



Scale: 5" / 100'  
Measured Depth Log

**Well Name** Ottesen LE 06-370HN

**Location** SEC.33-T01N-R66W

**State** COLORADO

**Country** USA

**API Number** 051234828800

**Geographic Region** DJ BASIN

**County** WELD

**Rig Number** PRECISION 466

**AFE #** 18DC0196

**Field** WATTENBERG

**Ground Elevation** 5076.5'

**K.B. Elevation** 5096.5'

**Logged Interval** 6000' MD To 18231' MD

**Total Depth** 18231' MD

**Formation** NIOBRARA B

**Type of Drilling Fluid** OIL BASED MUD

## Operator

**Company** Great Western Oil and Gas

**Address** 1801 Broadway, Ste 500  
Denver, CO 80202



## Geologist

**Name** Wyatt Wicks, Gabriel Rubio

**Company** Terra Guidance

**Address** 67 W. Floyd Ave. Ste 105  
Englewood, CO 80110  
(970) 260-5408

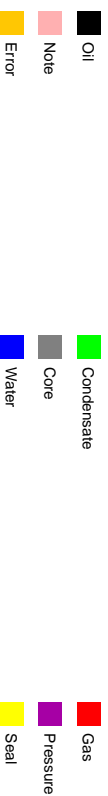


## Other

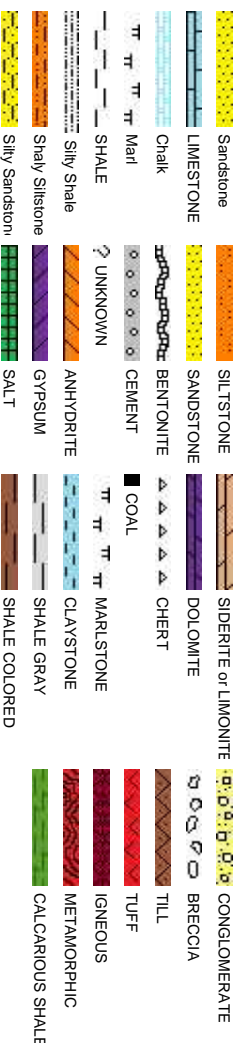
**Start Mudlog Date** 12/16/2018

**End Mudlog Date** 12/19/2018



























## Color Coding



## Rock Types



## Fossils

	F FOSSIL
	GASTROPOD
	OOLITE
	OSTRACOD
	PELECYPOD
	PELLET
	PISOLITE
	PLANT REMAINS
	PLANT SPORES
	SCAPHOPOD
	STROMATOPOROID
<b>Minerals</b>	
	ARGILL.
	BENTONITE
	BITUM.
	BRECCIA
	CALCL.
	CARBON.
	CHERT.
	CHERT.
	COAL.
	DOLCL.
	FELD.
	FERR.
	FORAMINIFERA
	FISH
	ANHYDRITIC

## Minerals

# Oil Show

**Oil Show**

☐ ORGANIC

☒ PINPOINT

☐ DEAD

☒ VUGGY

## Engineering

- QUESTIONABLE
- SPOTTED STAINING BIT

## Porosity

# Porosity

- E EARTHLY
- F FRACTURE
- X INTERCRYSTALLINE
- Q INTERCOLLITIC
- M MOLDIC
- ↓ FAULT
- CONNECTION (LEFT)
- CONNECTION (RIGHT)
- CONNECTION GAS
- CORE - LOST
- CORE - RECOVERED
- DST INTERVAL
- CASING

## Accessories

LACEOUS	GLAUCONITE
LITE GRAIN	GYPSIFEROUS
OMITE	HEAVY MINERAL
ENOUS SUBSTANCE	KAOLIN
CIA FRAGMENTS	MARLSTONE
AREOUS	MINERAL CRYSTALS
ONACEOUS FLAKES	ODULES
K	PHOSPHATE PELLETS
T	PYRITE
- THIN BEDS	SALT CAST
MMITIC	SANDY
SPAR	SILICEOUS
UGINOUS PELLET	SILTY
UGINOUS	TUFFACEOUS
	SILTSTONE STRINGER

### Stringer

	ANHYDRITE STRINGER
	BENTONITE STRINGER
	COAL STRINGER
	DOLomite STRINGER
	GYPSUM STRINGER
	LIMESTONE STRINGER
	MARLSTONE (CALC) STRG
	MARLSTONE (DOL) STRG
	SANDSTONE STRINGER
	SHALE STRINGER

## Other Symbols

FORMATION TOP	L LITHOGRAPHIC
GAS SHOW	MX MICROXLN
DEPTH MN DEPTH	A ANGULAR
ORMAL FAULT	R ROUNDED
OIL SHOW	B SUBANG
VERTURNED STRATA	P SUBRND

### Rounding

	MX MICROXLN
	M MUDSTONE
	P PACKSTONE
	W WACKESTONE

### Sorting

### Textures

IDEWALL CORE (LEFT)	M MODERATE
IDEWALL CORE (RIGHT)	P POOR
LIDE	C CHALKY
	W WELL

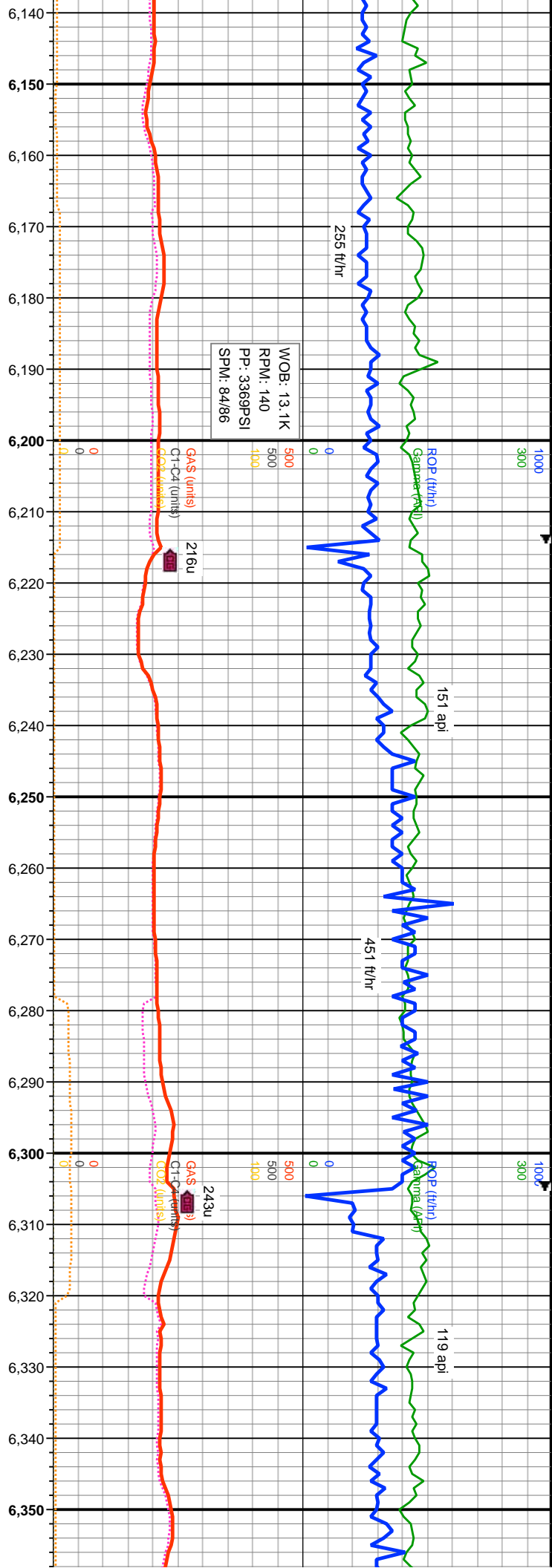
SURVEY	C CRYPTOXLN
TRIP GAS	E EARTHY

### CALCARIUOS SHALE

WIRELINE TESTED - LEFT	FX FINELYXLN
WIRELINE TESTED - RT	GS GRAINSTONE

### CALCARIOUS SHALE





MD: 6.193'  
INC: 47.12°  
AZM: 207.92°  
TVD: 4.686.04'  
VS: 3.075.41'

MD: 6.283'  
INC: 47°  
AZM: 207.85°  
TVD: 4.747.35'  
VS: 3.130.1'

TVD (ft)

TVD (ft)

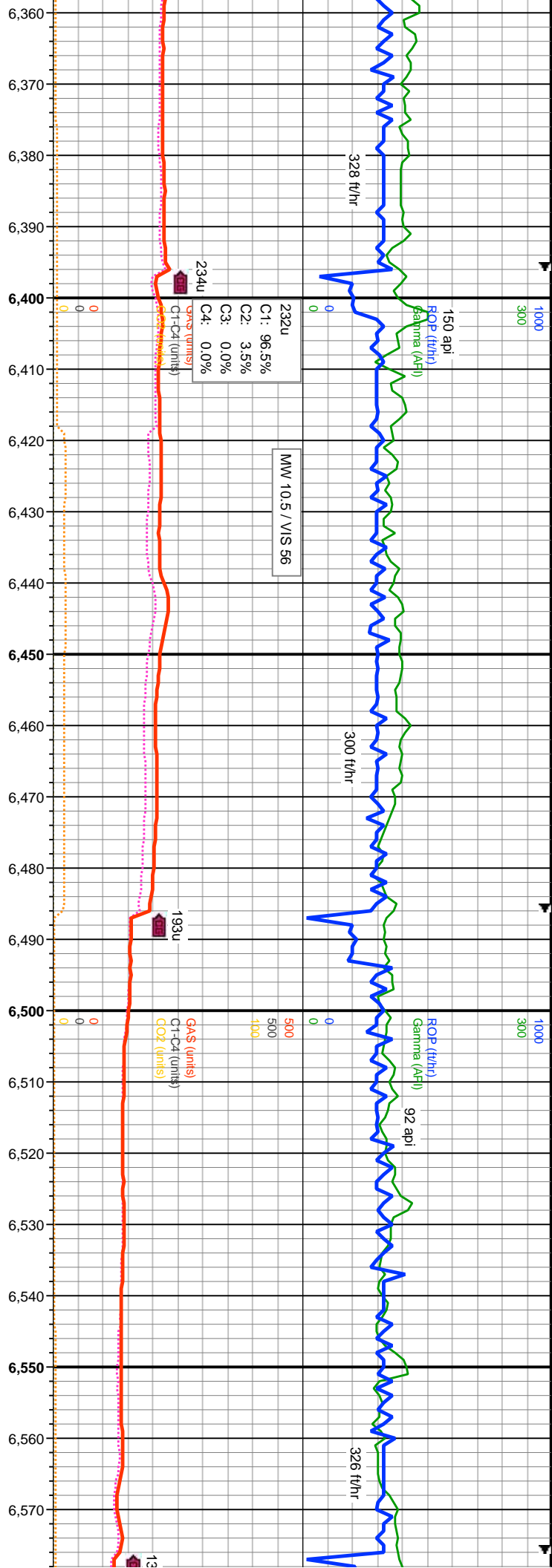
100% SHY SLTST: lt-medgy, sft-modly frm, sb blkly-pty, tr ffs, arg, slty, rthy, ip cly  
rch, sl calc.

100% SHY SLTST: lt-medgy, sft-modly frm,  
rch, sl calc.

9000

9000





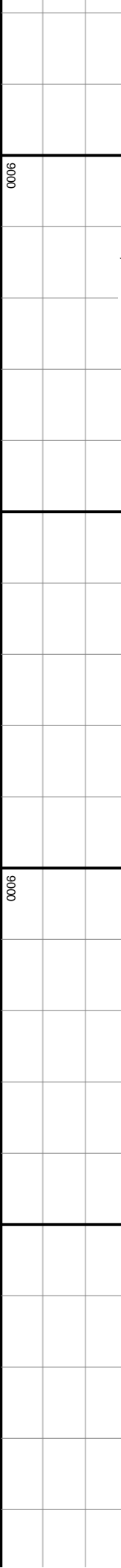
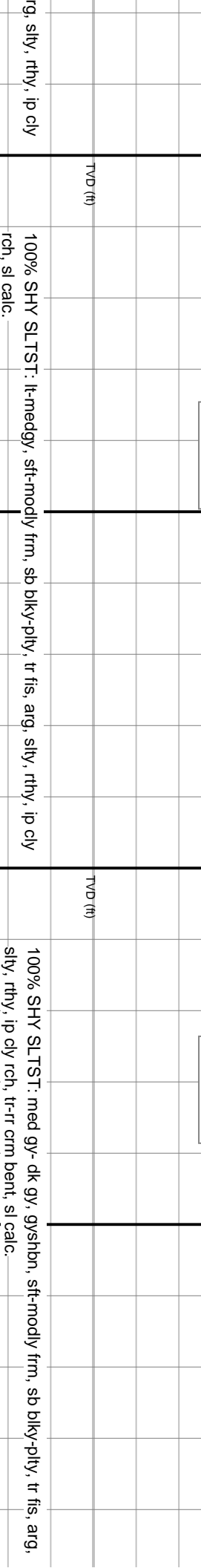
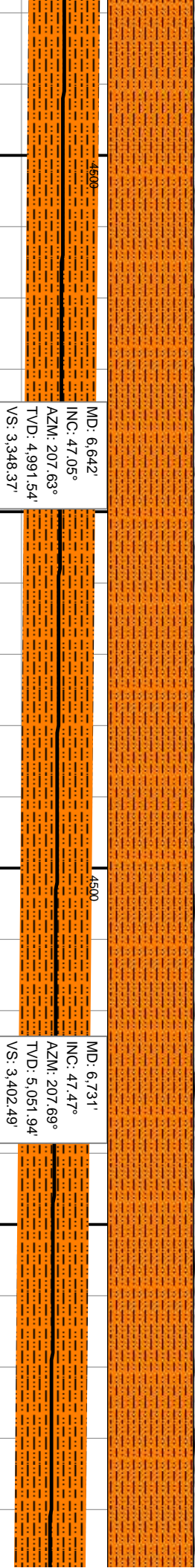
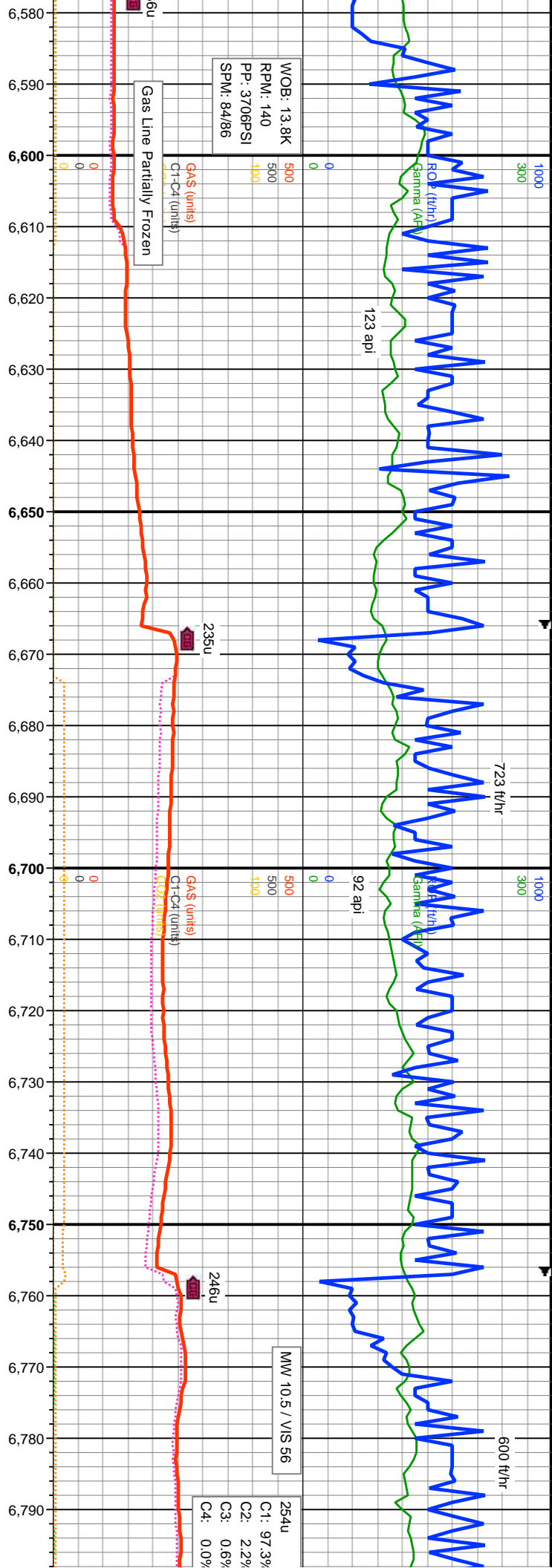
MD: 6,373'  
INC: 47.17°  
AZM: 207.99°  
TVD: 4,808.63'  
VS: 3,184.84'

MD: 6,462'  
INC: 47.18°  
AZM: 207.83°  
TVD: 4,869.13'  
VS: 3,239.04'

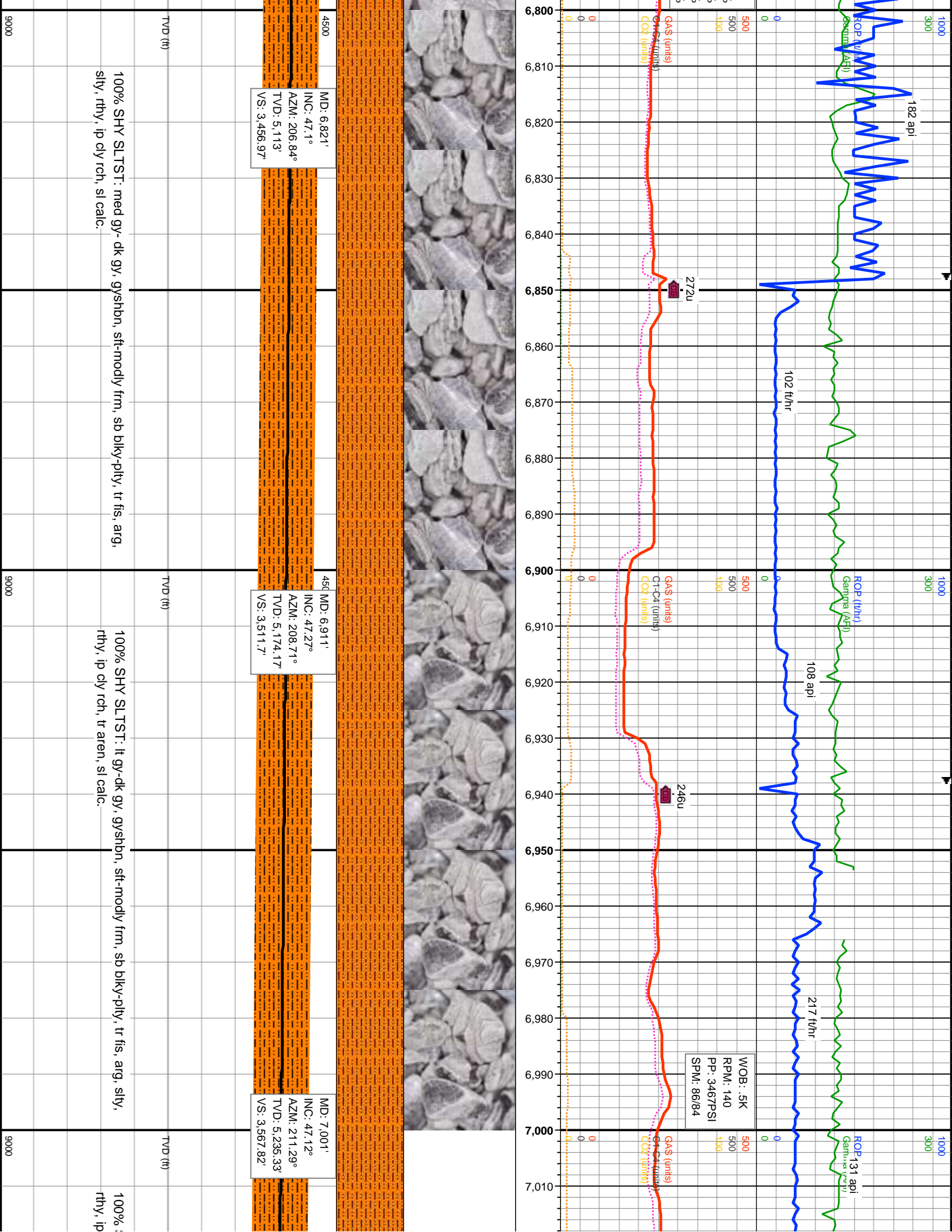
MD: 6,552'  
INC: 47.19°  
AZM: 207.72°  
TVD: 4,930.3'  
VS: 3,293.76'

100% SHY SLTST: lt-medgy, sft-modly frm, sb blk-y-ply, tr fis, arg, silty, rthy, ip clay  
rch, sl calc.

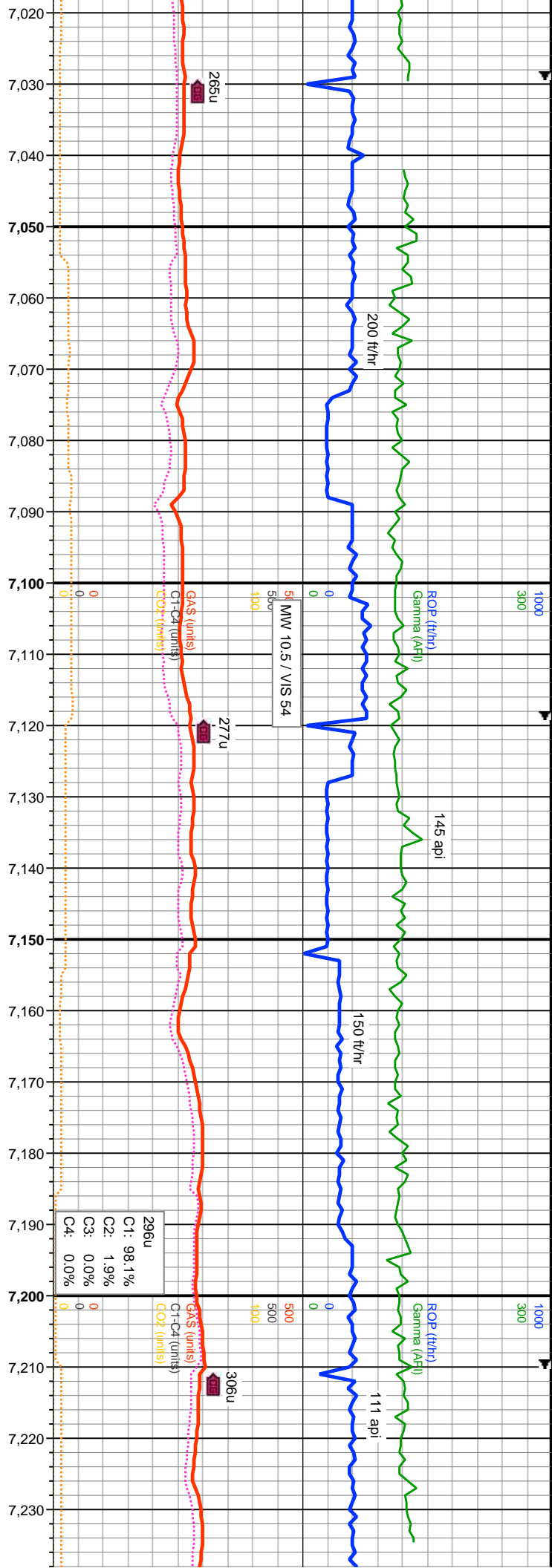
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rch, sl calc.



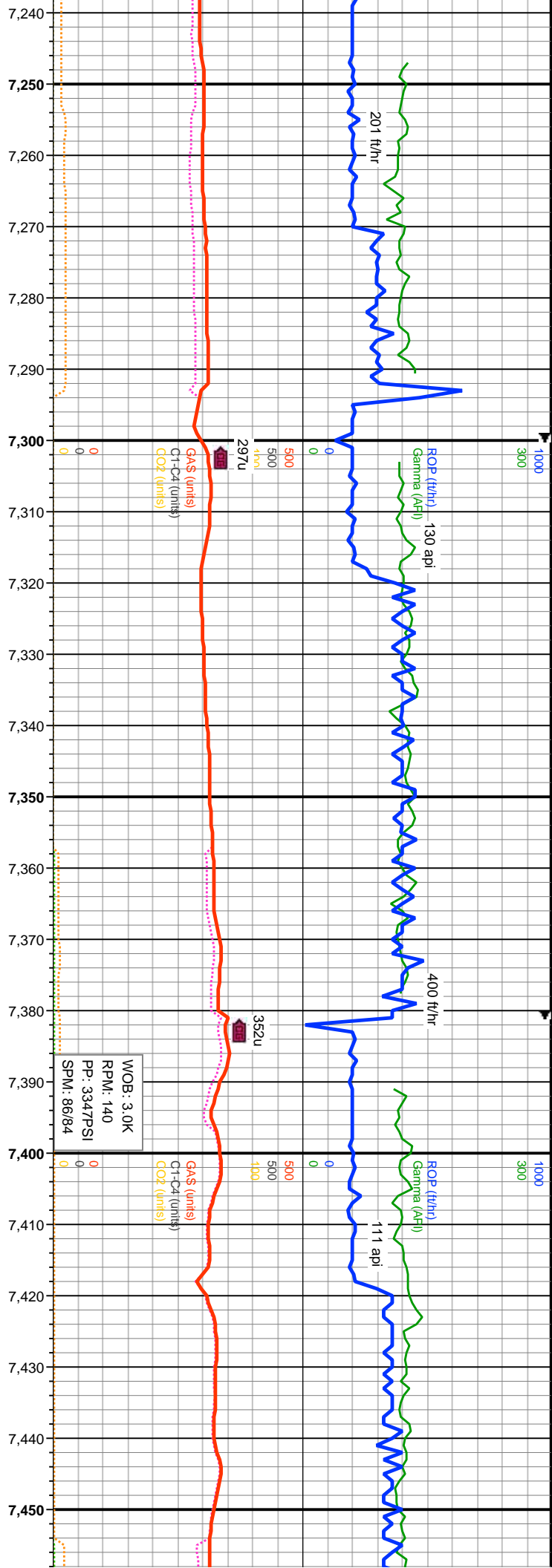






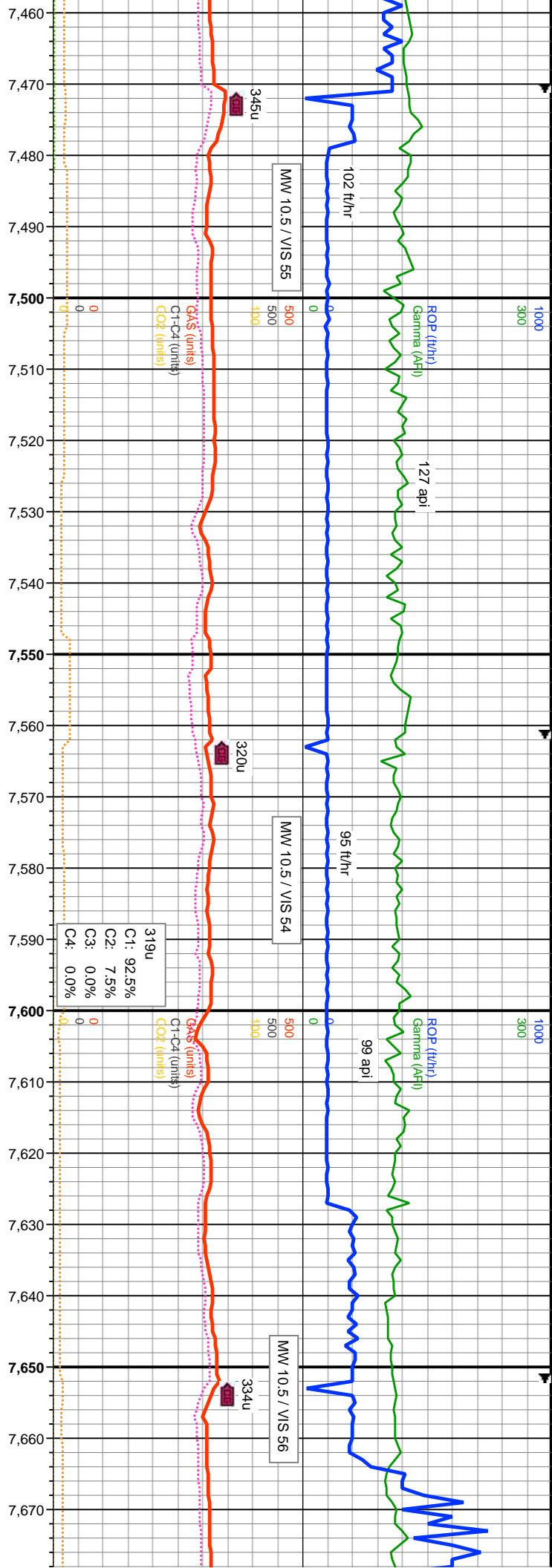


SHV SLTST: lt gy-dk gy, gysbhn, sft-modly frm, sb blk-y-pltly, tr fis, arg, slty, cly rch, tr grty, sl calc.		100% SHV SLTST: lt gy-dk gy, gysbhn, sft-modly frm, sb blk-y-pltly, tr fis, mas, arg, slty, rthy, ip cly rch, sl calc.		100% SHV SLTST: lt gy-d rthy, ip cly rch, sl calc.	
MD: 7,090'		MD: 7,180'		MD: 7,180'	
INC: 47.18°		INC: 47.15°		INC: 47.15°	
AZM: 210.77°		AZM: 209.6°		AZM: 209.6°	
TVD: 5,296.85'		TVD: 5,357.05'		TVD: 5,357.05'	
VS: 3,623.89'		VS: 3,680.11'		VS: 3,680.11'	
4500		4500		4500	
TVD (ft)		TVD (ft)		TVD (ft)	
9000		9000		9000	



MD: 7.270' INC: 47.09° AZM: 207.5° TVD: 5,418.29' VS: 3,735.27'				MD: 7.359' INC: 46.55° AZM: 208.48° TVD: 5,479.19' VS: 3,789.2'				MD: 7.449' INC: 46.82° AZM: 210.02° TVD: 5,540.94' VS: 3,844.41'			
4500				4500				4500			
TVD (ft)				TVD (ft)				TVD (ft)			
100% SHY SLTST: lt gy-dk gy, gysbhn, sft-modly frm, sb blk-y-pltly, tr fis, arg, slty, rthy, ip cly rch, sl calc.				100% SHY SLTST: lt gy-med gy, gysbhn, sft-modly frm, sb blk-y-pltly, tr fis, arg, slty, rthy, ip cly rch, sl calc.				100% SHY SLTST: lt gy-med gy, gysbhn, sft-modly frm, sb blk-y-pltly, tr fis, arg, slty, rthy, ip cly rch, sl calc.			
9000				9000				9000			

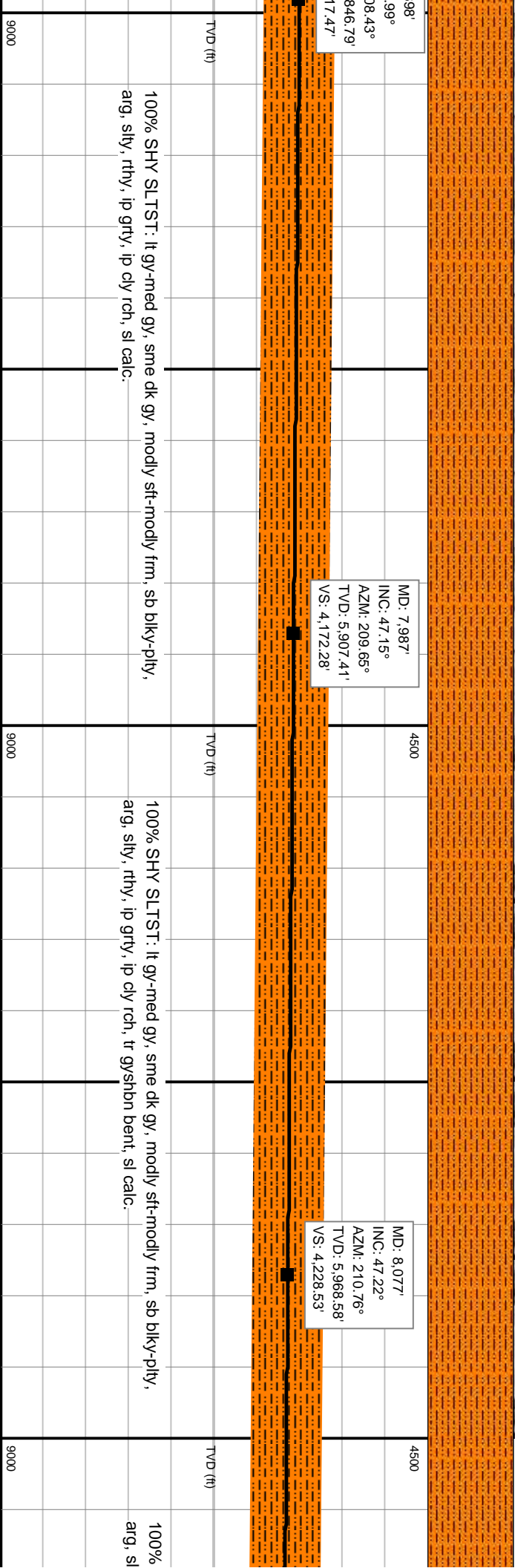
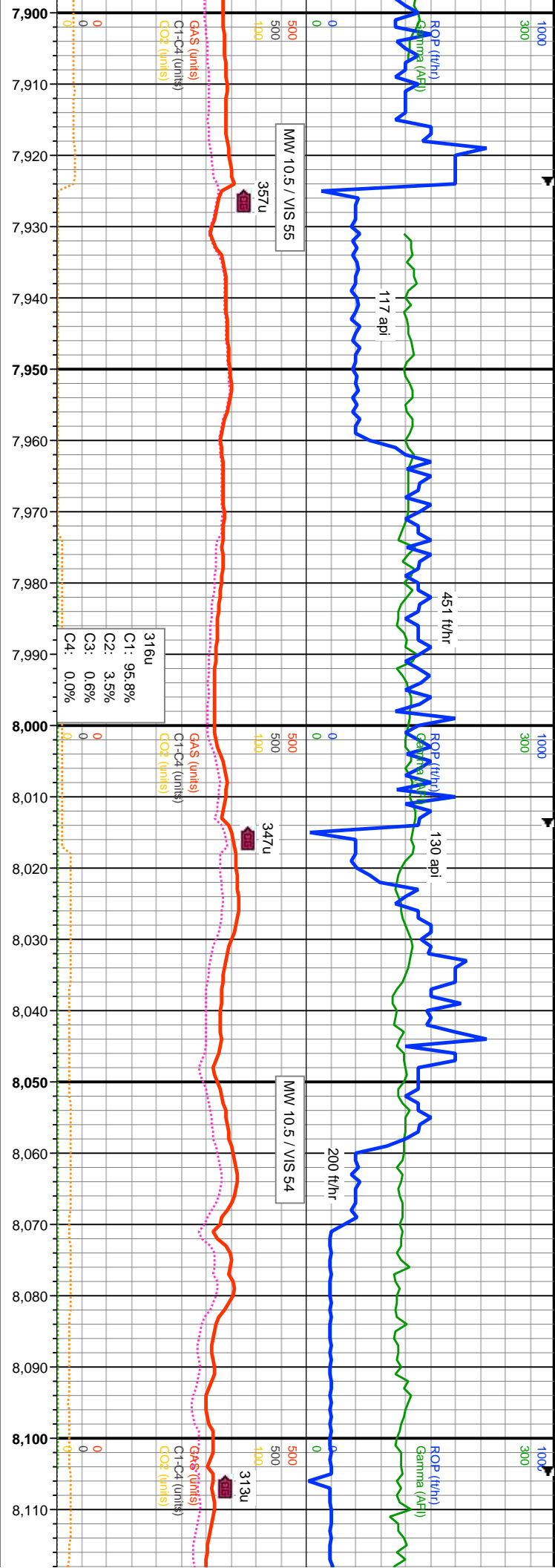


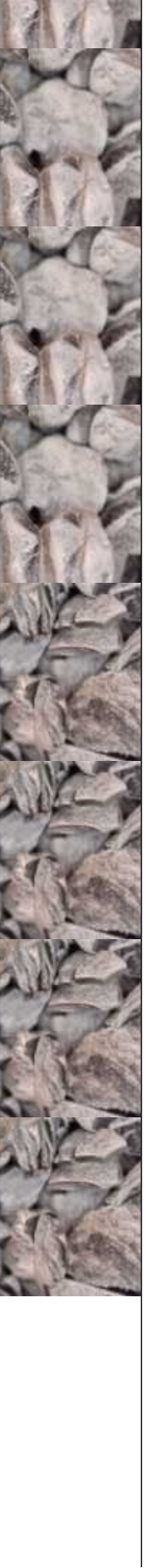
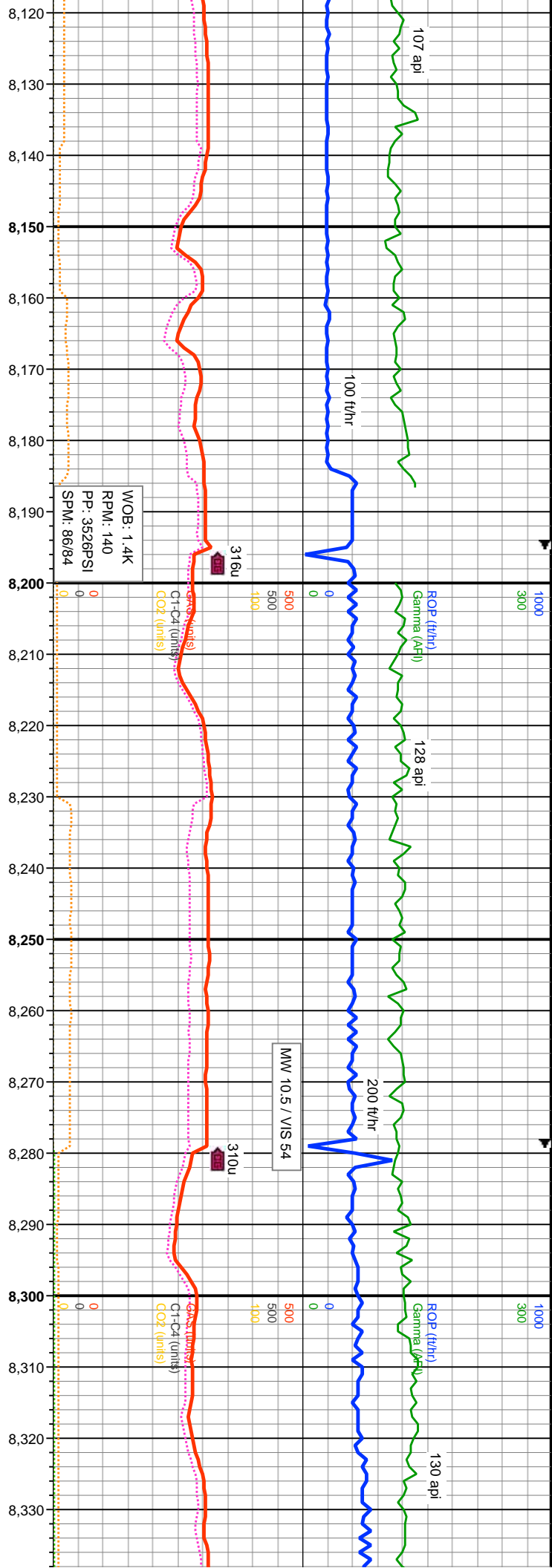


-modly frm, sb blk-y-sb plty, tr fis,		100% SHY SLTST: lt gy-med gy, gys/bn, sft-modly frm, sb blk-y-plty, arg, slty, rthy, ip cly rch, sl calc.	
4500	MD: 7.539' INC: 47.21° AZM: 209.54°	4500	MD: 7.628' INC: 47.15° AZM: 207.67°
VS: 3,900.24'		VS: 3,954.88'	
TVD: 5,602.3'		TVD: 5,662.8'	
TVD (ft)		TVD (ft)	
9000		9000	

[illegible]

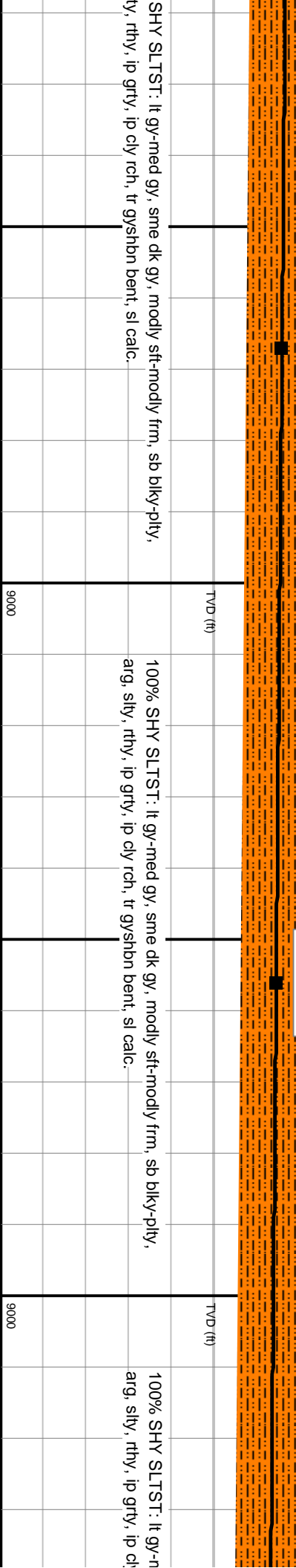




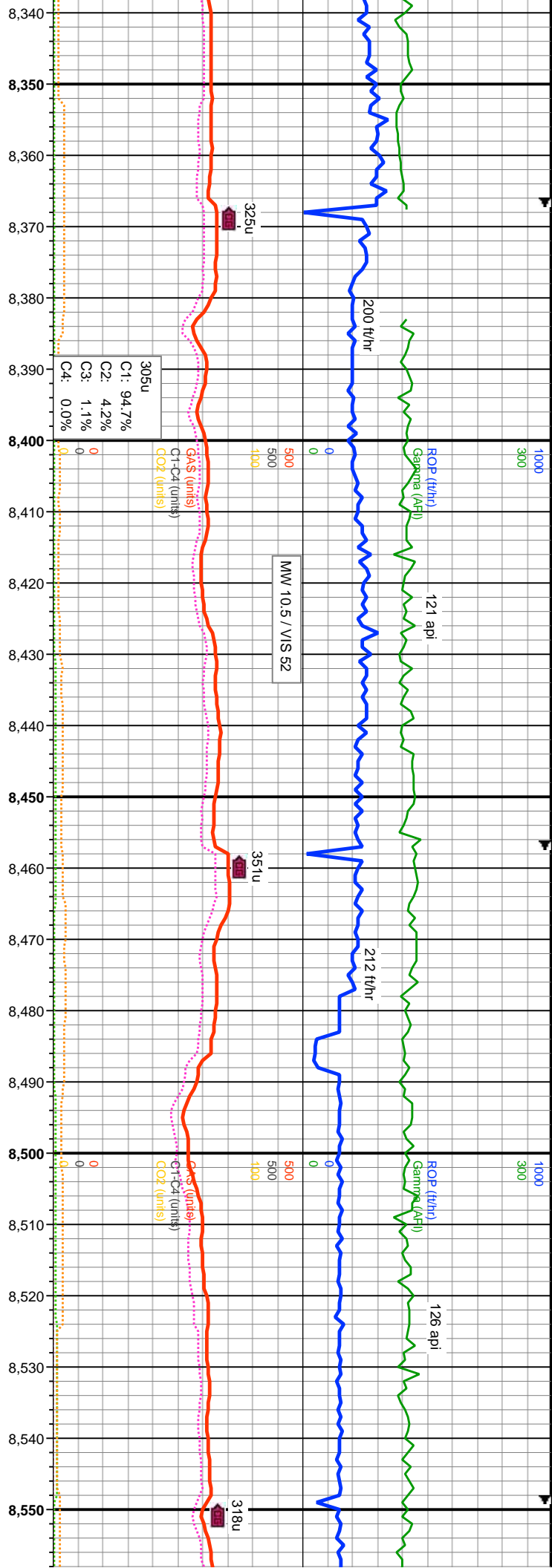


MD: 8,167'  
INC: 47.19°  
AZM: 208.09°  
TVD: 6,029.73'  
VS: 4,284.31'

MD: 8,256'  
INC: 47.16°  
AZM: 207.05°  
TVD: 6,090.23'  
VS: 4,338.29'



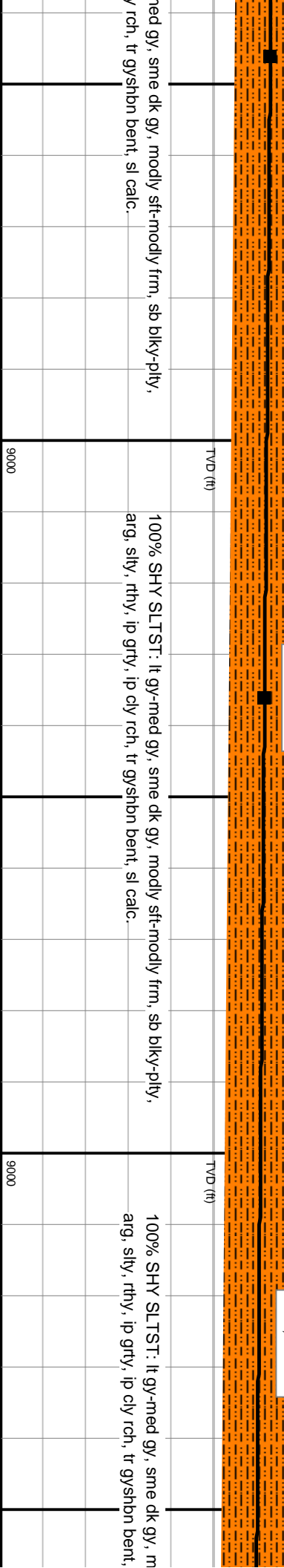




MD: 8,346'  
INC: 47.13°  
AZM: 208.05°  
TVD: 6,151.44'  
VS: 4,392.83'

MD: 8,436'  
INC: 47.27°  
AZM: 209.05°  
TVD: 6,212.59'  
VS: 4,448.07'

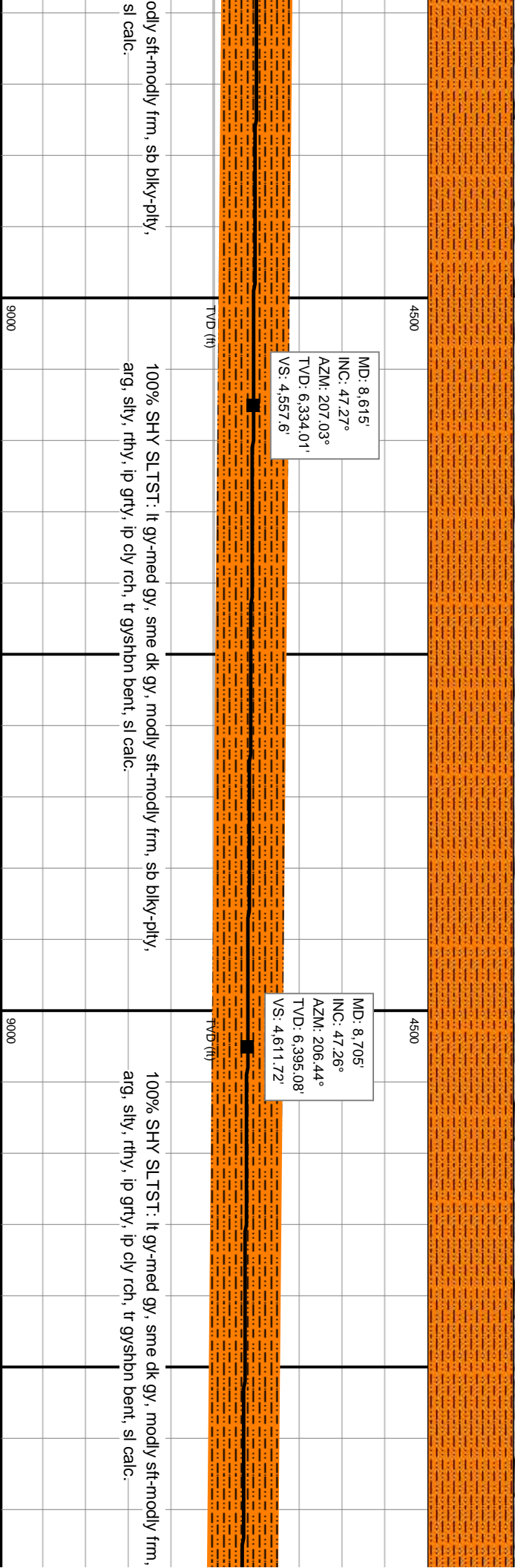
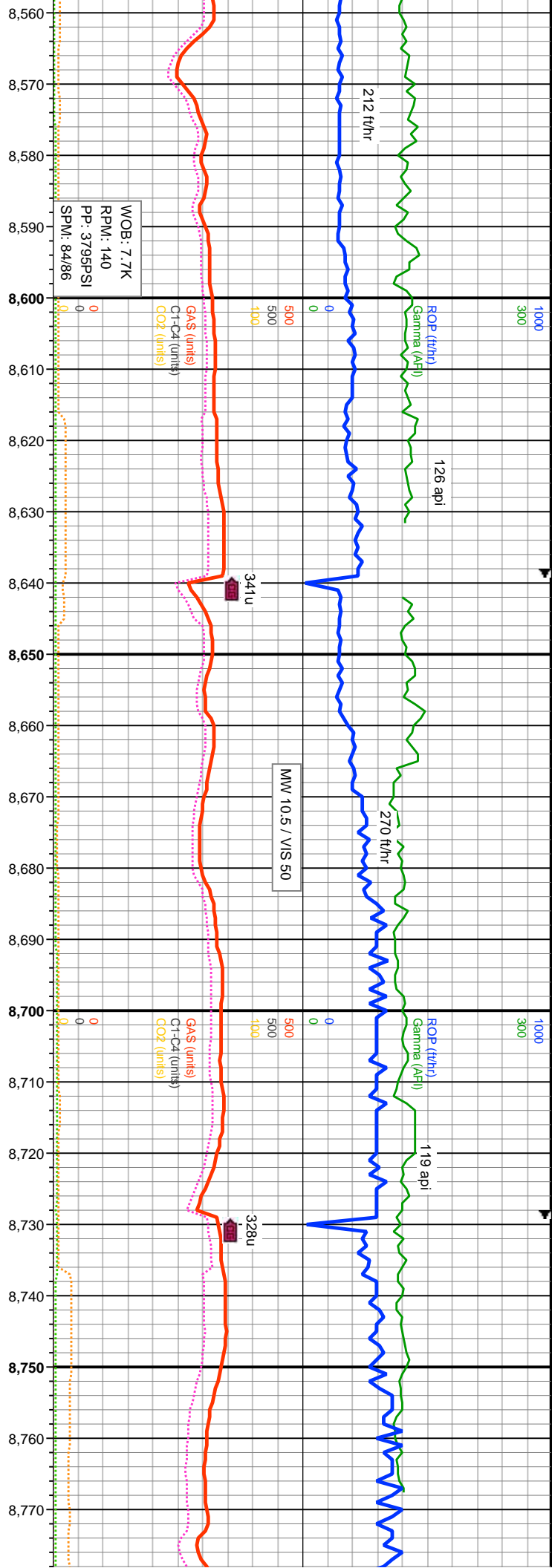
MD: 8,526.7'  
INC: 47.31°  
AZM: 208.29°  
TVD: 6,274.11'  
VS: 4,503.9'



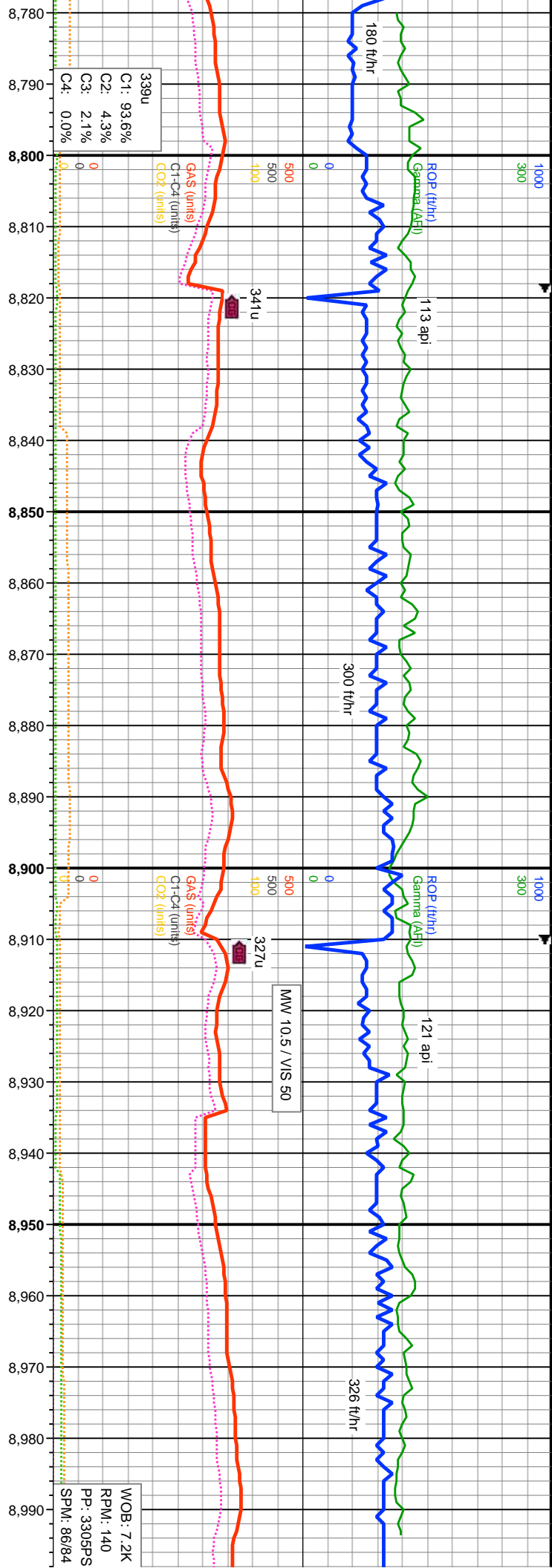
led gy, sme dk gy, modly sft-modly frm, sb blkly-p-ty,  
y rch, tr gysbhn bent, sl calc.

100% SHY SLTST: lt gy-med gy, sme dk gy, modly sft-modly frm, sb blkly-p-ty,  
arg, silty, rthy, ip grty, ip cly rch, tr gysbhn bent, sl calc.

100% SHY SLTST: lt gy-med gy, sme dk gy, m  
arg, silty, rthy, ip grty, ip cly rch, tr gysbhn bent,







MD: 8,795'  
INC: 47.32°  
AZM: 206.32°  
TVD: 6,456.13'  
VS: 4,665.63'

MD: 8,885'  
INC: 47.29°  
AZM: 207.53°  
TVD: 6,517.16'  
VS: 4,719.9'

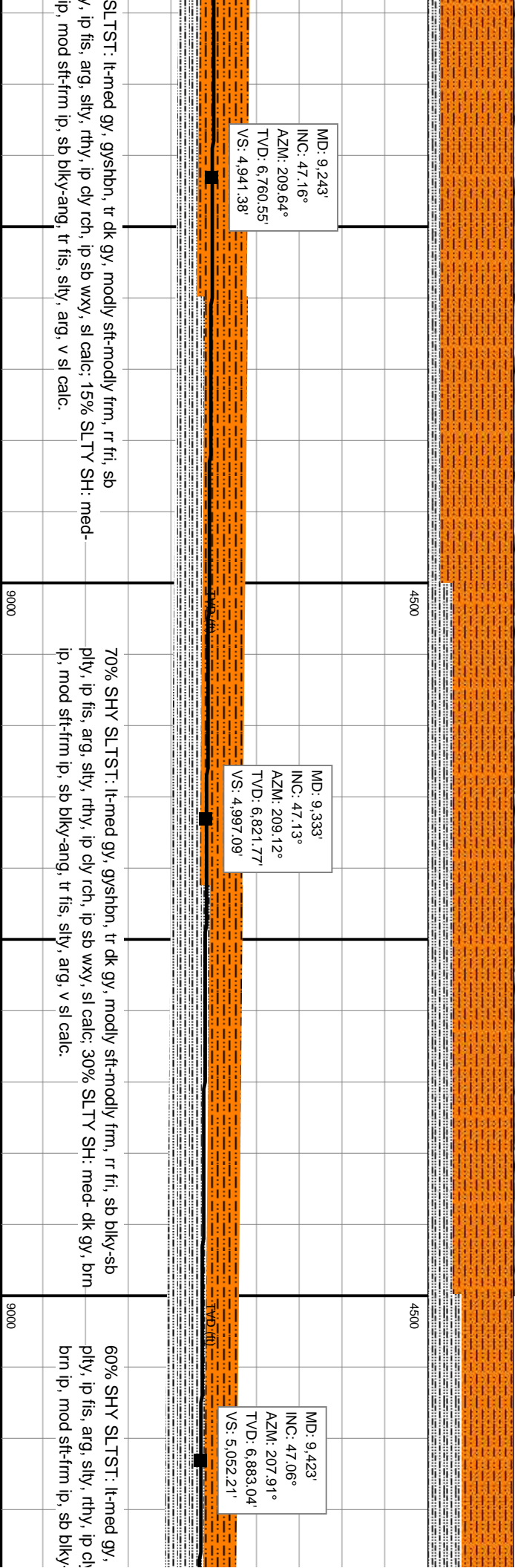
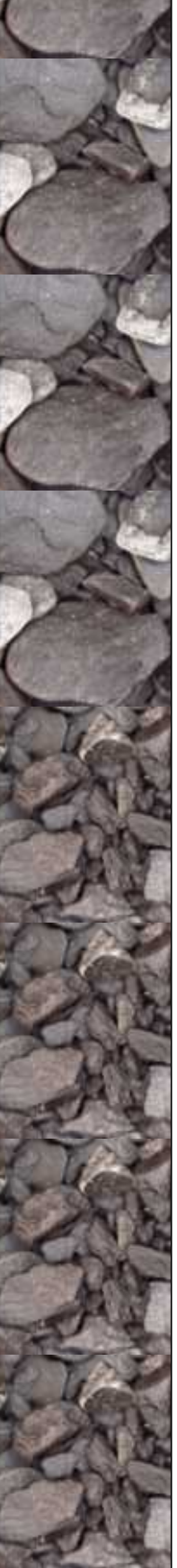
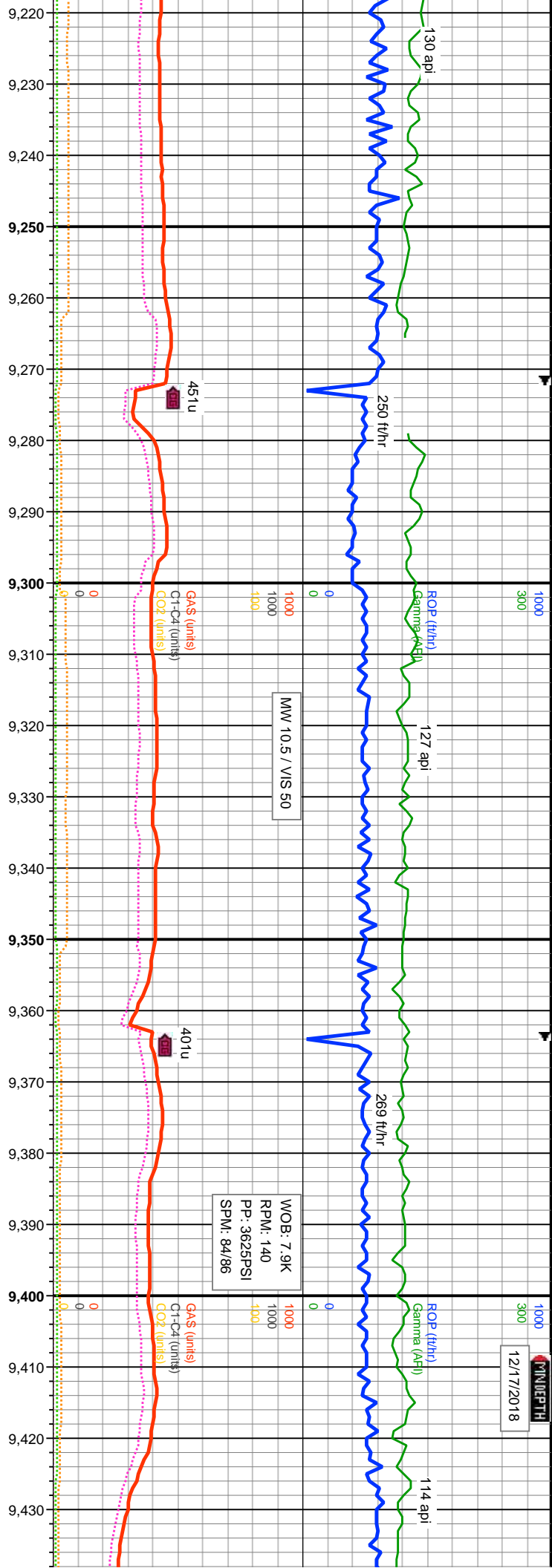
MD: 8,974'  
INC: 47.24°  
AZM: 209.08°  
TVD: 6,577.55'  
VS: 4,774.43'

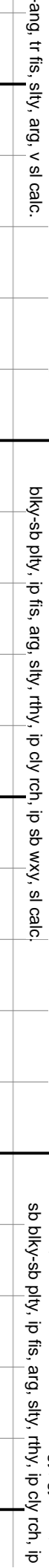
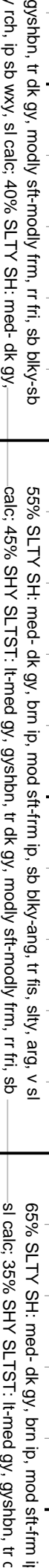
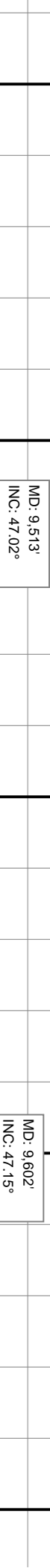
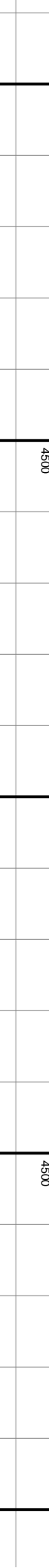
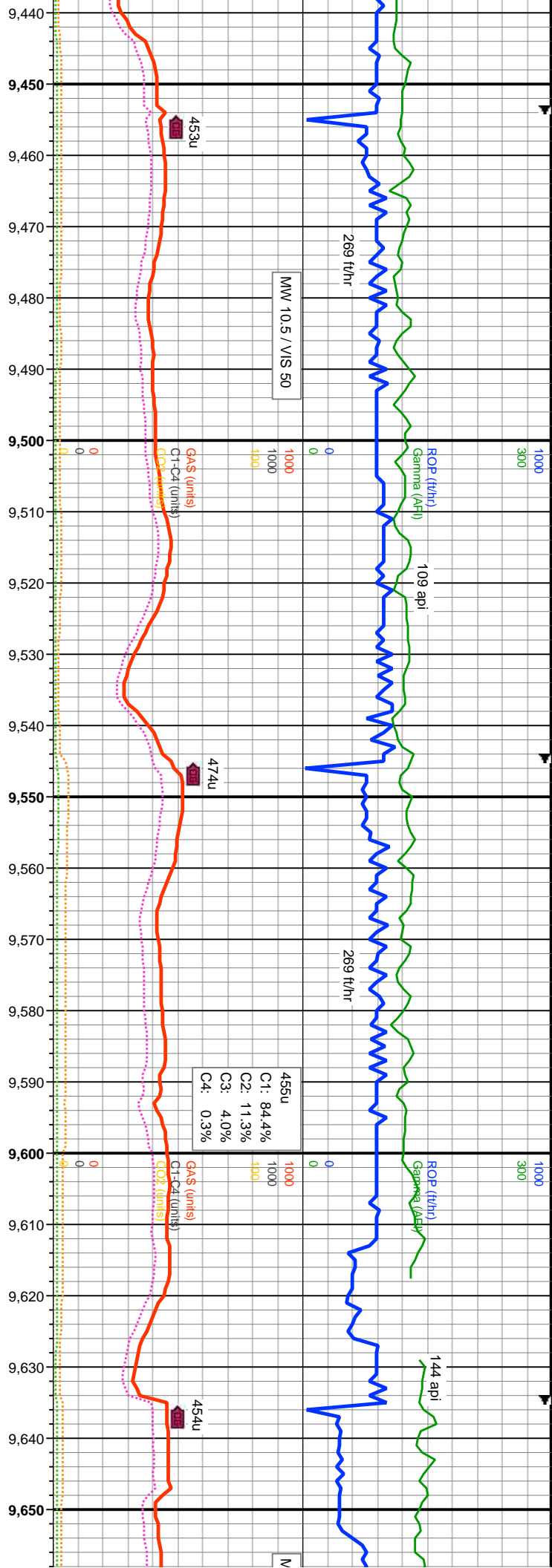
sb blk-y-pity,  
arg, silty, rthy, ip grty, ip cly rch, tr gysbhn bent, sl calc.

100% SHY SLTST: It gy-med gy, sme dk gy, modly sft-modly frm, sb blk-y-pity,  
arg, silty, rthy, ip grty, ip cly rch, tr gysbhn bent, sl calc.









MD: 9,513'  
INC: 47.02°  
AZM: 206.84°  
TVD: 6,944.37'  
VS: 5,106.55'

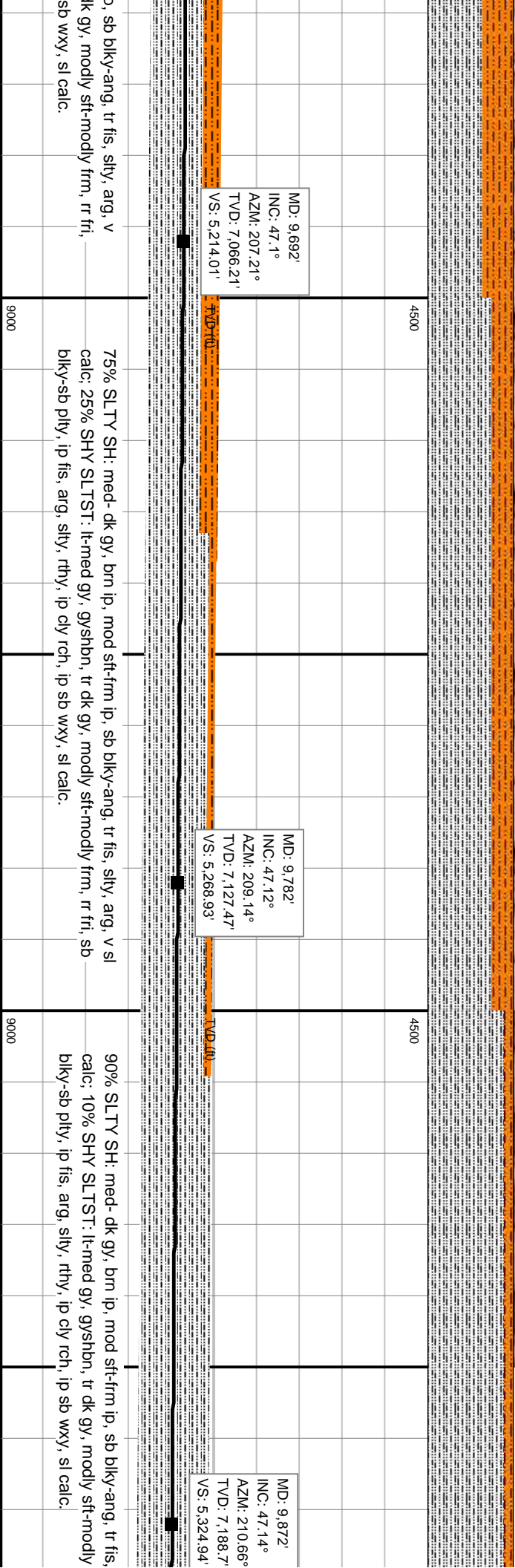
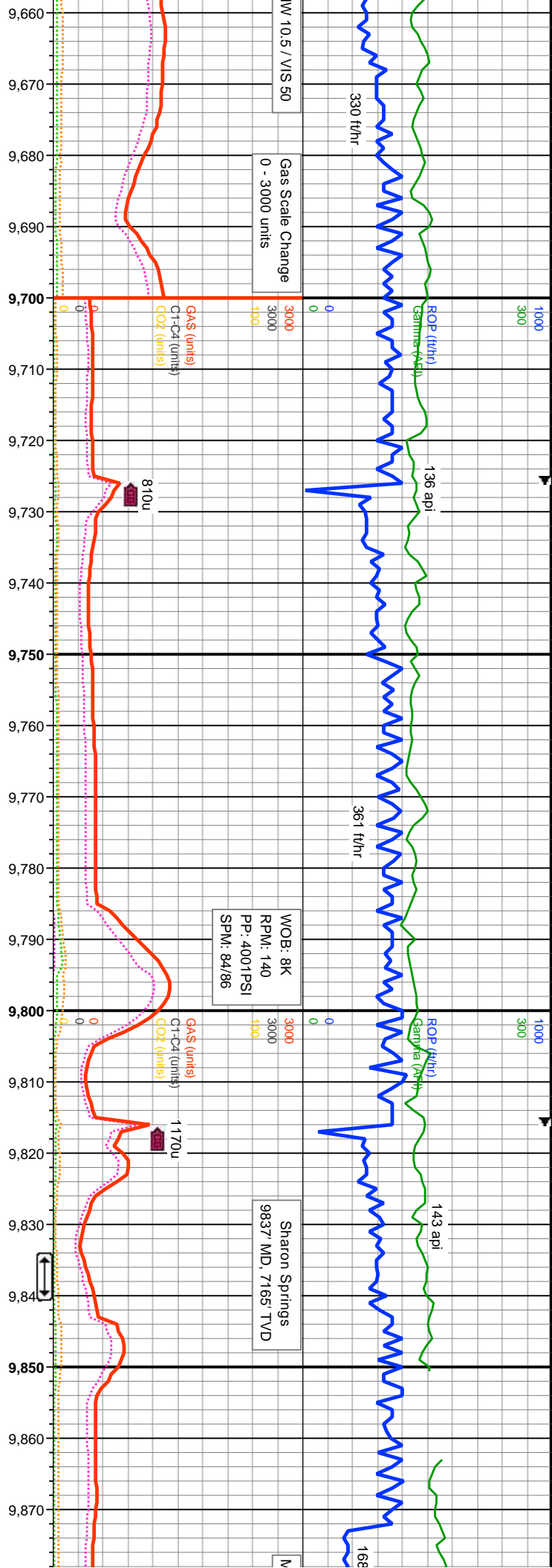
MD: 9,602'  
INC: 47.15°  
AZM: 206.6°  
TVD: 7,004.98'  
VS: 5,159.9'

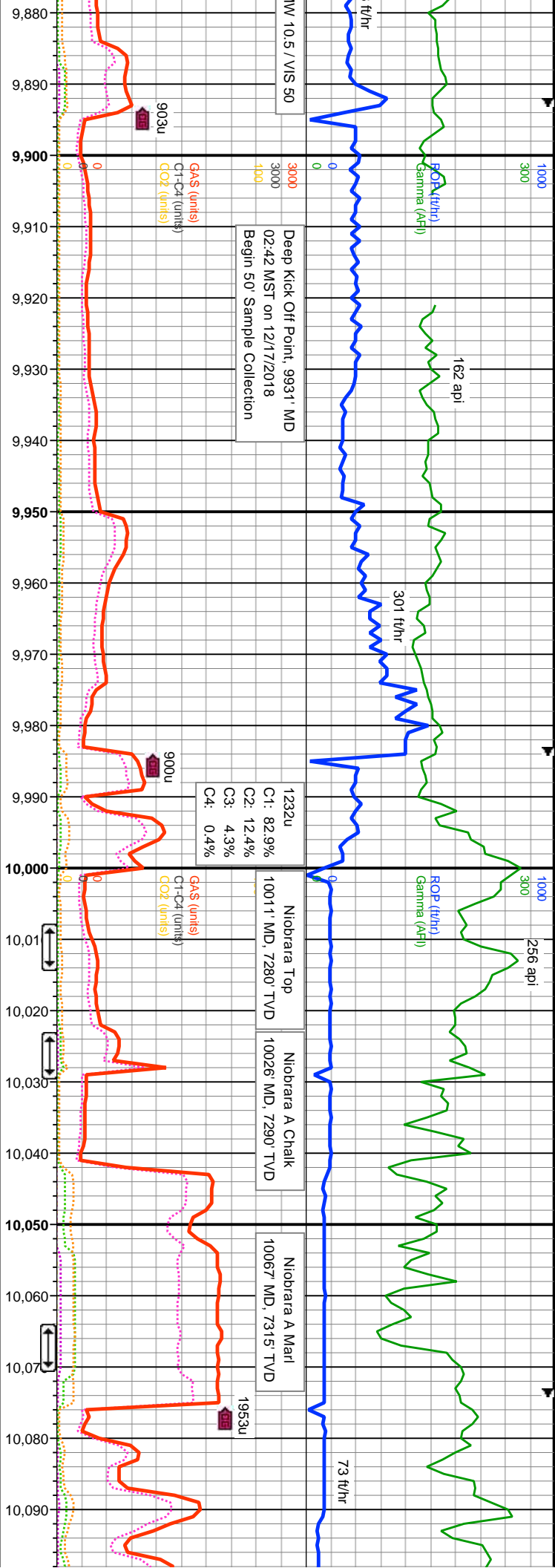
55% SLTY SH: med- dk gy, brn ip, mod sft-frm ip, sb blk-ang, tr fis, slty, arg, v sl calc; 45% SHY SLTST: lt-med gy, gyshbn, tr dk gy, modly sft-modly frm, rr fri, sb blk- sb ply, ip fis, arg, slty, rthy, ip cly rch, ip sb wxy, sl calc.

65% SLTY SH: med- dk gy, brn ip, mod sft-frm ip, sl calc; 35% SHY SLTST: lt-med gy, gyshbn, tr c sb blk- sb ply, ip fis, arg, slty, rthy, ip cly rch, ip

gyshbn, tr dk gy, modly sft-modly frm, rr fri, sb blk- sb / rch, ip sb wxy, sl calc; 40% SLTY SH: med- dk gy, ang, tr fis, slty, arg, v sl calc.



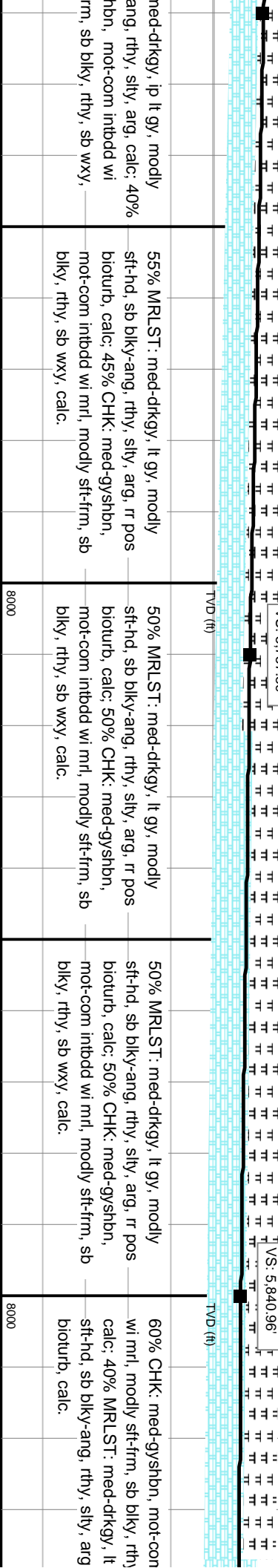
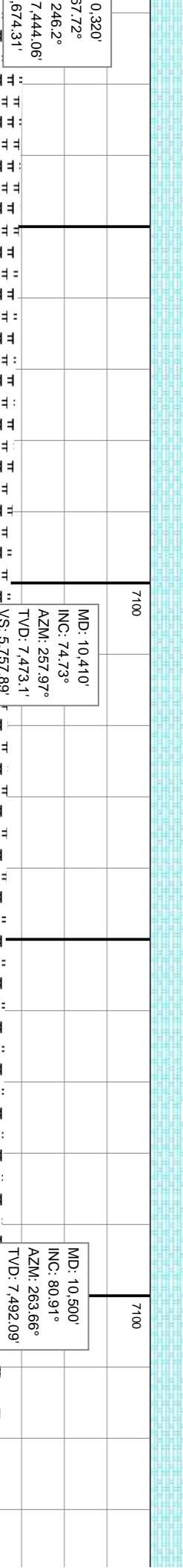
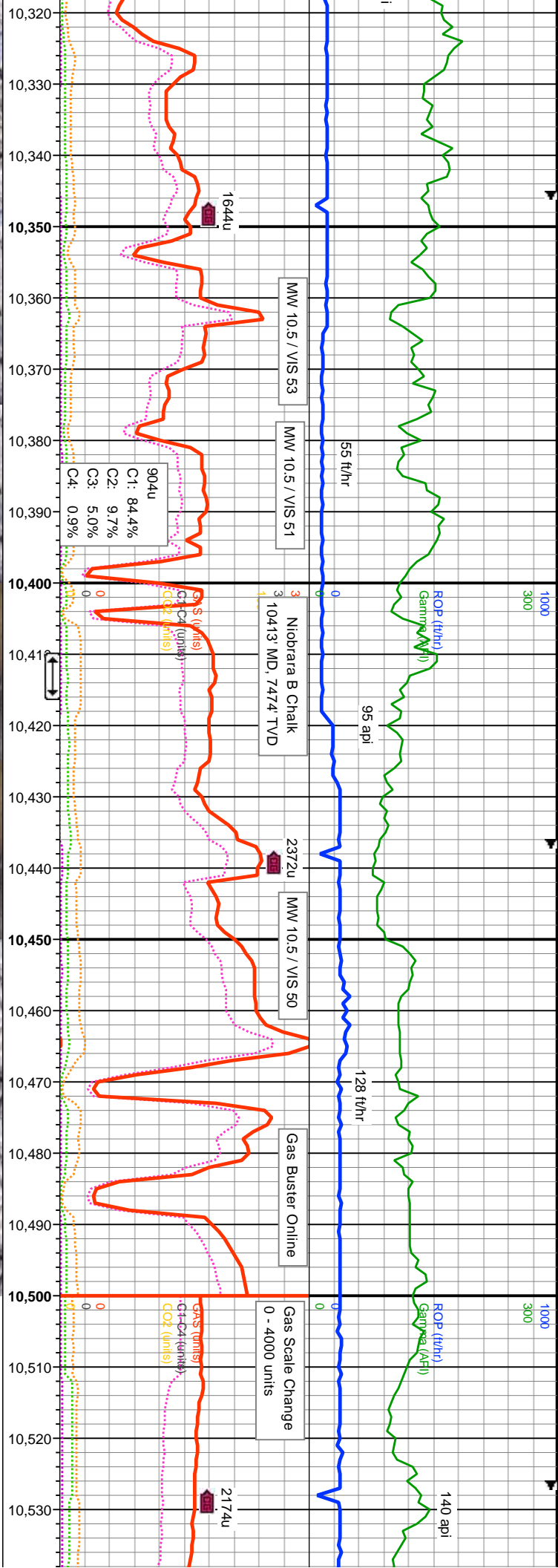




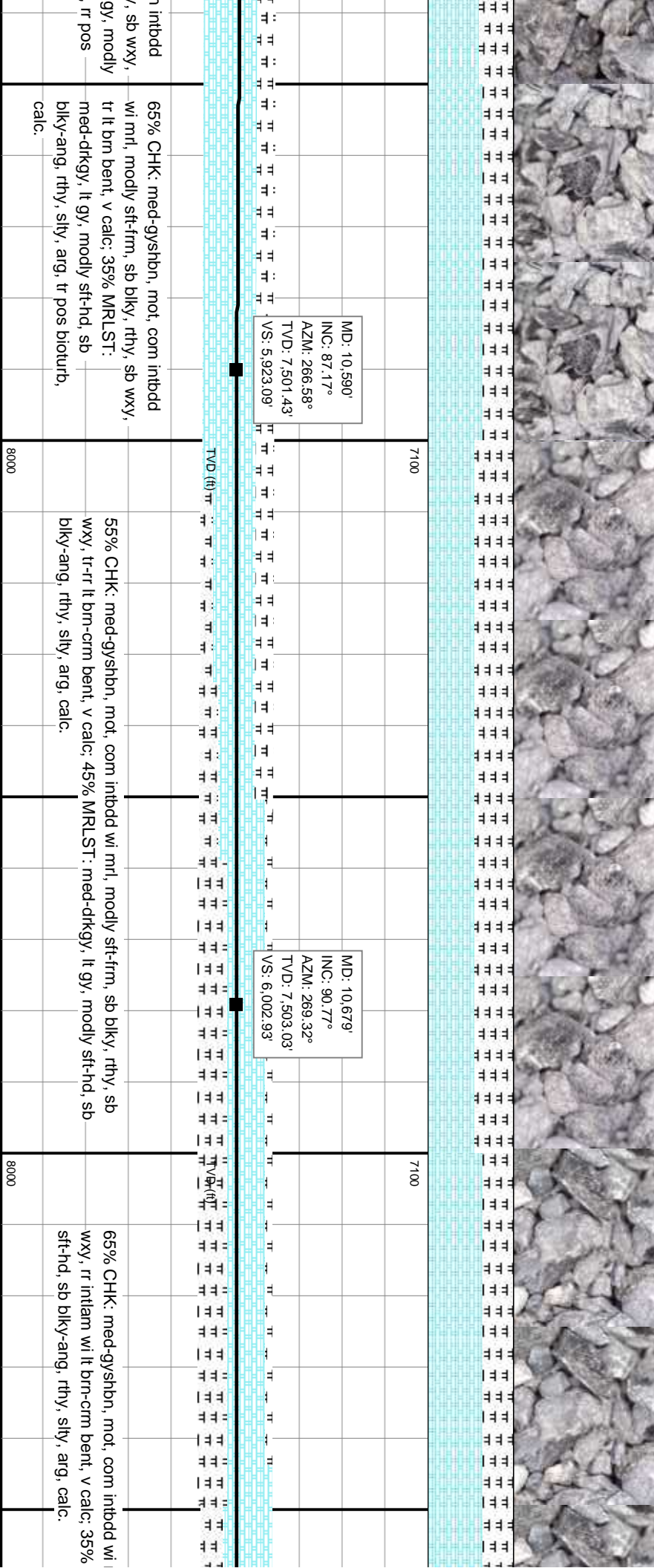
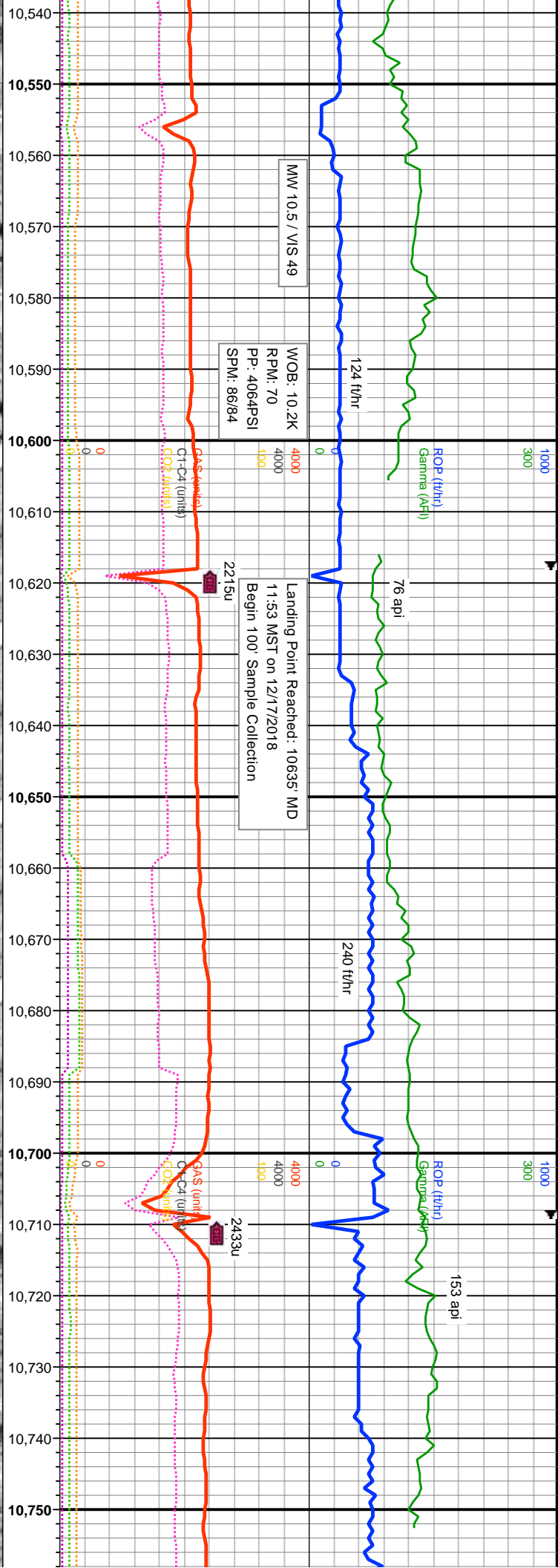
TVD Scale Change 7100-8000		MD: 9,961' INC: 49.1° AZM: 214.13° TVD: 7,248.12' VS: 5.382.67'	
Z1100		7100	
TVD (ft)		TVD (ft)	
silty, arg, v sl fm, rr fri, sb		50% MRLST: med-dkgy, modly sft-hd, sb bkly-ang, rthy, silty, arg, calc; 30% CHK: med-gyshbn, mot-com intbdd wi mrl, modly sft-fm, sb bkly, rthy, sb wxy, calc; 20% SLTY SH: med-dk gy, sme brn, mod sft-fm ip, sb bkly-ang, tr fis, silty, arg, v sl calc.	
100% SLTY SH: med- dk gy, brn ip, mod sft-fm ip, sb bkly-ang, tr fis, silty, arg, v sl calc; TR SHY SLTST		65% MRLST: med-dkgy, modly sft-hd, sb bkly-ang, rthy, silty, arg, calc; 35% CHK: med-gyshbn, mot-com intbdd wi mrl, modly sft-fm, sb bkly, rthy, sb wxy, calc.	
8000		8000	

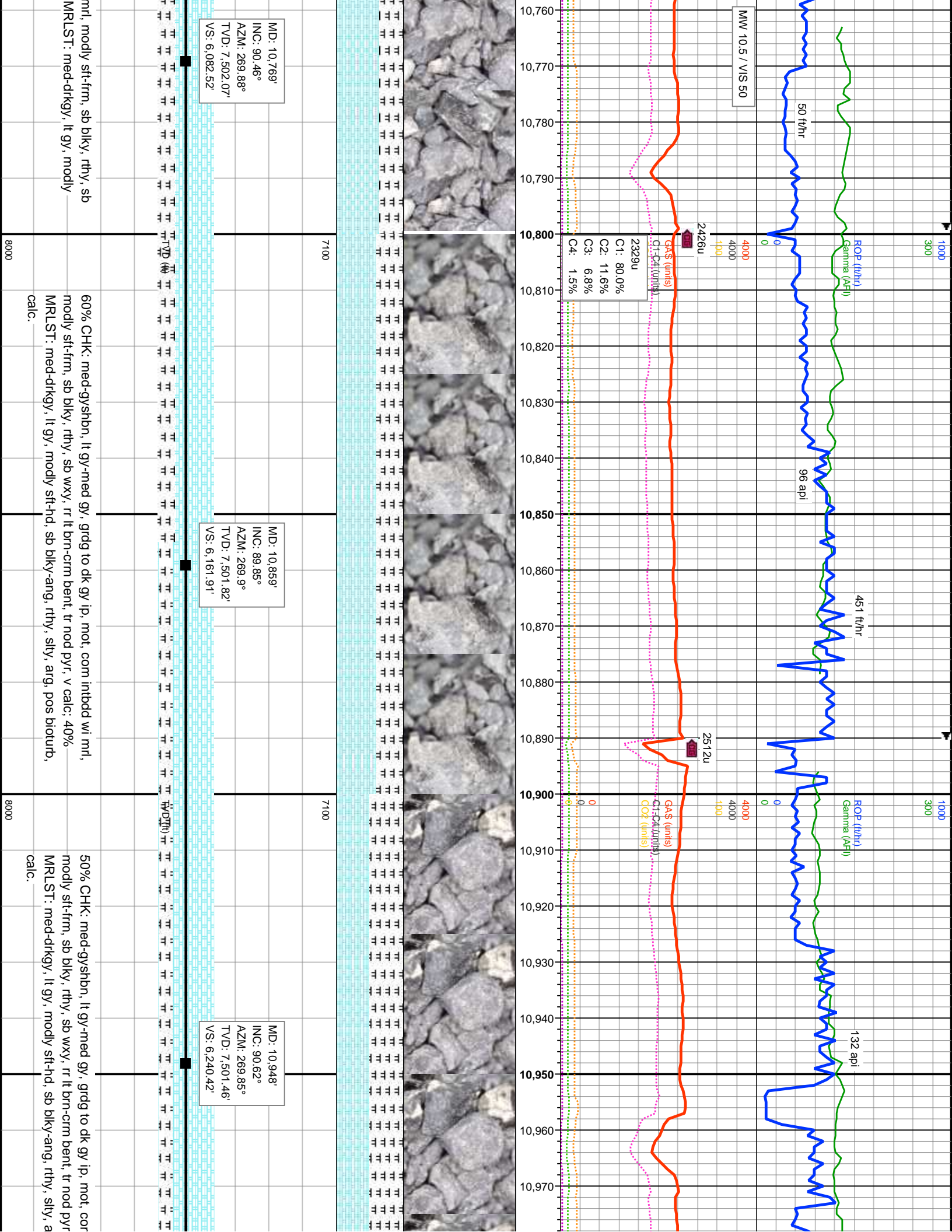




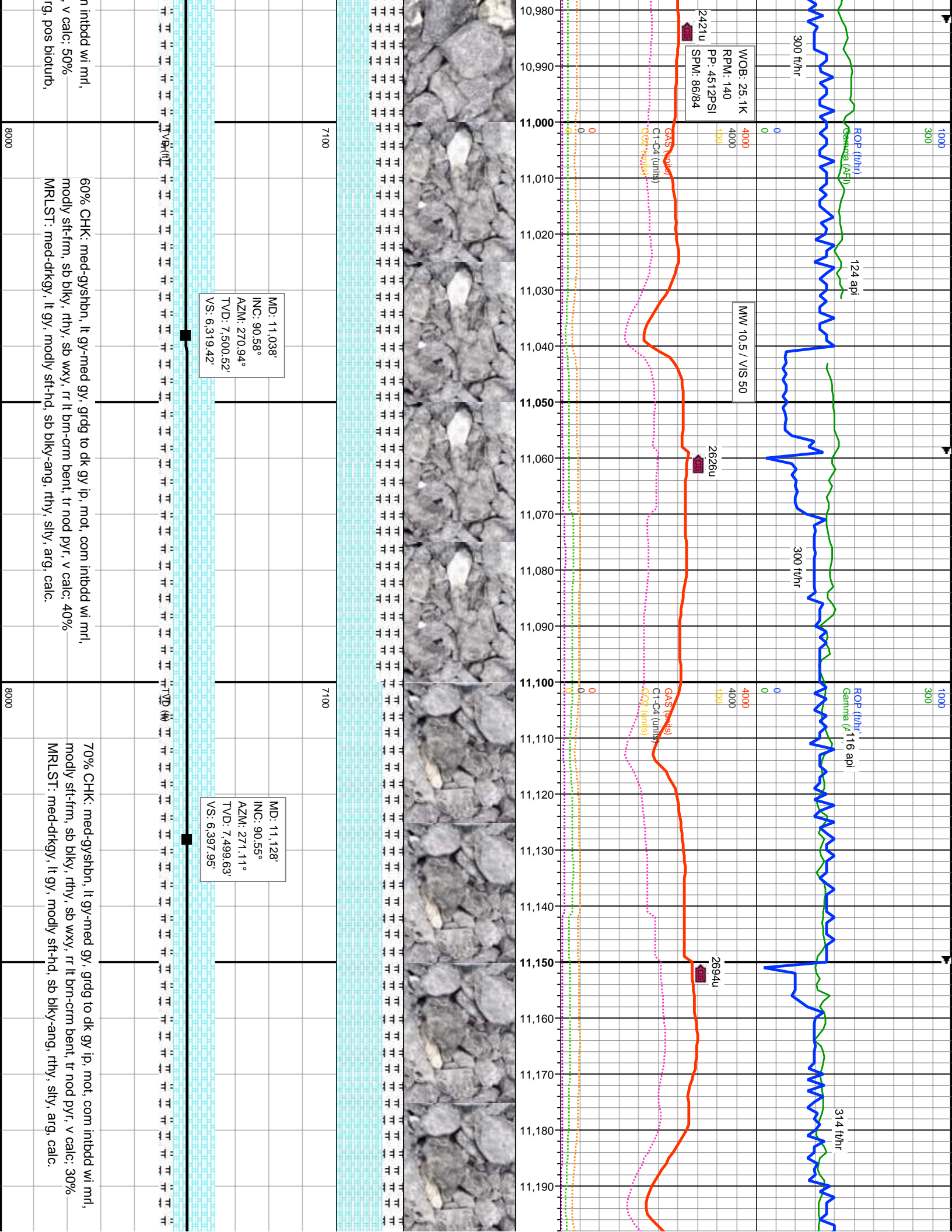






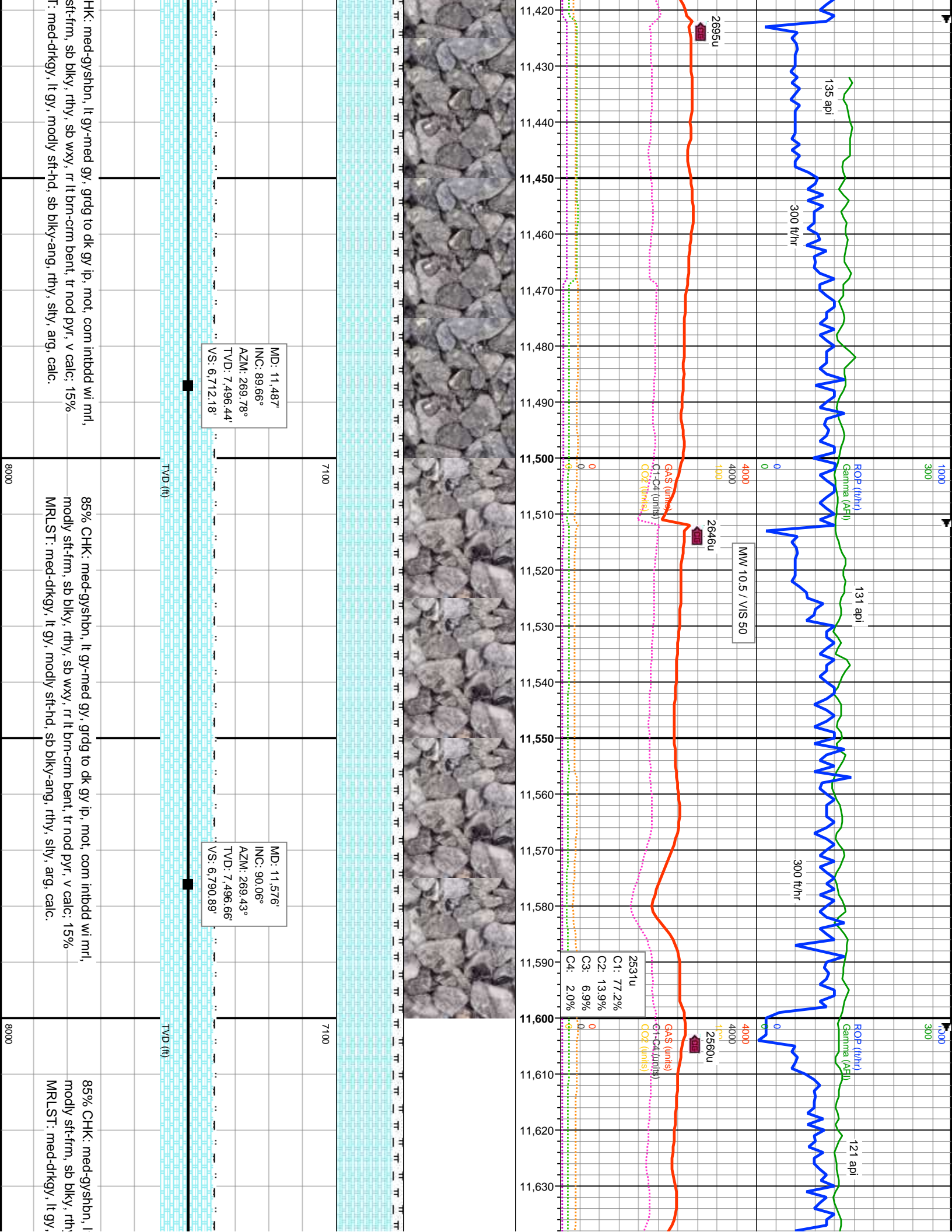








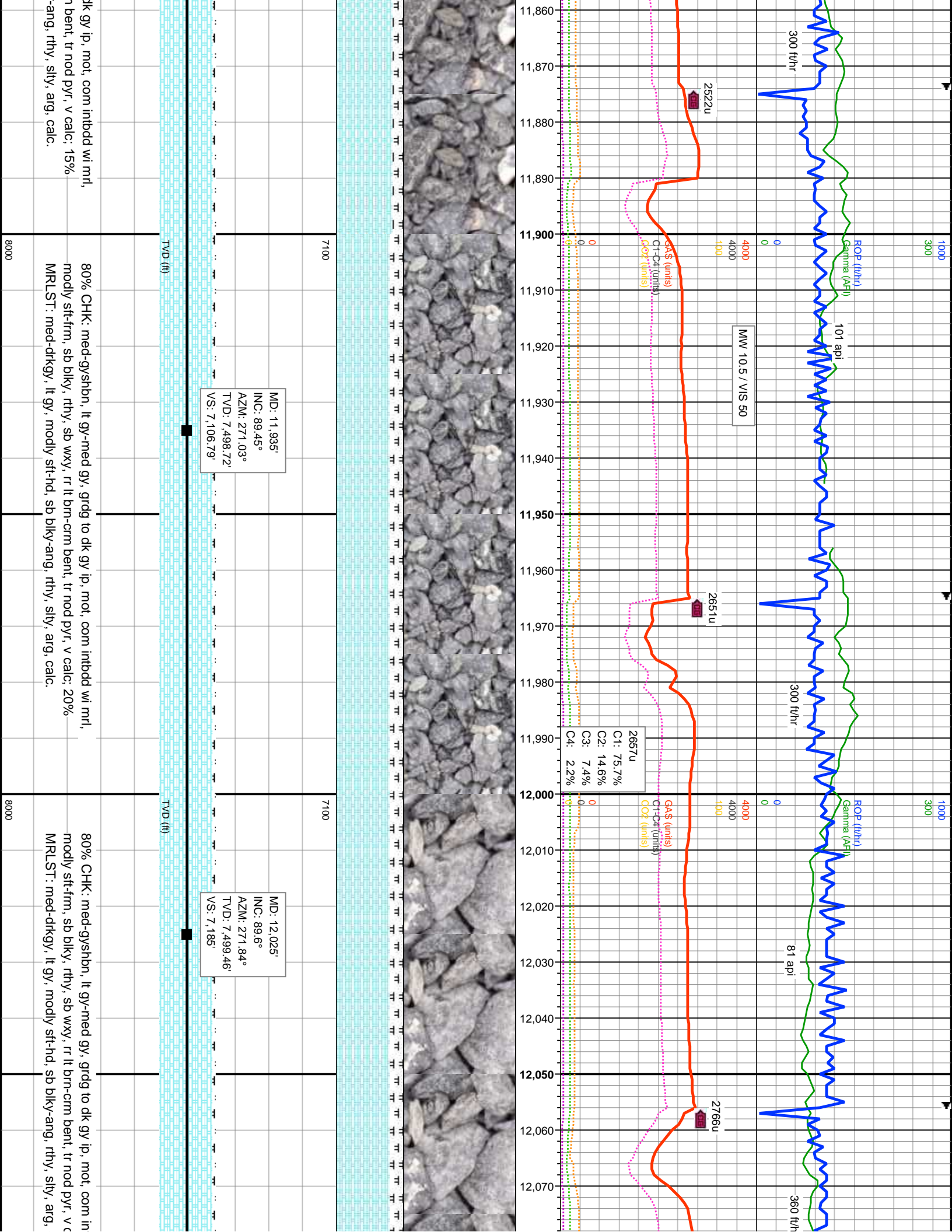


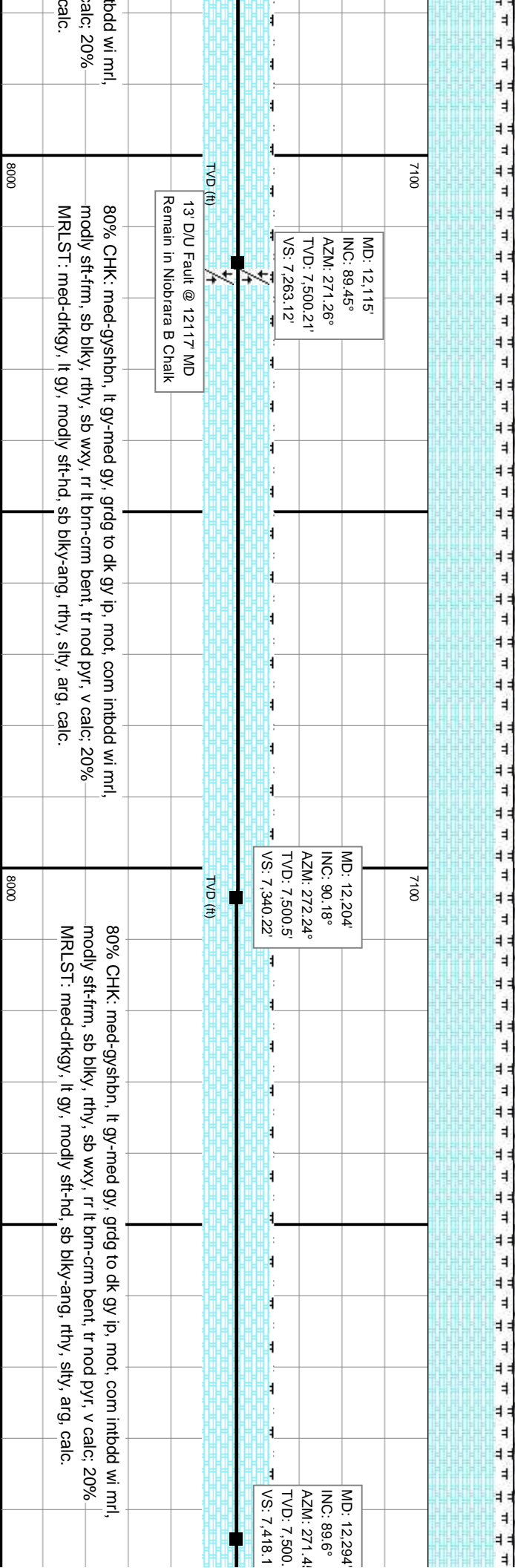
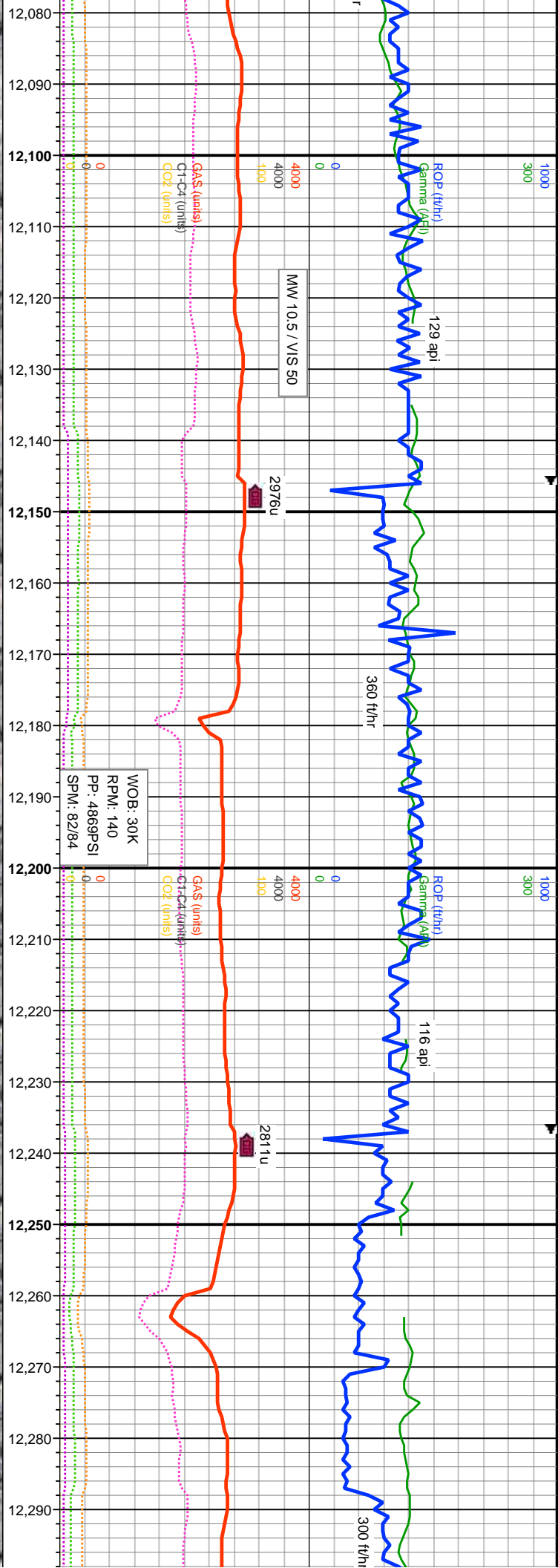


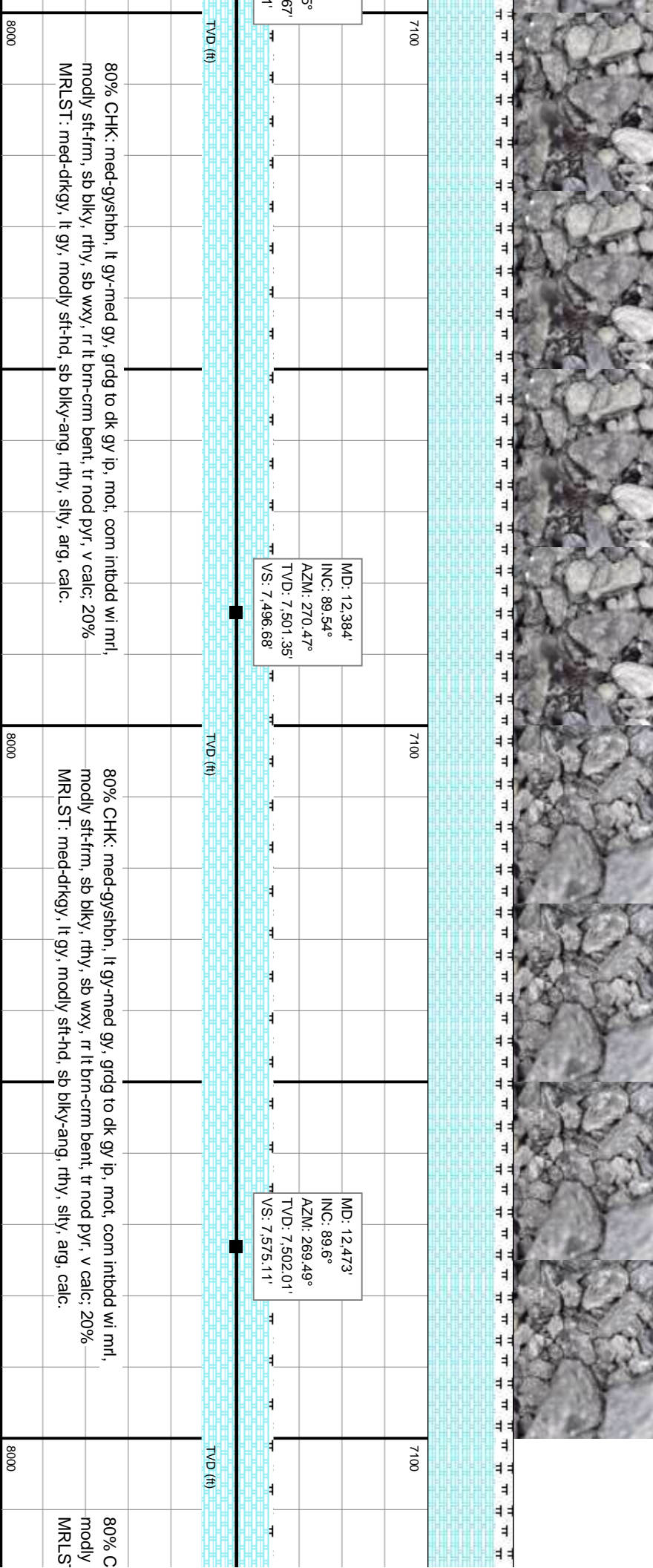
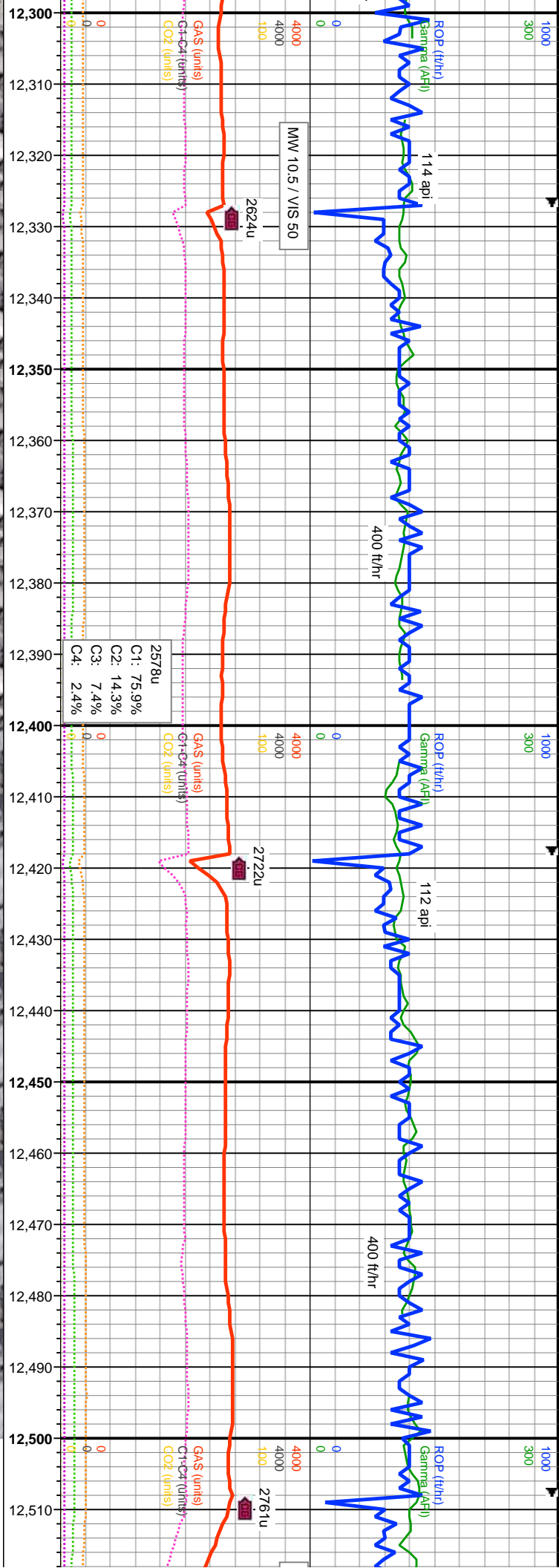




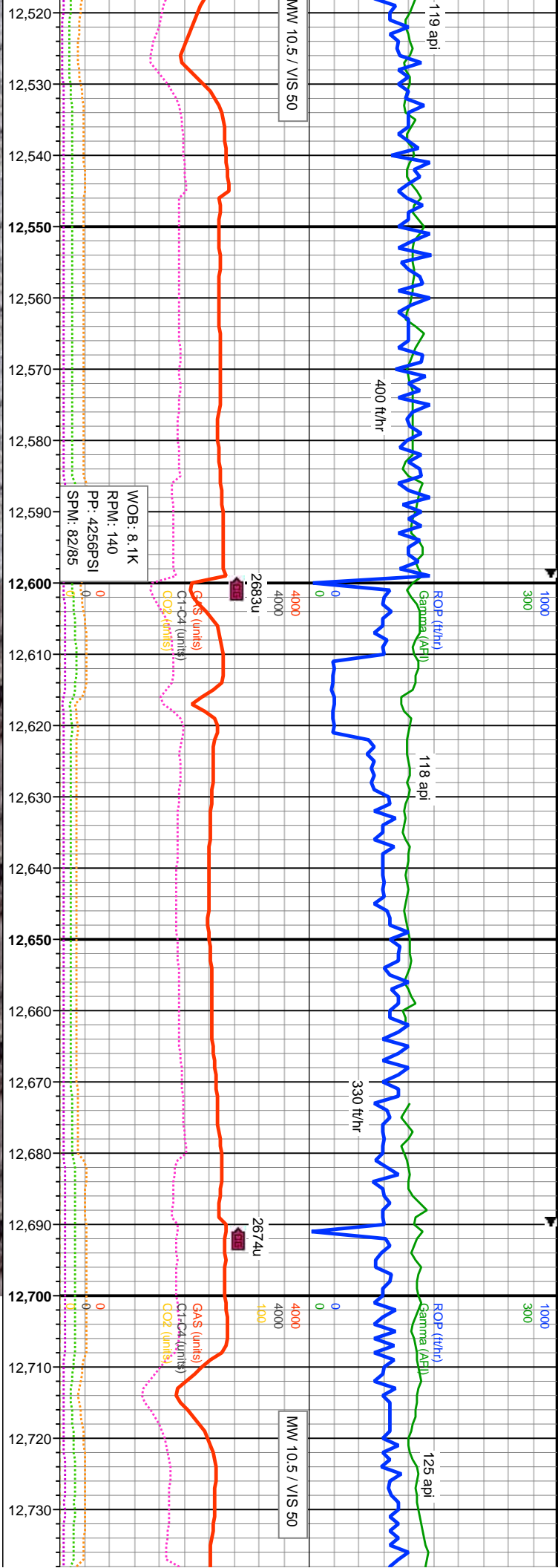












MD: 12,563'  
INC: 89.63°  
AZM: 266.97°  
TVD: 7,502.62'  
VS: 7.656.69'

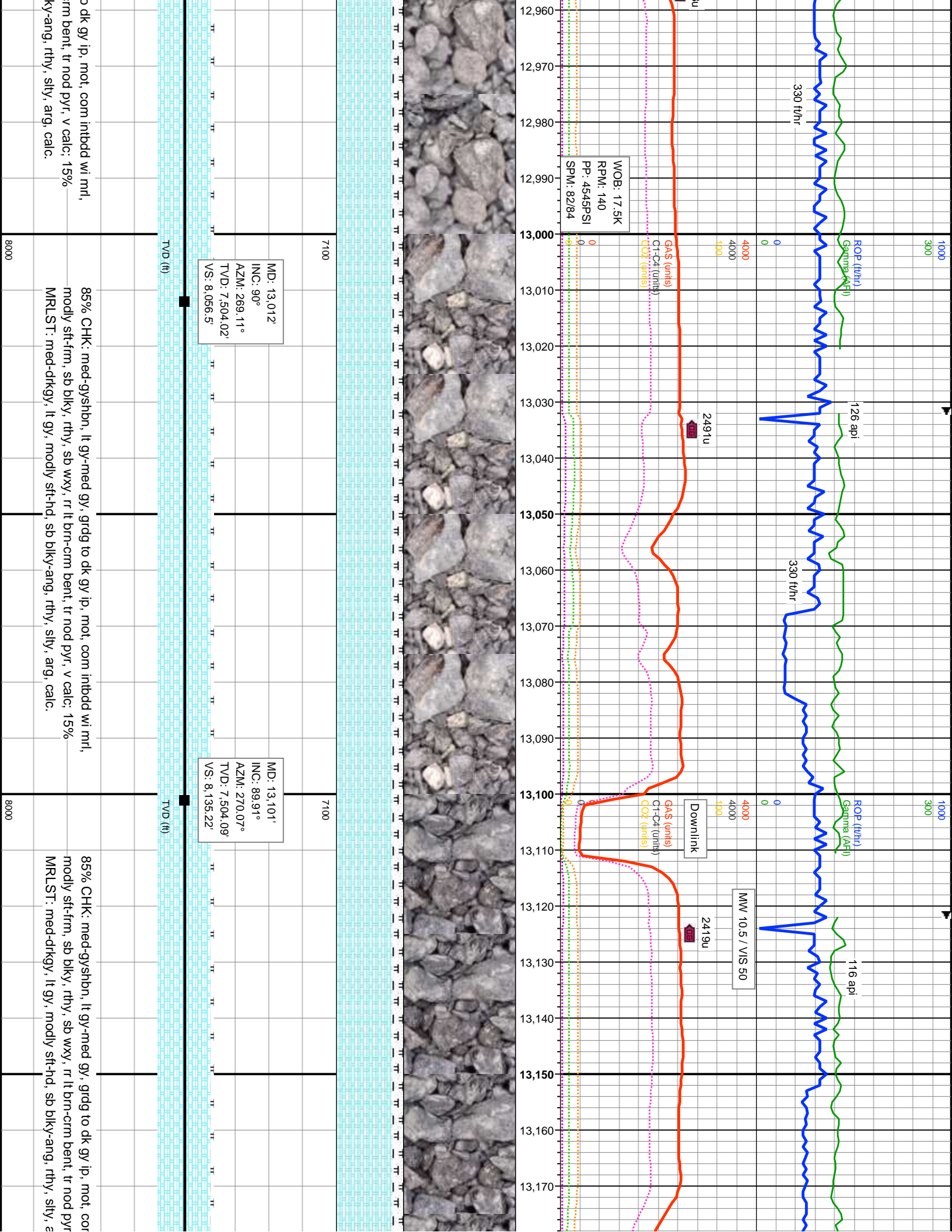
MD: 12,653'  
INC: 90.03°  
AZM: 267.98°  
TVD: 7,502.89'  
VS: 7.736.78'

MD: 12,653'  
INC: 90.03°  
AZM: 267.98°  
TVD: 7,502.89'  
VS: 7.736.78'

HK: med-gyshbn, lt gy-med gy, grdg to dk gy ip, mot, com intbdd wi mrl, sft-firm, sb blkly, rthy, sb wxy, rr lt brn-crm bent, tr nod pyr, v calc: 20% t, med-drkgy, lt gy, modly sft-hd, sb blkly-ang, rthy, slty, arg, calc.		7100	8000
80% CHK: med-gyshbn, lt gy-med gy, grdg to dk gy ip, mot, com intbdd wi mrl, modly sft-firm, sb blkly, rthy, sb wxy, rr lt brn-crm bent, tr nod pyr, v calc: 20% MRLST: med-drkgy, lt gy, modly sft-hd, sb blkly-ang, rthy, slty, arg, calc.		7100	8000
80% CHK: med-gyshbn, modly sft-firm, sb blkly, rth MRLST: med-drkgy, lt gy,		7100	8000

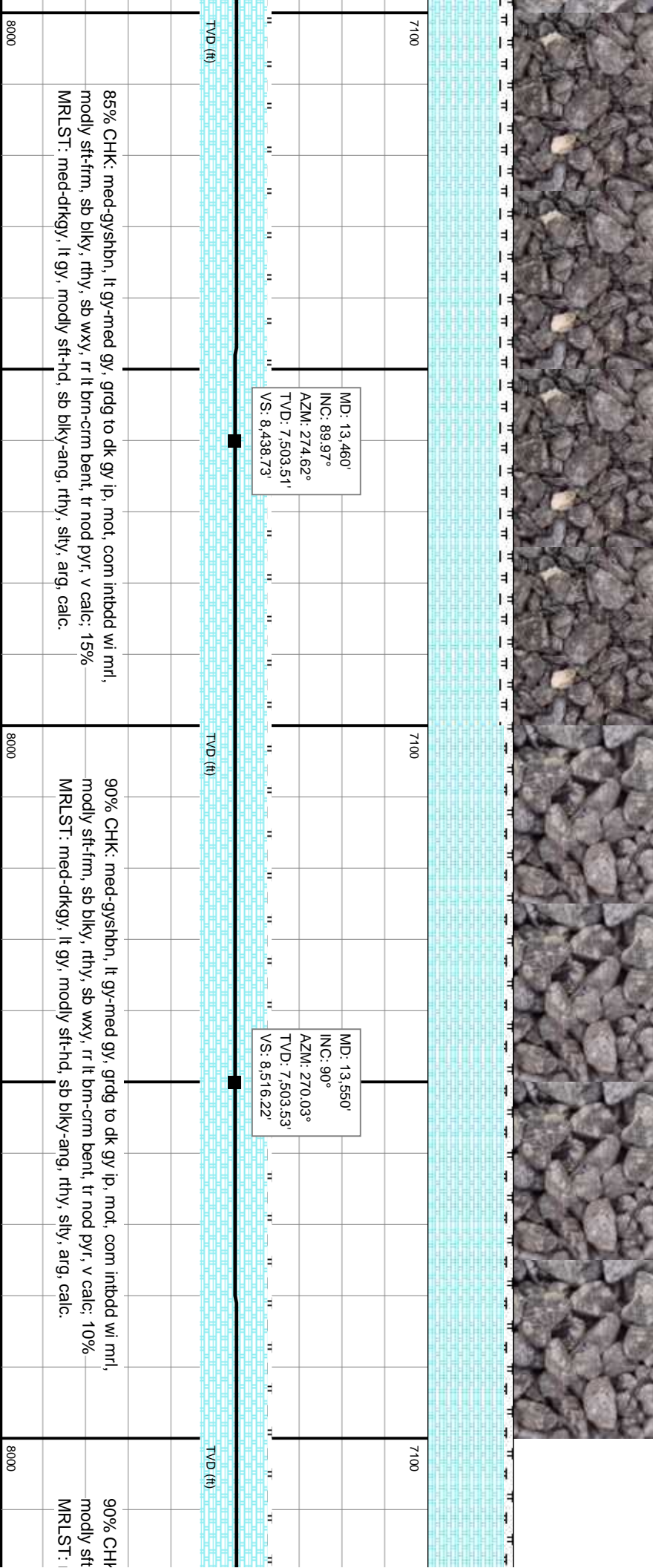
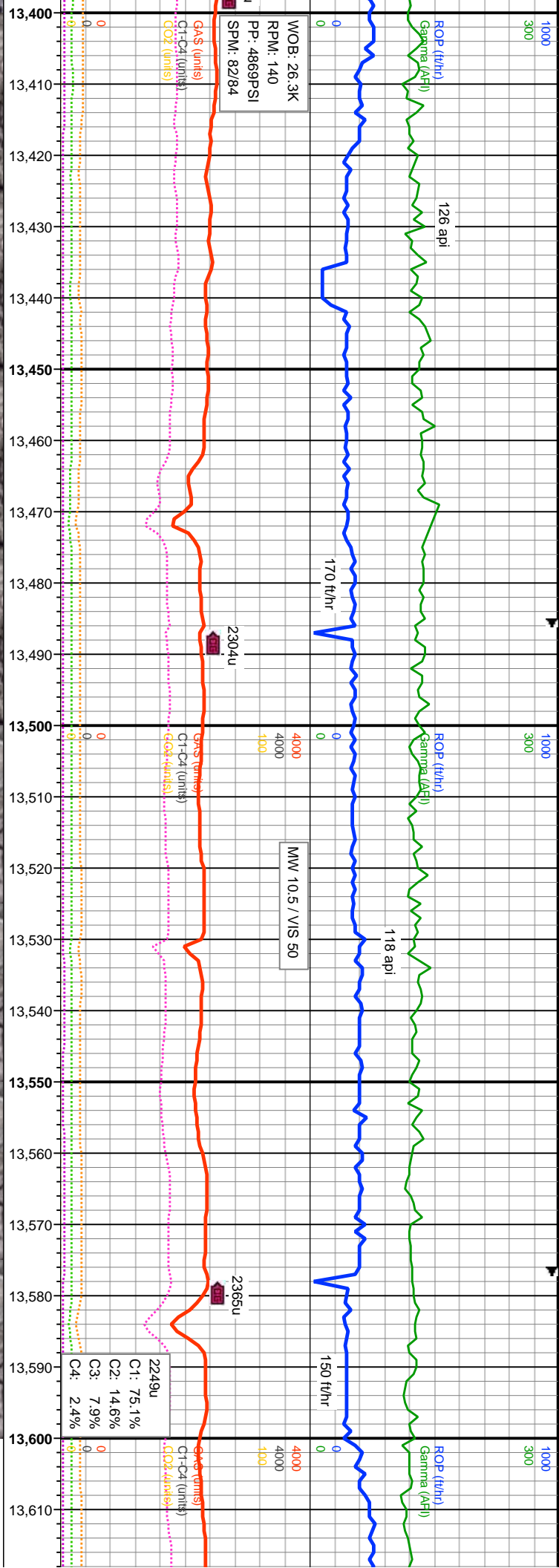




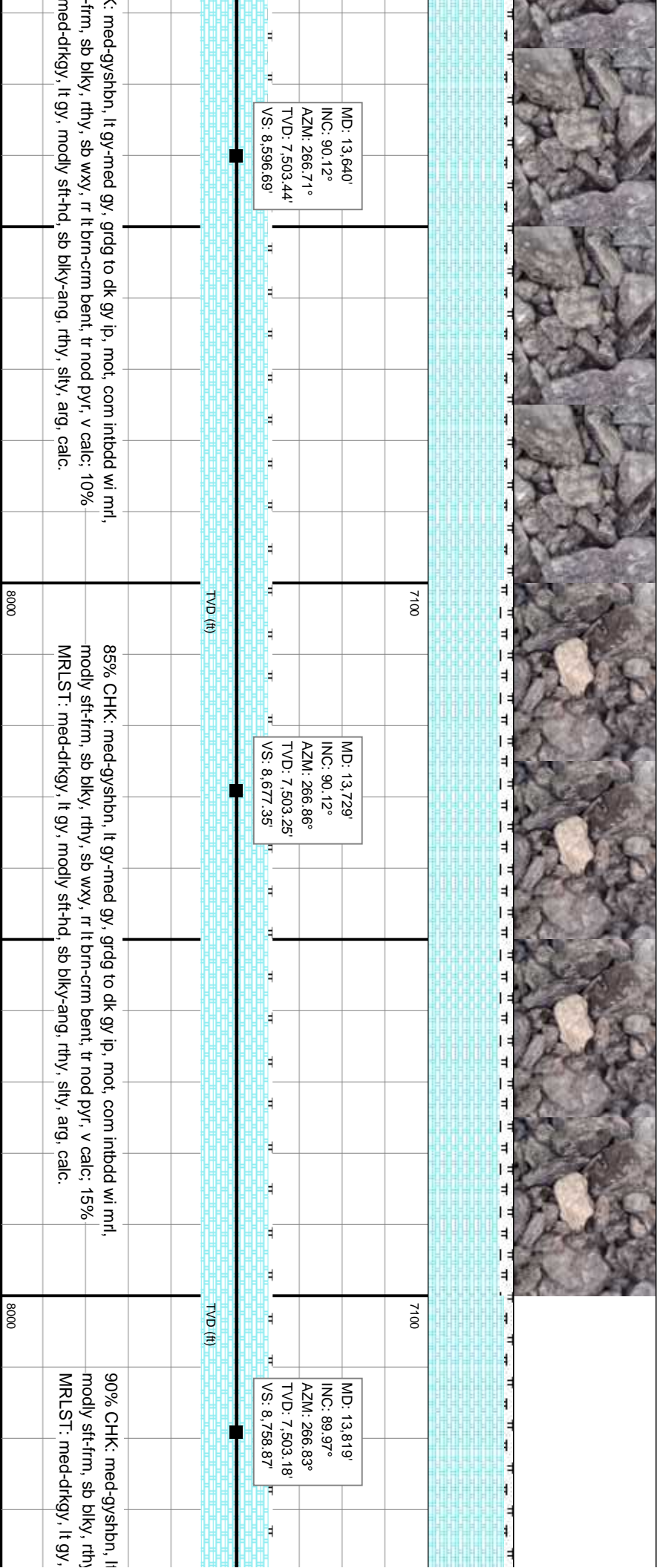
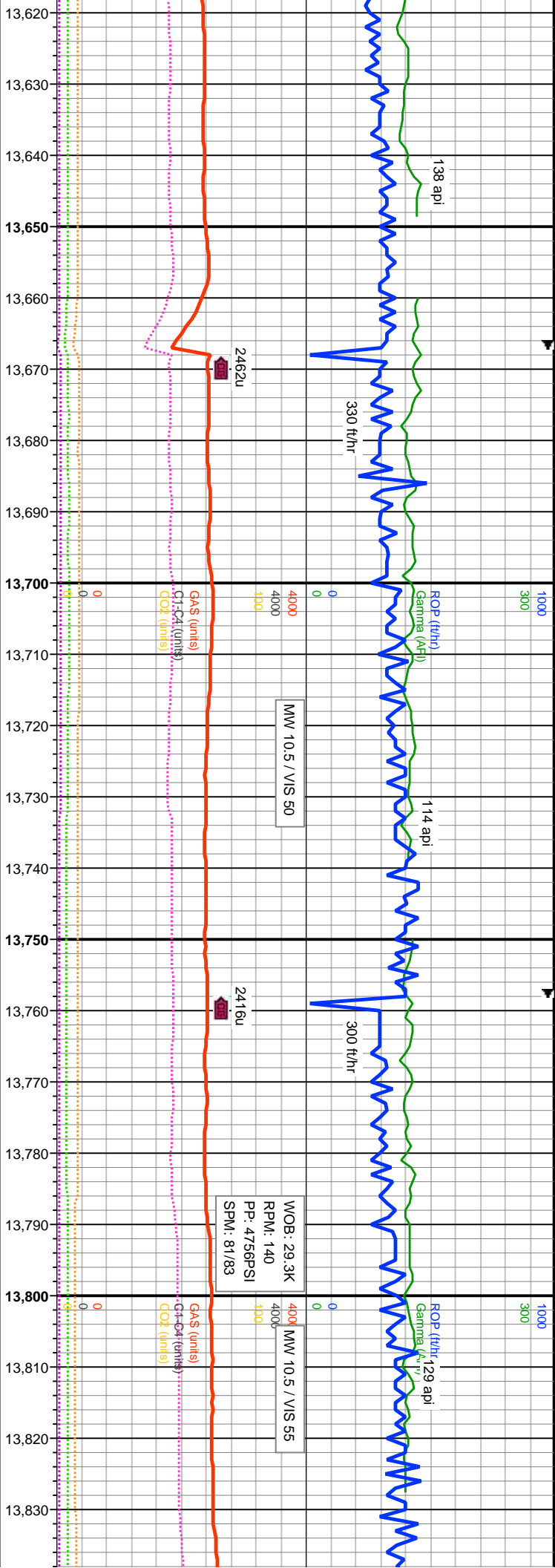


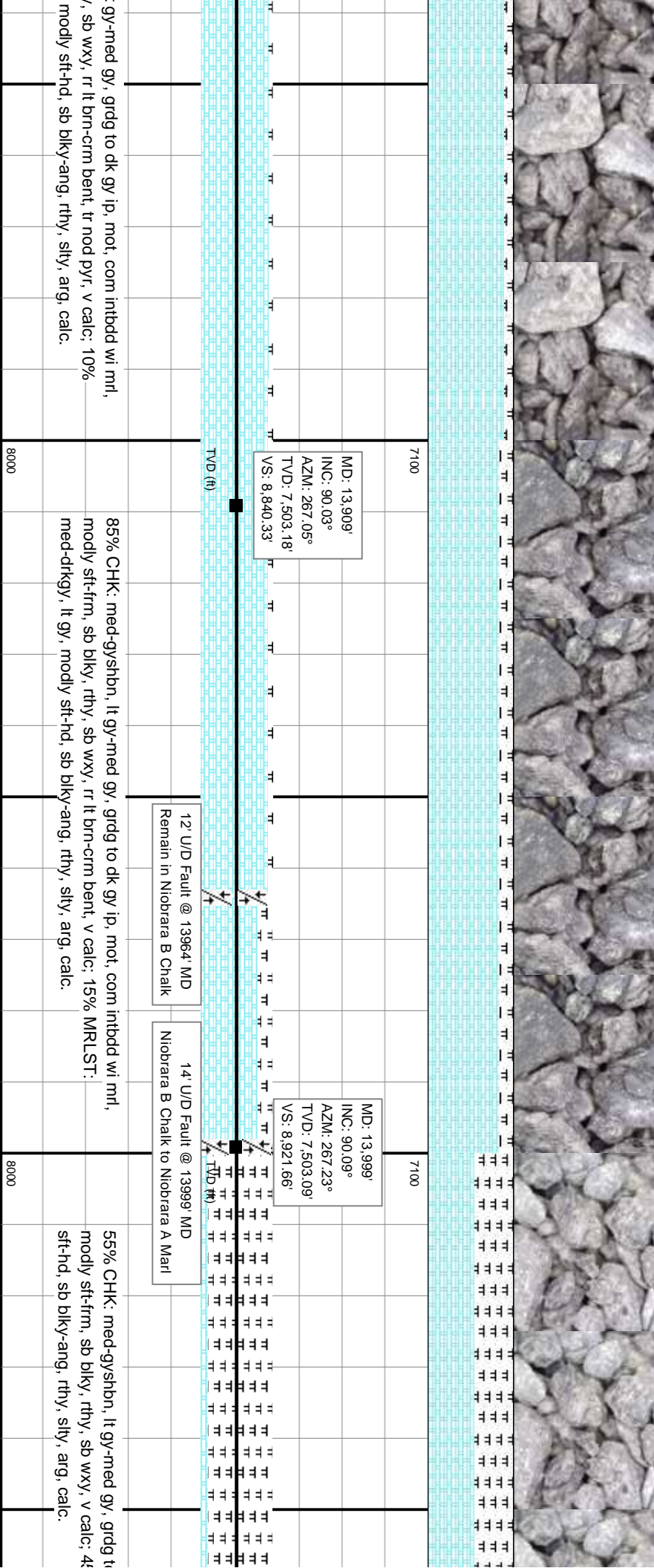
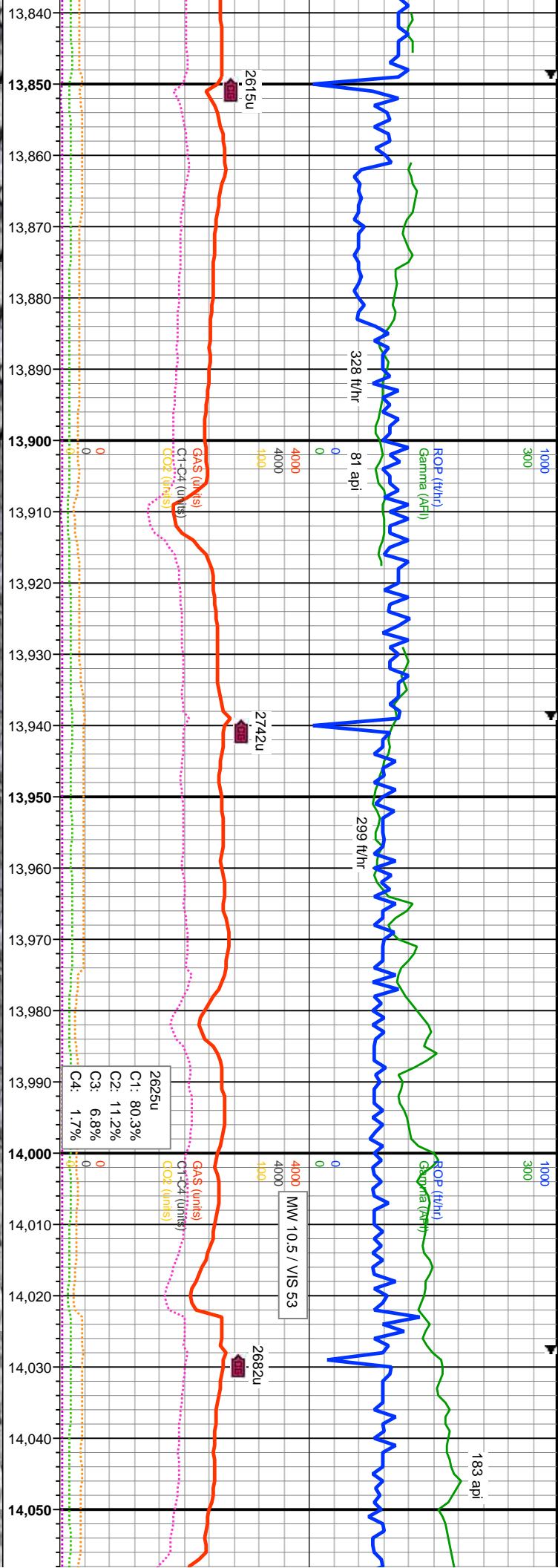




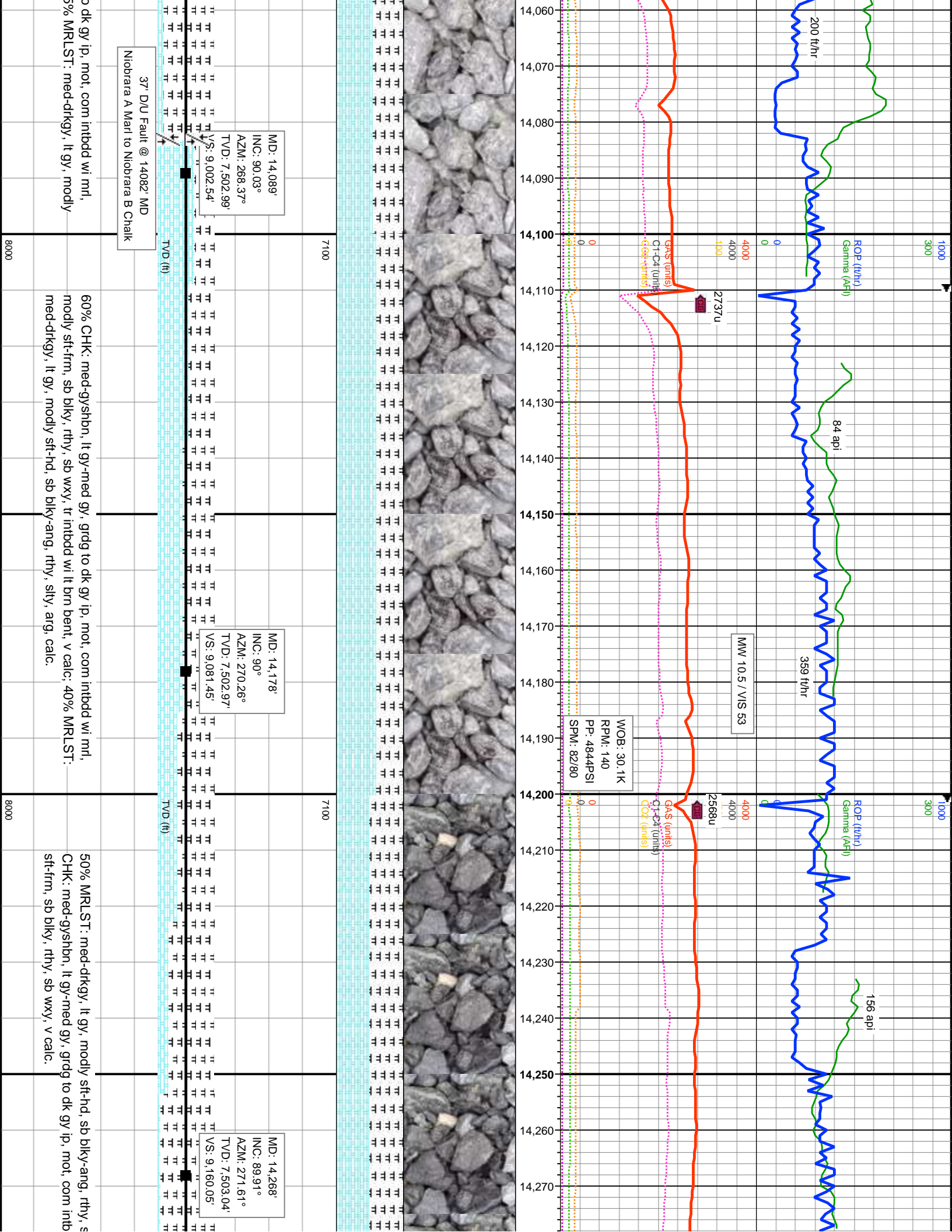






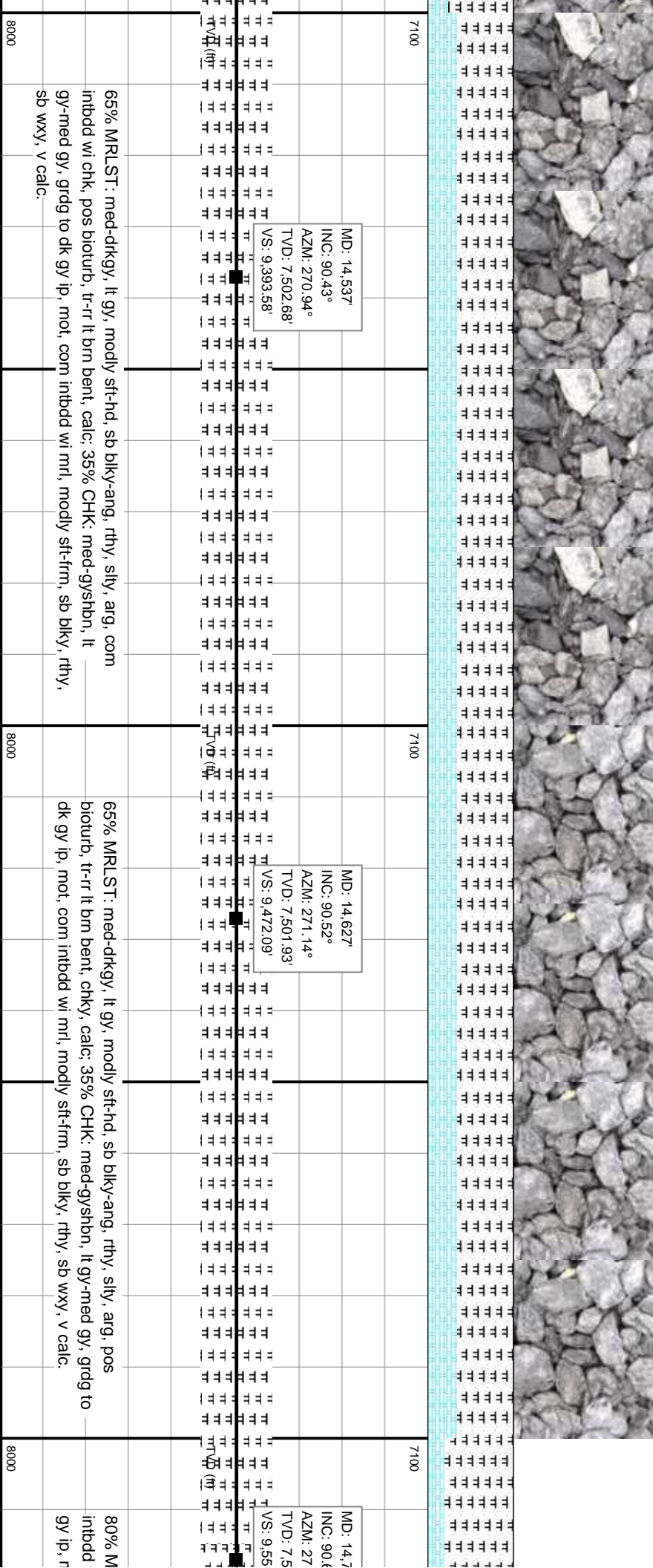
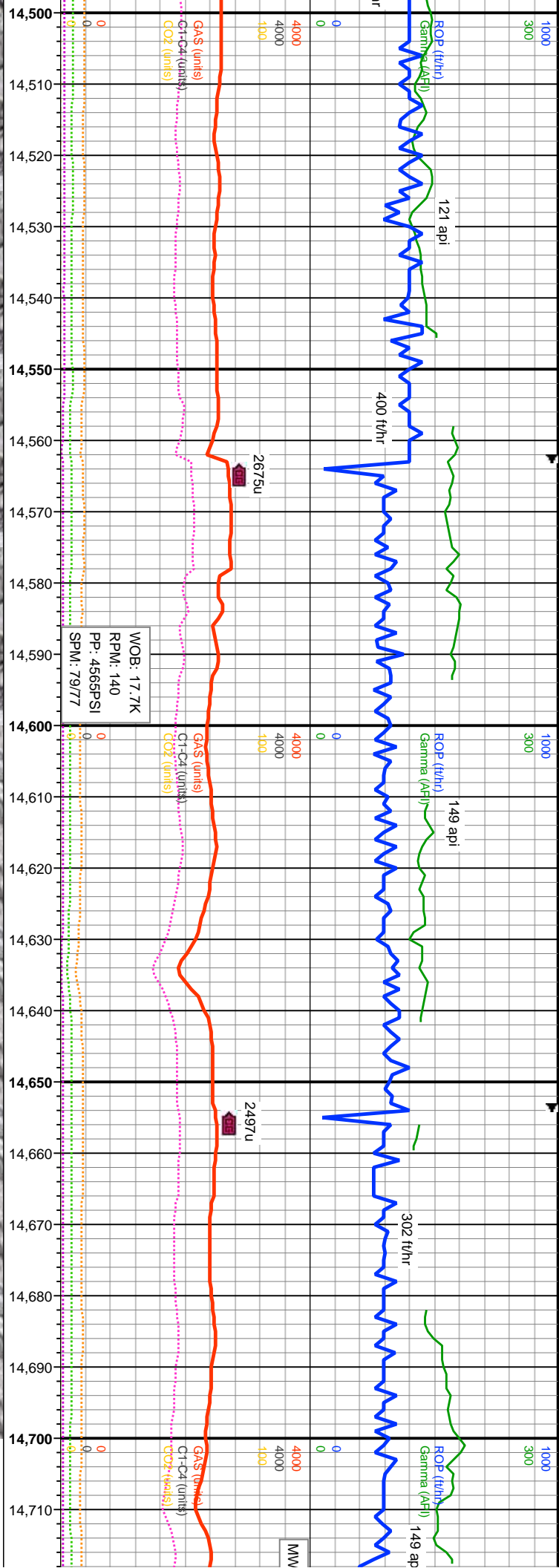


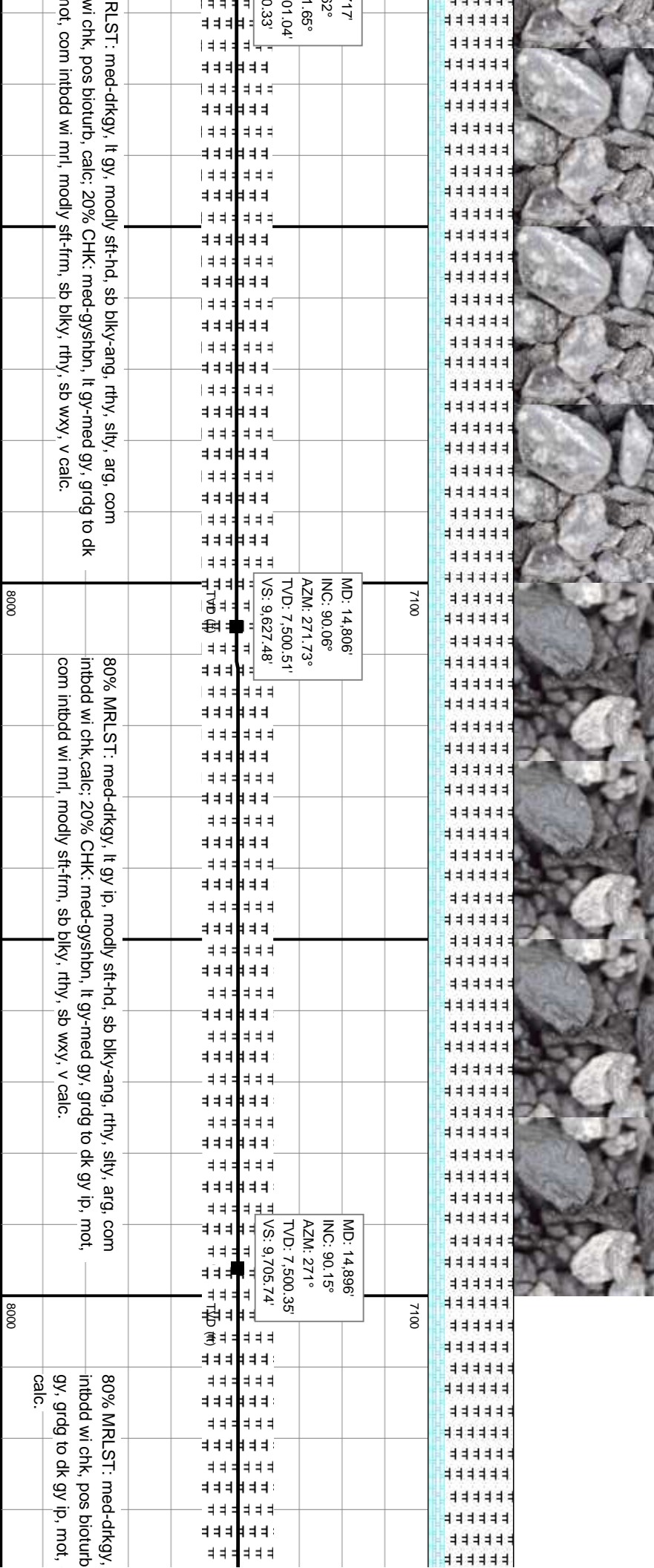
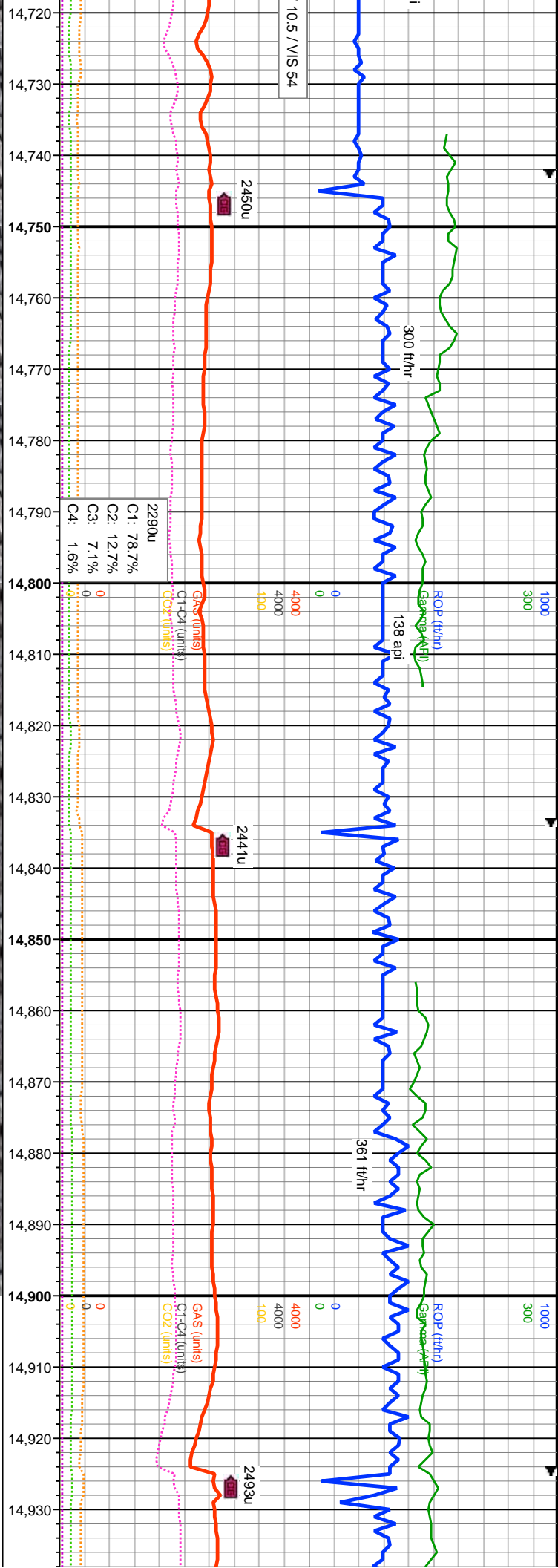




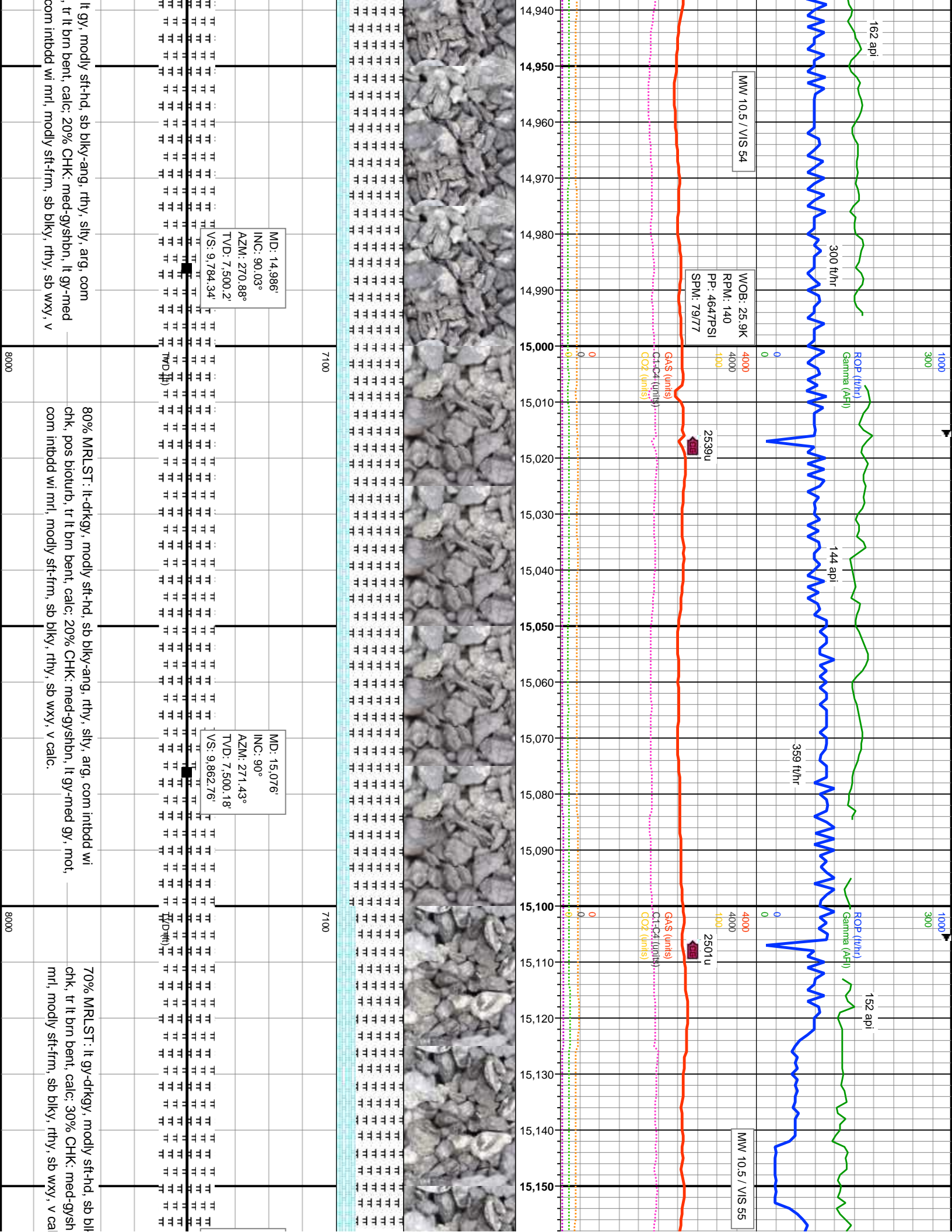






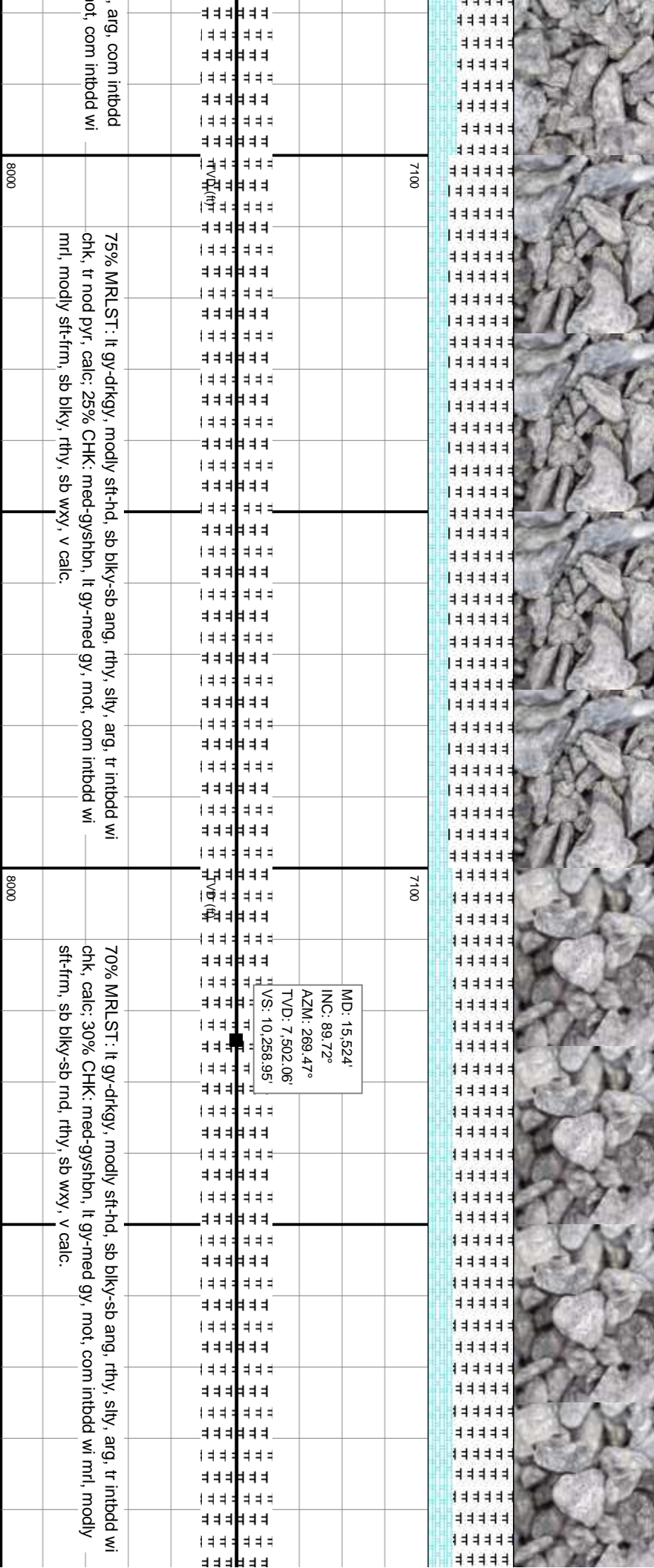
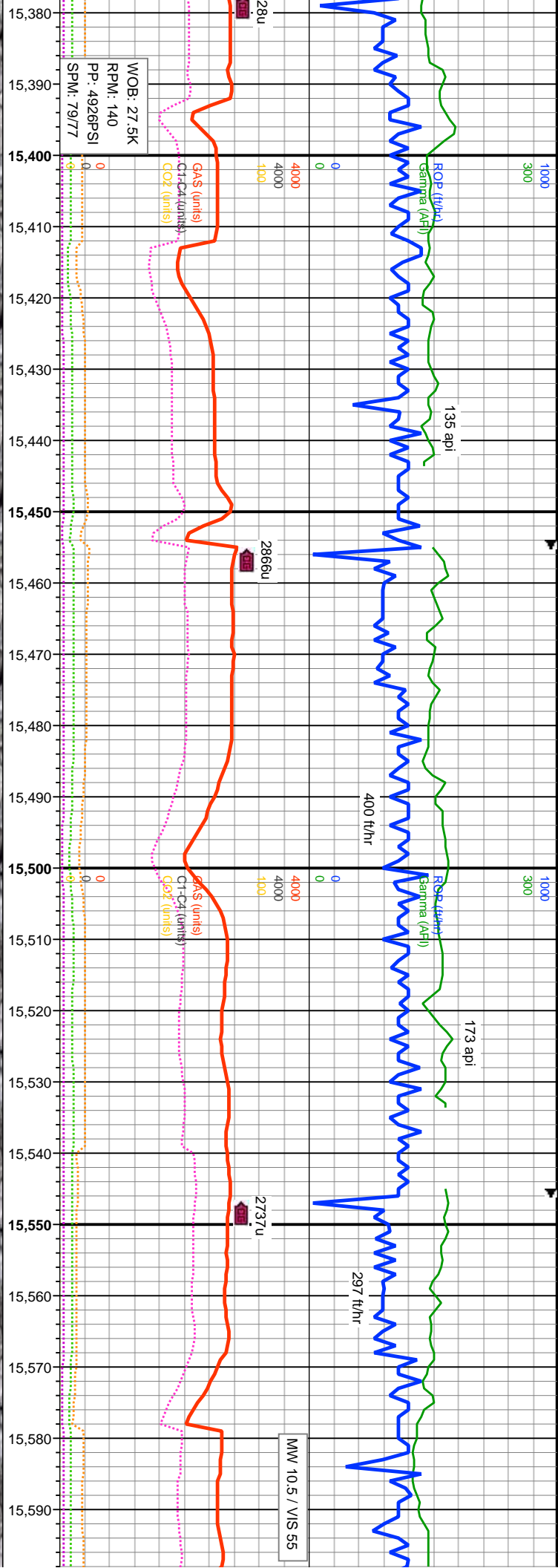


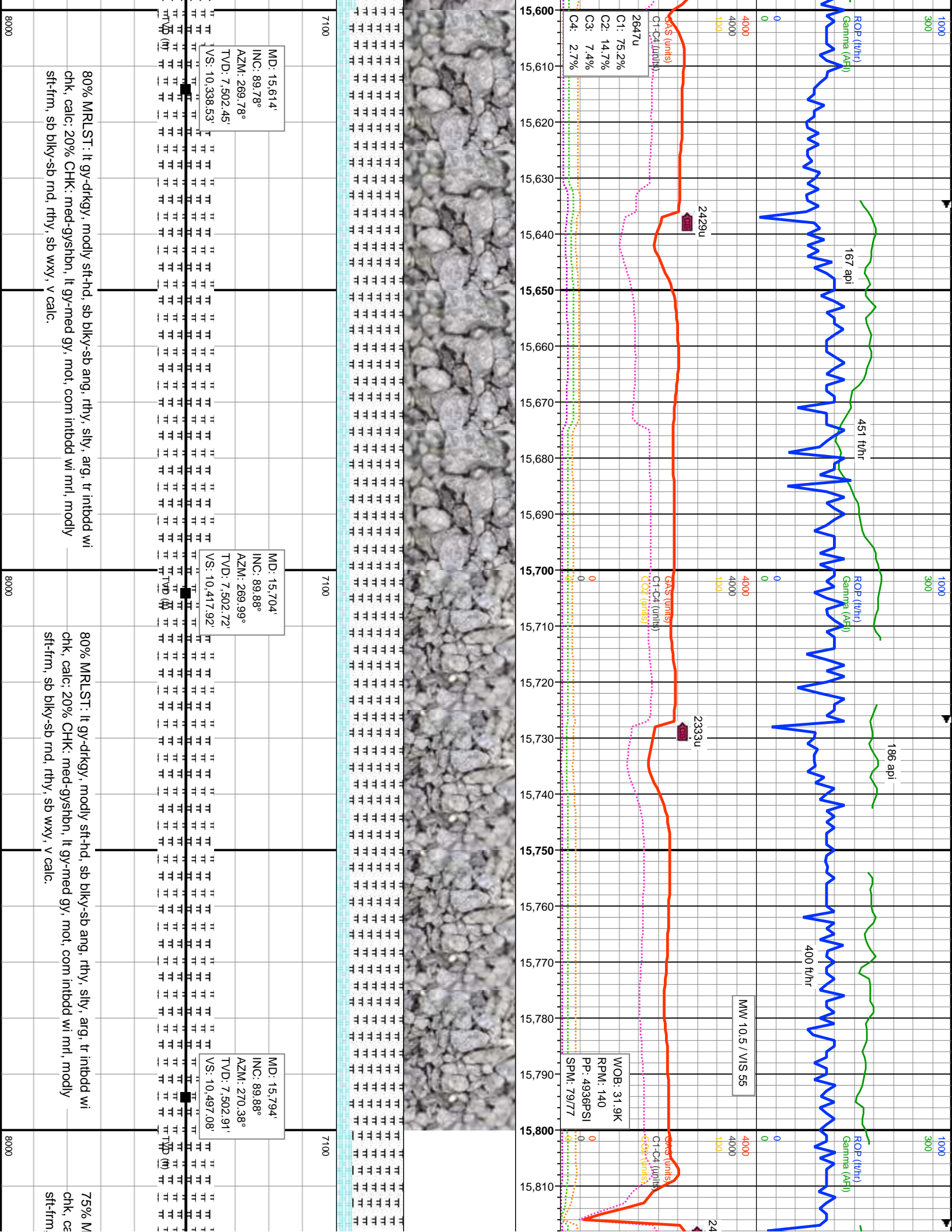




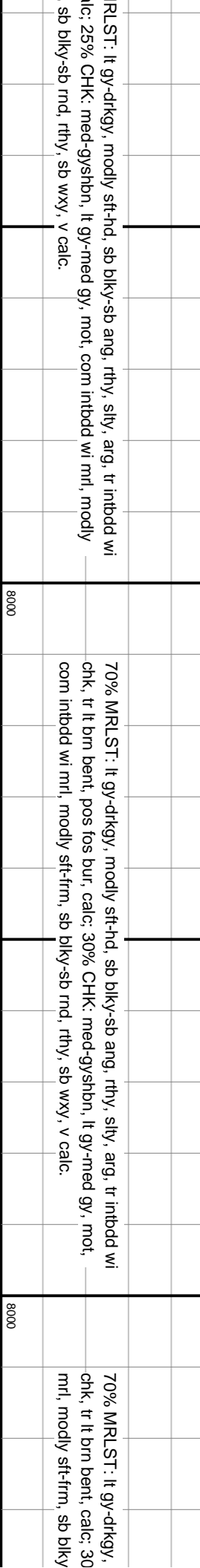


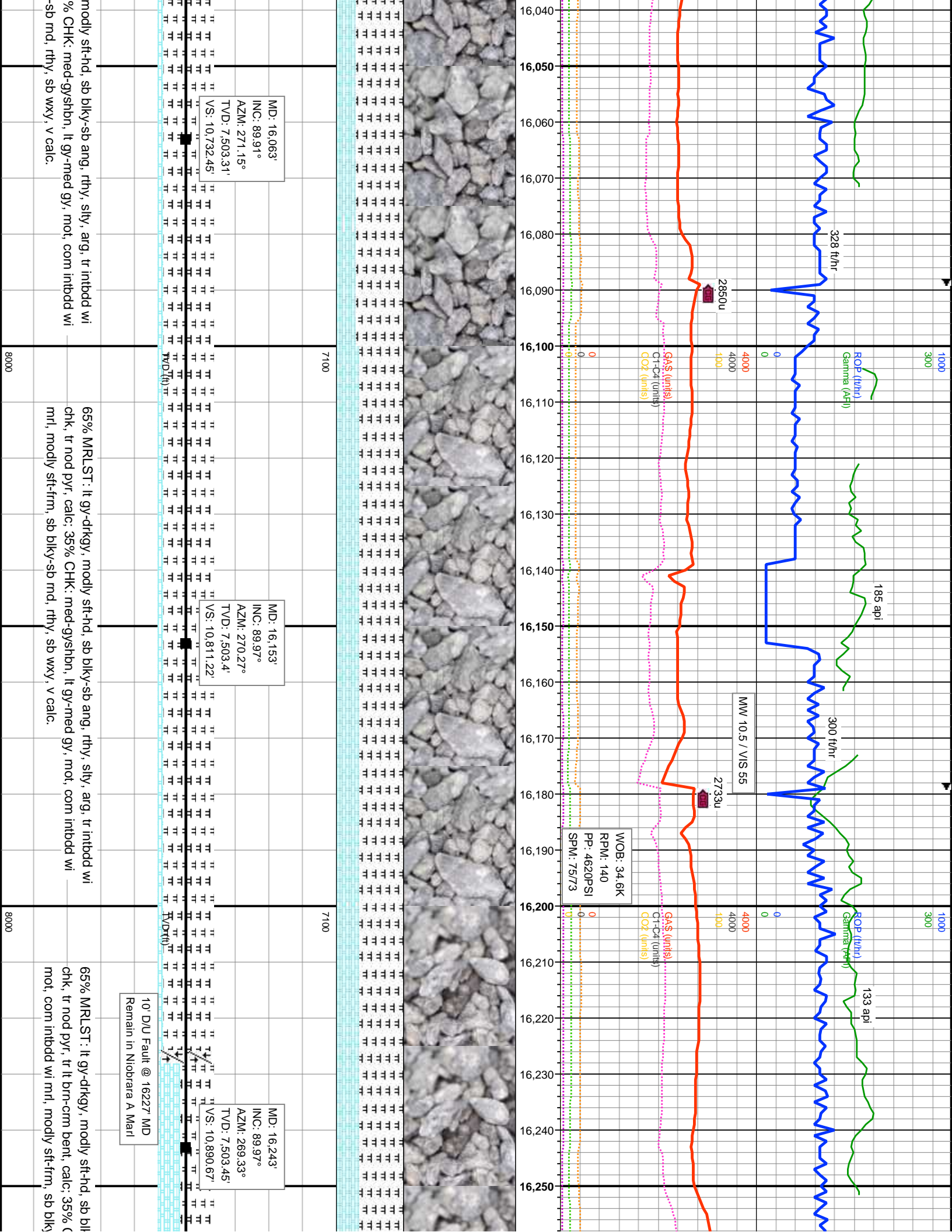




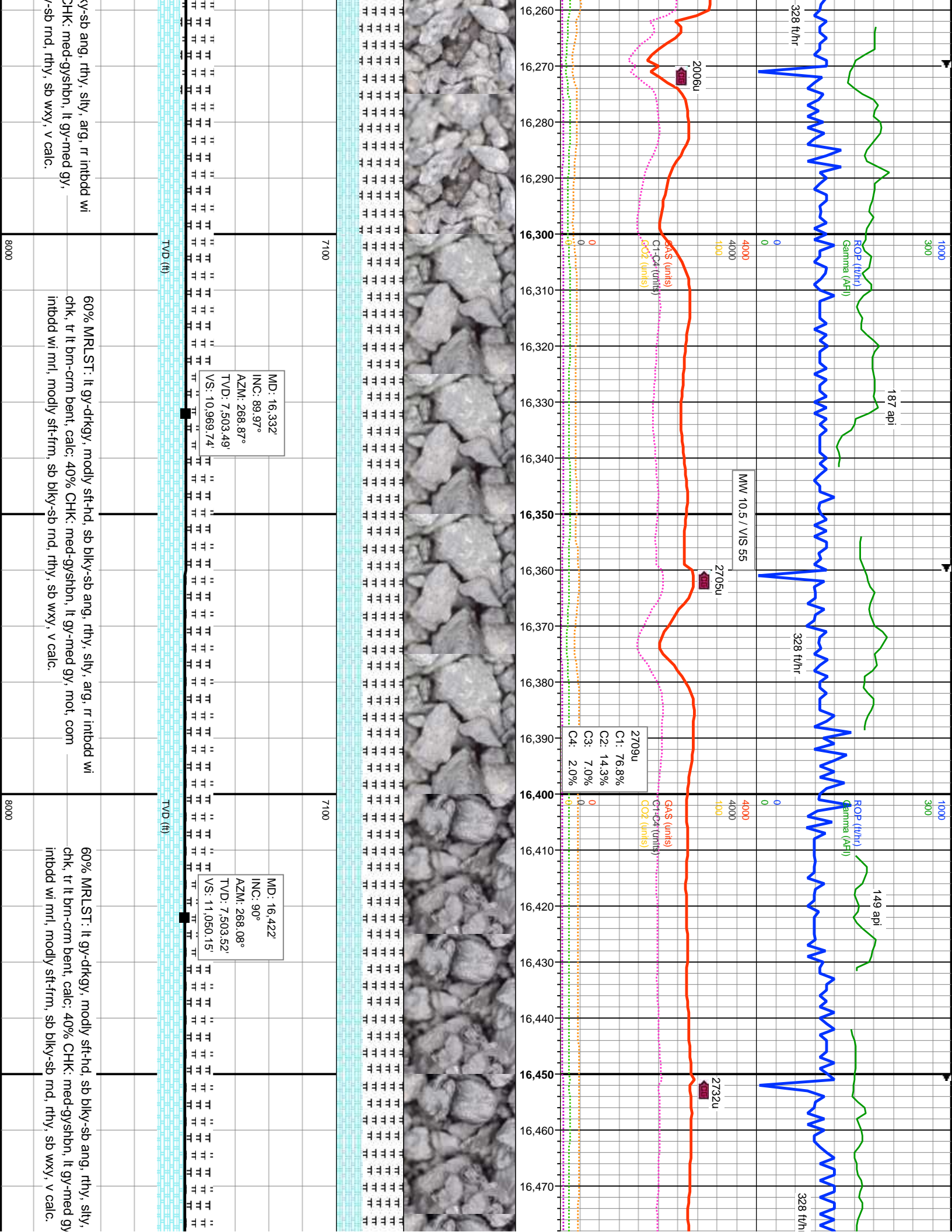


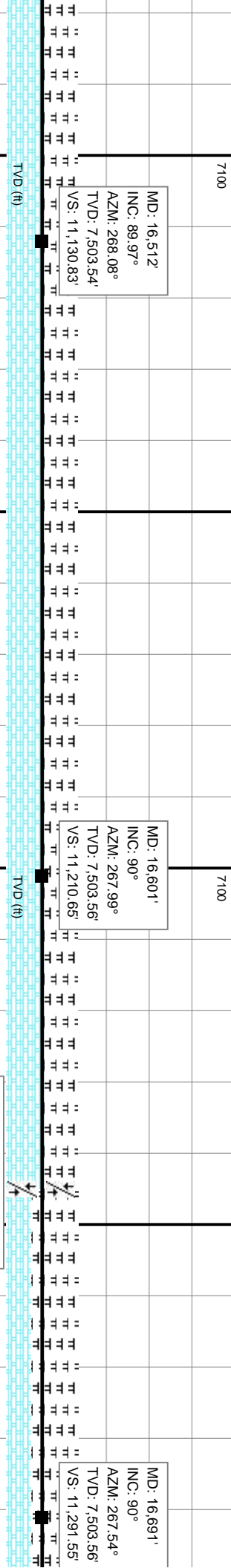
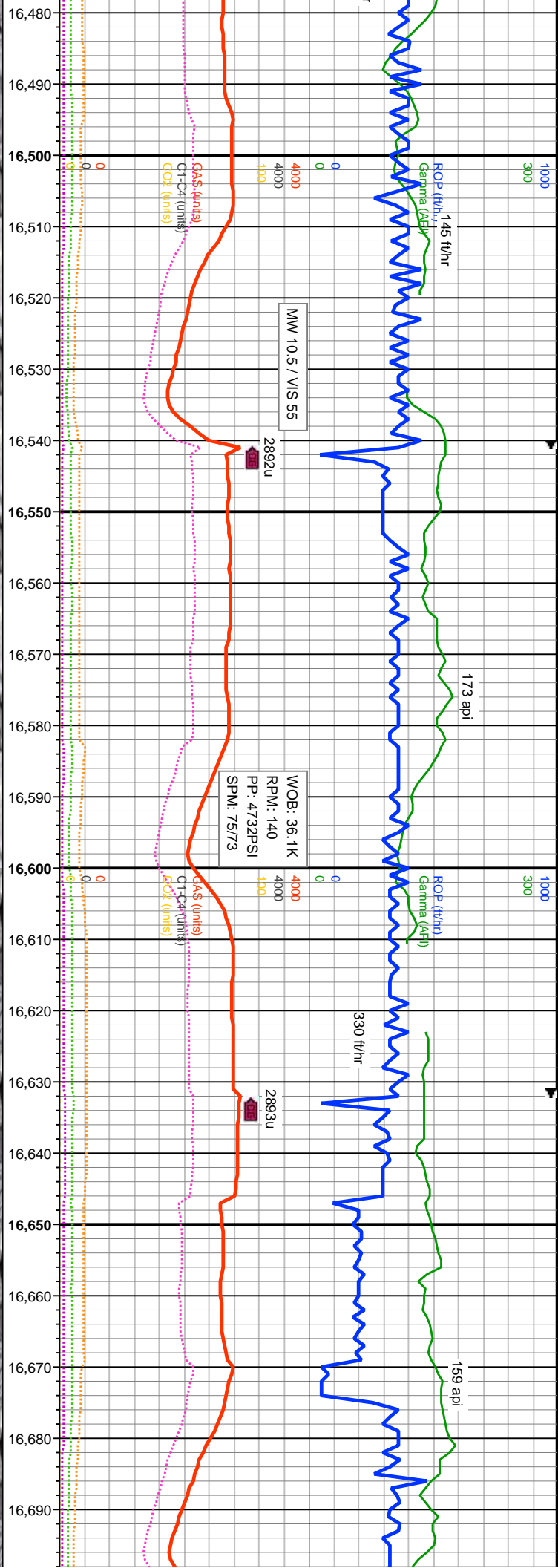








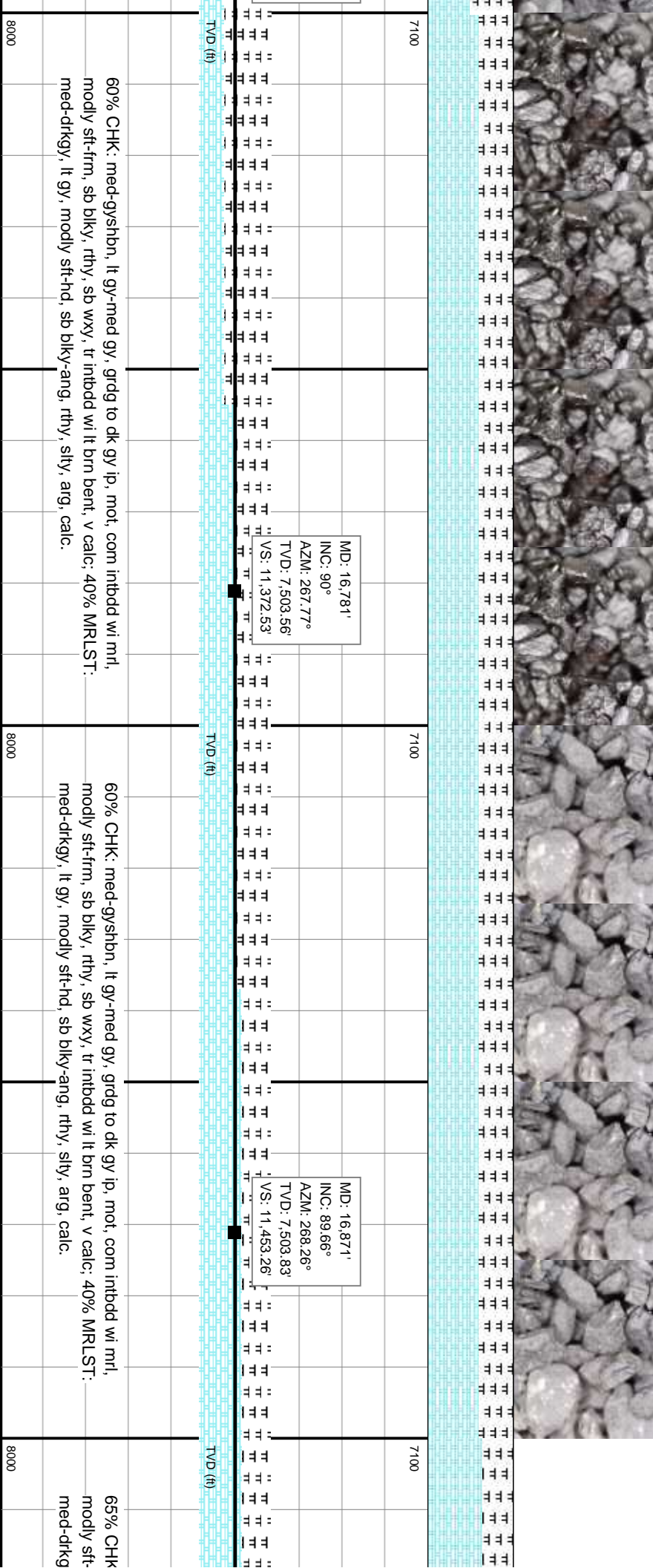
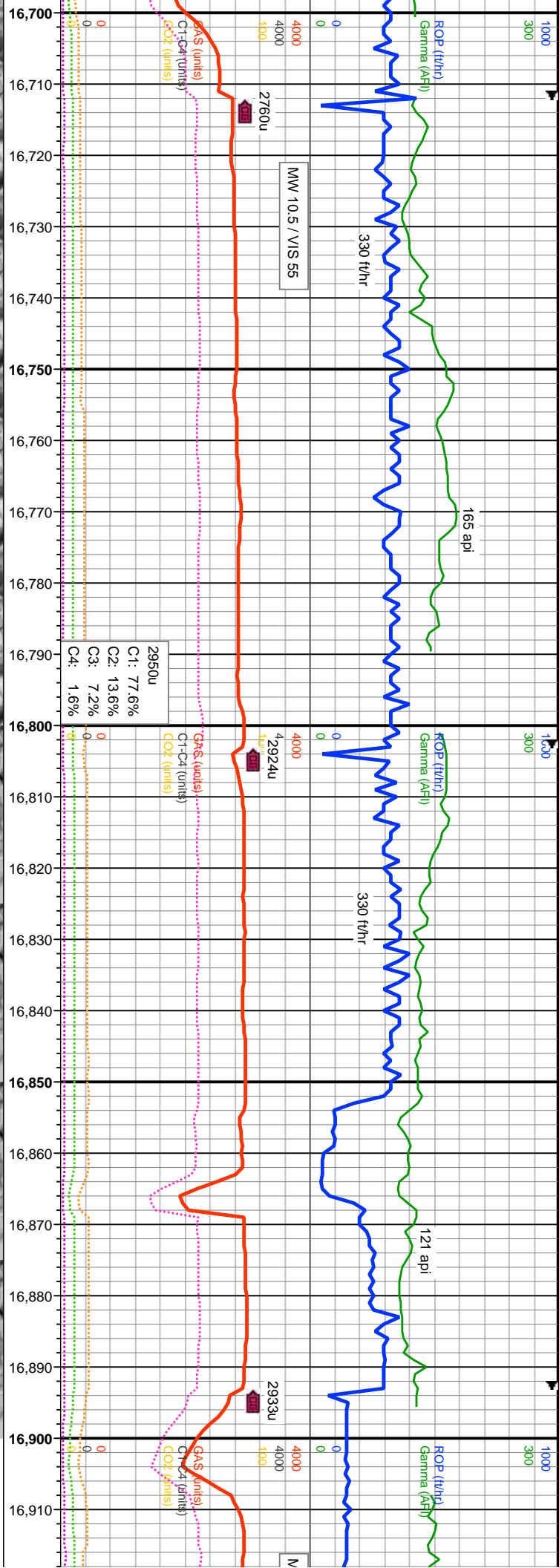


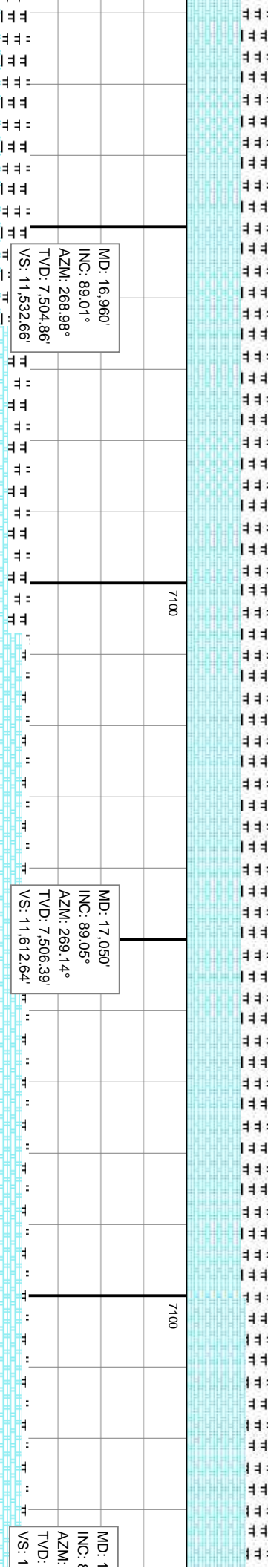
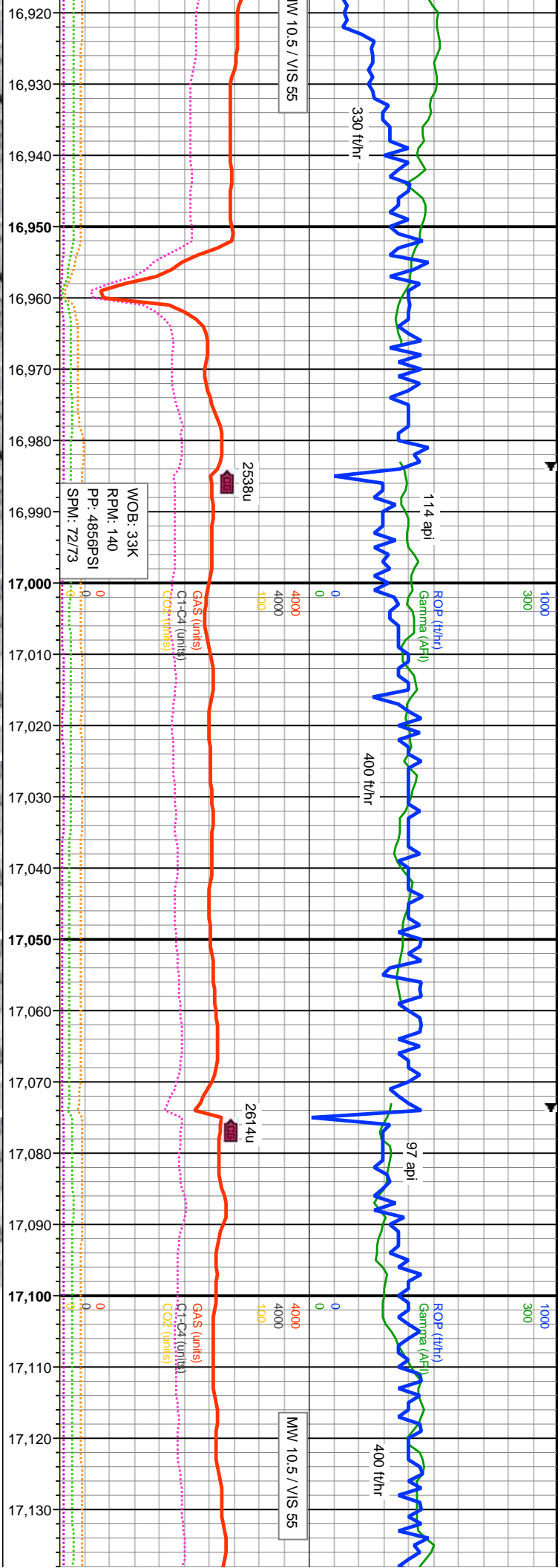


6' U/D Fault @ 16745' MD  
Remain in Niobrara A Marl

arg, rr intbdd wi  
mot, com  
60% MRLST: lt gy-drkgy, modly sft-hd, sb blk-y-sb ang, rthy, silty, arg, rr intbdd wi  
chk, tr lt brn-crm bent, calc, 40% CHK: med-gyshbn, lt gy-med gy, mot, com  
intbdd wi mrl, modly sft-frm, sb blk-y-sb mrd, rthy, sb wxy, v calc.  
50% CHK: med-gyshbn, lt gy-med gy, grgd to dk gy ip, mot, com intbdd wi mrl,  
modly sft-frm, sb blk-y, rthy, sb wxy, tr intbdd wi lt brn bent, v calc, 50% MRLST:  
med-drkgy, lt gy, modly sft-hd, sb blk-y-ang, rthy, arg, calc.







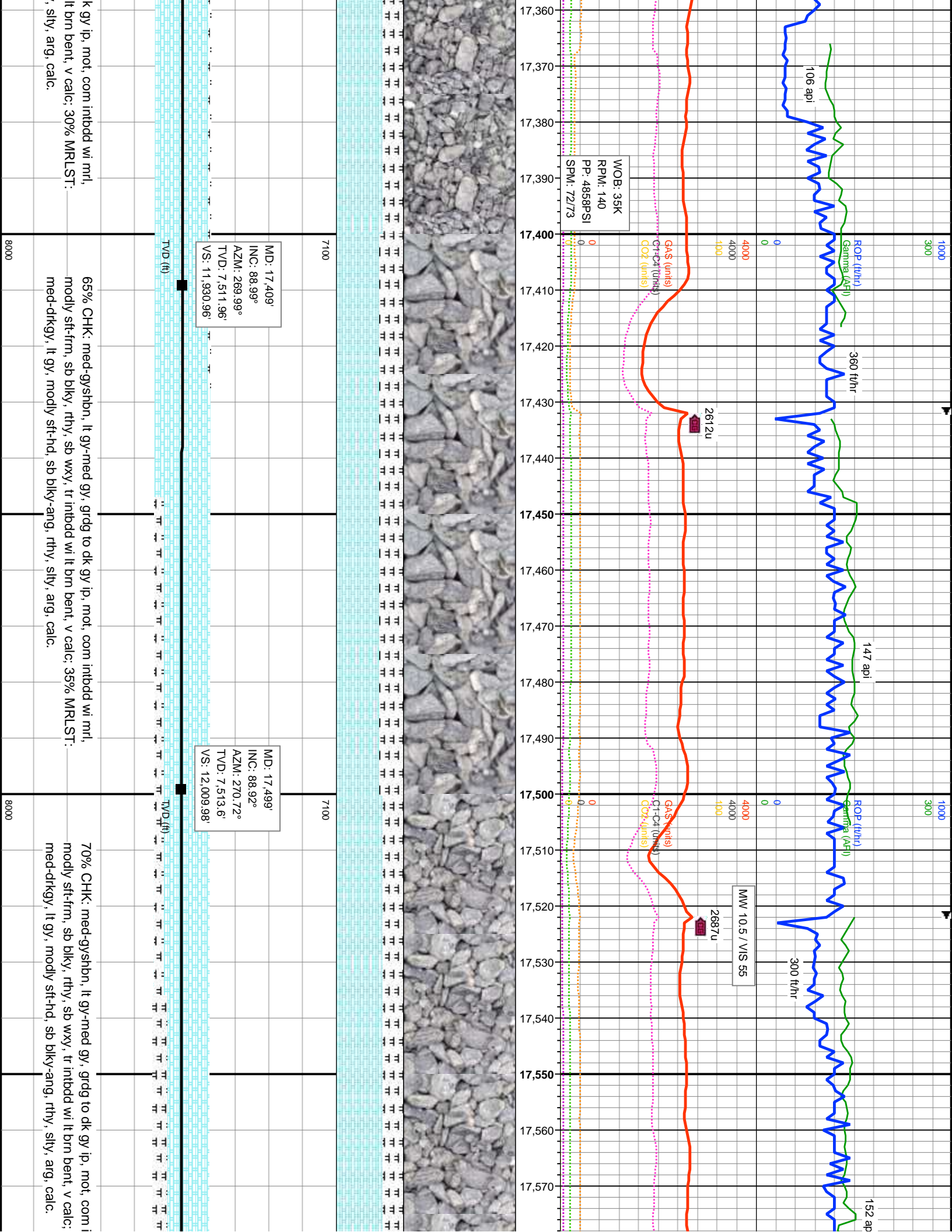
med-gyshbn, lt gy-med gy, grdg to dk gy ip, mot, com intbdd wi mnl, modly sft-firm, sb blkly, rthy, sb wxy, tr intbdd wi lt brn bent, v calc, 35% MRLST: med-dfkg, lt gy, modly sft-hd, sb blkly-ang, rthy, sily, arg, calc.

65% CHK: med-gyshbn, lt gy-med gy, grdg to dk gy ip, mot, com intbdd wi mnl, modly sft-firm, sb blkly, rthy, sb wxy, tr intbdd wi lt brn bent, v calc, 35% MRLST: med-dfkg, lt gy, modly sft-hd, sb blkly-ang, rthy, sily, arg, calc.

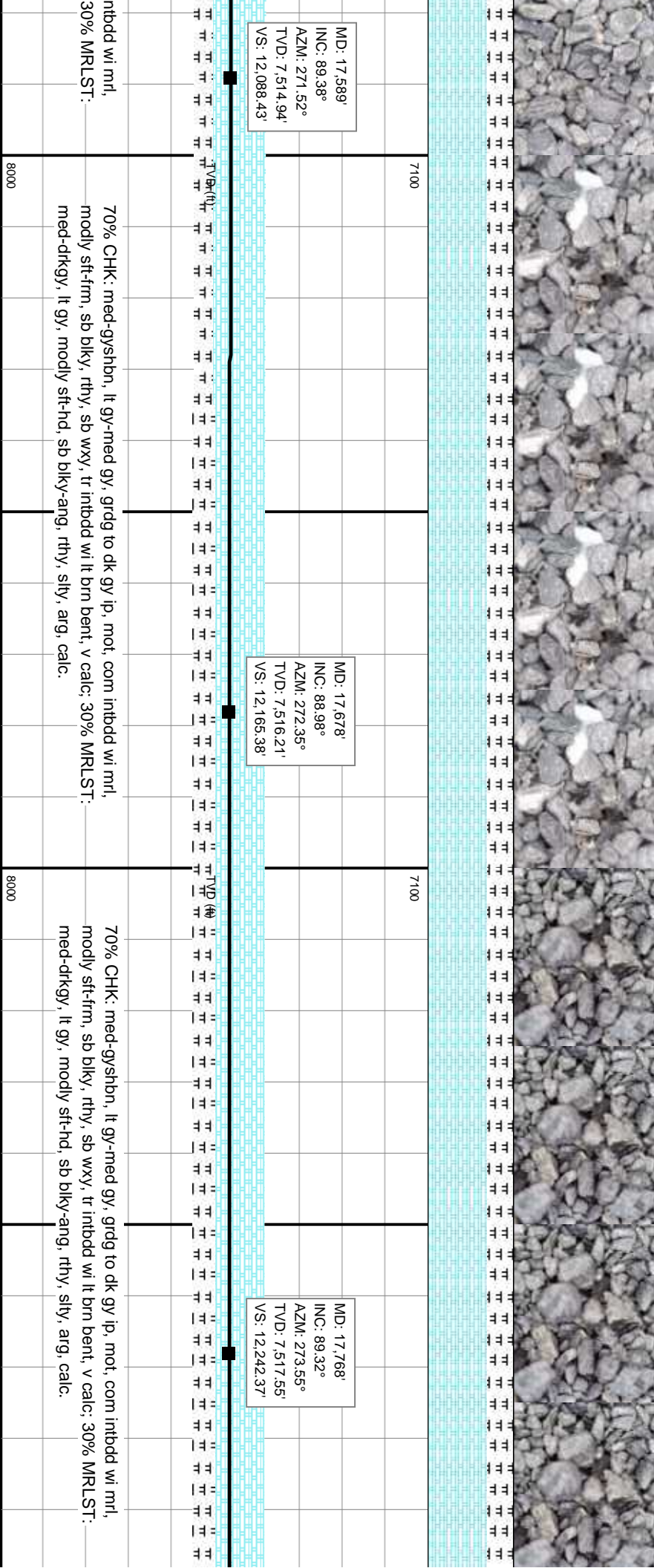
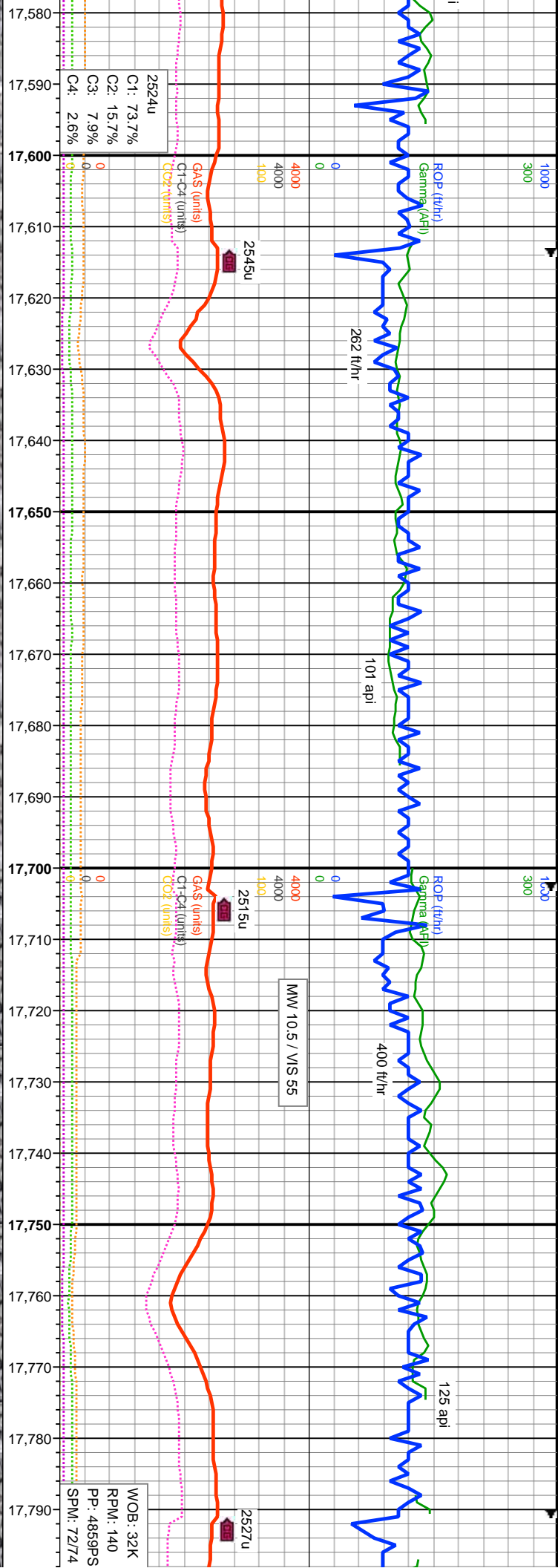
70% CHK: med-gyshbn, lt gy-med gy, grdg to dk gy ip, mot, com intbdd wi mnl, modly sft-firm, sb blkly, rthy, sb wxy, tr intbdd wi lt brn bent, v calc, 35% MRLST: med-dfkg, lt gy, modly sft-hd, sb blkly-ang, rthy, sily, arg, calc.

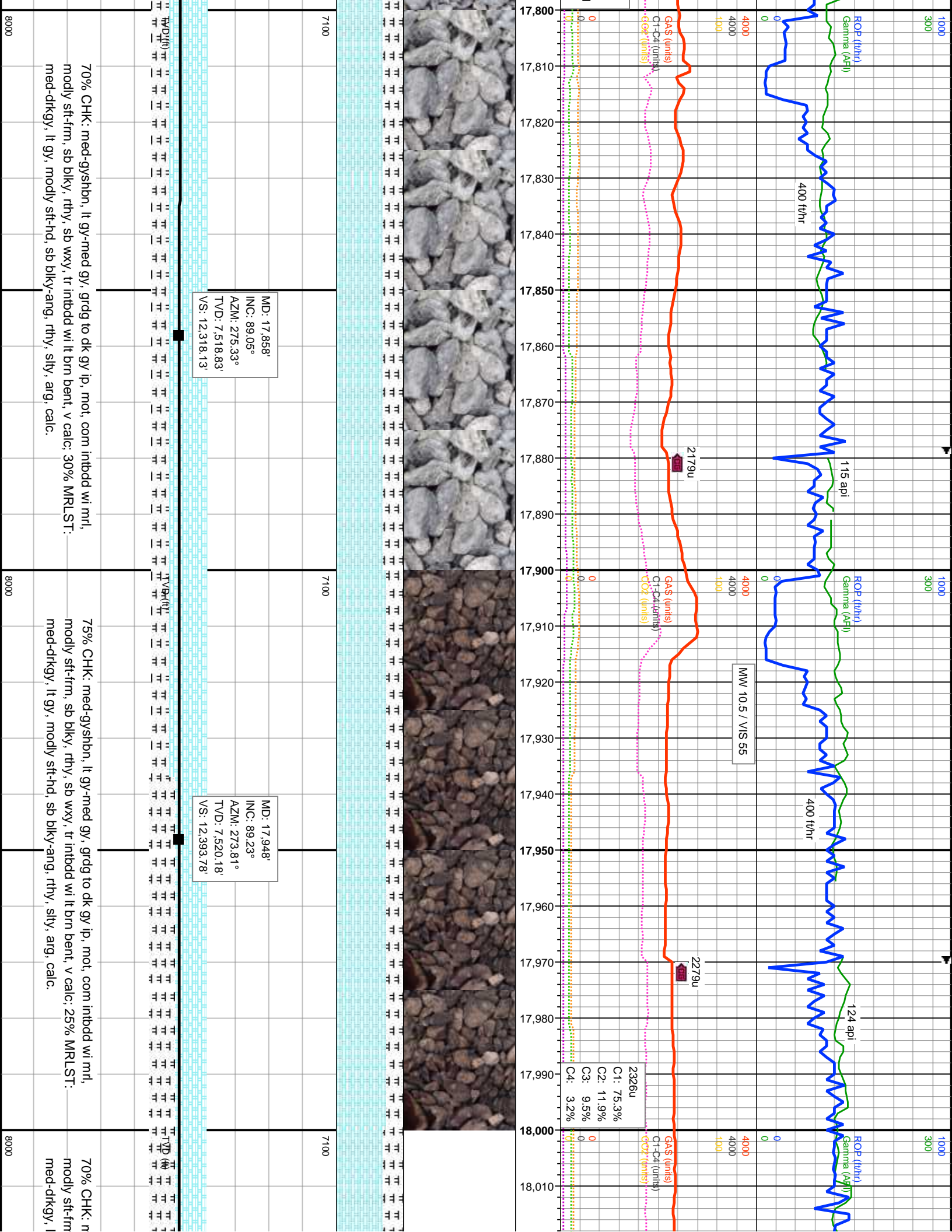




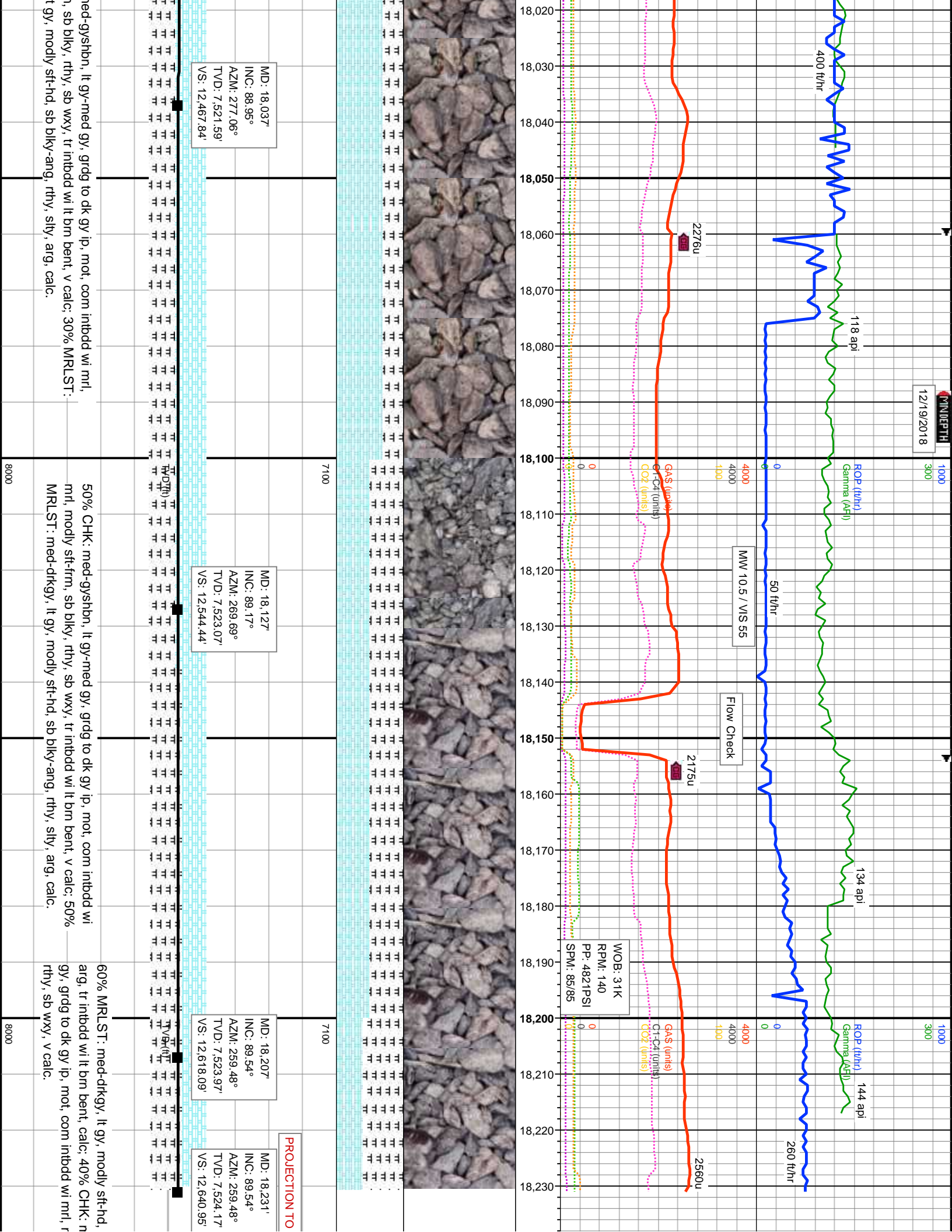


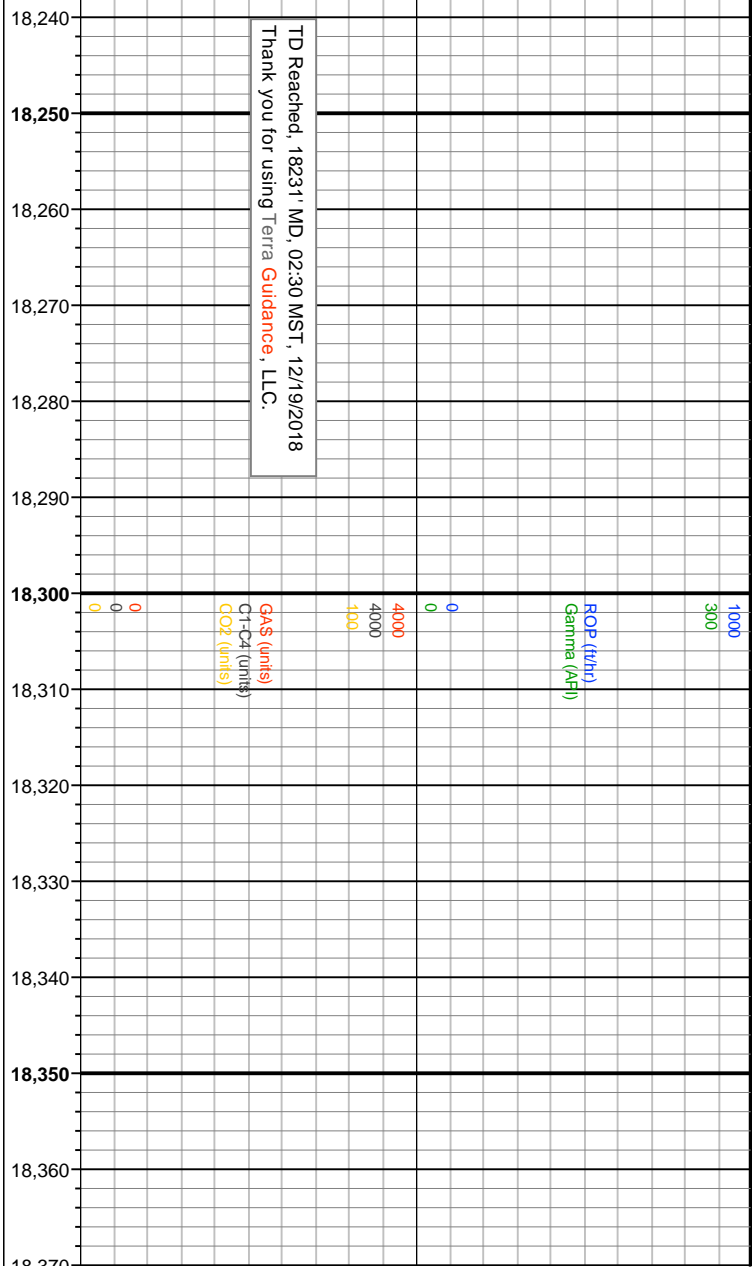












BIT		7100									
FM Name		Excursion Depths									
Niobrara	10011										
Ft Hays											
Codell											
Carlile											
Greenhorn											

sb blk-y-ang, rthy, stly,  
ed-gyshbn, lt gy-med  
nodly sft-frm, sb blk-y,

8000