



Scale: 5" / 100'
Measured Depth Log

Well Name Ottesen LE 06-370HC

Location NWSE SEC 33-T1N-R66W

State COLORADO

Country USA

API Number 051234435500

Geographic Region DJ BASIN

County WELD

Rig Number PRECISION 466

AFE # 18DC0192

Field WATTENBERG

Ground Elevation 5076.5'

K.B. Elevation 5096.5'

Logged Interval 6000' MD To 18459' MD

Total Depth 18459' MD

Formation CODELL

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, Zach Souvall

Company Terra Guidance

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



Other

Start Mudlog Date 12/10/2018

End Mudlog Date 12/13/2018

Color Coding

- Oil
- Note
- Error
- Condensate
- Core
- Water
- Gas
- Pressure
- Seal

Rock Types

- Sandstone
- LIMESTONE
- Chalk
- Marl
- SHALE
- Silty Shale
- Shaly Siltstone
- Silty Sandstone
- SILTSTONE
- SANDSTONE
- BENTONITE
- CEMENT
- UNKNOWN
- ANHYDRITE
- GYPSUM
- SALT
- SIDERITE or LIMONITE
- DOLOMITE
- CHERT
- COAL
- MARLSTONE
- CLAYSTONE
- SHALE GRAY
- SHALE COLORED
- CONGLOMERATE
- BRECCIA
- TILL
- TUFF
- IGNEOUS
- METAMORPHIC
- CALCARIOUS SHALE

Fossils

- F FOSSIL
- ARGIL
- ARGILL
- GASTROPOD
- ALGAE
- AMPHIPORA
- BELEMNITE
- BIOCLASTIC
- BRACHIOPOD
- BRYOZOA
- CEPHALOPOD
- CORAL
- CRINOID
- ECHINOID
- FISH
- FORAMINIFERA
- ANHYDRITIC
- ARGILL
- BENTONITE
- BITUMEN
- BRECCIA
- CALCAREOUS
- CARBONATE
- CHITIN
- CHITUL
- COAL
- DOLIC
- FELDSPAR
- FERRUGINOUS
- FERRUGINOUS

Minerals

Oil Show

- ORGANIC
- PINPOINT
- VUGGY
- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING
- BIT

Engineering

- CASING
- CONNECTION (LEFT)
- CONNECTION (RIGHT)
- CONNECTION GAS
- CORE - LOST
- CORE - RECOVERED
- DST INTERVAL
- FAULT
- MOLDIC
- POROSY
- EARTHLY
- FENESTRAL
- FRACTURE
- INTERCRYSTALLINE
- INTEROOLITIC
- MOLDIC

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

	M MUDSTONE
	P PACKSTONE
	W WACKESTONE

Sorting

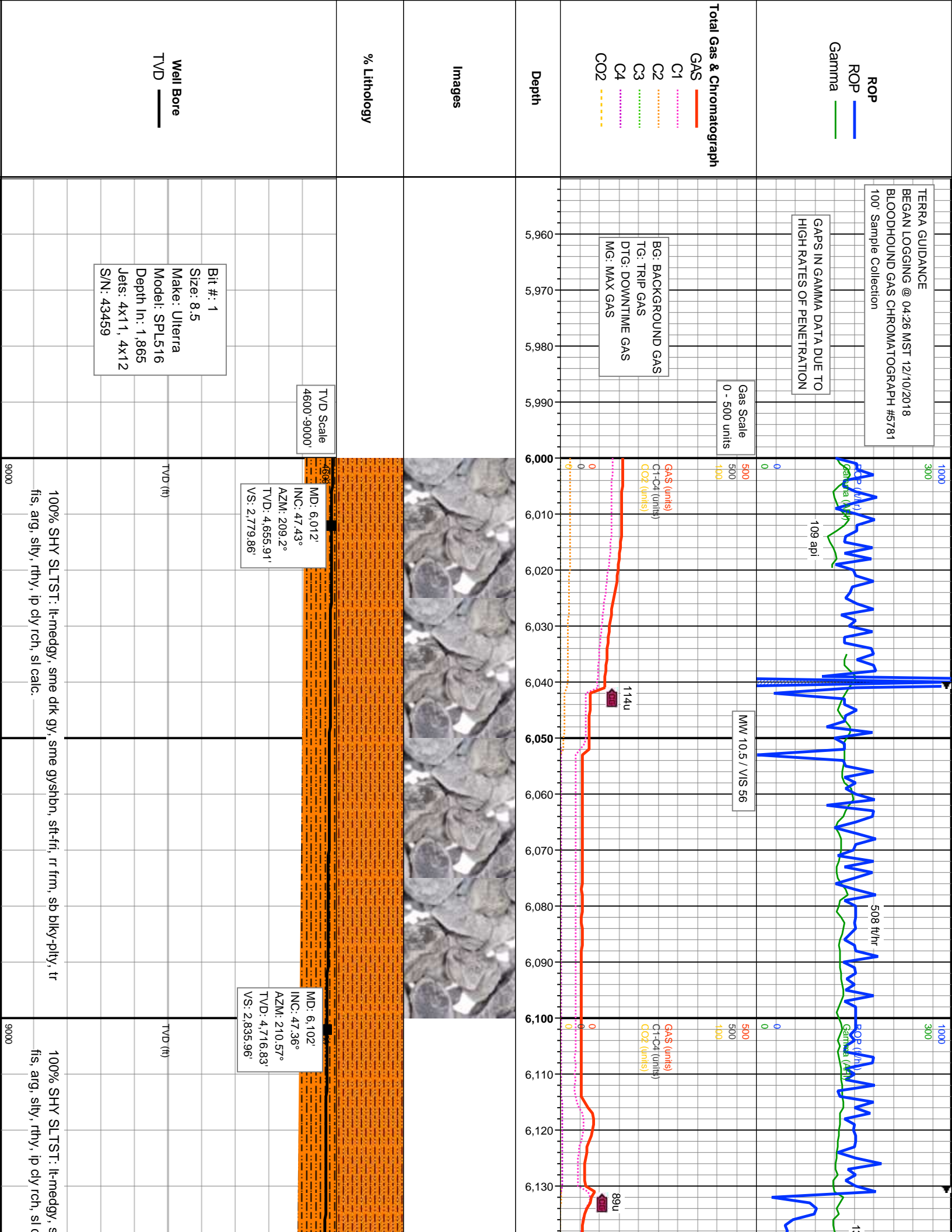
Textures

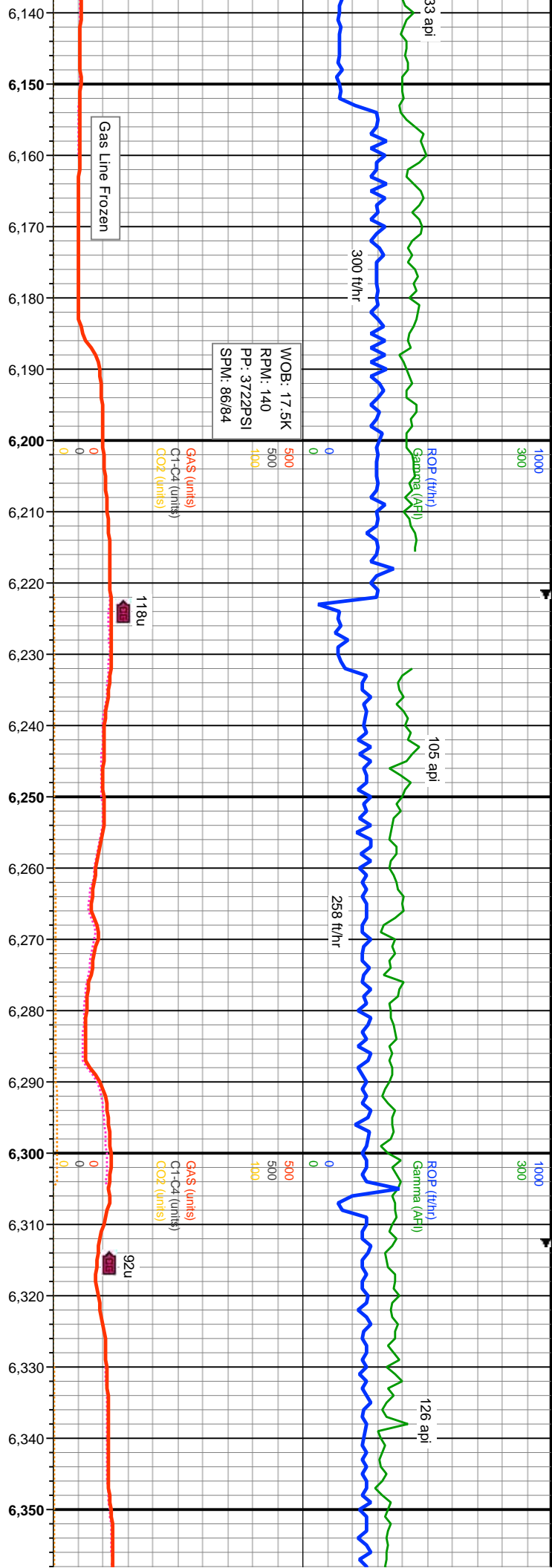
	M MODERATE
	P POOR
	W WELL

CALCARIUOS SHALE

CALCARIOUS SHALE

SURVEY	CRYPTOXLN
TRIP GAS	E EARTHY
WIRELINE TESTED - LEFT	FX FINELYXLN
WIRELINE TESTED - RT	GS GRAINSTONE

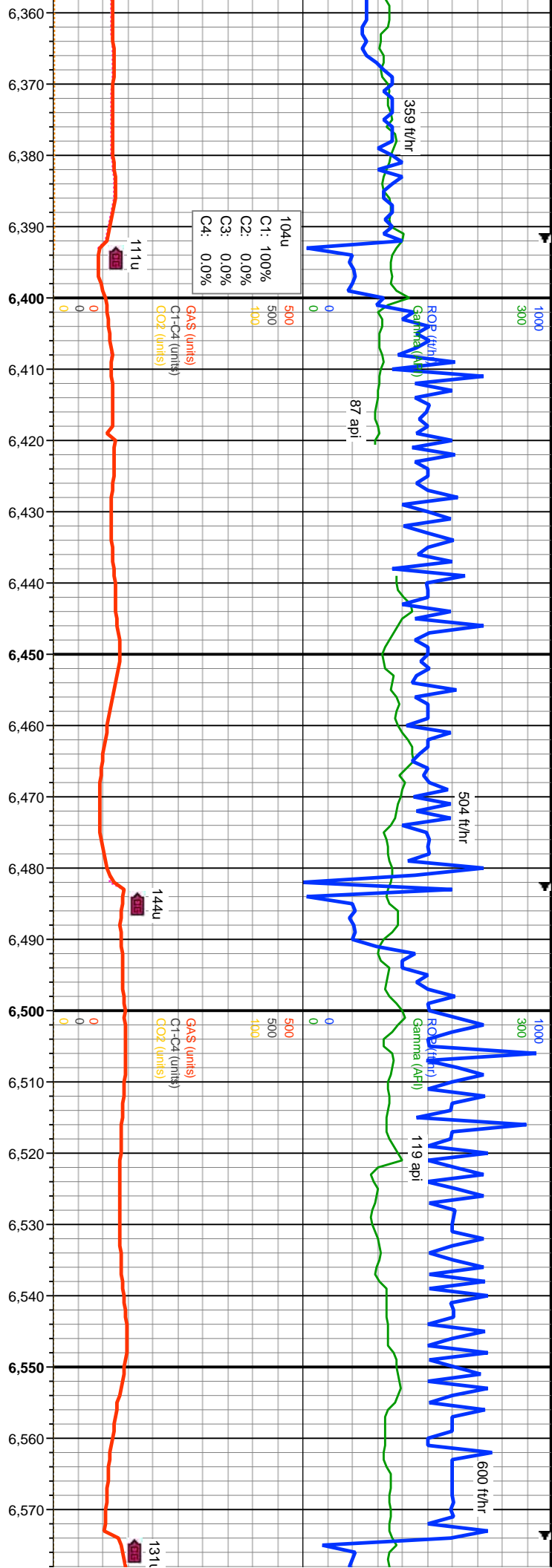




MD: 6,191'
INC: 47.55°
AZM: 211.27°
TVD: 4,777.01'
VS: 2,892.11'

MD: 6,281'
INC: 47.42°
AZM: 210.3°
TVD: 4,837.83'
VS: 2,948.84'

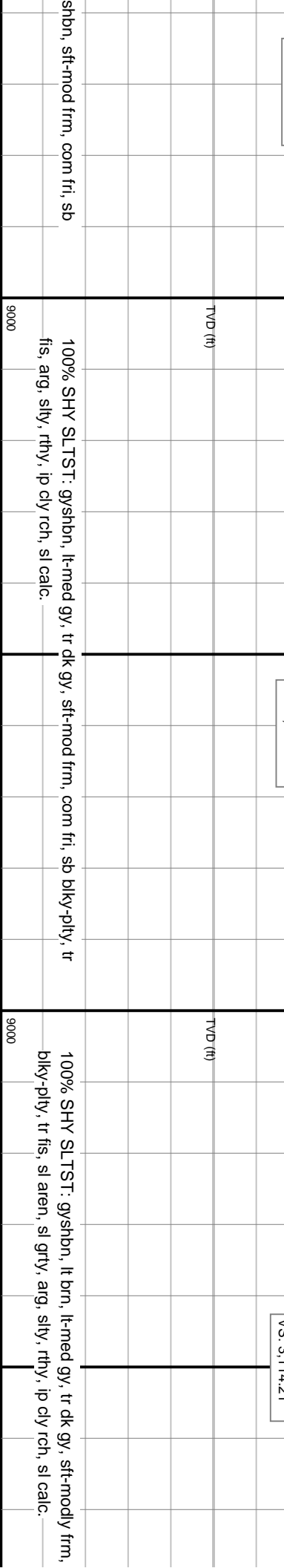
100% SHY SLTST: lt-medgy, sme drk gy, sme gysbhn, sft-tri, rr frm, sb blk-ply, tr fis, arg, slty, rthy, ip cly rch, sl calc.	100% SHY SLTST: lt-medgy, sme drk gy, sme gysbhn, sft-tri, rr frm, sb blk-ply, tr fis, arg, slty, rthy, ip cly rch, sl calc.
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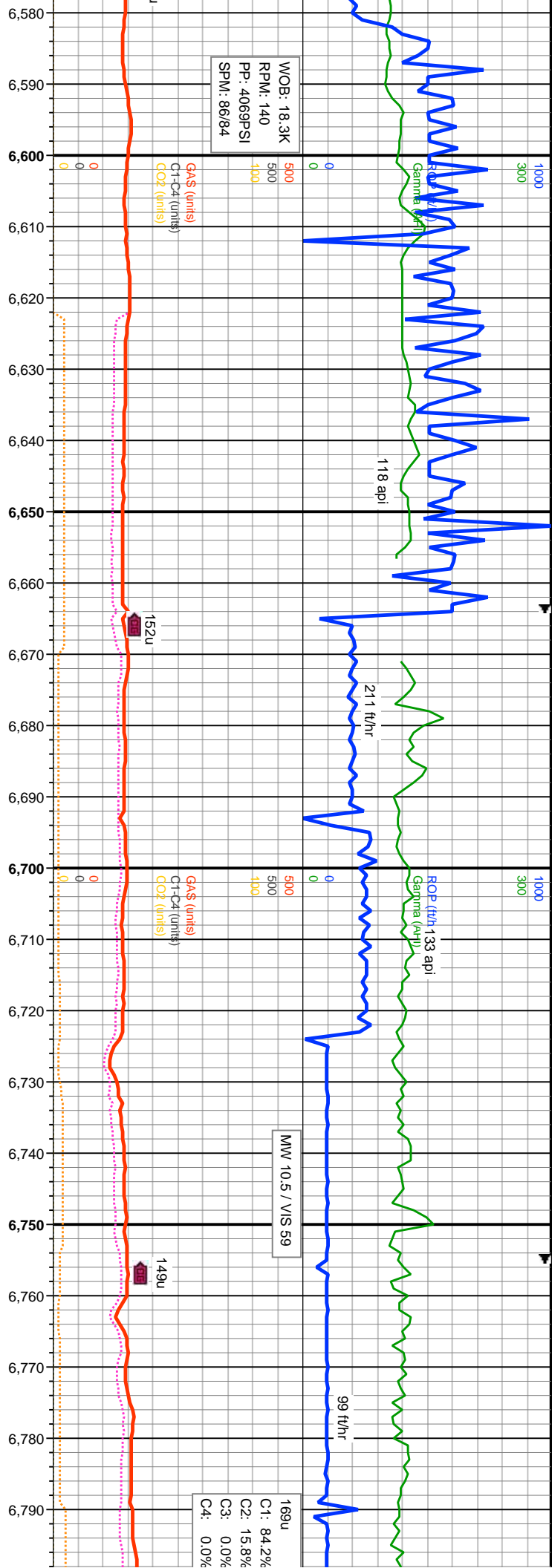


MD: 6,371'
INC: 47.54°
AZM: 208.87°
TVD: 4,898.66'
VS: 3,004.83'

MD: 6,461'
INC: 47.19°
AZM: 207.96°
TVD: 4,959.62'
VS: 3,059.98'

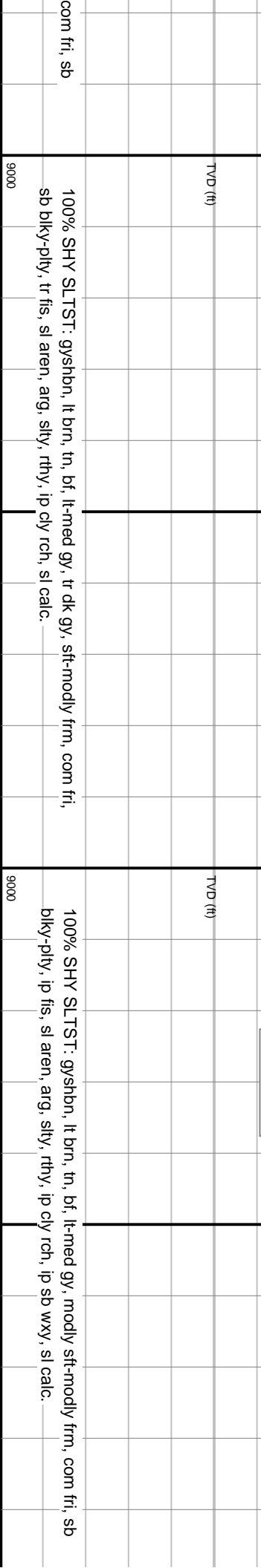
MD: 6,550'
INC: 47.63°
AZM: 207.79°
TVD: 5,019.85'
VS: 3,114.21'

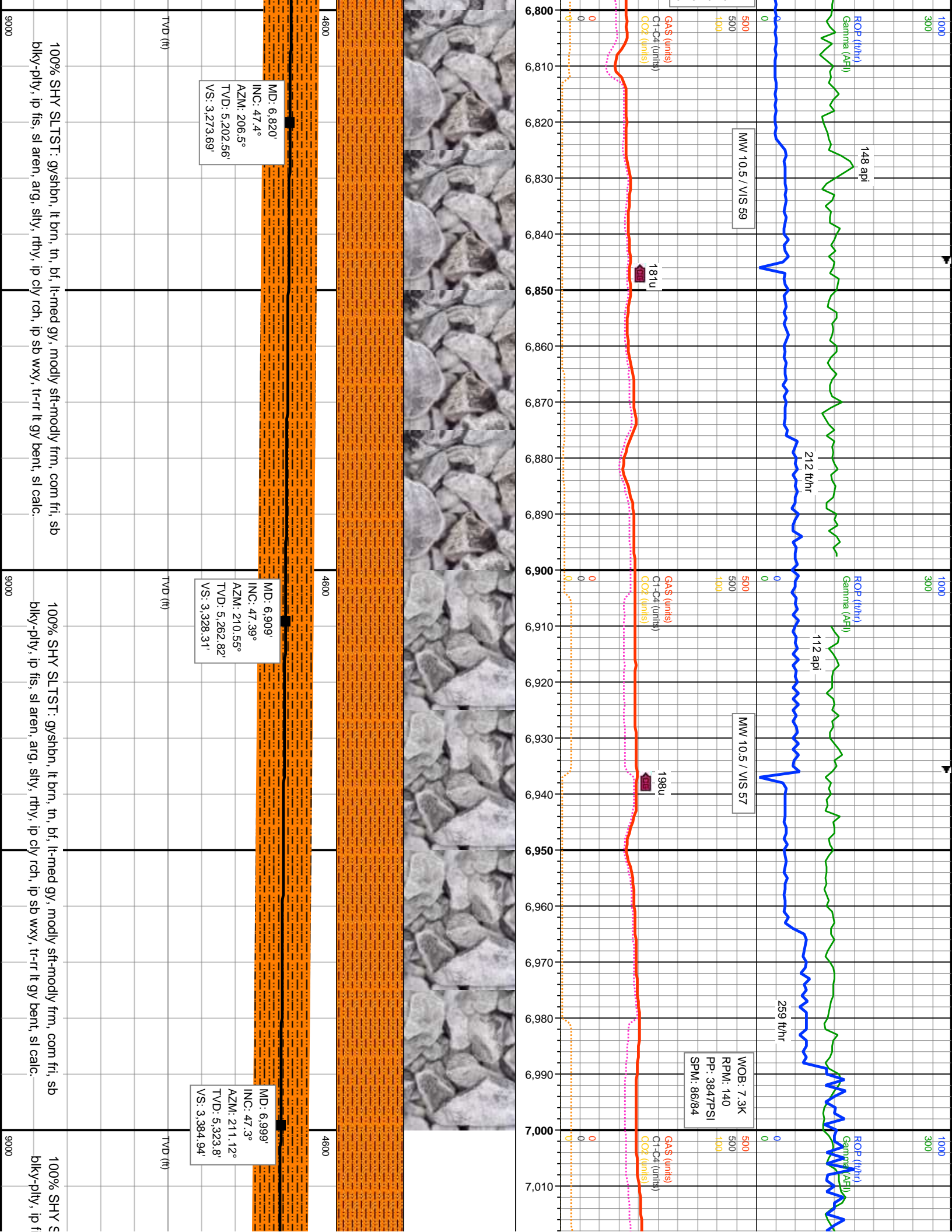


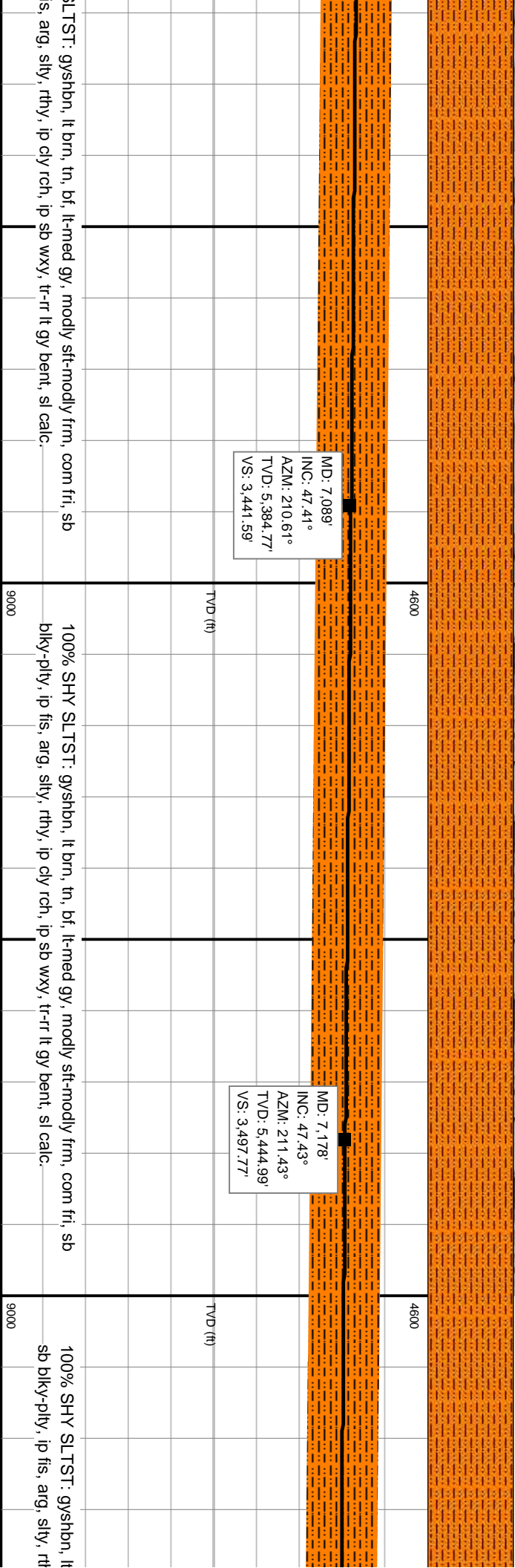
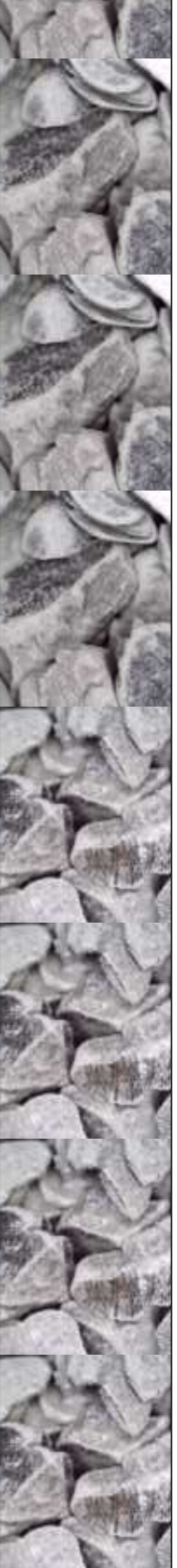
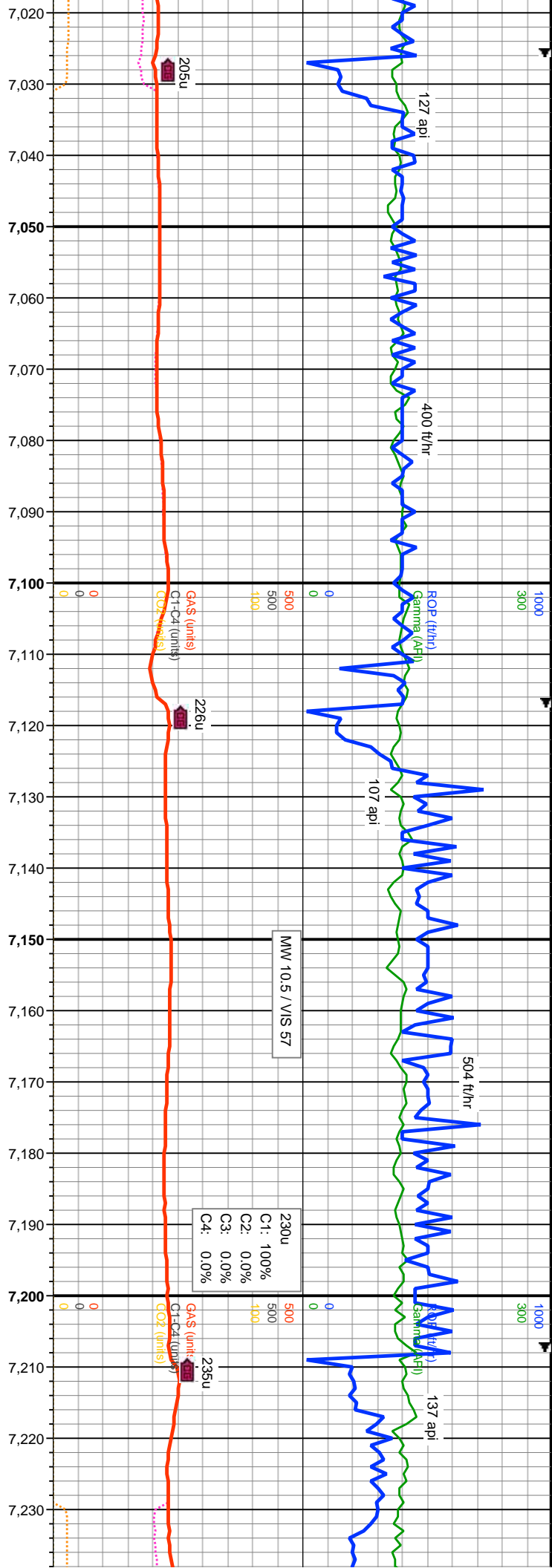


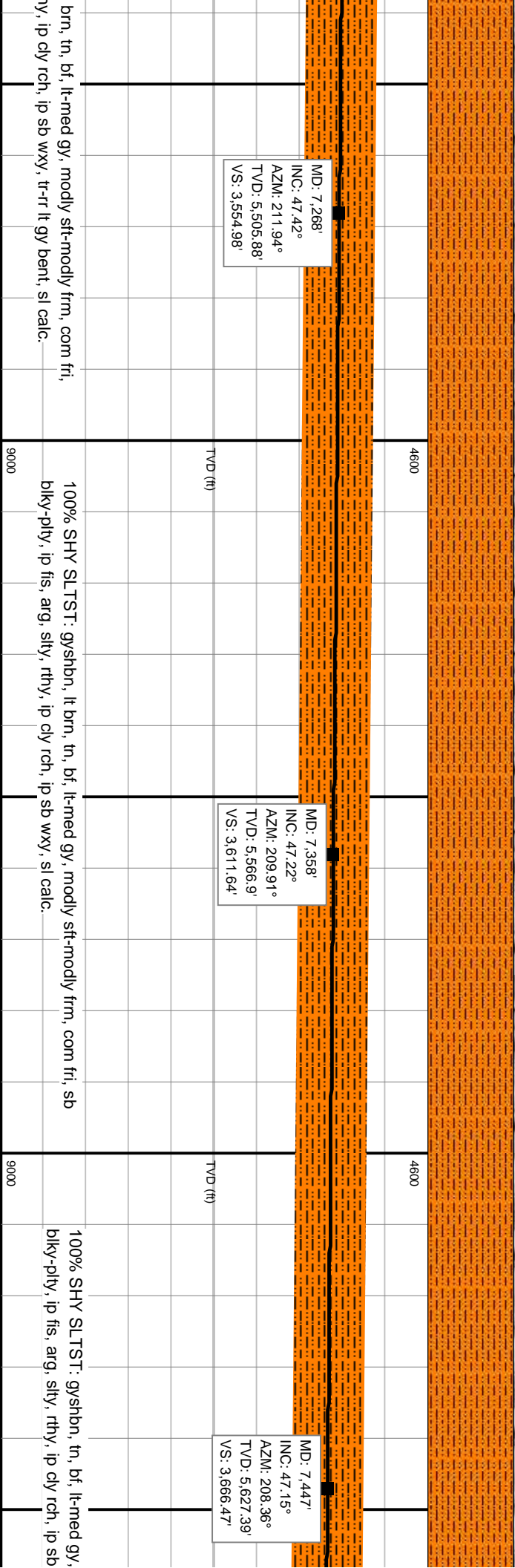
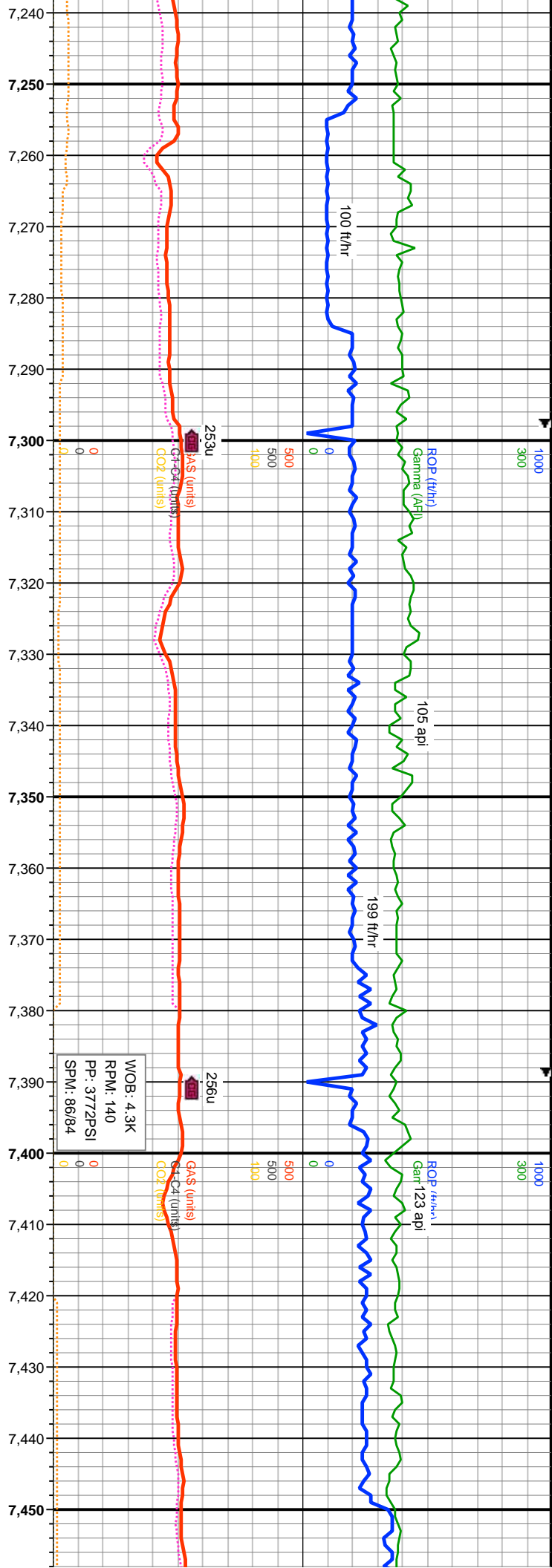
MD: 6,640'
INC: 47.45°
AZM: 205.09°
TVD: 5,080.61'
VS: 3,168.21'

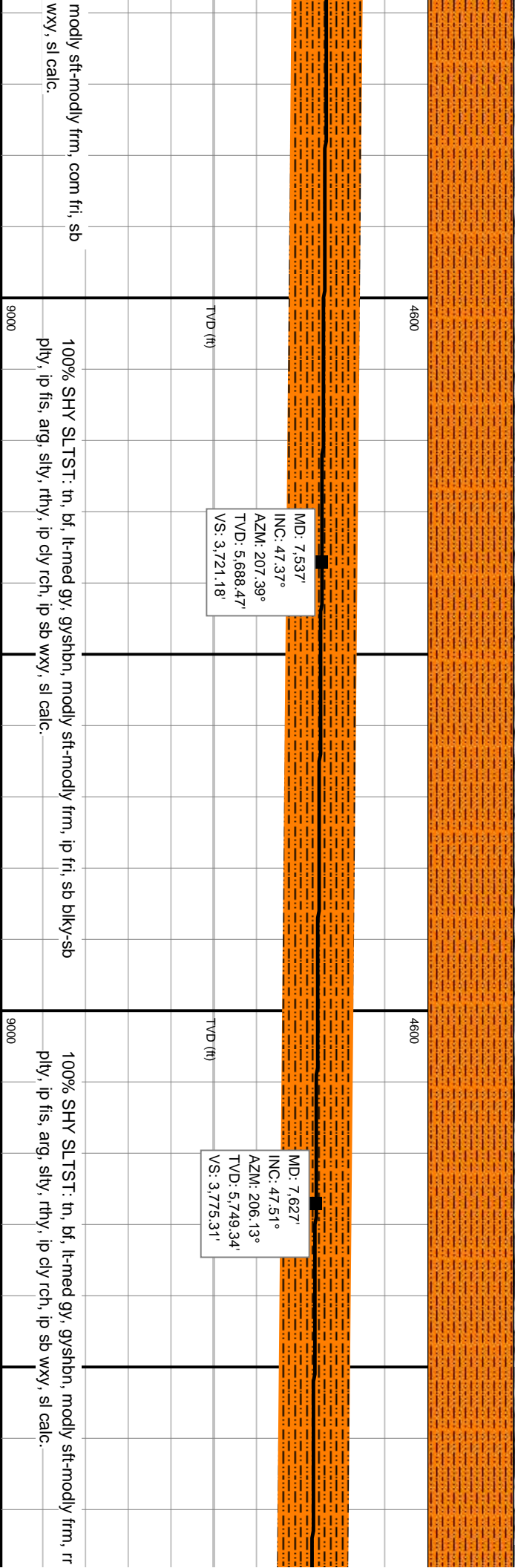
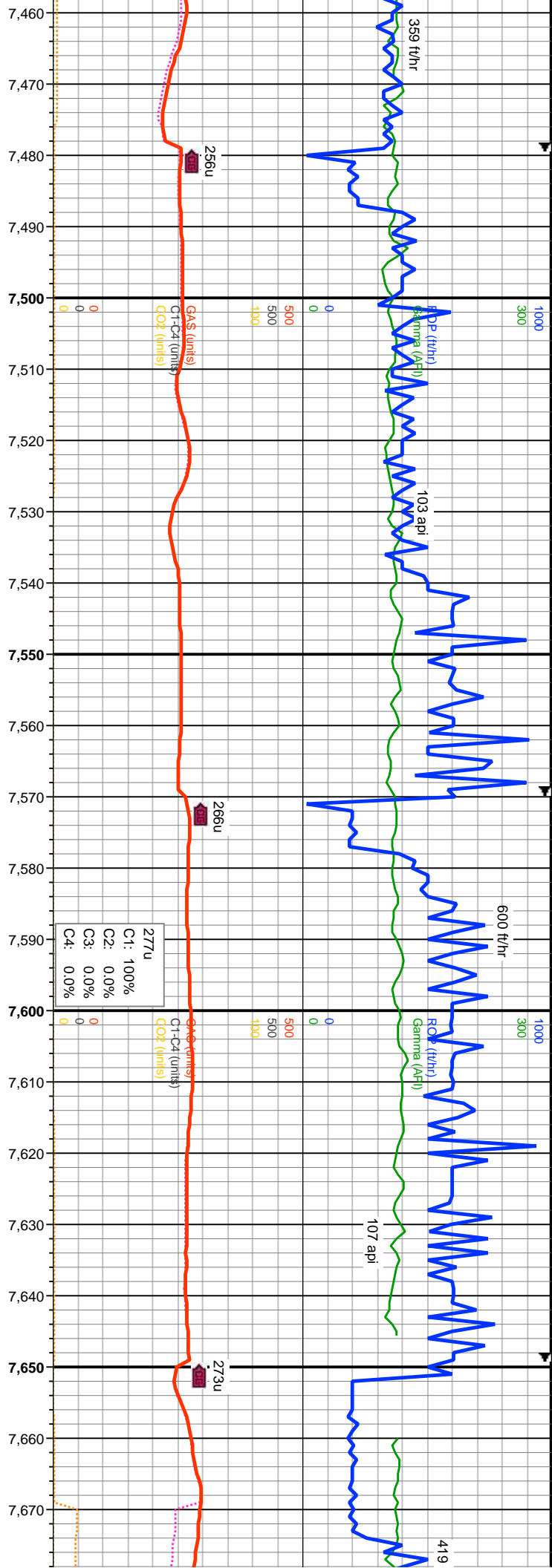
MD: 6,730'
INC: 47.29°
AZM: 203.86°
TVD: 5,141.57'
VS: 3,220.72'











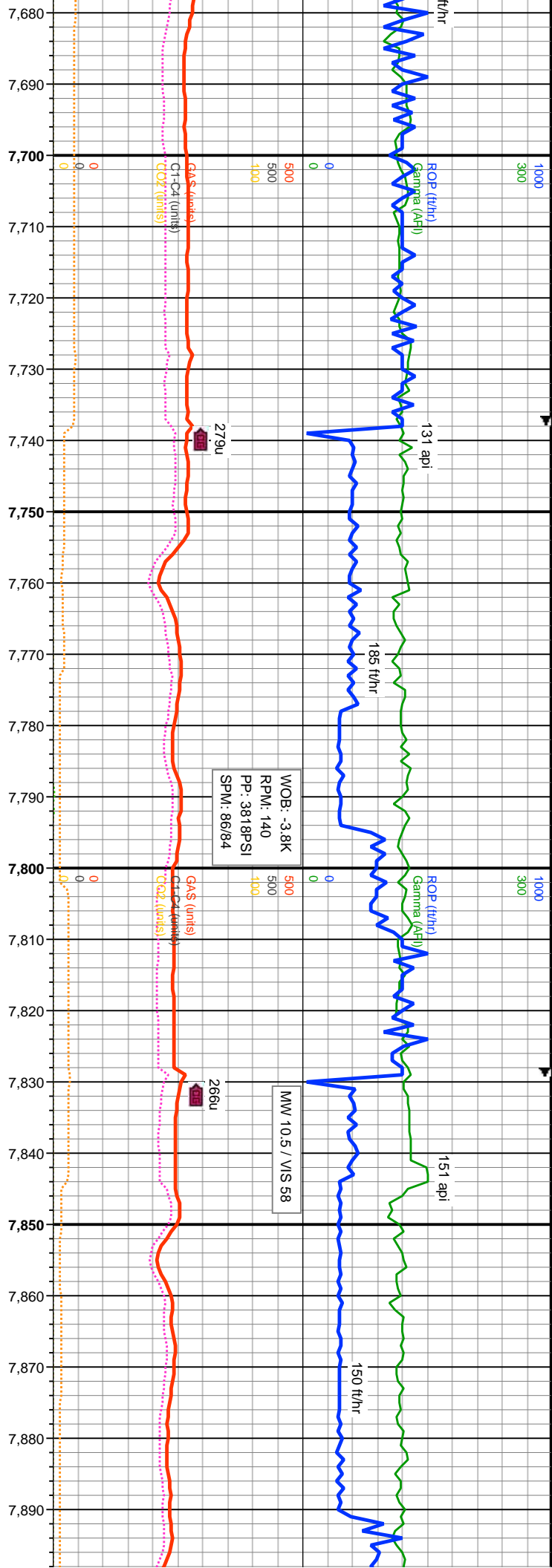
MD: 7,537'
INC: 47.37°
AZM: 207.39°
TVD: 5,688.47'
VS: 3,721.18'

MD: 7,627'
INC: 47.51°
AZM: 206.13°
TVD: 5,749.34'
VS: 3,775.31'

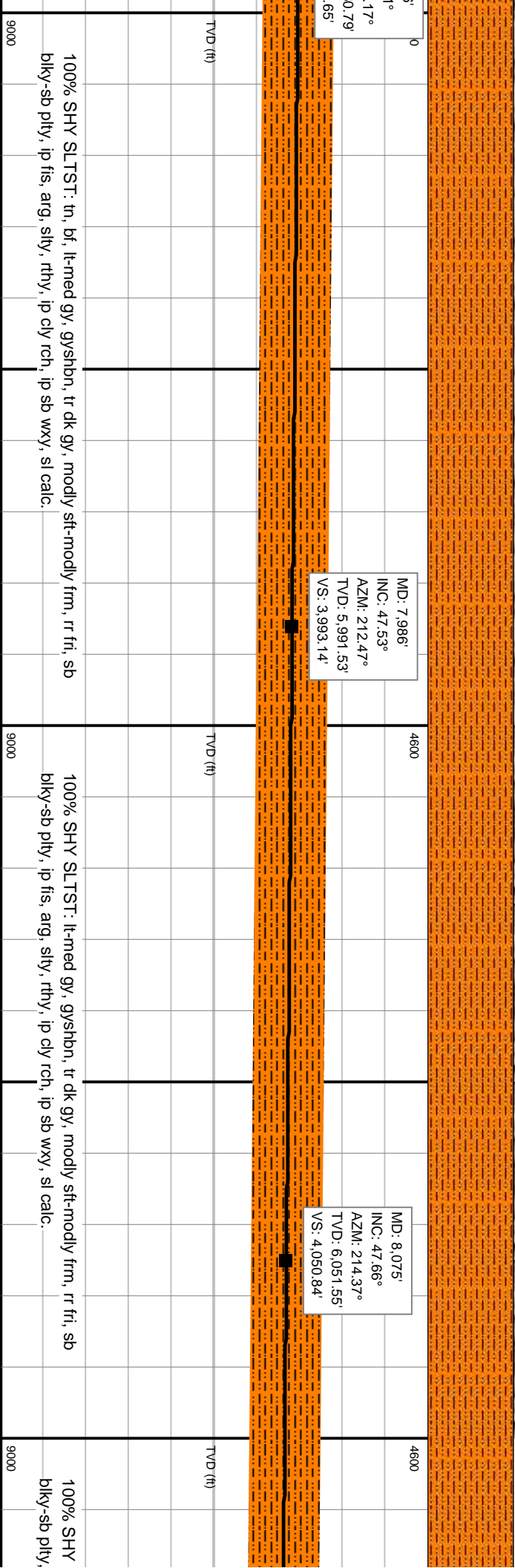
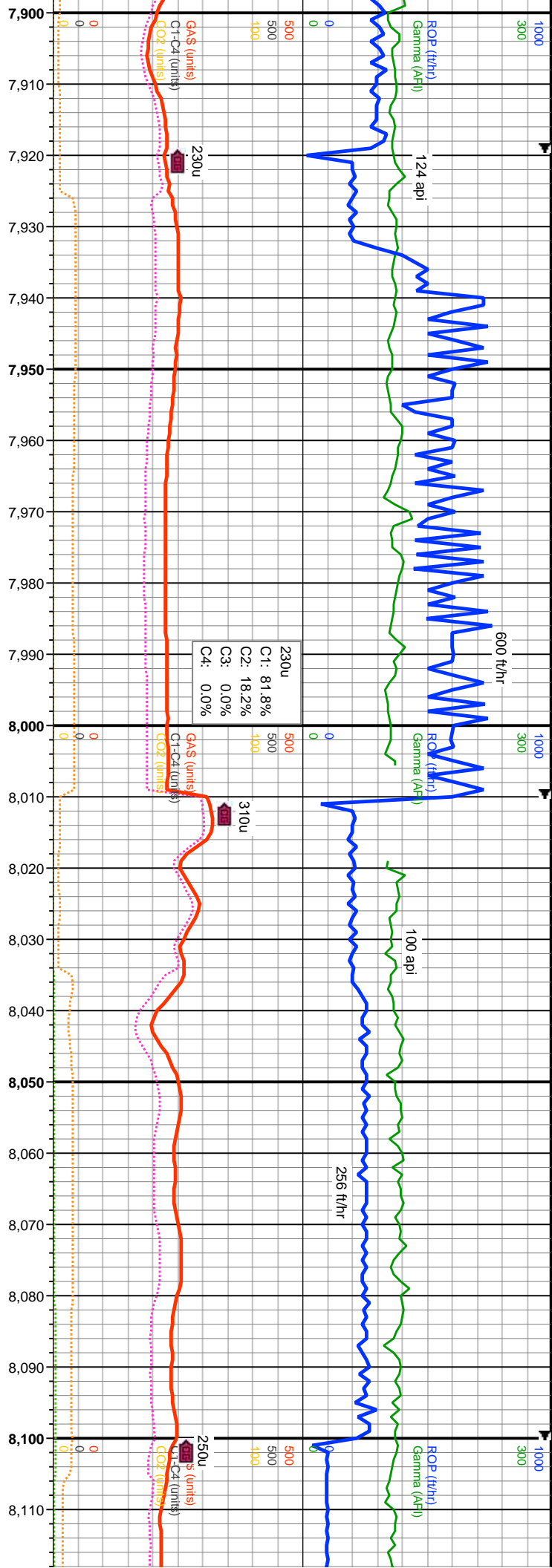
modly sft-modly frm, com fri, sb wxy, sl calc.

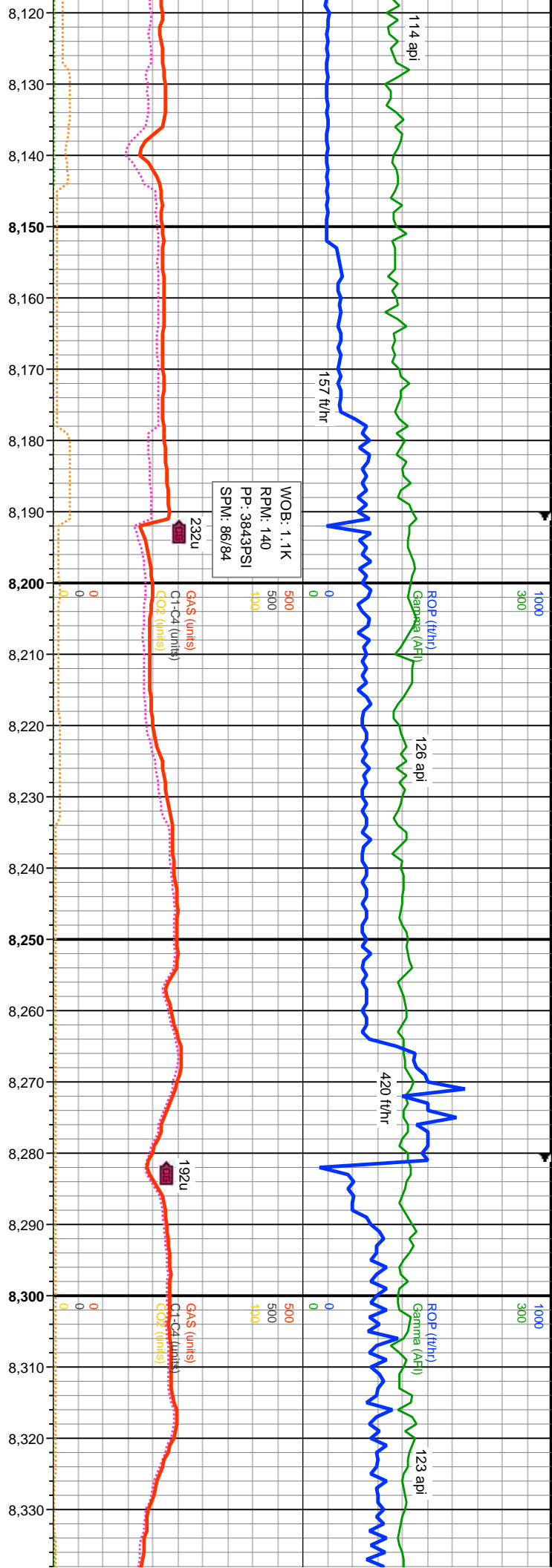
100% SHY SLTST: tn, bf, lt-med gy, gyshbn, modly sft-modly frm, ip fri, sb blk-y-sb pty, ip fls, arg, slty, rthy, ip cly rch, ip sb wxy, sl calc.

100% SHY SLTST: tn, bf, lt-med gy, gyshbn, modly sft-modly frm, rr pty, ip fls, arg, slty, rthy, ip cly rch, ip sb wxy, sl calc.



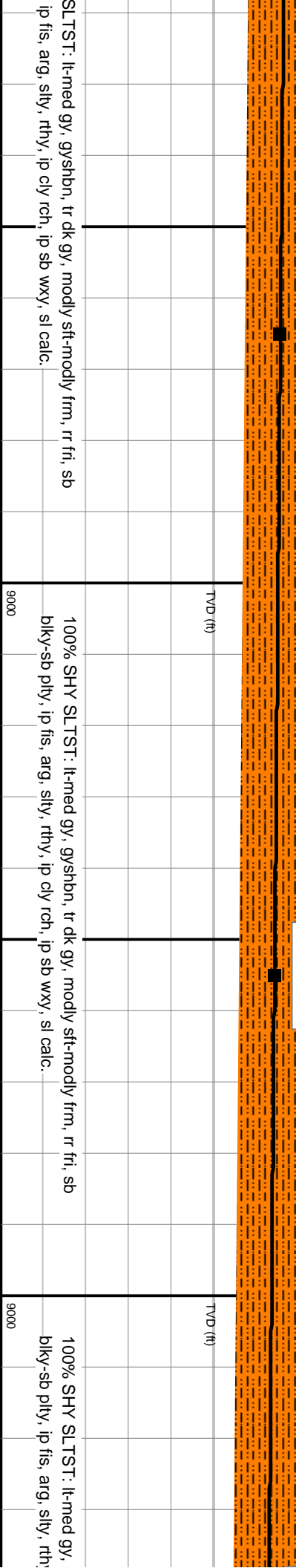
fri, sb blkly-sb		100% SHY SLTST: tn, bf, lt-med gy, gysbhn, tr dk gy, modly sft-modly frm, rr fri, sb blkly-sb plty, ip fis, arg, slty, rthy, ip cly rch, ip sb wxy, sl calc.		100% SHY SLTST: tn, bf, lt-med gy, gysbhn, tr dk gy, modly sft-modly frm, rr fri, sb blkly-sb plty, ip fis, arg, slty, rthy, ip cly rch, ip sb wxy, sl calc.	
9000		MD: 7,717' INC: 47.59° AZM: 205.73° TVD: 5,810.09' VS: 3,828.98'		MD: 7,806' INC: 47.6° AZM: 206.16° TVD: 5,870.1' VS: 3,882.1'	
4600		MD: 7,896' INC: 47.6° AZM: 208° TVD: 5,93° VS: 3,936'			
TVD (ft)		TVD (ft)			





MD: 8,165'
INC: 47.71°
AZM: 211.44°
TVD: 6,112.14'
VS: 4,108.98'

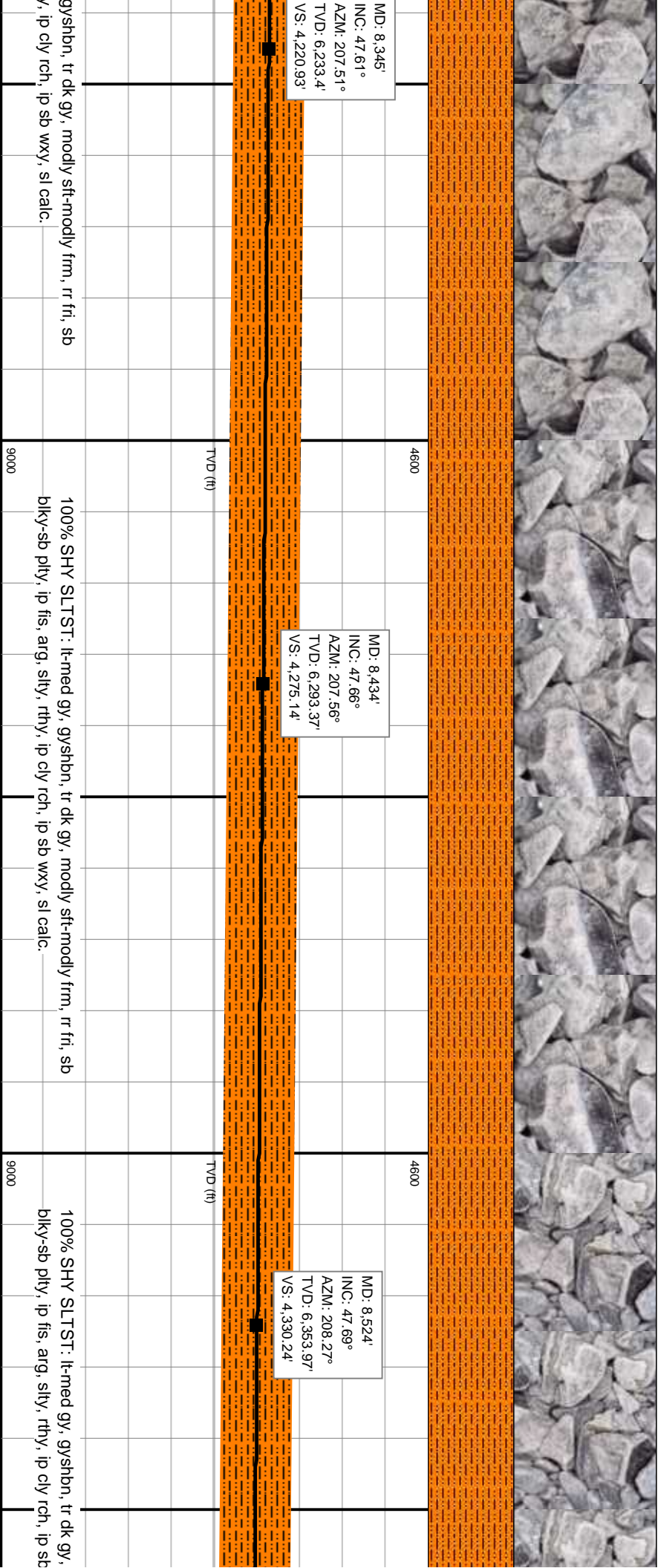
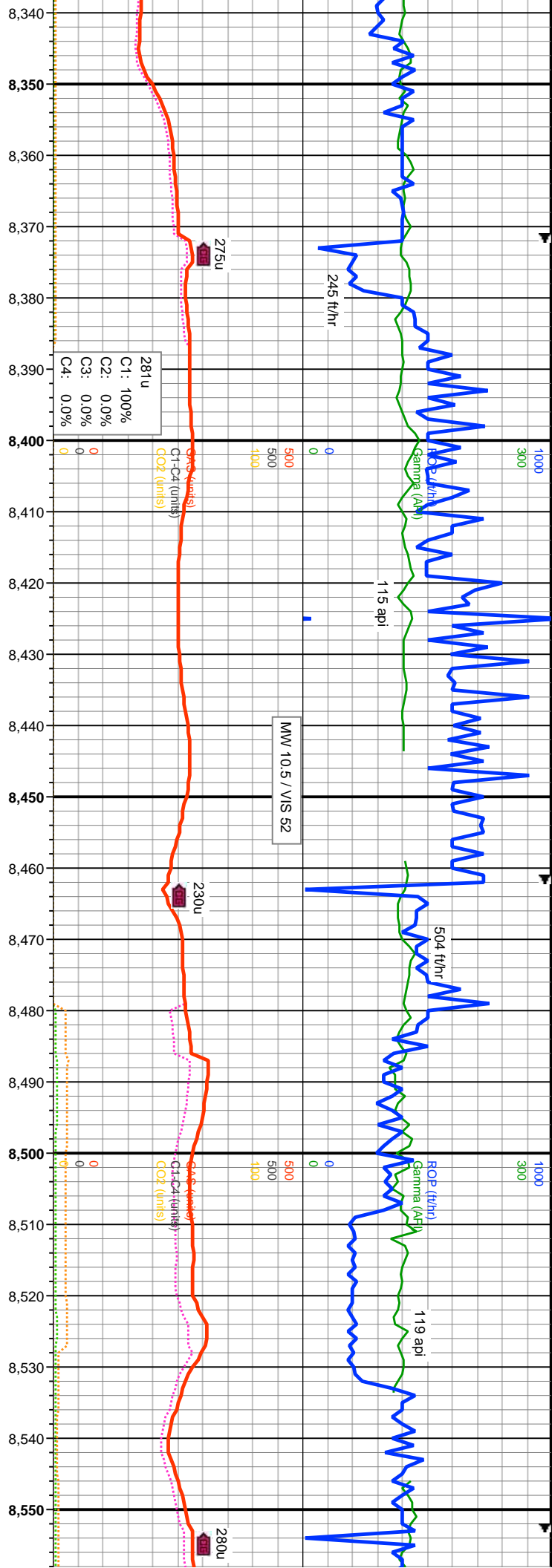
MD: 8,255'
INC: 47.65°
AZM: 209.18°
TVD: 6,172.74'
VS: 4,165.59'

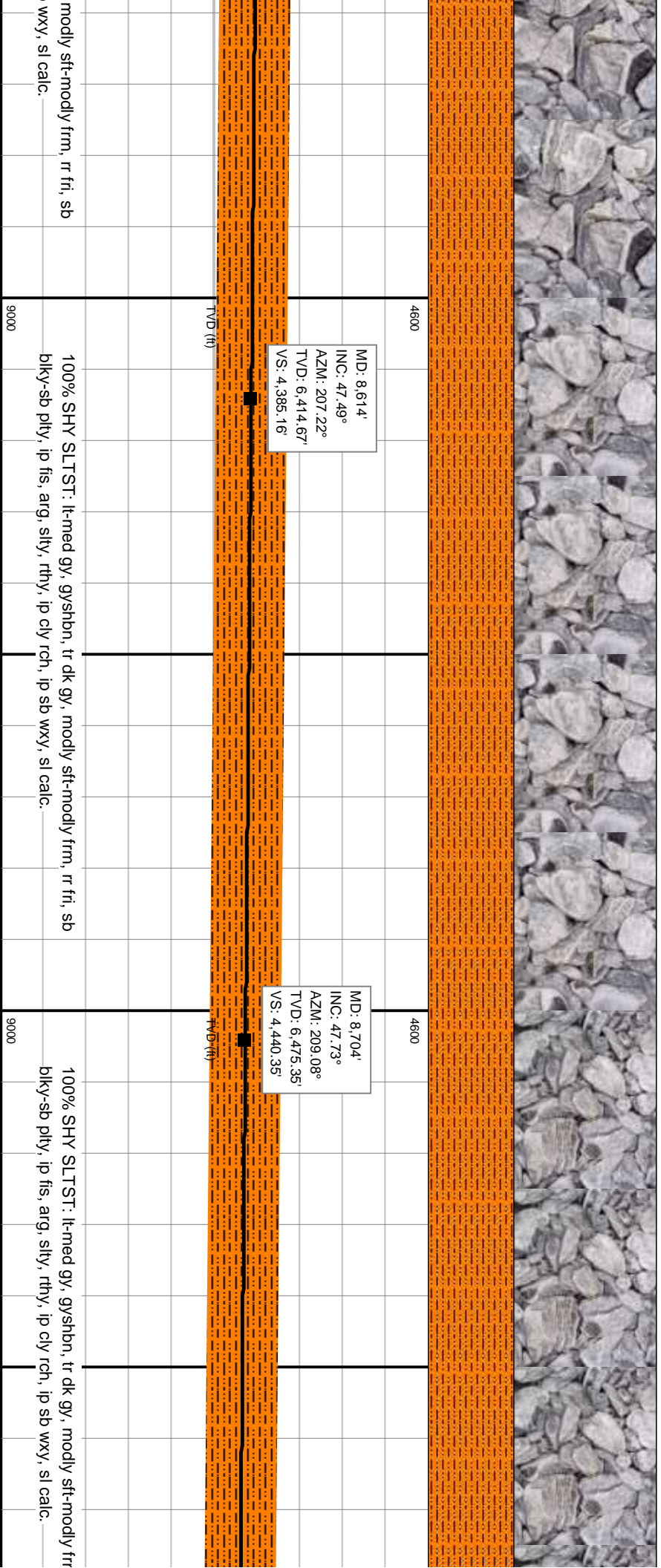
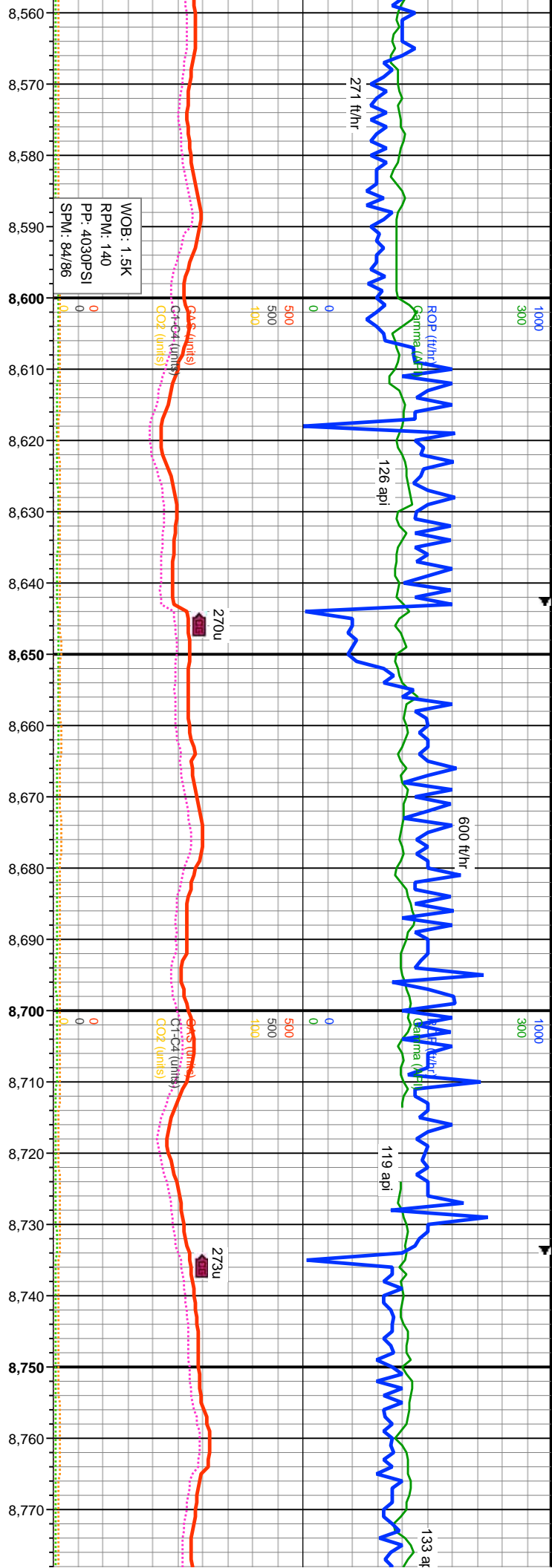


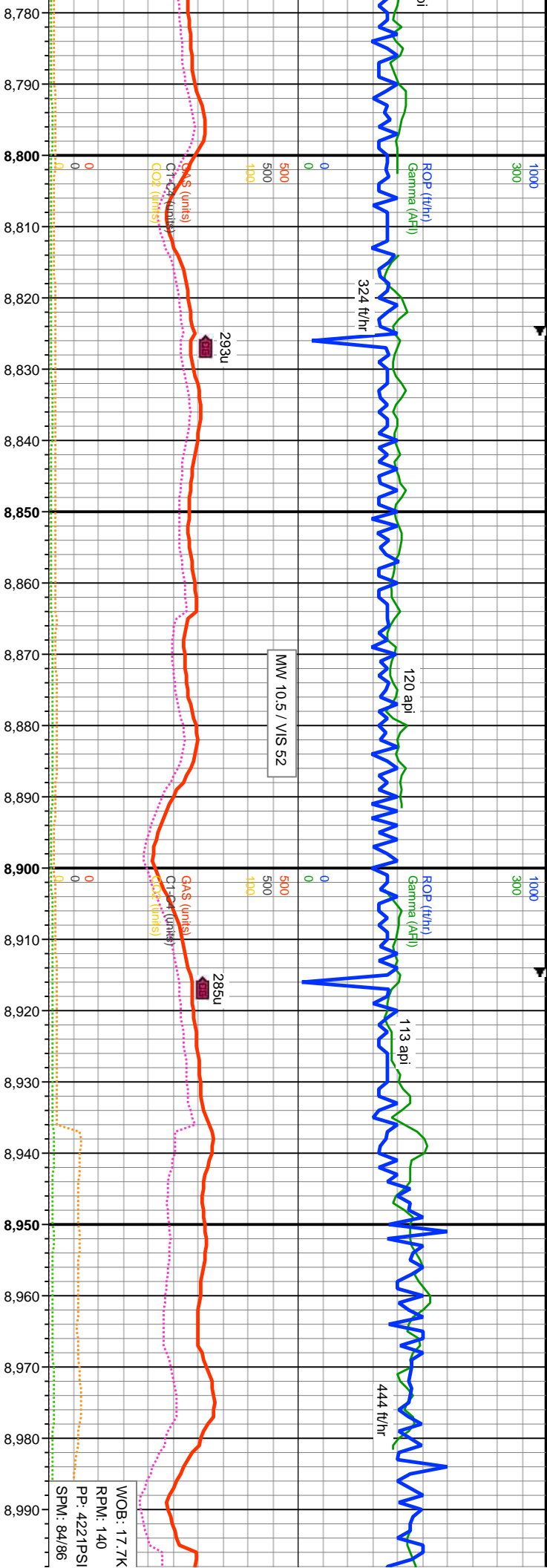
SLTST: lt-med gy, gyshbn, tr dk gy, modly sft-modly frm, rr fri, sb
ip fis, arg, slty, rthy, ip cly rch, ip sb wxy, sl calc.

100% SHY SLTST: lt-med gy, gyshbn, tr dk gy, modly sft-modly frm, rr fri, sb
blky-sb pty, ip fis, arg, slty, rthy, ip cly rch, ip sb wxy, sl calc.

100% SHY SLTST: lt-med gy,
blky-sb pty, ip fis, arg, slty, rth







MD: 8.793'
INC: 47.61°
AZM: 208.7°
TVD: 6.535.28'
VS: 4.495.46'

MD: 8.883'
INC: 47.82°
AZM: 207.94°
TVD: 6.595.84'
VS: 4.550.86'

MD: 8.973'
INC: 47.75°
AZM: 207.32°
TVD: 6.656.31'
VS: 4.605.87'

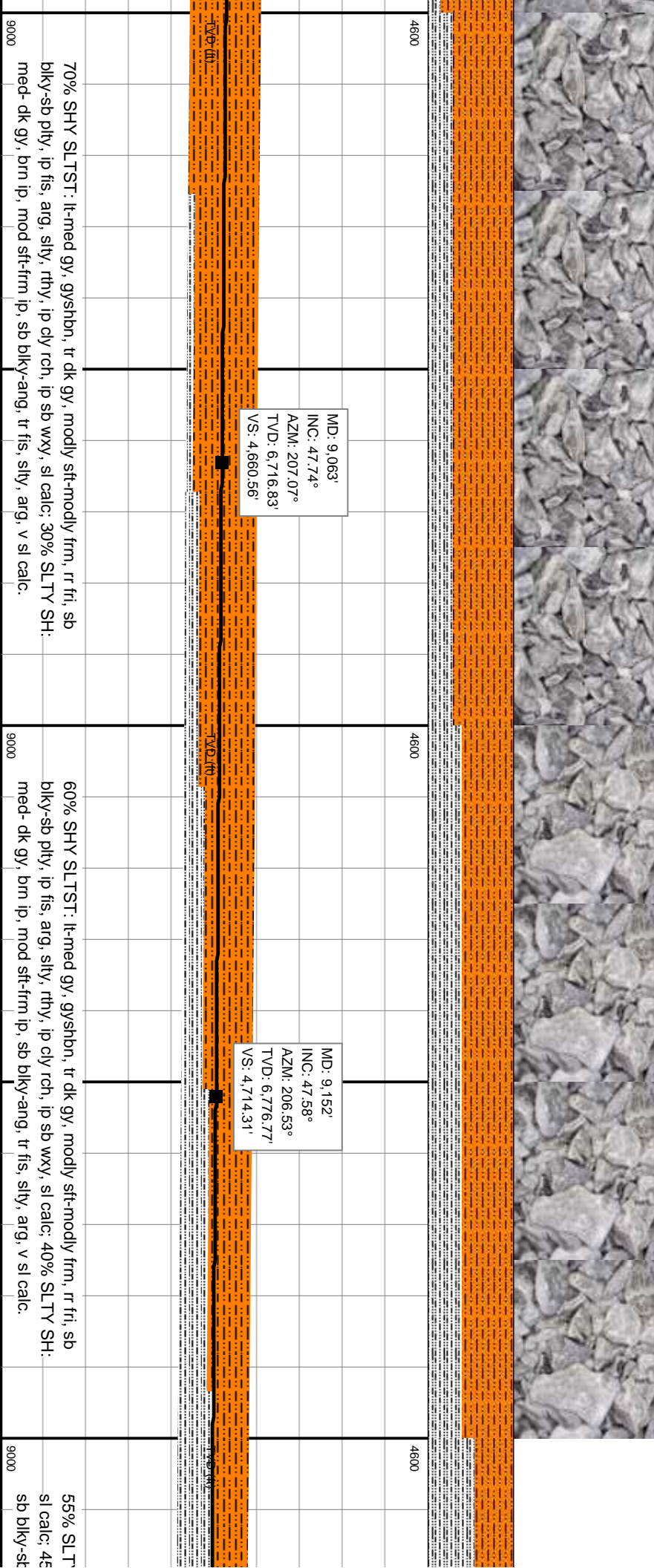
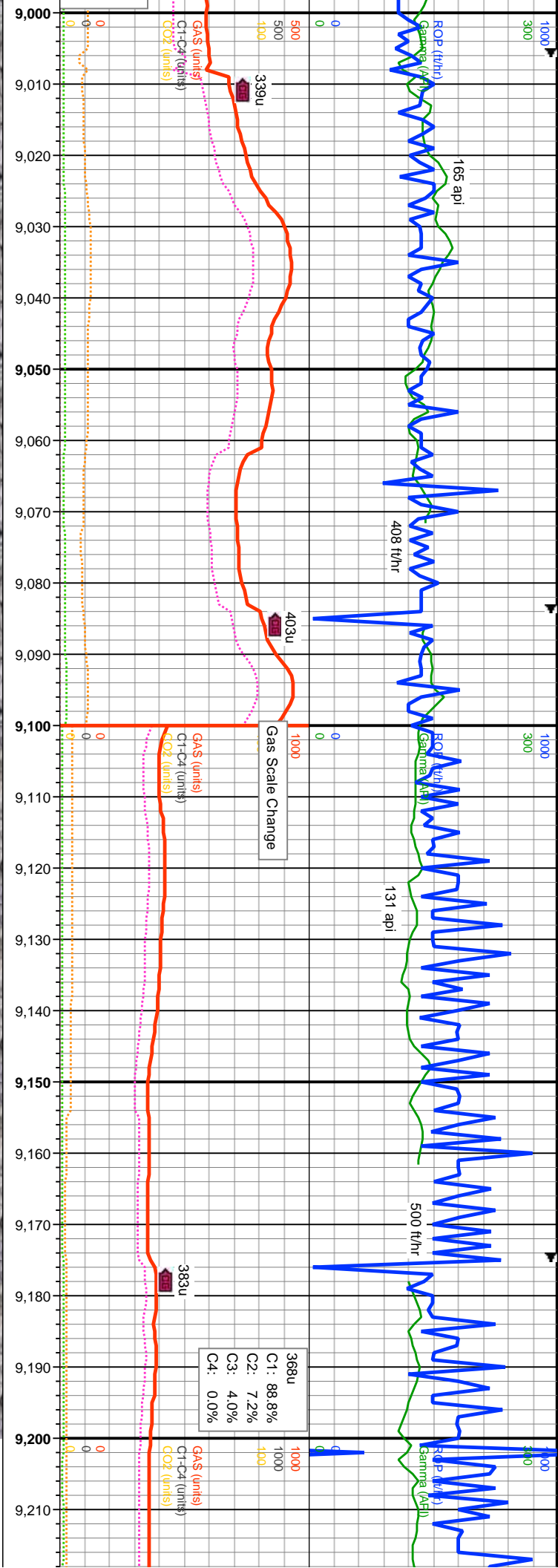
TVD (ft)

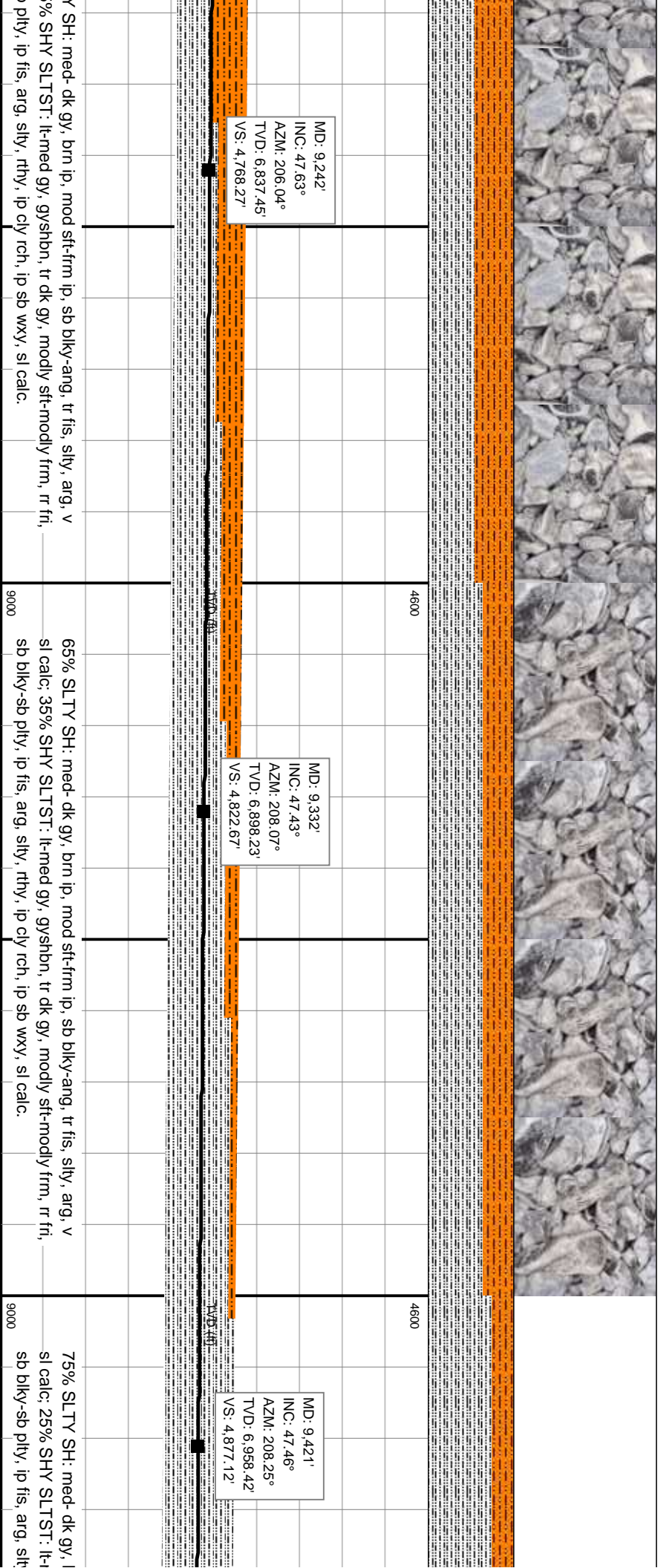
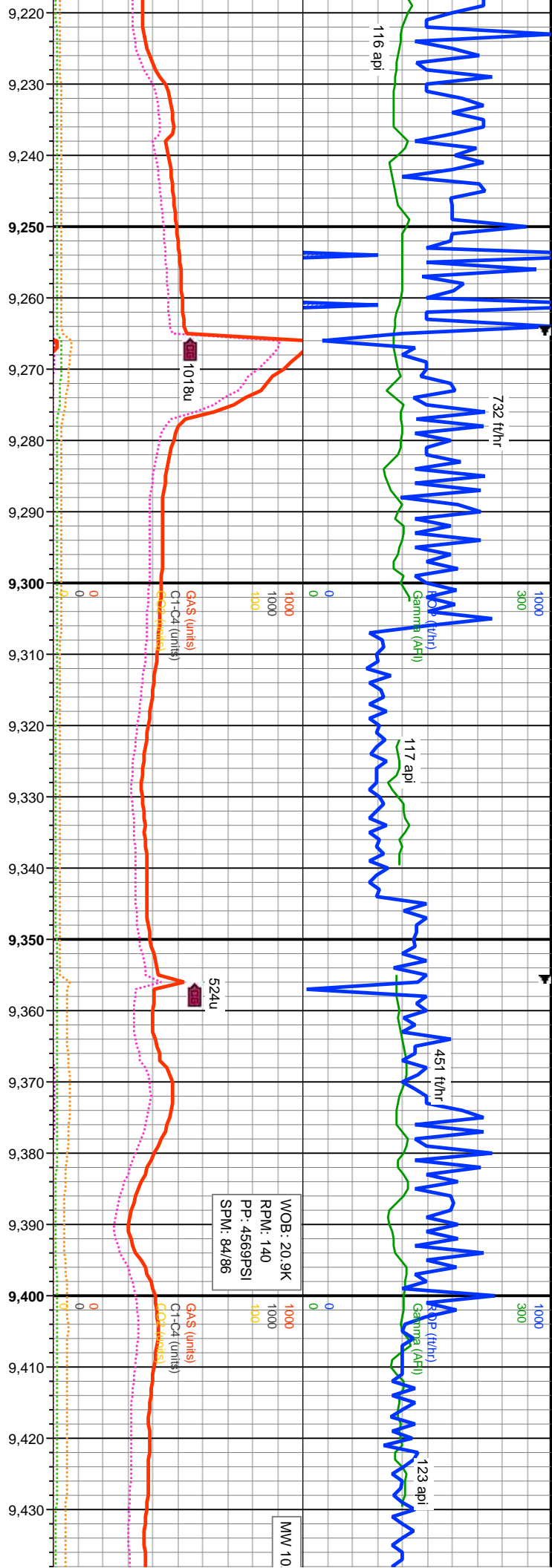
TVD (ft)

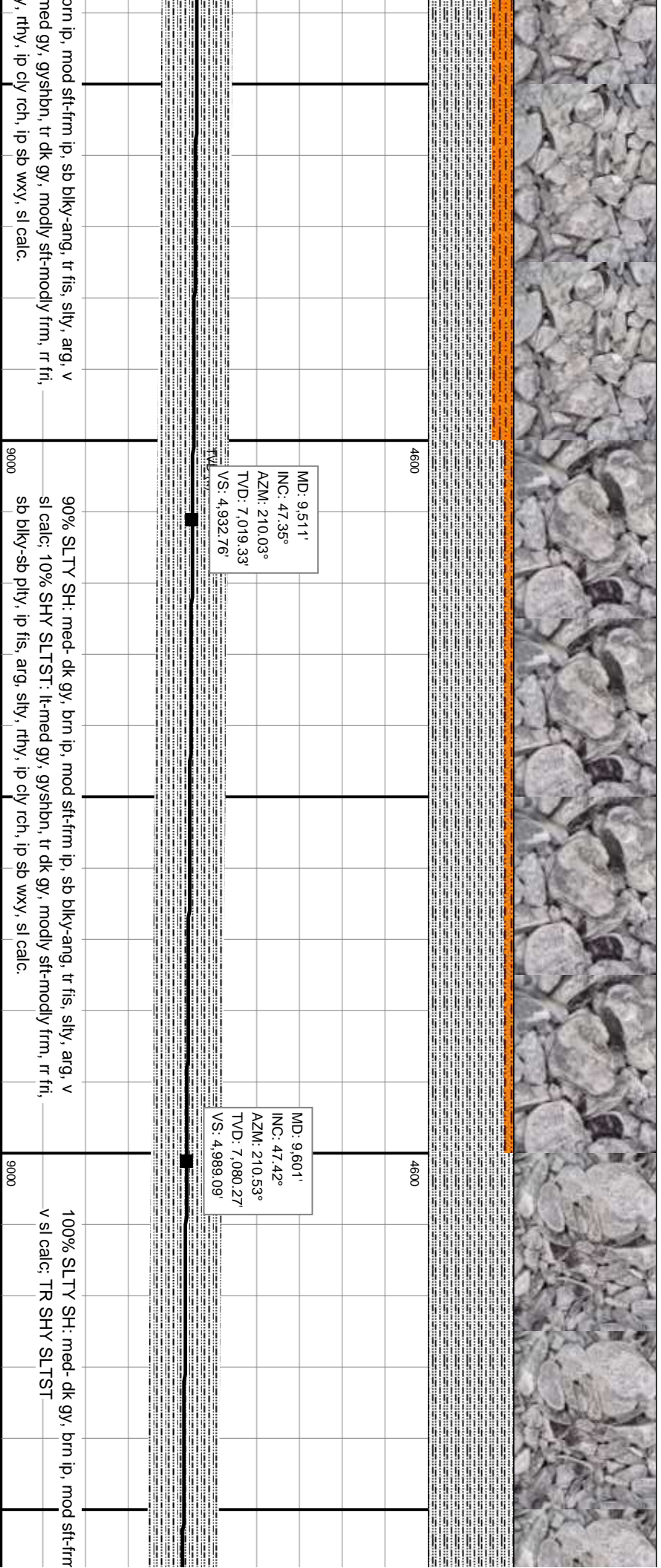
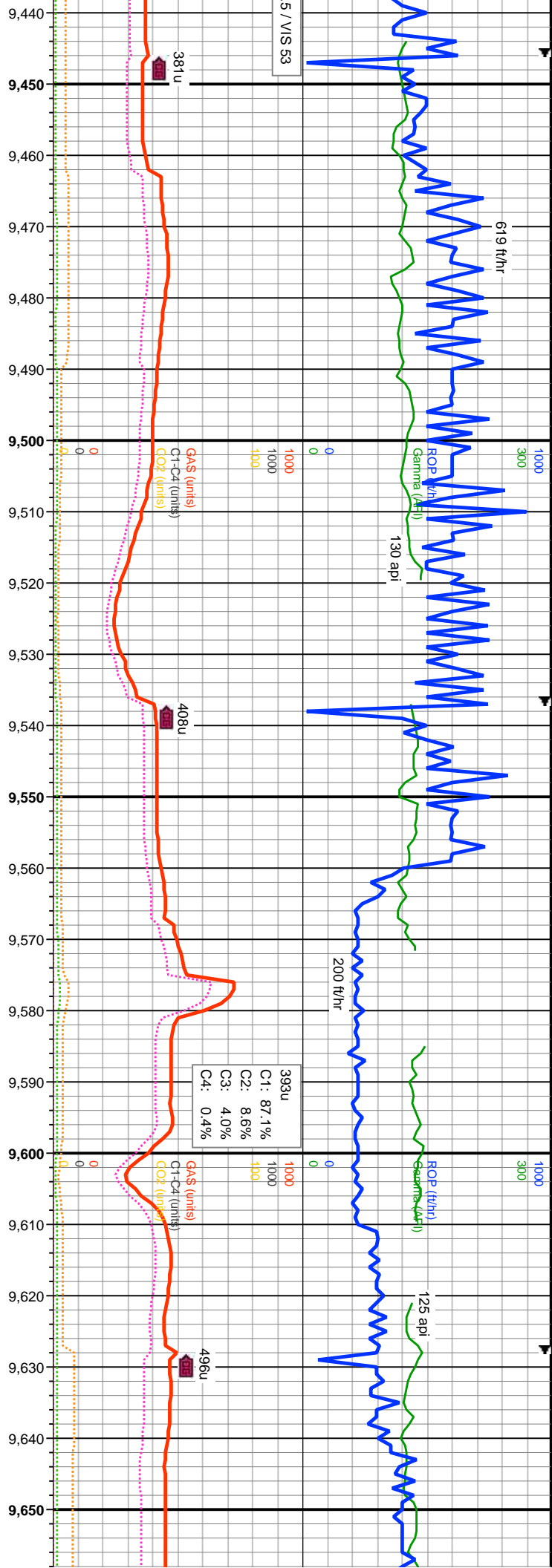
TVD (ft)

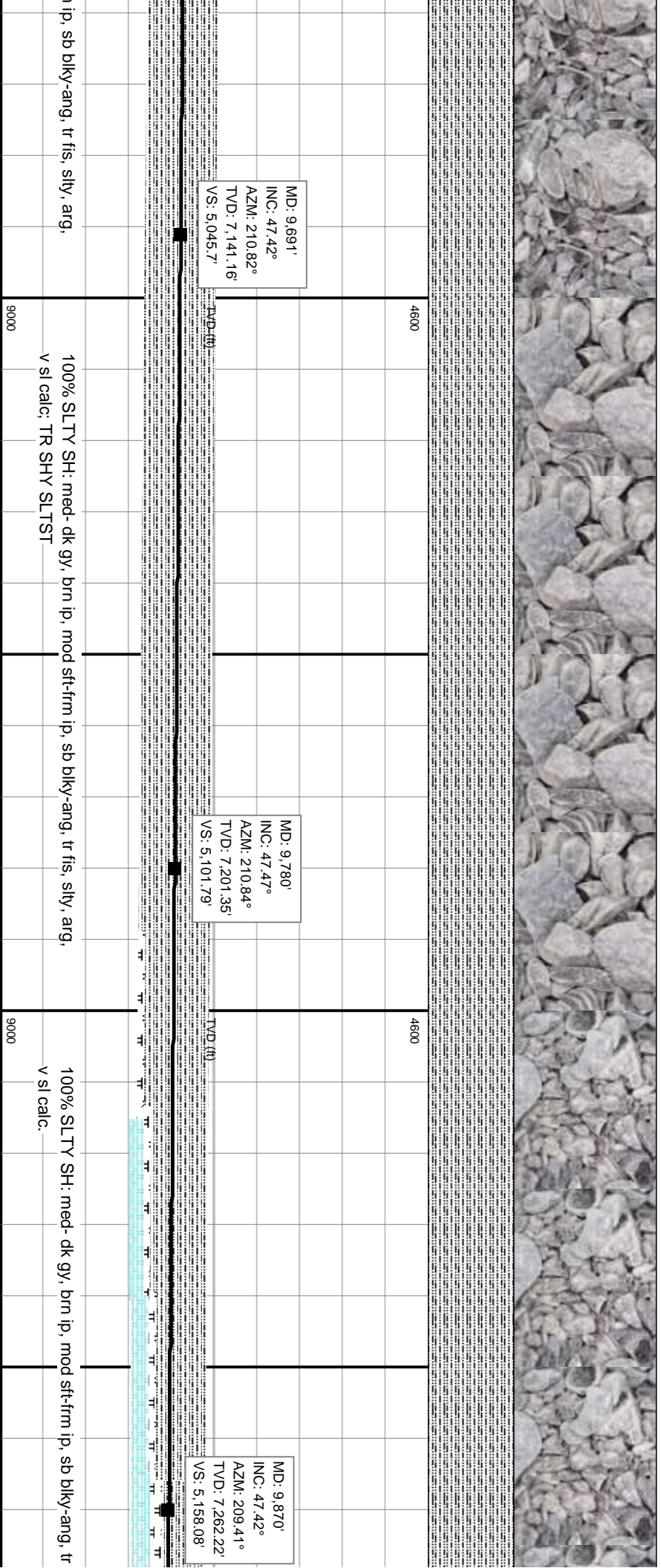
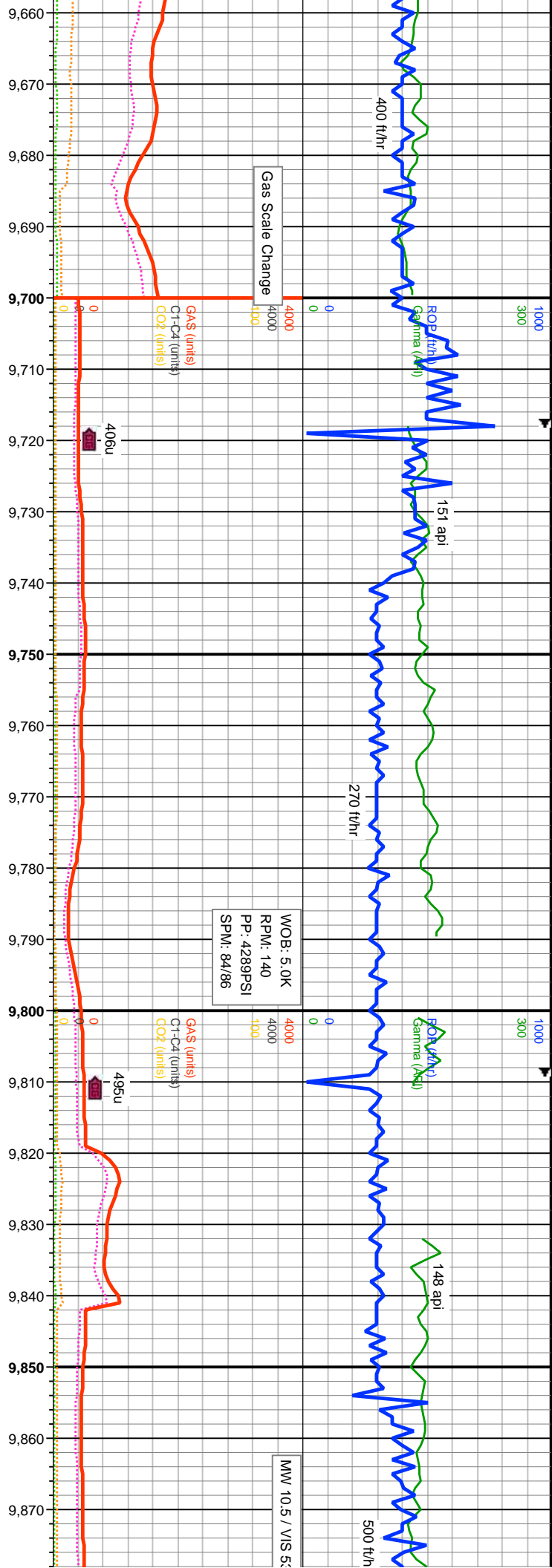
100% SHY SLTST: lt-med gy, gysbhn, tr dk gy, modly sft-modly frm, rr fri, sb blkly-sb plty, ip fis, arg, slty, rthy, ip cly rch, ip sb wxy, sl calc: TR SLTY SH

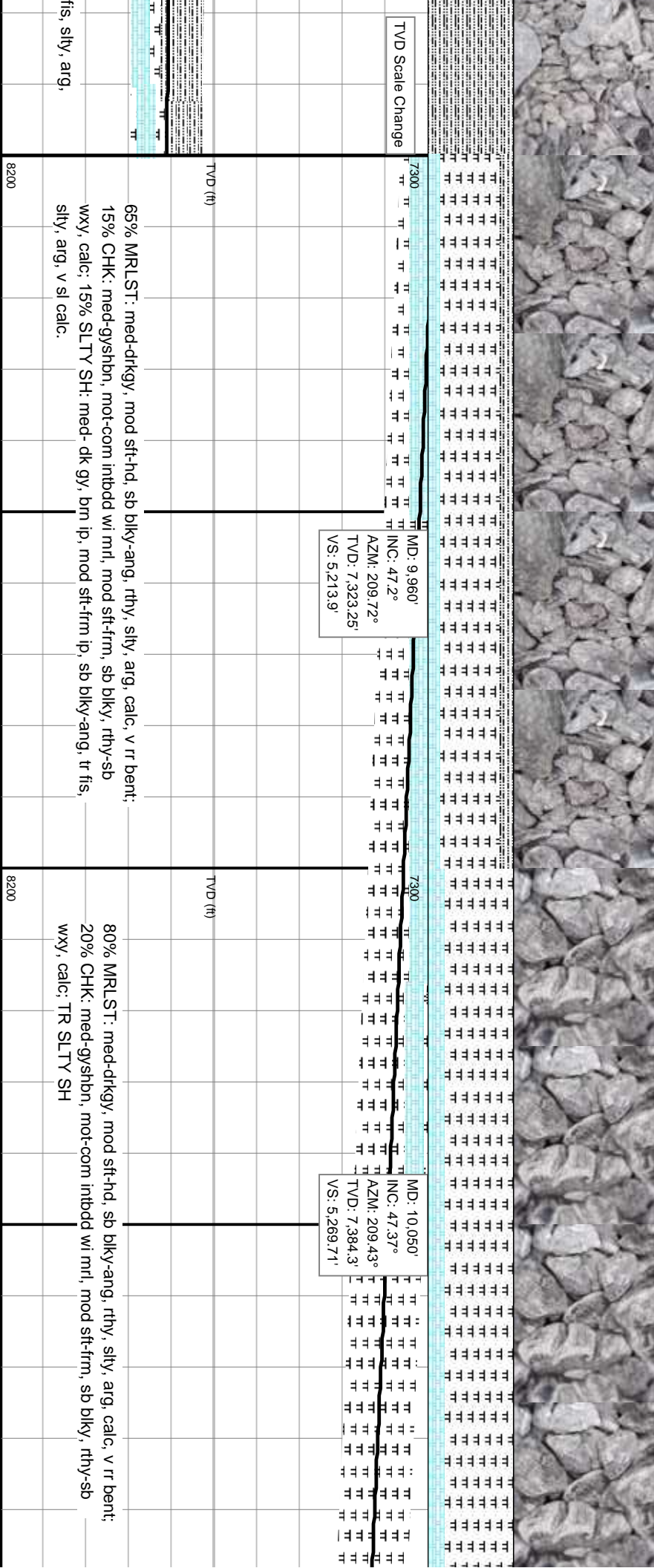
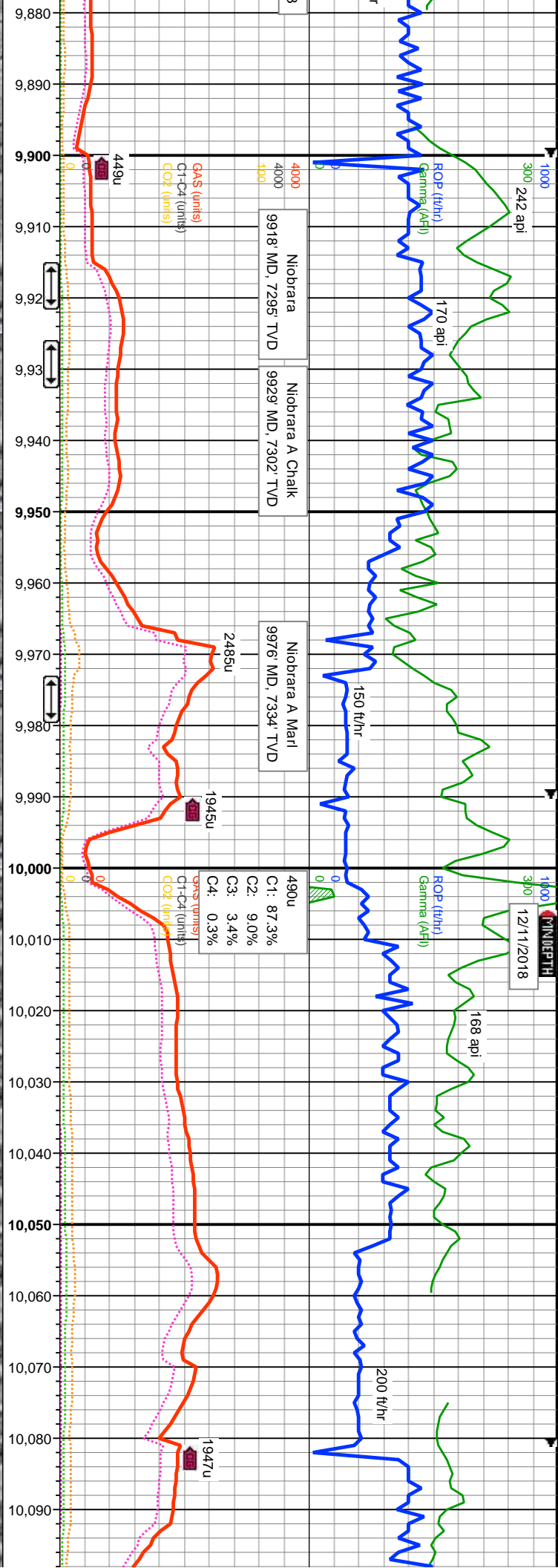
85% SHY SLTST: lt-med gy, gysbhn, tr dk gy, modly sft-modly frm, rr fri, sb blkly-sb plty, ip fis, arg, slty, rthy, ip cly rch, ip sb wxy, sl calc: 15% SLTY SH: med- dk gy, brn ip, mod sft-frm ip, sb blkly-ang, tr fis, slty, arg, v sl calc.

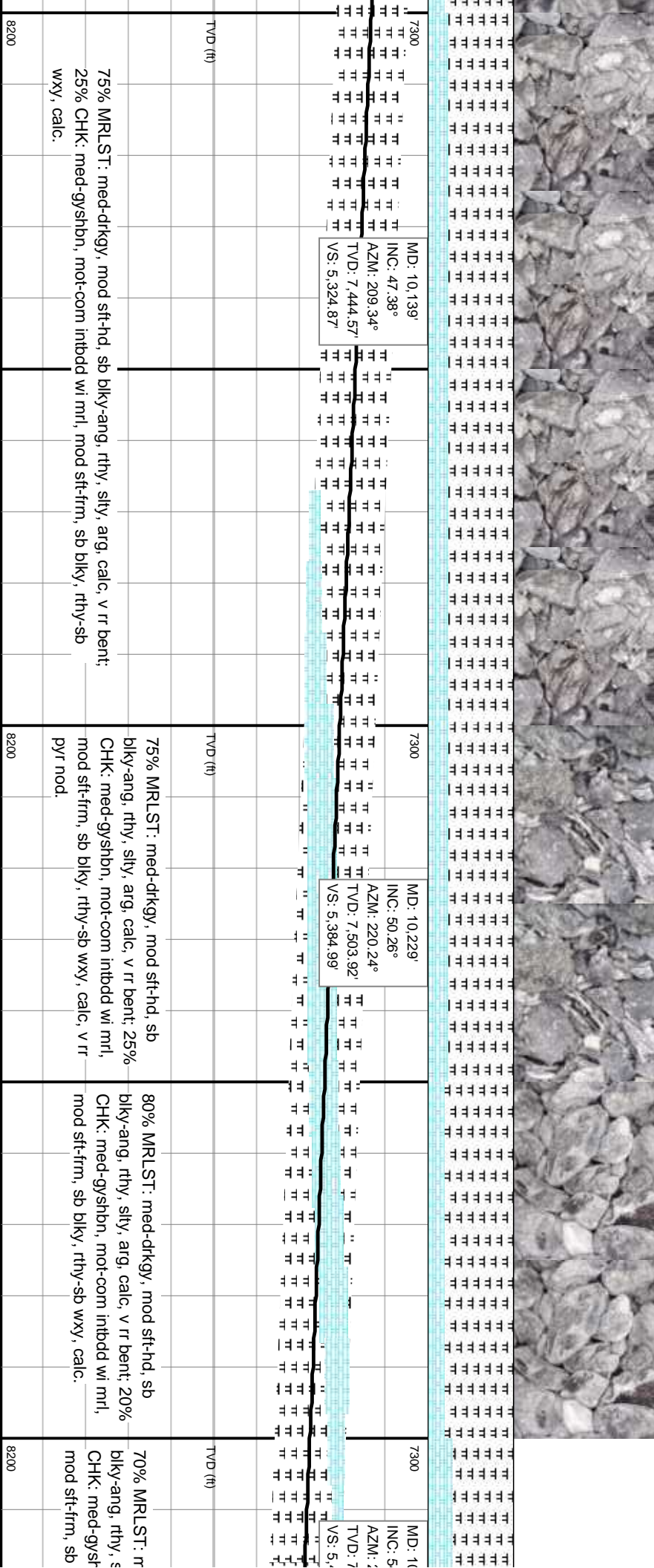
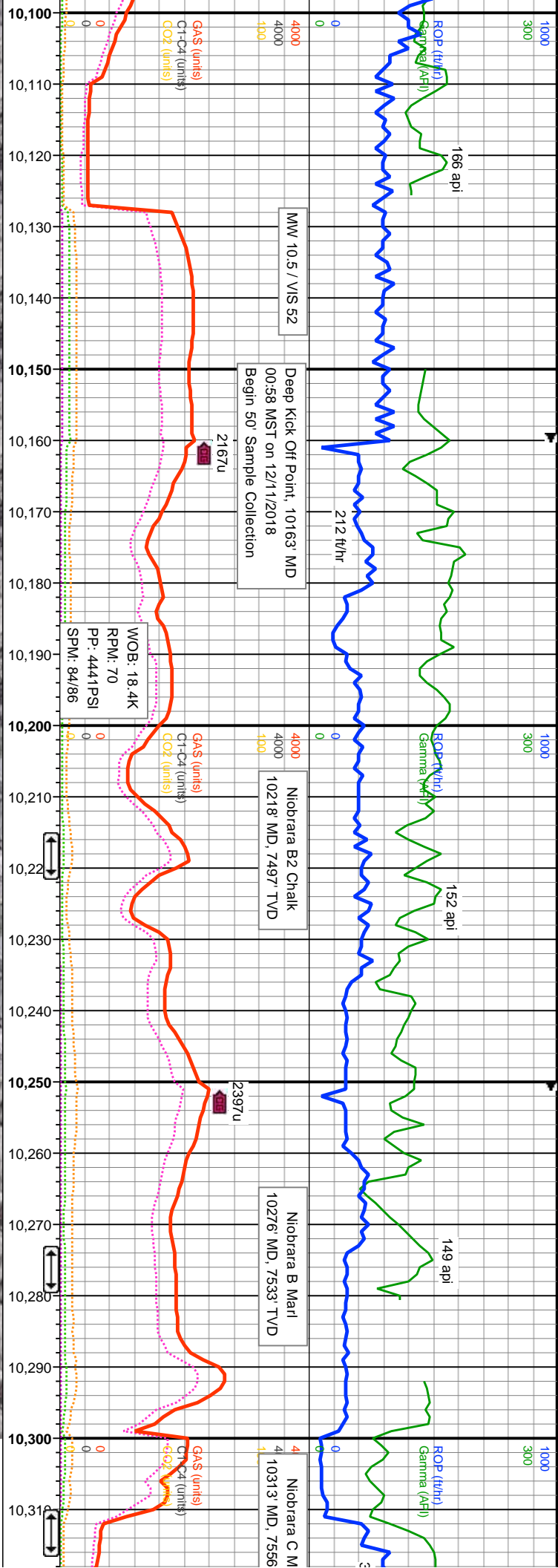


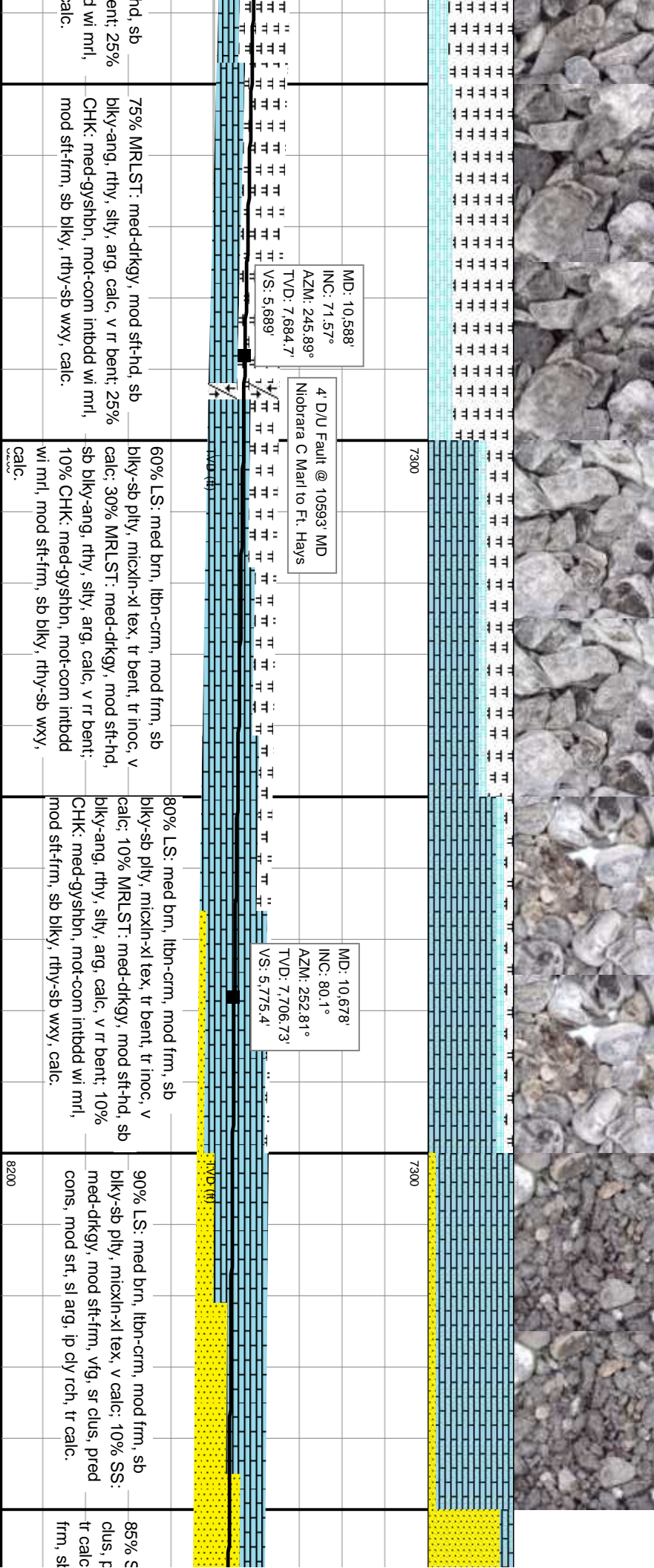
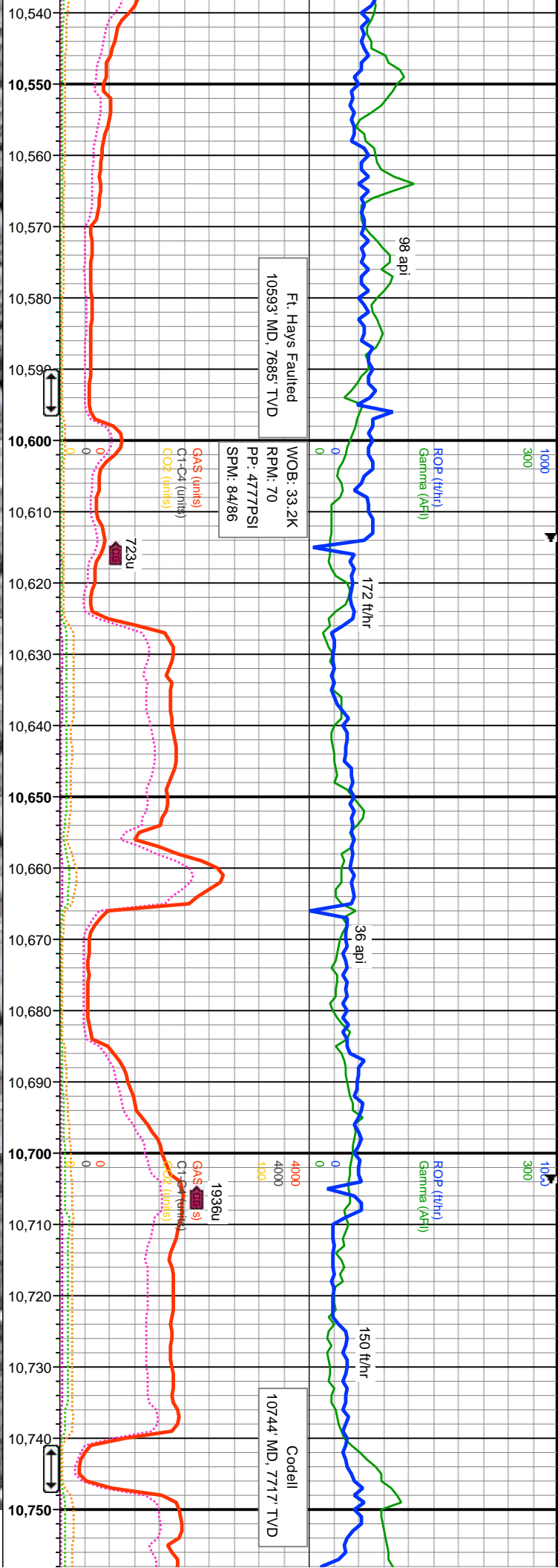


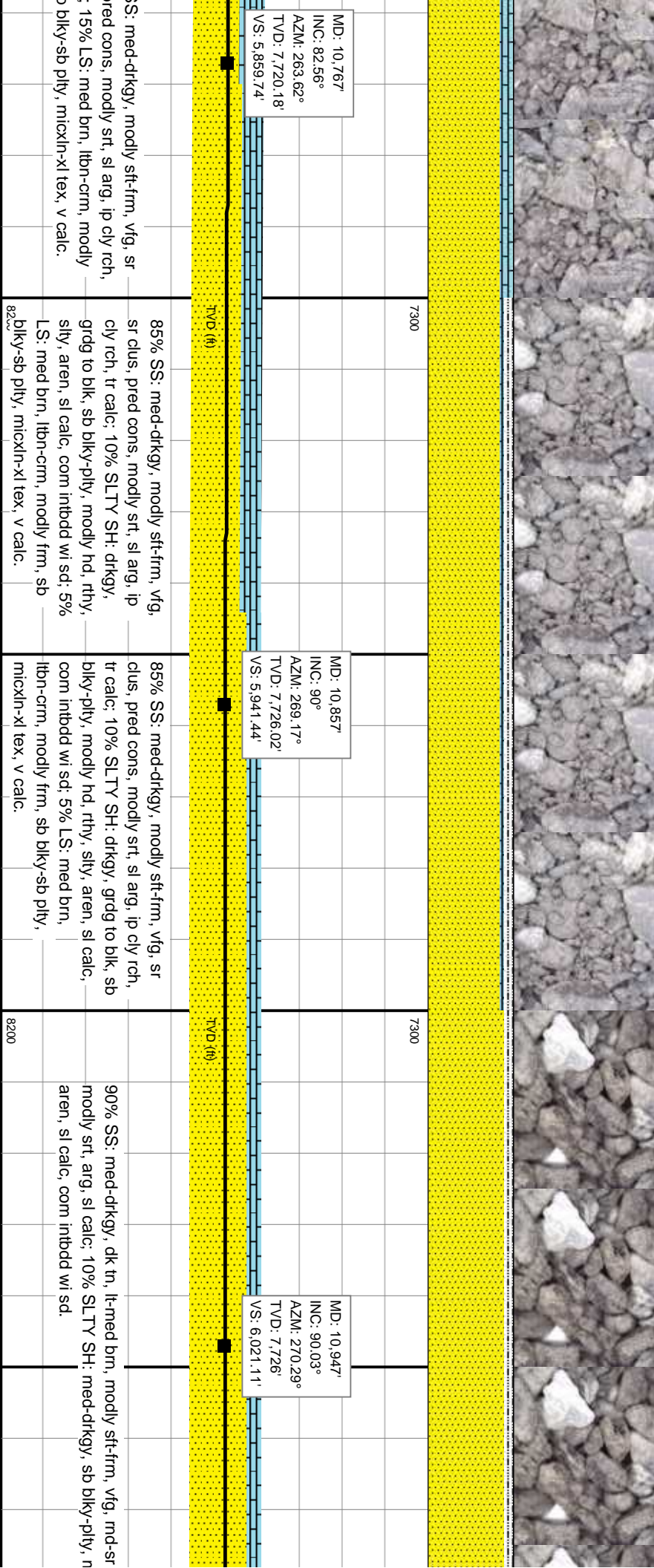
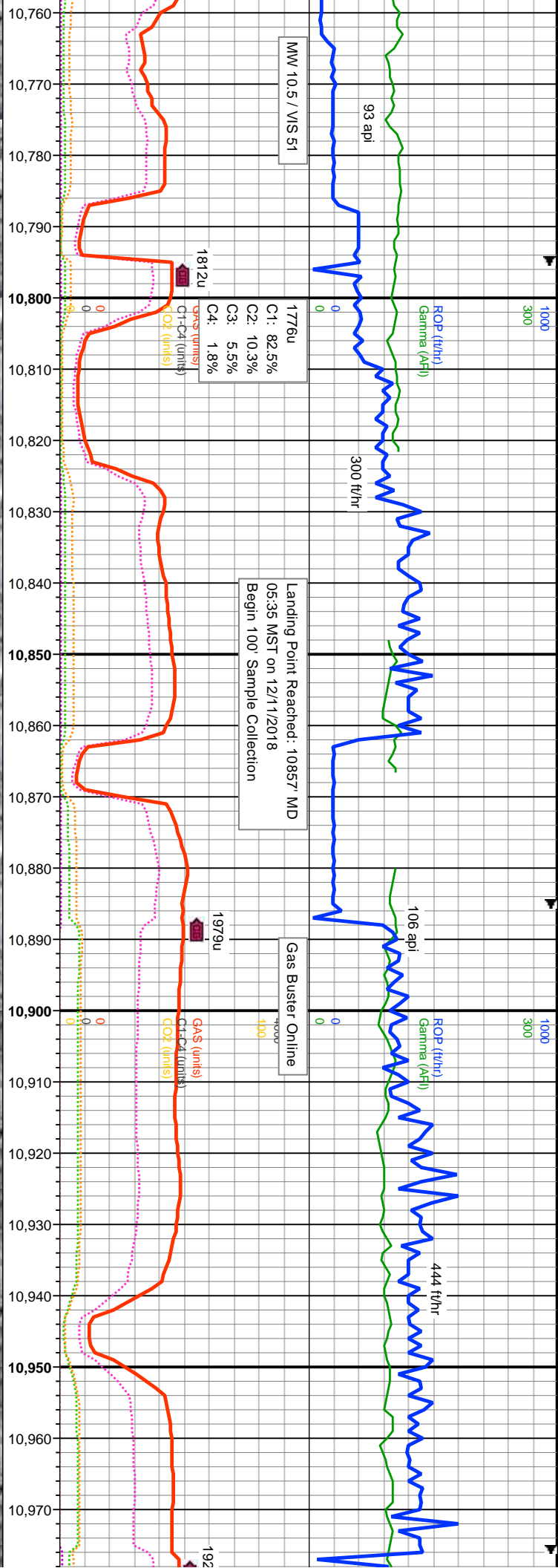


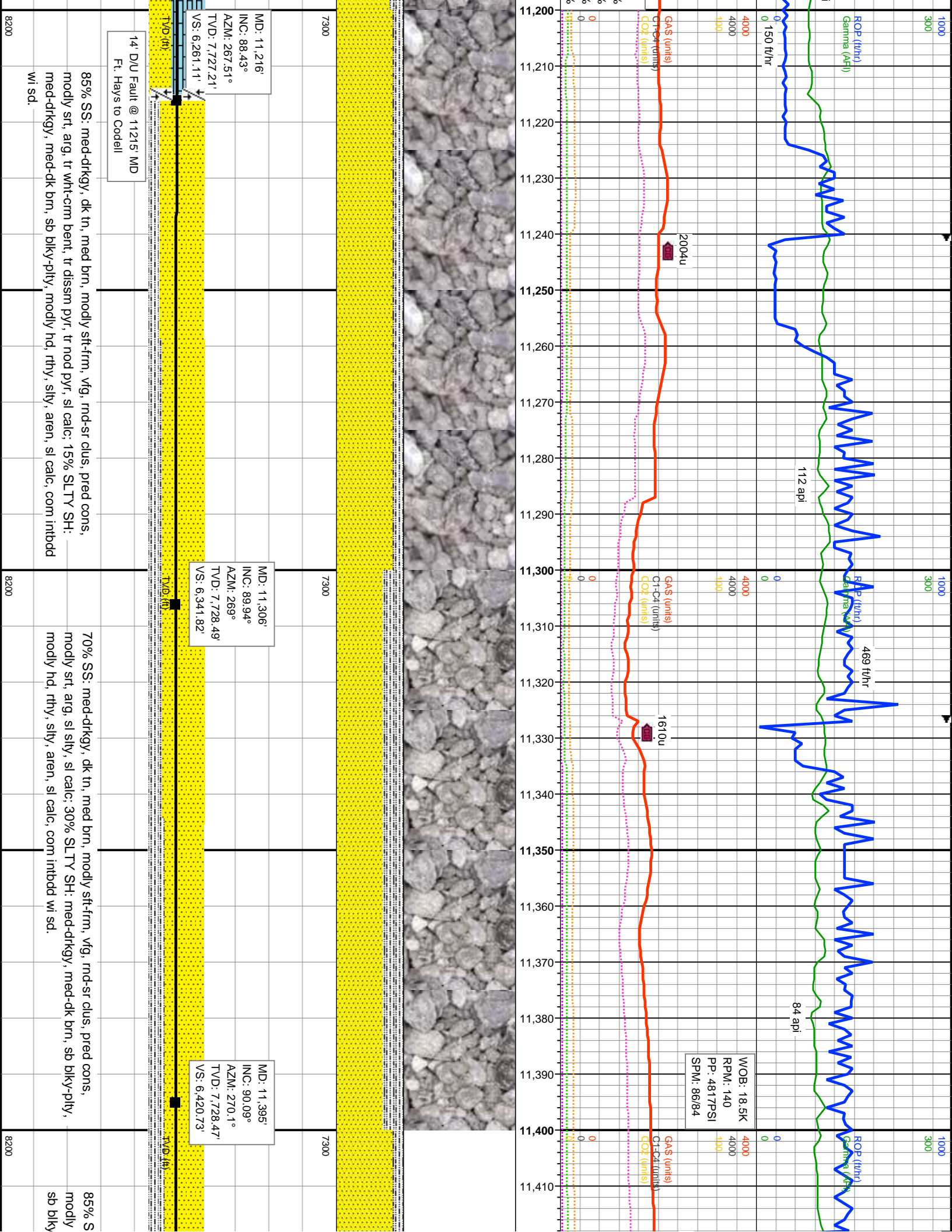


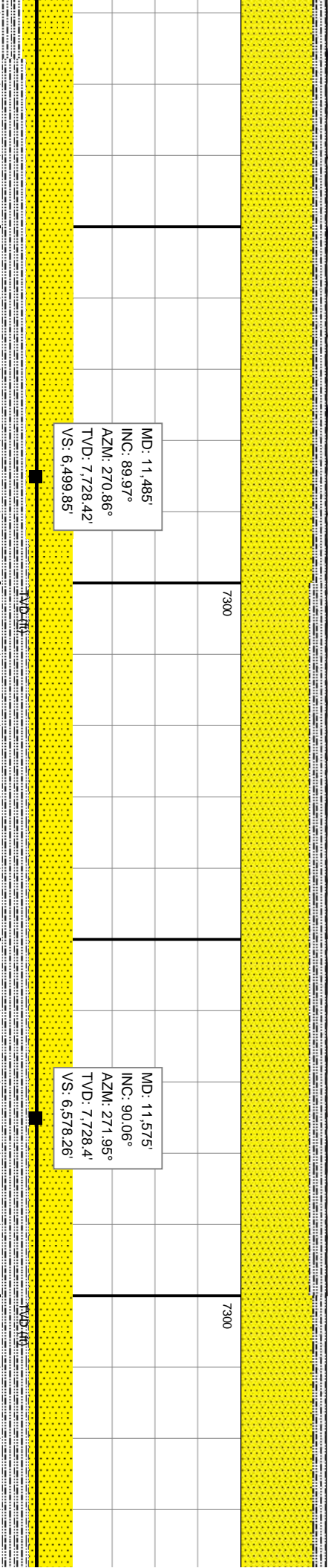
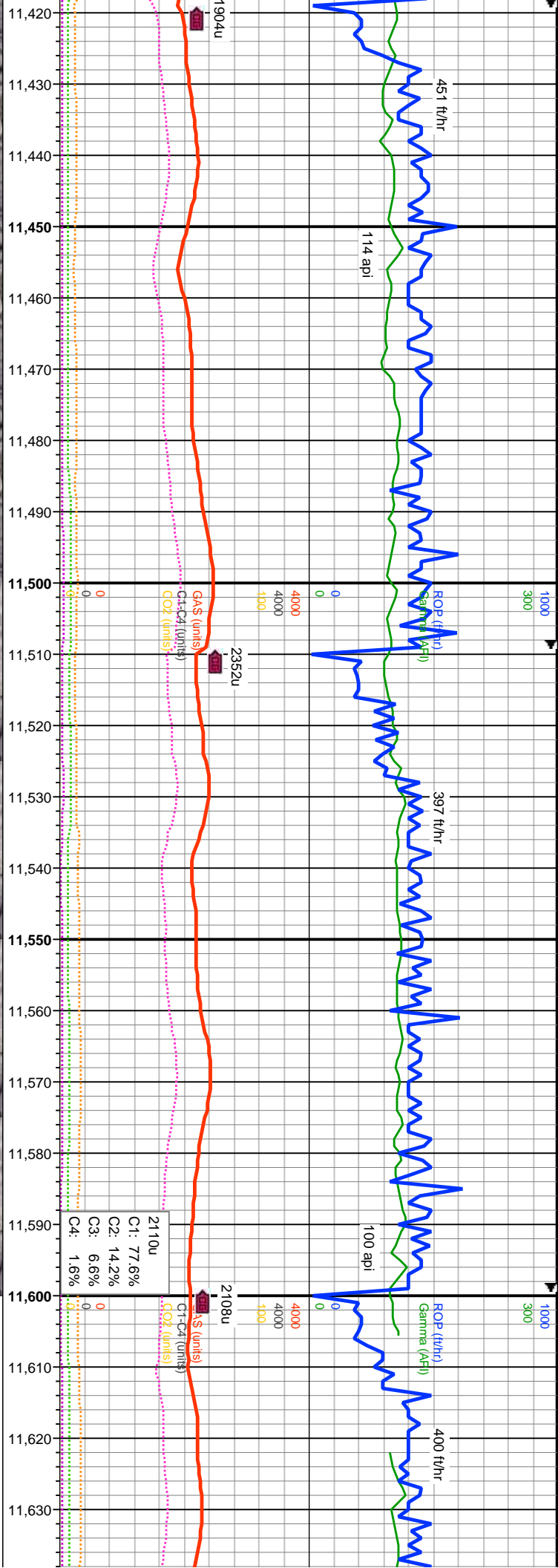












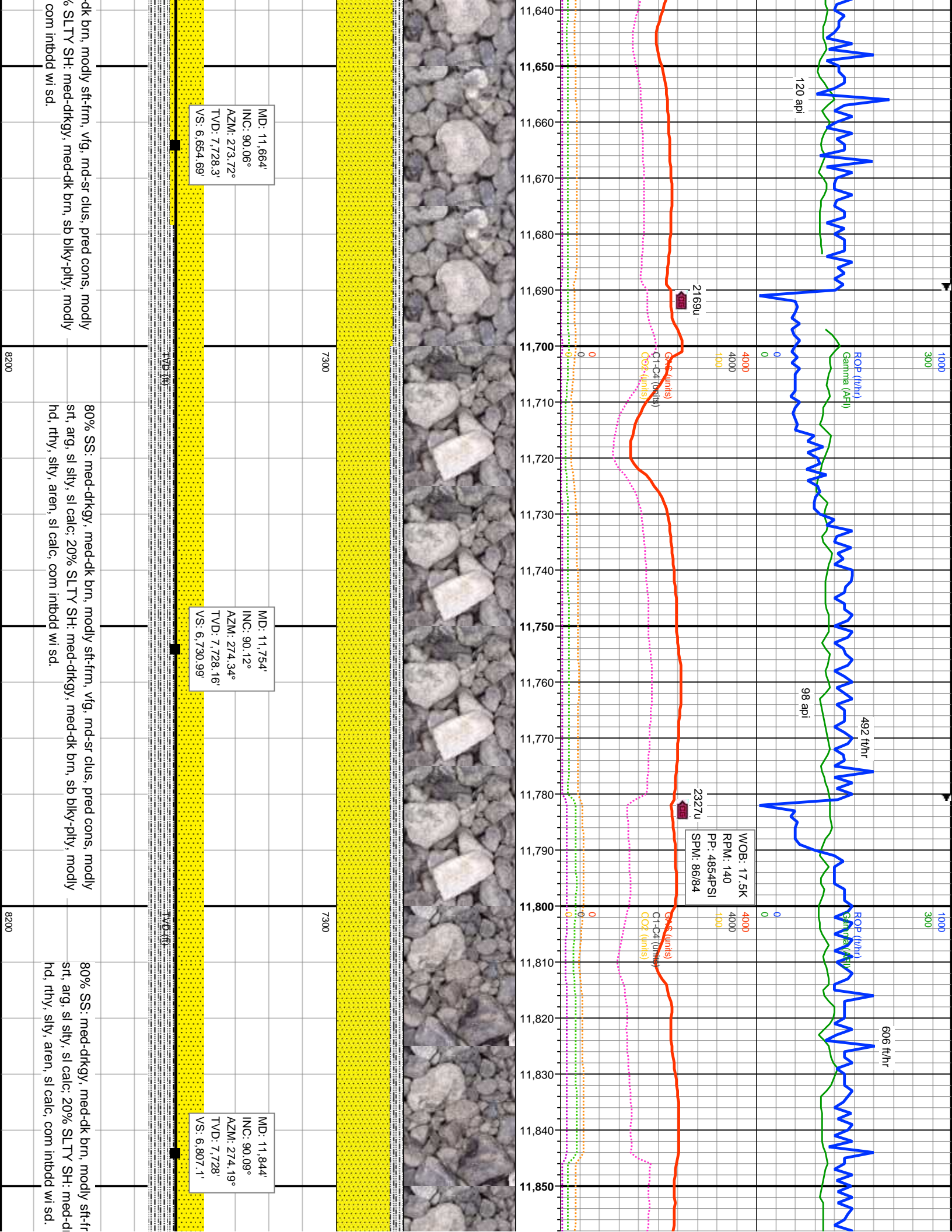
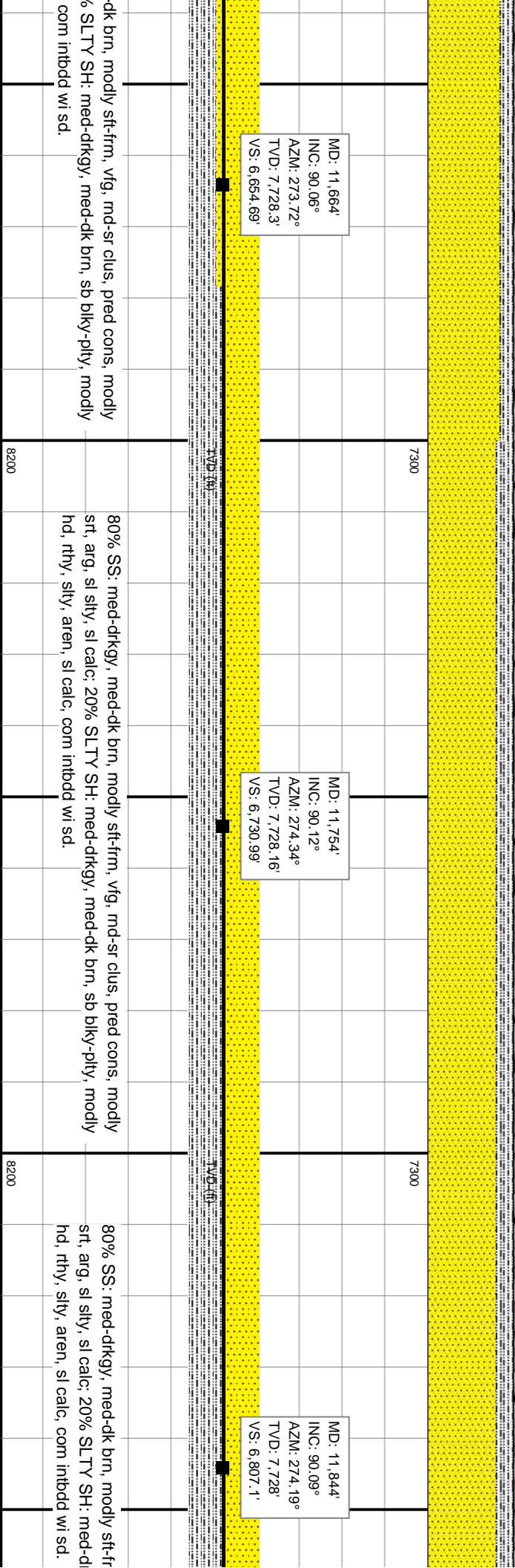
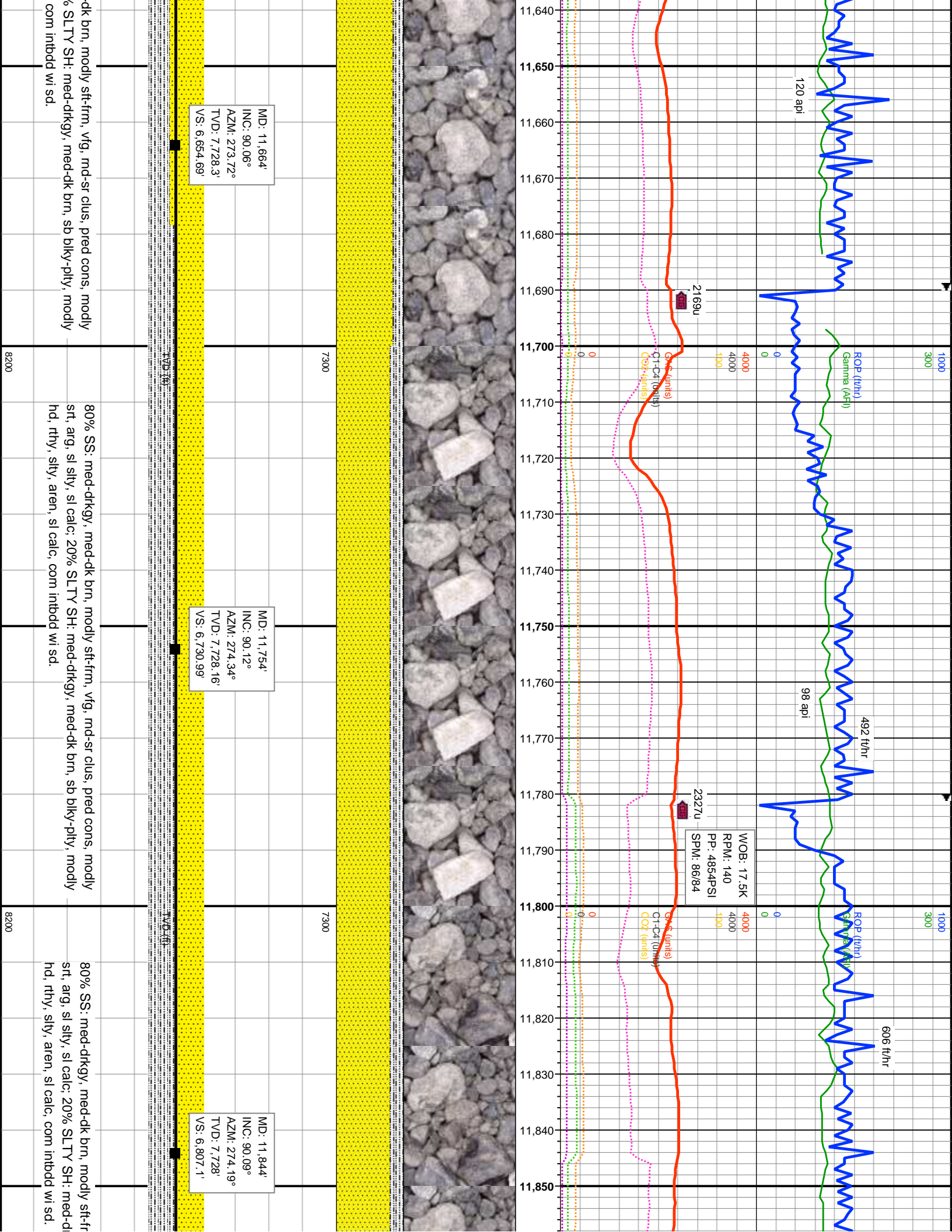
MD: 11,485'
INC: 89.97°
AZM: 270.86°
TVD: 7,728.42'
VS: 6,499.85'

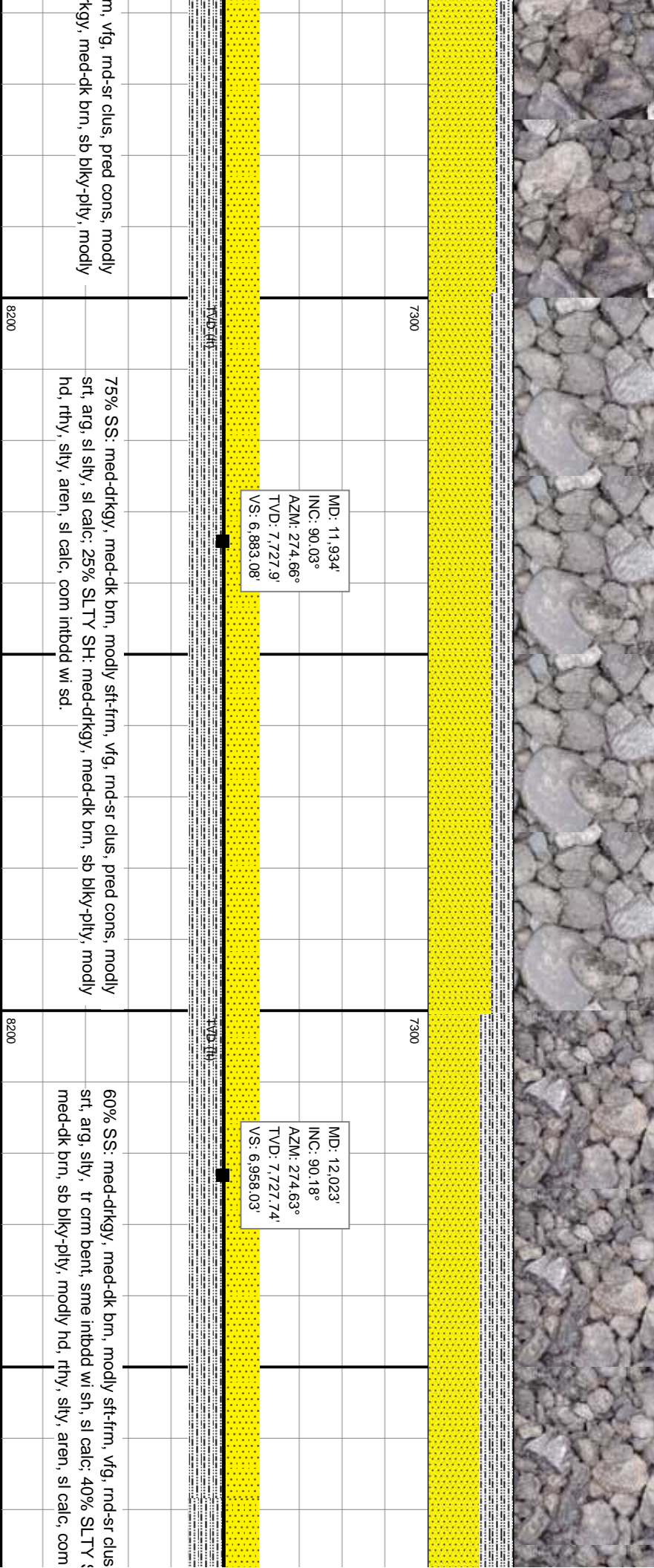
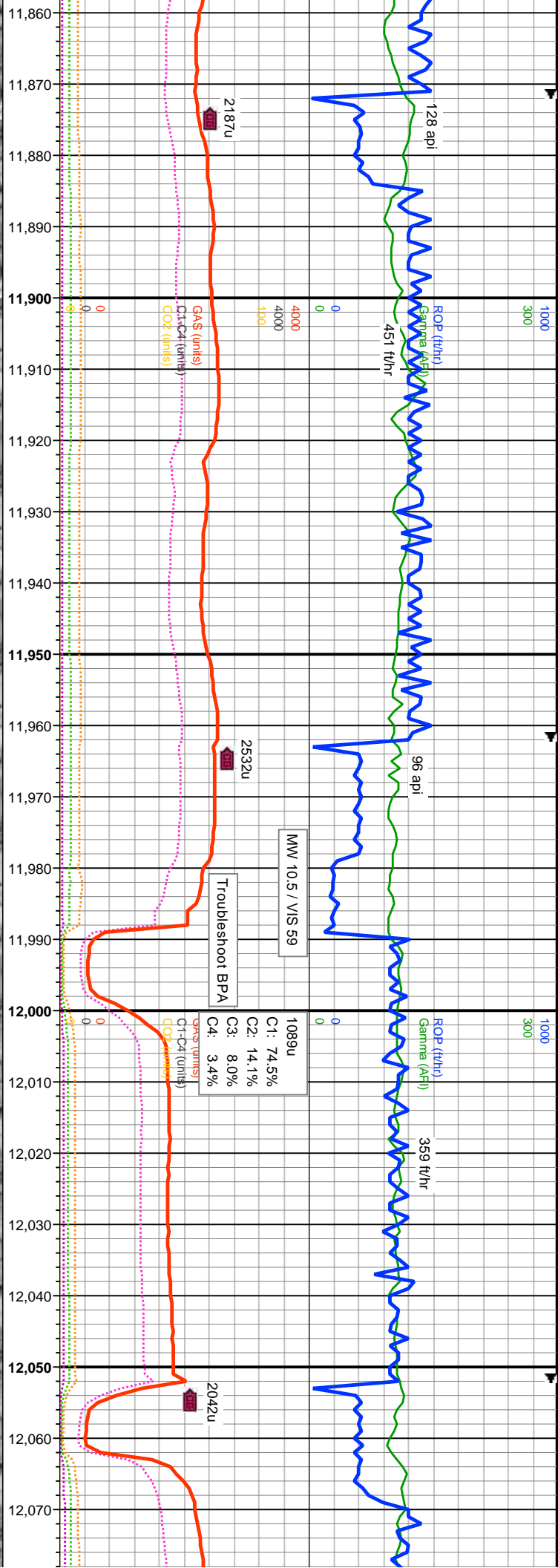
MD: 11,575'
INC: 90.06°
AZM: 271.95°
TVD: 7,728.4'
VS: 6,578.26'

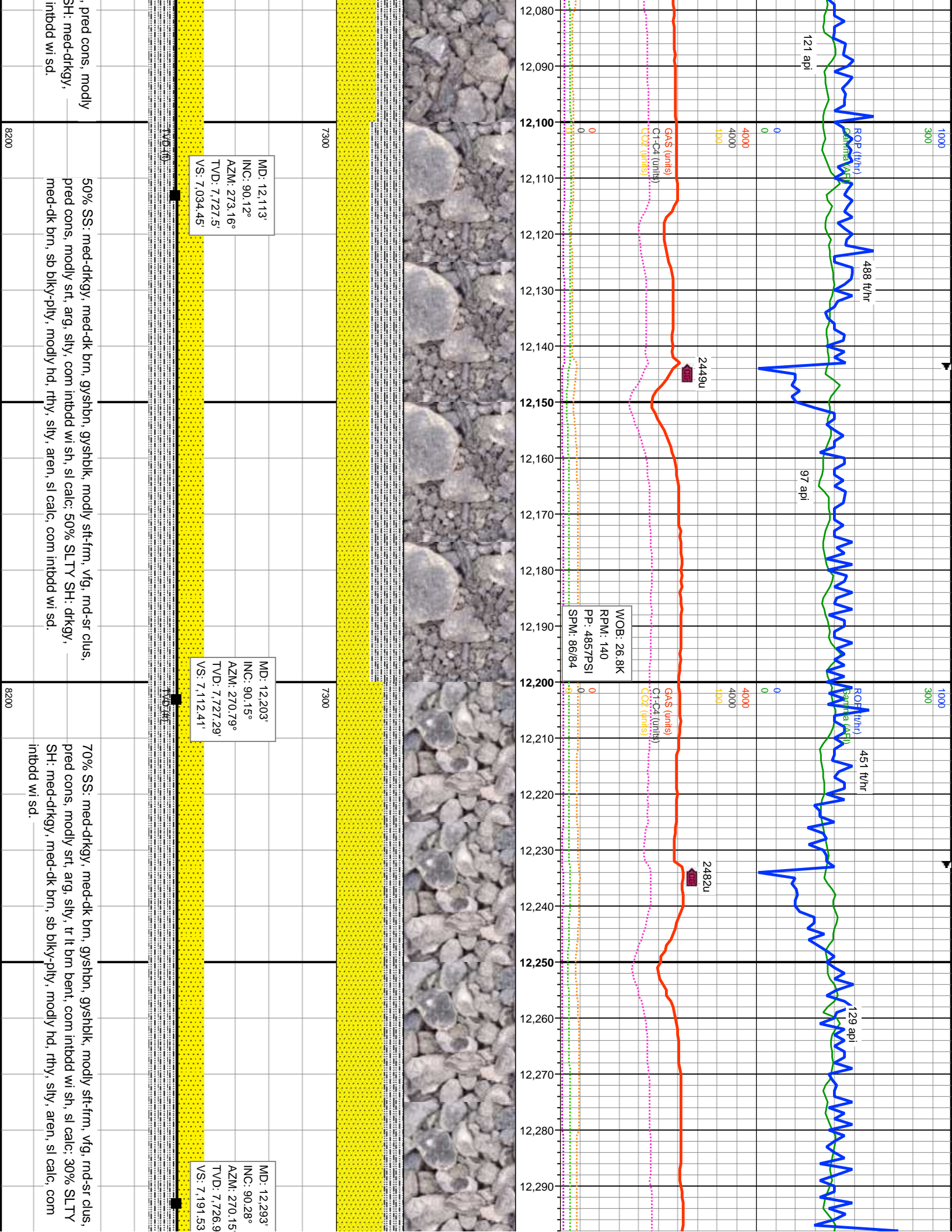
S. med-drkgy, tn-dk tn, med brn, modly sft-fm, vfg, rnd-sr clus, pred cons, srt, arg, sl stly, tr lt brn bent, sl calc; 15% SLTY SH: med-drkgy, med-dk brn, -ply, modly hd, rthy, stly, aren, sl calc, com intbdd wi sd.

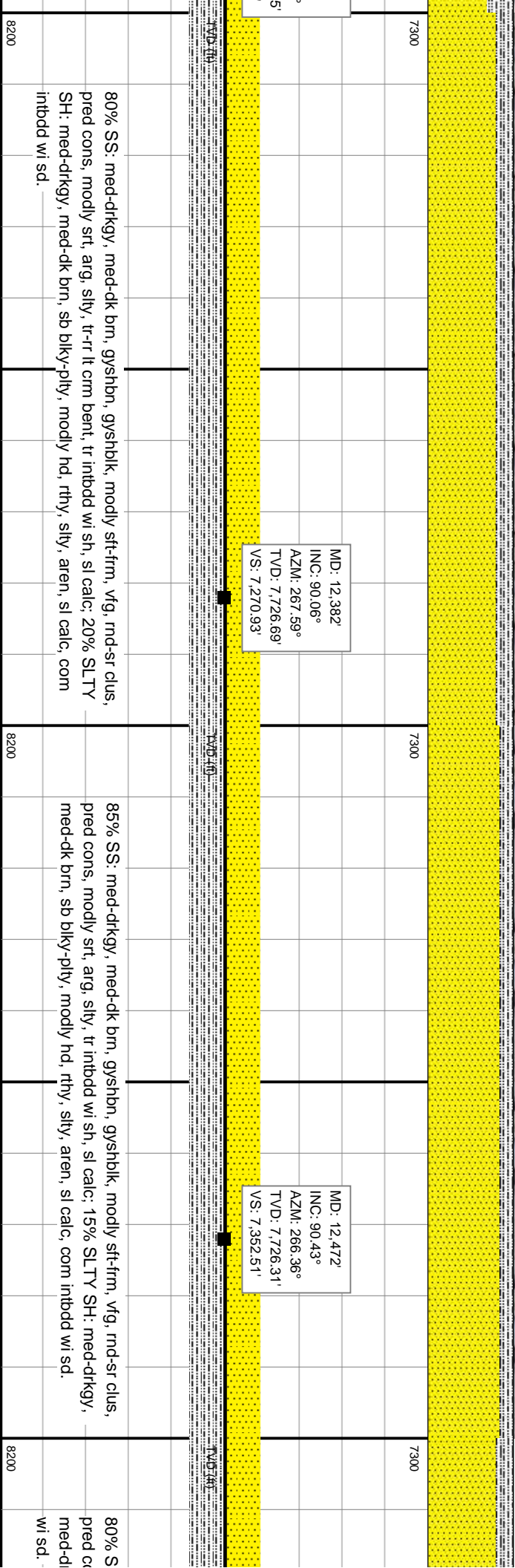
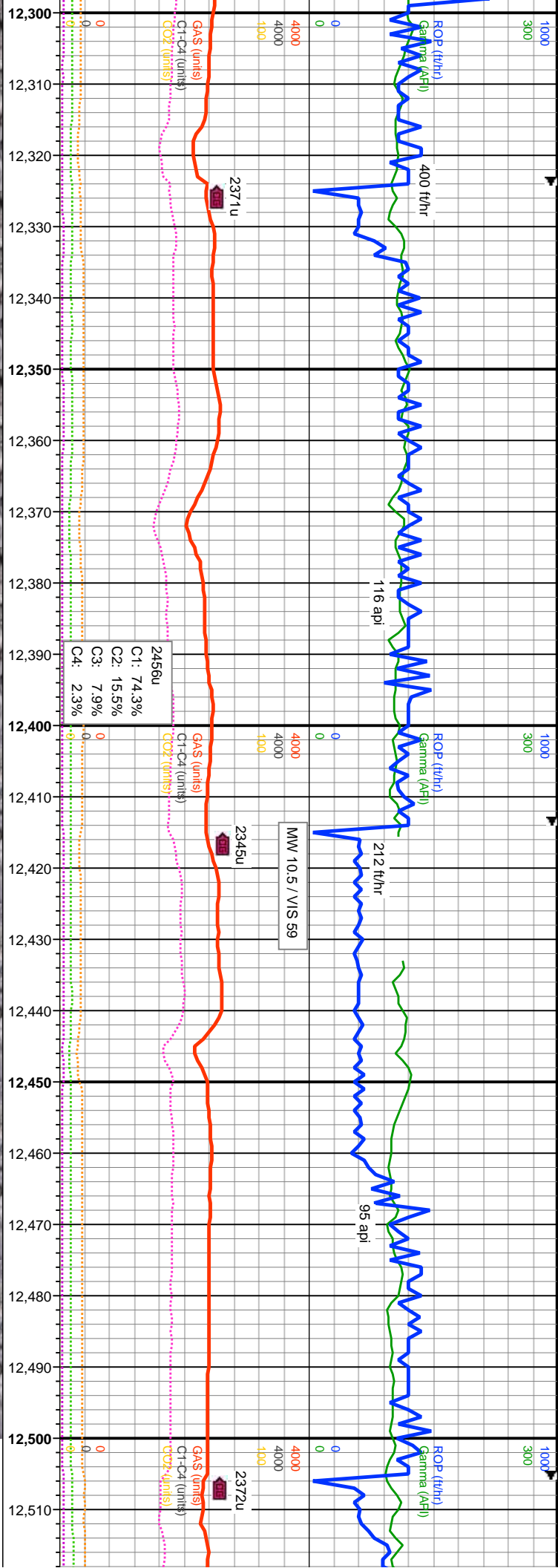
80% SS: med-drkgy, tn-dk tn, med brn, modly sft-fm, vfg, rnd-sr clus, pred cons, modly srt, arg, sl stly, tr lt brn-it crm bent, sl calc; 20% SLTY SH: med-drkgy, med-dk brn, sb blkly-pty, modly hd, rthy, stly, aren, sl calc, com intbdd wi sd.

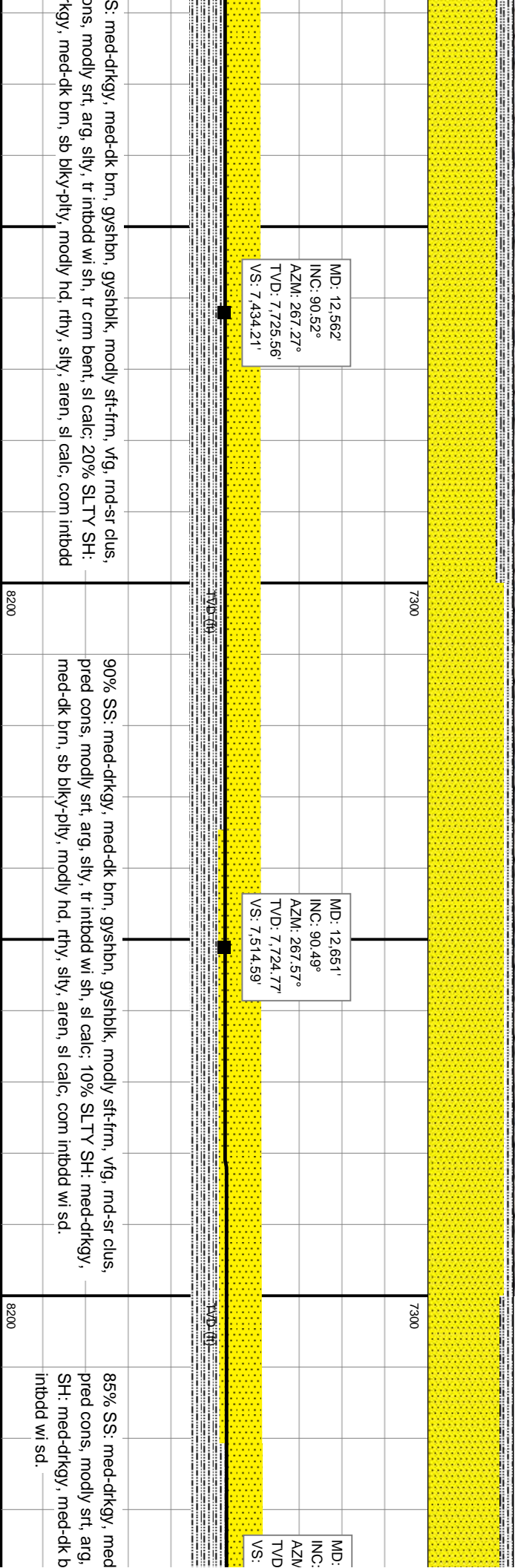
85% SS: med-drkgy, med srt, arg, sl stly, sl calc; 15% hd, rthy, stly, aren, sl calc,

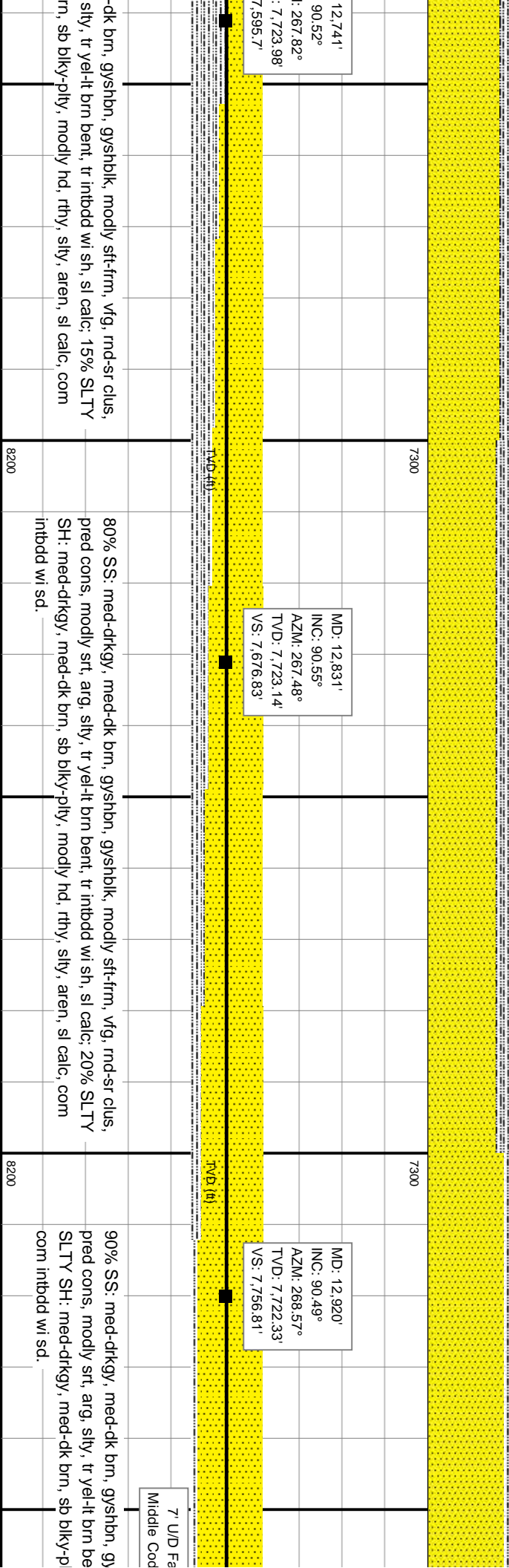
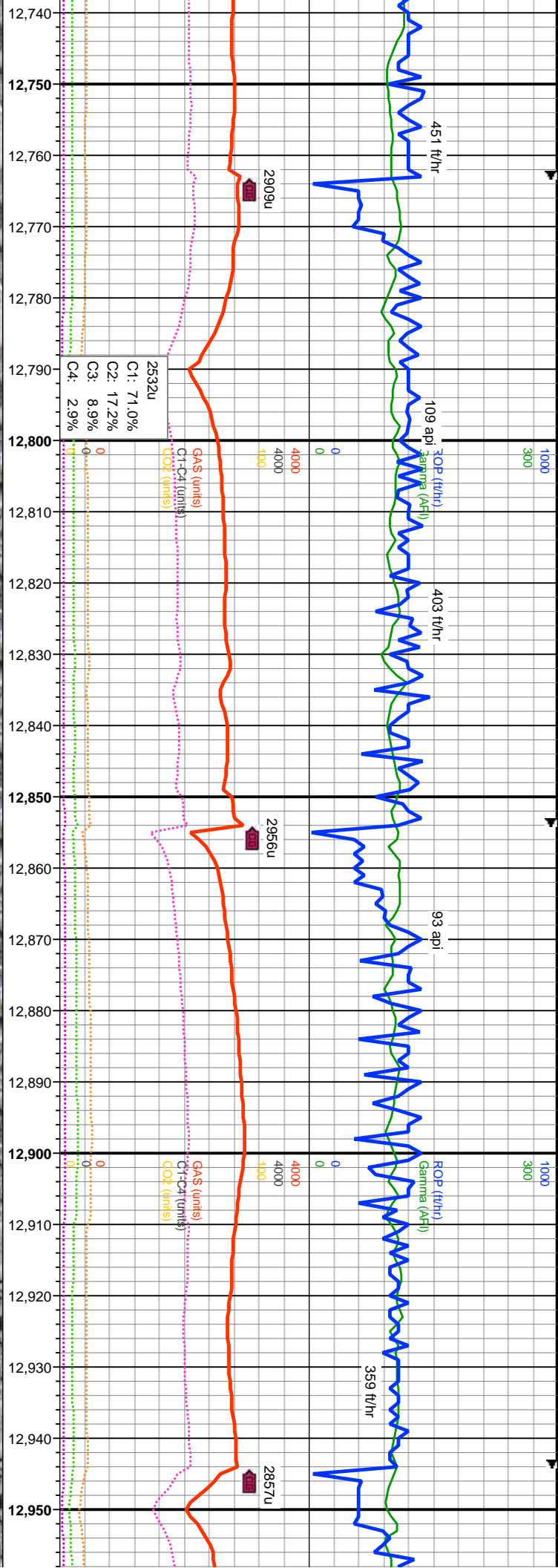


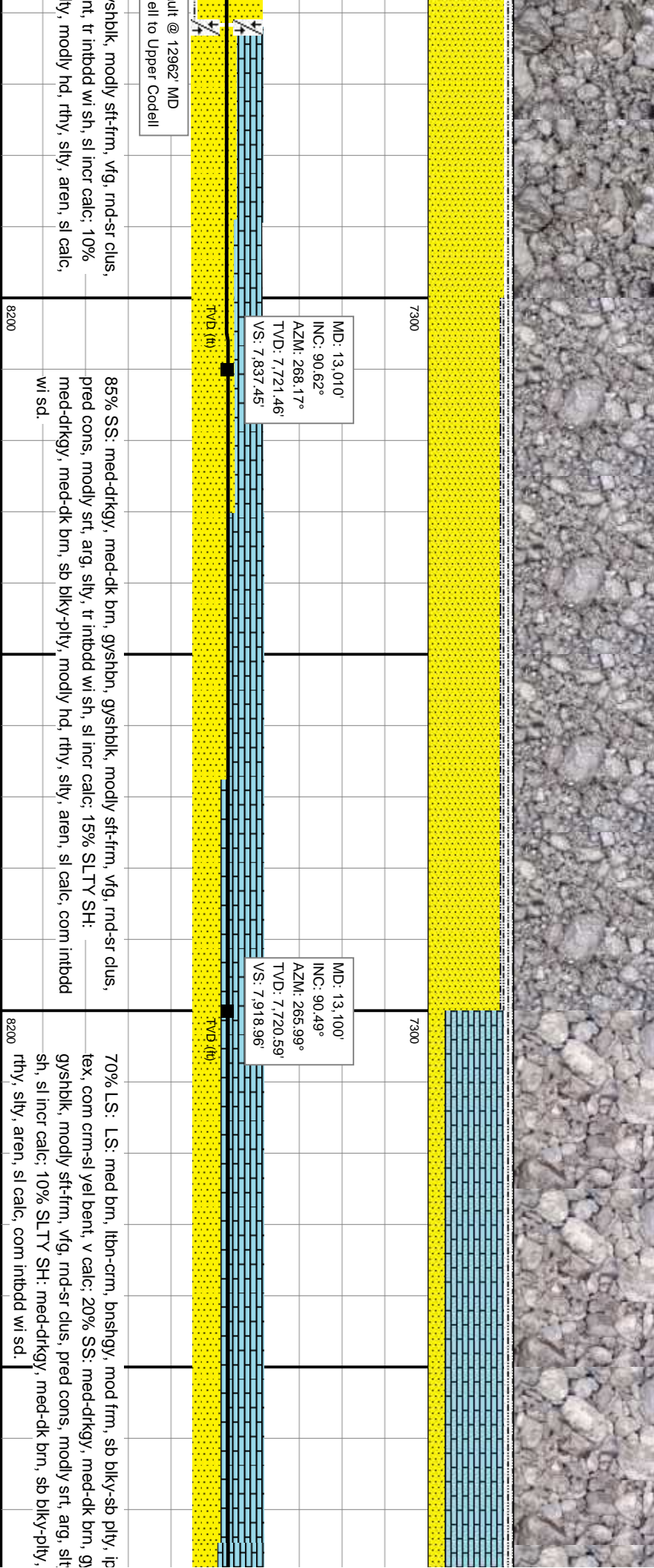
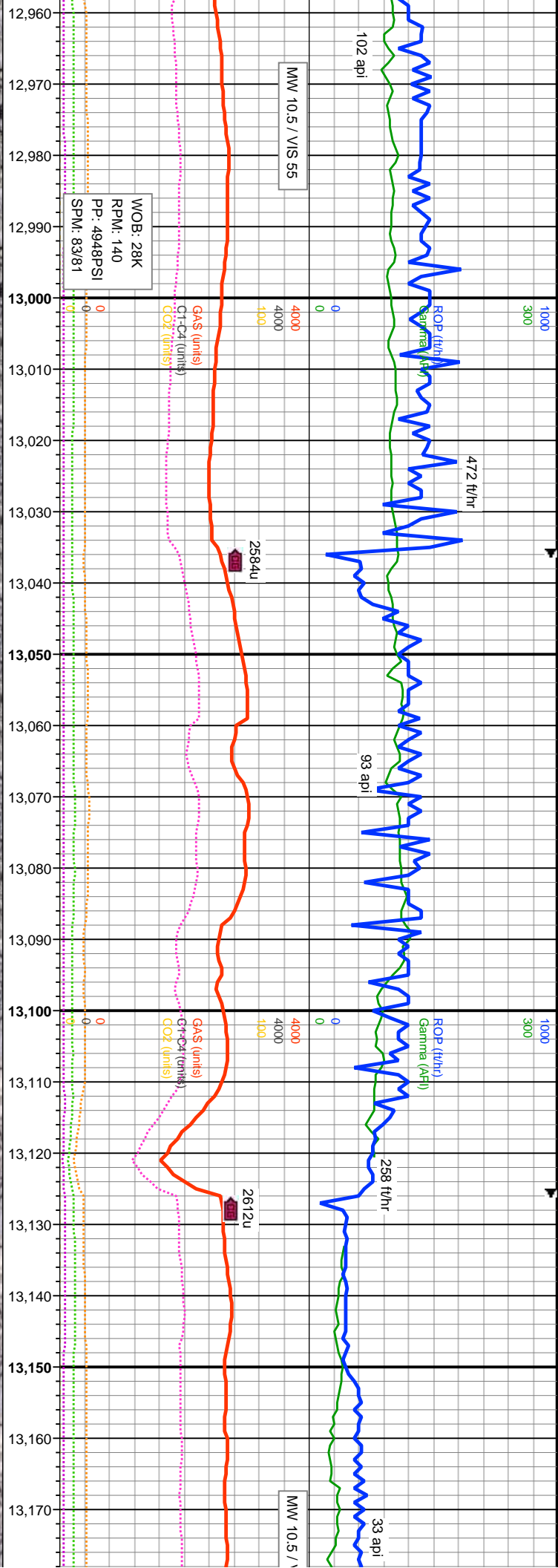


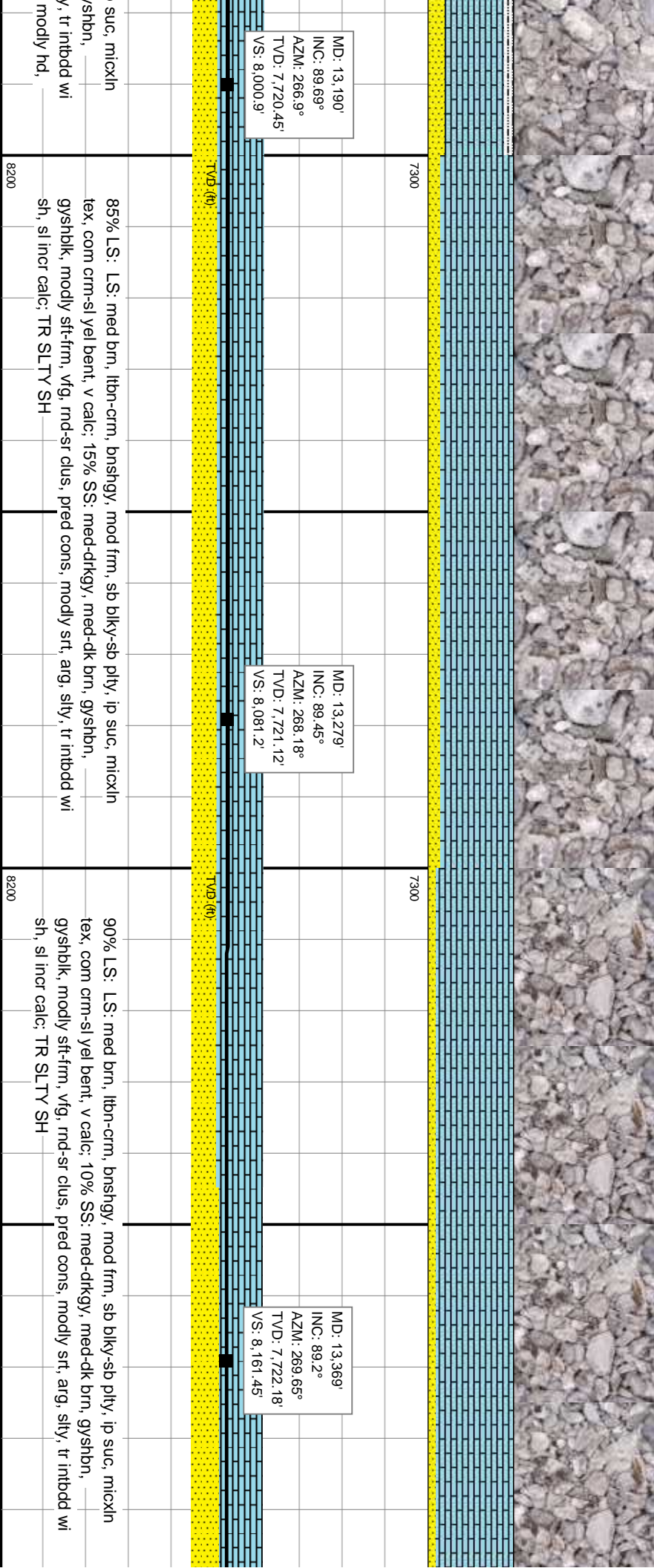
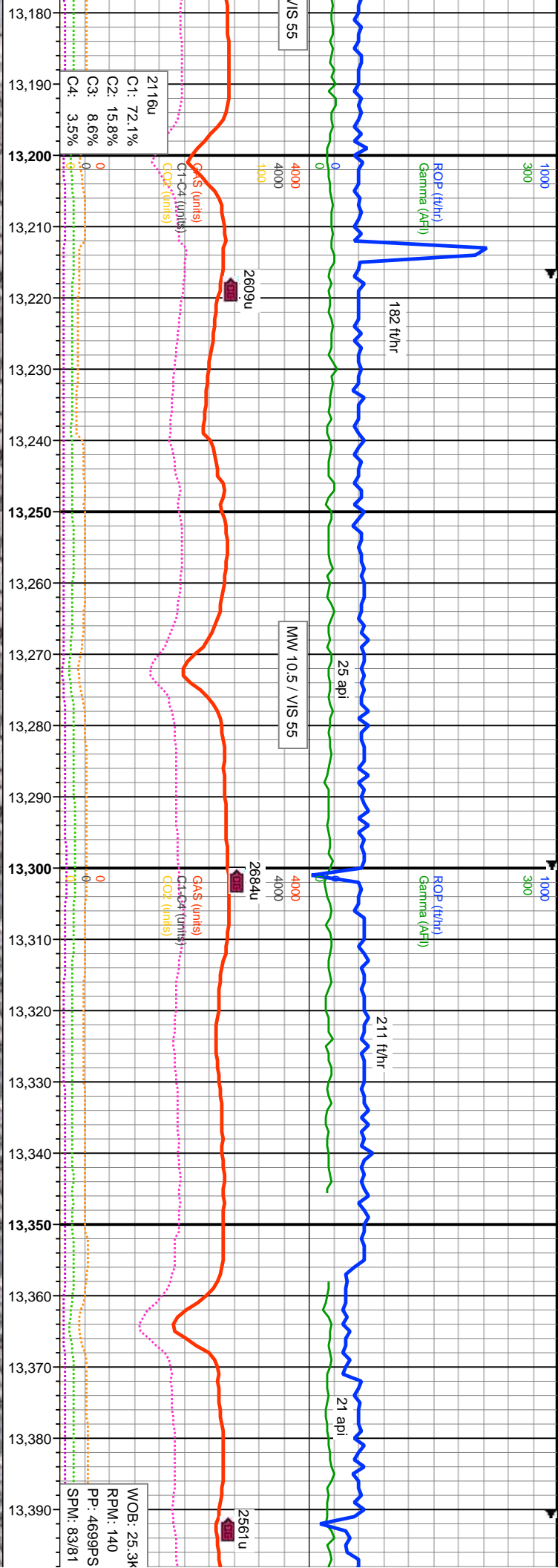


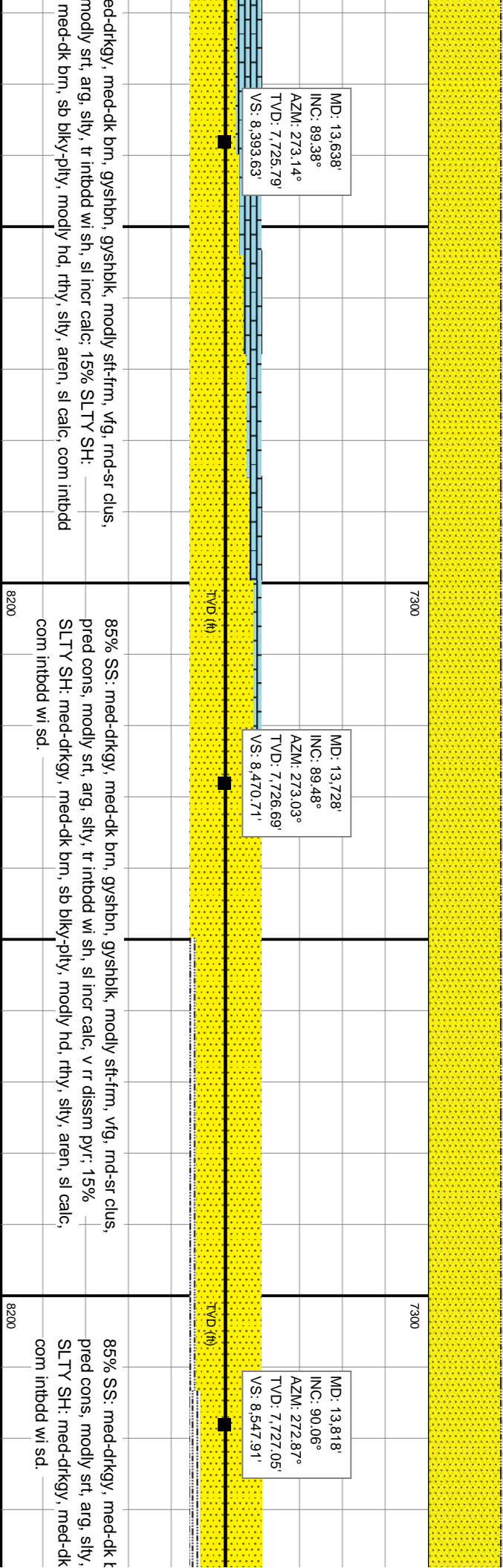
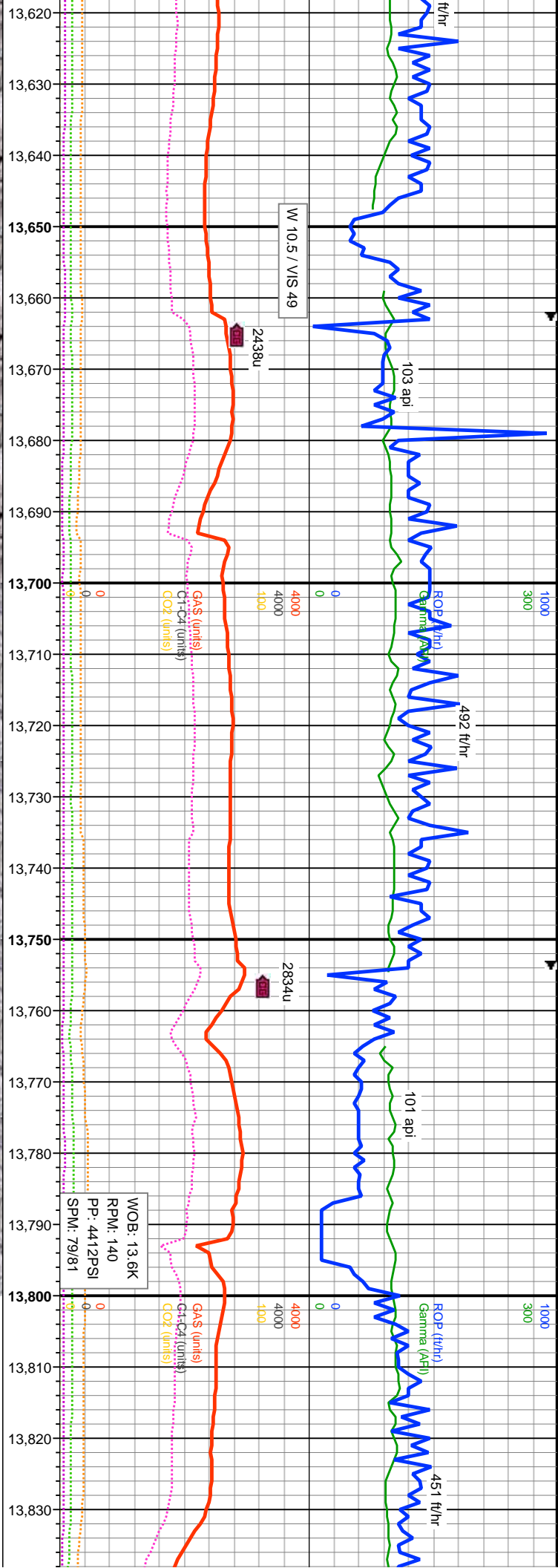


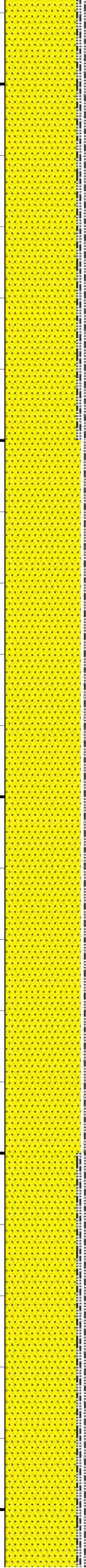
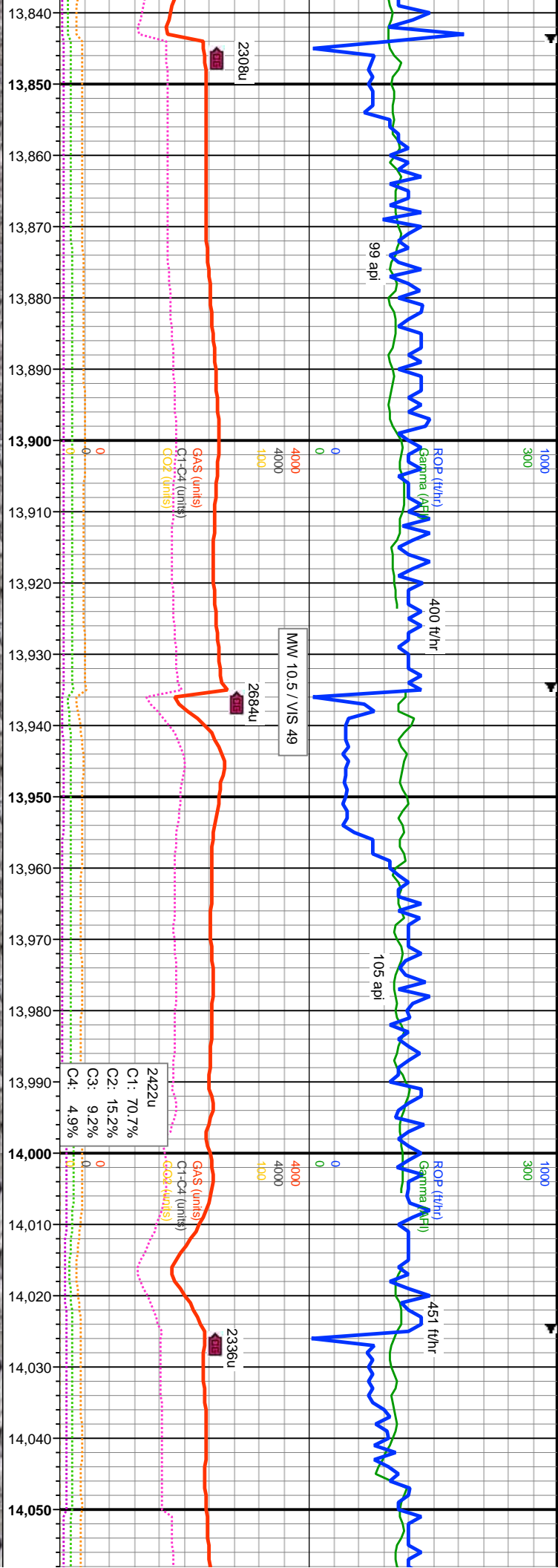












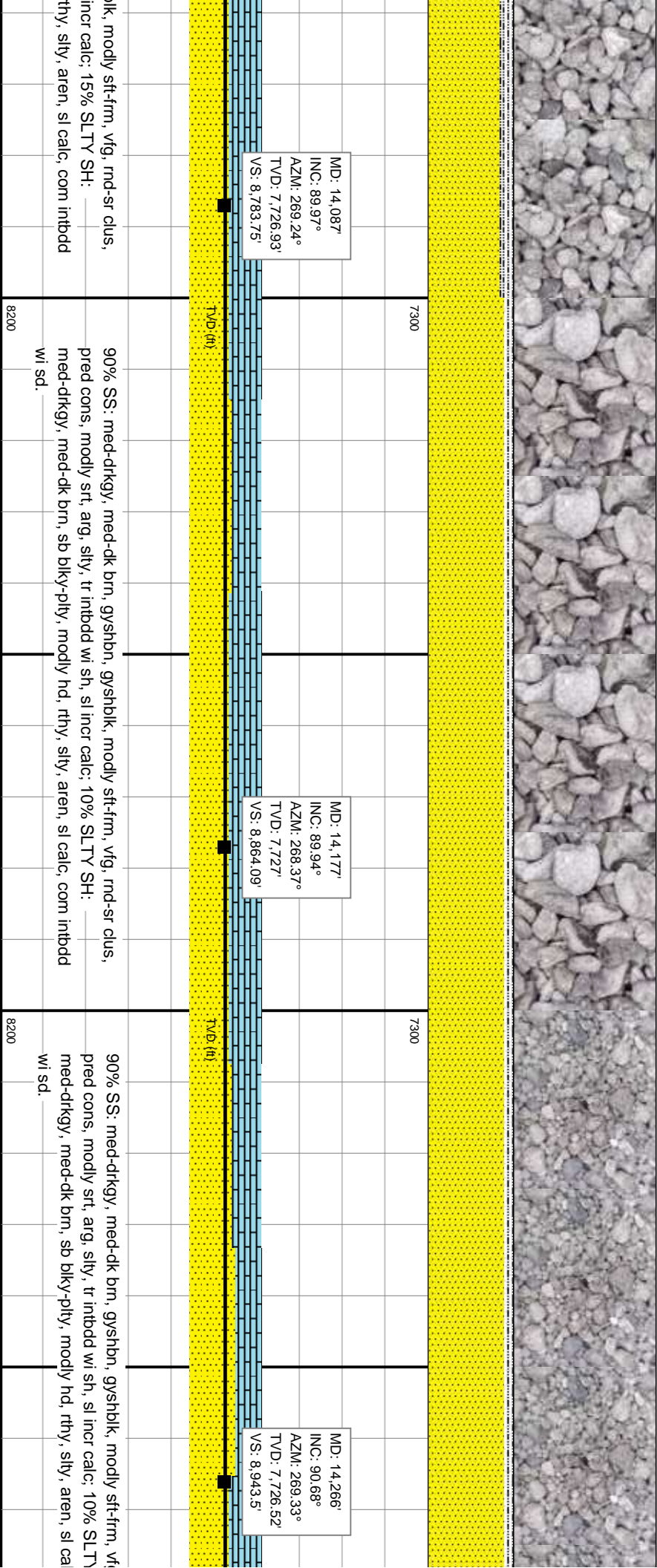
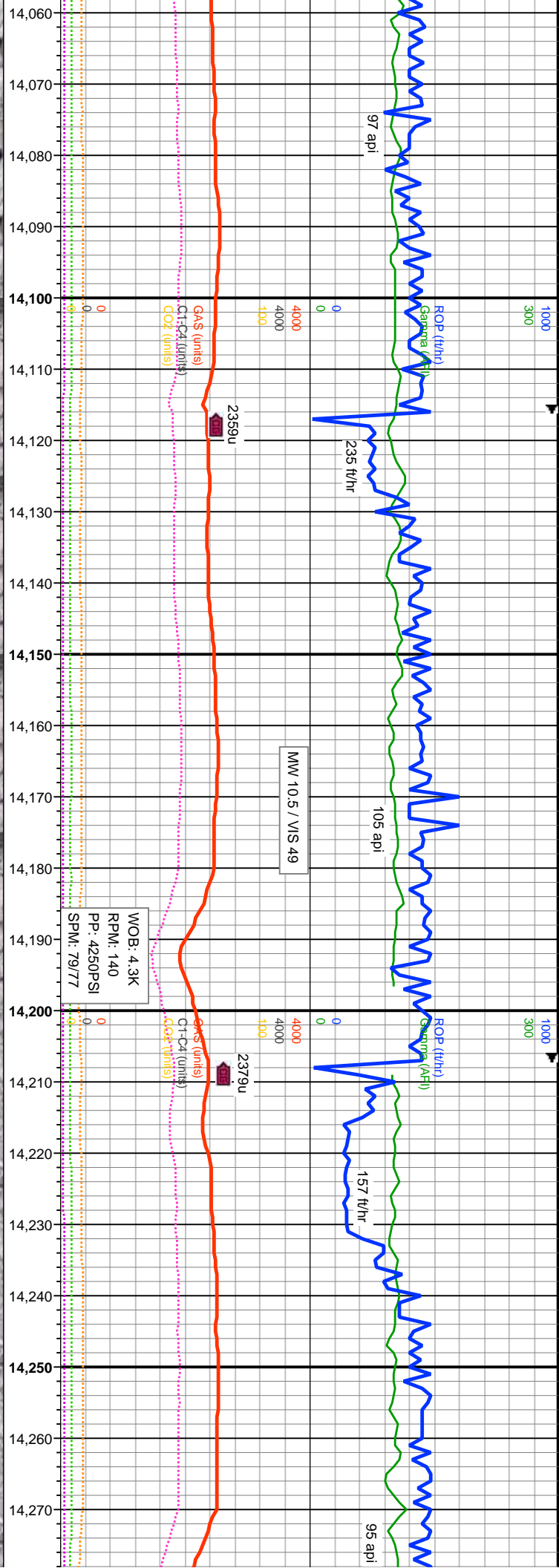
MD: 13,907'
INC: 90.03°
AZM: 271.4°
TVD: 7,726.98'
VS: 8,624.88'

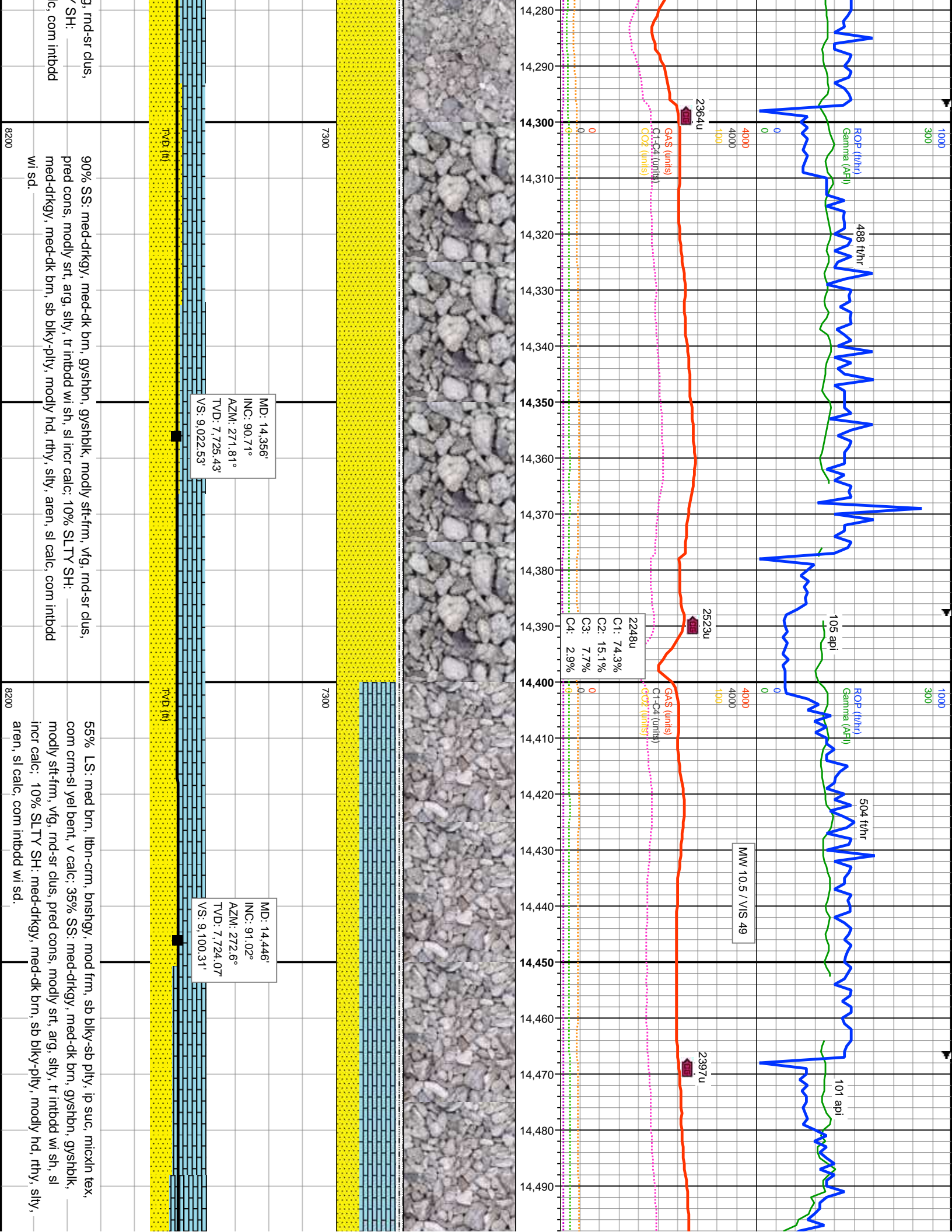
MD: 13,997'
INC: 90.03°
AZM: 269.77°
TVD: 7,726.93'
VS: 8,703.92'

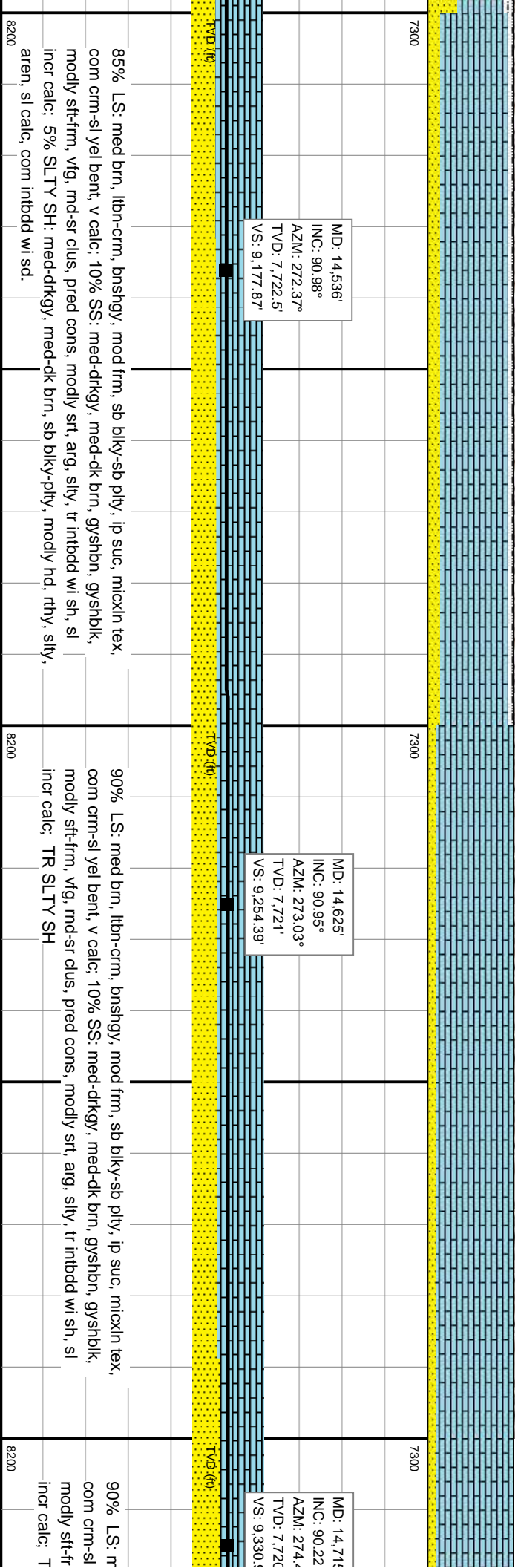
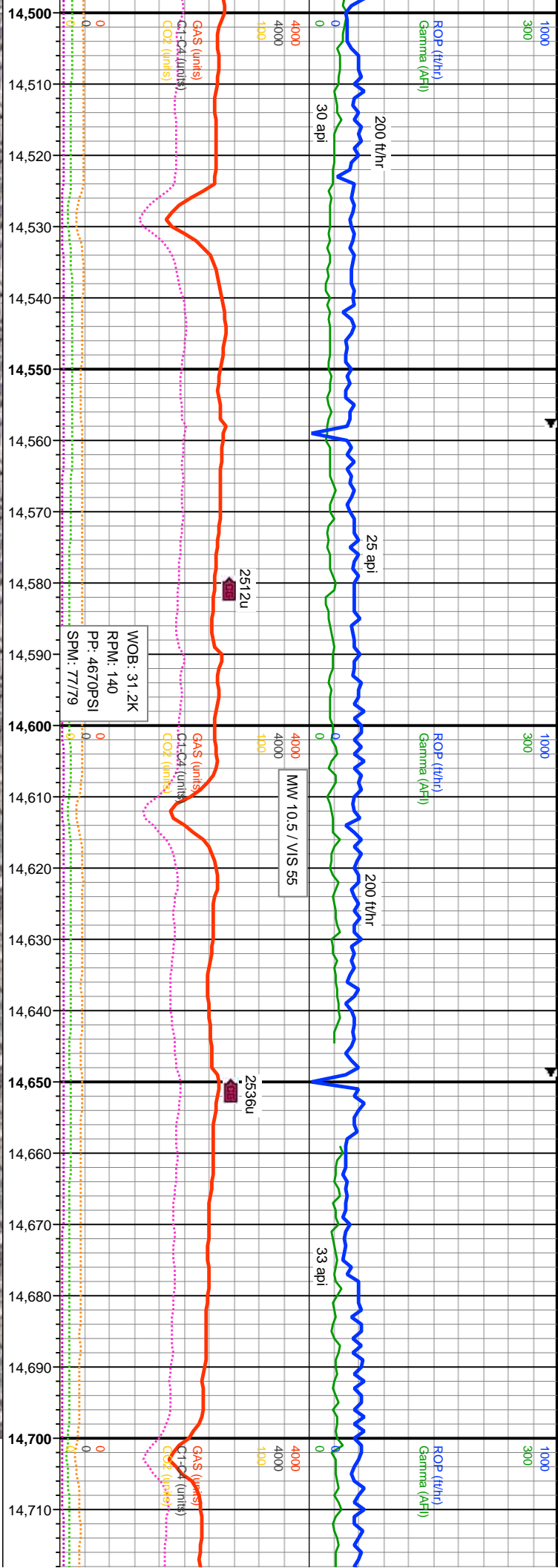
15' U/D Fault @ 14044' MD
Lower Codell to Upper Codell

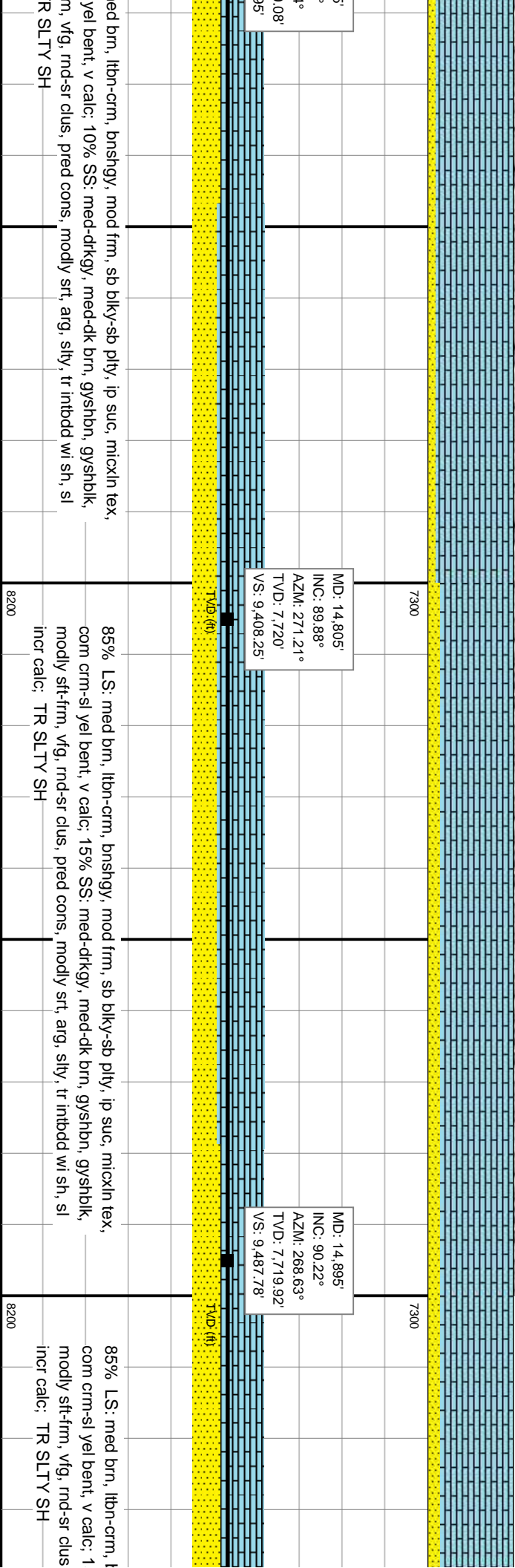
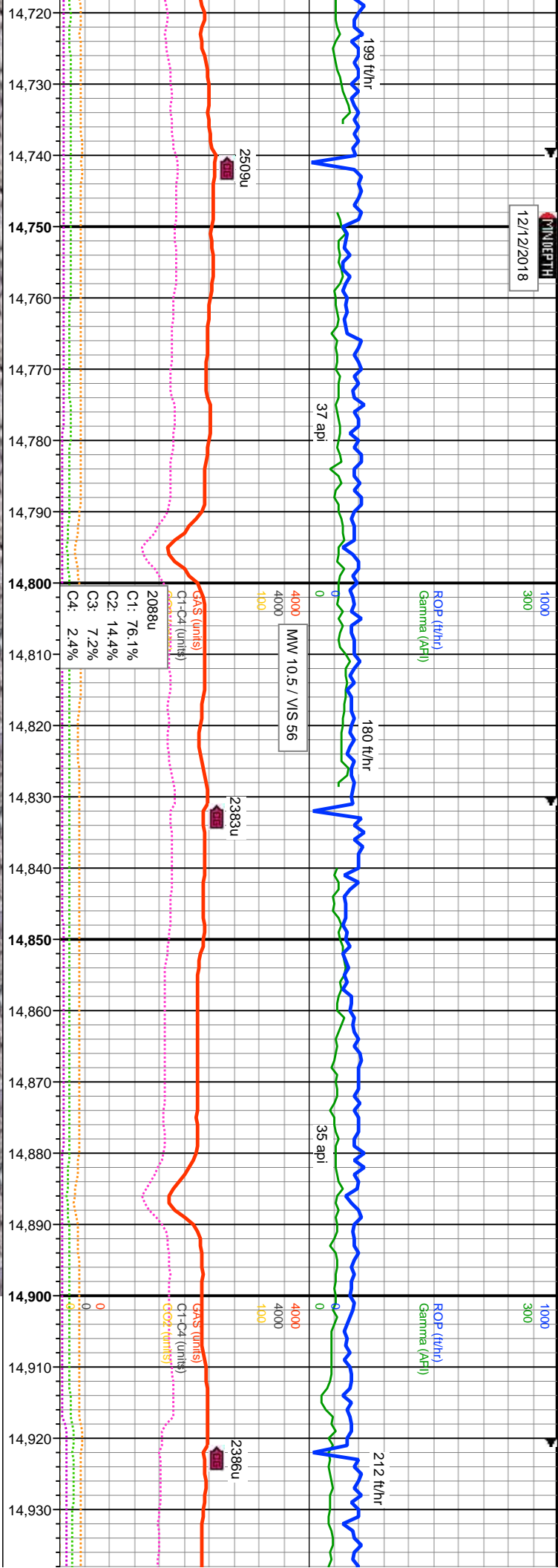
90% SS: med-drkgy, med-dk brn, gyshtbn, gyshtbk, modly sft-frn, vfg, rnd-sr clus, pred cons, modly srt, arg, silty, tr intbdd wi sh, sl incr calc: 10% SLTY SH: med-drkgy, med-dk brn, sb blkly-plty, modly hd, rthy, silty, aren, sl calc, com intbdd wi sd.

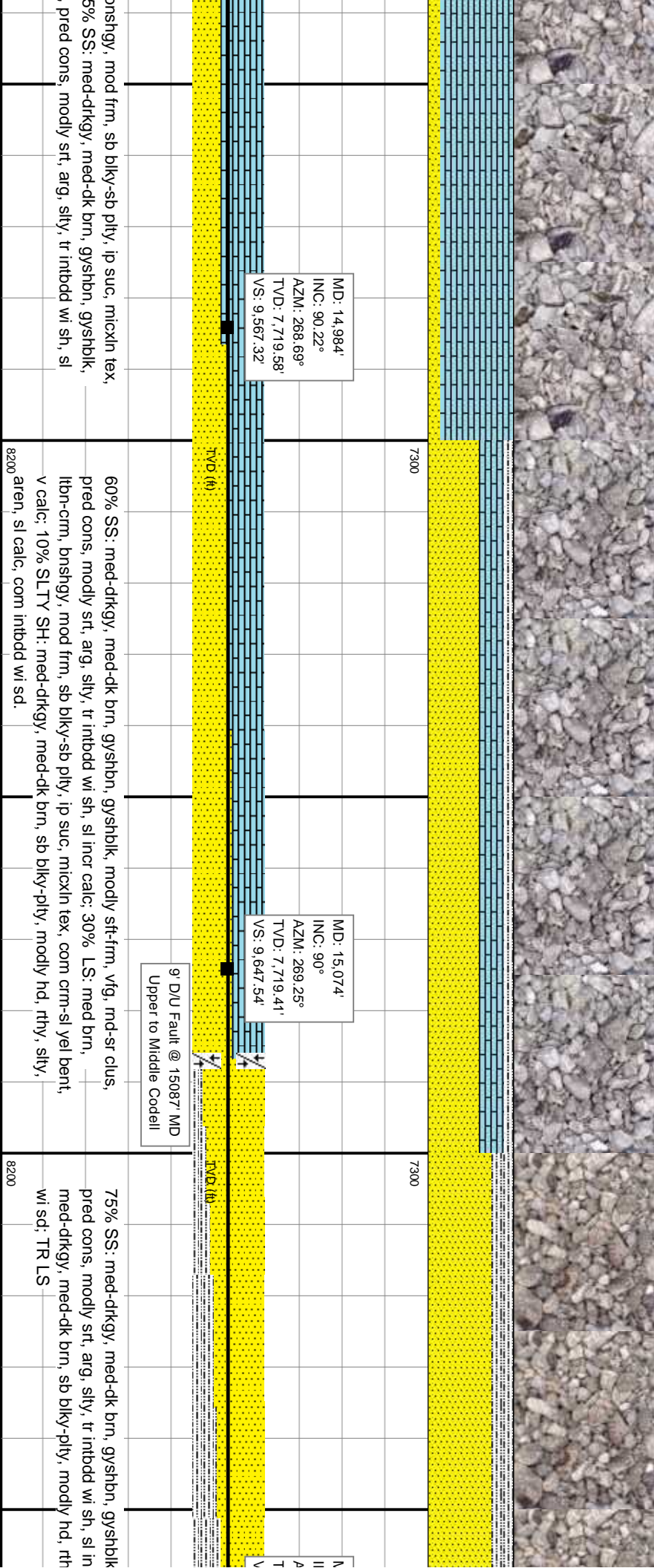
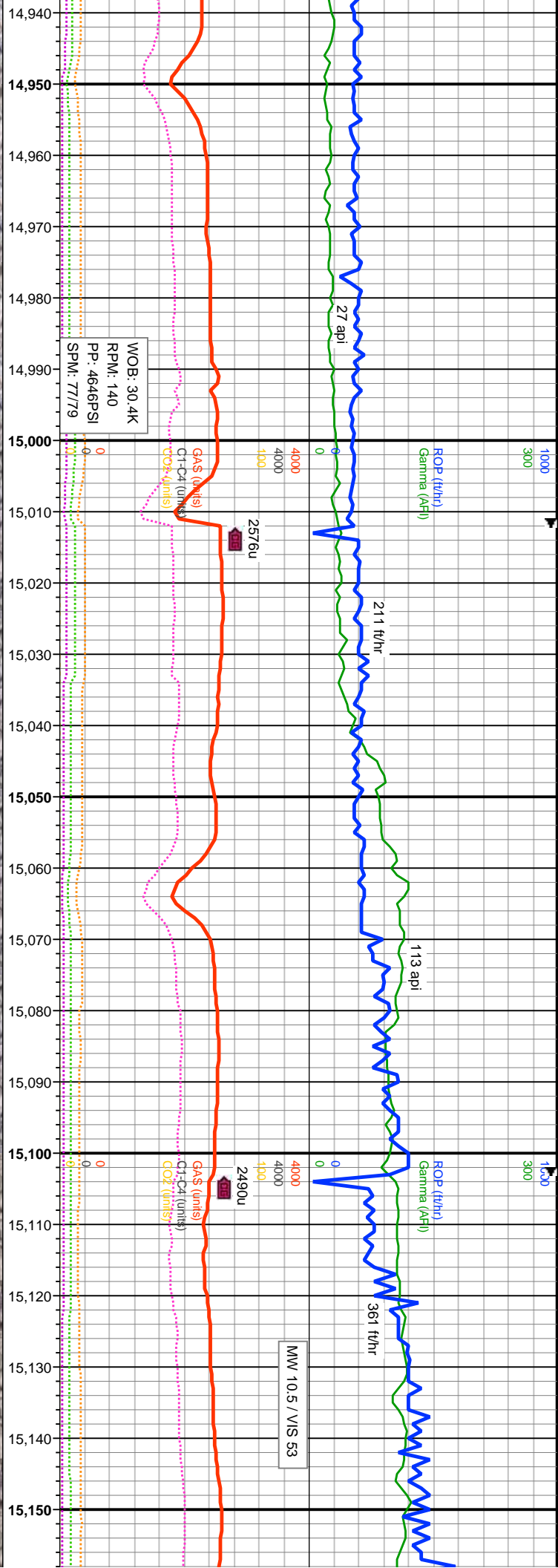
85% SS: med-drkgy, med-dk brn, gyshtbn, gyshtbk, modly sft-frn, vfg, rnd-sr clus, pred cons, modly srt, arg, silty, tr intbdd wi sh, sl med-drkgy, med-dk brn, sb blkly-plty, modly hd, rthy, silty, aren, sl calc, com intbdd wi sd.

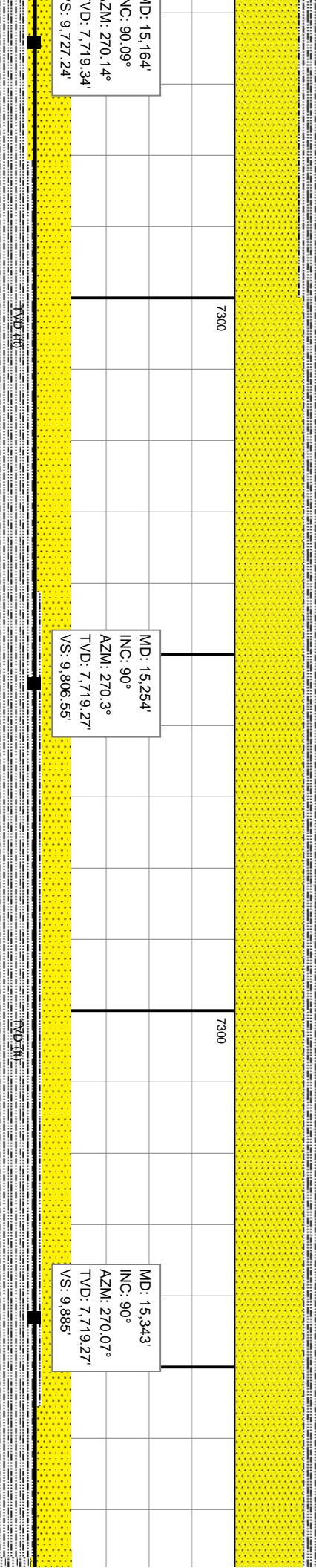
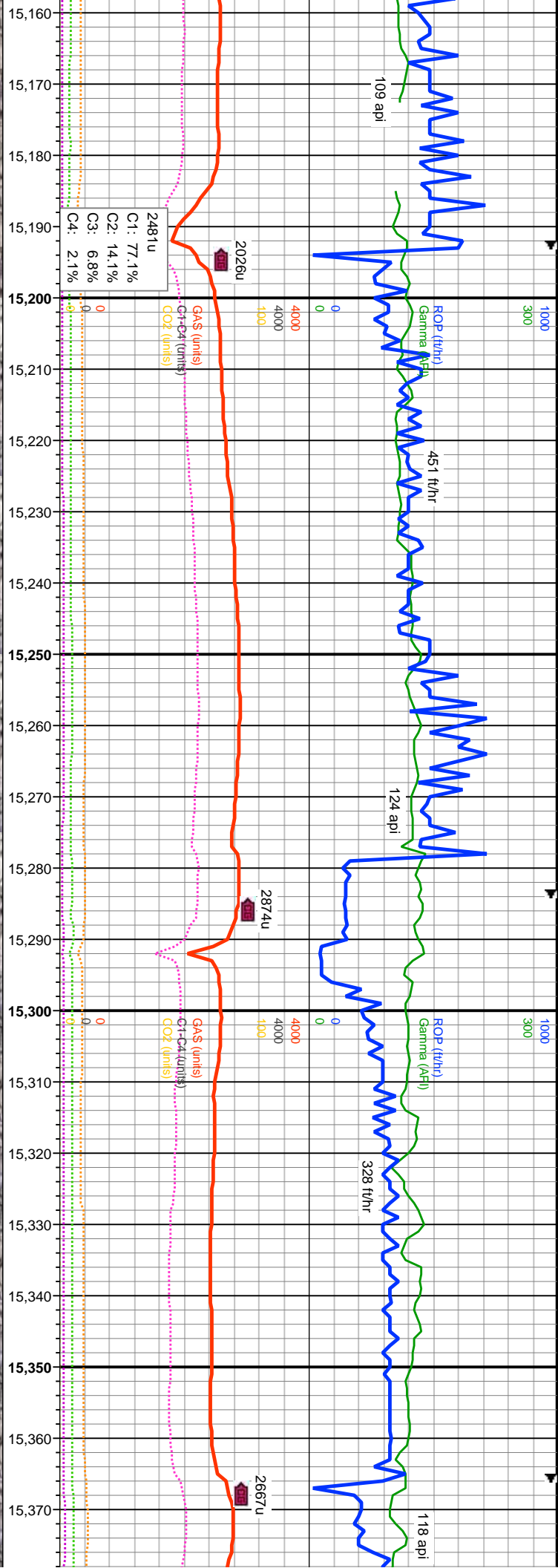










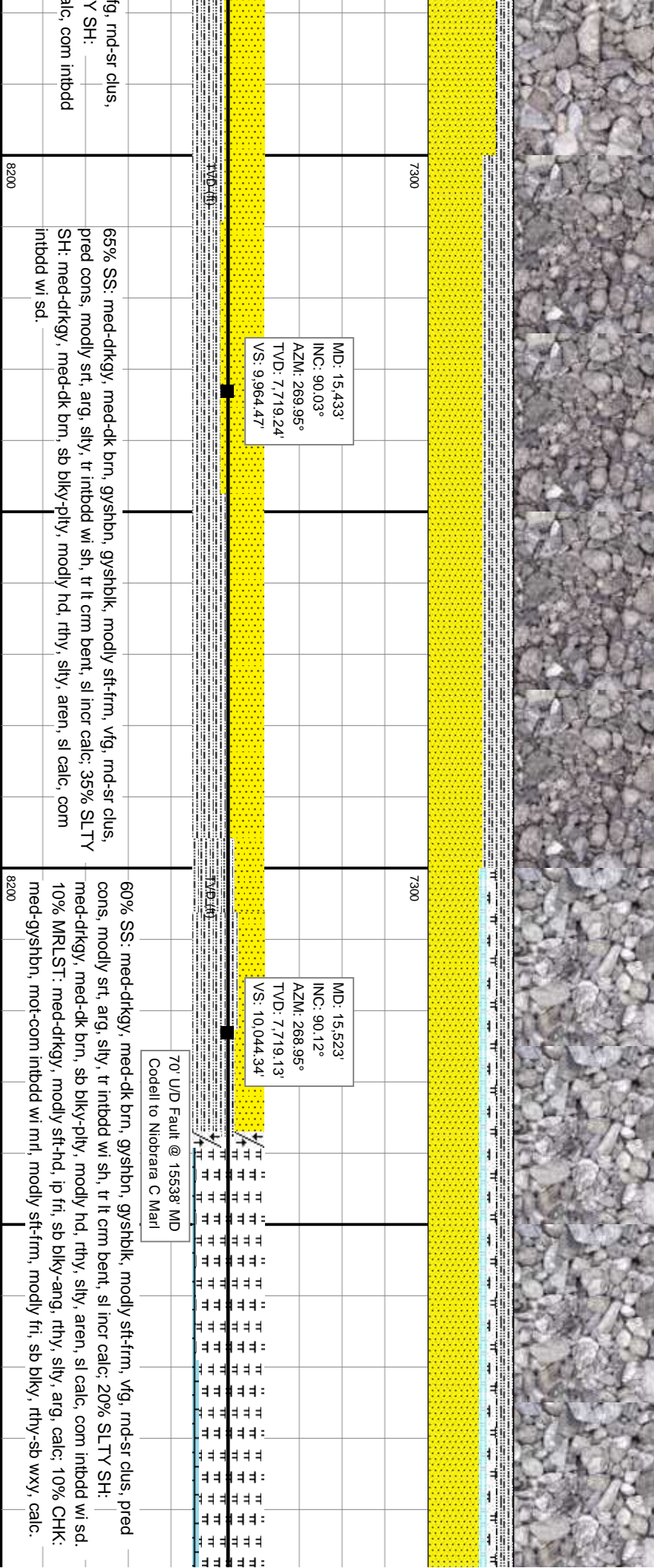
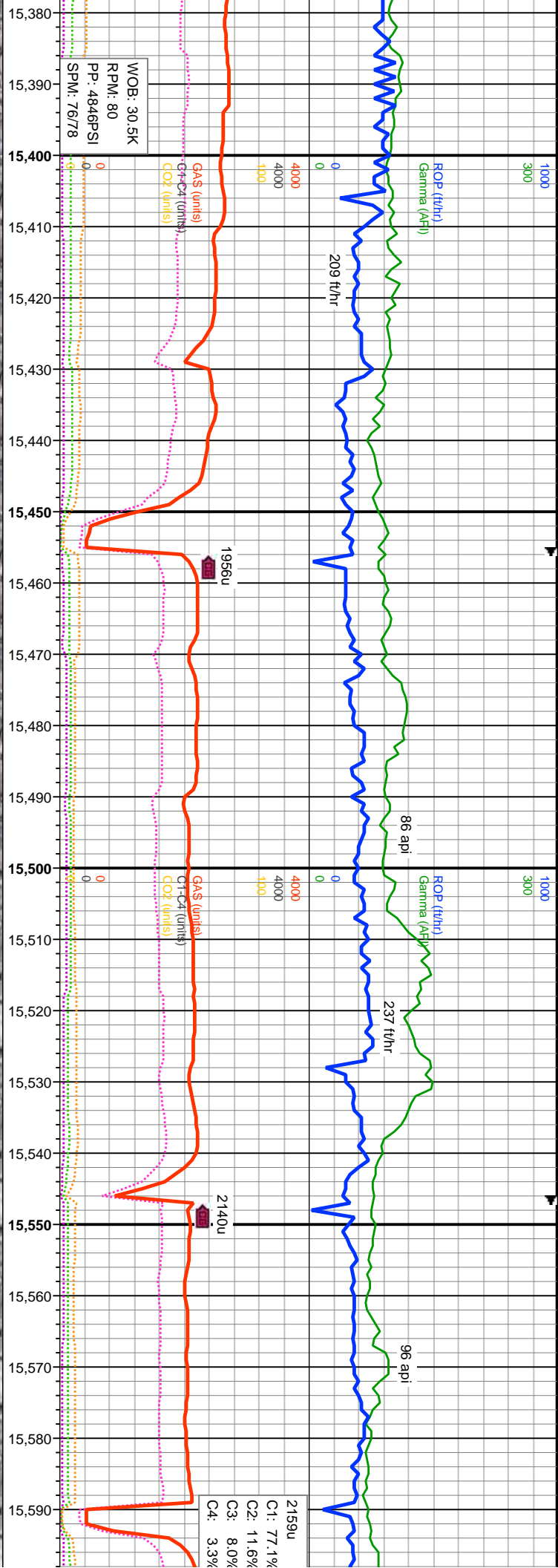


ID: 15,164'
INC: 90.09°
AZM: 270.14°
V/D: 7.719.34'
VS: 9.727.24'

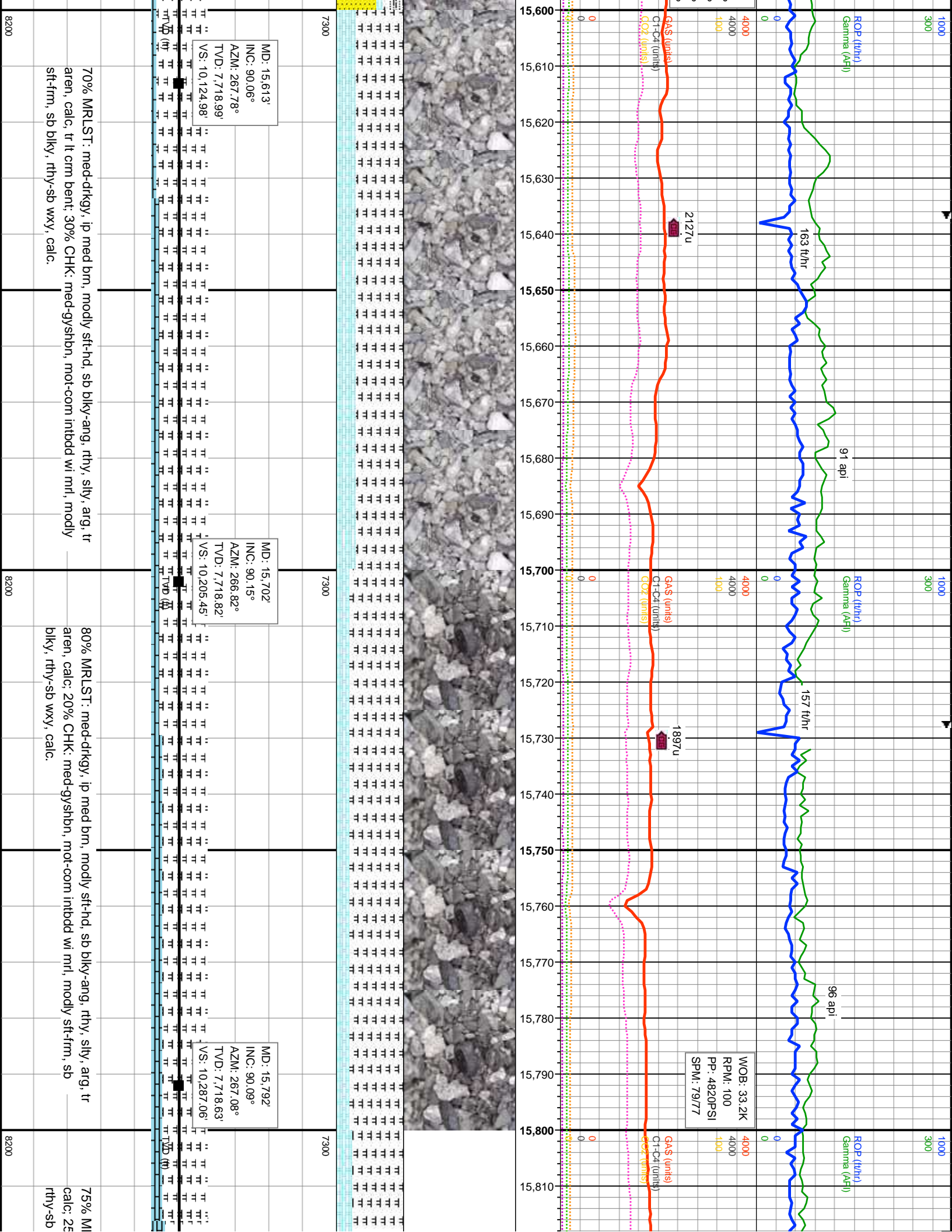
MD: 15,254'
INC: 90°
AZM: 270.3°
TVD: 7.719.27'
VS: 9.806.55'

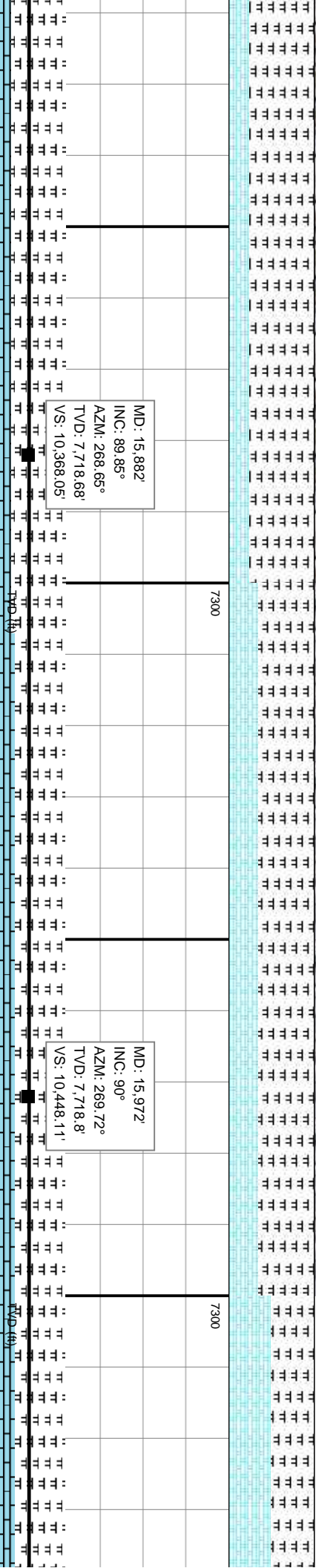
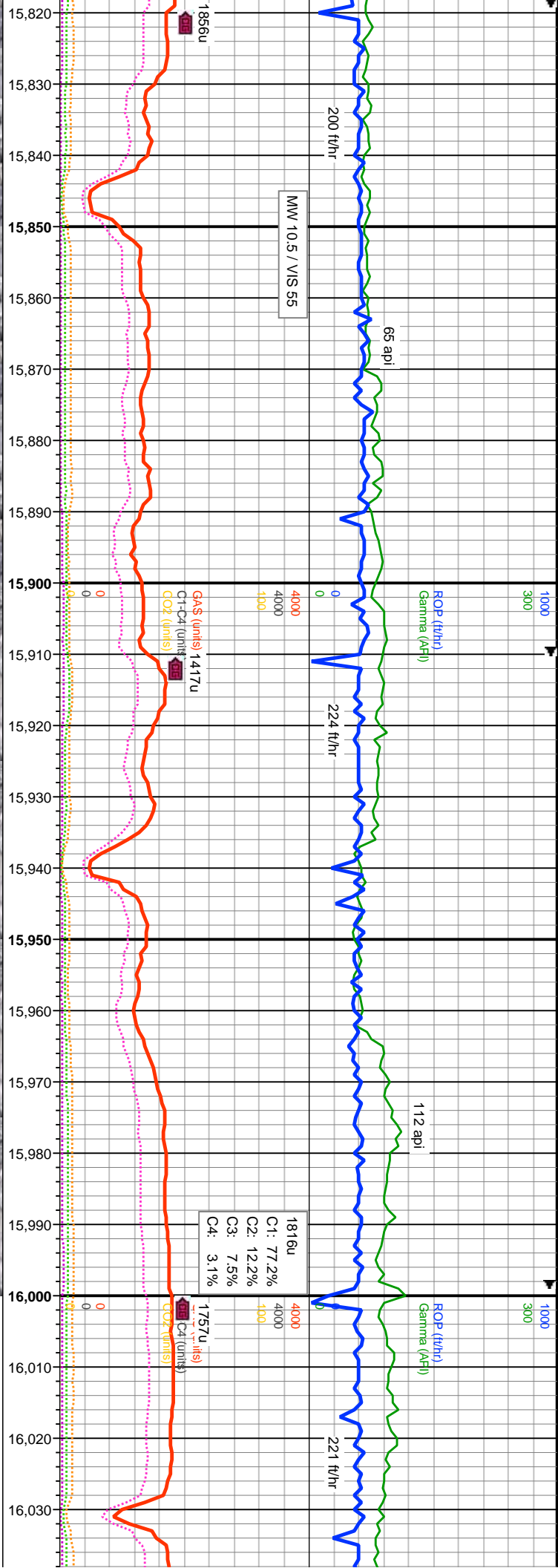
MD: 15,343'
INC: 90°
AZM: 270.07°
TVD: 7.719.27'
VS: 9.885'

80% SS: med-dkgy, med-dk brn, gysbhn, gysbhlk, modly sft-fm, vfg, md-sr clus, pred cons, modly srt, arg, slty, tr intbdd wi sh, sl incr calc; 20% SLTY SH: med-dkgy, med-dk brn, sb blk-ply, modly hd, rthy, slty, aren, sl calc, com intbdd wi sd; TR LS



70' U/D Fault @ 15538' MD
Codell to Niobrara C Marl

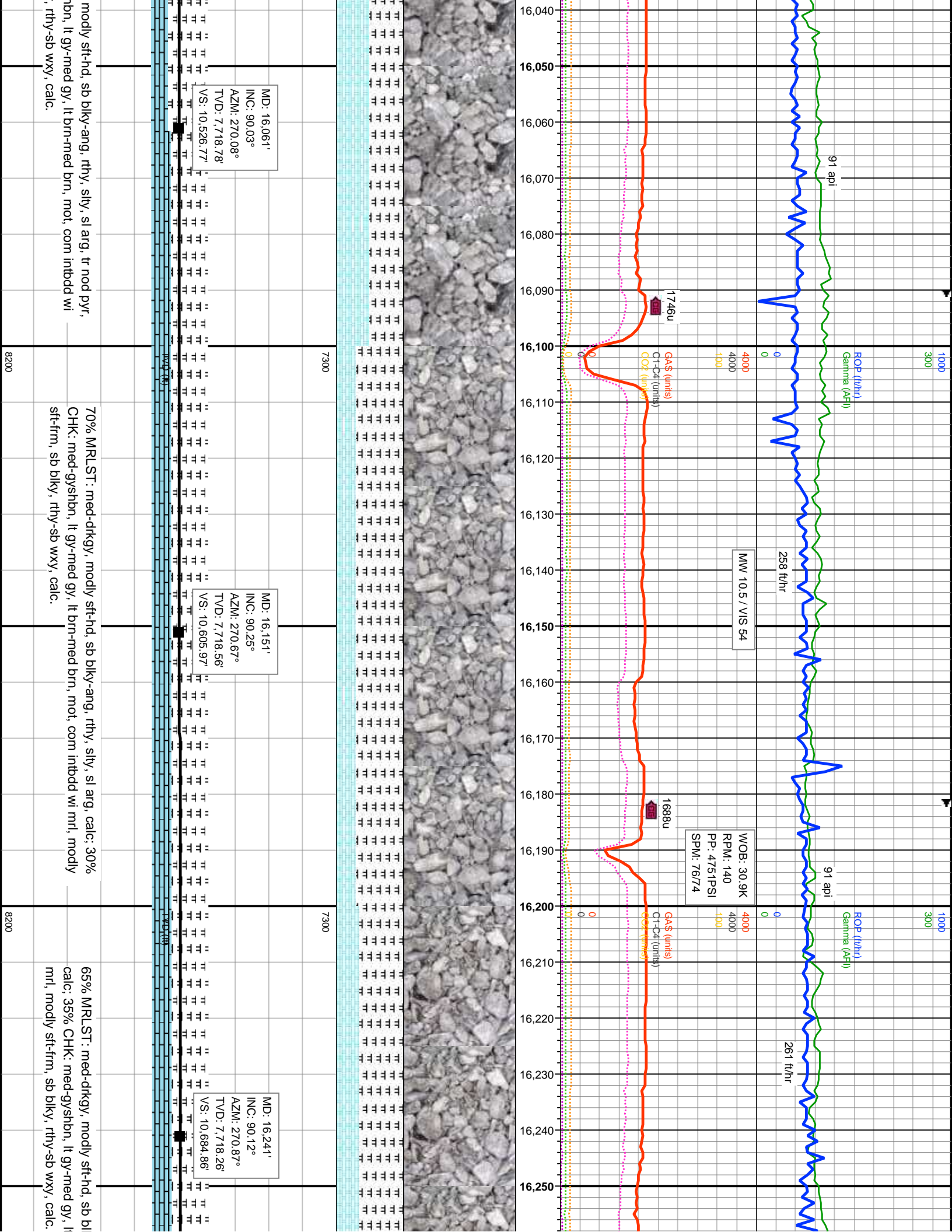


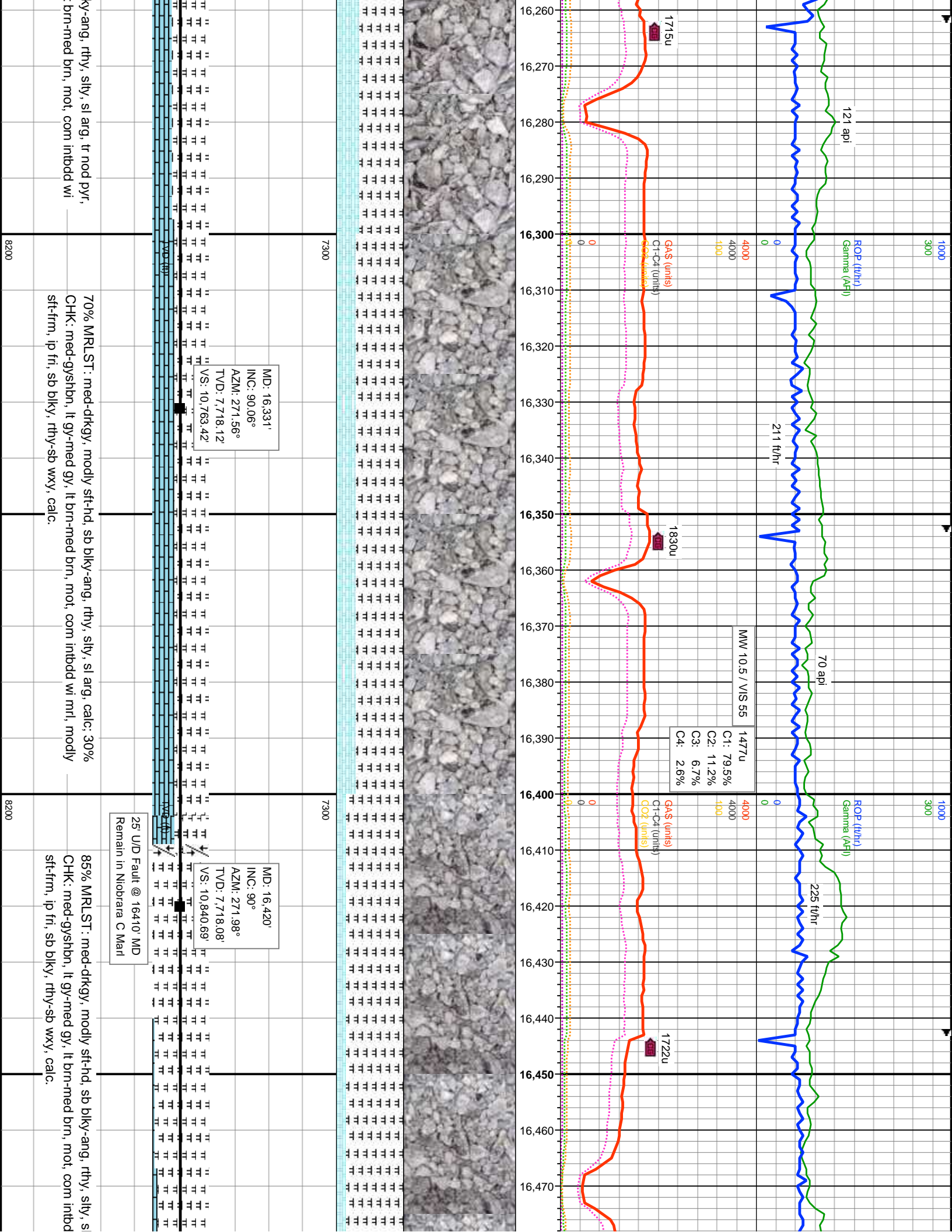


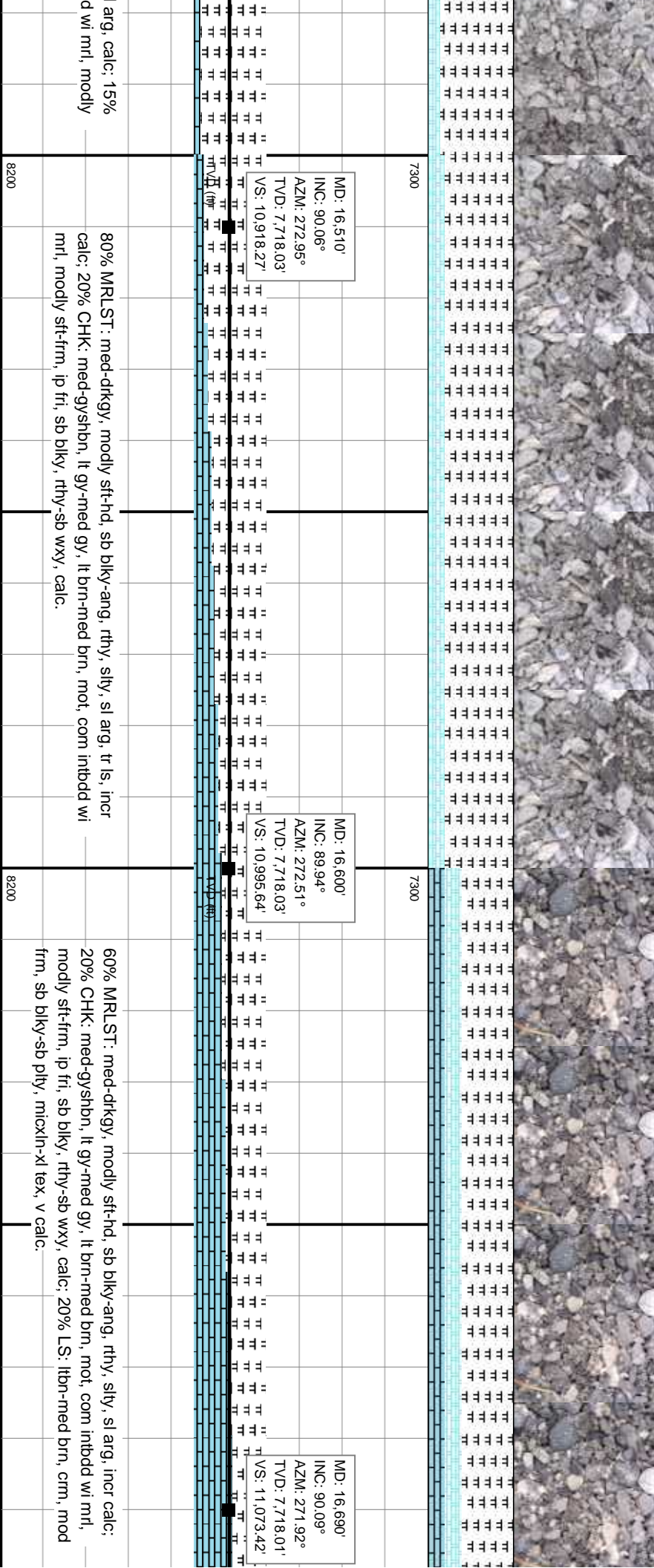
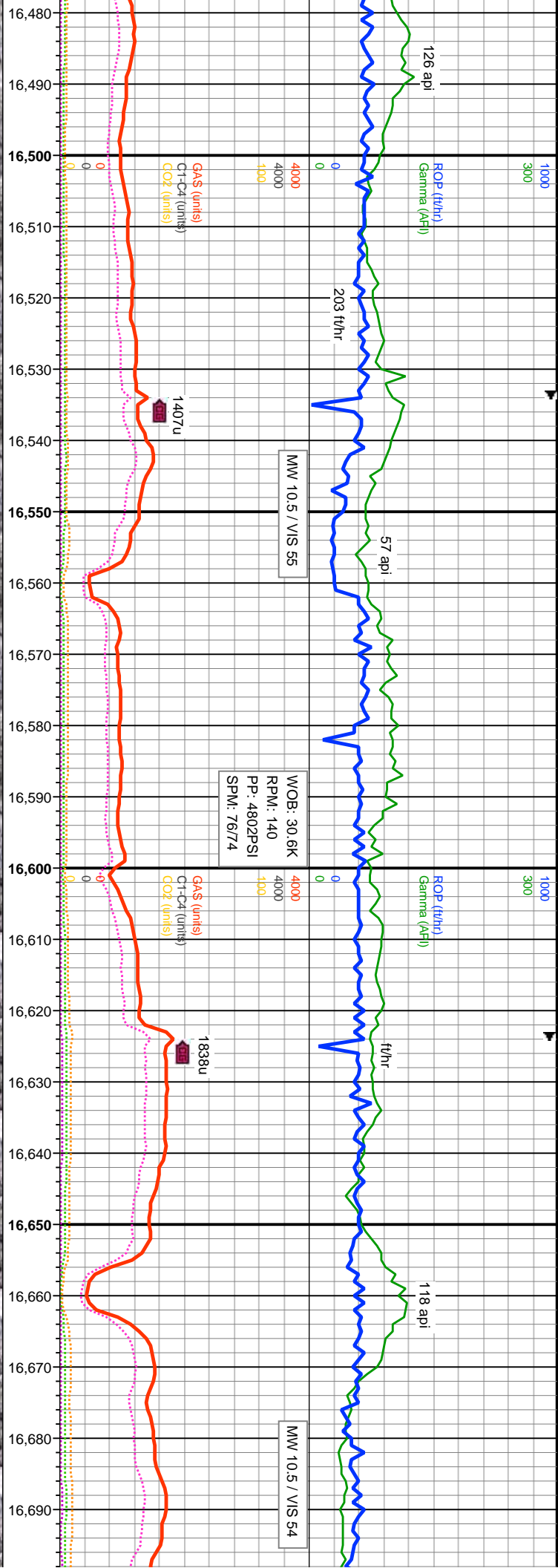
RLST: med-dkgy, ip med brn, modly sft-hd, sb blk-ang, rthy, silty, arg,
% CHK: med-gyshbn, mot-com intbdd w/ mrl, modly sft-frn, sb blk-
wxy, calc.

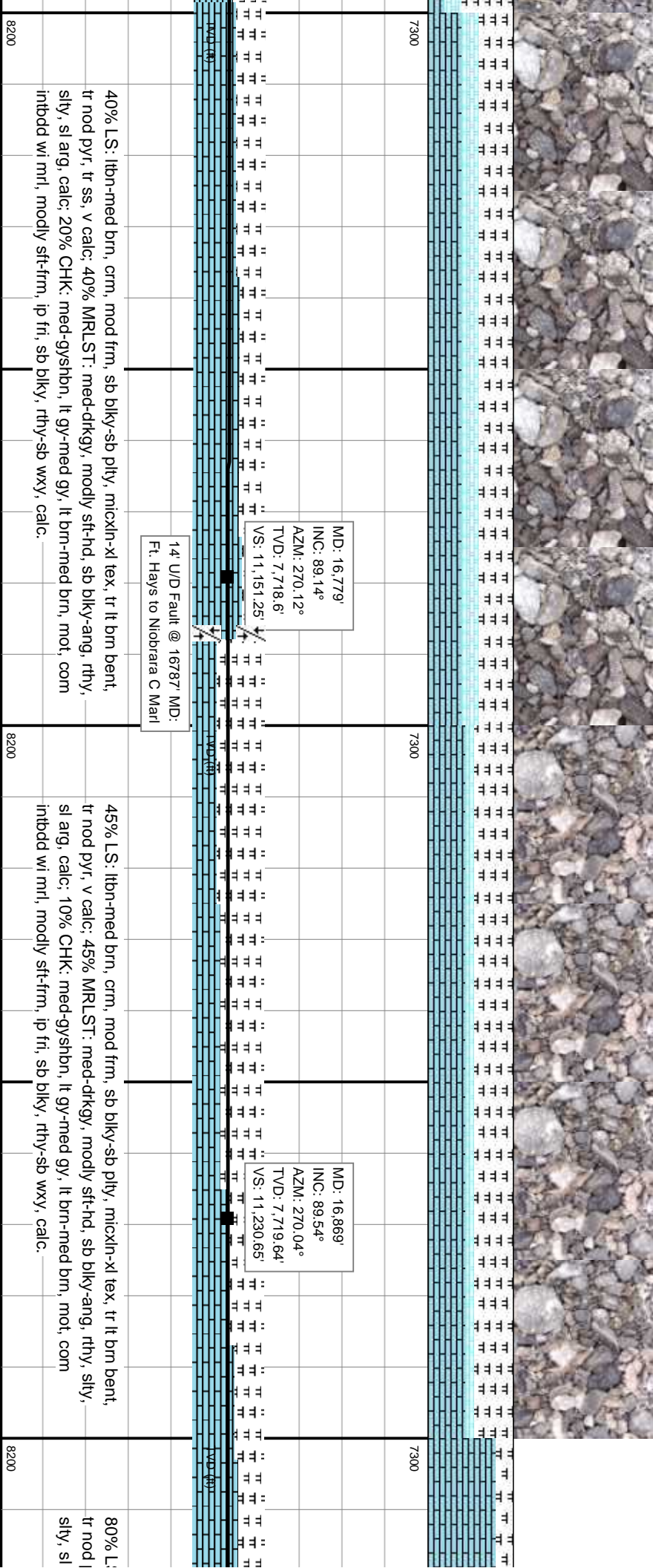
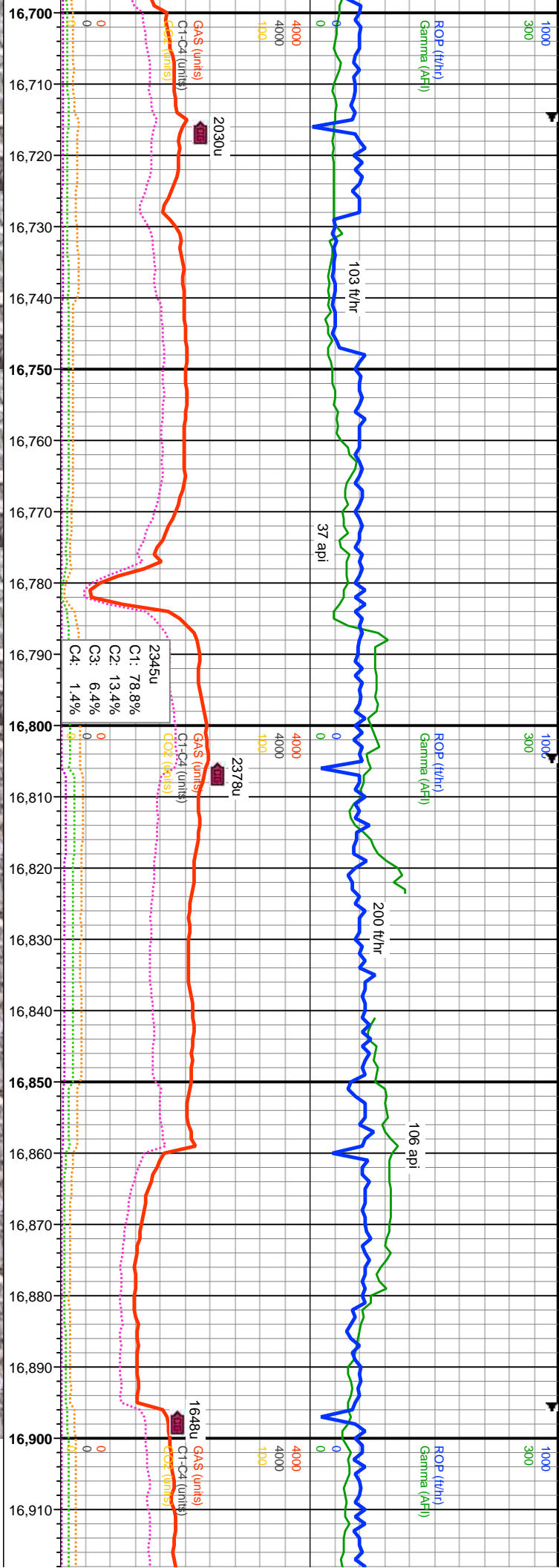
65% MRLST: med-dkgy, ip lt gy, ip med brn, modly sft-hd, sb blk-ang, rthy,
silty, arg, calc, 35% CHK: med-gyshbn, mot-com intbdd w/ mrl, modly sft-frn,
sb blk-ang, rthy-sb wxy, calc.

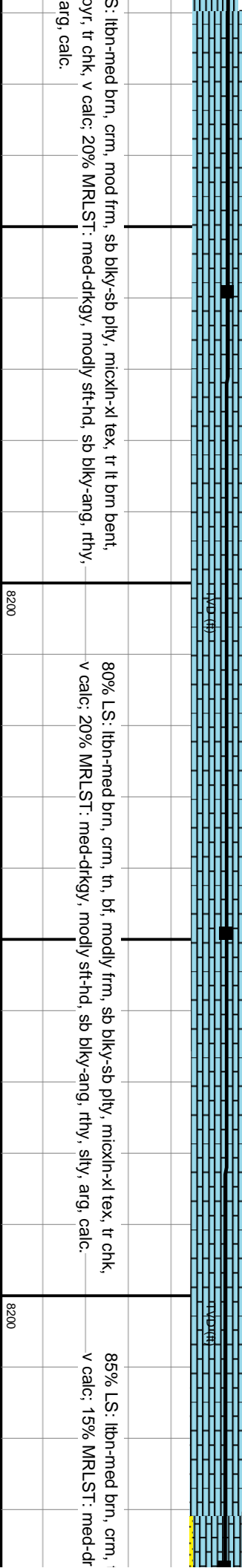
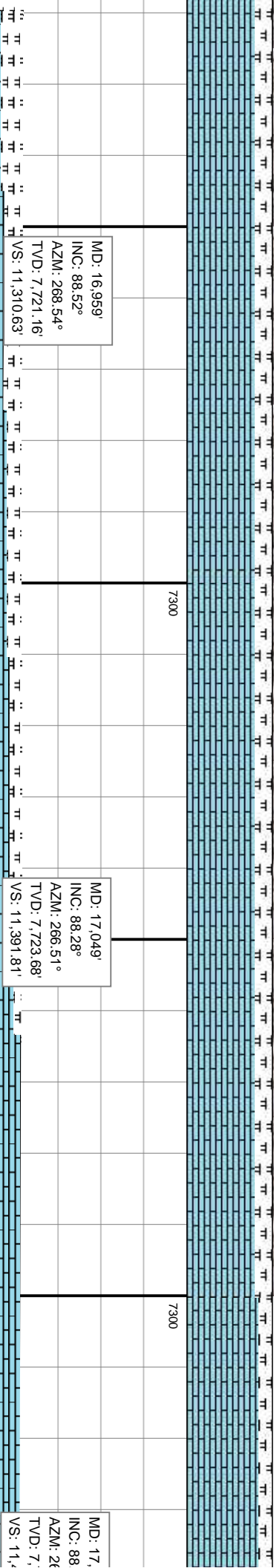
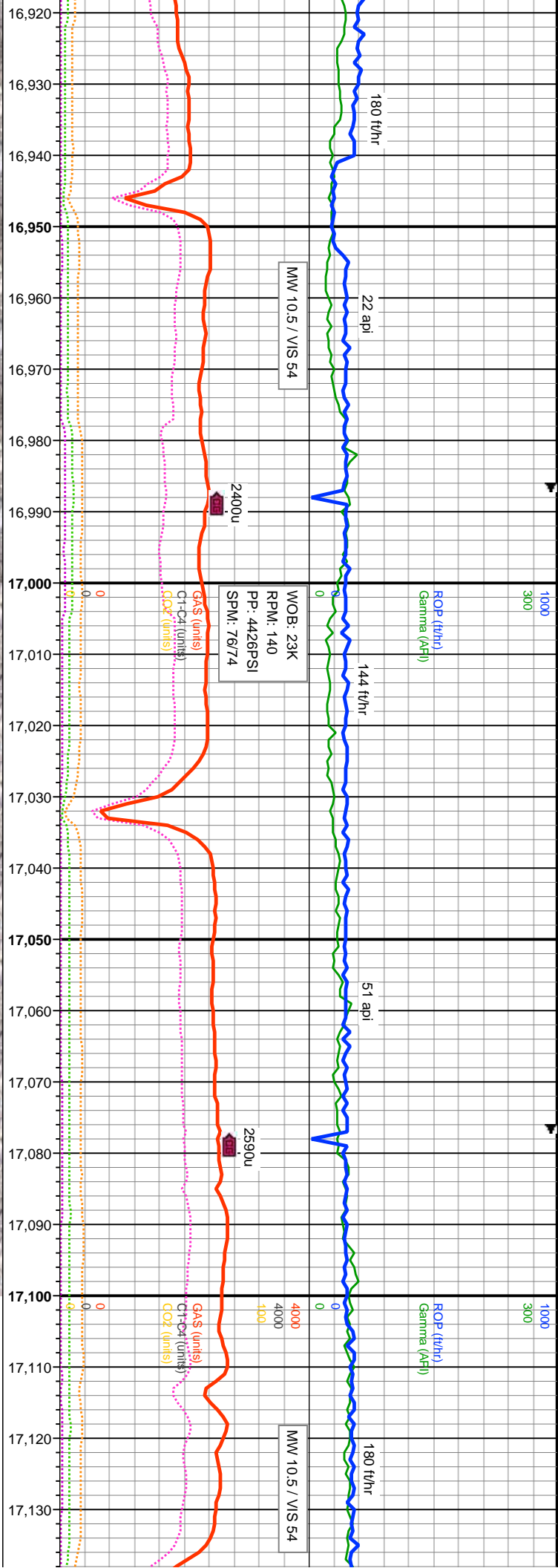
50% MRLST: med-dkgy,
calc, 50% CHK: med-gysl
mrl, modly sft-frn, sb blk-ang

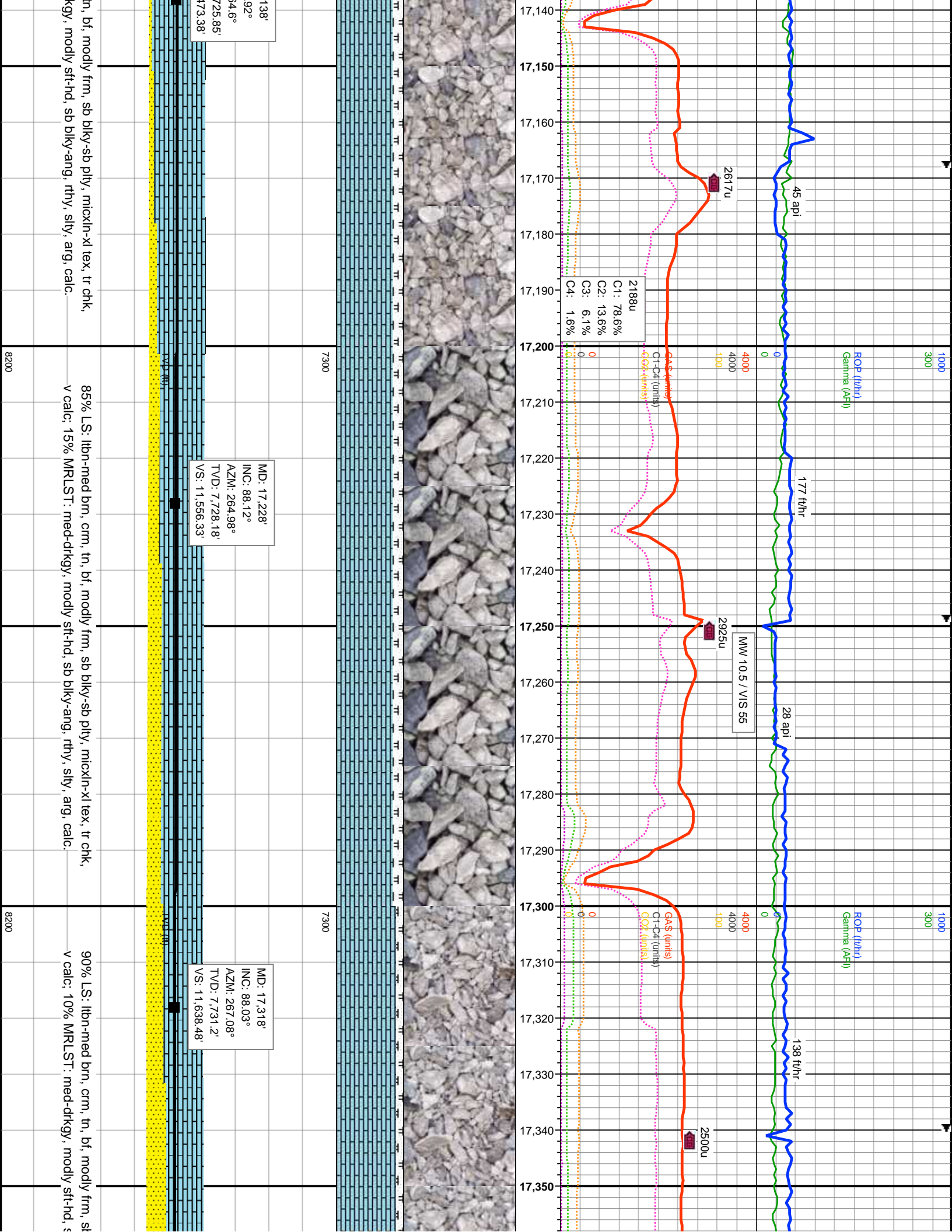


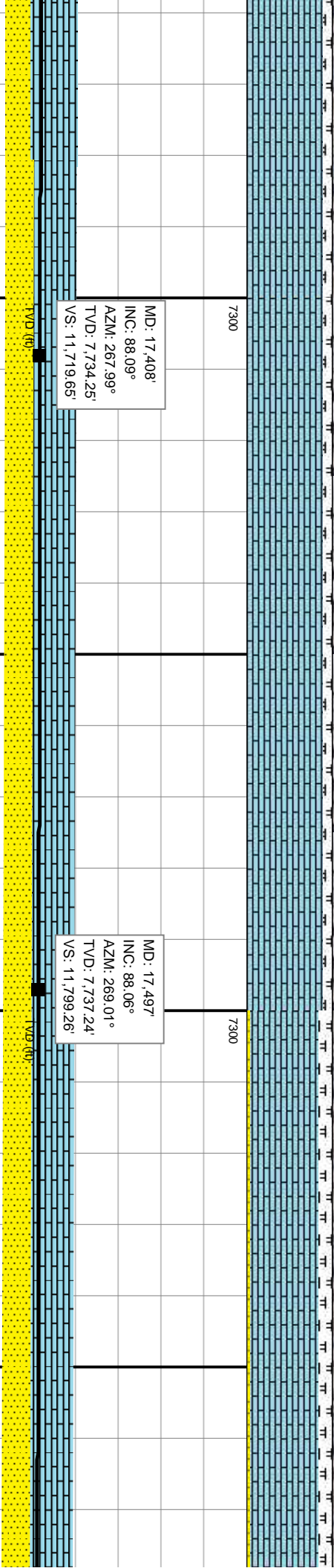
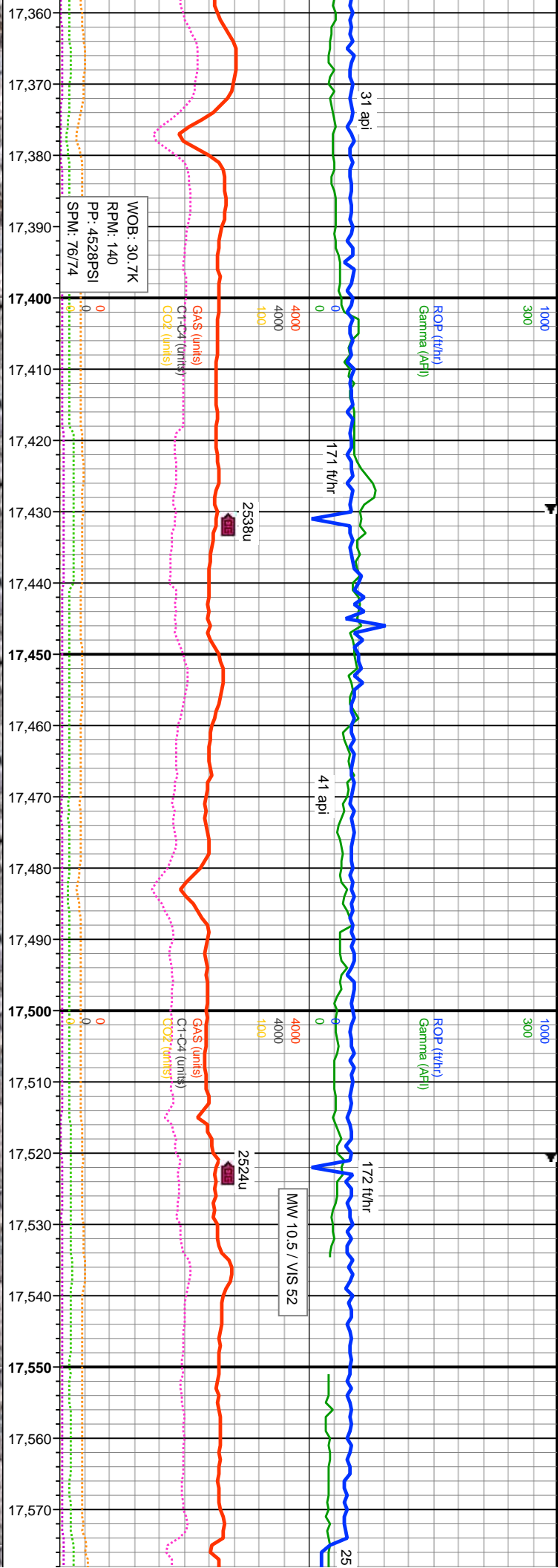






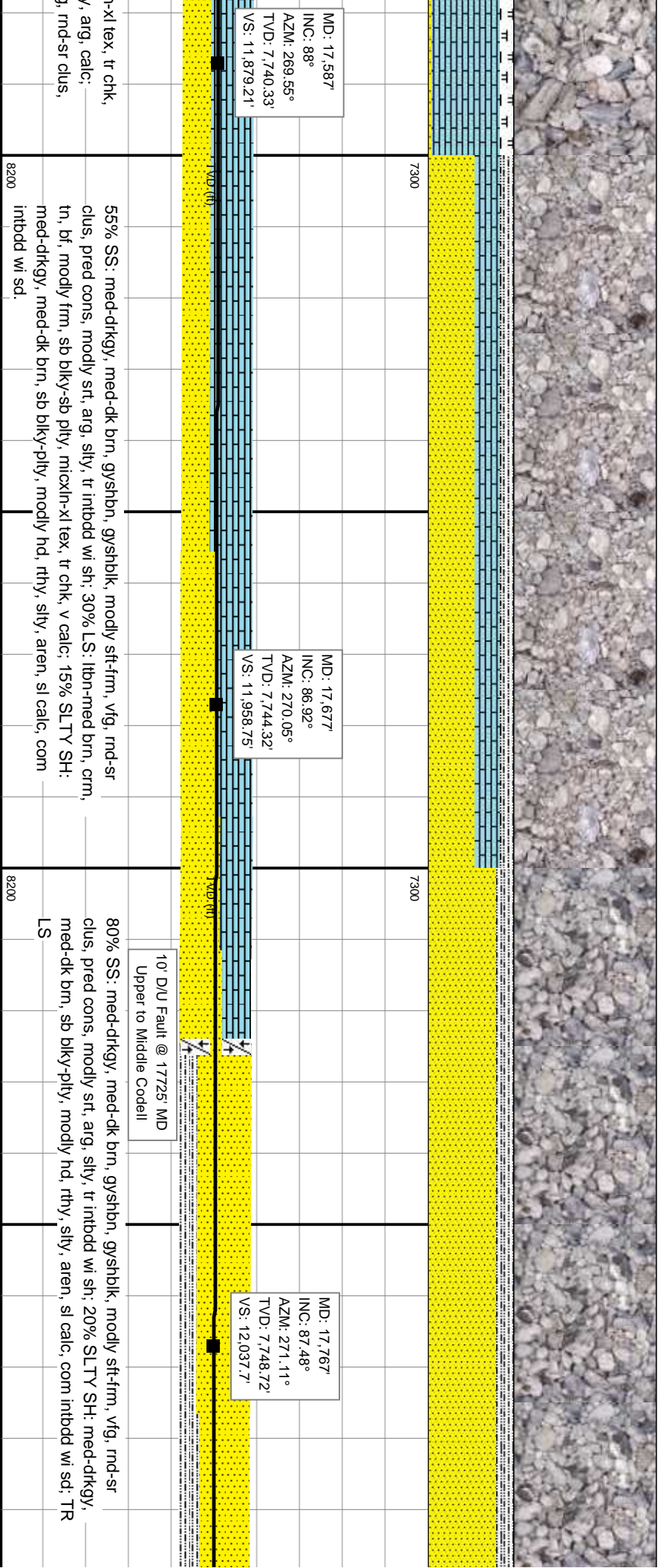
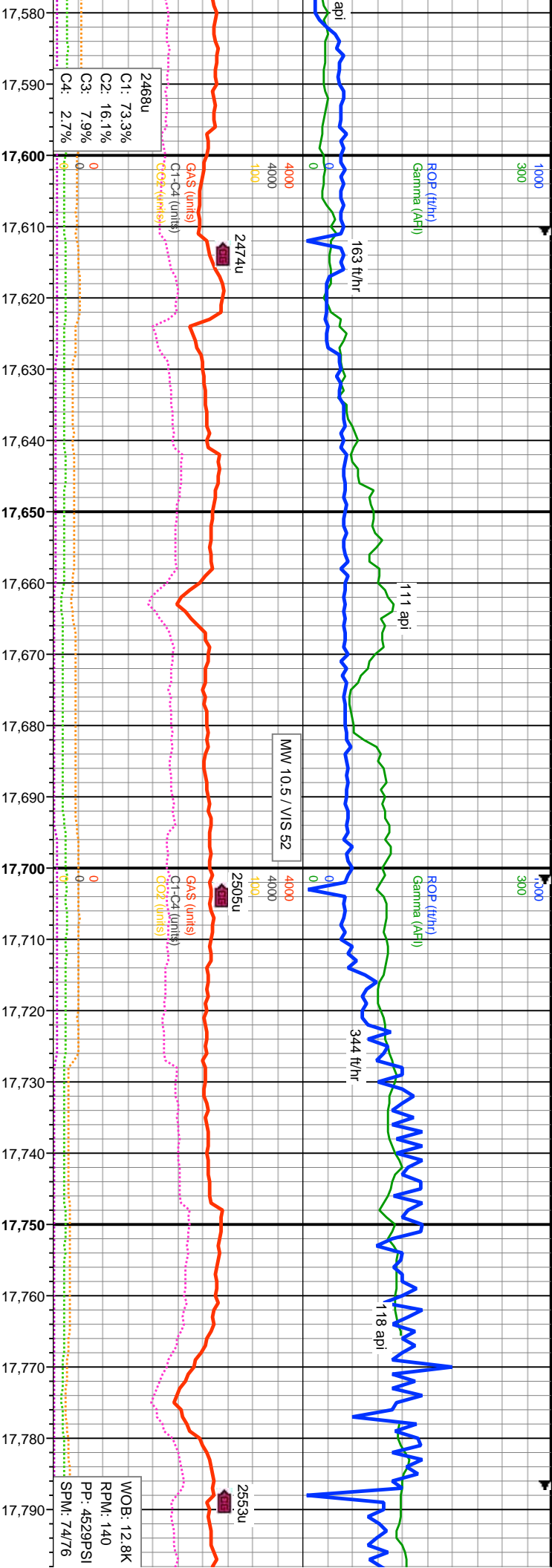


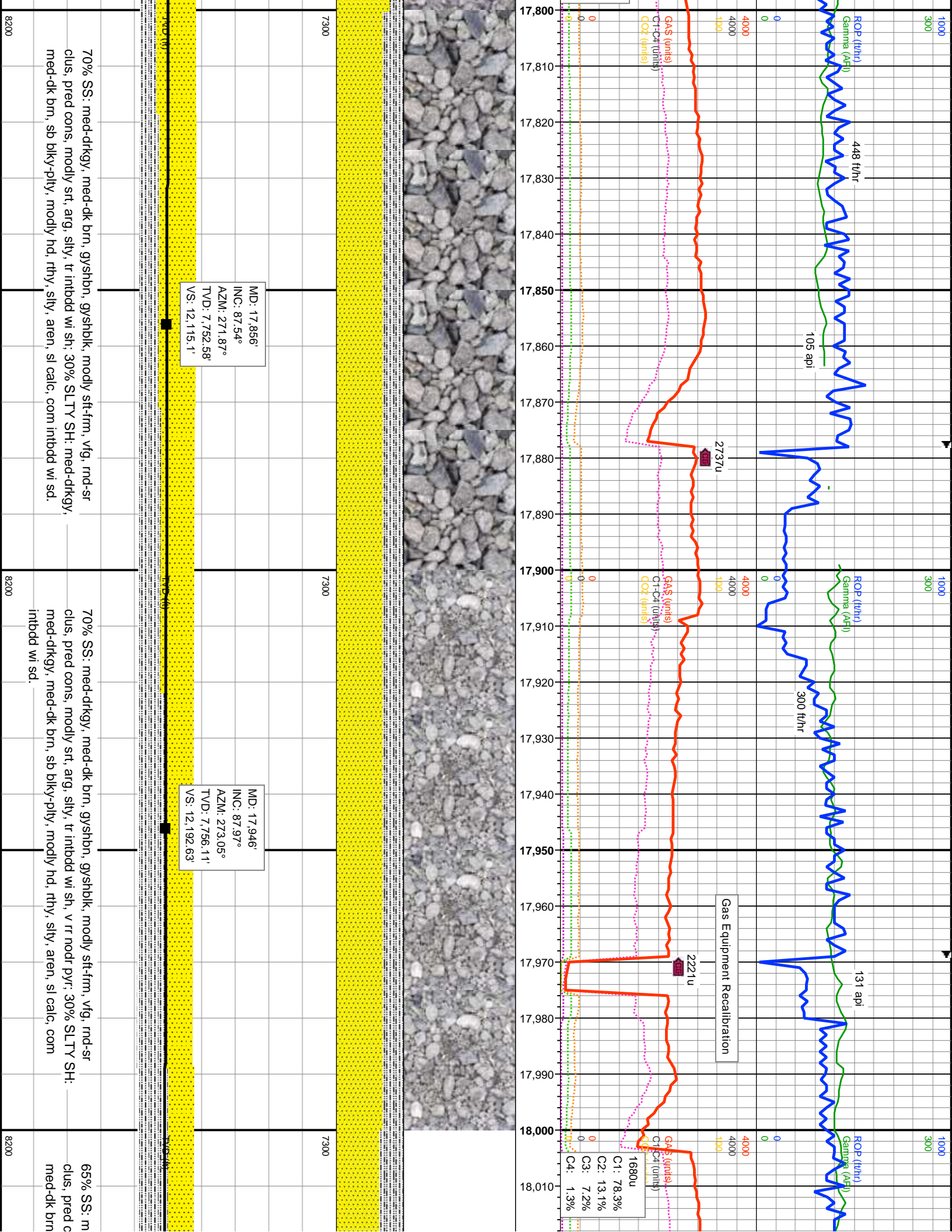


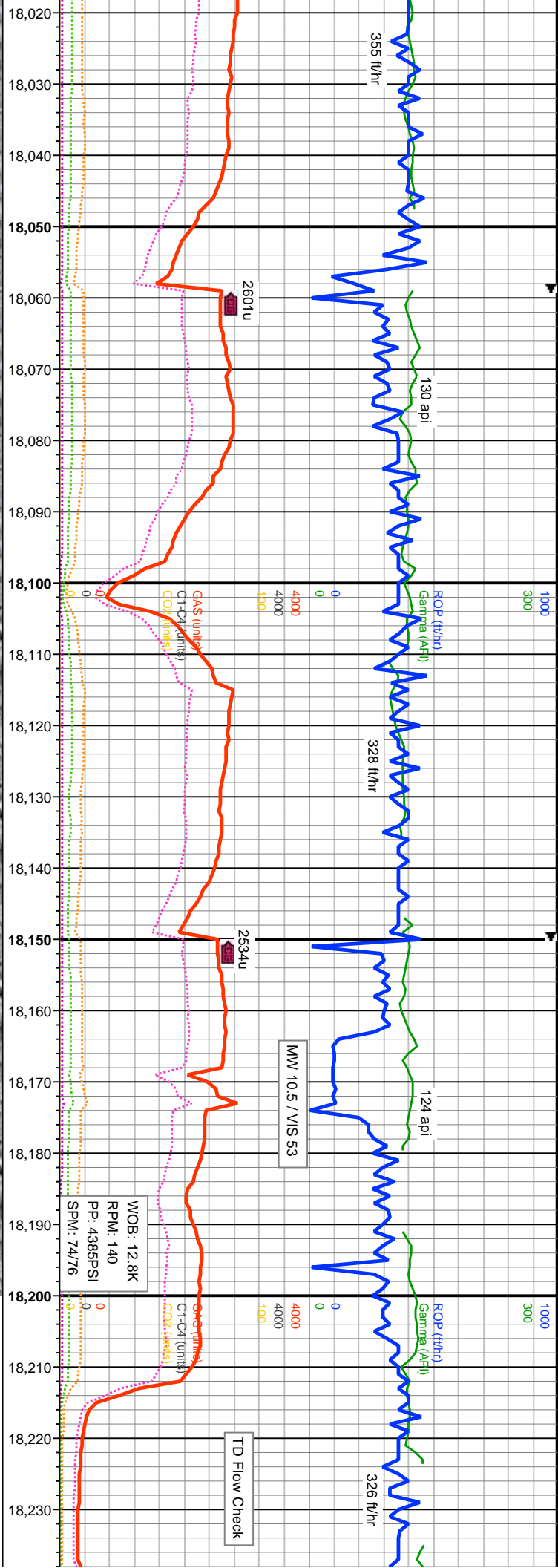


90% LS: ltbn-med brn, cm, tn, bf, modly frm, sb biky-sb pily, micxln-xl tex, tr chk, v calc, 10% MRLST: med-dkgy, modly sft-hd, sb biky-ang, rthy, silty, arg, calc.

80% LS: ltbn-med brn, cm, tn, bf, modly frm, sb biky-sb pily, micxln-xl tex, tr chk, v calc, 15% MRLST: med-dkgy, modly sft-hd, sb biky-ang, rthy, silty, arg, calc, 5% SS: med-dkgy, med-dk brn, gysbhn, gysblik, modly sft-frm, vfg pred cons, modly srt, arg, silty, tr intbdd wi sh







MD: 18,036'
INC: 88.31°
AZM: 273.98°
TVD: 7,759.03'
VS: 12,269.32'

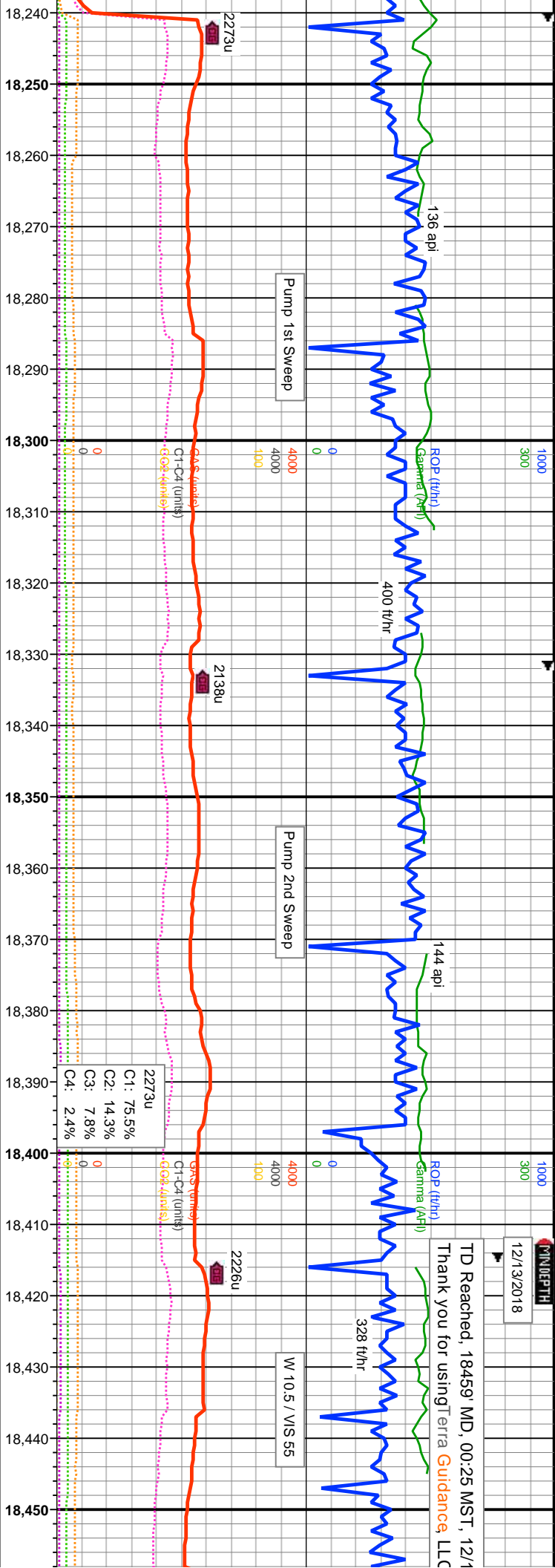
MD: 18,125'
INC: 88.12°
AZM: 274.58°
TVD: 7,761.8'
VS: 12,344.53'

MD: 18,215'
INC: 87.97°
AZM: 273.7°
TVD: 7,764.87'
VS: 12,420.7'

med-dkgy, med-dk brn, gysbhn, gysbhlk, modly sft-firm, vfg, rnd-sr
cons, modly srt, arg, slty, tr intbdd wi sh; 35% SLTY SH: med-dkgy,
sb blkly-plty, modly hcd, rthy, slty, aren, sl calc, com intbdd wi sd.

60% SS: med-dkgy, med-dk brn, gysbhn, gysbhlk, modly sft-firm, vfg, rnd-sr
clus, pred cons, modly srt, arg, slty, tr intbdd wi sh; 40% SLTY SH: med-dkgy,
med-dk brn, sb blkly-plty, modly hcd, rthy, slty, aren, sl calc, com intbdd wi sd.

70% SS: med-dkgy, med-dk brn, gysbhn, gysbhlk, modly sft-firm, vfg, rnd-sr
clus, pred cons, modly srt, arg, slty, tr intbdd wi sh; 40% SLTY SH: med-dkgy,
med-dk brn, sb blkly-plty, modly hcd, rthy, slty, aren, sl calc, com intbdd wi sd.



MD: 18,305'
INC: 88.49°
AZM: 270.36°
TVD: 7,767.65'
VS: 12,498.58'

MD: 18,396'
INC: 88°
AZM: 258.86°
TVD: 7,770.42'
VS: 12,581.49'

MD: 18,436'
INC: 87.97°
AZM: 255.61°
TVD: 7,771.82'
VS: 12,620.06'

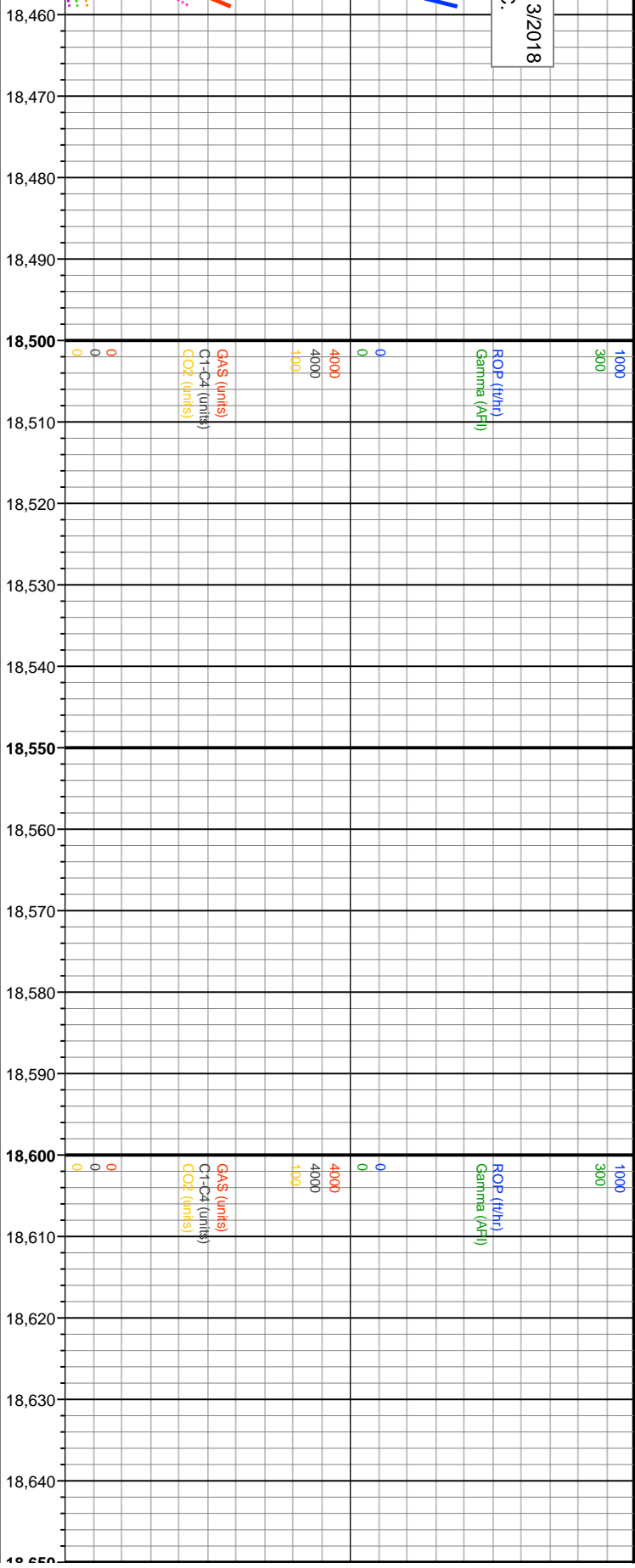
Project

75% SS: med-drkgy, med-dk brn, gysbhn, modly sft-firm, vfg, rnd-sr
clns, pred cons, modly srt, arg, silty, tr intbdd wi sh; 25% SLTY SH: med-drkgy,
med-dk brn, sb blkly-plty, modly hd, rthy, silty, aren, sl calc, com intbdd wi sd.

75% SS: med-drkgy, med-dk brn, gysbhn, modly sft-firm, vfg, rnd-sr
clns, pred cons, modly srt, arg, silty, tr intbdd wi sh; 25% SLTY SH: med-drkgy,
med-dk brn, sb blkly-plty, modly hd, rthy, silty, aren, sl calc, com intbdd wi sd.

70% SS: med-drkgy, med-dk brn, gysbhn, modly sft-firm, vfg, rnd-sr
clns, pred cons, modly srt, arg, silty, tr intbdd wi sh; 30% SLTY SH: med-drkgy,
med-dk brn, sb blkly-plty, modly hd, rthy, silty, aren, sl calc, com intbdd wi sd.

Project

[illegible]