



Scale: 5" / 100'
Measured Depth Log

Well Name Mahalo State AA09-72-1AHNB

Location SESE SEC4 T6N R63W

State CO

County WELD

Country USA

Rig Number PRECISION 828

API Number 05-123-39012

AFE # 200342

Region DENVER-JULESBURG BASIN

Field WATTENBERG

Spud Date 1/8/2015

Drilling Completed 1/16/2014

Surface Coordinates 325' FSL, 1253' FEL

Lat/Long: 40.50951/-104.43667

Bottom Hole Coordinates 30' FNL, 2510 FEL

Ground Elevation 4700'

K.B. Elevation 4716'

Logged Interval 7043' To 11883'

Total Depth 11883'

Formation Niobrara B

Type of Drilling Fluid FRESH WATER, LSND

Company NOBLE ENERGY INC.

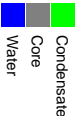
Address 1625 Broadway
Denver, CO 80202

Name JAMES TAYLOR
Company NOBLE ENERGY INC.

Address 1625 Broadway
Denver, CO 80202

WELLSITE GEOLOGISTS: GARY L. MYE
C.S. METZ
S.B. SWIRININ

LOG CONTINUED
GEOLOGICAL



Zone Correlation

erator

ologist

ther

RS

MILES

UES FROM FILE: Mahalo State AA09-72-1AHNB Vert.mplot
SERVICES PROVIDED BY COLUMBINE LOGGING, INC.

lor Coding



Rock Types

UNKNOWN	BRECCIA	GRANITE	SHALE
CHALK	CEMENT	GYPSUM	SHALE COLORET
MARLSTONE	CHERT	IGNEOUS	SHALE GRAY
SANDSTONE	CLAY CHOKE SAND	SIDERITE or LIMONITE	SILTSTONE
SHALY SANDSTONE	CLAYSTONE	LIMESTONE	TILL
SILTY SHALE	COAL	METAMORPHIC	TUFF
SHALY SILTSTONE	CONGLOMERATE	NO SAMPLE	WELDED TUFF
ANHYDRITE	DOLOMITE	SALT	
BENTONITE	DOLOMITIC LIMESTONE	SALT-PEPPER SAND	

Accessories

GASTROPOD	ARGILLITE GRAIN	HEAVY MINERAL	ANHYDRITE STRINGER
INOCERAMUS	BENTONITE	KAOLIN	BENTONITE STRINGER
ALGAE	OOOLITE	BITUMENOUS SUBSTANCE	COAL STRINGER
AMPHIPORA	OSTRACOD	BRECCIA FRAGMENTS	DOLOMITTE STRINGER
BELEMNITE	PELECYPOD	CALCAREOUS	GYPSUM STRINGER
BIOLASTIC	PELLET	CARBONACEOUS FLAKES	LIMESTONE STRINGER
BRACHIOPOD	PISOLITE	CHTDK	MARLSTONE (CALC) STRG
BRYOZOA	PLANT REMAINS	CHTLT	MARLSTONE (DOL) STRG
CERPHALOPOD	PLANT SPORES	COAL - THIN BEDS	SANDSTONE STRINGER
CORAL	SCAPHOPOD	DOLOMITIC	SHALE STRINGER
CRINOID	STROMATOPOROID	FELDSPAR	SILTSTONE STRINGER
ECHINOID		FERRUGINOUS PELLET	
FISH		FERRUGINOUS	TUFFACEOUS
FORAMINIFERA	ANHYDRITIC	GLAUCONITE	
FOSSIL	ARGILLACEOUS	GYPSIFEROUS	Stringer

Other Symbols

Oil Show

P PINPOINT	DST INTERVAL	WIRELINE TESTED - LEFT	E EARTHY
V VUGGY	FAULT	WIRELINE TESTED - RT	FX FINELYXLN

D DEAD	FORMATION TOP	DRILL STEM TEST	GS GRAINSTONE
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Engineering

EVEN	GAS SHOW	MINDEPTH MN DEPTH	L LITHOGRAPHIC
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QUESTIONABLE	BIT	OIL SHOW	MX MICROXLN
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SPOTTED STAINING	CONNECTION (UP)	MINDEPTH MN DEPTH UP	MS MUDSTONE
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Rounding

CONNECTION (DOWN)	MINDEPTH MN DEPTH (DOWN)	A ANGULAR	PS PACKSTONE
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Porosity

CONNECTION GAS	NORMAL FAULT	R ROUNDED	WS WACKESTONE
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E EARTHY	CONNECTION GAS (LEFT)	OVERTURNED STRATA	B SUBANG
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FENESTRAL	TRIP GAS	REVERSE FAULT	P SUBRND
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Sorting

F FRACTURE	TRIP GAS (LEFT)	CASING	M MODERATE
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Textures

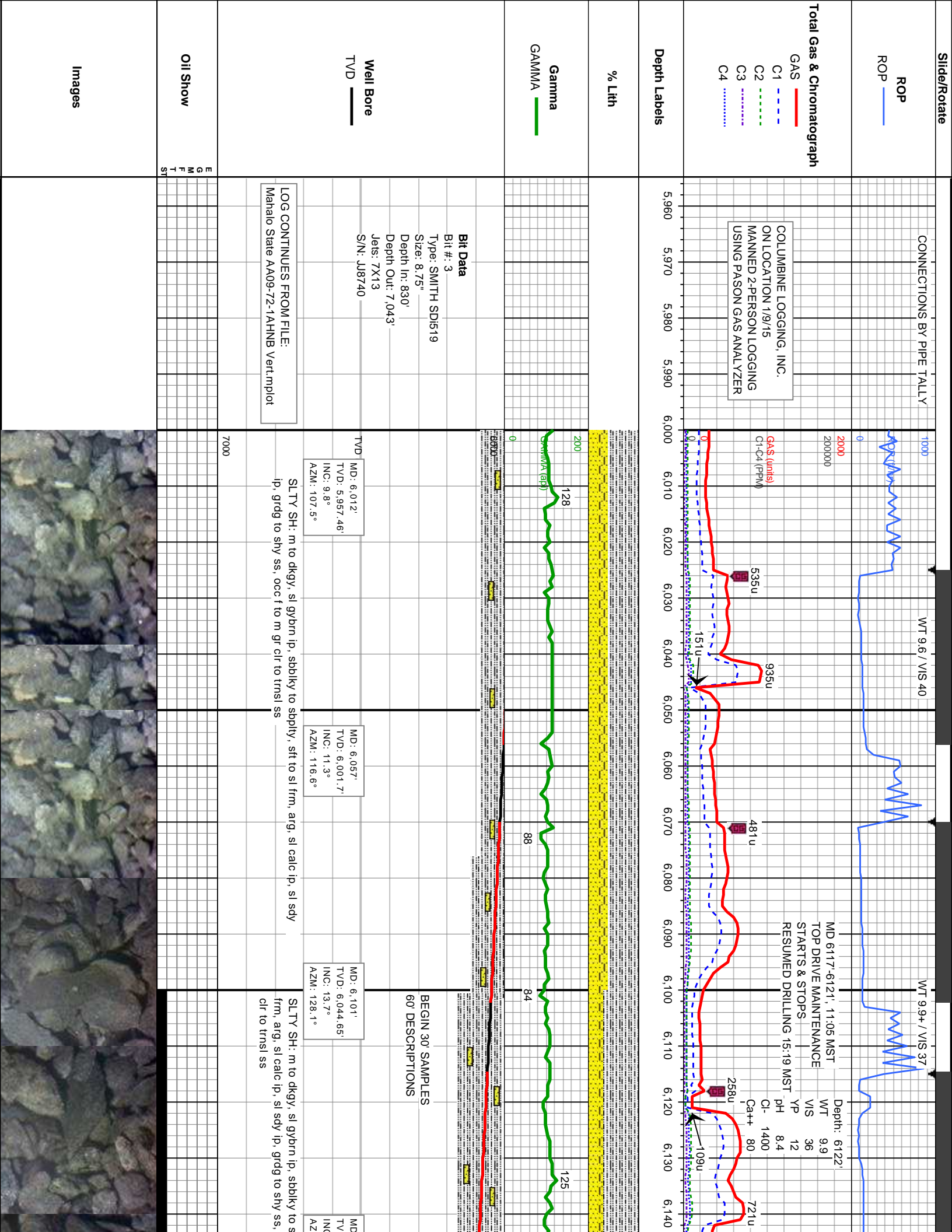
INTERCRYSTALLINE	DOWN TIME GAS	SIDEWALL CORE (LEFT)	P POOR
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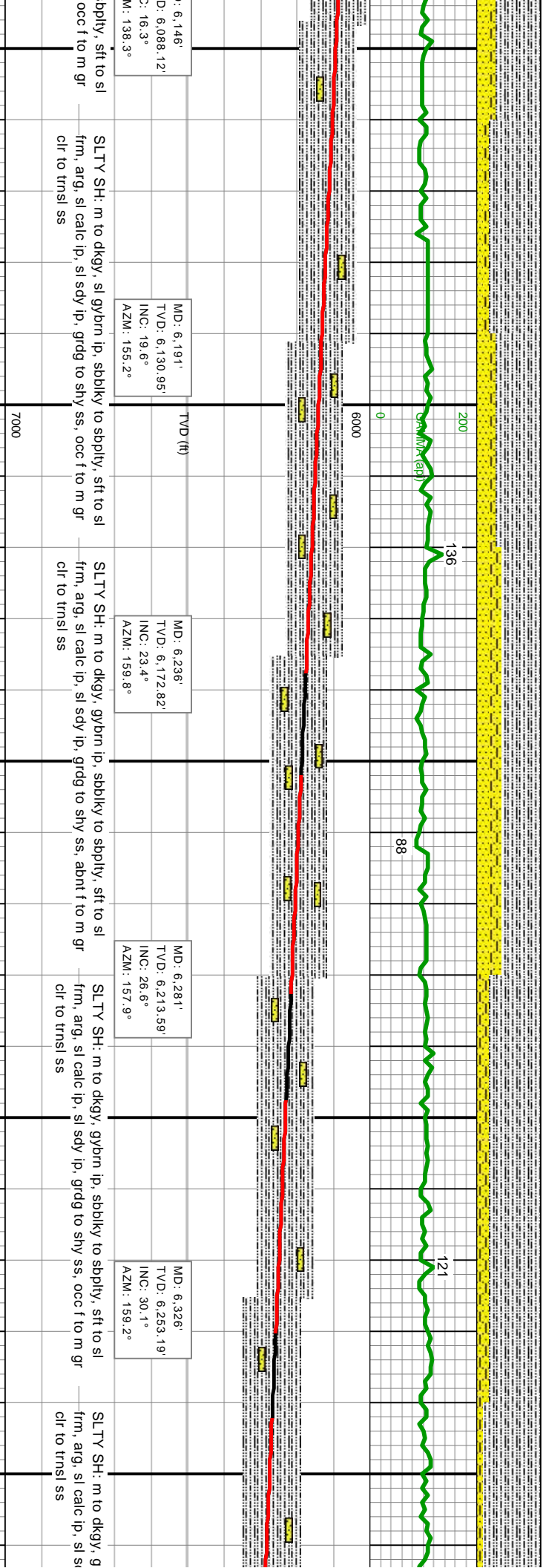
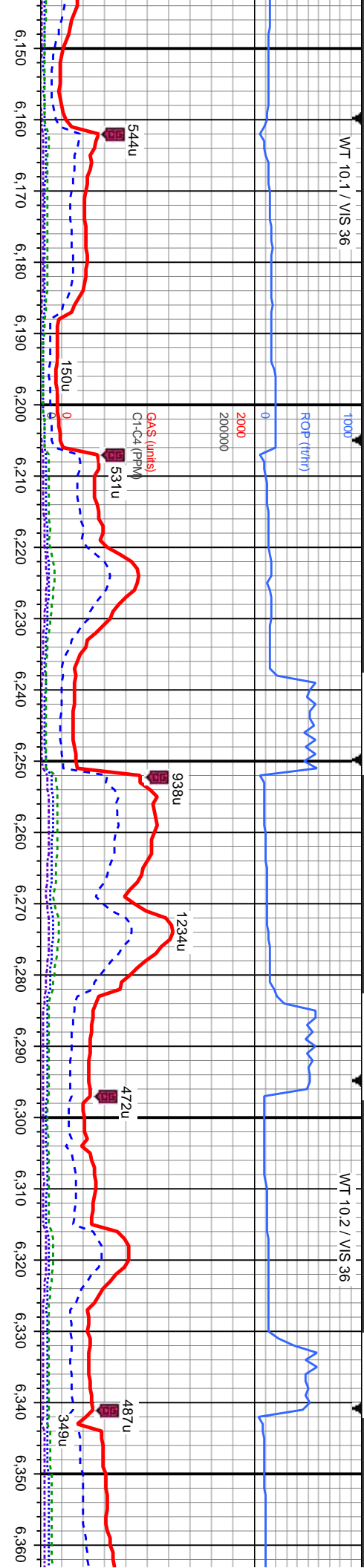
INTEROOLITIC	DOWN TIME GAS (LEFT)	SIDEWALL CORE (RIGHT)	BS BOUNDSTONE
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W WELL

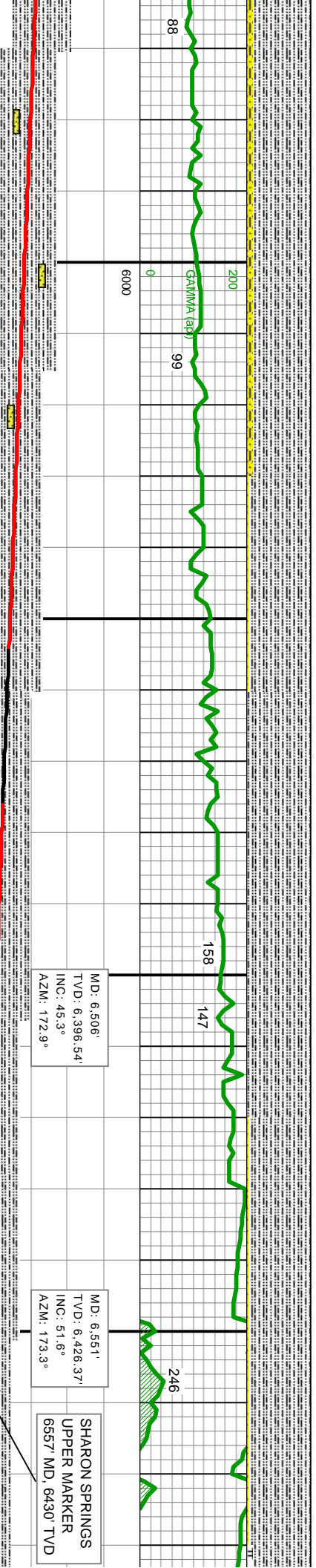
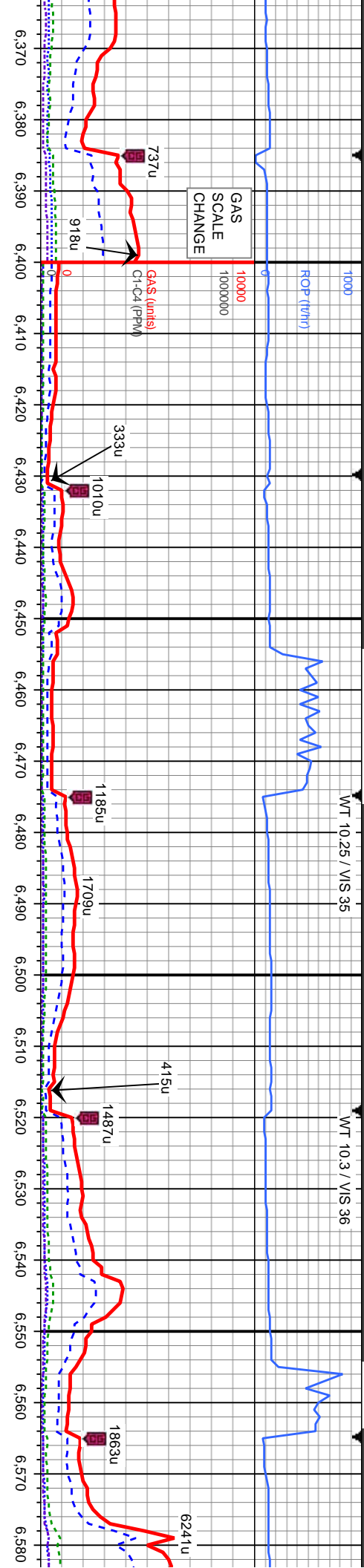
MOLDIC	CORE - LOST	SLIDE	C CHALKY
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ORGANIC	CORE - RECOVERED	SURVEY	CX CRYPTOXLN
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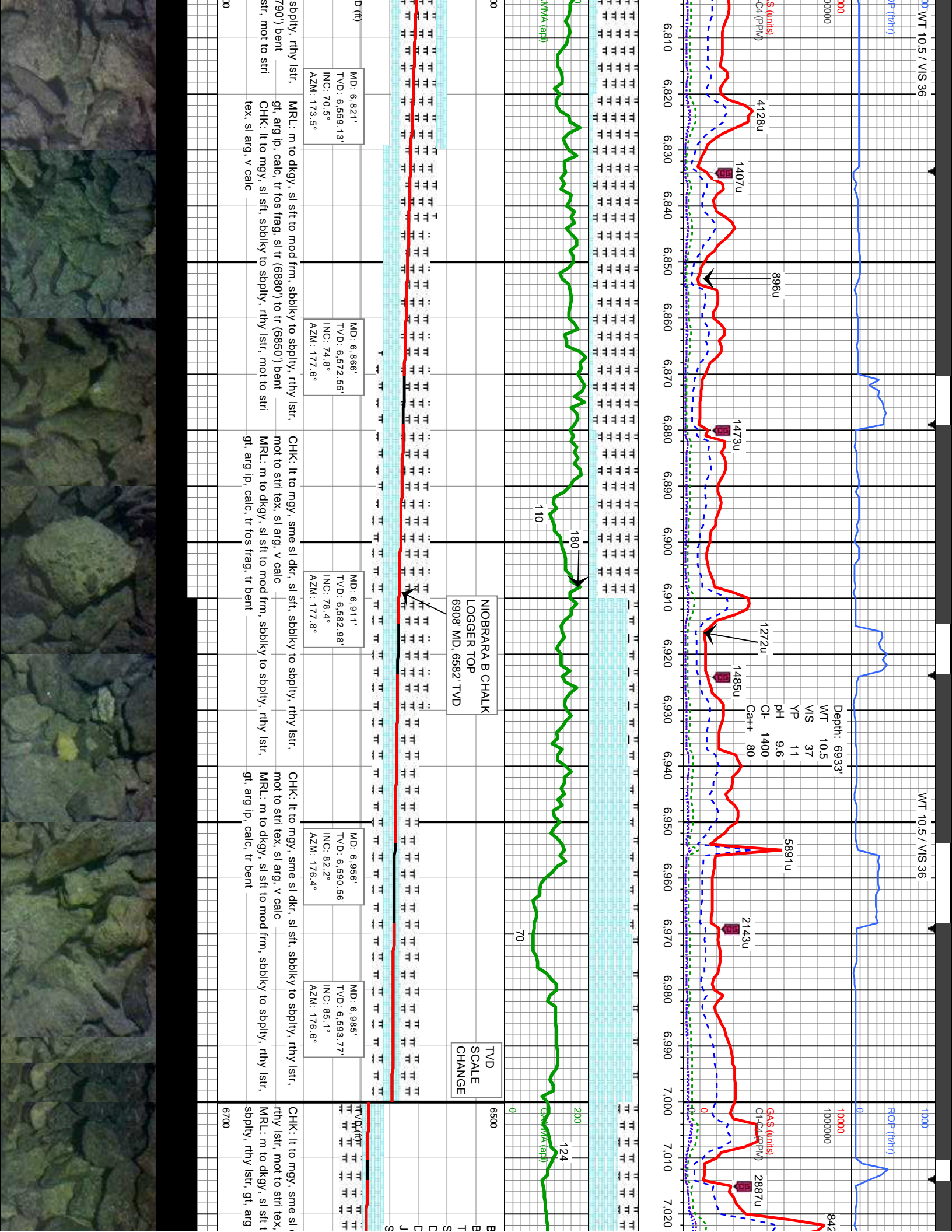


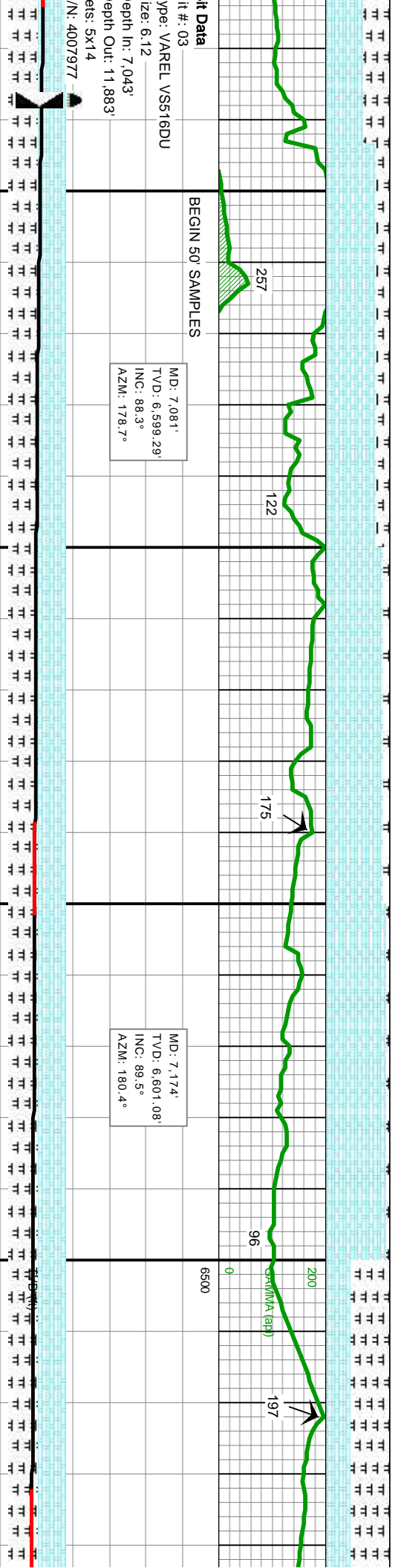
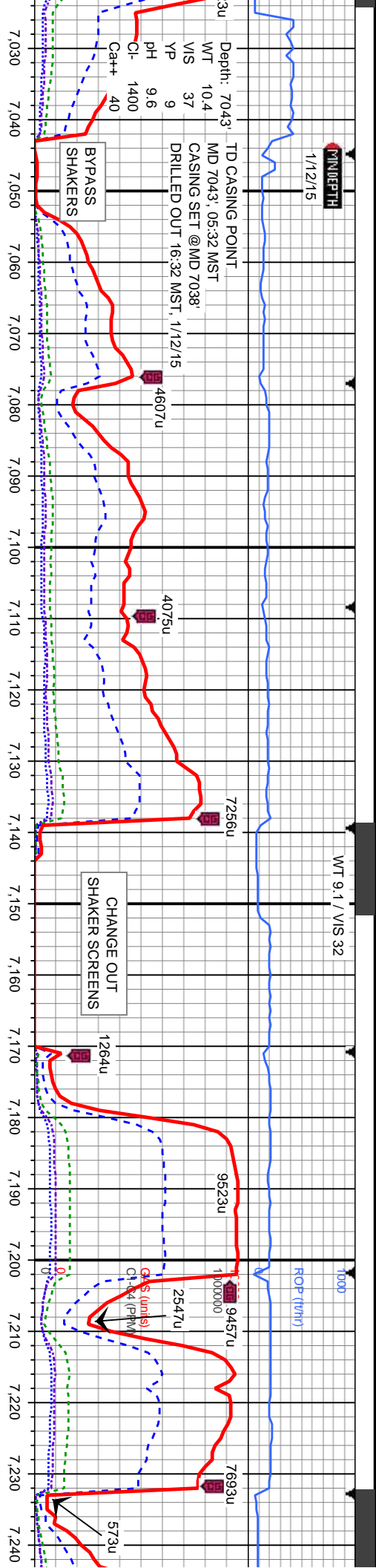
MD: 6.146' D: 6.088, 12° INC: 16.3° AZM: 138.3°	MD: 6.191' TVD: 6.130, 95° INC: 19.6° AZM: 155.2°	MD: 6.236' TVD: 6.172, 82° INC: 23.4° AZM: 159.8°	MD: 6.281' TVD: 6.213, 59° INC: 26.6° AZM: 157.9°	MD: 6.326' TVD: 6.253, 19° INC: 30.1° AZM: 159.2°
SLTY SH: m to dkgy, sl gybrn ip, sbblky to spbly, sft to sl frm, arg, sl calc ip, sl sdy ip, grdg to shy ss, occ f to m gr cfr to trnsl ss	SLTY SH: m to dkgy, sl gybrn ip, sbblky to spbly, sft to sl frm, arg, sl calc ip, sl sdy ip, grdg to shy ss, occ f to m gr cfr to trnsl ss	SLTY SH: m to dkgy, gybrn ip, sbblky to spbly, sft to sl frm, arg, sl calc ip, sl sdy ip, grdg to shy ss, abnt f to m gr cfr to trnsl ss	SLTY SH: m to dkgy, gybrn ip, sbblky to spbly, sft to sl frm, arg, sl calc ip, sl sdy ip, grdg to shy ss, occ f to m gr cfr to trnsl ss	SLTY SH: m to dkgy, gybrn ip, sbblky to spbly, sft to sl frm, arg, sl calc ip, sl sdy ip, grdg to shy ss, occ f to m gr cfr to trnsl ss
7000				



MD: 6.371' TVD: 6.291.5' INC: 33.2° AZM: 164.5°	SLTY SH: m to dkgy, gybrn ip, sbblky to sbply, sft to sl frm, arg, grdg to shy ss, occ f to m gr
MD: 6.416' TVD: 6.328.48' INC: 36.3° AZM: 169.6°	SLTY SH: m to dkgy, gybrn ip, sbblky to sbply, sme ply, sft to sl frm, arg, grdg to shy ss
MD: 6.461' TVD: 6.363.67' INC: 40.8° AZM: 172°	SLTY SH: m to dkgy, gybrn ip, sbblky to sbply, sme ply, sft to sl frm, arg, grdg to shy ss, sl tr(6490')to tr(6520')bent
MD: 6.506' TVD: 6.396.54' INC: 45.3° AZM: 172.9°	SLTY SH: m to dkgy, gybrn ip, sbblky to sbply, sme ply, sft to sl frm, arg, tr ss, abnt bent
MD: 6.551' TVD: 6.426.37' INC: 51.6° AZM: 173.3°	SLTY SH: m to dkgy, gybrn ip, sbblky to sbply, sme ply, sft to sl frm, arg, tr ss, abnt bent

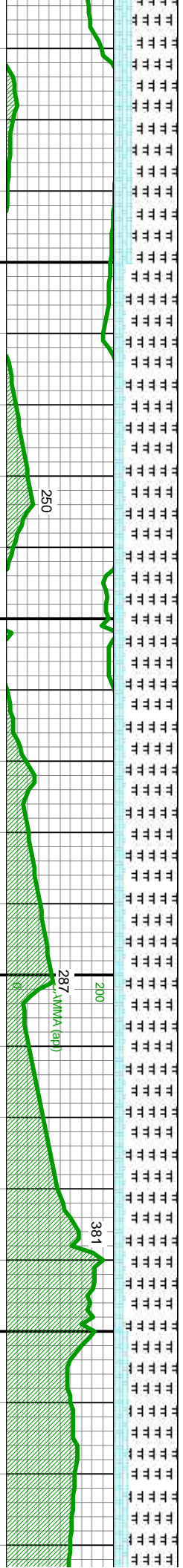
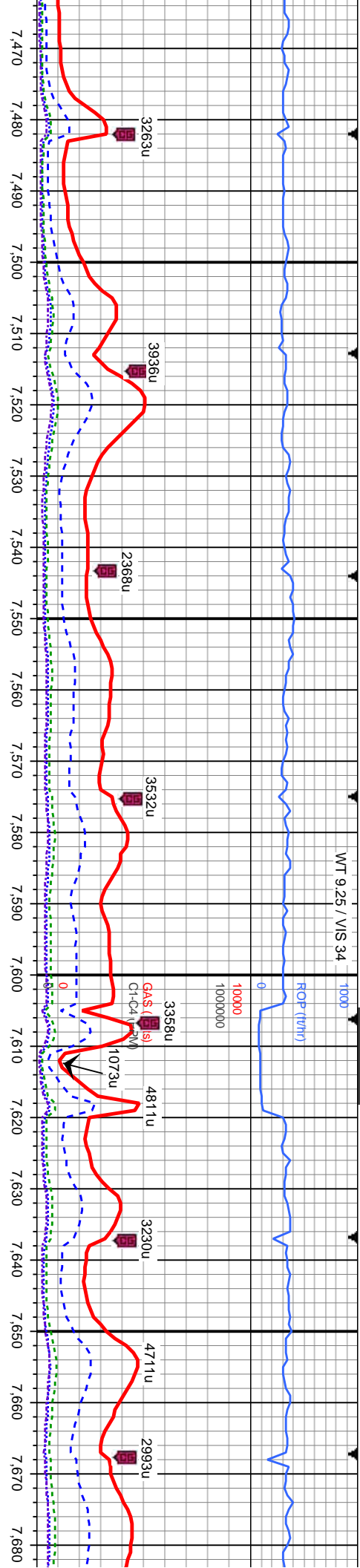






dkr, si sft, sbbkly to sbply, si arg, v calc	CHK: It to mgy, sme si dkr, si sft, sbbkly to sbply, rthy lstr, mot to stri tex, tr fos frag, v calc, occ bent, abnt mrl
o mod frm, sbbkly to p, calc, scat bent	CHK: It to mgy, sme si dkr, si sft, sbbkly to sbply, rthy lstr, mot to stri tex, tr fos frag, v calc, occ mrl
	MRL: m to dkgv, si sft to mod frm, sbbkly to sbply, rthy lstr, gt, arg ip, calc, tr fos frag CHK: It to mgy, sme si dkr, si sft, sbbkly to rthy lstr, mot tex, v calc





MD: 7.548°
TVD: 6,603.29'
INC: 88.6°
AZM: 179.3°

MD: 7.640°
TVD: 6,604.57'
INC: 89.8°
AZM: 180.3°

FAULTING

B CHALK

B MARL

A MARL

gy, sl sft to mod frm, sbbkly to
— tr, gt, arg ip, calc, occ cal incl, abnt
ant

MRU: m to dkgy, sl to mod frm, sbbkly to spbly,
— rthy lstr, gt, arg ip, calc, occ cal incl, abnt fos
frag, scat bent

CHK: lt to mgy, gybrn ip, sl sft, sbbkly to spbly,
— rthy lstr, mot tex, sl arg, v calc

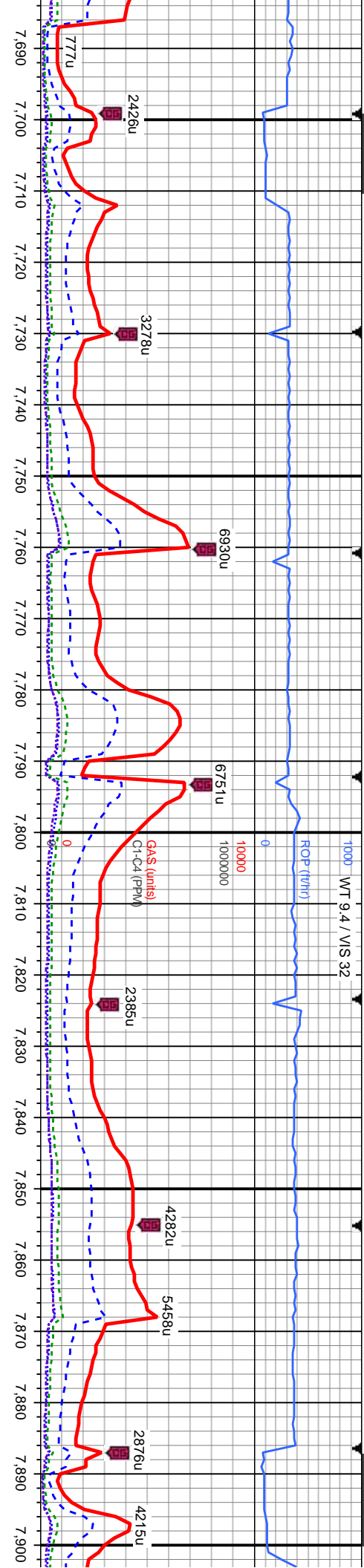
MRU: m to dkgy, mod frm, sbbkly to spbly, rthy
lstr, gt, arg ip, calc, occ cal incl, scat fos frag,
— abnt bent, sl tr ss

CHK: lt to mgy, gybrn ip, sl sft, sbbkly to spbly,
— rthy lstr, mot tex, sl arg, tr cal incl, v calc

MRU: m to dkgy, mod frm, sbbkly
lstr, gt, arg ip, calc, occ cal incl, scat bent

CHK: lt to mgy, gybrn ip, sl sft, sb
rthy lstr, mot tex, sl arg, v calc





MD: 7.734'
TVD: 6,604'
INC: 90.9°
AZM: 181.1°

MD: 7.828'
TVD: 6,602.19'
INC: 91.3°
AZM: 179.3°

to sbply, rthy
cat fos frag,
bly to sbply,

MRU: m to dkg, mod frm, sbply to sbply, rthy
lstr, gt, arg lp, calc, occ cal incl, scat fos frag,
occ bent, occ chk

MRU: m to dkg, mod frm, sbply to sbply, rthy
lstr, gt, arg lp, calc, tr cal incl, tr fos frag, tr bent,
tr chk

MRU: m to dkg, mod frm, sbply to sbply, rthy
lstr, gt, arg lp, calc, tr bent, tr chk

MRU: m to dkg, mod frm, sbply to sbply, rthy
lstr, gt, arg lp, calc, tr bent, tr chk

6700

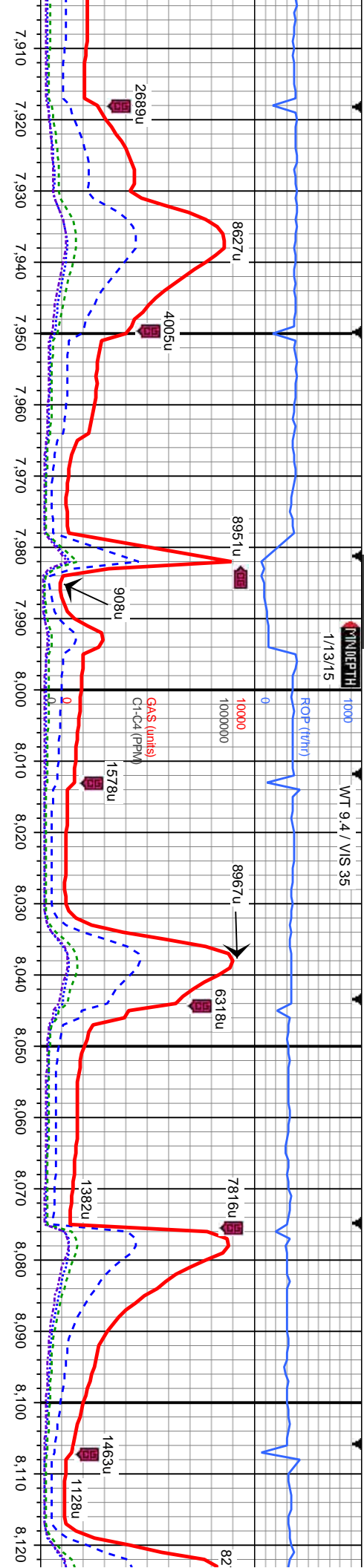
6500

GA\$ (units)
C1-C4 (PPM)

336

434

302



MD: 7.923'
TVD: 6,600.62'
INC: 90.6°
AZM: 181.3°

MD: 8.016'
TVD: 6,600.86'
INC: 89.1°
AZM: 181.6°

MD: 8.111'
TVD: 6,602.6'
INC: 88.8°
AZM: 180.2°

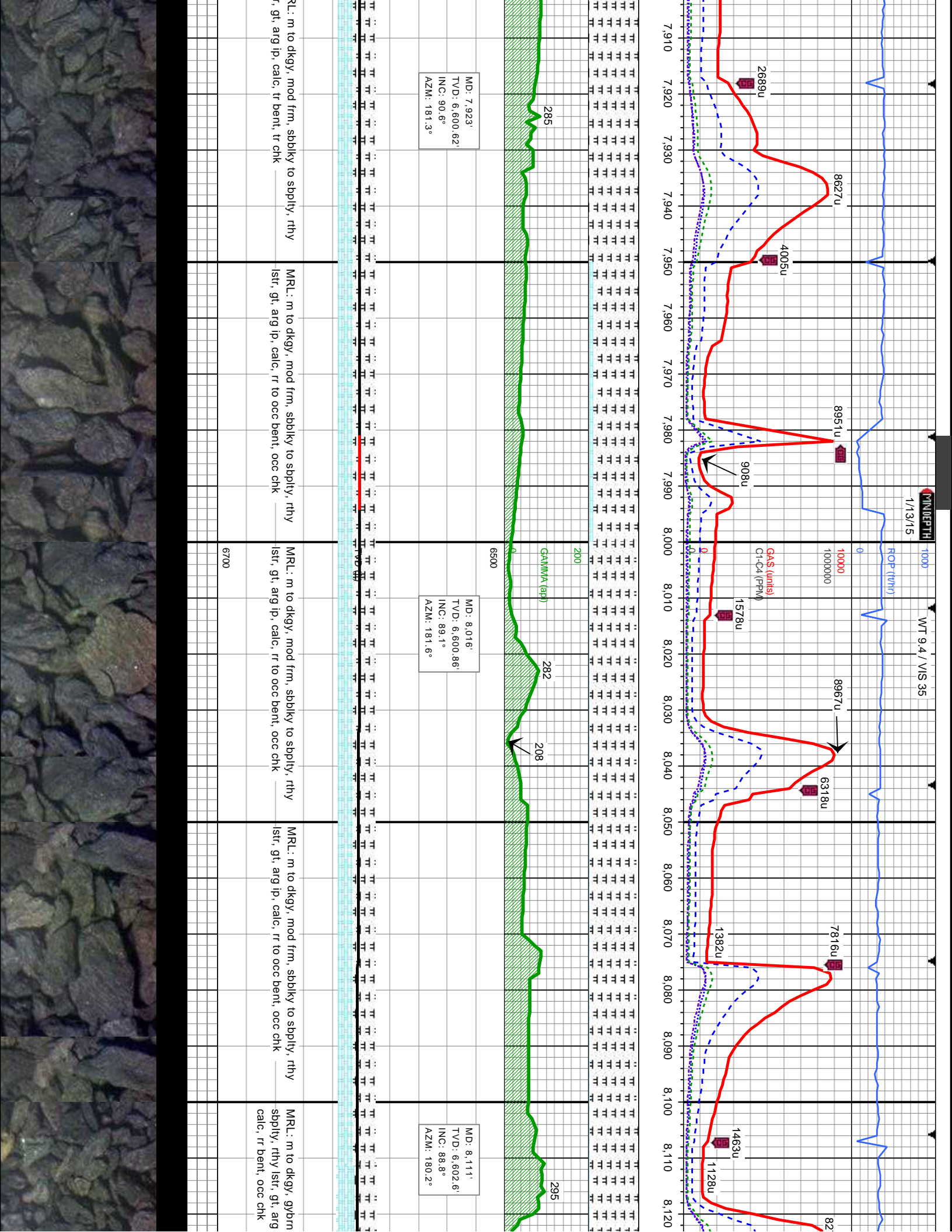
MRU: m to dkgy, mod frm, sbblky to spbly, rthy
lstr, gt, arg ip, calc, rr to occ bent, occ chk

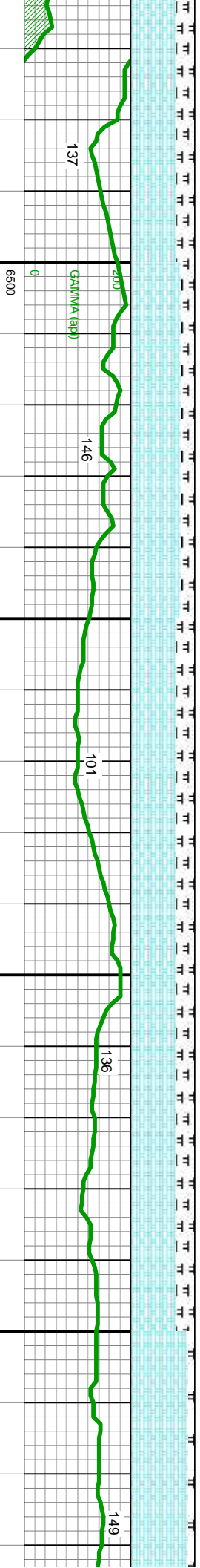
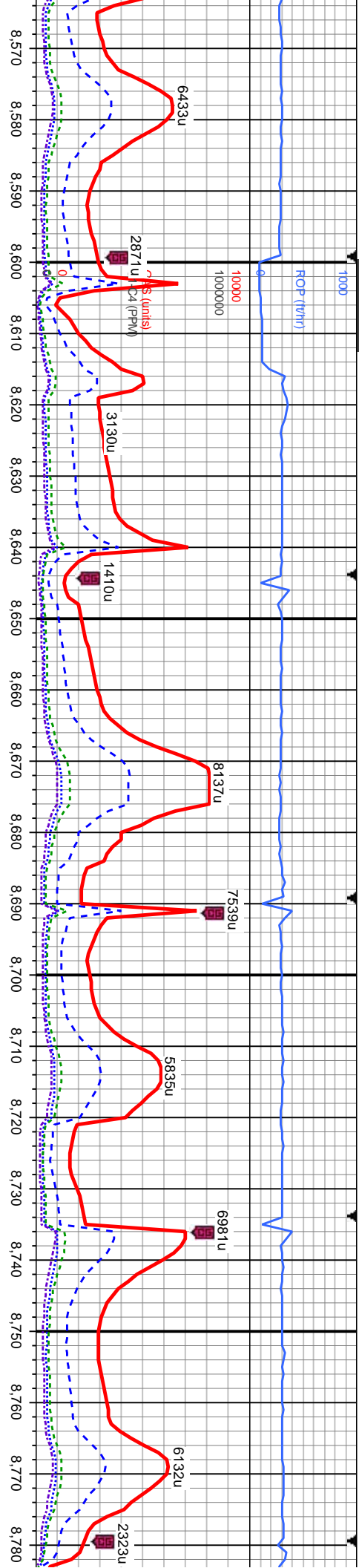
MRU: m to dkgy, mod frm, sbblky to spbly, rthy
lstr, gt, arg ip, calc, rr to occ bent, occ chk

MRU: m to dkgy, mod frm, sbblky to spbly, rthy
lstr, gt, arg ip, calc, rr to occ bent, occ chk

MRU: m to dkgy, mod frm, sbblky to spbly, rthy
lstr, gt, arg ip, calc, rr to occ bent, occ chk

6700



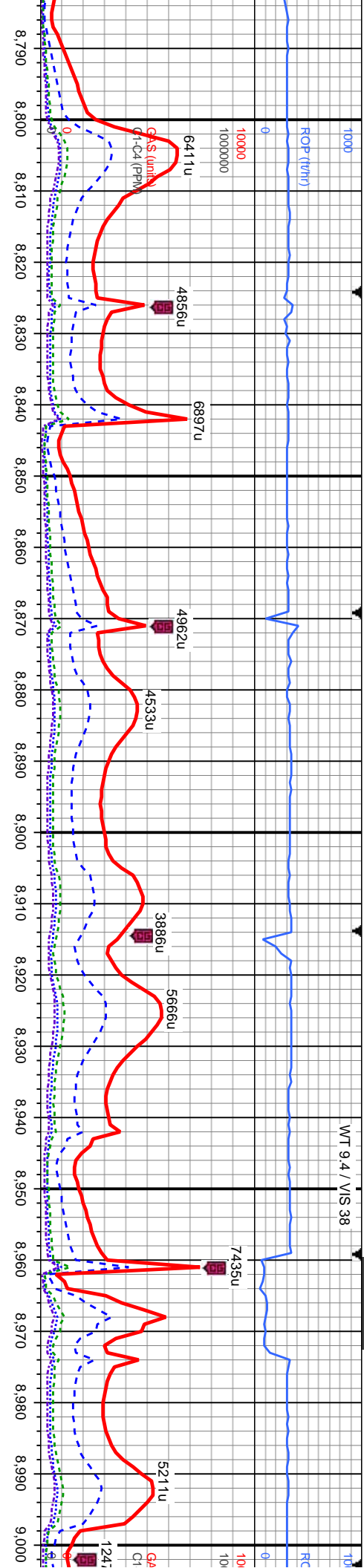


MD: 8.631'
TVD: 6,604.05'
INC: 90.1°
AZM: 181.3°

MD: 8.721'
TVD: 6,603.5'
INC: 90.6°
AZM: 181.4°

gybn ip, sl sft, sbblky to spbly, rthy lstr, mot to stri tex, sl arg, v calc	CHK: It to mgy, gybn ip, sl sft, sbblky to spbly, rthy lstr, mot to stri tex, sl arg, v calc	CHK: It to mgy, gybn ip, sl sft, sbblky to spbly, rthy lstr, mot to stri tex, sl arg, v calc	CHK: It to mgy, gybn ip, sl sft, sbblky to spbly, rthy lstr, mot to stri tex, sl arg, v calc	CHK: It to mgy, gybn ip, sl sft, sbblky to spbly, rthy lstr, mot to stri tex, sl arg, v calc
gy, mod frm, sbblky to spbly, rthy calc, tr cal incl, occ fos frag, rr bent	MR.L: m to dkgy, mod frm, sbblky to spbly, rthy lstr, gt, arg ip, calc, tr cal incl, occ fos frag, rr bent	MR.L: m to dkgy, mod frm, sbblky to spbly, rthy lstr, gt, arg ip, calc, tr cal incl, occ fos frag, rr bent	MR.L: m to dkgy, mod frm, sbblky to spbly, rthy lstr, gt, arg ip, calc, tr cal incl, occ fos frag, rr bent	MR.L: m to dkgy, mod frm, sbblky to spbly, rthy lstr, gt, arg ip, calc, tr cal incl, occ fos frag, rr bent





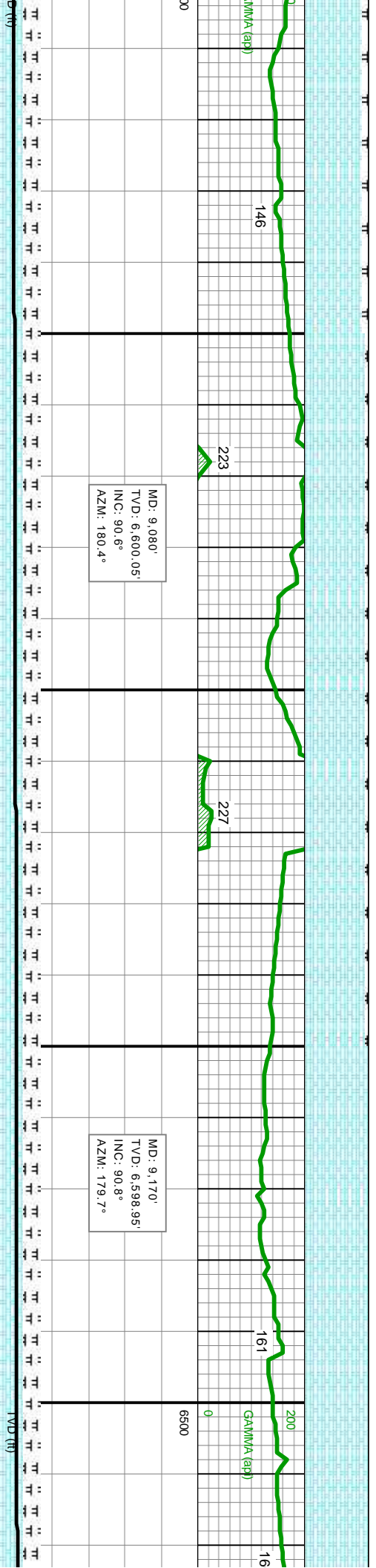
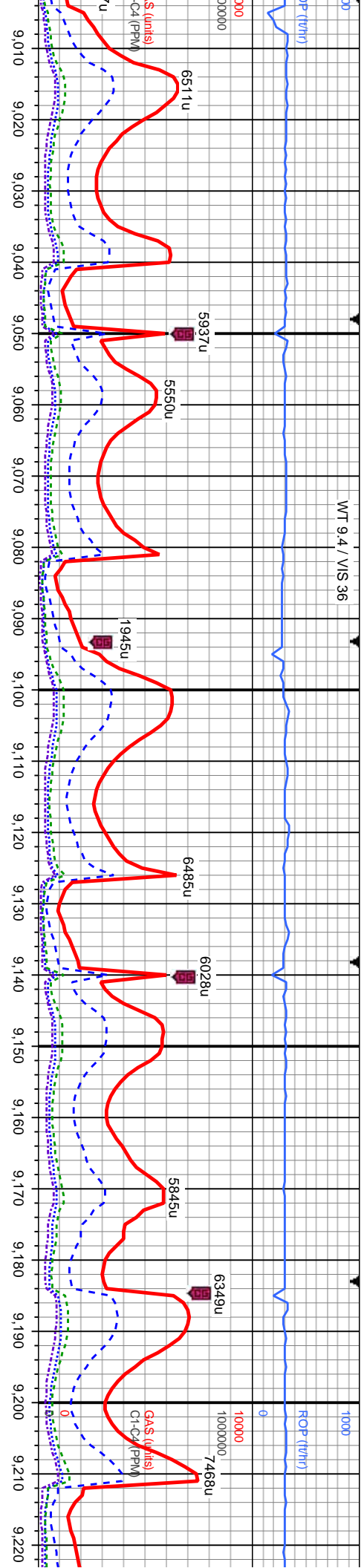
MD: 8,811'
TVD: 6,602.63'
INC: 90.5°
AZM: 180.4°

MD: 8,900'
TVD: 6,601.86'
INC: 90.5°
AZM: 179.6°

MD: 8,990'
TVD: 6,600.99'
INC: 90.6°
AZM: 181°

CHK: It to mgy, gybrn ip, sl sft, sbblky to sbply, rthy lstr, mot to stri tex, sl arg, v calc	CHK: It to mgy, gybrn ip, sl sft, sbblky to sbply, rthy lstr, mot to stri tex, sl arg, v calc	CHK: It to mgy, gybrn ip, sl sft, sbblky to sbply, rthy lstr, mot to stri tex, sl arg, v calc	CHK: It to mgy, gybrn ip, sl sft, sbblky to sbply, rthy lstr, mot to stri tex, sl arg, v calc
MR.L: m to dkgy, mod frm, sbblky to sbply, rthy lstr, gt, arg ip, calc, tr cal incl, occ fos frag, tr bent	MR.L: m to dkgy, mod frm, sbblky to sbply, rthy lstr, gt, arg ip, calc, tr cal incl, occ fos frag, tr bent	MR.L: m to dkgy, mod frm, sbblky to sbply, rthy lstr, gt, arg ip, calc, tr cal incl, occ fos frag, tr bent	MR.L: m to dkgy, mod frm, sbblky to sbply, rthy lstr, gt, arg ip, calc, tr cal incl, occ fos frag, tr bent





HLK: lt to mgy, gybnn ip, sl sft, sbblky to sbply,
y/ylst, mot to str tex, sl arg, v calc
RL: m to dkgy, mod frm, sbblky to sbply, rthy
r, gt, arg ip, calc, tr cal incl, occ fos frag, occ
nt

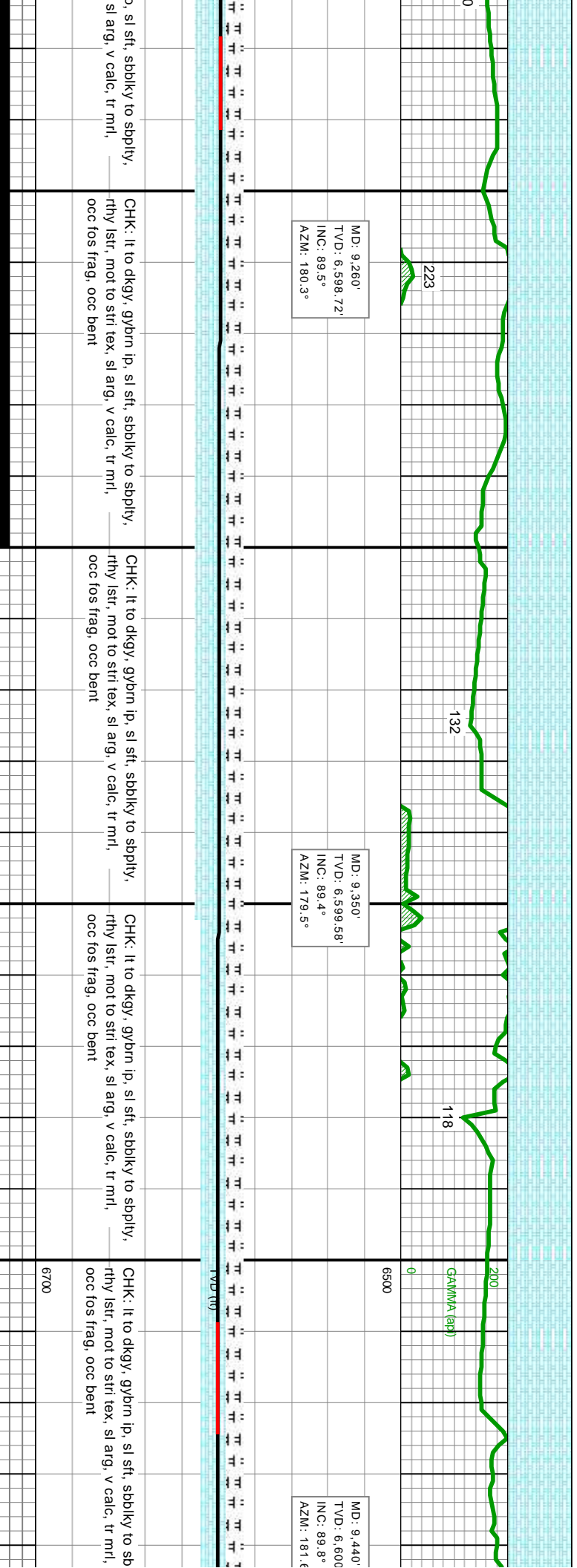
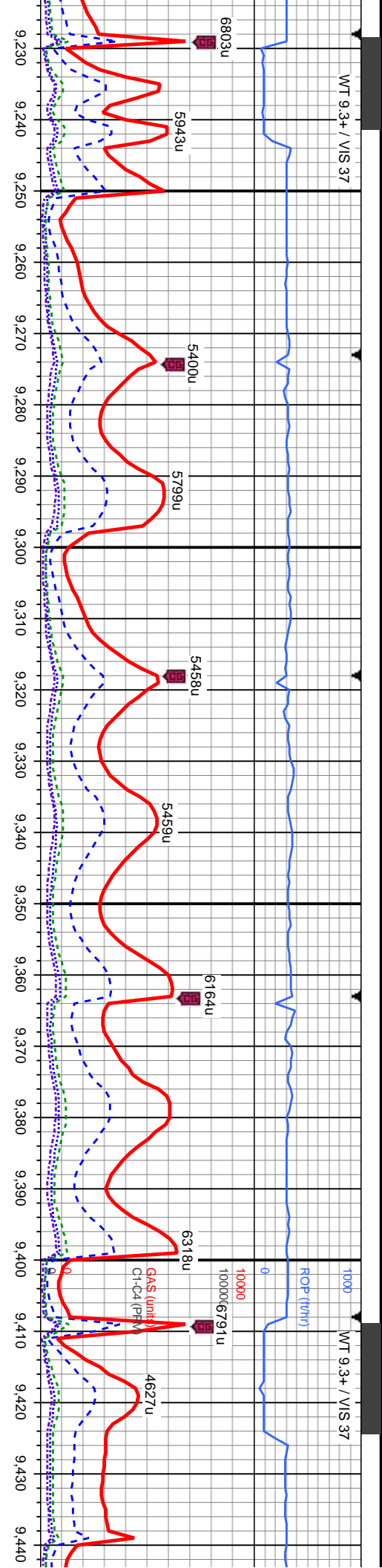
CHK: It to mgy, gybm ip, sl sft, sbblky to sbply,
rthy lstr, mot to str tex, sl arg, v calc
MRL: m to dkyg, mod frm, sbblky to sbply, rthy
lstr, gft, arg ip, calc, tr cal incl, occ fos frag, occ
bent

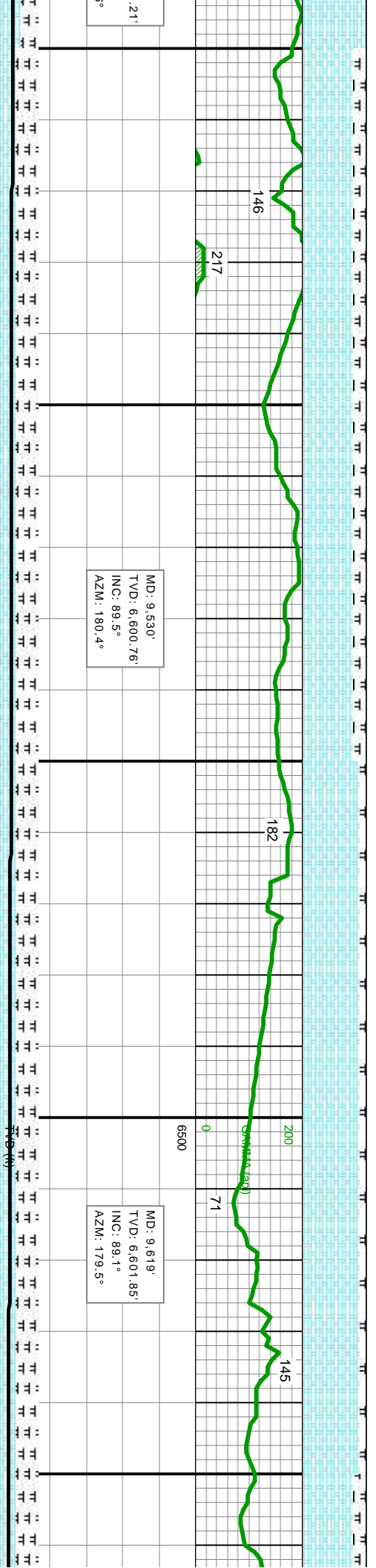
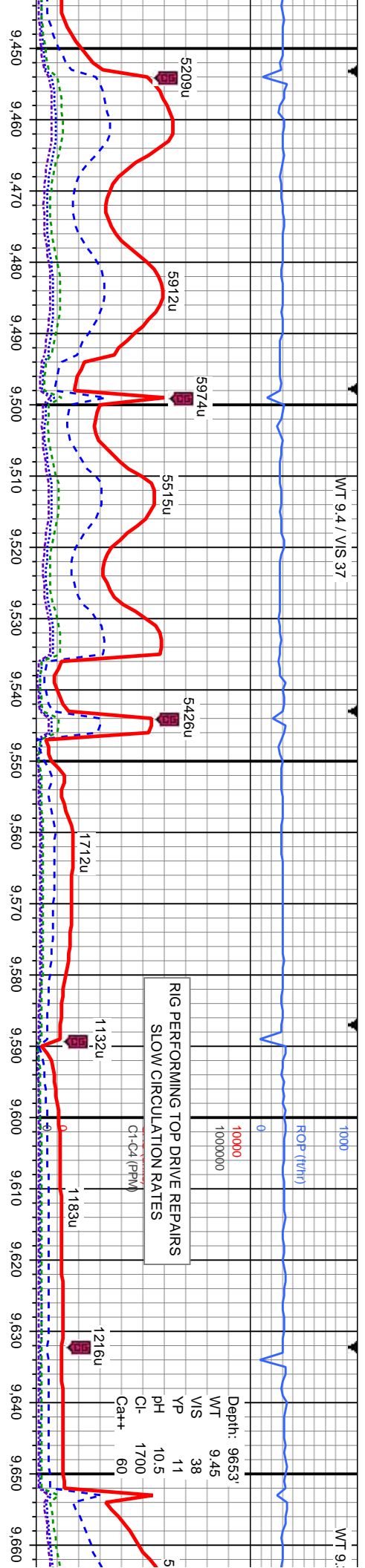
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rthy lstr, mot to str ltx, sl arg, v calc
MRL: m to dkyg, mod frm, sbblky to spbply, rthy
lstr, gt, arg ip, calc, tr cal incl, occ fos frag, occ
bent

CHK: It to mgy, gybhn ip, sl sft, sbbkly to sbply
rthy lstr, mot to str tex, sl arg, v calc, tr mrl,
occ fos frag. occ bent

CHK: It to mgy, gybrn il rthy lstr, mot to stri tex, occ fos frag, occ bent	62700
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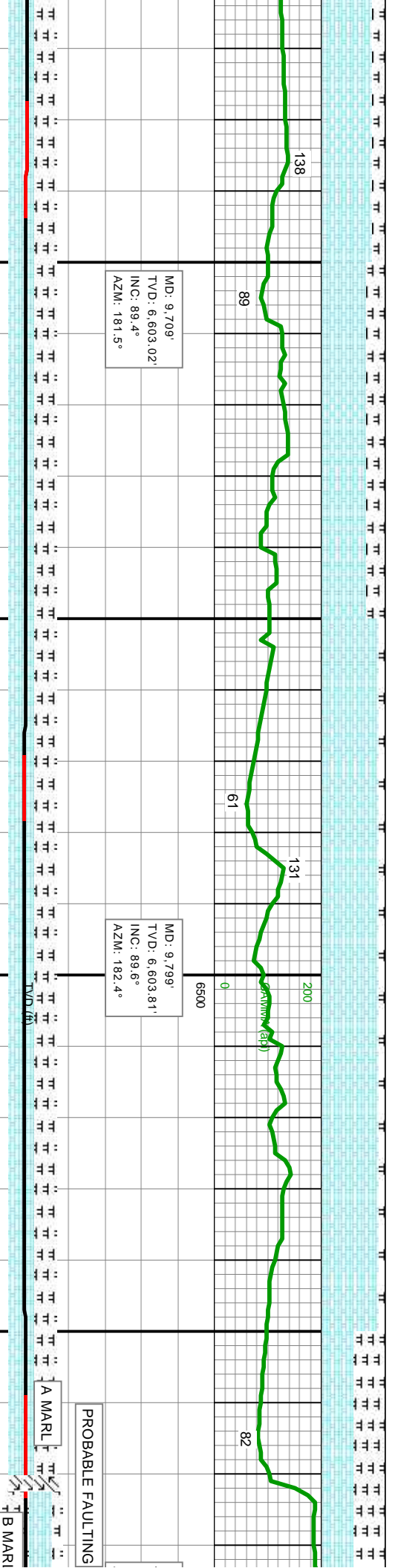






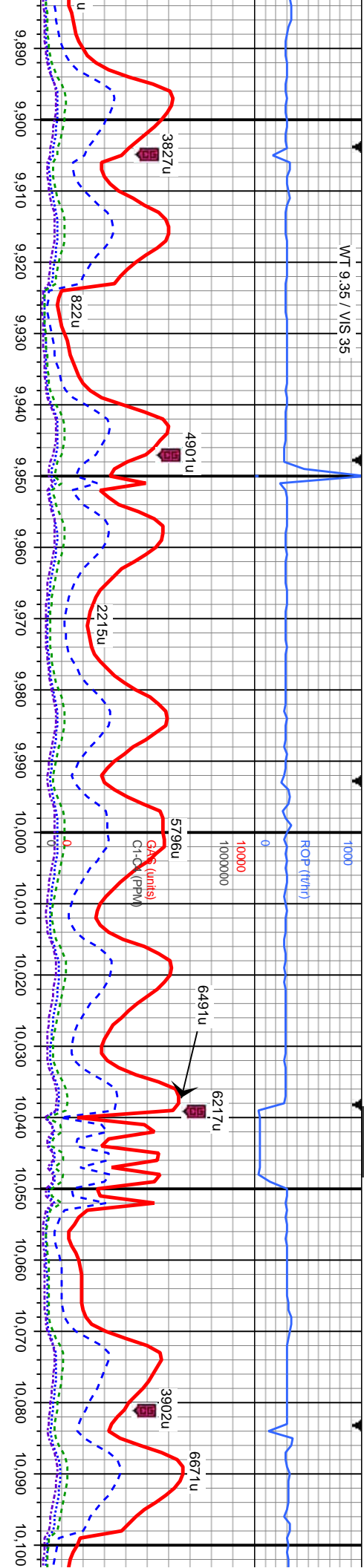
CHK: It to dkgy, gybrn ip, sl sft, sbblky to sbply, rthy lstr, mot to str l ex, sl arg, v calc, MR.L: m to dkgy, mod frm, sbblky to sbply, rthy lstr, gt, arg ip, calc, occ cal incl, tr fos frag, tr bent	CHK: It to dkgy, gybrn ip, sl sft, sbblky to sbply, rthy lstr, mot to str l ex, sl arg, v calc, MR.L: m to dkgy, mod frm, sbblky to sbply, rthy lstr, gt, arg ip, calc, occ cal incl, tr fos frag, tr bent	CHK: It to dkgy, gybrn ip, sl sft, sbblky to sbply, rthy lstr, mot to str l ex, sl arg, v calc, MR.L: m to dkgy, mod frm, sbblky to sbply, rthy lstr, gt, arg ip, calc, occ cal incl, tr fos frag, tr bent	CHK: It to dkgy, gybrn ip, sl sft, sbblky to sbply, rthy lstr, mot to str l ex, sl arg, v calc, MR.L: m to dkgy, mod frm, sbblky to sbply, rthy lstr, gt, arg ip, calc, occ cal incl, tr fos frag, tr bent
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MRL: m to dkyg, mod frm, sbbiky
lstr, gt, arg ip, calc, occ cal incl, o
bent

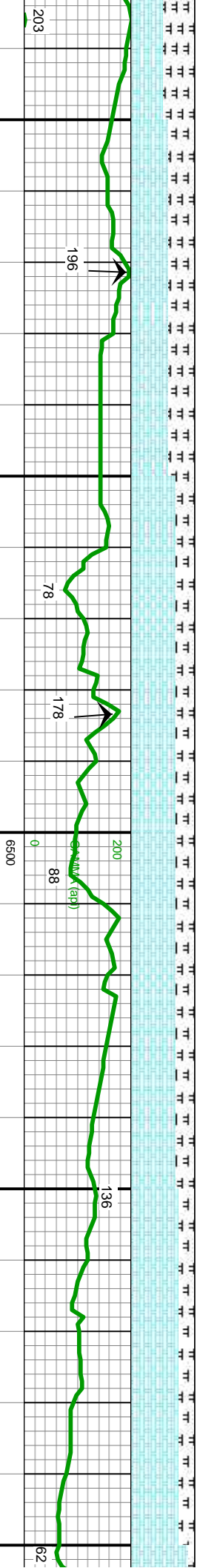




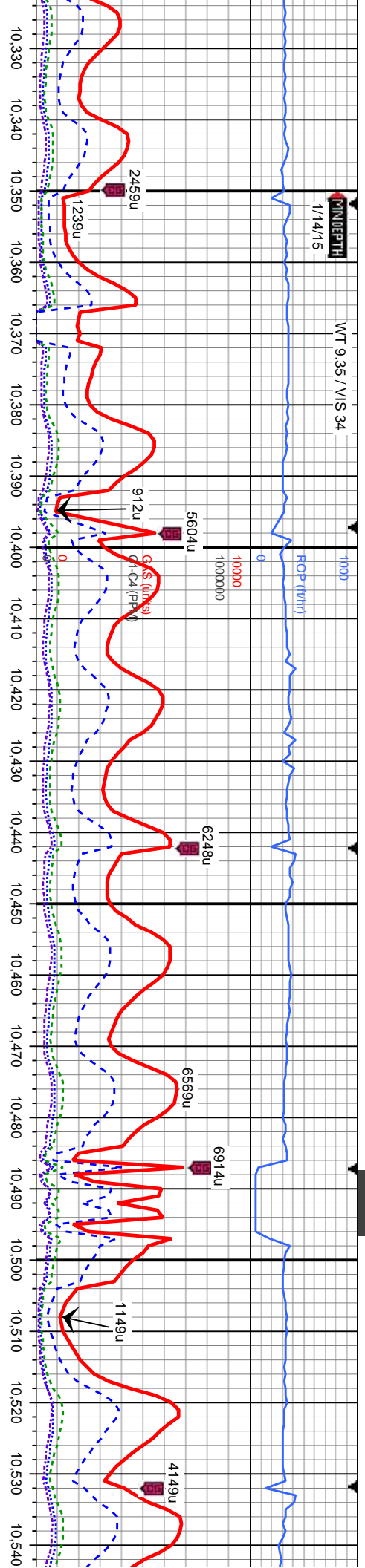
MD: 9.889'
TVD: 6,603.26'
INC: 91.1°
AZM: 181.9°

MD: 9.979'
TVD: 6,602.39'
INC: 90°
AZM: 181°

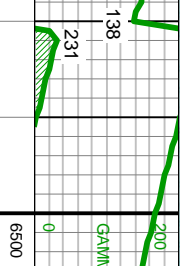
MD: 10.069'
TVD: 6,601.92'
INC: 90.6°
AZM: 182.1°



to sbply, rthy occ fos frag, tr	CHK: It to dkgy, sme gybrn, sl sft, sbblky to sbply, rthy lstr, mot to stri tex, sl arg, v calc MRL: m to dkgy, mod frm, sbblky to sbply, rthy lstr, gt, arg ip, calc, occ cal incl, tr fos frag, sl tr bent	CHK: It to dkgy, sme gybrn, sl sft, sbblky to sbply, rthy lstr, mot to stri tex, sl arg, v calc MRL: m to dkgy, mod frm, sbblky to sbply, rthy lstr, gt, arg ip, calc, occ cal incl, tr fos frag, sl tr bent	CHK: It to dkgy, sme gybrn, sl sft, sbblky to sbply, rthy lstr, mot to stri tex, sl arg, v calc MRL: m to dkgy, mod frm, sbblky to sbply, rthy lstr, gt, arg ip, calc, occ cal incl, tr fos frag, tr bent	CHK: It to dkgy, sme gybrn, sl sft, sbblky to sbply, rthy lstr, mot to stri tex, sl arg, v calc MRL: m to dkgy, mod frm, sbblky to sbply, rthy lstr, gt, arg ip, calc, occ cal incl, occ fos frag, tr bent
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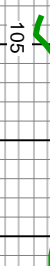
MD: 10.339'
TVD: 6,598.78'
INC: 90°
AZM: 182.3°



MD: 10.428'
TVD: 6,598.78'
INC: 90°
AZM: 181.6°

NO GAMMA DATA

MD: 10.518'
TVD: 6,599.25'
INC: 89.4°
AZM: 179.9°



mod frm, sbblky to
ip, calc, occ cal incl, abnt

MRU: m to dkgy, gybrn ip, mod frm, sbblky to
sbply, rthy lstr, gt, arg ip, calc, occ cal incl, abnt
fos frag, occ bent

CHK: It to dkgy, sme gybrn, sl sft, sbblky to
sbply, rthy lstr, mot to stri tex, sl arg, v calc

mod frm, sbblky to
ip, calc, occ cal incl, abnt

MRU: m to dkgy, gybrn ip, mod frm, sbblky to
sbply, rthy lstr, gt, arg ip, calc, occ cal incl, abnt
fos frag, occ bent

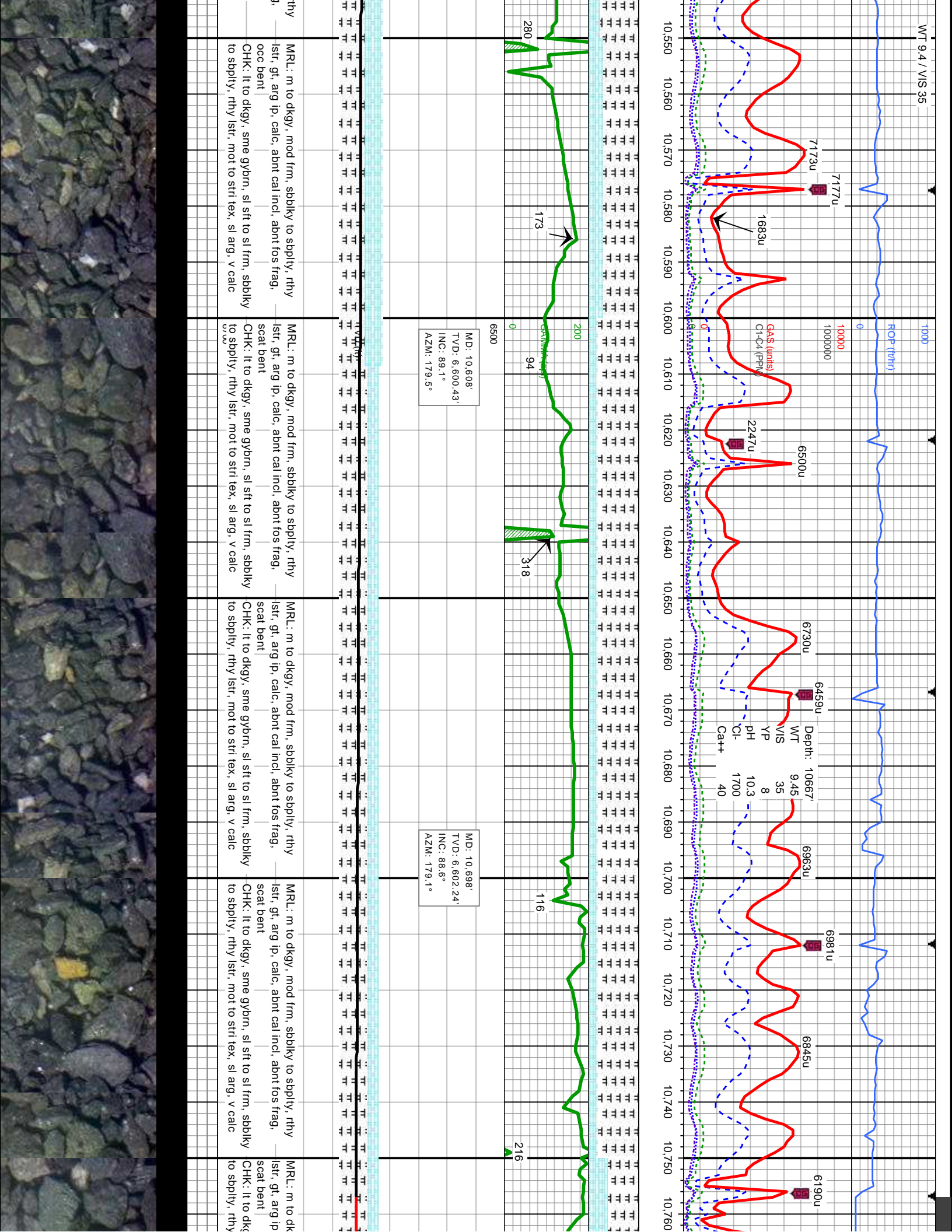
CHK: It to dkgy, sme gybrn, sl sft, sbblky to
sbply, rthy lstr, mot to stri tex, sl arg, v calc

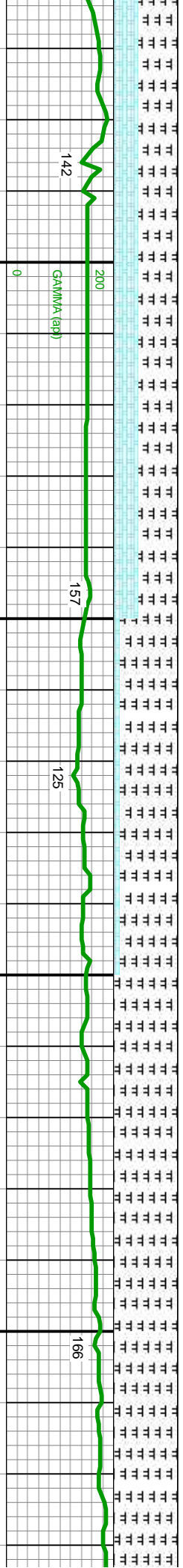
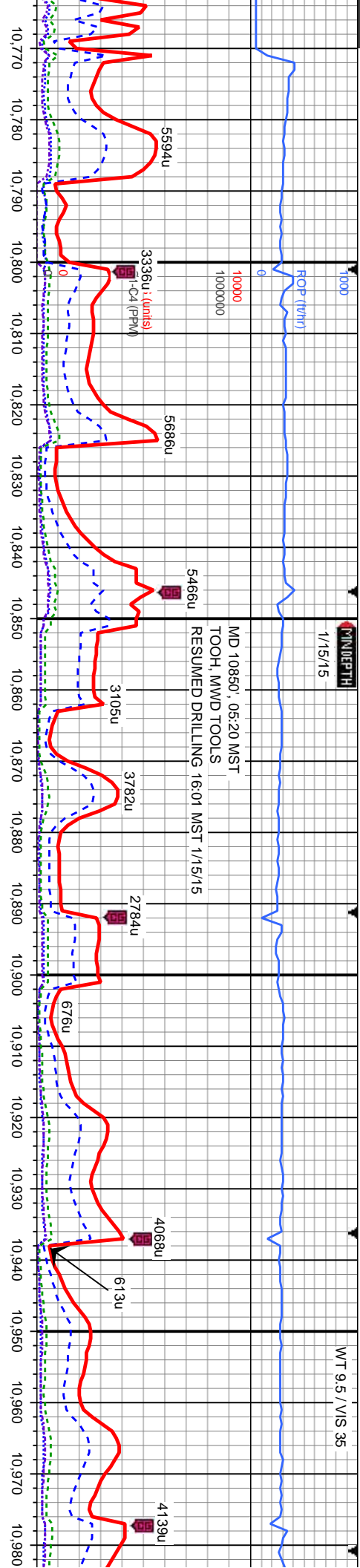
mod frm, sbblky to
ip, calc, occ cal incl, abnt

MRU: m to dkgy, gybrn ip, mod frm, sbblky to
sbply, rthy lstr, gt, arg ip, calc, occ cal incl, abnt
fos frag, occ bent

CHK: It to dkgy, sme gybrn, sl sft, sbblky to
sbply, rthy lstr, mot to stri tex, sl arg, v calc







MD: 10,788'
TVD: 6,603.57'
INC: 89.7°
AZM: 180.3°

MD: 10,878'
TVD: 6,603.73'
INC: 90.1°
AZM: 180.4°

MD: 10,968'
TVD: 6,603.73'
INC: 89.9°
AZM: 179.6°

gy, mod frm, sbblky to sbply, rthy
calc, abnt cal incl, abnt fos frag,
—
y, sme gybrn, sl sft to sl frm, sbblky
lstr, mot to stri tex, sl arg, v calc

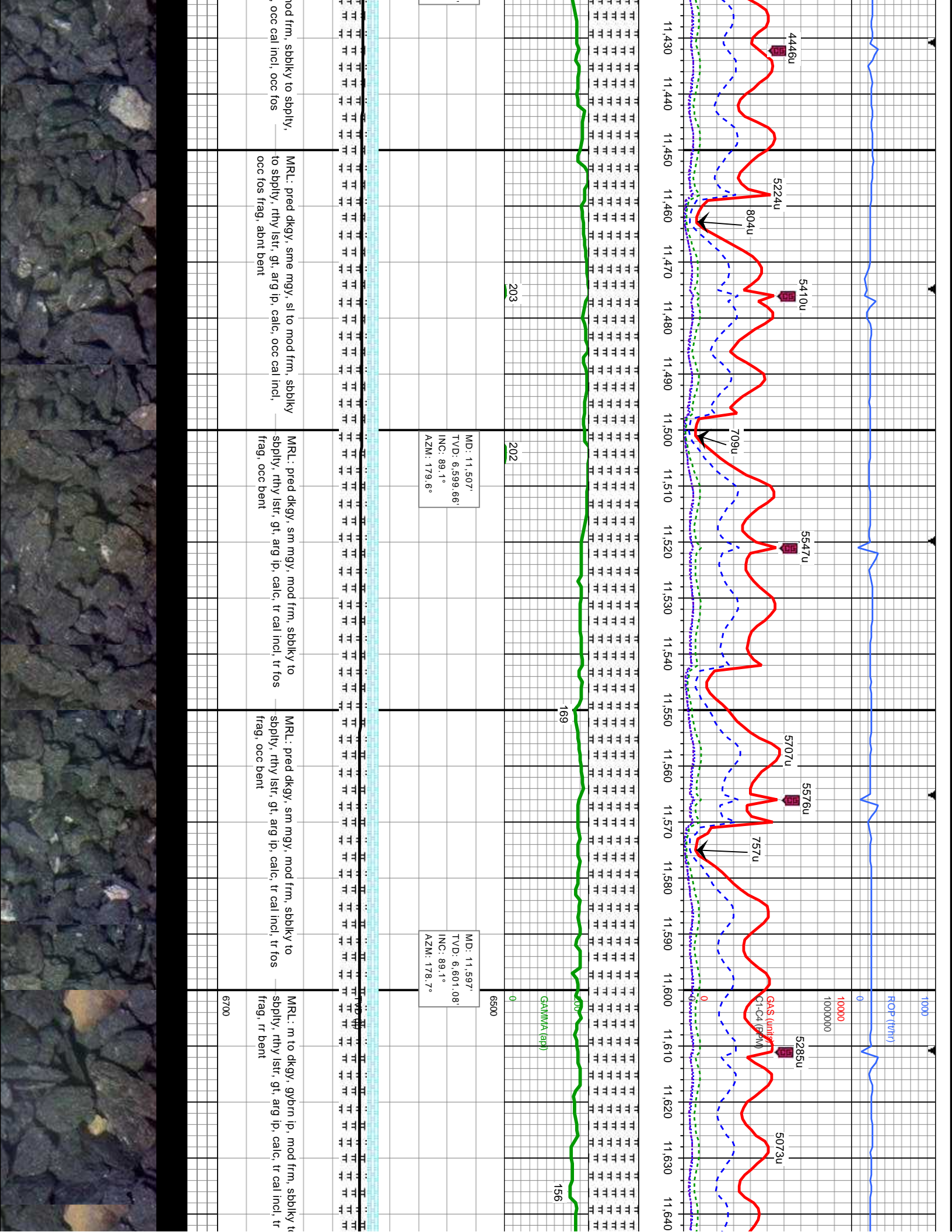
MRU: m to dkgy, mod frm, sbblky to sbply, rthy
lstr, gt, arg ip, calc, abnt cal incl, abnt fos frag,
—
scat bent
CHK: lt to dkgy, sme gybrn, sl sft to sl frm, sbblky
to sbply, rthy lstr, mot to stri tex, sl arg, v calc

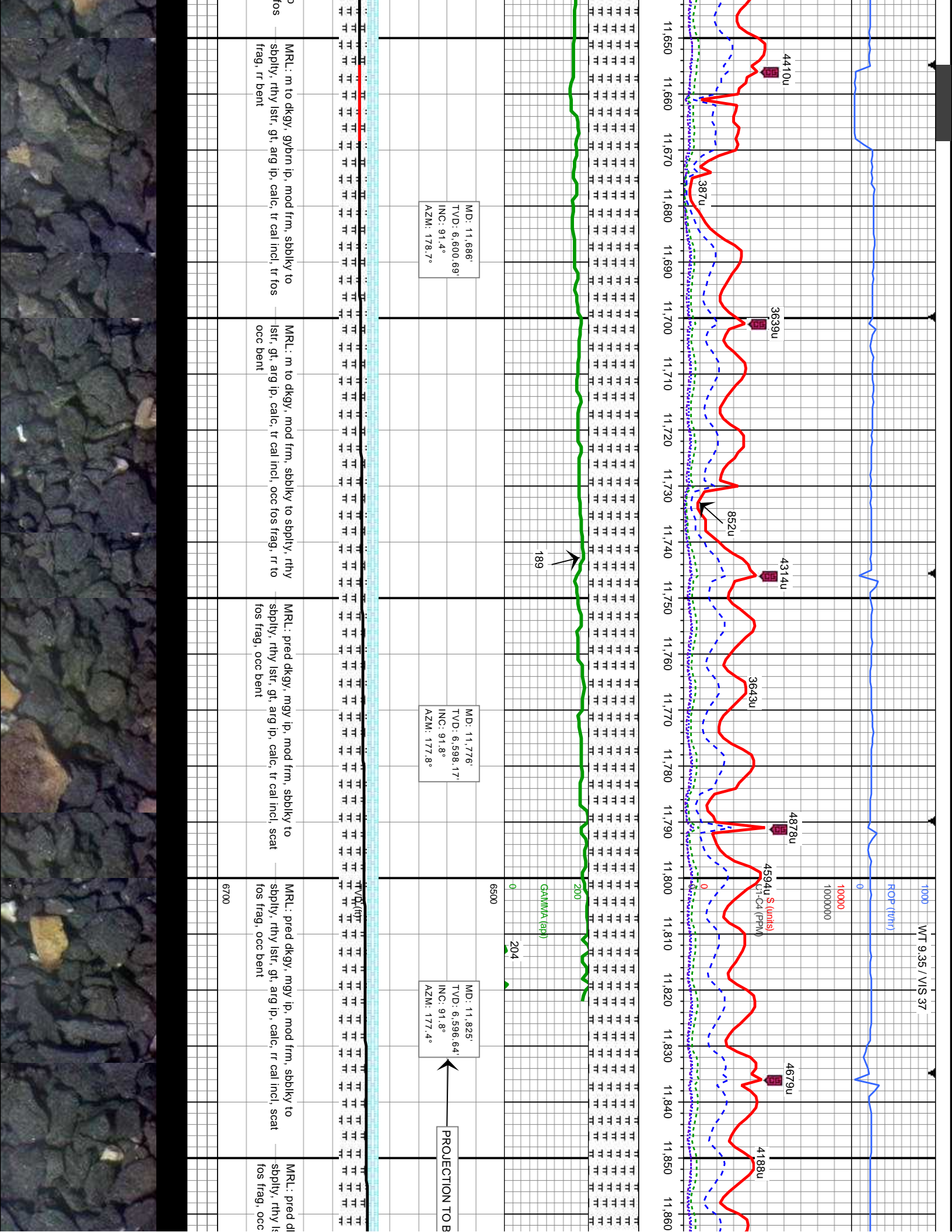
MRU: m to dkgy, mod frm, sbblky to sbply, rthy
lstr, gt, arg ip, calc, abnt cal incl, abnt fos frag,
—
abnt bent, occ chk

MRU: m to dkgy, mod frm, sbblky to sbply, rthy
lstr, gt, arg ip, calc, abnt cal incl, abnt fos frag,
—
abnt bent, rr chk

MRU: m to dkgy, mod frm, sbblky
lstr, gt, arg ip, calc, abnt cal incl, i
scat to abnt bent, rr chk

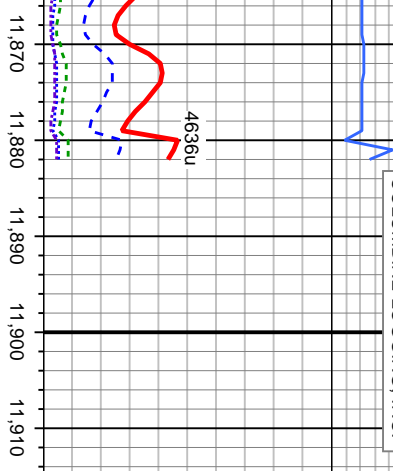






1/16/15

THANK YOU FOR CHOOSING
COLUMBINE LOGGING, INC.



三三三三三三
 三三三三三三
 三三三三三三
 三三三三三三
 三三三三三三

MD: 11,883'
TVD: 6,594.81'
INC: 91.8°
AZM: 177.4°

三三三
三三三
三三三
三三三
三三三
三三三

TD @ MD 11883'
00:06 MST, 1/16/15

kg, mgy ip, mod frm, sbbkly to
str, gt, arg ip, calc, occ cal incl, scat
to scat bent

