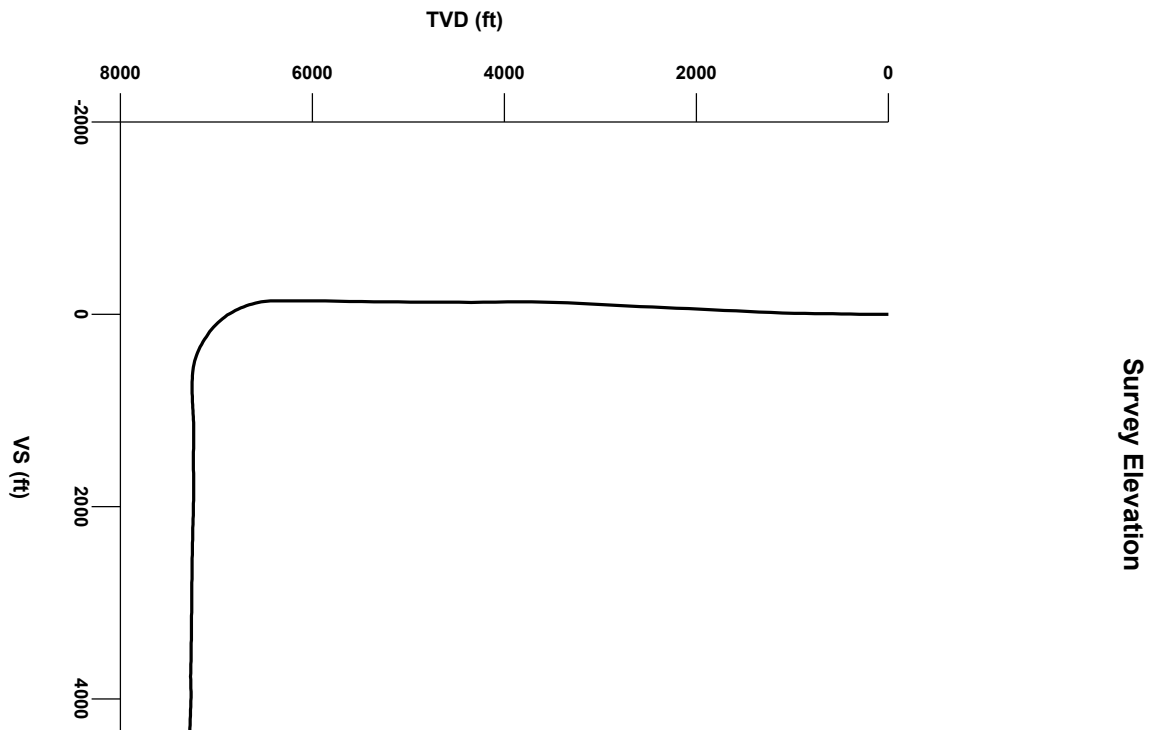
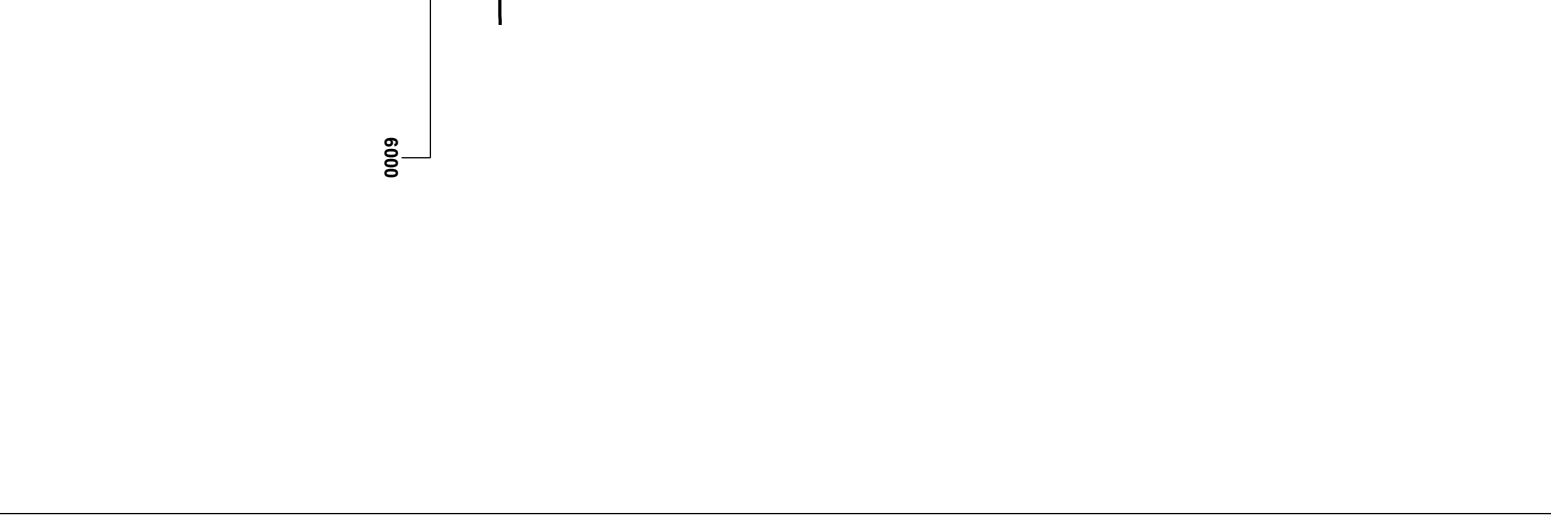
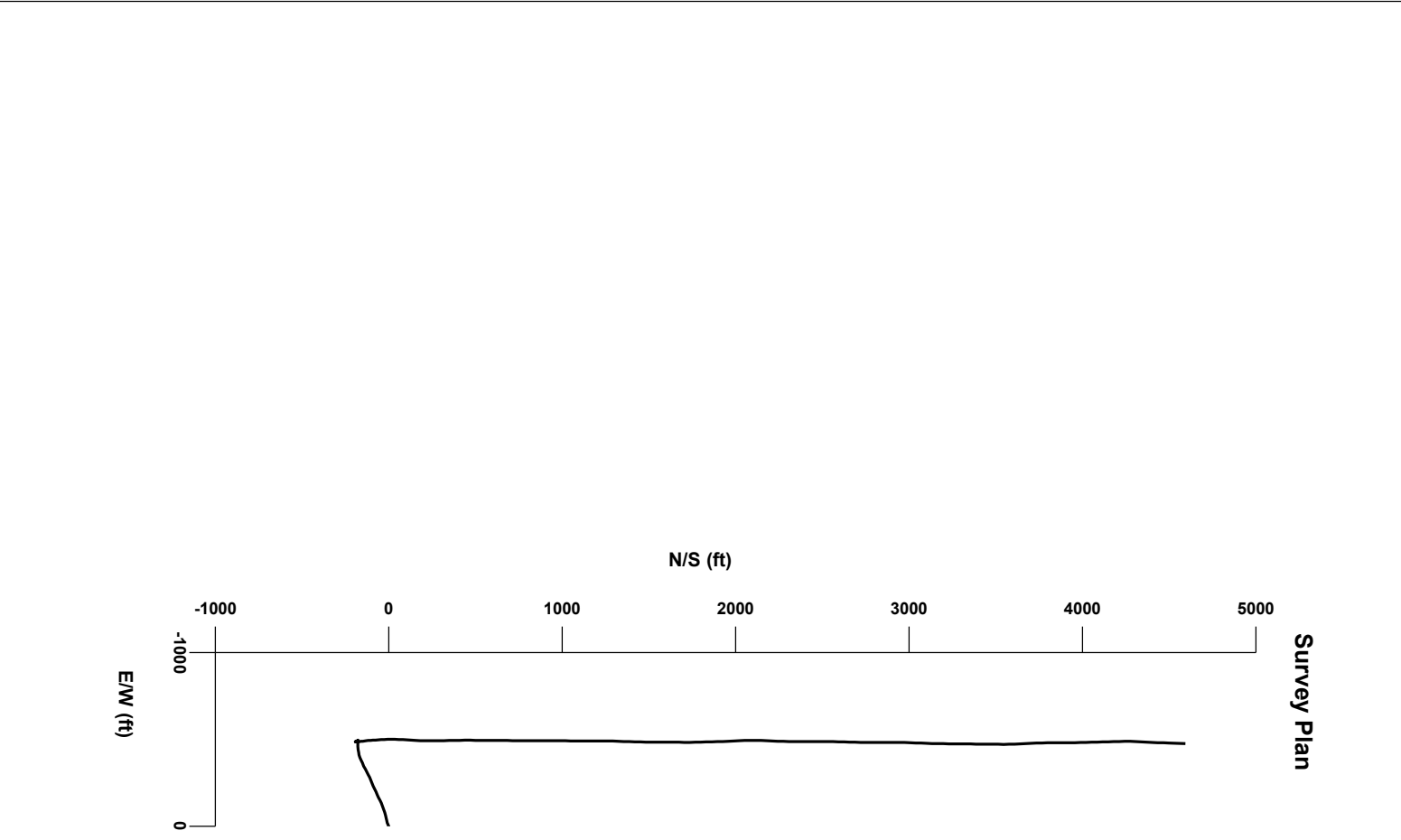


OPERATOR: PDC ENERGY
WELL: MAGNUSON 23I-221
LOCATION: SWSW SEC 23, 7N, 66W
COUNTY: WELD
STATE: COLORADO
SPOT: SHL 225' FSL x 690' FWL
ELEVATION: GL 4,899' / KB 4,914'
FIELD: WATENBERG
SPUD DATE: 1/15/2013
TD DATE: 1/24/2012
DATES LOGGED: 1/19/2013 - 1/24/2013
DEPTHS LOGGED: 6,500' - 11,715'
LOGGERS: KEVIN DONAHUE, BRION BROWN
DRILLING FLUID: LSND
DRILLING RIG: ENSIGN #14
API: 05-123-35275
LOG TYPE: LATERAL
SCALE: 1:240 (5 inches per 100 feet)
REMARKS: WELLSITE GEOLOGICAL SERVICES PROVIDED BY COLUMBINE LOGGING, INC.



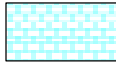
Survey Elevation



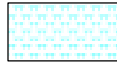
LITHOLOGIES



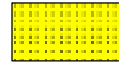
Breccia



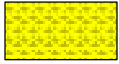
Chalk



Marl



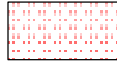
Sandstone



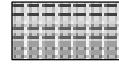
Shaly Sandstone



Shaly Siltstone



Siltstone



Silty Shale

ENGINEERING SYMBOLS



Casing



Casing



Connection



Connection Gas



Arrow

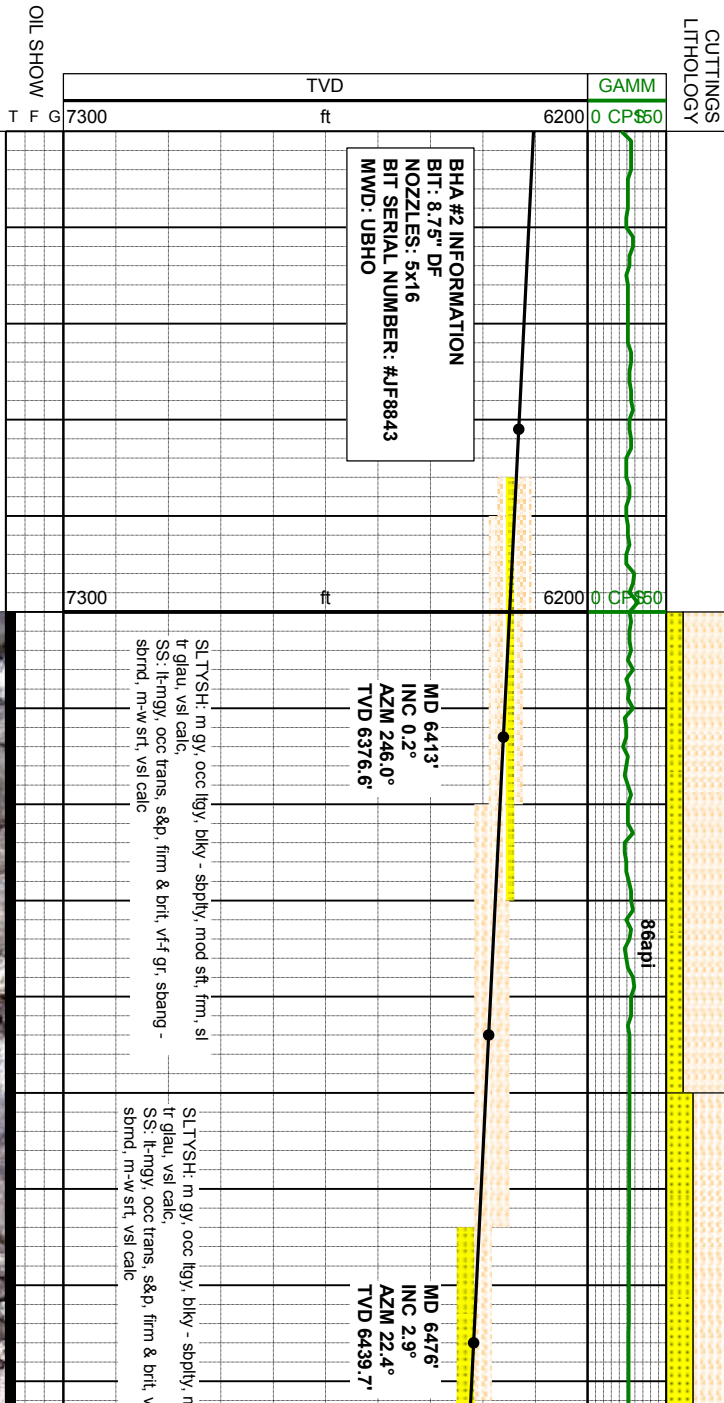
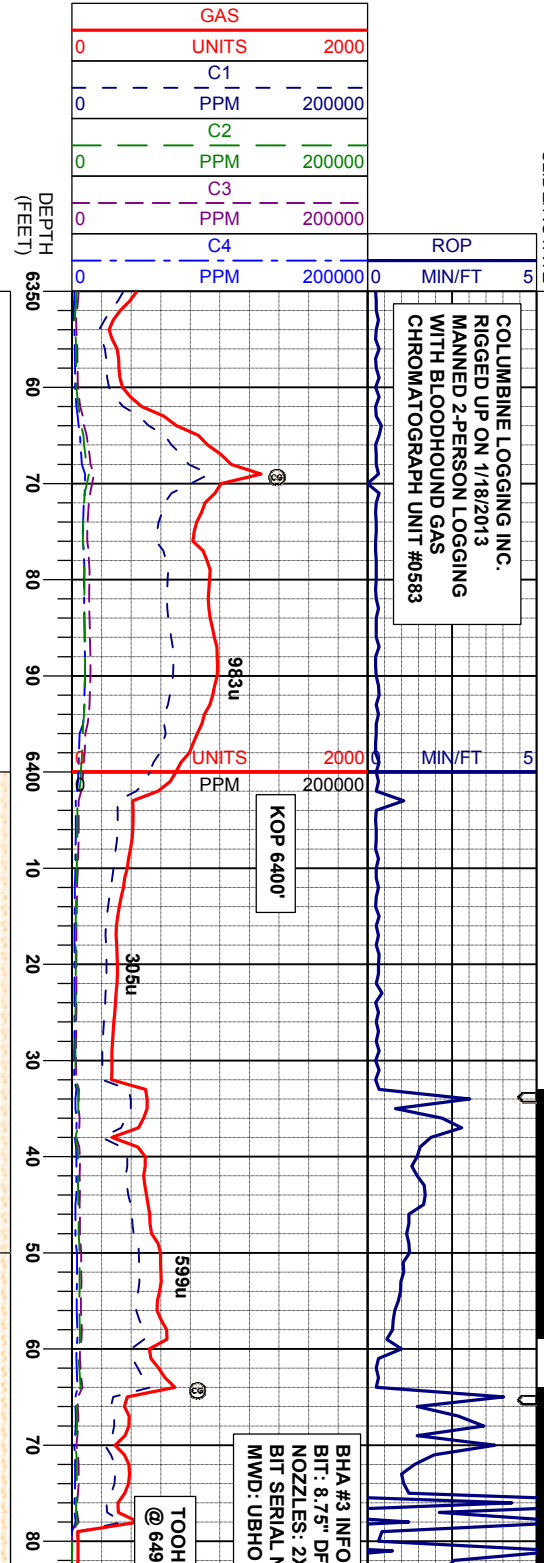


Midnight Depth



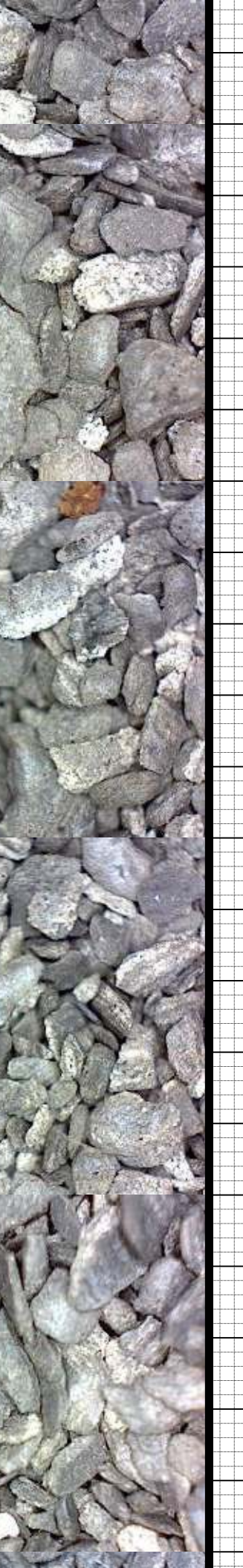
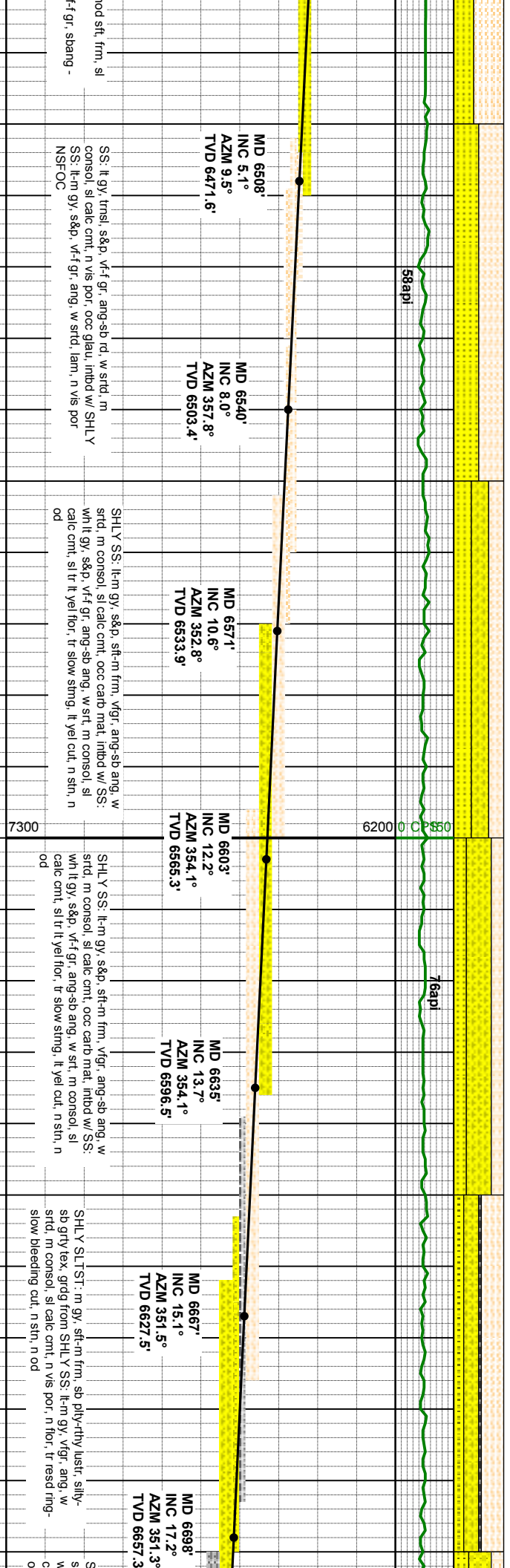
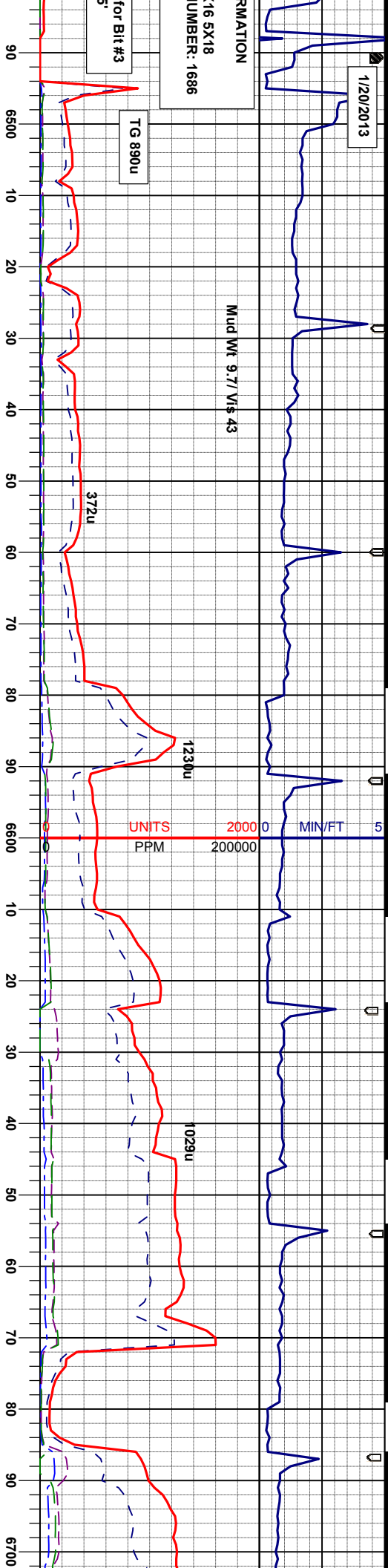
Arrow

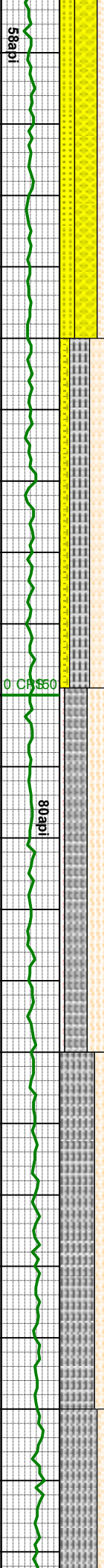
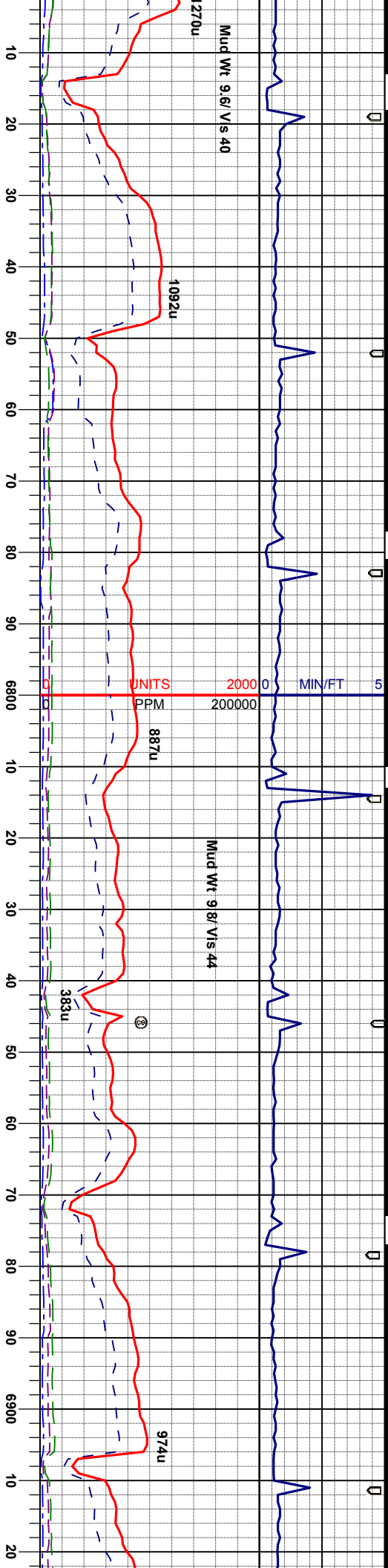
SLIDE/ROTATE



SAMPLE PHOTOS





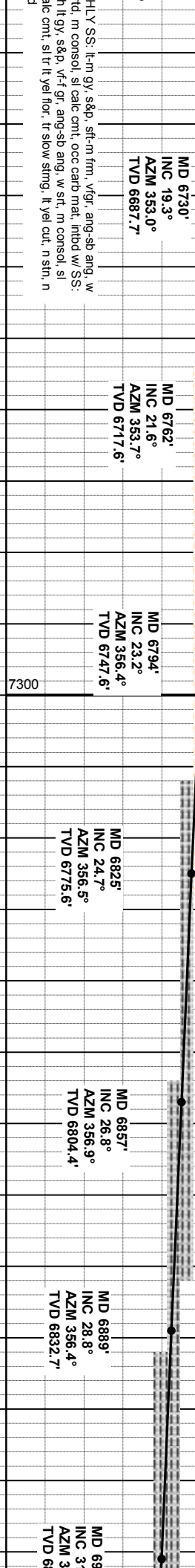


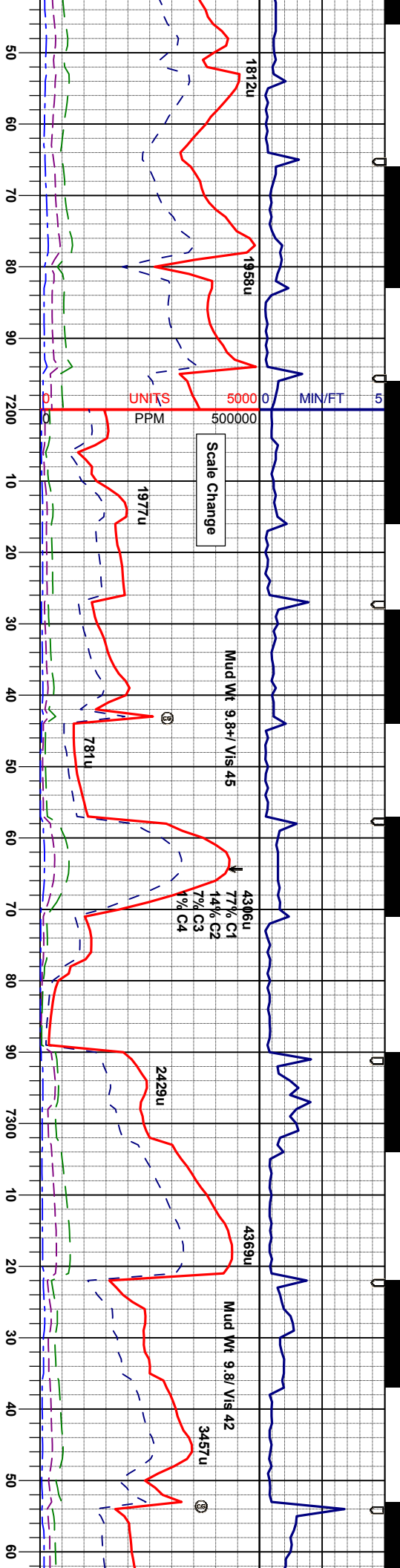
SLTY SH: lt-m gy, sft, sb ply, rthy isr, silty tex, sl calc, gridg from SHLY SS: lt gy, sft, vgr, ang, w strd, m consol, sl calc, n flor, tr resd -sl sting cut, n stn, n od

SLTY SH: lt-m gy, sft, sb ply, rthy isr, silty tex, sl calc, gridg from SHLY SS: lt gy, sft, vgr, ang, w strd, m consol, sl calc, n flor, tr resd -sl sting cut, n stn, n od

SLTY SH: lt-m gy, frm-sft, sb pilg, biky, rthy isr, silty tex, imbd w/ SHLY SLTST: lt gy, sft, sb biky, rthy, silty sl calc n flor, tr sting lt yel cut, n stn.

SLTY SH: lt-m gy, frm-sft, sb pilg, biky, rthy isr, silty tex, imbd w/ SHLY SLTST: lt gy, sft, sb biky, rthy, silty sl calc n flor, tr sting lt yel cut, n stn.





SLTY SH: m-dk gy, sft-m frm, sb ply& biky, rthy-sb wxy lstr, silty-sb gry tex, sl calc, tr dsm pyr, n flor, sl tr sting lt yel cut, n sin

SLTY SH: m-dk gy, sft-m frm, sb ply& biky, rthy-sb wxy lstr, silty-sb gry tex, sl calc, tr dsm pyr, MRL: m-dk gy, mod sft-frm, biky- spily, rthy, occ scat bent, vcalc, n flor, sl tr sting lt yel cut, n sin

SLTY SH: m-dk gy, sft-m frm, sb ply& biky, rthy-sb wxy lstr, silty-sb gry tex, sl calc, tr dsm pyr, CHK: lt gy- cm w occ spec wn, v sft- fr- sl frm, sbiky, wxy - sl mot bd, v calc, MRL: m-dk gy, mod sft-frm, biky- spily, rthy, occ scat bent, vcalc

SLTY SH: m-dk gy, sft-m frm, sb ply& biky, rthy-sb wxy lstr, silty-sb gry tex, sl calc, tr dsm pyr, CHK: lt gy- cm w occ spec wn, v sft- fr- sl frm, sbiky, wxy - sl mot bd, v calc, MRL: m-dk gy, mod sft-frm, biky- spily, rthy, occ scat bent, vcalc

MRL: m-dk scat bent, v CHK: lt gy- sbiky, wxy

MD 7174' INC 50.4° AZM 3.6° TVD 7030.0'

MD 7206' INC 52.5° AZM 3.4° TVD 7070.1'

MD 7238' INC 54.8° AZM 3.0° TVD 7089.0'

MD 7269' INC 56.5° AZM 2.2° TVD 7106.5'

MD 7301' INC 57.7° AZM 0.9° TVD 7123.9'

MD 7333' INC 59.3° AZM 0.0° TVD 7140.6'

Niobrara Top
Prog: 7,094' TVD
Loggers: 7,087' TVD

Niobrara A Top
Prog: 7,124' TVD
Loggers: 7,113' TVD

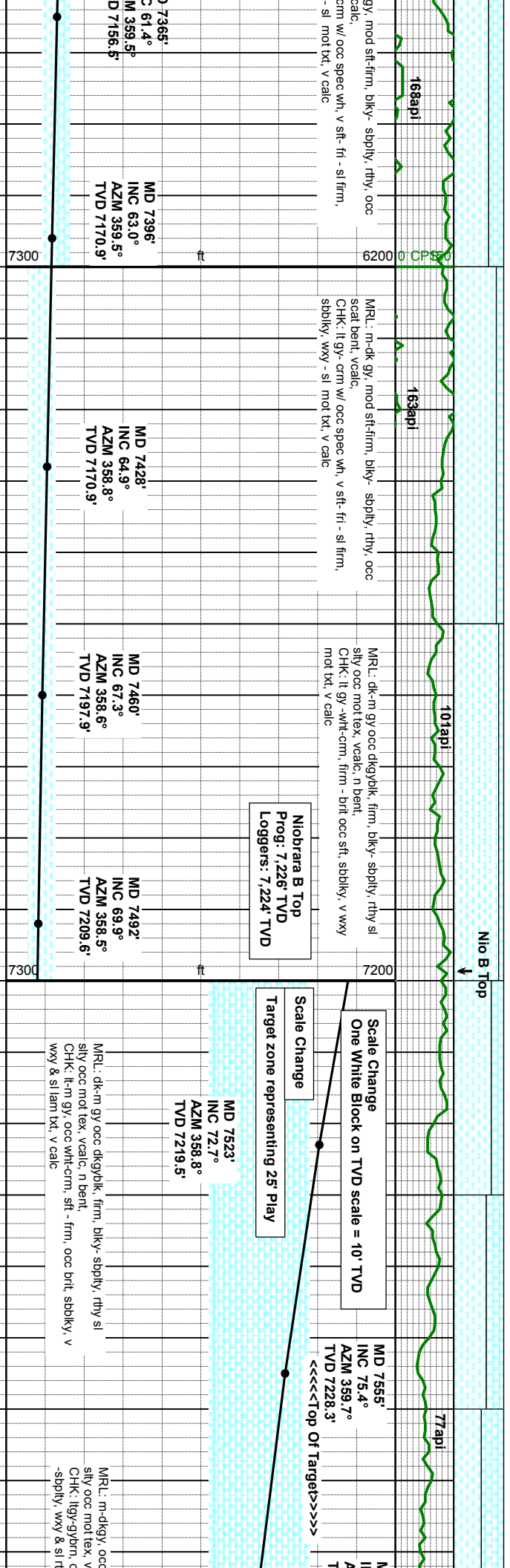
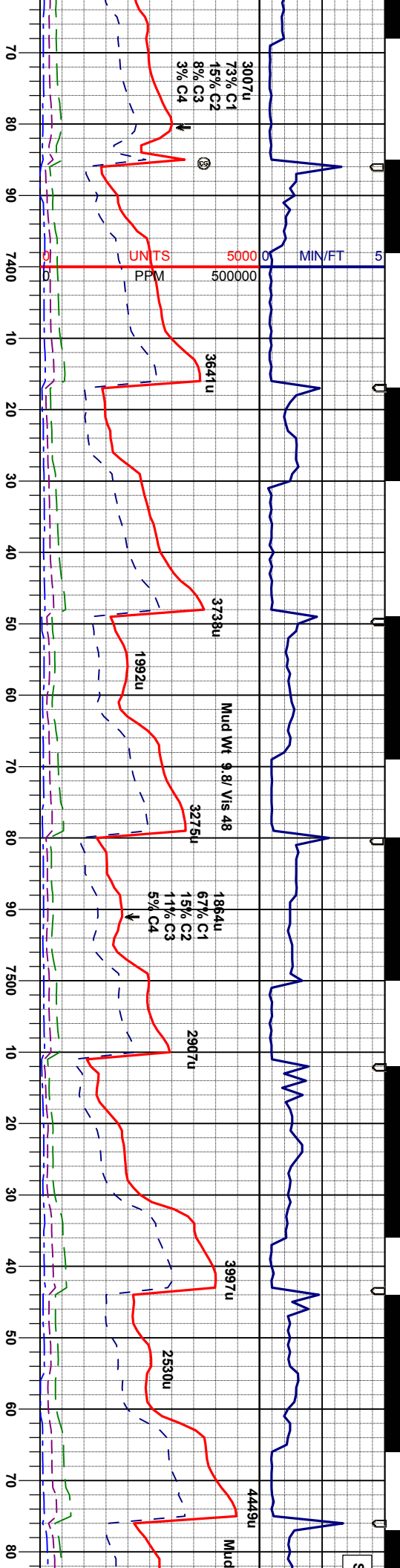
7300

6200 0 CPS 50

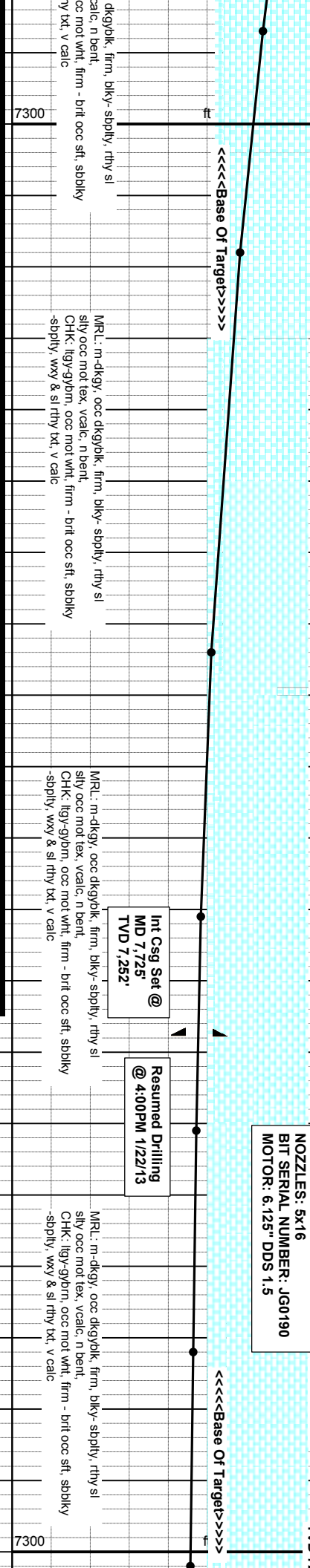
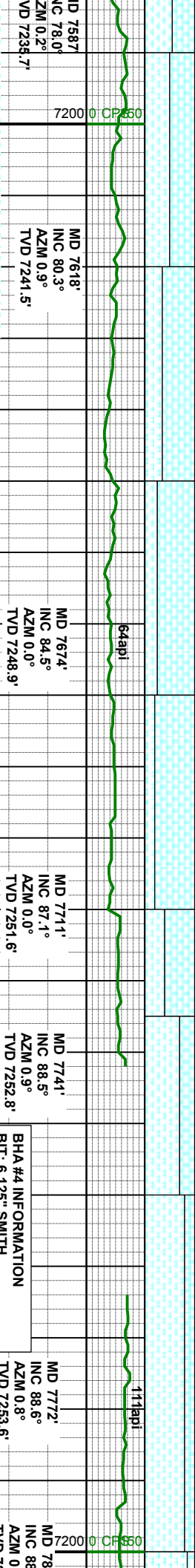
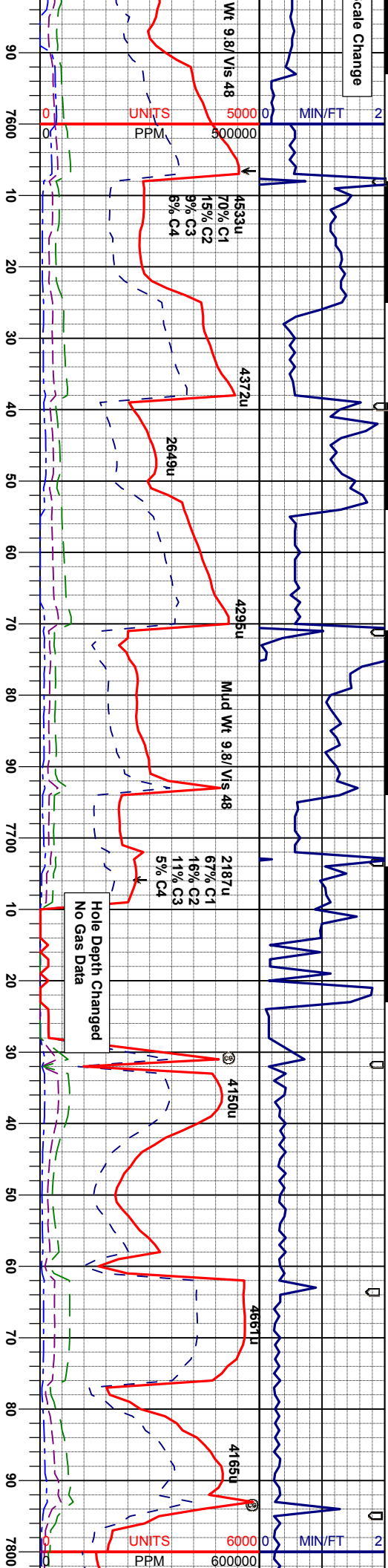
163

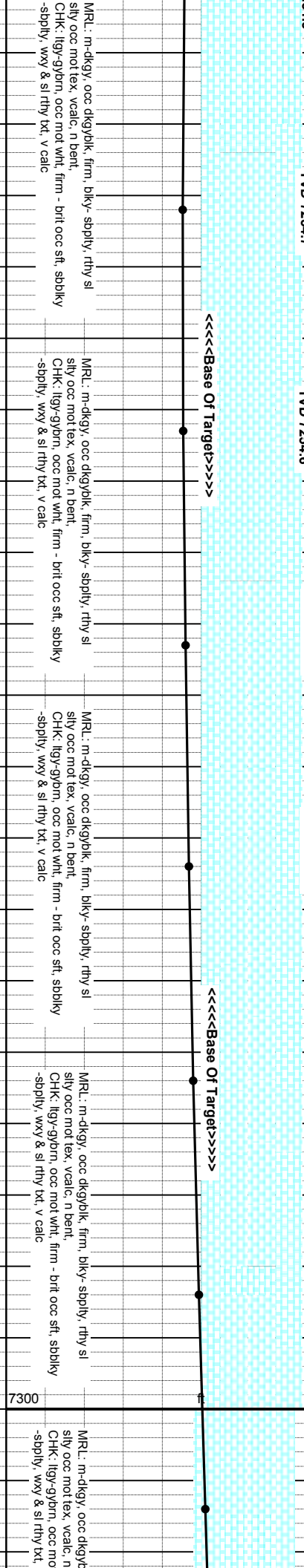
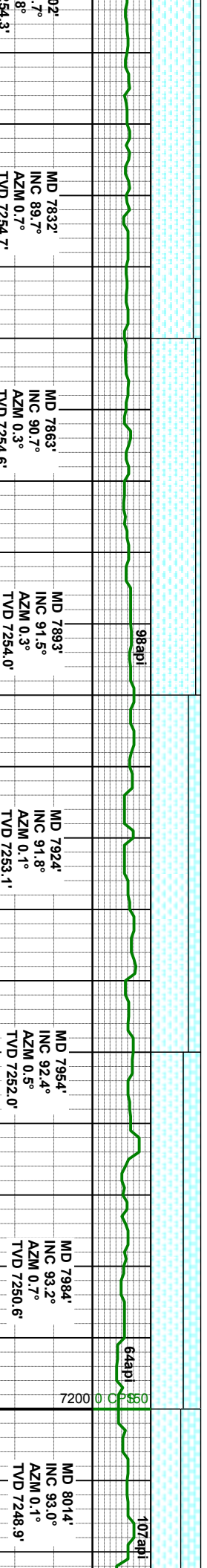
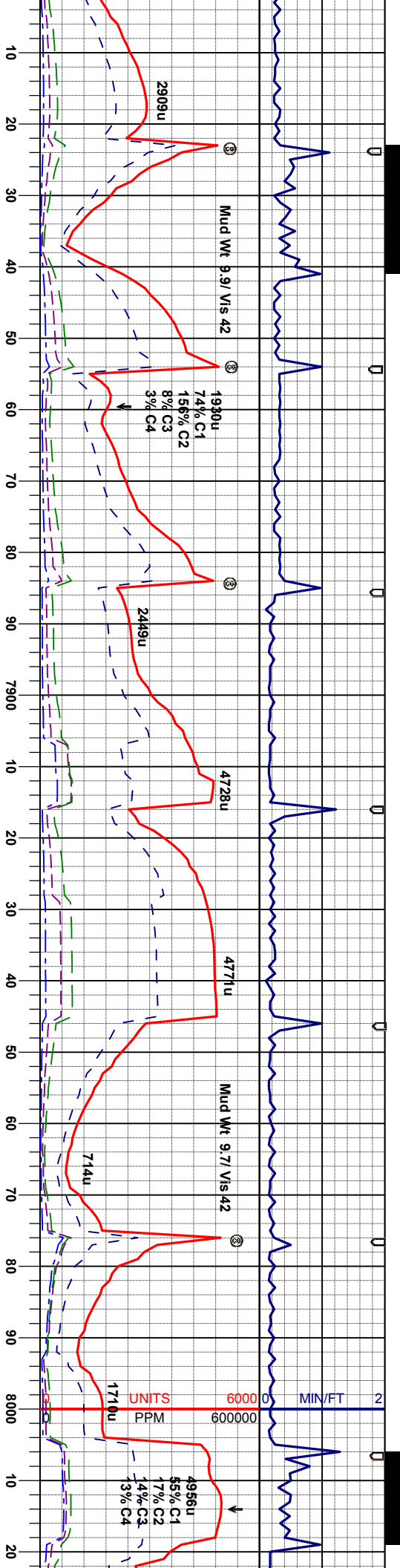
89api

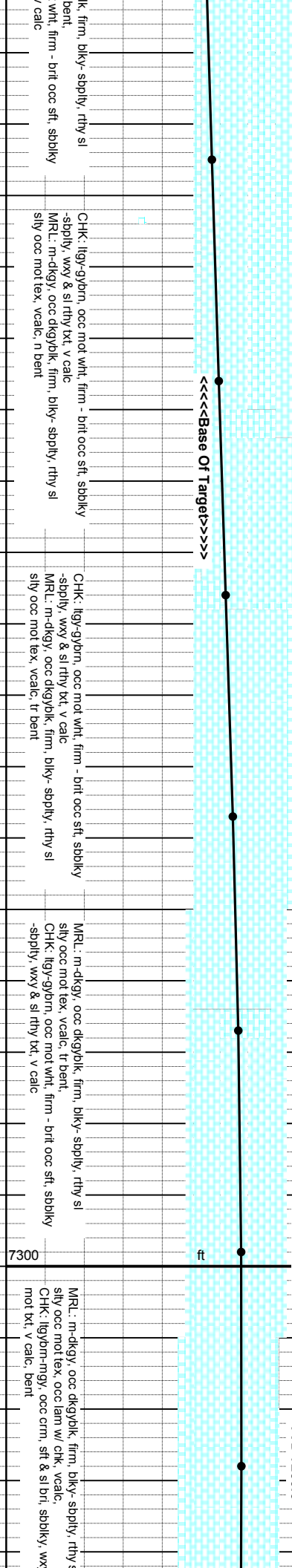
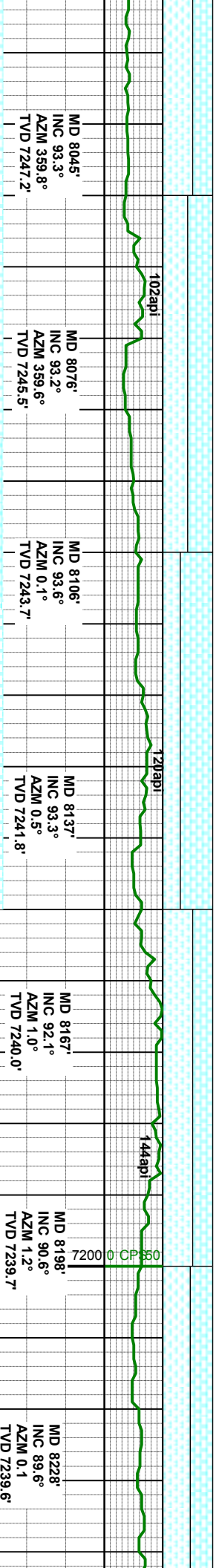
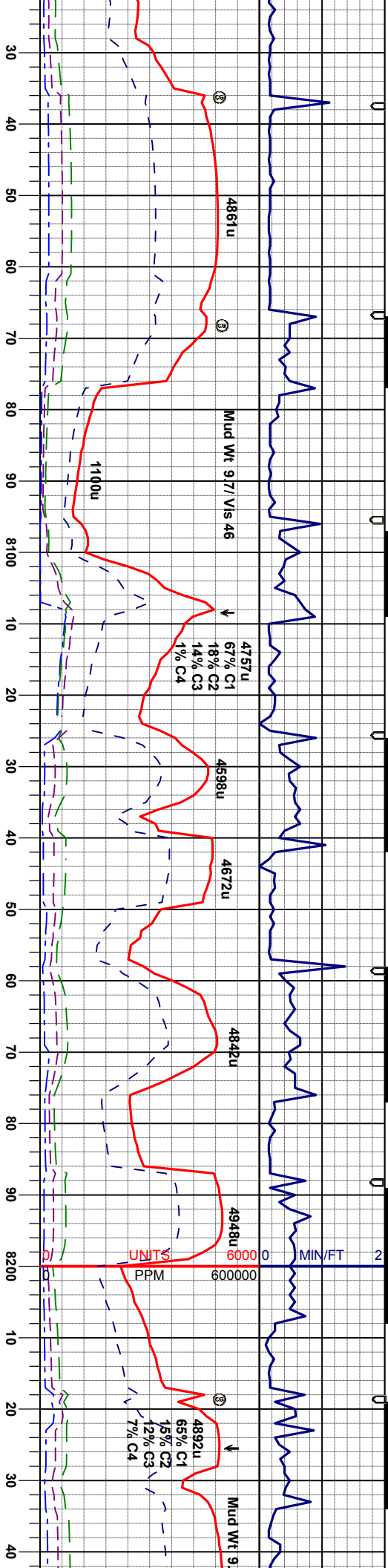


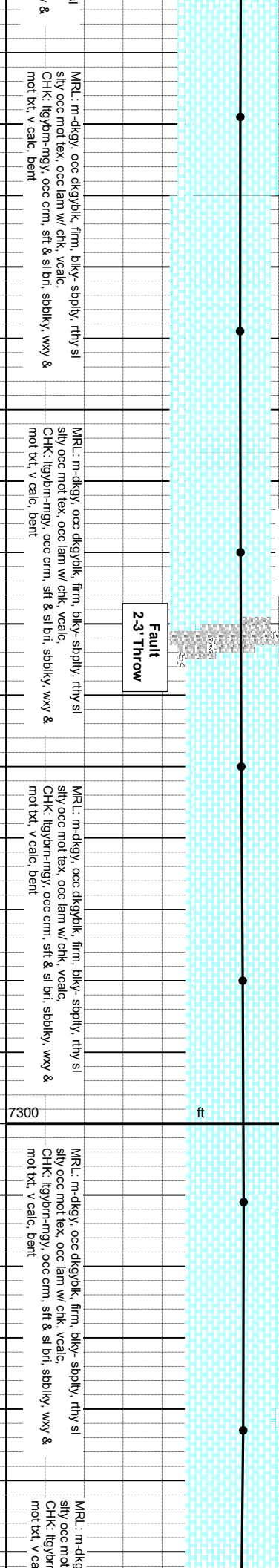
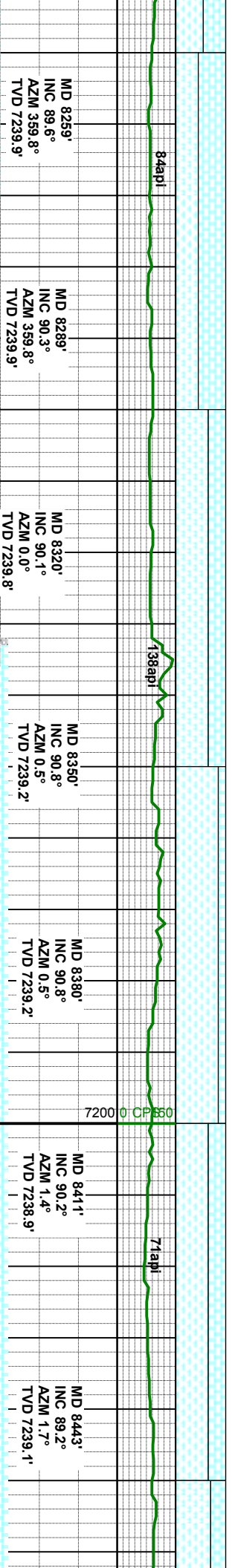
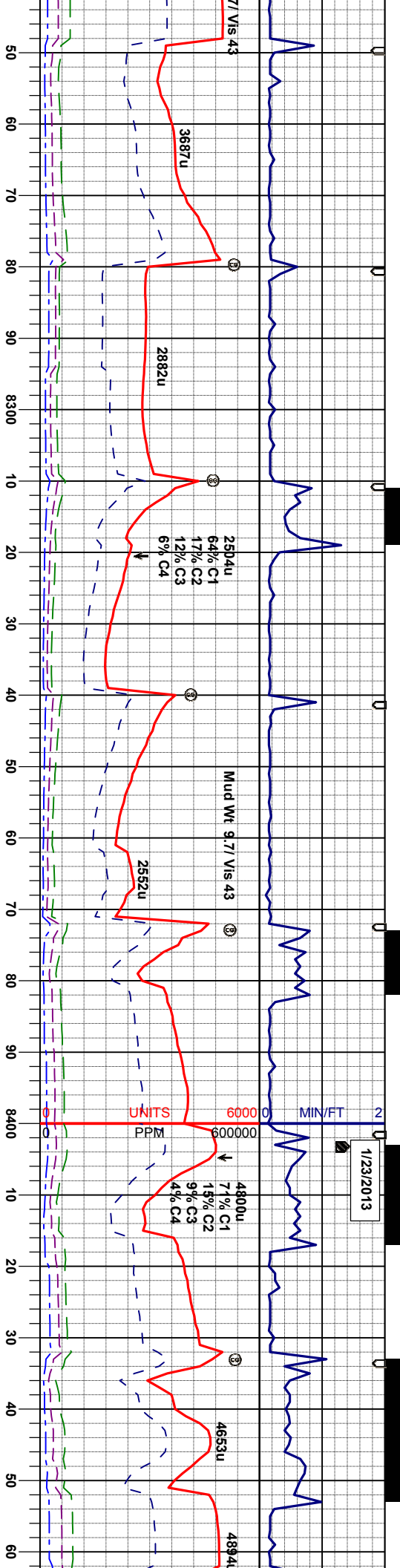


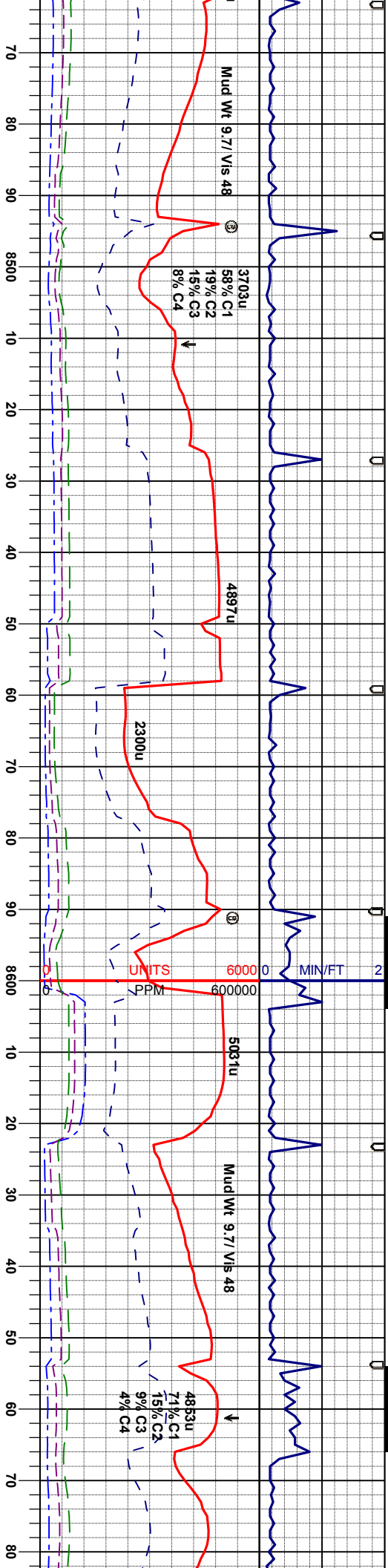
Scale Change











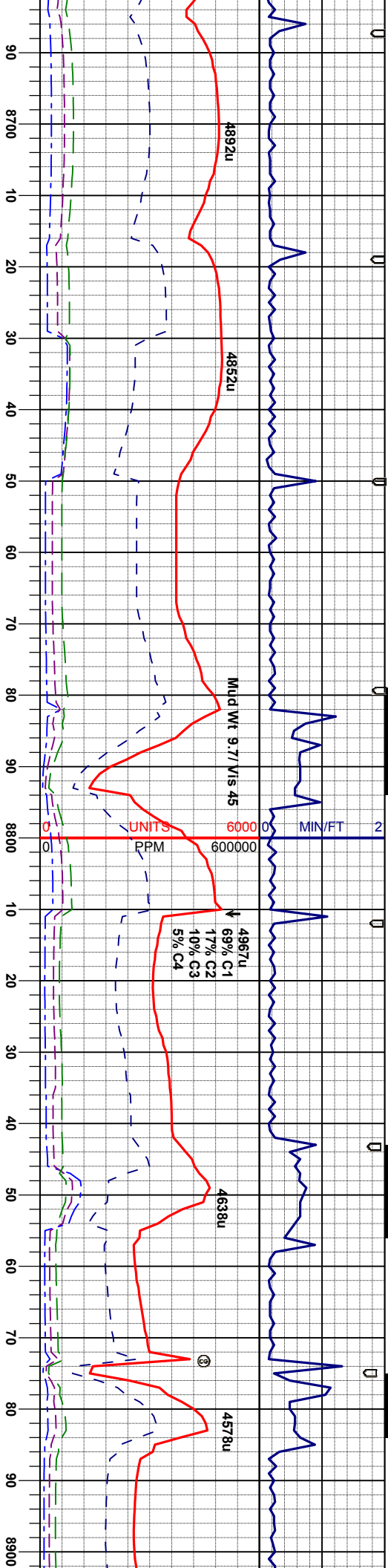
MD 8474' INC 88.6° AZM 1.9° TVD 7239.7'	MD 8506' INC 89.5° AZM 1.7° TVD 7240.2'	MD 8538' INC 90.0° AZM 1.4° TVD 7240.4'	MD 8570' INC 90.3° AZM 1.7° TVD 7240.3'	MD 8601' INC 90.0° AZM 0.5° TVD 7240.2'	MD 8633' INC 90.4° AZM 0.1° TVD 7240.1'	MD 8665' INC 89.9° AZM 0.7° TVD 7240.0'
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MR.L: m-dkgy, occ dkgyblk, firm, blk- spply, rthy sl
sily occ mot tex, occ lam w/ chk, vcalc.
CHK: llybrn-mgy, occ crm, sft & sl bri, sbdky, wxy &
mot txt, v calc, bent

MR.L: m-dkgy, occ dkgyblk, firm, blk- spply, rthy sl
sily occ mot tex, occ lam w/ chk, vcalc.
CHK: llybrn-mgy, occ crm, sft & sl bri, sbdky, wxy &
mot txt, v calc, n bent

MR.L: m-dkgy, occ dkgyblk, firm, blk- spply, rthy sl
sily occ mot tex, occ lam w/ chk, vcalc.
CHK: llybrn-mgy, occ crm, sft & sl bri, sbdky, wxy &
mot txt, v calc, n bent





MD	INC	AZM	TVD
MD 8696'	INC 90.5°	AZM 0.1°	TVD 7239.9'
MD 8728'	INC 91.2°	AZM 0.5°	TVD 7239.4'
MD 8760'	INC 91.5°	AZM 0.3°	TVD 7238.7'
MD 8792'	INC 91.1°	AZM 0.7°	TVD 7237.9'
MD 8823'	INC 91.1°	AZM 0.5°	TVD 7237.4'
MD 8855'	INC 90.7°	AZM 359.7°	TVD 7236.9'
MD 8887'	INC 89.9°	AZM 358.3°	TVD 7236.7'

MRU: m-dkgy, ooc dkgyblk, firm, bly- spilly, rthy sl
sily ooc mot tex, ooc lam w/ chk, vcalc,
CHK: llylon-rgy, ooc crm, stf & sl brl, sbily, wxy &
mot btl, v calc, n bent

MRU: m-dk gy, stf-firm, sb bly& sb fis, rthy-sb wxy istr,
mot and lam tex, v calc, tr sec calcite, inbd w/ CHK: it
gy, wh stf, sb ply, mot & chky tex, v calc, tr it yel flor,
sting lt yel cut, lt yel/bn stn, n od

MRU: m-dk gy, stf-firm, sb bly& sb fis, rthy-sb wxy istr,
mot and lam tex, v calc, tr sec calcite, inbd w/ CHK: it
gy, wh stf, sb ply, mot & chky tex, v calc, tr it yel flor,
sting lt yel cut, lt yel/bn stn, n od

7300

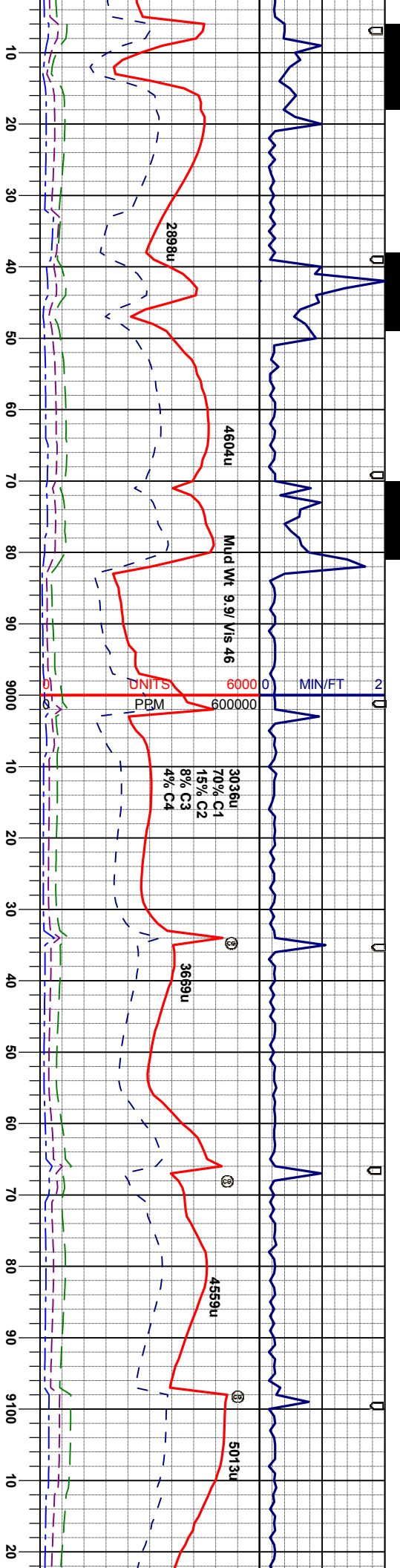
ft

7200 CP250

<<<<Top Of Target>>>>

<<<<Top Of Ta





MD 8918'
INC 89.4°
AZM 358.1°
TVD 7236.8'

MD 8950'
INC 88.7°
AZM 358.1°
TVD 7237.4'

MD 8982'
INC 88.0°
AZM 358.1°
TVD 7238.3'

MD 9014'
INC 88.3°
AZM 358.6°
TVD 7239.4'

MD 9045'
INC 88.2°
AZM 358.5°
TVD 7240.3'

MD 9077'
INC 88.4°
AZM 357.8°
TVD 7241.3'

MD 9109'
INC 88.6°
AZM 357.4°
TVD 7242.1'

get>>>>

<<Top Of Target>>>>

MR: m-dk gy & blk, sft-m frm, sb blk, rthy-sb wxy
it, mot & lam tex, m-v calc, w org mat, n flor, sting it
it cut, lt yel/bn sht, n od

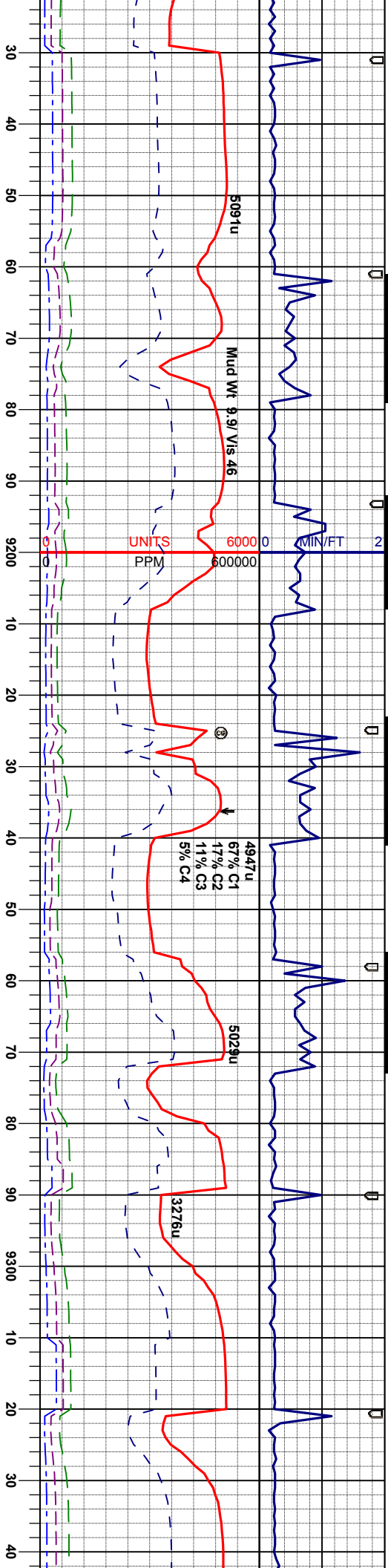
MR: m-dk gy & blk, sft-m frm, sb blk, rthy-sb wxy
it, mot & lam tex, m-v calc, w org mat, n flor, sting it
it cut, lt yel/bn sht, n od

MR: m-dk gy, sft-frm, sb blk & sb fis, rthy-sb wxy
it, mot and lam tex, v calc, tr sec calcite, intbd w CHK
it gy, wh sft, sb blk, mot & chky tex, v calc, tr lt yel flor,
sting lt yel cut, lt yel/bn sht, n od

CHK: lt gy, wh, sft, sb blk & blk, rthy-sb wxy
it, mot & lam tex, m-v calc, w org mat, n flor, sting it
it cut, lt yel/bn sht, n od

CHK: lt gy, wh, sft, sb blk & blk, rthy-sb wxy
it, mot & lam tex, m-v calc, w org mat, n flor, sting it
it cut, lt yel/bn sht, n od





MD 9140'
INC 89.2°
AZM 356.9°
TVD 7242.7'

MD 9172'
INC 89.0°
AZM 357.1°
TVD 7243.2'

MD 9204'
INC 88.3°
AZM 359.0°
TVD 7243.9'

MD 9236'
INC 87.9°
AZM 0.4°
TVD 7245.1'

MD 9267'
INC 88.5°
AZM 2.3°
TVD 7245.9'

MD 9299'
INC 88.8°
AZM 2.9°
TVD 7246.7'

MD 9331'
INC 89.5°
AZM 2.5°
TVD 7247.2'

biky rthy-sb wxy istr, mot
w/ MRL: m-dk gy & blk, sft
v calc, tr fos, tr bent flor,
tn, n od

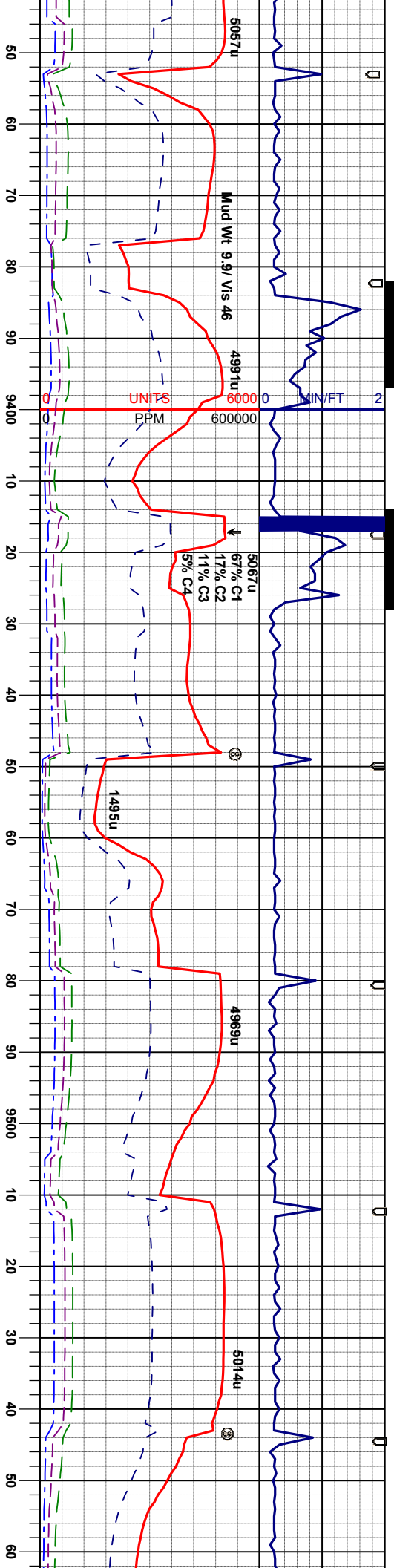
MRL: m-dkgy occ dkgyblk, firm, biky- sbply, rthy sl
sily occ mot tex, vcalc, tr bent,
CHK: ilgy-gpdm, occ mot wlt, firm - bnti occ sft, sbbkly
-sbply, wxy & sl rthy tlt, v calc

CHK: il gy, wh, sft, sb ply& biky, rthy-sb wxy istr, mot
tex, v calc, w occ fos, inbd w/ MRL: m-dk gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flor,
sting lt-m yel/blu cut, lt yel sn, n od

CHK: il gy, wh, sft, sb ply& biky, rthy-sb wxy istr, mot
tex, v calc, w occ fos, inbd w/ MRL: m-dk gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flor,
sting lt-m yel/blu cut, lt yel sn, n od

CHK: il gy, wh, sft, sb ply& biky, rthy-sb wxy istr, r, r
tex, v calc, w occ fos, inbd w/ MRL: m-dk gy & bl
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flor
sting lt-m yel/blu cut, lt yel sn, n od





MD 9363'
INC 89.8°
AZM 2.5°
TVD 7247.4'

MD 9394'
INC 88.9°
AZM 1.6°
TVD 7247.7'

MD 9426'
INC 87.8°
AZM 0.6°
TVD 7248.7'

MD 9458'
INC 87.8°
AZM 0.9°
TVD 7249.9'

MD 9490'
INC 88.0°
AZM 0.4°
TVD 7251.1'

MD 9522'
INC 88.9°
AZM 0.6°
TVD 7251.9'

MD 9553'
INC 88.9°
AZM 0.2°
TVD 7252.5'

CHK: It gy, wh, sft, sb pily& biky, rthy-sb wxy lstr, mot
tex, v calc, w occ fos, inbd w/ MRL: m-dk gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flor,
sting lt-m yeilblu cut, lt yei sn, n od

CHK: It gy, wh, sft, sb pily& biky, rthy-sb wxy lstr, mot
tex, v calc, w occ fos, inbd w/ MRL: m-dk gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flor,
sting lt-m yeilblu cut, lt yei sn, n od

CHK: It gy, wh, sft, sb pily& biky, rthy-sb wxy lstr, mot
tex, v calc, w occ fos, inbd w/ MRL: m-dk gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flor,
sting lt-m yeilblu cut, lt yei sn, n od

CHK: It gy, wh, sft, sb pily& biky, rthy-sb wxy lstr, mot
tex, v calc, w occ fos, inbd w/ MRL: m-dk gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flor,
sting lt-m yeilblu cut, lt yei sn, n od

CHK: It gy, wh, sft, sb pily& biky, rthy-sb wxy lstr, mot
tex, v calc, w occ fos, inbd w/ MRL: m-dk gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flor,
sting lt-m yeilblu cut, lt yei sn, n od

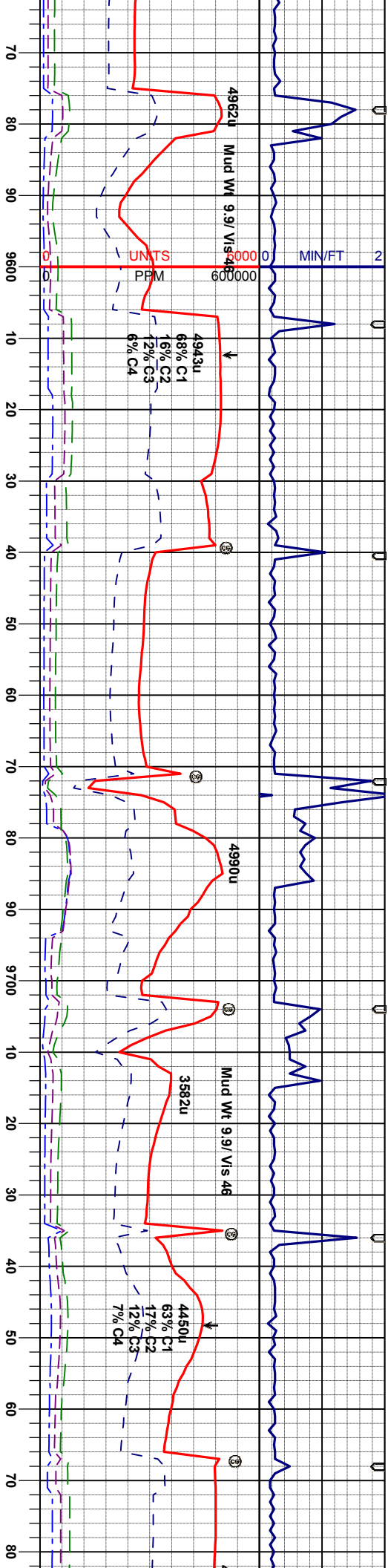
7300

ft

7200 0 CP 550

88api

128 api



MD 9585'
INC 89.0°
AZM 0.4°
TVD 7253.1'

MD 9617'
INC 88.5°
AZM 359°
TVD 7253.8'

MD 9649'
INC 89.8°
AZM 0.2°
TVD 7254.4'

MD 9681'
INC 88.9°
AZM 1.3°
TVD 7254.4'

MD 9713'
INC 88.6°
AZM 1.1°
TVD 7254.9'

MD 9745'
INC 89.2°
AZM 1.8°
TVD 7254.4'

MD 9777'
INC 89.7°
AZM 2.2°
TVD 7255.0'

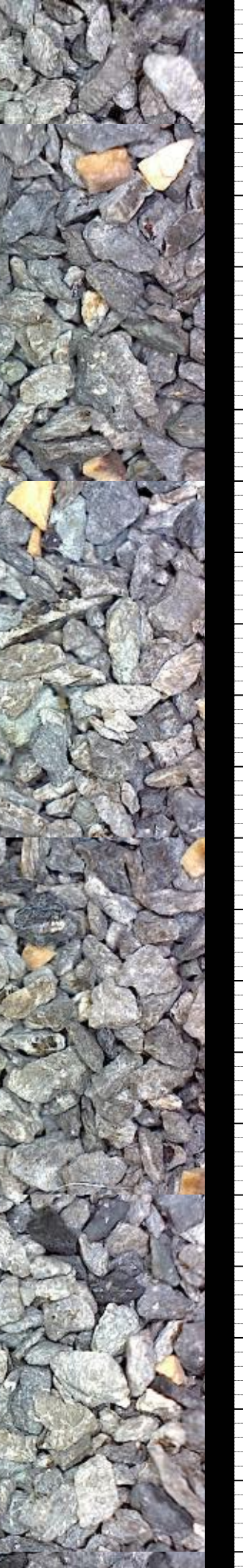
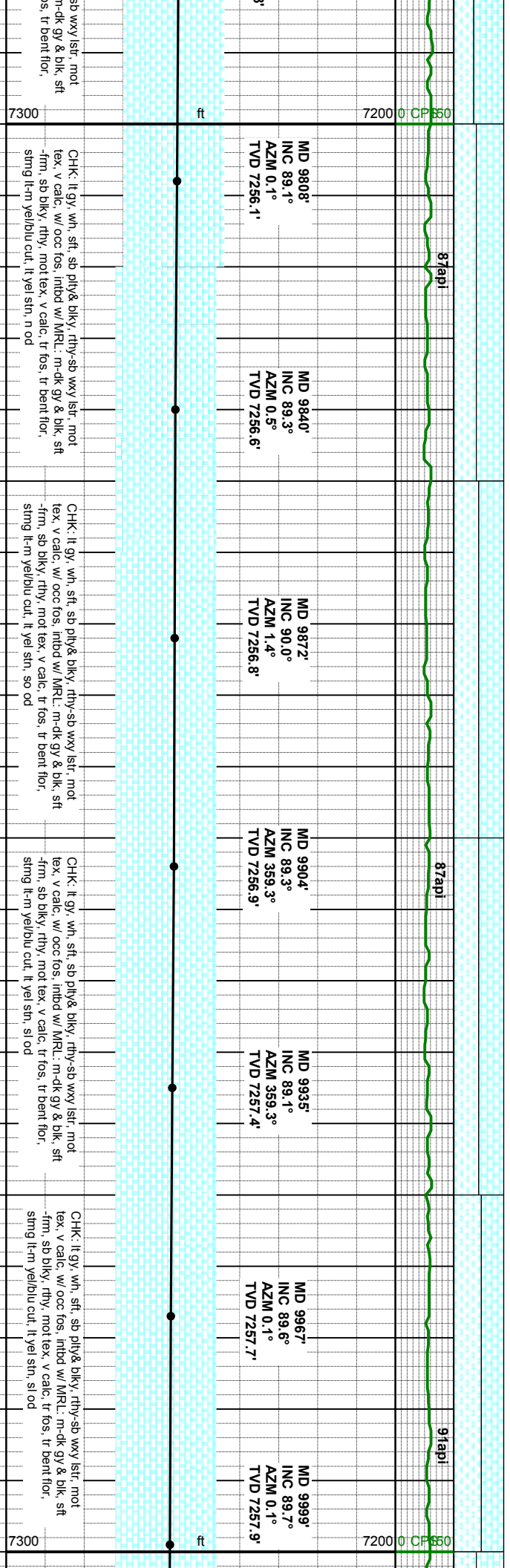
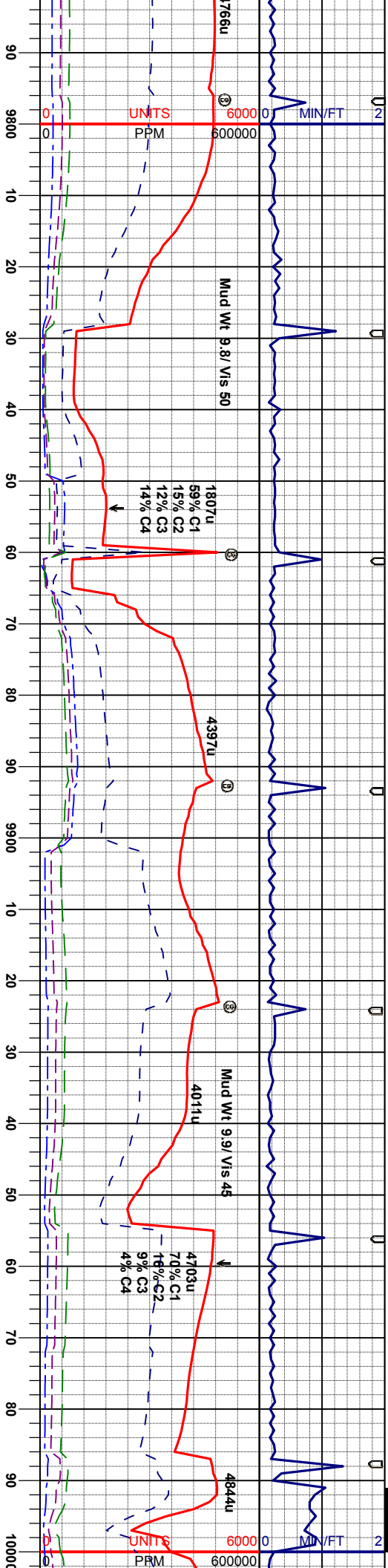
h, sft, sb ply& biky, rthy-sb wxy/str, mot
occ fos, intbd w/ MRL, m-ck gy & blk, sft
rthy, mot tex, v calc, tr fos, tr bent flor,
blu cut, lt yel sin, n od

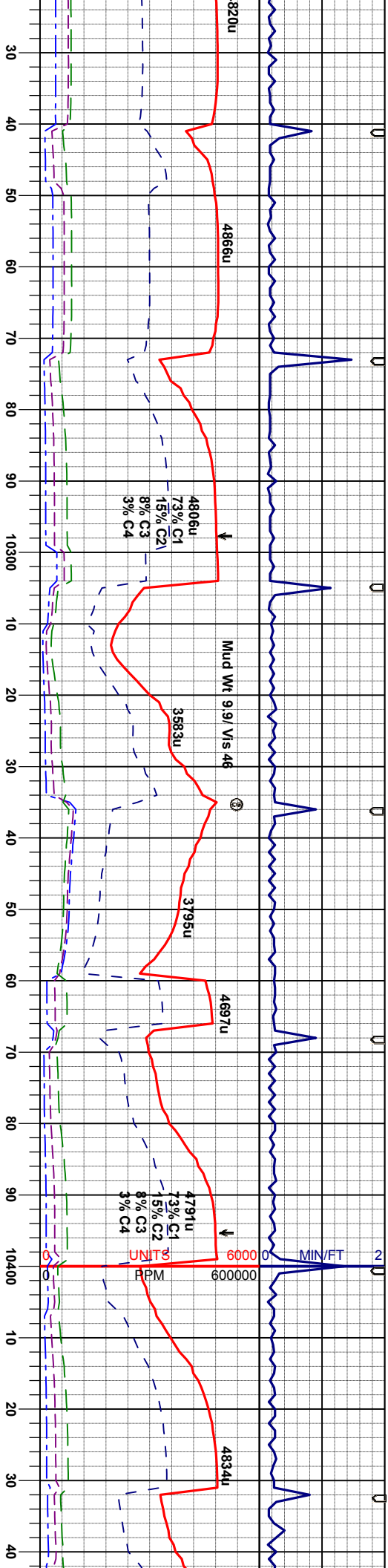
CHK: lt gy, wh, sft, sb ply& biky, rthy-sb wxy/str, mot
tex, v calc, w occ fos, intbd w/ MRL, m-ck gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flor,
stimg lt-m yel/blu cut, lt yel sin, n od

CHK: lt gy, wh, sft, sb ply& biky, rthy-sb wxy/str, mot
tex, v calc, w occ fos, intbd w/ MRL, m-ck gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flor,
stimg lt-m yel/blu cut, lt yel sin, n od

CHK: lt gy, wh, sft, sb ply& biky, rthy-sb wxy/str, mot
tex, v calc, w occ fos, intbd w/ MRL, m-ck gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flor,
stimg lt-m yel/blu cut, lt yel sin, n od





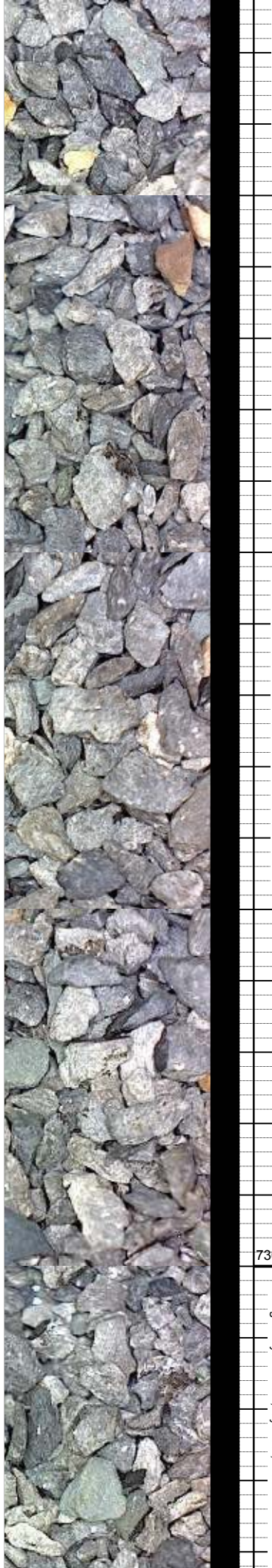


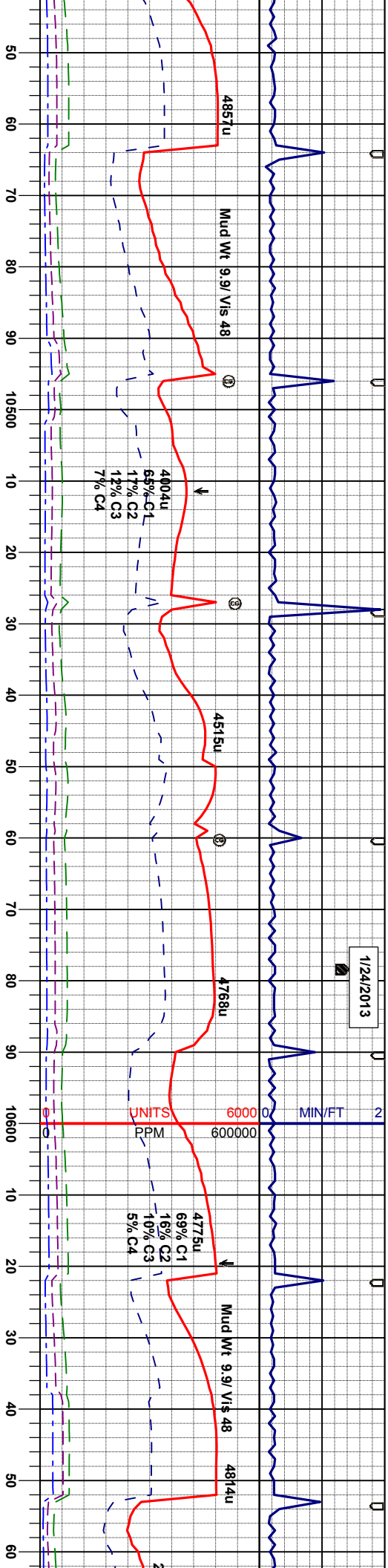
MD 10252'	INC 89.3°	AZM 1.2°	TVD 7260.4'
MD 10284'	INC 89.1°	AZM 0.8°	TVD 7260.8'
MD 10316'	INC 89.5°	AZM 1.4°	TVD 7261.2'
MD 10348'	INC 89.6°	AZM 1.4°	TVD 7261.5'
MD 10379'	INC 89.1°	AZM 0.0°	TVD 7261.8'
MD 10411'	INC 89.1°	AZM 0.7°	TVD 7262.3'
MD 10443'	INC 89.1°	AZM 0.7°	TVD 7262.8'

CHK: It gy, wh, sft, sb ply& biky, rthy-sb wxy lstr, mot
tex, v calc, w/ occ fos, inbnd w/ MRL: m-dk gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flr,
stng lt-m yel/blu cut, lt yel stn, n od

CHK: It gy, wh, sft, sb ply& biky, rthy-sb wxy lstr, mot
tex, v calc, w/ occ fos, inbnd w/ MRL: m-dk gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flr,
stng lt-m yel/blu cut, lt yel stn, n od

CHK: It gy, wh, sft, sb ply& biky, rthy-sb wxy lstr, mot
tex, v calc, w/ occ fos, inbnd w/ MRL: m-dk gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flr,
stng lt-m yel/blu cut, lt yel stn, n od





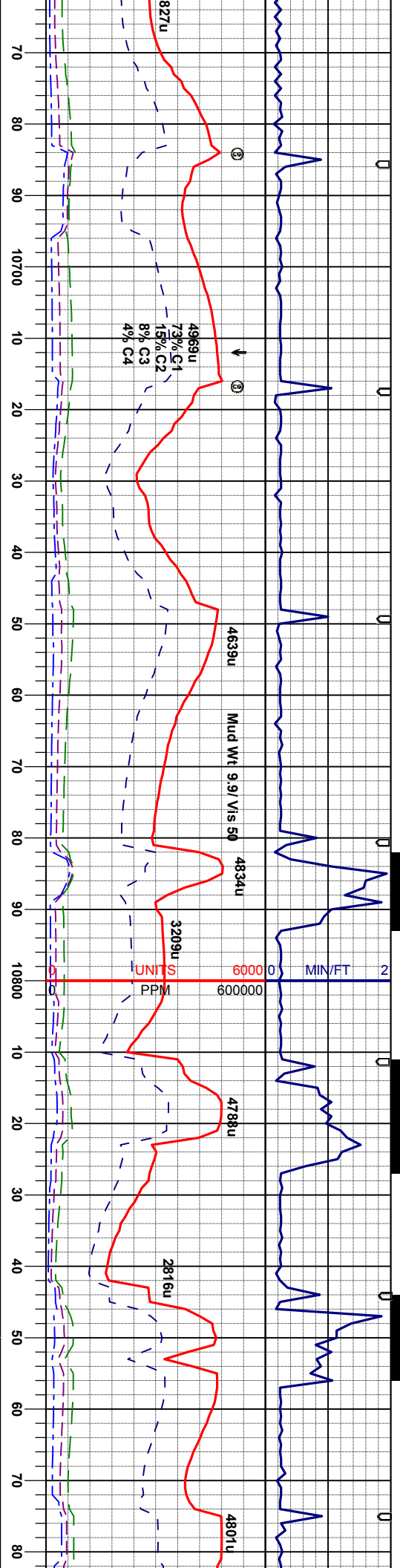
MD 10475' INC 89.3° AZM 0.3° TVD 7263.1'	MD 10506' INC 89.3° AZM 0.8° TVD 7263.5'	MD 10538' INC 89.4° AZM 1.0° TVD 7263.9'	MD 10570' INC 89.3° AZM 0.3° TVD 7264.3'	MD 10602' INC 89.2° AZM 0.5° TVD 7264.7'	MD 10633' INC 89.3° AZM 0.7° TVD 7265.1'
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CHK: It gy, wh, sft, sb ply& bly, rthy-sb wvy lsir, mot
tex, v calc, w/ occ fos, intbd w/ MRL, m-dk gy & blk, sft
-frm, sb bly, rthy, mot tex, v calc, tr fos, tr bent flor,
sting lt-m yel/blu cut, lt yel sin, n od

CHK: It gy, wh, sft, sb ply& bly, rthy-sb wvy lsir, mot
tex, v calc, w/ occ fos, intbd w/ MRL, m-dk gy & blk, sft
-frm, sb bly, rthy, mot tex, v calc, tr fos, tr bent flor,
sting lt-m yel/blu cut, lt yel sin, n od

CHK: It gy, wh, sft, sb ply& bly, rthy-sb wvy lsir, mot
tex, v calc, w/ occ fos, intbd w/ MRL, m-dk gy & blk, sft
-frm, sb bly, rthy, mot tex, v calc, tr fos, tr bent flor,
sting lt-m yel/blu cut, lt yel sin, n od





h, sft, sb ply& biky, rthy-sb wxy lst, mot
occ fos, imbd w/ MRL: m-dk gy & blk, sft
rthy, mot tex, v calc, tr fos, tr bent flor,
blu cut, lt yel stn, n od

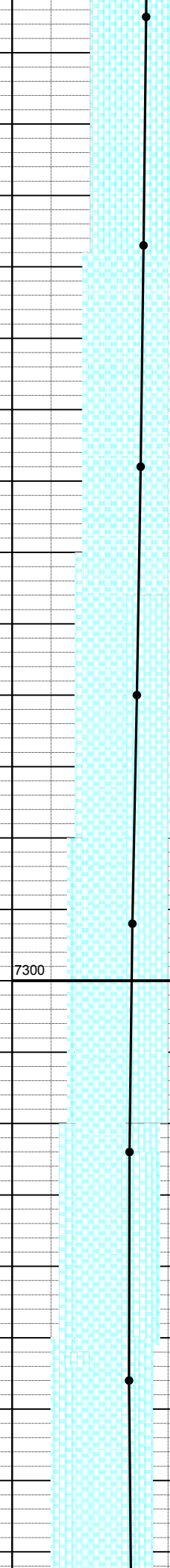
CHK: lt gy, wh, sft, sb ply& biky, rthy-sb wxy lst, mot
tex, v calc, w/ occ fos, imbd w/ MRL: m-dk gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent flor,
slimg itm yell/blu cut, lt yel stn, n od

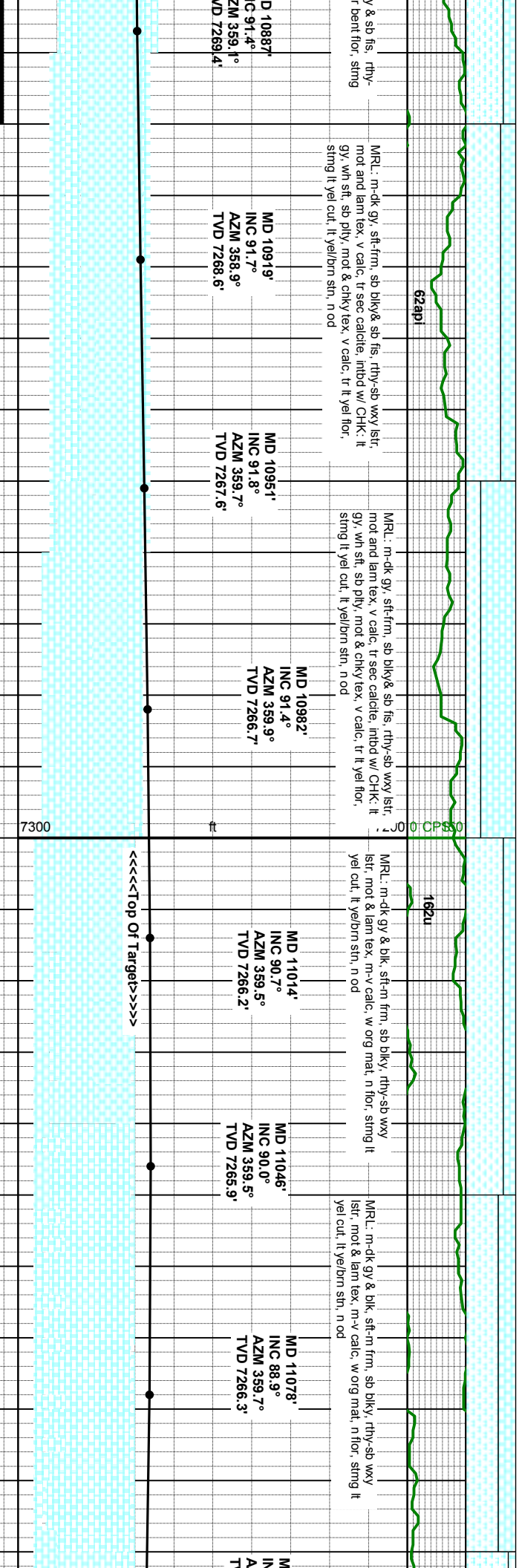
CHK: lt gy, wh, sft, sb ply& biky, rthy-sb wxy lst, mot
tex, v calc, w/ occ fos, imbd w/ MRL: m-dk gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, tr bent

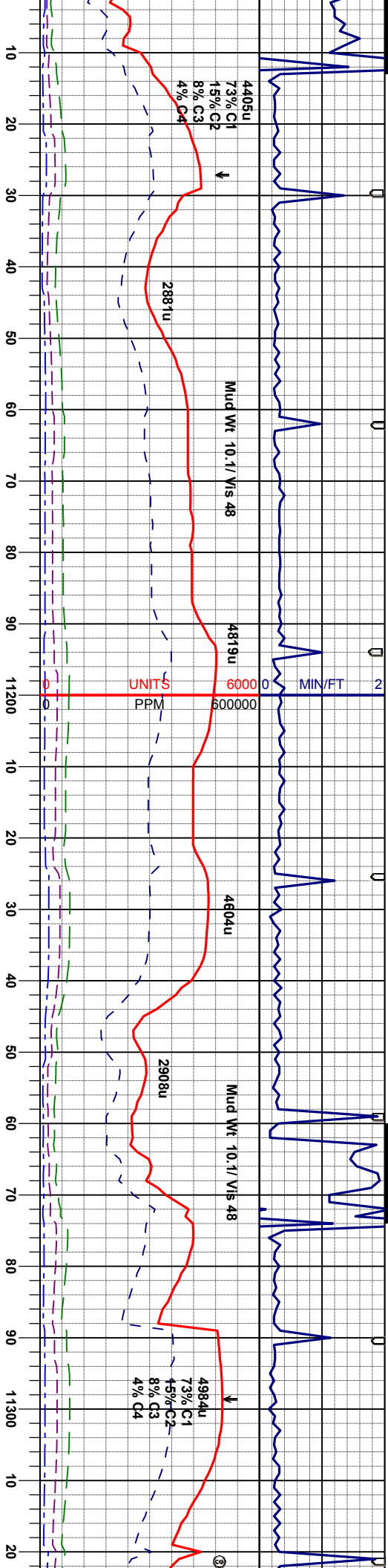
CHK: lt gy, wh, sft, sb ply & biky, rthy-sb wxy lst, mot
tex, v calc, w/ occ fos, imbd w/ MRL: m-dk gy & blk, sft
-frm, sb biky, rthy, mot tex, v calc, tr fos, sme bent

MRL: m-dk gy & blk, sft-frm, sb blk
sb wxy lst, mot tex, v calc, w/ tr fos,
m yell/blu cut, lt yel/bm stn, n od

10665' INC 88.7° AZM 359.6° TVD 7266.6'	MD 10697' INC 88.7° AZM 358.6° TVD 7266.3'	MD 10728' INC 88.6° AZM 358.4° TVD 7266.9'	MD 10760' INC 87.8° AZM 357.0° TVD 7267.9'	MD 10792' INC 88.1° AZM 356.8° TVD 7269.1'	MD 10824' INC 89.2° AZM 357.2° TVD 7269.9'	MD 10856' INC 90.5° AZM 358.4° TVD 7270.0'
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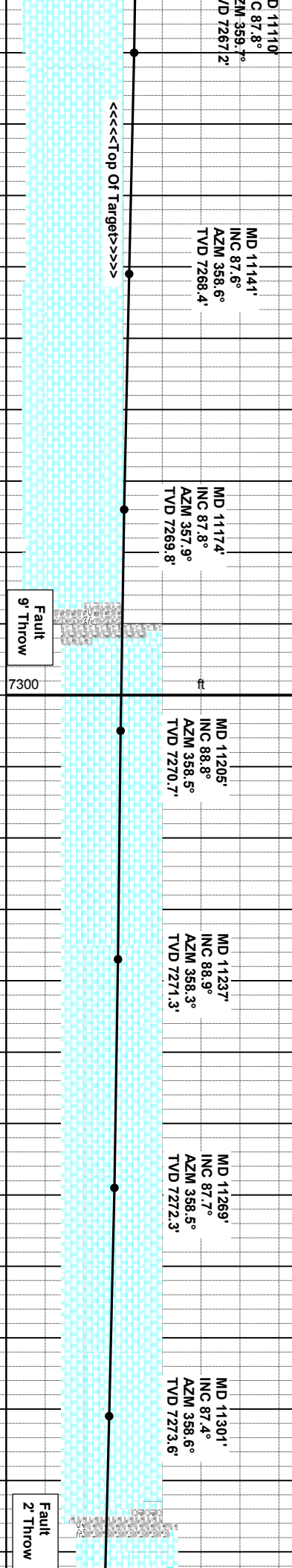
MR.L: m-dk gy, sft-frm, sb blk& sb fis, rthy-sb wxy lst, mot and lam tex, v calc, tr sec calcite, intbd w/CHK; it gy, wh sft, sb ply, mot & chky tex, v calc, tr it yel flr, string it yel cut, lt yel/bm sin, n od

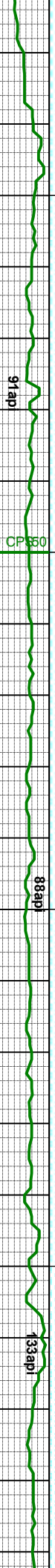
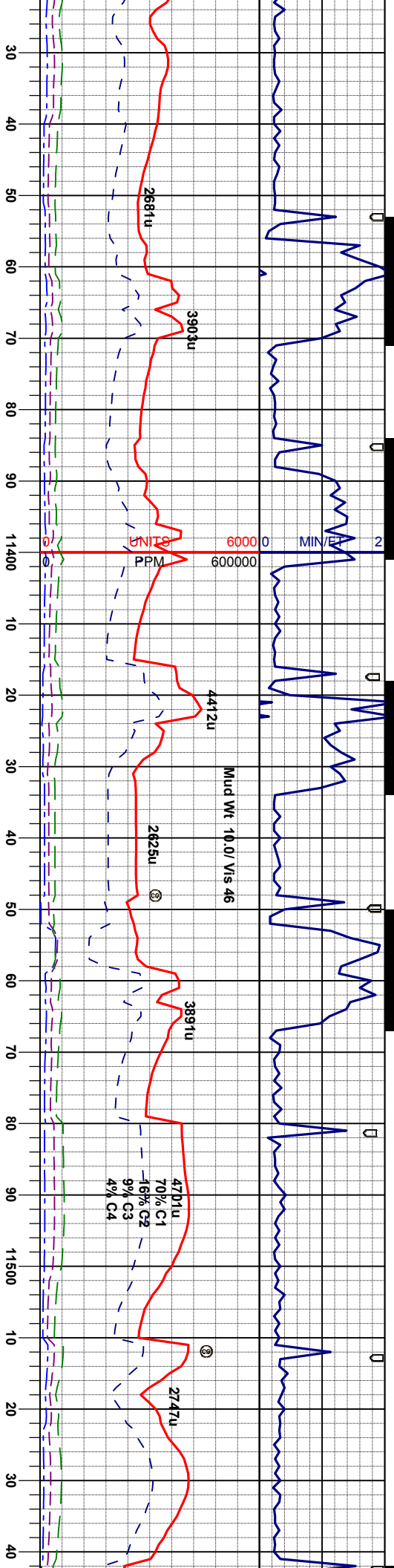
MR.L: m-dk gy, sft-frm, sb blk& sb fis, rthy-sb wxy lst, mot and lam tex, v calc, tr sec calcite, intbd w/CHK; it gy, wh sft, sb ply, mot & chky tex, v calc, tr it yel flr, string it yel cut, lt yel/bm sin, n od

CHK: lt gy, wh, sft, sb ply & blk, rthy-sb wxy lst, mot tex, v calc, w/ ooc fos, intbd w/ MR.L: m-dk gy & blk, sft-frm, sb blk, rthy, mot tex, v calc, tr fos, sme bent

CHK: lt gy, & wh, sft, sb blk, rthy lst, silty-mot tex, tr fos, cleaner chalk, v calc, tr it yel blu hor, string it yel cut, lt yel/bm sin, n od

CHK: lt gy, & wh, sft, sb blk, rthy lst, silty-mot tex, tr fos, cleaner chalk, v calc, tr it yel blu hor, string it yel cut, lt yel/bm sin, n od





<p>MR.L: m-dk, gy, & blk, sft, sb biky, rthy-sb wxy/sr, mot and sb grry tex, occ fos, v calc w/ ogr mat, occ bent, n flor, smg it yel cut, it yel bn shn, n od</p>	<p>MR.L: m-dk, gy, & blk, sft, sb biky, rthy-sb wxy/sr, mot and sb grry tex, occ fos, v calc w/ ogr mat, occ bent, n flor, smg it yel cut, it yel bn shn, n od</p>	<p>MR.L: m-dk, gy, & blk, sft, sb biky, rthy-sb wxy/sr, mot and sb grry tex, occ fos, v calc w/ ogr mat, occ bent, n flor, smg it yel cut, it yel bn shn, n od</p>
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