



Scale: 5" / 100'
Measured Depth Log

Well Name Waste Management 2L-421

Location SESW SEC 2 T2N R64W

State Colorado

Country USA

API Number 05-123-36957-0000

Region Wattenberg

Spud Date 7/16/2013

Surface Coordinates 230' FSL x 2080' FWL

Bottom Hole Coordinates 501' FNL x 1825' FWL

County Weld

Rig Number Ensign 14

Field Wattenberg

Drilling Completed 7/25/2013

Ground Elevation 4934'

K.B. Elevation 4949'

Logged Interval 6300' To 11433'

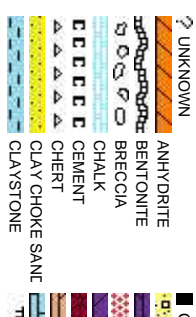
Total Depth 11433'

Formation Shannon, Sharon spgs, Niobrara, Ft. Hayes, Codell

Type of Drilling Fluid LSND

Company PDC Energy Inc.
Address 1775 Sherman Street, Ste 3000
Denver , CO 80203

Name Brian Hoffman
Company PDC Energy
Address 1775 Sherman Denver , CO 80



Operator

Geologist

Street, Ste 3000
20

Rock Types

AL	CONGLOMERATE	METAMORPHIC	SHALY SILTSTONE
g, b, o, b	DOLomite	X X X X X X NO SAMPLE	SILTY SHALE
	GRANITE	SALT	SILTSTONE
	GYPSUM	SANDSTONE	TILL
	IGNEOUS	SALT-PEPPER SANT	TUFF
	SIDERITE or LIMONITE	SHALE	WELDED TUFF
	LIMESTONE	SHALE COLORED	
tt tt	MARLSTONE	SHALE GRAY	
		SHALY SANDSTONE	

Accessories

Fossils	F FOSSIL	ARGILLACEOUS	GLAUCONITE	TUFFACEOUS
GASTROPOD	ARGILLITE GRAIN	GYPSIFEROUS		
ALGAE	OOLITE	B BENTONITE	HEAVY MINERAL	
AMPHIROA	OSTRACOD	BITUMENOUS SUBSTANCE	INOCERAMUS	ANHYDRITE STRINGER
BELEMITE	PELECYPOD	BRECCIA FRAGMENTS	KAOLIN	BENTONITE STRINGER
BIOCLASTIC	PELLET	CALCAREOUS	MARLSTONE	COAL STRINGER
BRACHIOPOD	PISOLITE	CARBONACEOUS FLAKES	MINERAL CRYSTALS	DOLomite STRINGER
BRYOZOA	PLANT REMAINS	CHTDK	NODULES	GYPSUM STRINGER
CEPHALOPOD	PLANT SPORES	CHTLT	PHOSPHATE PELLET:	LIMESTONE STRINGER
CORAL	SCAPHOPOD	COAL - THIN BEDS	PYRITE	MARLSTONE (CALC) STRG
CRINOID	STROMATOPOROID	DOLOMITIC	SALT CAST	MARLSTONE (DOL) STRG
ECHINOID		FELDSPAR	SANDY	SANDSTONE STRINGER
FISH				SHALE STRINGER
FORAMINIFERA	ANHYDRITIC	FERRUGINOUS	SILICEOUS	SILTSTONE STRINGER
			SILTY	

Other Symbols

Oil Show	MOLDIC	FAULT	WIRELINE TESTED - LEFT	E EARTHY
ORGANIC	P PINPOINT	FORMATION TOP	WIRELINE TESTED - RT	FX FINELYXLN
DEAD	VUGGY	GAS SHOW		ES GRAINSTONE
EVEN		MINDEPTH MN DEPTH		L LITHOGRAPHIC
QUESTIONABLE				
SPOTTED STAINING				
Engineering	NORMAL FAULT	ANGULAR		MX MICROXLN
BIT	OIL SHOW	ROUNDED		MS MUDSTONE
CONNECTION (LEFT)	OVERTURNED STRATA	SUBANG		PS PACKSTONE
CONNECTION (RIGHT)	REVERSE FAULT	SUBRND		WS WACKSTONE
CONNECTION GAS	SIDEWALL CORE (LEFT)			
CONNECTION GAS	SIDEWALL CORE (RIGHT)			
Textures				
FRACTURE	CORE - LOST	SLIDE		BS BOUNDSTONE
INTERCRYSTALLINE	CORE - RECOVERED	SURVEY		C CHALKY
INTEROOLITIC	DST INTERVAL	TRIP GAS		CX CRYPTOXLN
				M MODERATE
				P POOR
				W WELL

Slide/Rotate

ROP
ROF
GAMMA

Columbine Logging
2-Manned Geosteering
Operational 7/19/2013
Bloodhound # 707

Total Gas & Chromatograph
GAS
C1
C2
C3
C4
CO2

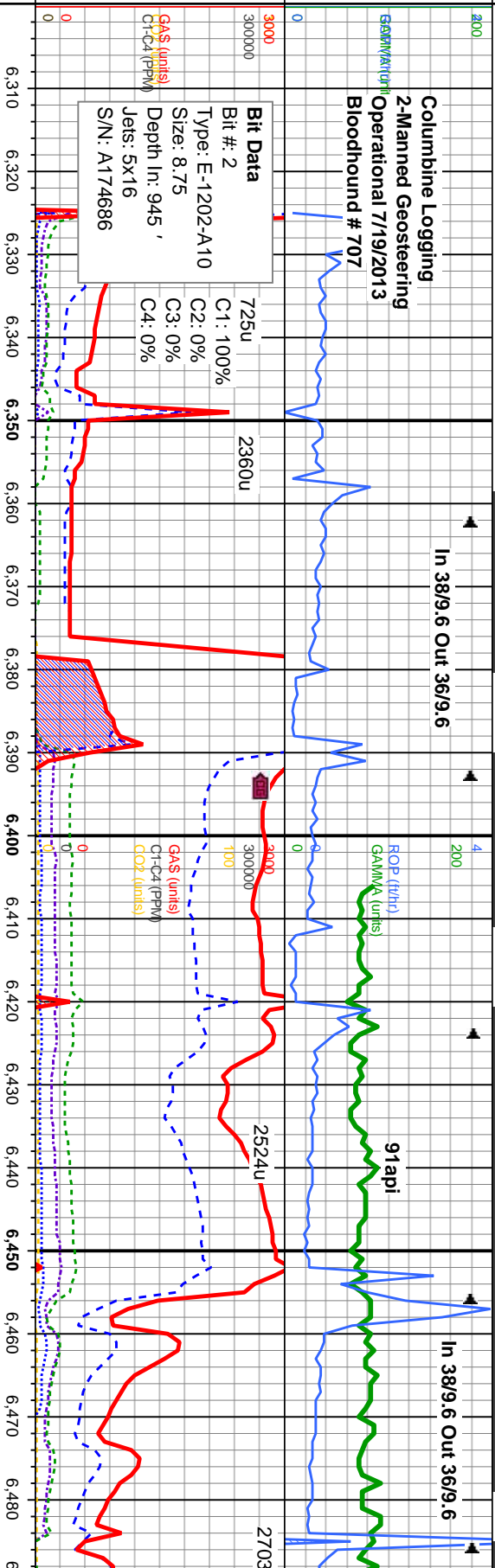
Depth Labels

% Lith

Well Bore
TVD

Oil Show

Images



MD: 6,313'
TVD: 6,291.43'
Inclination: 2.3°
Azimuth: 19°
VS: -140.41°

MD: 6,377'
TVD: 6,355.13'
Inclination: 7.5°
Azimuth: 14.6°
VS: -135.37°

MD: 6,408'
TVD: 6,385.82'
Inclination: 9.1°
Azimuth: 13°
VS: -131.17°

MD: 6,471'
TVD: 6,447.62'
Inclination: 13.5°
Azimuth: 4.6°
VS: -119.22°

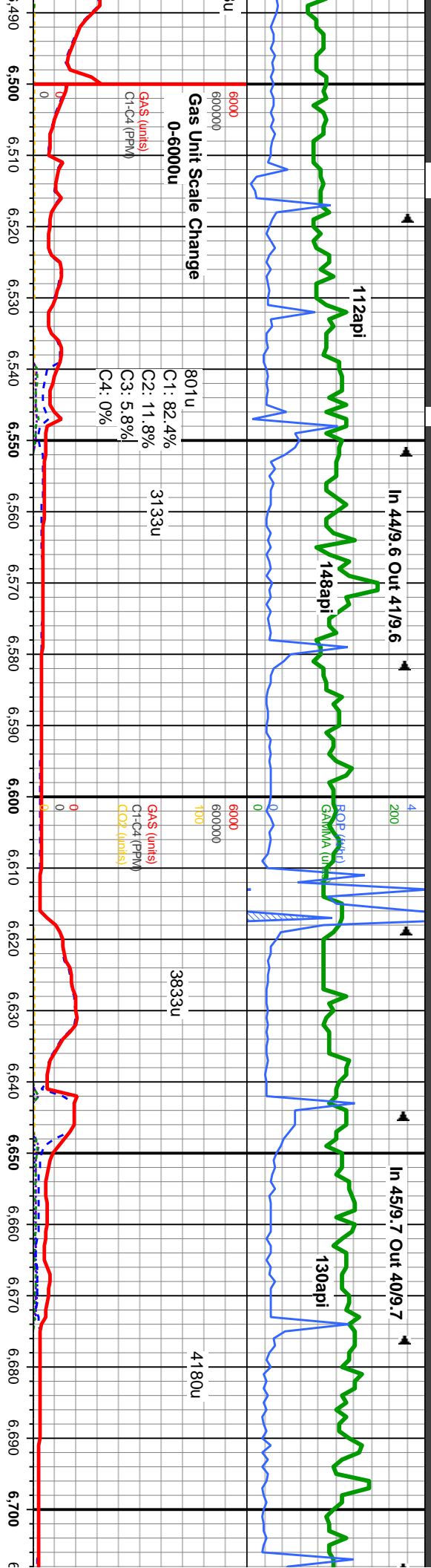
SLTY SH: lt-m gy, sft, sb ply, rthy-grty tex, sl calc, w/ occ carb lams, grdg to SHLY SLTST: lt gy, sft, sb ply, rthy, silty sl calc, SHLY SS: ltgy, s&p, vfgr, ang-sb rd, w strd, m consol, sl calc cmt, n vis por n flor, fnt tr lt yel cut, n sin

SLTY SH: lt-m gy, sft, sb ply, rthy-grty tex, sl calc, w/ occ carb lams, grdg to SHLY SLTST: lt gy, sft, sb ply, rthy, silty sl calc, SHLY SS: ltgy, s&p, vfgr, ang-sb rd, w strd, m consol, sl calc cmt, n vis por n flor, fnt tr lt yel cut, n sin

SLTY SH: lt-m gy, sft, sb ply, rthy-grty tex, sl calc, w/ occ carb lams, grdg to SHLY SLTST: lt gy, sft, sb ply, rthy, silty sl calc, SHLY SS: ltgy, s&p, vfgr, ang-sb rd, w strd, m consol, sl calc cmt, n vis por n flor, fnt tr lt yel cut, n sin

TR
P
FR
G
E





MD: 6,503'
TVD: 6,478.56'
Inclination: 15.1°
Azimuth: 4.9°
VS: -111.32'

MD: 6,535'
TVD: 6,509.27'
Inclination: 17.1°
Azimuth: 6.7°
VS: -102.27'

MD: 6,567'
TVD: 6,539.42'
Inclination: 20.4°
Azimuth: 5.4°
VS: -92.03'

MD: 6,599'
TVD: 6,569.16'
Inclination: 23.1°
Azimuth: 4.4°
VS: -80.45'

SLTY SH: lt-m gy, sft, sb ply, rthy-grty tex, sl calc, w/ occ carb lams, grdg to SHLY SLTST: lt gy, sft, sb ply, rthy, silty sl calc, SHLY SS: ltgy, s&p, vfgr, ang-sb rd, w strd, m consol, sl calc cnt, n vis por n flor, fnt tr lt yel cut, n sin

SLTY SH: lt-m gy, sft, sb ply, rthy-grty tex, sl calc, w/ occ carb lams, grdg to SHLY SLTST: lt gy, sft, sb ply, rthy, silty sl calc, fnt tr lt yel cut, n sin

Sharon Spgs @
MD 6680' / TVD 66642'

grty tex, sl
Y SLTST:
SLTY SH: lt-m gy, sft, sb ply, rthy-grty tex, sl calc, w/ occ carb lams, grdg to SHLY SLTST: lt gy, sft, sb ply, rthy, silty sl calc, SHLY SS: ltgy, s&p, vfgr, ang-sb rd, w strd, m consol, sl calc cnt, n vis por n flor, fnt tr lt yel cut, n sin

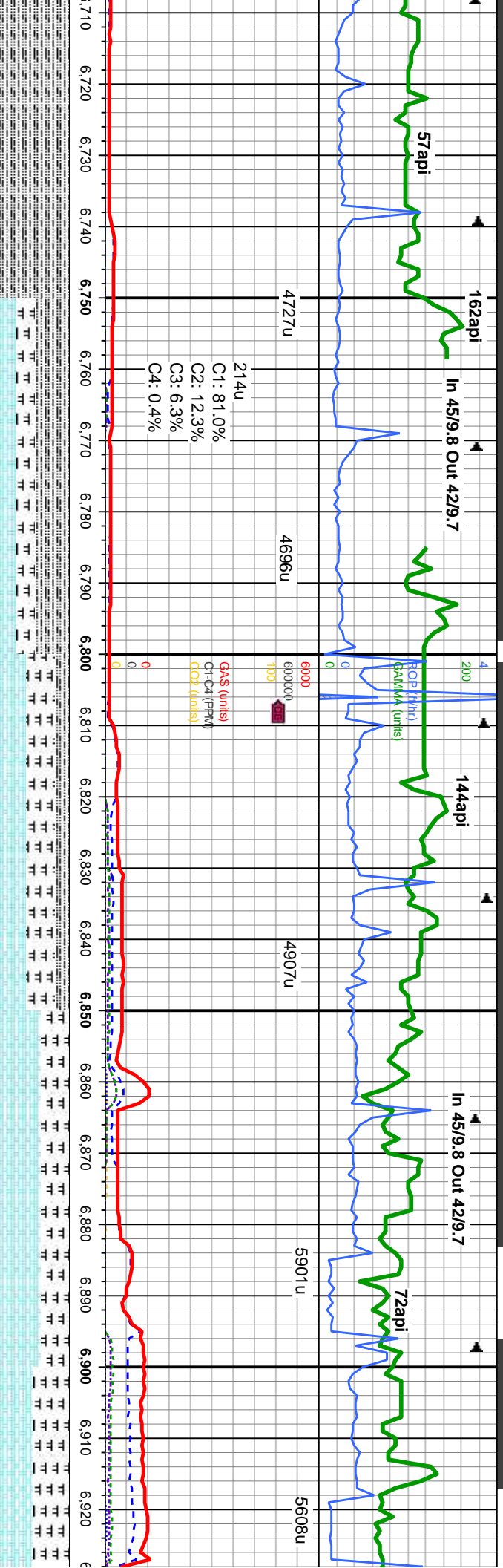
SLTY SH: lt-m gy, sft, sb ply, rthy-grty tex, sl calc, w/ occ carb lams, grdg to SHLY SLTST: lt gy, sft, sb ply, rthy, silty sl calc, SHLY SS: ltgy, s&p, vfgr, ang-sb rd, w strd, m consol, sl calc cnt, n vis por n flor, fnt tr lt yel cut, n sin

MD: 6,630'
TVD: 6,597.57'
Inclination: 24.2°
Azimuth: 5.6°
VS: -68.3'

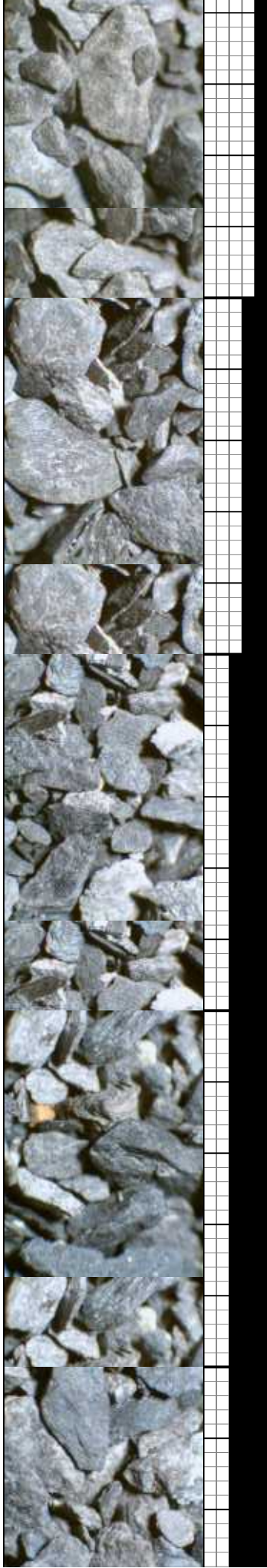
MD: 6,662'
TVD: 6,626.31'
Inclination: 27.1°
Azimuth: 6.3°
VS: -54.6'

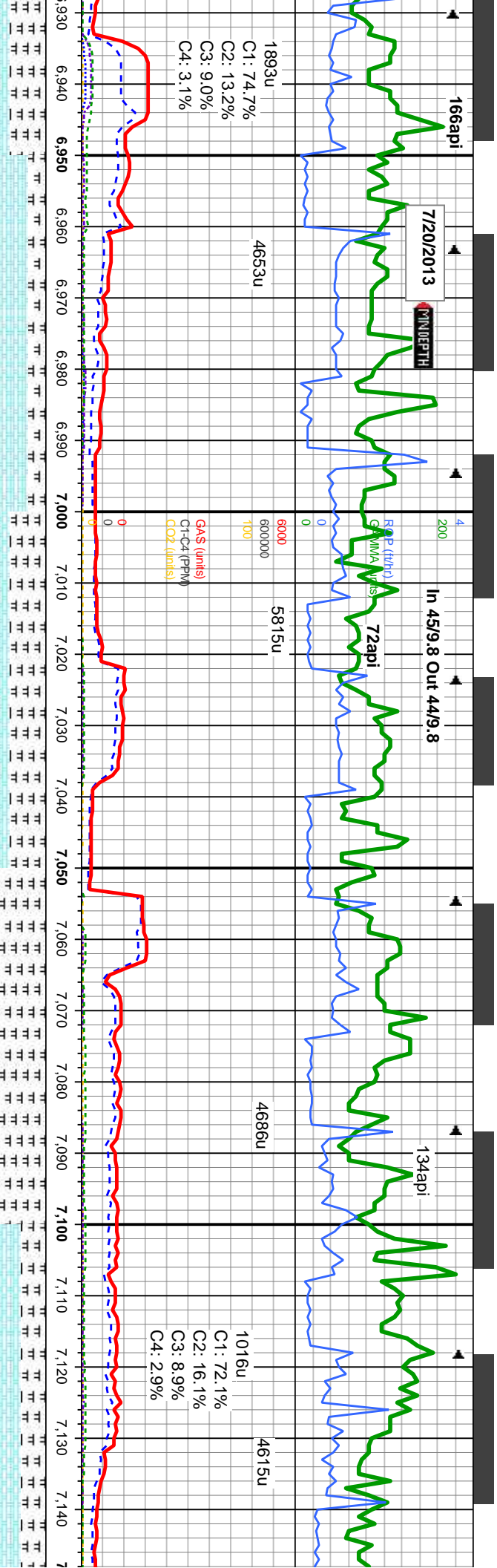
MD: 6,694'
TVD: 6,654.26'
Inclination: 30.4°
Azimuth: 8.6°
VS: -39.46'

SLTY SH: lt-m gy, sft, sb ply, rthy-grty tex, sl calc, w/ occ carb lams, grdg to SHLY SLTST: lt gy, sft, sb ply, rthy, silty sl calc, fnt tr lt yel cut, n sin



SH: lt-m gy, sft, sb ply, rthy-grty tex, sl / occ carb lams, grgd to SHLY : lt gy, sft, sb ply, rthy, silty sl calc, fnt cut, n stn	SLTY SH: lt-m gy, gy rdn sft, sb blk& ply, rthy lstr, silty tex, v sl calc cmt, n flor, CHK: lt -m gy, off wh, sft, sb blk, rthy-sb wxy lstr, mot & fos tex, v calc, wi tr fos, tr lt gn flor, fast stmg bri yel cut lt yel brn stn. MRLST: m-dk gy & blk, sft, sb blk, rthy-sb wxy, mot tex, v calc, wi org mat, n flor, stmg bri yel cut lt yel brn stn	
	MD: 6,728' TVD: 6,678'	MD: 6,757' TVD: 6,706.87' Inclination: 36.4° Azimuth: 6.5° VS: -5.98°
Niobrara @ MD 6728' / TVD 6678'	SLTY SH: lt-m gy, gy rdn sft, sb blk& ply, lstr, silty tex, v sl calc cmt, n flor, CHK: lt -m gy, off wh, sft, sb blk, rthy-sb wxy lstr, mot & fos tex, v calc, wi tr fos, tr lt gn flor, fast stmg bri yel cut lt yel brn stn. MRLST: m-dk gy & blk, sft, sb blk, rthy-sb wxy, mot tex, v calc, wi org mat, n flor, stmg bri yel cut lt yel brn stn	
	MD: 6,725' TVD: 6,680.6' Inclination: 33.2° Azimuth: 7.7° VS: -23.71°	MD: 6,789' TVD: 6,732.1° Inclination: 36° Azimuth: 4.4° VS: 13.14°
Niobrara A @ MD 6815' / TVD 6752'	SLTY SH: lt-m gy, gy rdn sft, sb blk& ply, rthy lstr, silty tex, v sl calc cmt, n flor, CHK: lt -m gy, off wh, sft, sb blk, rthy-sb wxy lstr, mot & fos tex, v calc, wi tr fos, tr lt gn flor, fast stmg bri yel cut lt yel brn stn. MRLST: m-dk gy & blk, sft, sb blk, rthy-sb wxy, mot tex, v calc, wi org mat, n flor, stmg bri yel cut lt yel brn stn	
	MD: 6,820' TVD: 6,755.9° Inclination: 40.5° Azimuth: 1° VS: 32.77°	MD: 6,853' TVD: 6,780.41' Inclination: 43.1° Azimuth: 356.1° VS: 54.82°
	CHK: lt-m gy brn in part, s lam, rthy-sb wxy lstr, mot calc, MRL: m gy, sft, sb lstr, mot & lam tex, v calc fos, fnt, lt yel /gn flor, fast yel stn.	
	MD: 6,894' TVD: 6,802.3° Inclination: 46.2° Azimuth: 354.5° VS: 76.67°	MD: 6,916' TVD: 6,824.1° Inclination: 47.5° Azimuth: 354.7° VS: 100.0°





sft, sb blkly, sb fis.
tex w/ occ fos, v
blkly, rthy -sb wxy
w/ org mat & occ
stmg, lt-m yel cut, lt
stn.

CHK: lt-m gy brn in part, sft, sb blkly, sb fis.
lam, rthy-sb wxy lstr, mot tex w/ occ fos, v
calc, MRL: m gy, sft, sb blkly, rthy -sb wxy lstr,
mot & lam tex, v calc w/ org mat & occ fos,
fnt, lt yel /gn flr, fst stmg, lt-m yel cut, lt yel
stn.

6150

CHK: lt-m gy brn in part, sft, sb blkly, sb
fis. lam, rthy-sb wxy lstr, mot tex w/ occ
fos, v calc, MRL: m gy, sft, sb blkly, rthy
-sb wxy lstr, mot & lam tex, v calc w/ org
mat & occ fos, tr pyr, fnt, lt yel /gn flr, fst
stmg, lt-m yel cut, lt yel stn.

CHK: lt-m gy brn in part, sft, sb blkly, sb
fis. lam, rthy-sb wxy lstr, mot tex w/ occ
fos, v calc, MRL: m gy, sft, sb blkly, rthy
-sb wxy lstr, mot & lam tex, v calc w/ org
mat & occ fos, tr pyr, fnt, lt yel /gn flr, fst
stmg, lt-m yel cut, lt yel stn.

CHK: lt-m gy brn in part, sft, sb blkly, sb
fis. lam, rthy-sb wxy lstr, mot tex w/ occ
fos, v calc, MRL: m gy, sft, sb blkly, rthy
-sb wxy lstr, mot & lam tex, v calc w/ org
mat & occ fos, tr pyr, fnt, lt yel /gn flr, fst
stmg, lt-m yel cut, lt yel stn.

Niobrara B @
ID 6948' / TVD 6845'

MD: 6.948'
TVD: 6.845.2'
Inclination: 49.1°
Azimuth: 354.7°
VS: 124.1°

TVD SCALE CHANGE
6150' - 7150' TVD

MD: 6.979'
TVD: 6.864.7°
Inclination: 52.1°
Azimuth: 354.2°
VS: 148.2°

7150

Niobrara C @
MD 7.036' / TVD 6.898'

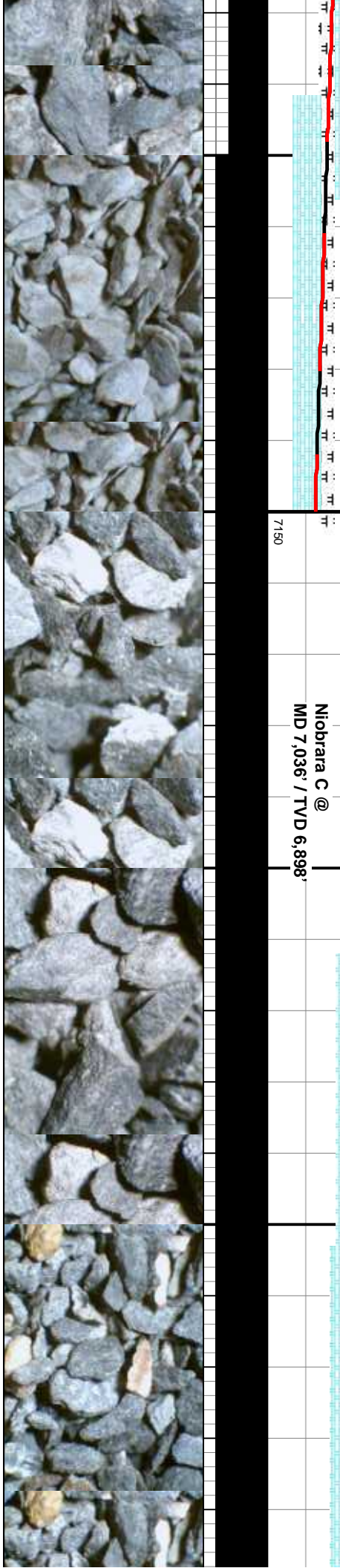
MD: 7.011'
TVD: 6.883.8°
Inclination: 54.1°
Azimuth: 353.1°
VS: 173.9°

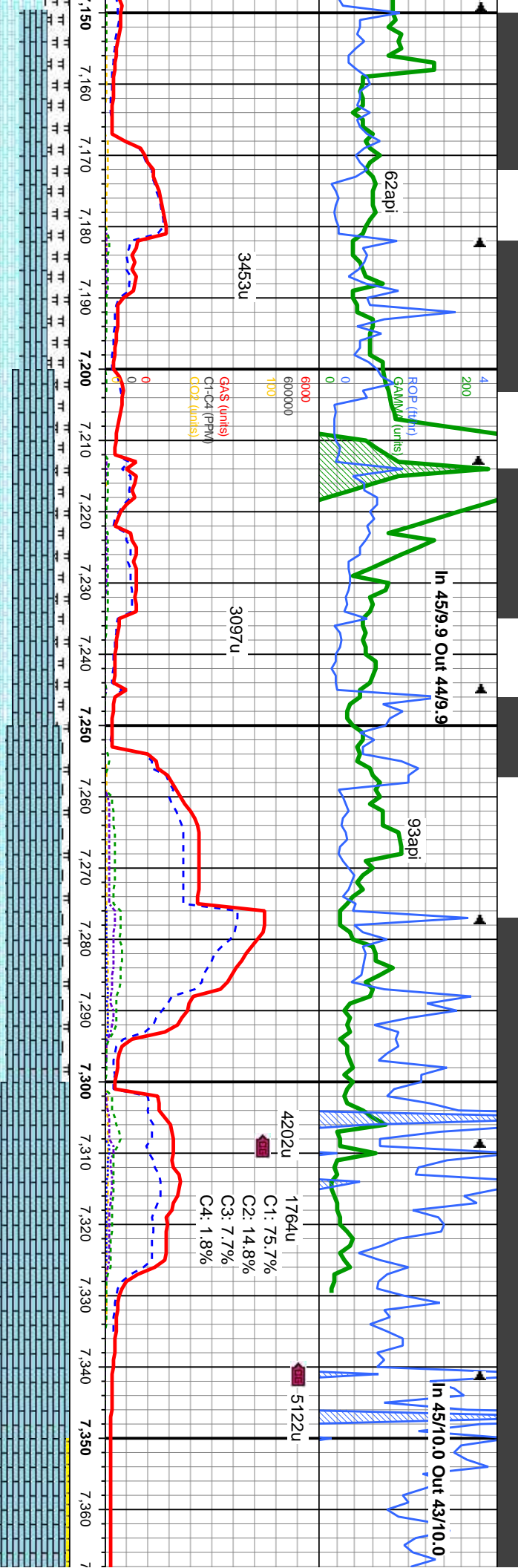
MD: 7.043'
TVD: 6.902.0°
Inclination: 56.1°
Azimuth: 352.6°
VS: 200.2°

MD: 7.074'
TVD: 6.918.7°
Inclination: 58.1°
Azimuth: 352.6°
VS: 226.3°

MD: 7.106'
TVD: 6.935.0°
Inclination: 60.1°
Azimuth: 352.6°
VS: 253.9°

MD: 7.138'
TVD: 6.950.1°
Inclination: 62°
Azimuth: 352.6°
VS: 282.1°



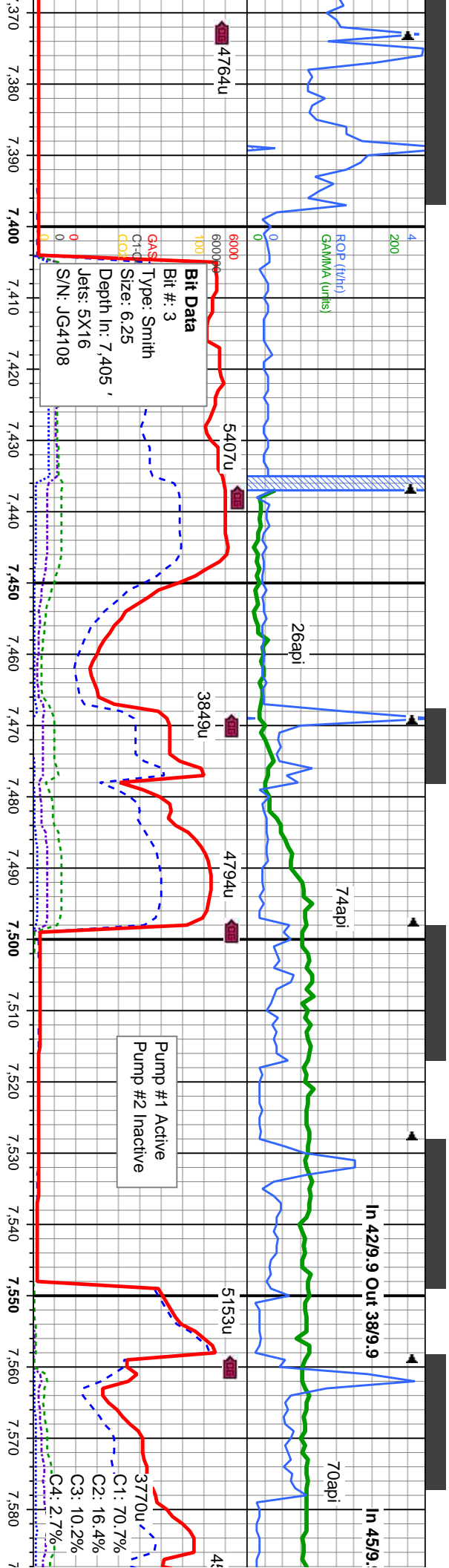


<p>LS: crm-gy brn, wh, sb pty- blk, sly mtx; v calc, wxy tex, spty yel flr, tr bent with dism pyr</p> <p>MRLST: m-dk gy, sme blk, sft, sb blk, rthy, mot tex, v calc, some fis intbdd wi chk</p> <p>CHK: med gy-med brn, sme wht, sft, sb blk, rthy-istr, mot tex, v calc wi occ fos, tr sec cal, tr pyr, med fast-fast, bl stmg cut, v sl od, no flr, pale org-yel flr ring, ft tan vis lt ring</p> <p>MD: 7,169' TVD: 6,963.6' Inclination: 65.4° Azimuth: 352.5° VS: 310'</p>	<p>LS: crm-gy brn, wh, sb pty- blk, sly mtx; v calc, wxy tex, spty yel flr, tr bent with dism pyr</p> <p>MRLST: m-dk gy, sme blk, sft, sb blk, rthy, mot tex, v calc, some fis intbdd wi chk</p> <p>CHK: med gy-med brn, sme wht, sft, sb blk, rthy-istr, mot tex, v calc wi occ fos, tr sec cal, tr pyr, med fast-fast, bl stmg cut, v sl od, no flr, pale org-yel flr ring, ft tan vis lt ring</p> <p>MD: 7,201' TVD: 6,976.3' Inclination: 65° Azimuth: 353.5° VS: 339.3'</p>	<p>LS: crm-gy brn, wh, sb pty- blk, sly mtx; v calc, wxy tex, spty yel flr, tr bent with dism pyr</p> <p>MRLST: m-dk gy, sme blk, sft, sb blk, rthy, mot tex, v calc, some fis intbdd wi chk</p> <p>CHK: med gy-med brn, sme wht, sft, sb blk, rthy-istr, mot tex, v calc wi occ fos, tr sec cal, tr pyr, med fast-fast, bl stmg cut, v sl od, no flr, pale org-yel flr ring, ft tan vis lt ring</p> <p>MD: 7,265' TVD: 6,998.1' Inclination: 71.5° Azimuth: 355.5° VS: 399.5'</p>	<p>LS: wh, tan, crm, sft-m grm, sb pty rthy-smth lstr, mic xl-fos tex, v calc, tr slyshy, tr dism pyr, n flr, tr stmg yel cut, n str, vtr ss, tr sh</p> <p>MD: 7,329' TVD: 7,014.9' Inclination: 78° Azimuth: 356.5° VS: 461.1'</p>	<p>LS: wh, tan, crm, sft-m grm, sb pty rthy-smth lstr, mic xl-fos tex, v calc, tr slyshy, tr dism pyr, n flr, tr stmg yel cut, n str, vtr ss, tr sh</p> <p>MD: 7,360' TVD: 7,020.1' Inclination: 82.4° Azimuth: 356.7° VS: 491.6'</p>
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Fort Hayes @
MD 7,159' / TVD 6,959'

7150





61S: lt-m gybm, tnsl, lrg transp qtz gm, clusters, m-f gr, ang-sb rd, m-w strd, n calc, tr - mod vis por; LS: wh, tan, crm, sft-m grfm, sb pty rthy-smth lstr, mic xl-fos tex, v calc, tr stlysh, tr dism pyr, n flor, tr stmg yel cut, n str, vtr ss	SS: lt-m gybm, tnsl, lrg transp qtz gm, clusters, m-f gr, ang-sb rd, m-w strd, n calc, tr - mod vis por; LS: wh, tan, crm, sft-m grfm, sb pty rthy-smth lstr, mic xl-fos tex, v calc, tr stlysh, tr dism pyr, n flor, tr stmg yel cut, n str	SS: lt-m gybm, tnsl, lrg transp qtz gm, clusters, m-f gr, ang-sb rd, m-w strd, n calc, tr - mod vis por; LS: wh, tan, crm, sft-m grfm, sb pty rthy-smth lstr, mic xl-fos tex, v calc, tr stlysh, tr dism pyr, n flor, tr stmg yel cut, n str	SS: lt-m gybm, tnsl, lrg transp qtz gm, clusters, m-f gr, ang-sb rd, m-w strd, n calc, tr - mod vis por; LS: wh, tan, crm, sft-m grfm, sb pty rthy-smth lstr, mic xl-fos tex, v calc, tr stlysh, tr dism pyr, n flor, tr stmg yel cut, n str
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MD: 7,405' TVD: 7,024.21' Inclination: 87.1° Azimuth: 356.7° VS: 536.4'

MD: 7,412' TVD: 7,024.62' Inclination: 86.1° Azimuth: 358.8° VS: 527.86'

MD: 7,443' TVD: 7,026.62' Inclination: 86.4° Azimuth: 357.4° VS: 558.81'

MD: 7,473' TVD: 7,028.48' Inclination: 86.6° Azimuth: 357.4° VS: 588.76'

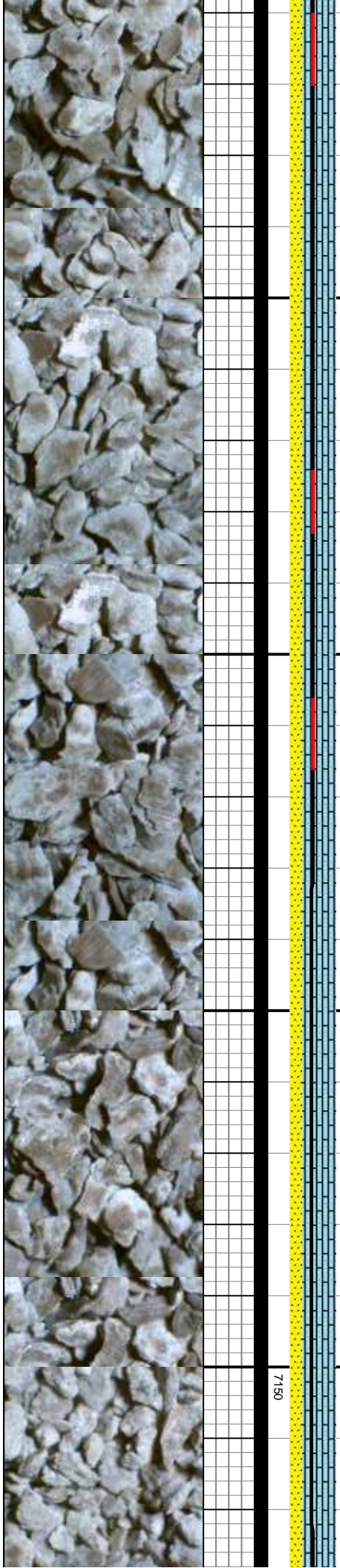
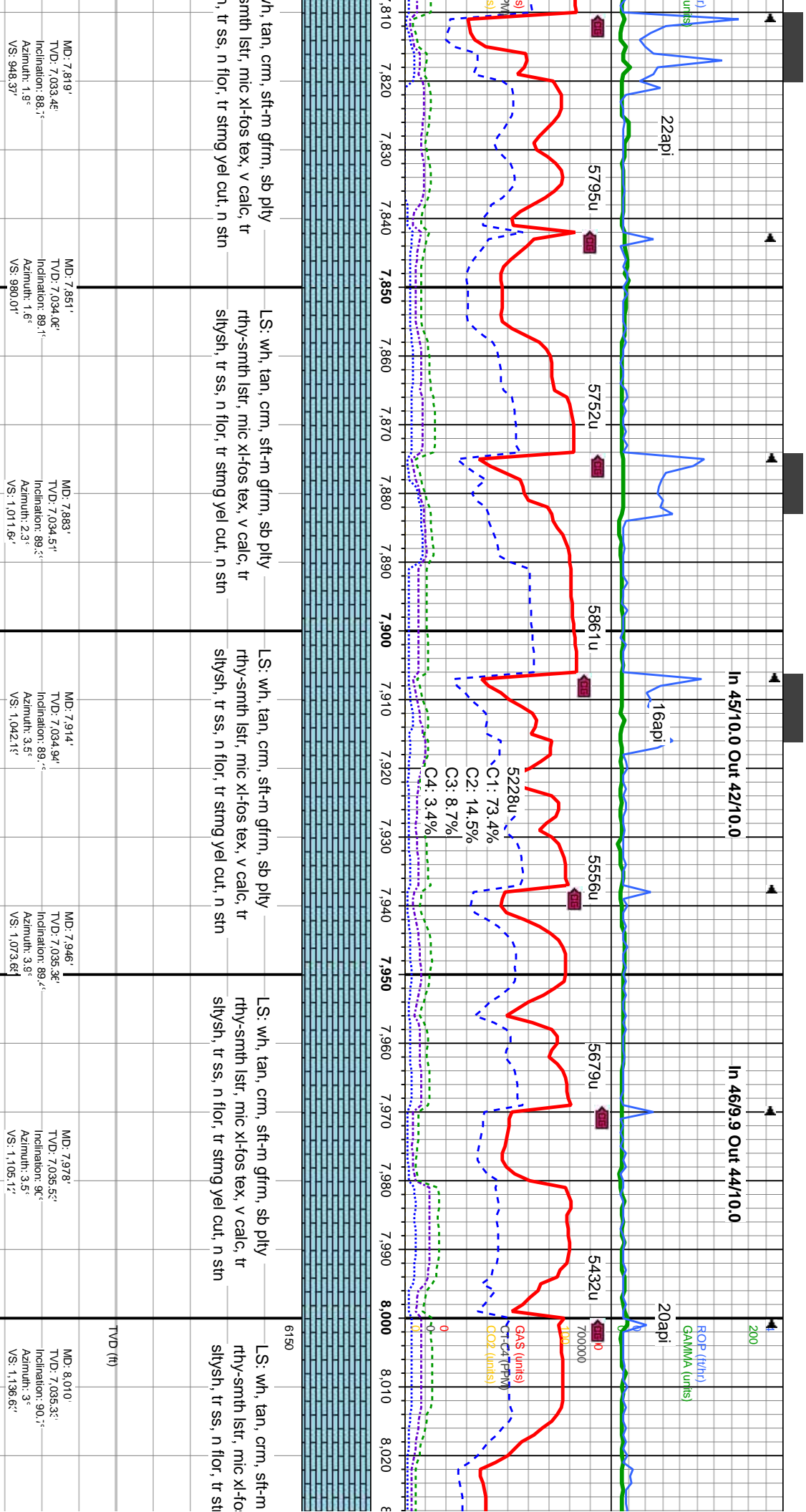
MD: 7,504' TVD: 7,030.11' Inclination: 87.4° Azimuth: 357.4° VS: 634.92'

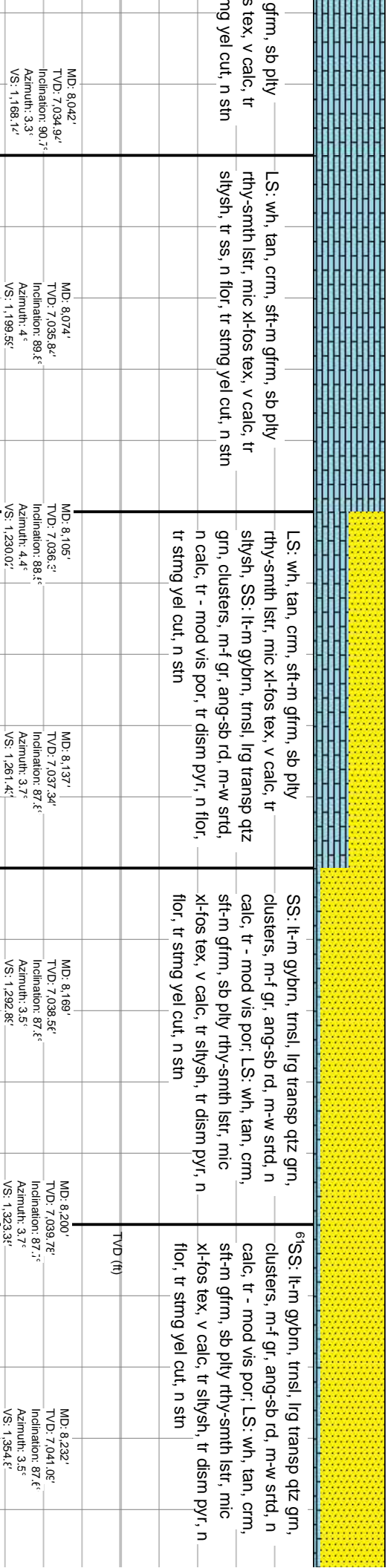
MD: 7,534' TVD: 7,031.16' Inclination: 88.1° Azimuth: 356.7° VS: 664.86'

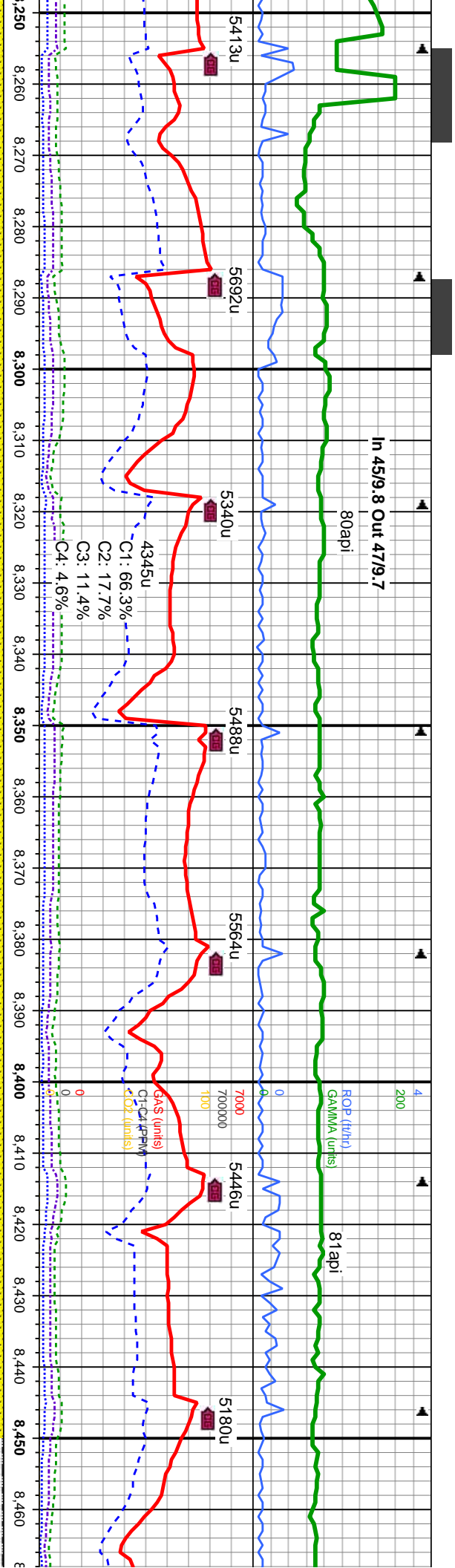
MD: 7,565' TVD: 7,031.57' Inclination: 90.1° Azimuth: 355.5° VS: 695.78'

7130

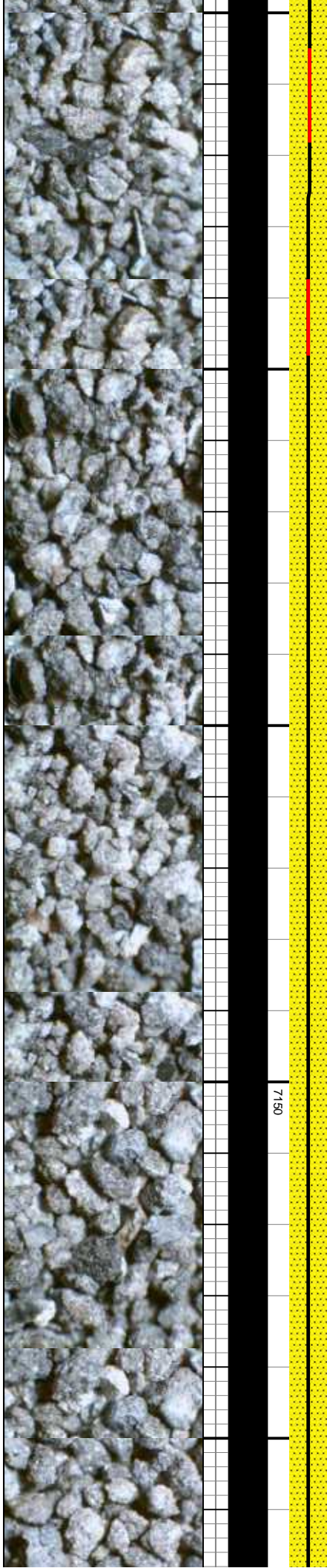


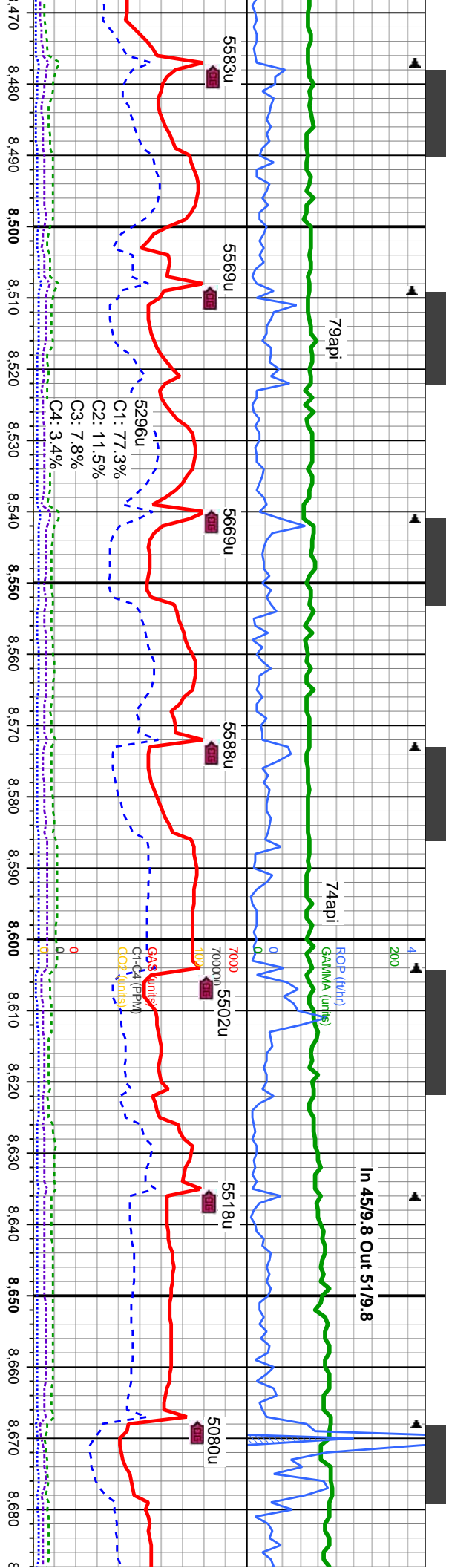




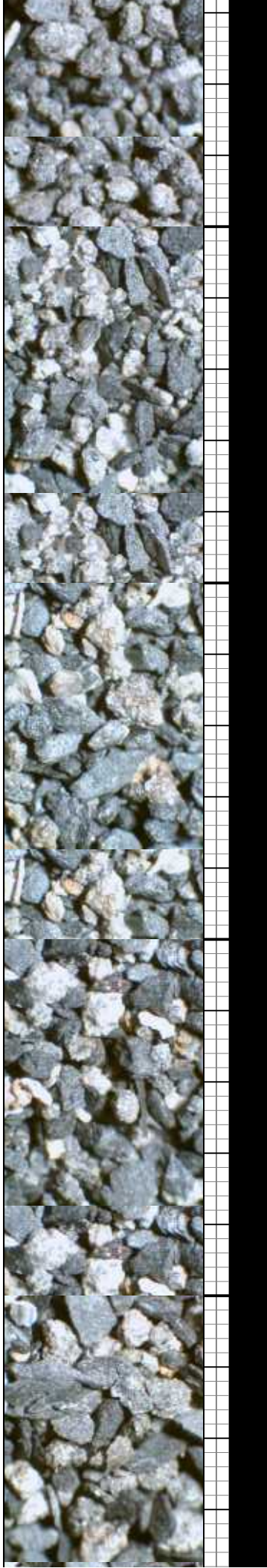
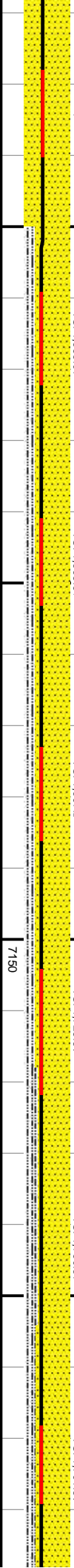


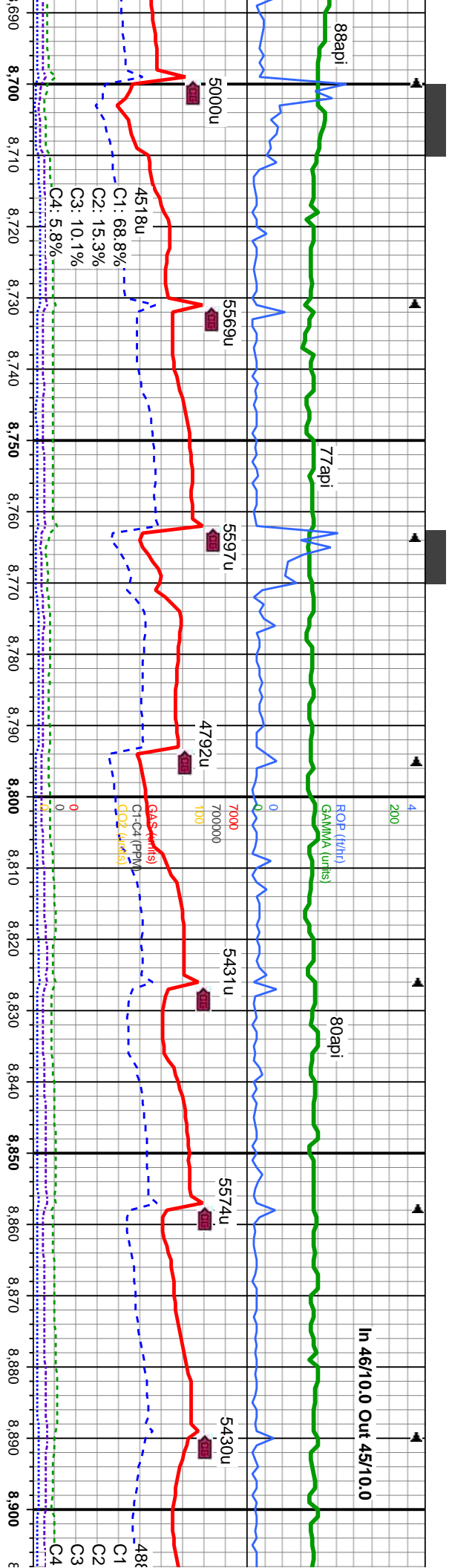
SS: lt-m gybrn, trns, lrg transp qtz grn, clusters, m-f gr, ang-sb rd, m-w strd, n calc, tr - mod vis por; LS: wh, tan, crm, sft-m gfrn, sb ply rthy-smth lstr, mic xl-fos tex, v calc, tr stlysh, tr disn pyr, n flor, tr sting yel cut, n stn	MD: 8.264' TVD: 7.042.25' Inclination: 88.1° Azimuth: 4.2° VS: 1.386.25'	MD: 8.296' TVD: 7.043.13' Inclination: 88.5° Azimuth: 4.7° VS: 1.417.6'
	MD: 8.327' TVD: 7.043.62' Inclination: 89.5° Azimuth: 4.9° VS: 1.447.9'	MD: 8.359' TVD: 7.044.07' Inclination: 89.1° Azimuth: 4.9° VS: 1.479.3'
SS: lt-m gybrn, trns, lrg transp qtz grn, clusters, m-f gr, ang-sb rd, m-w strd, n calc, tr - mod vis por; n flor, tr sting yel cut, n stn	MD: 8.391' TVD: 7.044.56' Inclination: 89.2° Azimuth: 4.9° VS: 1.510.6'	MD: 8.422' TVD: 7.045.03' Inclination: 89° Azimuth: 5.1° VS: 1.540.9'
	MD: 8.454' TVD: 7.045.56' Inclination: 89.1° Azimuth: 5.1° VS: 1.572.25'	





SS: m-dk gy, occ mgybrn, tr transp qtz grn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, sl tr glau, n calc; SLTY SH: m-dkgy sft-frn, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, sting cut, mod brn str.	MD: 8.486' TVD: 7,046.05' Inclination: 85° Azimuth: 4.4° VS: 1.603.62'
SS: m-dk gy, occ mgybrn, tr transp qtz grn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, sl tr glau, n calc; SLTY SH: m-dkgy sft-frn, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, sting cut, mod brn str.	MD: 8.518' TVD: 7,046.44' Inclination: 89.1° Azimuth: 3.5° VS: 1.635.07'
SS: m-dk gy, occ mgybrn, tr transp qtz grn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, sl tr glau, n calc; SLTY SH: m-dkgy sft-frn, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, sting cut, mod brn str.	MD: 8.549' TVD: 7,046.62' Inclination: 89.1° Azimuth: 1.8° VS: 1.665.61'
SS: m-dk gy, occ mgybrn, tr transp qtz grn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-frn, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, sting cut, mod brn str.	MD: 8.613' TVD: 7,047.41' Inclination: 88.1° Azimuth: 1.2° VS: 1.728.84'
SS: m-dk gy, occ mgybrn, tr transp qtz grn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-frn, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, sting cut, mod brn str.	MD: 8.645' TVD: 7,048.07' Inclination: 88.1° Azimuth: 0.5° VS: 1.760.57'
SS: m-dk gy, occ mgybrn, tr transp qtz grn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-frn, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, sting cut, mod brn str.	MD: 8.676' TVD: 7,048.55' Inclination: 89.1° Azimuth: 359.3° VS: 1.791.34'



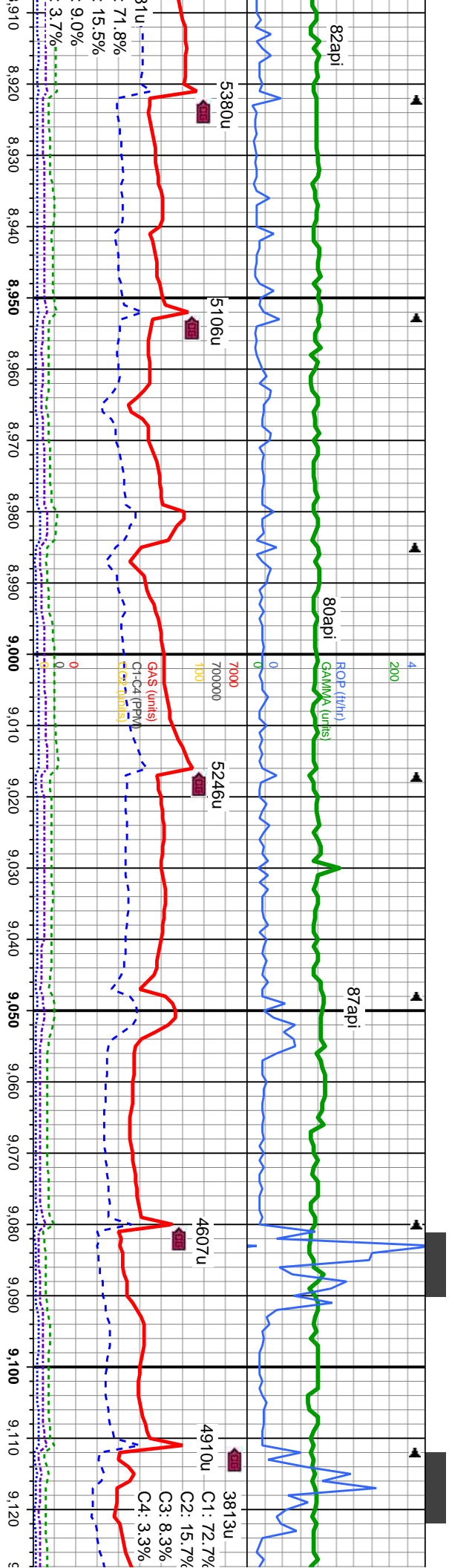


p qtz grn, d, tr bio,	SS: m-dk gy, occ mgybrn, tr transp qtz grn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-frn, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g sting cut, mod brn str.	SS: m-dk gy, occ mgybrn, tr transp qtz grn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-frn, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g sting cut, mod brn str.	6SS: m-dk gy, occ mgybrn, tr transp qtz grn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-frn, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g sting cut, mod brn str.	SS: m-dk gy, occ mgybrn, tr transp qtz grn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-frn, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g sting cut, mod brn str.	SS: l clust calc, cut, r
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MD: 8.708' TVD: 7,048.6' Inclination: 90.1° Azimuth: 359.6° VS: 1,823.1'	MD: 8.740' TVD: 7,048.02' Inclination: 91° Azimuth: 359.6° VS: 1,855.0'	MD: 8.771' TVD: 7,047.67' Inclination: 90.3° Azimuth: 359.3° VS: 1,885.8'	MD: 8.803' TVD: 7,047.46' Inclination: 90.1° Azimuth: 359.6° VS: 1,917.6'	MD: 8.835' TVD: 7,047.2° Inclination: 90.4° Azimuth: 359.6° VS: 1,949.4'	MD: 8.867' TVD: 7,046.97' Inclination: 90.4° Azimuth: 359.6° VS: 1,981.2'	MD: 8.898' TVD: 7,046.76' Inclination: 90.3° Azimuth: 359.1° VS: 2,012.0'
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7130

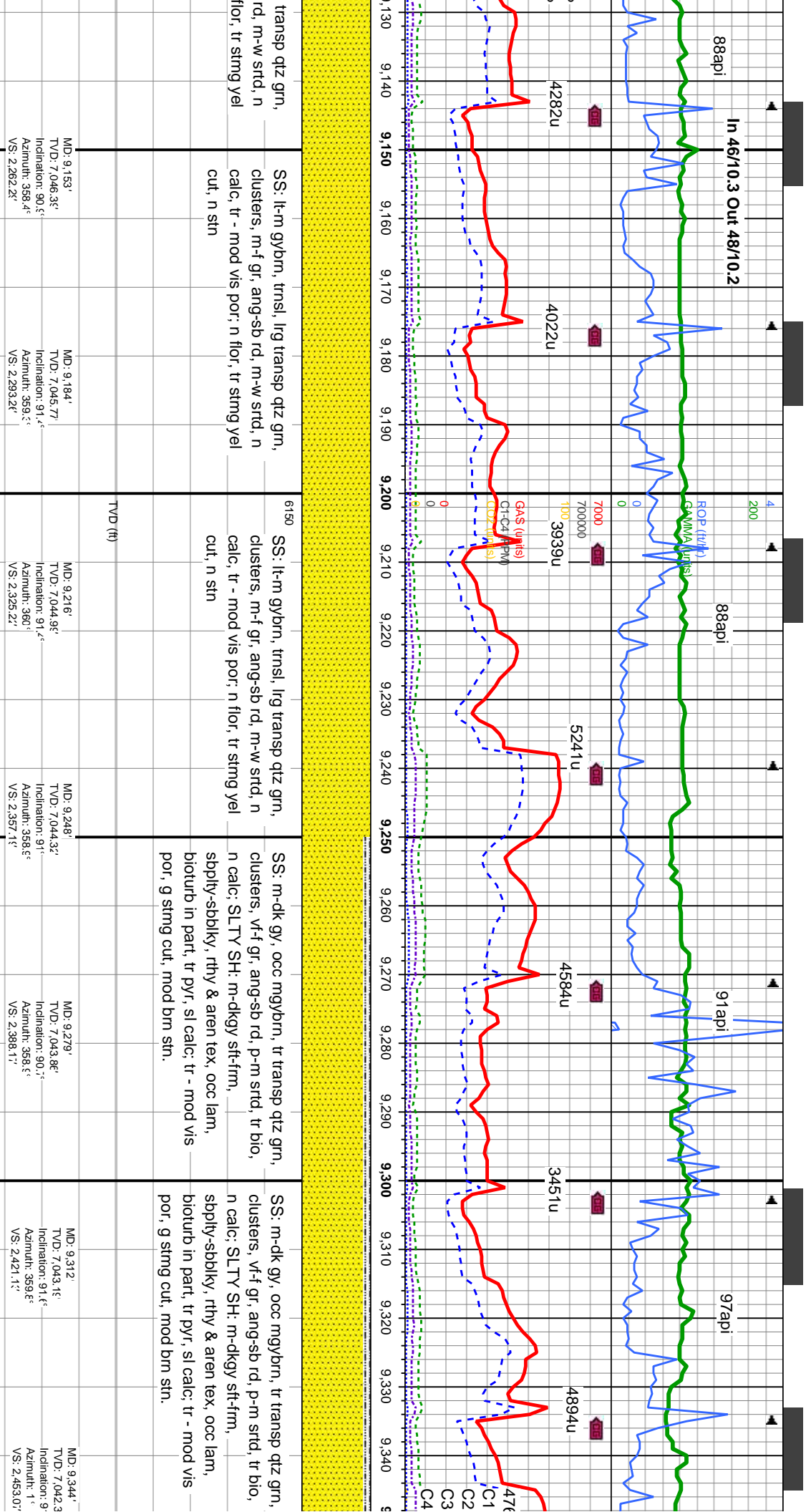




SS: lt-m gybrn, trns, lrg transp qtz grn, clusters, m-f gr, ang-sb rd, m-w strd, n calc, tr - mod vis por, n flor, tr sting yel cut, n stn	SS: lt-m gybrn, trns, lrg transp qtz grn, clusters, m-f gr, ang-sb rd, m-w strd, n calc, tr - mod vis por, n flor, tr sting yel cut, n stn	61SS: lt-m gybrn, trns, lrg transp qtz grn, clusters, m-f gr, ang-sb rd, m-w strd, n calc, tr - mod vis por, n flor, tr sting yel cut, n stn	SS: lt-m gybrn, trns, lrg transp qtz grn, clusters, m-f gr, ang-sb rd, m-w strd, n calc, tr - mod vis por, n flor, tr sting yel cut, n stn	SS: lt-m gybrn, trns, lrg transp qtz grn, clusters, m-f gr, ang-sb rd, m-w strd, n calc, tr - mod vis por, n flor, tr sting yel cut, n stn
MD: 8.930' TVD: 7,046.7' Inclination: 90° Azimuth: 358.6° VS: 2.043.6°	MD: 8.962' TVD: 7,046.7' Inclination: 90° Azimuth: 358.6° VS: 2.075.7°	MD: 8.993' TVD: 7,046.7' Inclination: 89.6° Azimuth: 358.4° VS: 2.106.6°	MD: 9.025' TVD: 7,046.7° Inclination: 89.6° Azimuth: 357.6° VS: 2.138.6°	MD: 9.089' TVD: 7,046.92° Inclination: 90° Azimuth: 357.6° VS: 2.198.6°

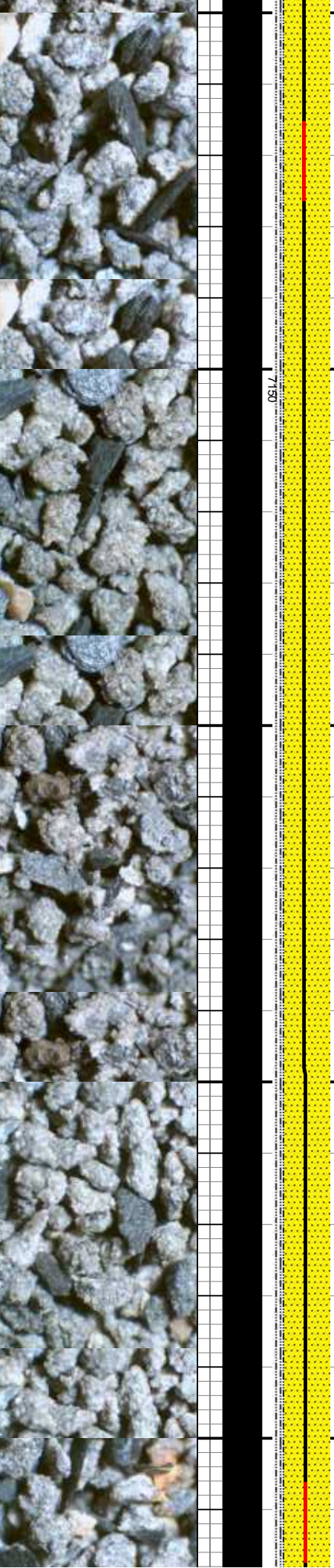
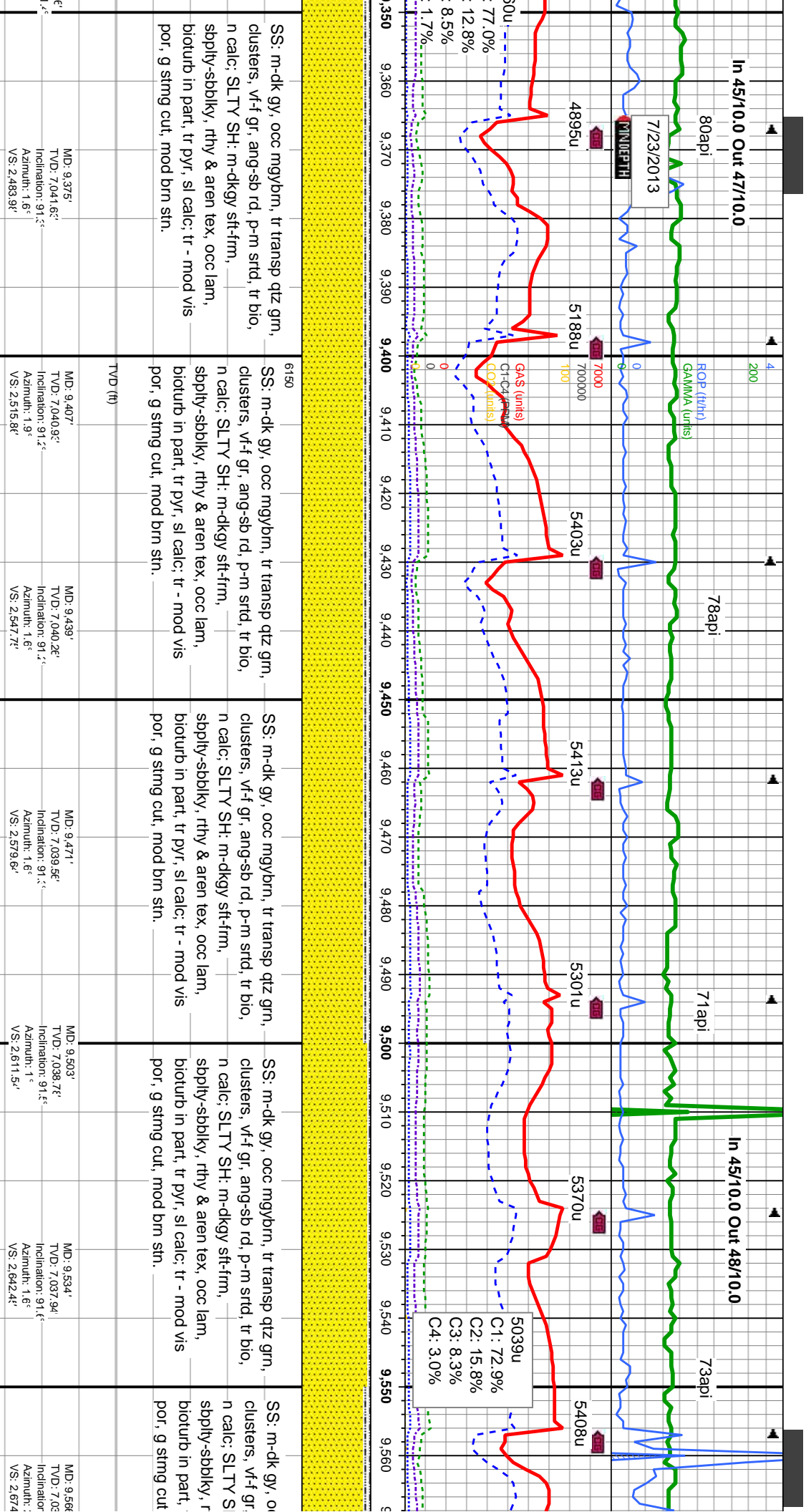
7150

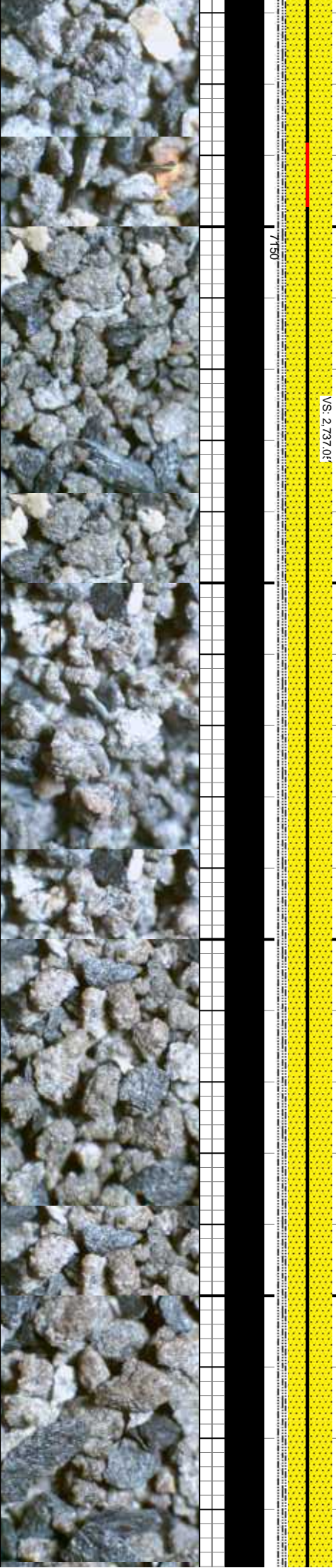
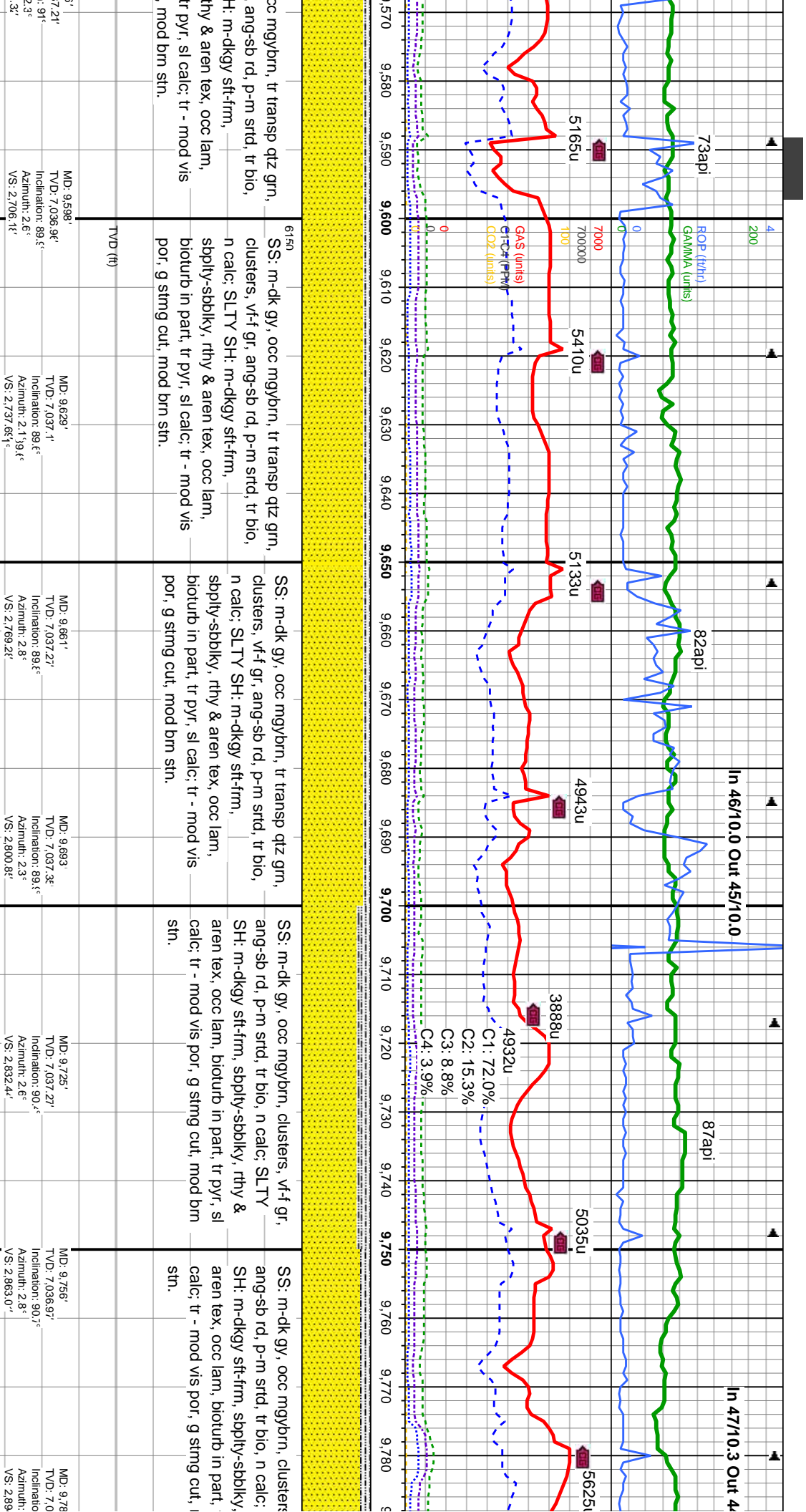


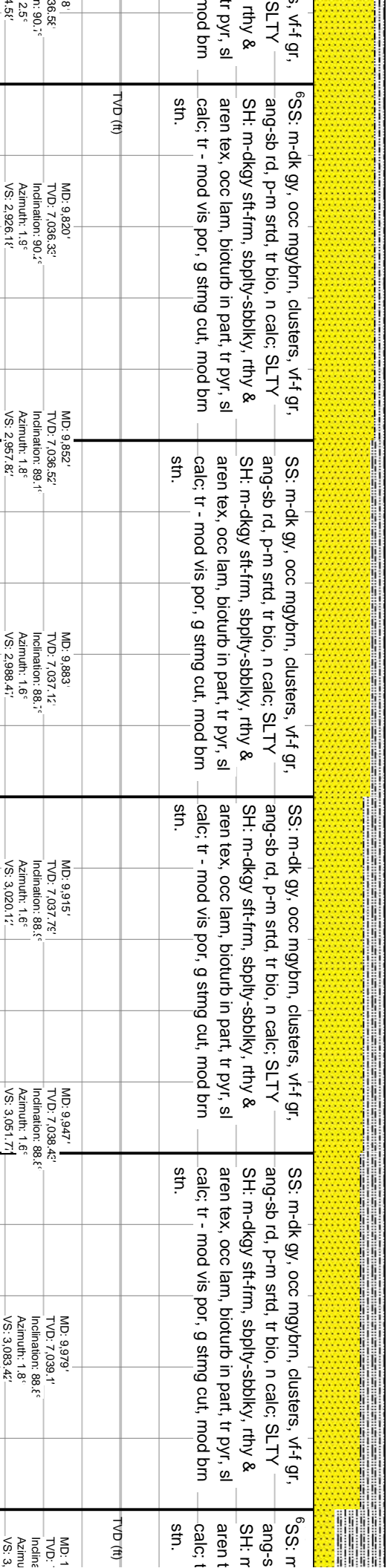


transp qtz grn, rd, m-w strd, n fltor, tr sting yel	SS: lt-m gybrn, trns, lrg transp qtz grn, clusters, m-f gr, ang-sb rd, m-w strd, n calc, tr - mod vis por; n fltor, tr sting yel cut, n stn	6150	SS: lt-m gybrn, trns, lrg transp qtz grn, clusters, m-f gr, ang-sb rd, m-w strd, n calc, tr - mod vis por; n fltor, tr sting yel cut, n stn	SS: m-dk gy, occ mgybrn, tr transp qtz grn, clusters, v-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-frm, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g sting cut, mod brn stn.	SS: m-dk gy, occ mgybrn, tr transp qtz grn, clusters, v-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-frm, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g sting cut, mod brn stn.
MD: 9.153' TVD: 7.046.3' Inclination: 90.5° Azimuth: 359.4° VS: 2.262.2'	MD: 9.184' TVD: 7.045.7' Inclination: 91.4° Azimuth: 359.3° VS: 2.293.2'	MD: 9.216' TVD: 7.044.9° Inclination: 91.4° Azimuth: 360° VS: 2.325.2'	MD: 9.248' TVD: 7.044.3° Inclination: 91° Azimuth: 358.5° VS: 2.357.1'	MD: 9.279' TVD: 7.043.8° Inclination: 90.1° Azimuth: 358.5° VS: 2.388.1'	MD: 9.312' TVD: 7.043.1° Inclination: 91.6° Azimuth: 359.5° VS: 2.421.1'

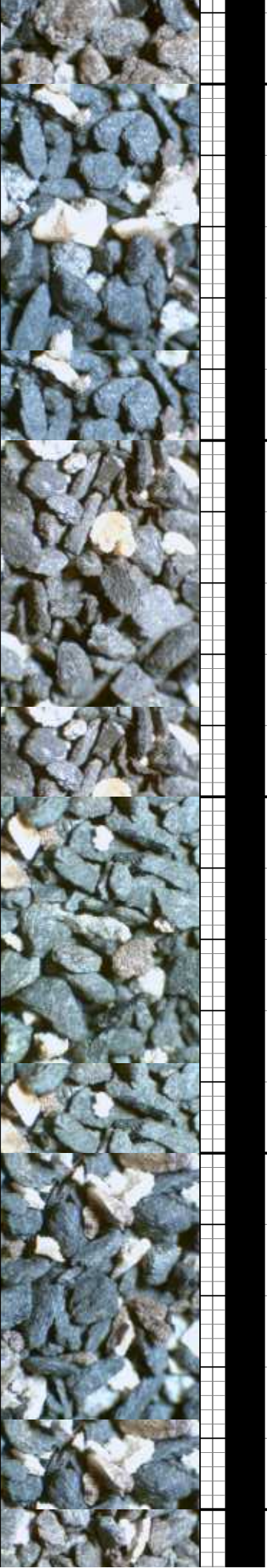


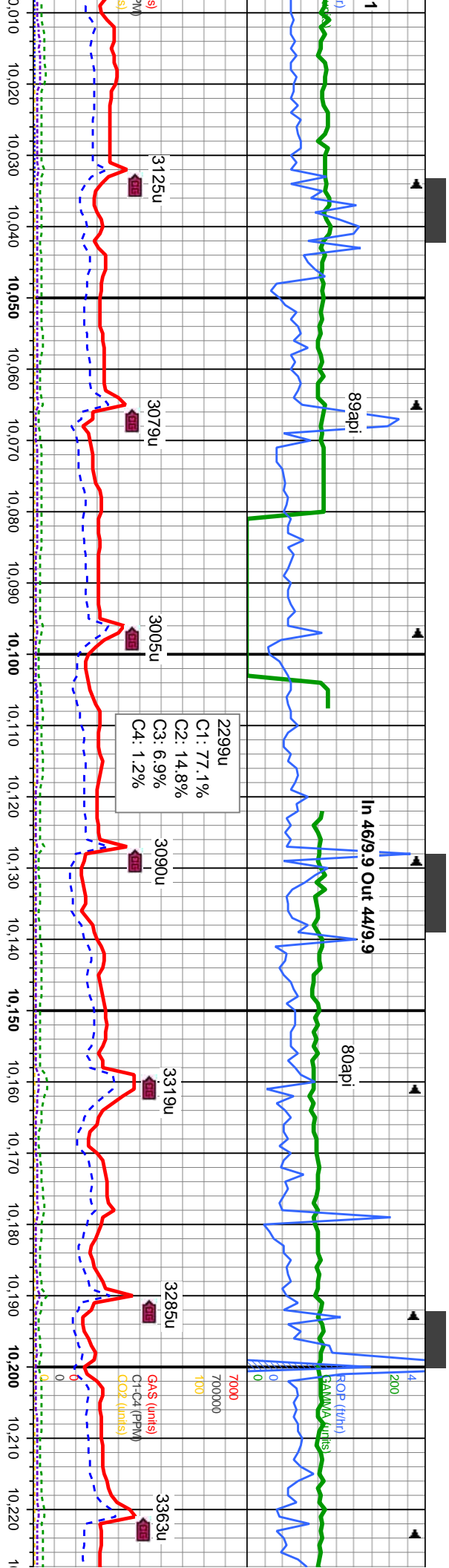






	6S: m-dk gy, occ mgybrn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-fm, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g sting cut, mod brn stn.	SS: m-dk gy, occ mgybrn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-fm, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g sting cut, mod brn stn.	SS: m-dk gy, occ mgybrn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-fm, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g sting cut, mod brn stn.	SS: m-dk gy, occ mgybrn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-fm, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g sting cut, mod brn stn.
8' MD: 9.820' TVD: 7.036.52' Inclination: 90.1° Azimuth: 1.6° VS: 2.926.14'	MD: 9.852' TVD: 7.037.12' Inclination: 89.1° Azimuth: 1.8° VS: 2.926.82'	MD: 9.863' TVD: 7.037.12' Inclination: 88.1° Azimuth: 1.6° VS: 2.988.47'	MD: 9.915' TVD: 7.037.73' Inclination: 88.1° Azimuth: 1.6° VS: 3.020.17'	MD: 9.979' TVD: 7.039.41' Inclination: 88.1° Azimuth: 1.8° VS: 3.083.42'
8' MD: 1 TVD: Inclination: Azimuth: VS: 3.	MD: 1 TVD: Inclination: Azimuth: VS: 3.	MD: 1 TVD: Inclination: Azimuth: VS: 3.	MD: 1 TVD: Inclination: Azimuth: VS: 3.	MD: 1 TVD: Inclination: Azimuth: VS: 3.





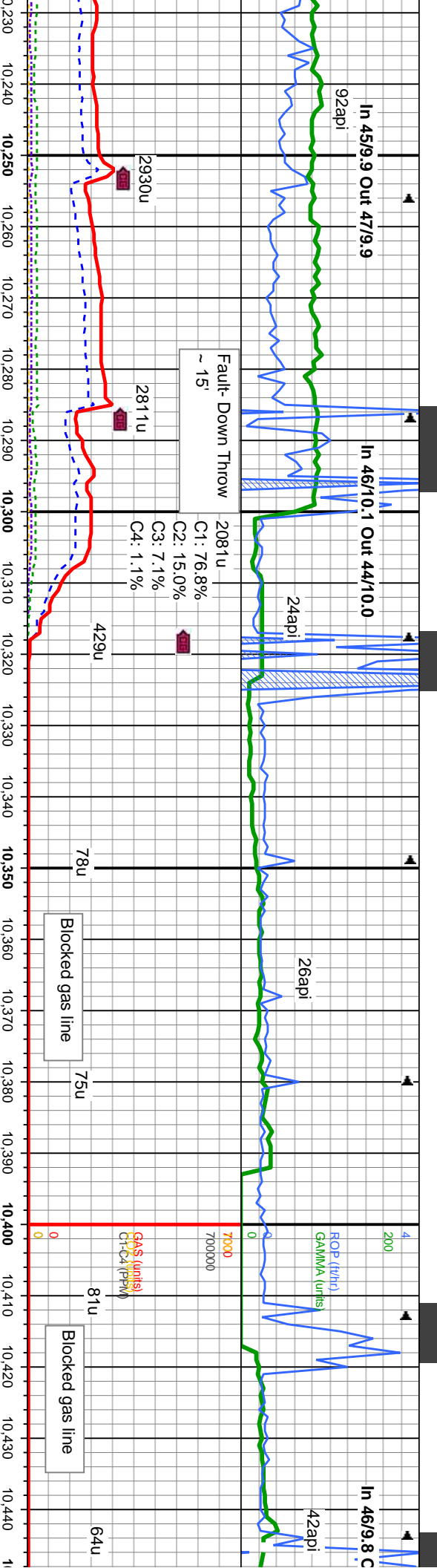
SS: m-dk gy, occ mgybrn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-frm, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc, tr - mod vis por, g string cut, mod brn str.

SS: m-dk gy, occ mgybrn, tr lng qtz grain, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-frm, sbsply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc, tr - mod vis por, g string cut, mod brn str.

SS: m-dk gy, occ mgybrn, tr lng qtz grain, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-frm, sbsply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc, tr - mod vis por, g string cut, mod brn str.

0.010'	MD: 10.042'	MD: 10.074'	MD: 10.137'	MD: 10.169'	MD: 10.201'
7.039.67'	TVD: 7.040.06'	TVD: 7.040.06'	TVD: 7.039.84'	TVD: 7.039.56'	TVD: 7.039.11'
Inclination: 89.1°	Inclination: 90.1°	Inclination: 90.1°	Inclination: 90.1°	Inclination: 90.1°	Inclination: 91.1°
Tr: 1.9°	Azimuth: 1.6°	Azimuth: 1.4°	Azimuth: 0.7°	Azimuth: 0.9°	Azimuth: 360°
VS: 3.145.7'	VS: 3.177.3'	VS: 3.239.7'	VS: 3.271.8'	VS: 3.307.0'	VS: 3.307.0'





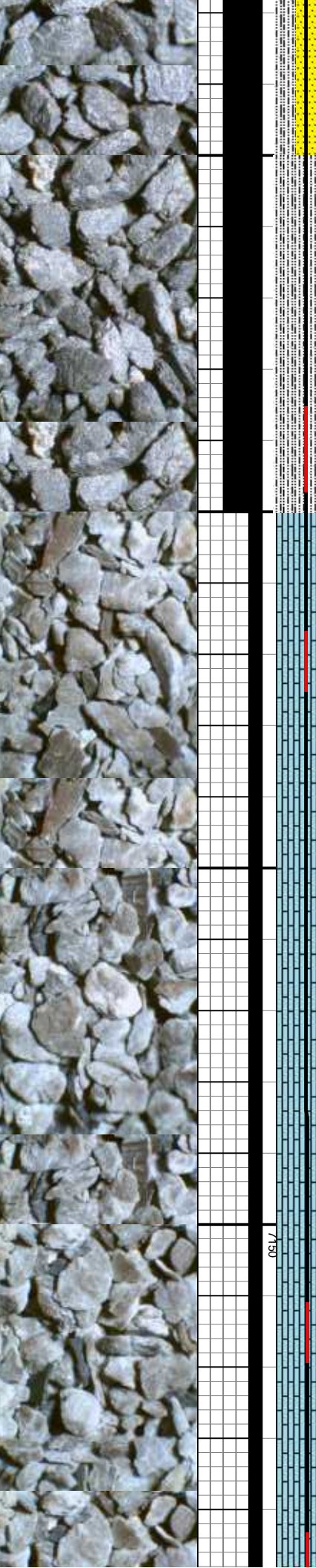
SS: m-dk gy, occ mybrn, tr lrg qtz grain, clusters, v-f gr, ang-sb rd, p-m strd, tr blo, n calc; SLTY SH: m-dkgy sft-firm, sbply-sbply, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g stng cut, mod brn stn.

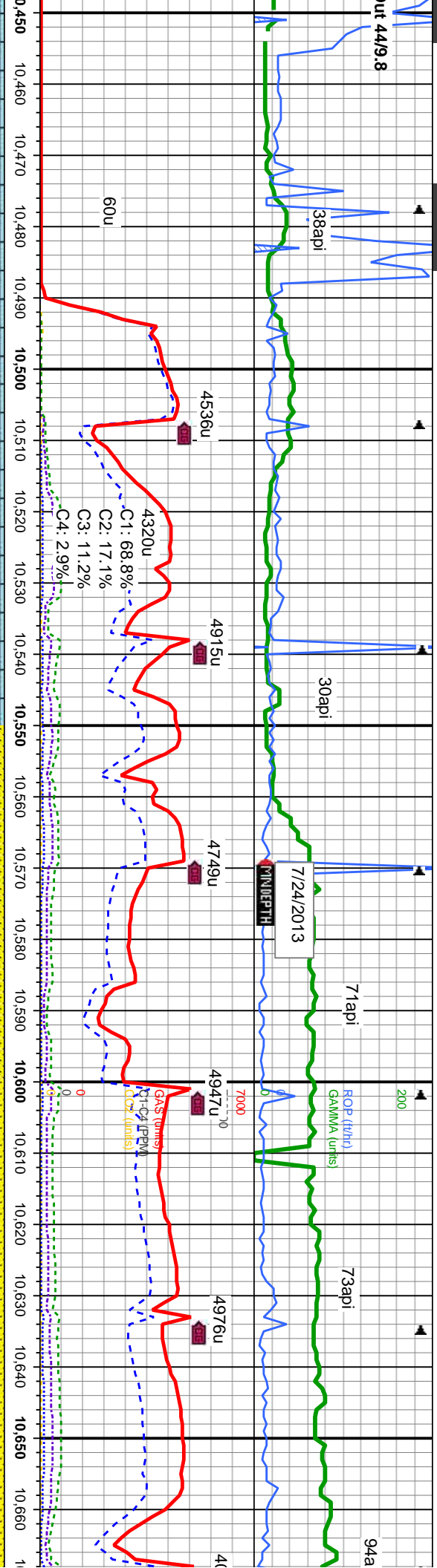
LS: wh, tan, crm, sft-m gfrm, sb ply rthy-smth lstr, mic xl-fos tex, v calc, tr stlysh, n flor, tr stng yel cut, n stn

LS: wh, tan, crm, sft-m gfrm, sb ply rthy-smth lstr, mic xl-fos tex, v calc, tr stlysh, n flor, tr stng yel cut, n stn

LS: wh, tan, crm, sft-m gfrm, sb ply rthy-smth lstr, mic xl-fos tex, v calc, tr stlysh, n flor, tr stng yel cut, n stn

D: 10.233' TVD: 7.038.5f' Inclination: 90.4° Azimuth: 0.2° VS: 3.338.9f'	MD: 10.264' TVD: 7.037.9f' Inclination: 91.4° Azimuth: 0.2° VS: 3.369.9f'	MD: 10.296' TVD: 7.037.2f' Inclination: 91.4° Azimuth: 360° VS: 3.401.8f'	MD: 10.328' TVD: 7.036.4f' Inclination: 91.4° Azimuth: 359.4° VS: 3.433.8f'	MD: 10.360' TVD: 7.035.7f' Inclination: 91.4° Azimuth: 359.4° VS: 3.465.7f'	MD: 10.391' TVD: 7.035.0f' Inclination: 91.4° Azimuth: 358.5° VS: 3.496.7f'	MD: 10.423' TVD: 7.034.4f' Inclination: 90.4° Azimuth: 359.1° VS: 3.528.7f'
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LS: wh, tan, crm, sft-m gfrm, sb plty
rthy-smth lsfr, mic xl-fos tex, v calc, tr
silysh, n flor, tr stmg yel cut, n stn

LS: wh, tan, crm, sft-m gfrm, sb plty
rthy-smth lsfr, mic xl-fos tex, v calc, tr
silysh, n flor, tr stmg yel cut, n stn

LS: wh, tan, crm, sft-m gfrm, sb plty
rthy-smth lsfr, mic xl-fos tex, v calc, tr
silysh, SS: lt-m gybrn, trnsj, lng transp qtz
grn, clusters, m-f gr, ang-sb rd, m-w strd,
n calc, tr - mod vis por, tr dism pyr, n flor,
tr stmg yel cut, n stn

LS: wh, tan, crm, sft-m gfrm, sb plty
rthy-smth lsfr, mic xl-fos tex, v calc, tr
silysh, SS: lt-m gybrn, trnsj, lng transp qtz
grn, clusters, m-f gr, ang-sb rd, m-w strd,
n calc, tr - mod vis por, tr dism pyr, n flor,
tr stmg yel cut, n stn

LS: wh, tan, crm, sft-m gfrm, sb plty
rthy-smth lsfr, mic xl-fos tex, v calc, tr
silysh, SS: lt-m gybrn, trnsj, lng transp qtz
grn, clusters, m-f gr, ang-sb rd, m-w strd,
n calc, tr - mod vis por, tr dism pyr, n flor,
tr stmg yel cut, n stn

MD: 10.455'
TVD: 7.034.27'
Inclination: 89.4°
Azimuth: 359.1°
VS: 3.560.77'

MD: 10.487'
TVD: 7.034.77'
Inclination: 89.4°
Azimuth: 359.4°
VS: 3.592.61'

MD: 10.519'
TVD: 7.035.74'
Inclination: 88.1°
Azimuth: 359.6°
VS: 3.624.67'

MD: 10.550'
TVD: 7.036.72'
Inclination: 88.1°
Azimuth: 359.6°
VS: 3.655.67'

MD: 10.582'
TVD: 7.037.84'
Inclination: 87.7°
Azimuth: 358.6°
VS: 3.687.96'

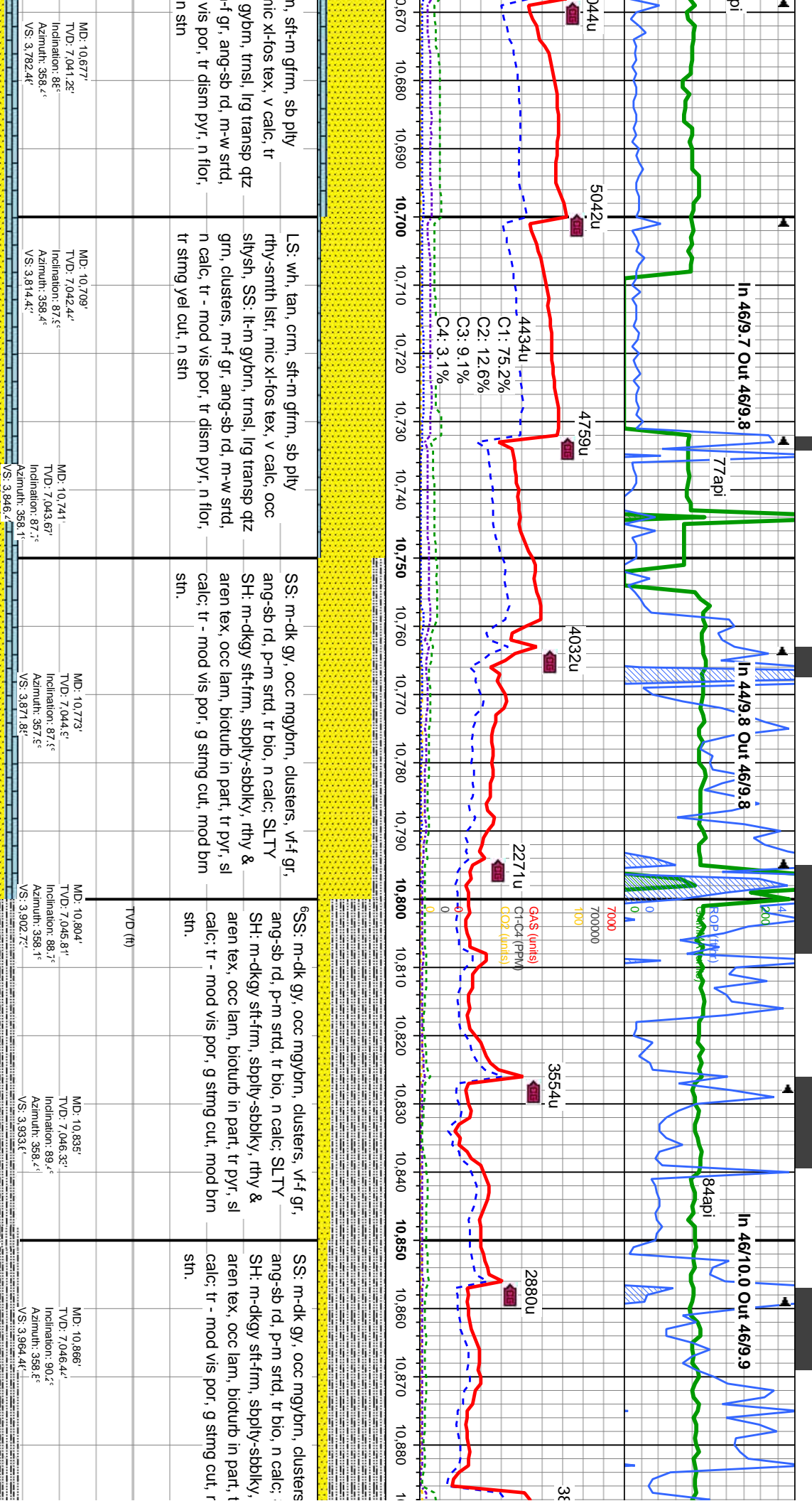
MD: 10.614'
TVD: 7.039.07'
Inclination: 87.6°
Azimuth: 358.6°
VS: 3.719.57'

MD: 10.646'
TVD: 7.040.21'
Inclination: 86.1°
Azimuth: 358.6°
VS: 3.751.41'

TVD (ft)

7130





n, sft-m gfrn, sb ply
mic xl-fos tex, v calc, tr
gybrn, trns, lng transp qtz
-f-gr, ang-sb rd, m-w strd,
n calc, tr - mod vis por, n flor,
n stn

LS: wh, tan, crn, sft-m gfrn, sb ply
rthy-smth lst, mic xl-fos tex, v calc, occ
stlysh, SS: lt-m gybrn, trns, lng transp qtz
grn, clusters, m-f gr, ang-sb rd, m-w strd,
n calc, tr - mod vis por, tr dism pyr, n flor,
tr sting yel cut, n stn

SS: m-dk gy, occ mybrn, clusters, vf-f gr,
ang-sb rd, p-m strd, tr bio, n calc, SLTY
SH: m-dkgy sft-fm, sbply-sbply, rthy &
aren tex, occ lam, bioturb in part, tr pyr, sl
calc, tr - mod vis por, g sting cut, mod brn
stn.

6SS: m-dk gy, occ mybrn, clusters, vf-f gr,
ang-sb rd, p-m strd, tr bio, n calc, SLTY
SH: m-dkgy sft-fm, sbply-sbply, rthy &
aren tex, occ lam, bioturb in part, tr pyr, sl
calc, tr - mod vis por, g sting cut, mod brn
stn.

SS: m-dk gy, occ mybrn, clusters
ang-sb rd, p-m strd, tr bio, n calc;
SH: m-dkgy sft-fm, sbply-sbply,
aren tex, occ lam, bioturb in part, t
calc, tr - mod vis por, g sting cut, r
stn.

MD: 10,677'
TVD: 7,041.25'
Inclination: 86°
Azimuth: 358.4°
VS: 3,782.4'

MD: 10,709'
TVD: 7,042.44'
Inclination: 87.5°
Azimuth: 358.4°
VS: 3,814.4'

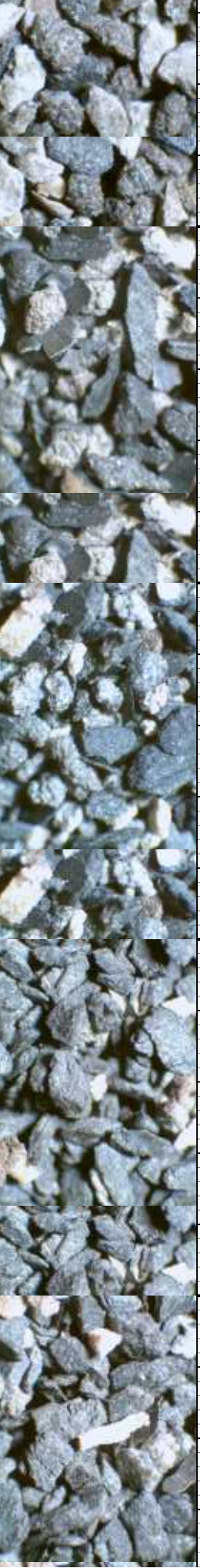
MD: 10,741'
TVD: 7,043.67'
Inclination: 87.7°
Azimuth: 358.1°
VS: 3,846.4'

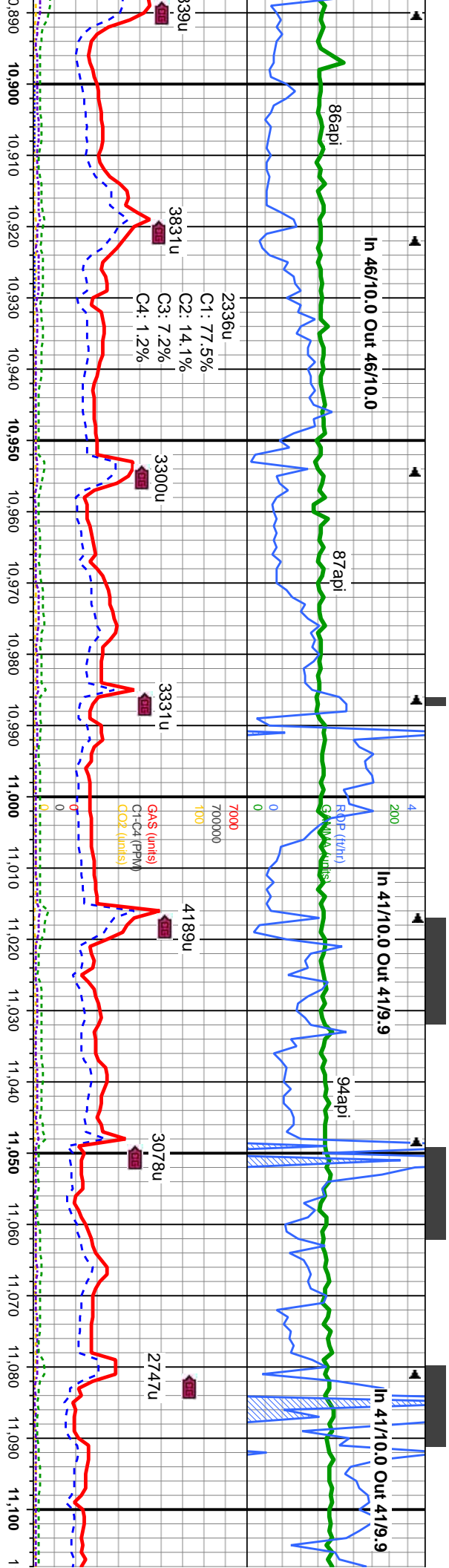
MD: 10,773'
TVD: 7,044.5°
Inclination: 87.5°
Azimuth: 357.5°
VS: 3,871.8'

MD: 10,804'
TVD: 7,045.81°
Inclination: 88.7°
Azimuth: 358.1°
VS: 3,902.7°

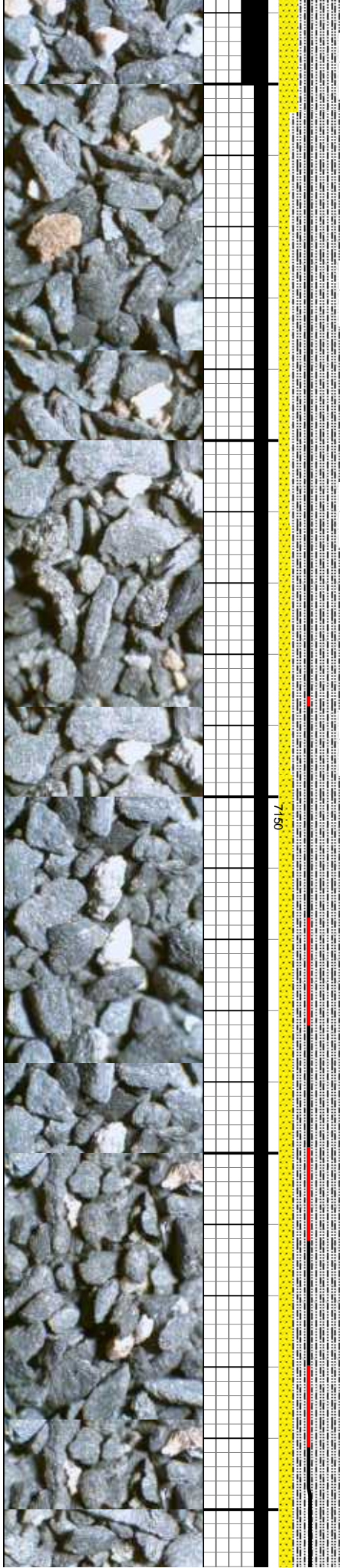
MD: 10,835'
TVD: 7,046.32°
Inclination: 89.4°
Azimuth: 358.4°
VS: 3,933.6°

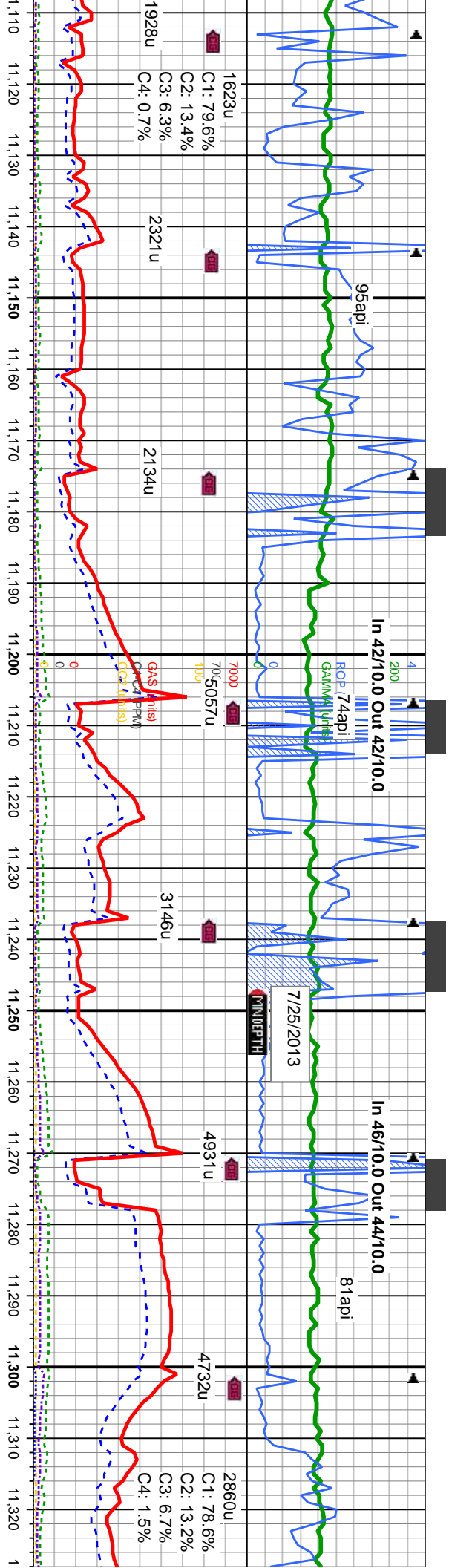
MD: 10,866'
TVD: 7,046.44°
Inclination: 90.2°
Azimuth: 358.5°
VS: 3,964.4°





SS: m-dk gy, occ mybrn, clusters, v-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-fm, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g string cut, mod bm str.	SS: m-dk gy, occ mybrn, clusters, v-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-fm, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g string cut, mod bm str.	6SS: m-dk gy, occ mybrn, clusters, v-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-fm, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g string cut, mod bm str.	SS: m-dk gy, occ mybrn, clusters, v-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-fm, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g string cut, mod bm str.	SS: n ang-s SH: n aren cal;
MD: 10.899' TVD: 7.046.27' Inclination: 90.6° Azimuth: 358.6° VS: 3.997.31'	MD: 10.931' TVD: 7.045.86' Inclination: 90.7° Azimuth: 358.2° VS: 4.029.11'	MD: 10.962' TVD: 7.045.46' Inclination: 90.7° Azimuth: 358.4° VS: 4.060.00'	MD: 10.994' TVD: 7.045.00' Inclination: 90.7° Azimuth: 358.4° VS: 4.091.92'	MD: 11.026' TVD: 7.044.52' Inclination: 91.4° Azimuth: 358.6° VS: 4.123.77'
MD: 11.058' TVD: 7.043.74' Inclination: 91.4° Azimuth: 359.6° VS: 4.155.51'	MD: 11.089' TVD: 7.042.86' Inclination: 91.7° Azimuth: 0.2° VS: 4.194.11'			





11,110 11,120 11,130 11,140 11,150 11,160 11,170 11,180 11,190 11,200 11,210 11,220 11,230 11,240 11,250 11,260 11,270 11,280 11,290 11,300 11,310 11,320 1

1623u
C1: 79.6%
C2: 13.4%
C3: 6.3%
C4: 0.7%

2321u

2134u

5057u
C1: 78.6%
C2: 13.2%
C3: 6.7%
C4: 1.5%

4931u

4732u

2860u

SS: m-dk gy, occ mybrn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-fm, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g sting cut, mod brn stn.

SS: m-dk gy, occ mybrn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-fm, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g sting cut, mod brn stn.

SS: m-dk gy, occ mybrn, clusters, vf-f gr, ang-sb rd, p-m strd, tr bio, n calc; SLTY SH: m-dkgy sft-fm, sbply-sbblky, rthy & aren tex, occ lam, bioturb in part, tr pyr, sl calc; tr - mod vis por, g sting cut, mod brn stn.

MD: 11,121'
TVD: 7,041.82'
Inclination: 92.1°
Azimuth: 0.2°
VS: 4,226.1'

MD: 11,153'
TVD: 7,040.48'
Inclination: 92.1°
Azimuth: 0.2°
VS: 4,258.0'

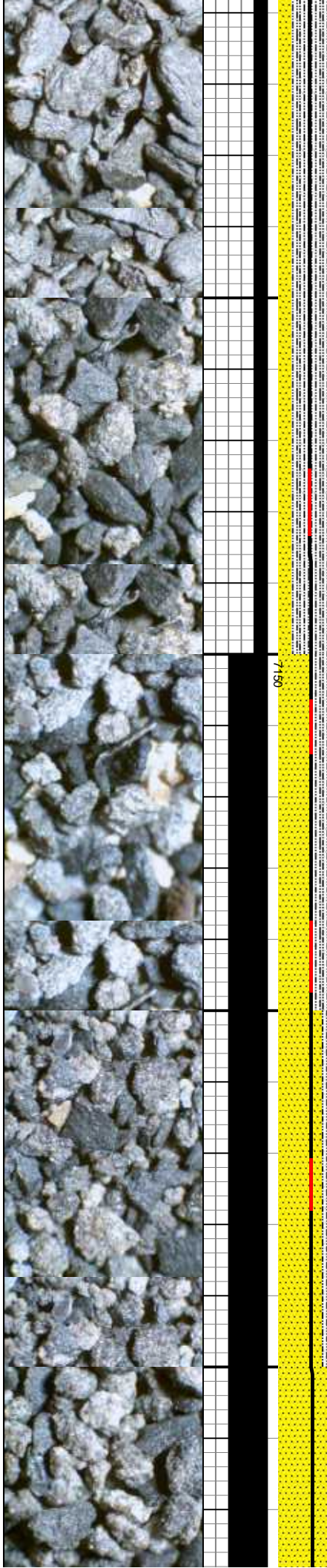
MD: 11,184'
TVD: 7,039.02'
Inclination: 92.1°
Azimuth: 0.7°
VS: 4,288.9'

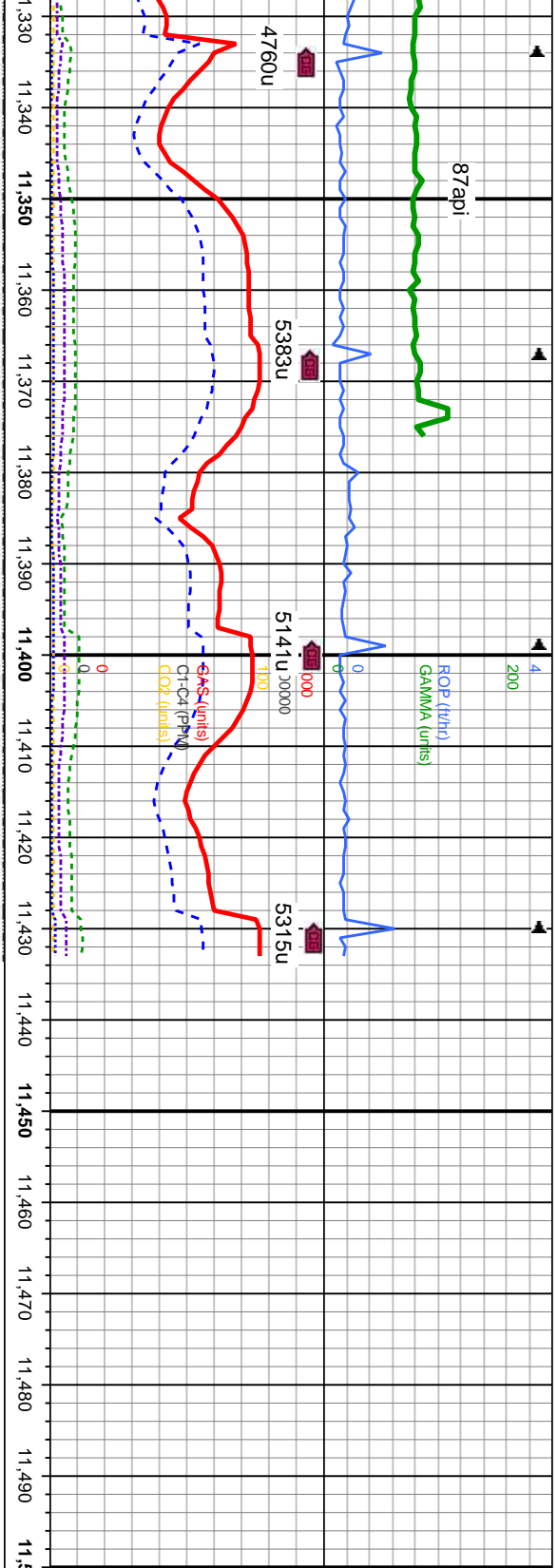
MD: 11,217'
TVD: 7,037.58'
Inclination: 92.4°
Azimuth: 1.4°
VS: 4,321.84'

MD: 11,248'
TVD: 7,036.58'
Inclination: 91.4°
Azimuth: 1.4°
VS: 4,352.71'

MD: 11,280'
TVD: 7,035.71'
Inclination: 91.4°
Azimuth: 1.4°
VS: 4,384.6'

MD: 11,312'
TVD: 7,034.88'
Inclination: 91.4°
Azimuth: 1.6°
VS: 4,416.5'





clusters, vf-f gr,
n calc; SLTY
ang-sb rd, p-m strd, tr bio, n calc; SLTY
SH: m-dkgy sft-fm, sbply-sbdky, rthy &
aren tex, occ lam, bioturb in part, tr pyr, sl
calc; tr - mod vis por, g string cut, mod brn
stn.

SS: m-dk gy, occ mybrn, clusters, vf-f gr,
ang-sb rd, p-m strd, tr bio, n calc; SLTY
SH: m-dkgy sft-fm, sbply-sbdky, rthy &
aren tex, occ lam, bioturb in part, tr pyr, sl
calc; tr - mod vis por, g string cut, mod brn
stn.

6150
SS: m-dk gy, occ mybrn, clusters, vf-f gr,
ang-sb rd, p-m strd, tr bio, n calc; SLTY
SH: m-dkgy sft-fm, sbply-sbdky, rthy &
aren tex, occ lam, bioturb in part, tr pyr, sl
calc; tr - mod vis por, g string cut, mod brn
stn.

TVD (ft)

Projection to Bit

TD 11433MD
@3:37 7/25/2013

Thank You For Using
Columbine Logging Inc.

MD: 11,343'
TVD: 7,034.01'
Inclination: 91.7°
Azimuth: 1.9°
VS: 4,447.44'

MD: 11,379'
TVD: 7,032.94'
Inclination: 91.7°
Azimuth: 2.3°
VS: 4,483.27'

MD: 11,433'
TVD: 7,031.34'
Inclination: 91.7°
Azimuth: 2.3°
VS: 4,537.07'

7150

