



Scale: 5" / 100'  
Measured Depth Log

**Well Name** Brant LE 08-082HC

**Location** SECTION 11, T1S, R67W

**State** COLORADO

**County** ADAMS

**Country** UNITED STATES

**Rig Number** PRECISION 460

**API Number** 050011034500

**AFE #** 19DC0077

**Geographic Region** DJ BASIN

**Field** WATTENBERG

**Ground Elevation** 4972.8'

**K.B. Elevation** 4992.8'

**Logged Interval** 6000' MD To 23434' MD

**Total Depth** 23434' MD

**Formation** CODELL

**Type of Drilling Fluid** OIL BASED MUD

## Operator

**Company** Great Western Operating Company, LLC

**Address** 1001 17th Street, Suite 2000  
Denver, CO 80202



## Geologist

**Name** Joey Luce, Zac Olds, Hunter Newman

**Company** Terra Guidance

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

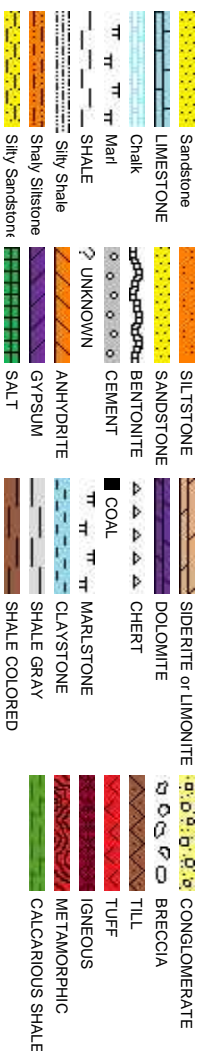


## Other

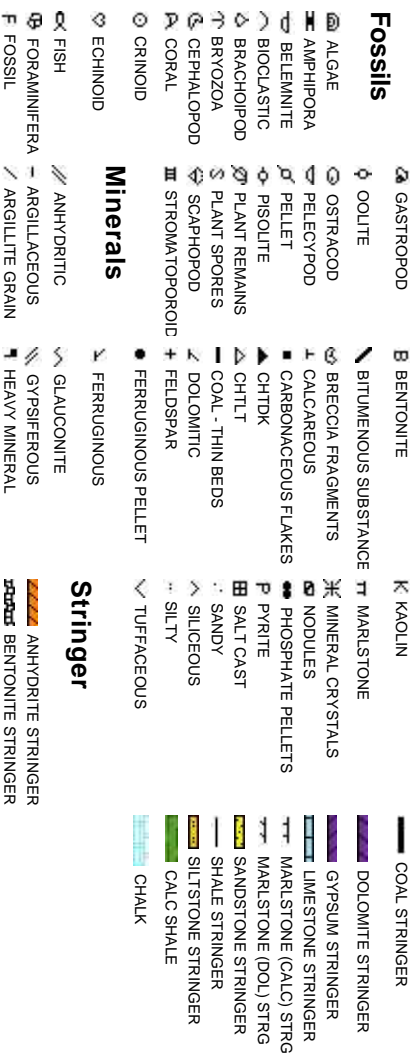
MUDLOG START DATE 06/16/2019

MUDLOG END DATE 06/23/2019

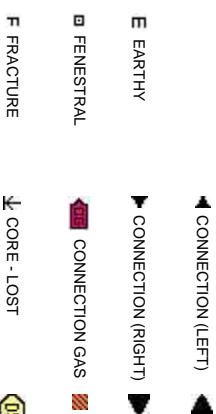
## Rock Types



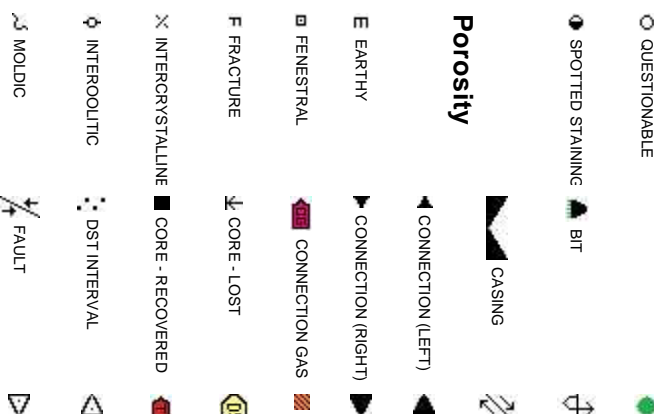
## Accessories



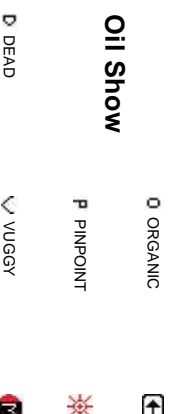
## Porosity



## Engineering



## Oil Show






# Other Symbols

 FORMATION TOP      L LITHOGRAPHIC


## Rounding

GAS SHOW       MICROXLN

 MIN DEPTH       ANGULAR       MUDSTONE

NORMAL FAULT       ROUNDED       PACKSTONE

OIL SHOW       SUBANG       WACKESTONE

OVERTURNED STRATA       SUBRND

## Sorting

REVERSE FAULT

## Textures

SIDEWALL CORE (LEFT)       MODERATE


SIDEWALL CORE (RIGHT)       BOUNDSTONE       POOR

SLIDE       CHALKY       WELL


 SURVEY       CRYPTOXLN

## CALCARIUOS SHALE

 TRIP GAS       EARTHY

WIRELINE TESTED - LEFT       FINELYXLN

## CALCARIOUS SHALE

WIRELINE TESTED - RT       GRAINSTONE

TERRA GUIDANCE  
BEGAN LOGGING @ 04:54 MDT 06/16/2019  
BLOODHOUND GAS CHROMATOGRAPH #5122  
100' Sample Collection

ROP  
ROP  
Gamma

GAPS IN GAMMA DATA DUE TO  
HIGH RATES OF PENETRATION

Gas Scale  
0 - 1000 Units

Total Gas & Chromatograph

GAS  
C1  
C2  
C3  
C4  
CO2

BG: BACKGROUND GAS  
TG: TRIP GAS  
DTG: DOWNTIME GAS  
MG: MAX GAS

Depth

5,960 5,970 5,980 5,990 6,000 6,010 6,020 6,030 6,040 6,050 6,060 6,070 6,080 6,090 6,100 6,110 6,120 6,130

Images

% Lithology

TVD Scale  
5800' - 8500'

Bit #: 1  
Size: 8.5"  
Make: Ulterra  
Model: SPL516  
Depth In: 1778'  
Jets: 4x11,4x12  
S/N: 48060

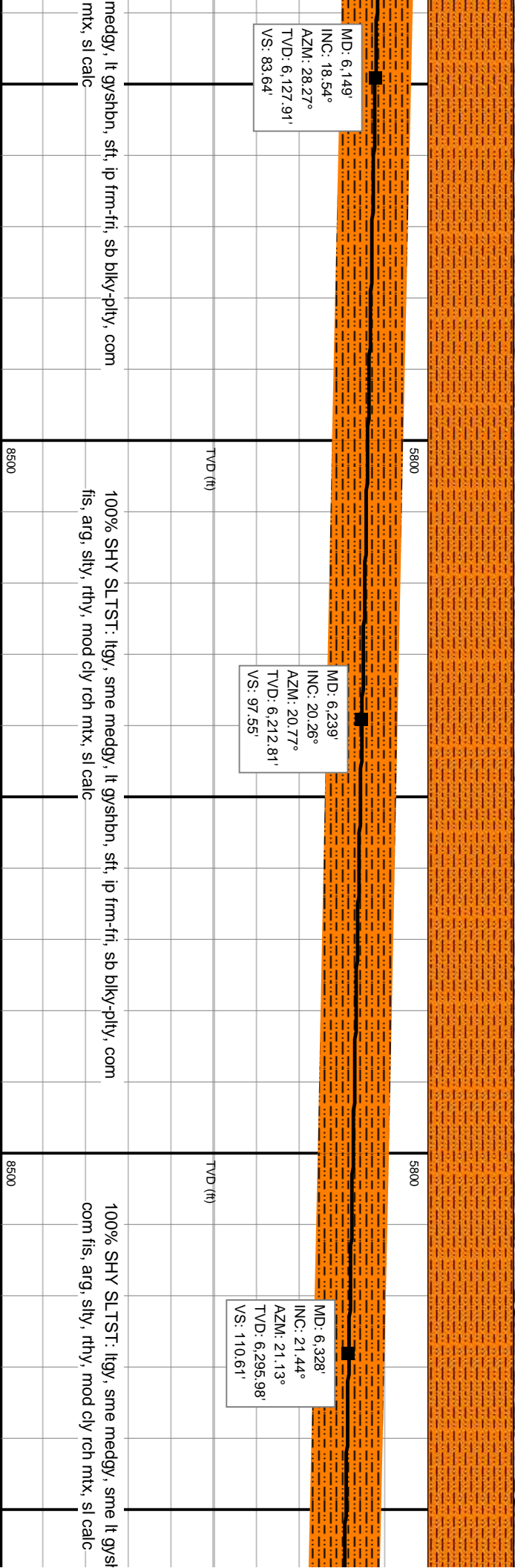
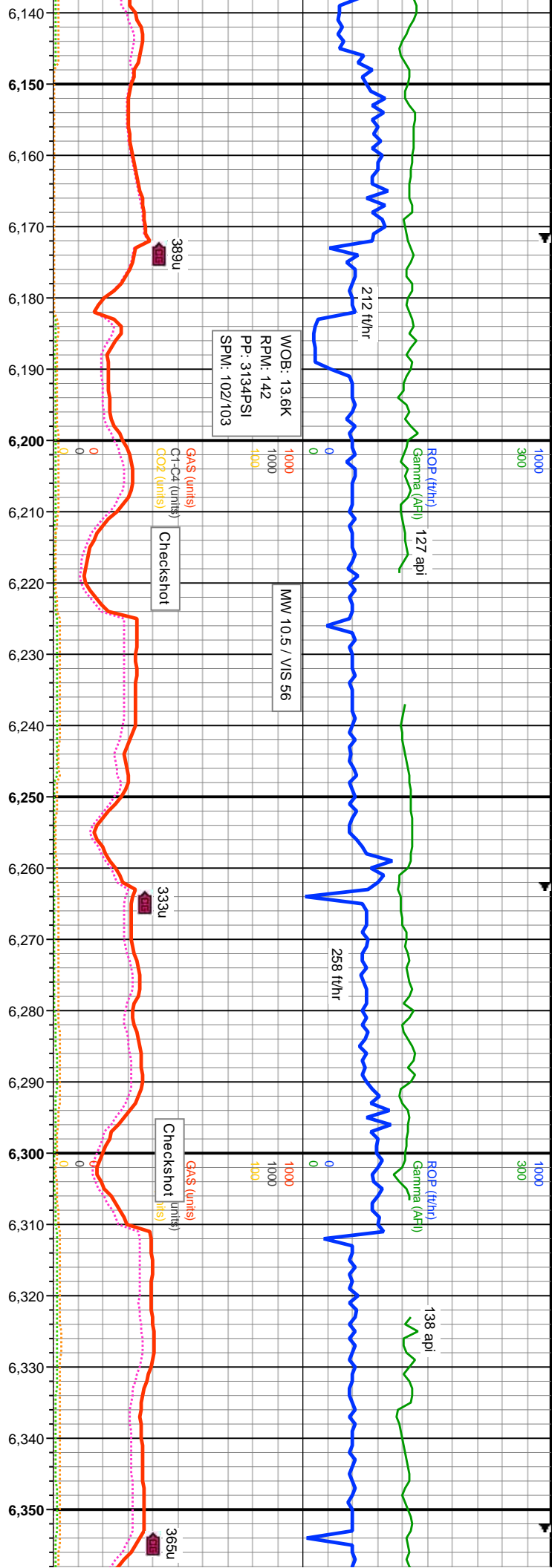
Well Bore  
TVD

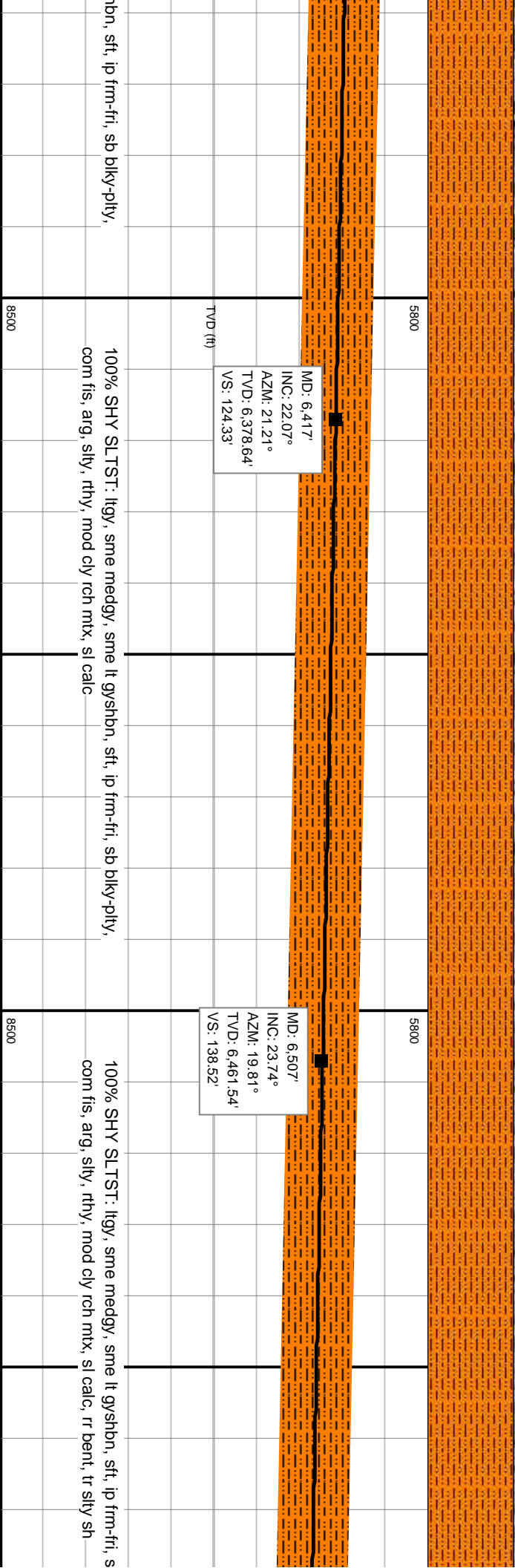
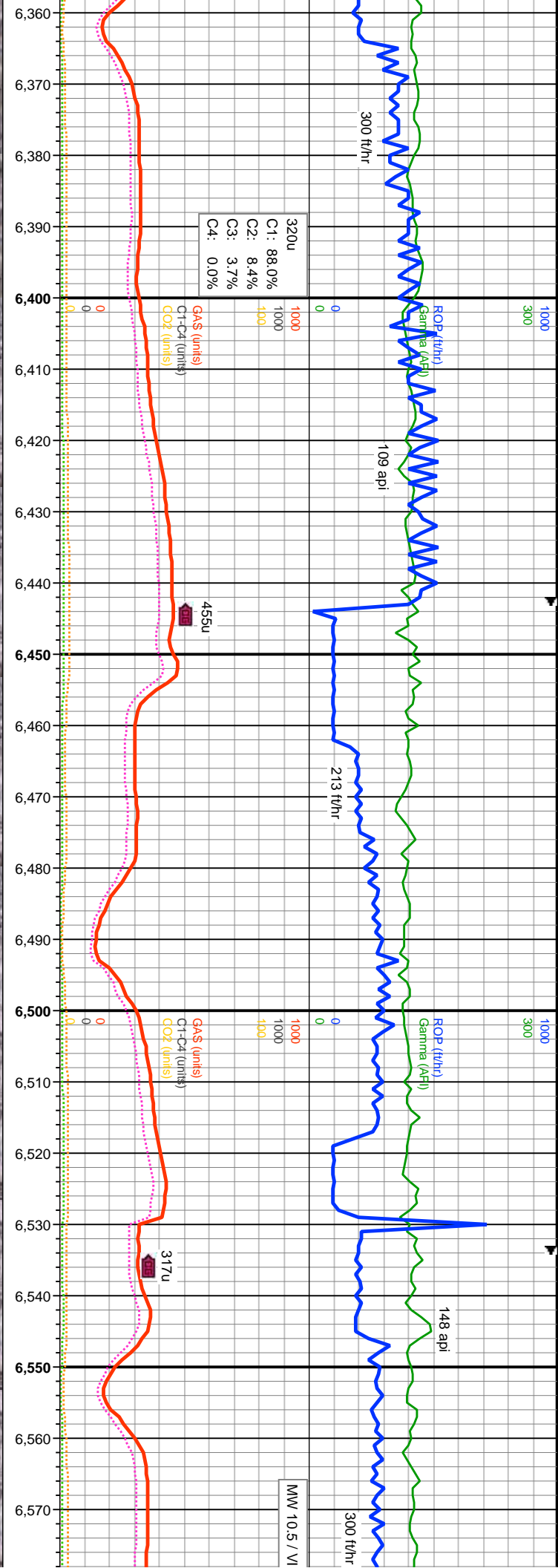
MD: 6,059'  
INC: 17.28°  
AZM: 28.74°  
TVD: 6,042.27'  
VS: 69.02'

100% SHY SLTST: ltgy, sme medgy, lt gysbhn, sft, ip frm-fri, sb blkly-plty, com  
fis, arg, slty, rthy, mod cly rch mtX, sl calc

100% SHY SLTST: ltgy, sme  
fis, arg, slty, rthy, mod cly rch

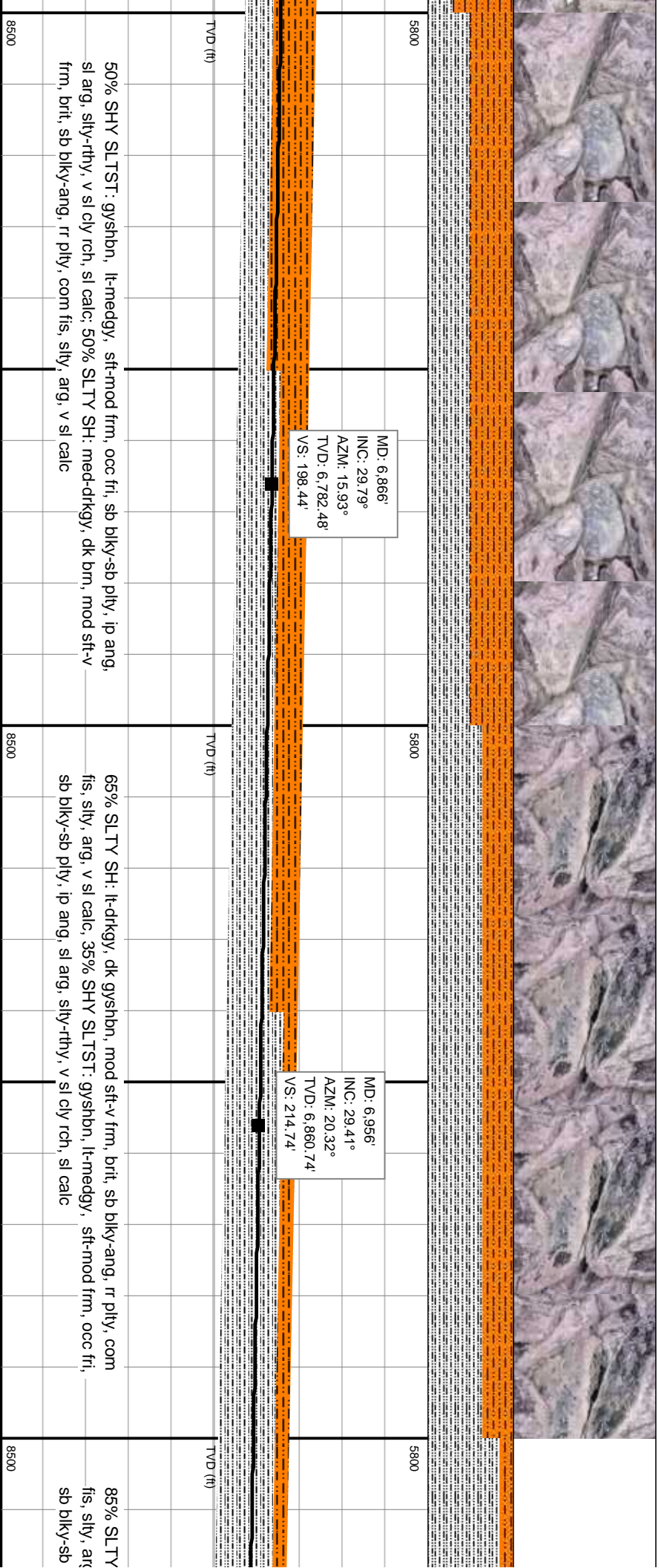
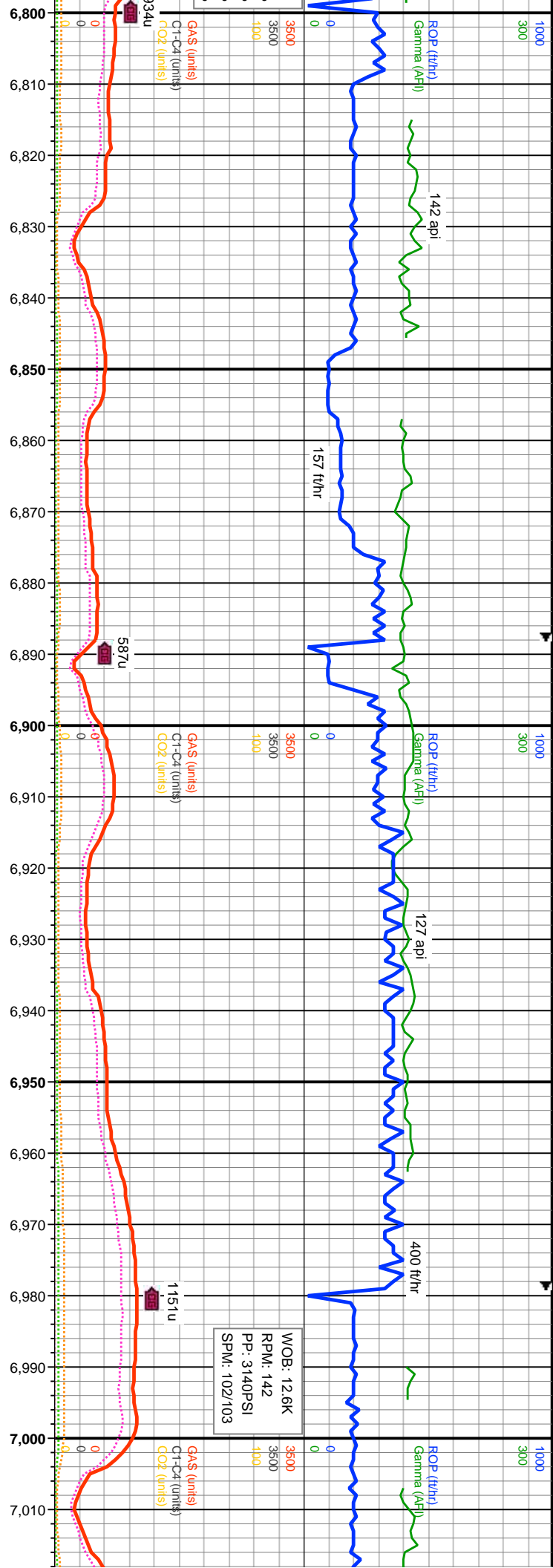






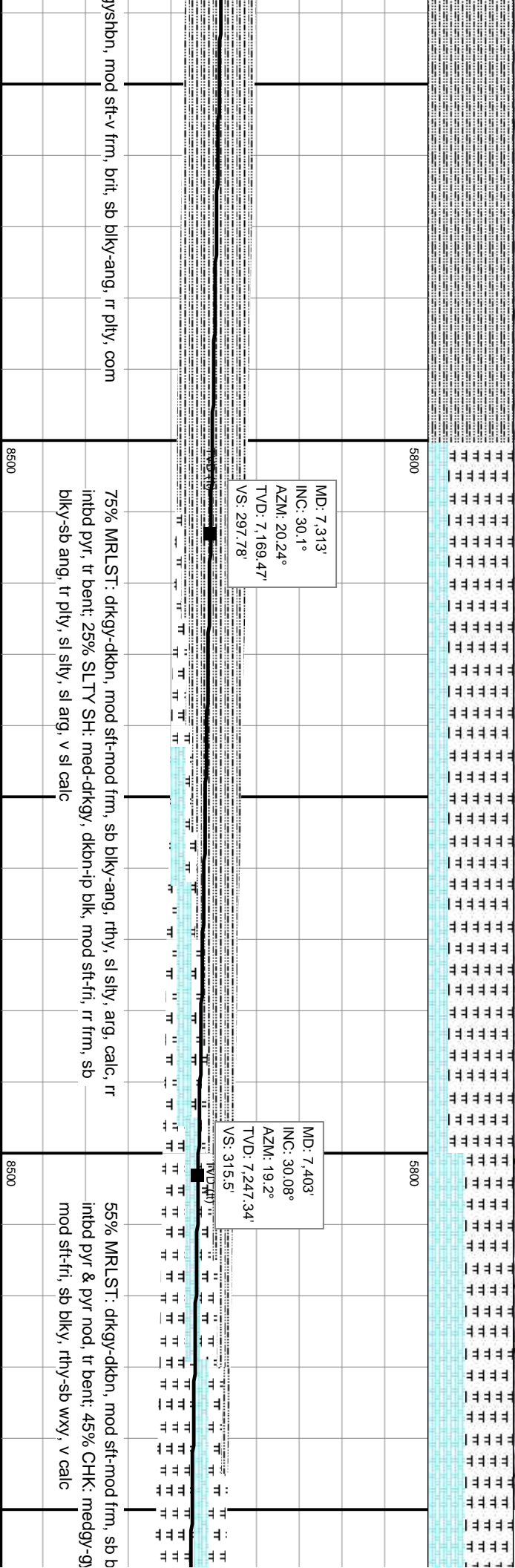
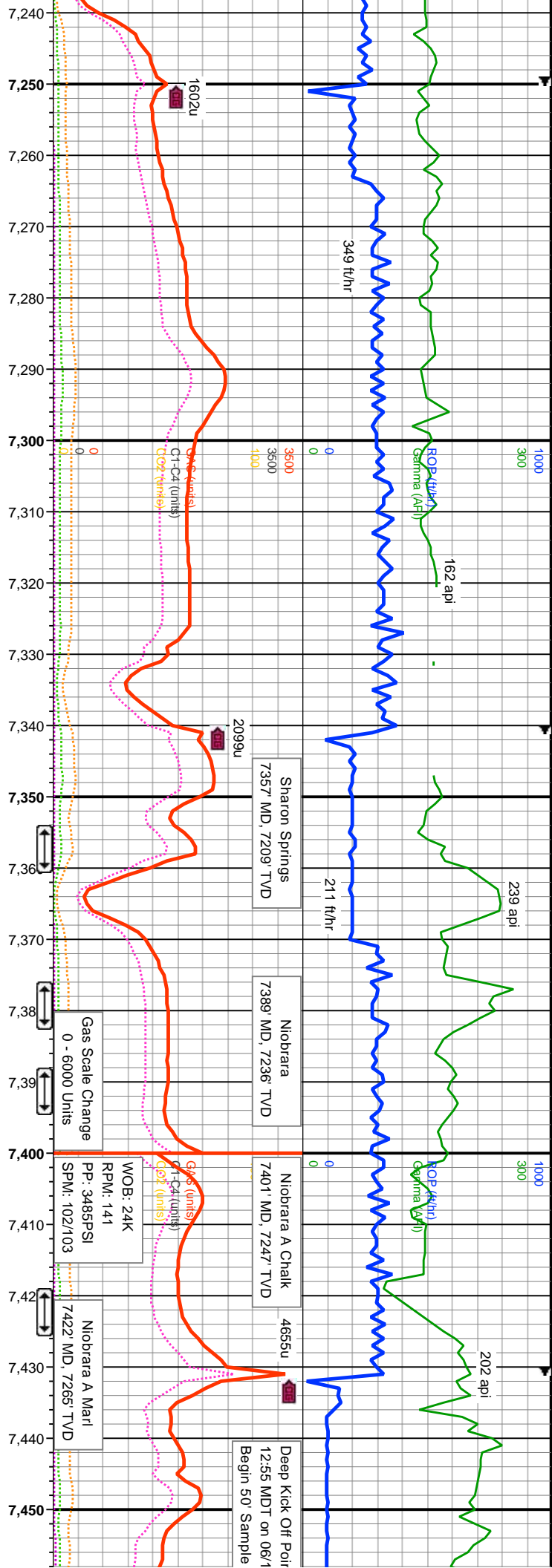




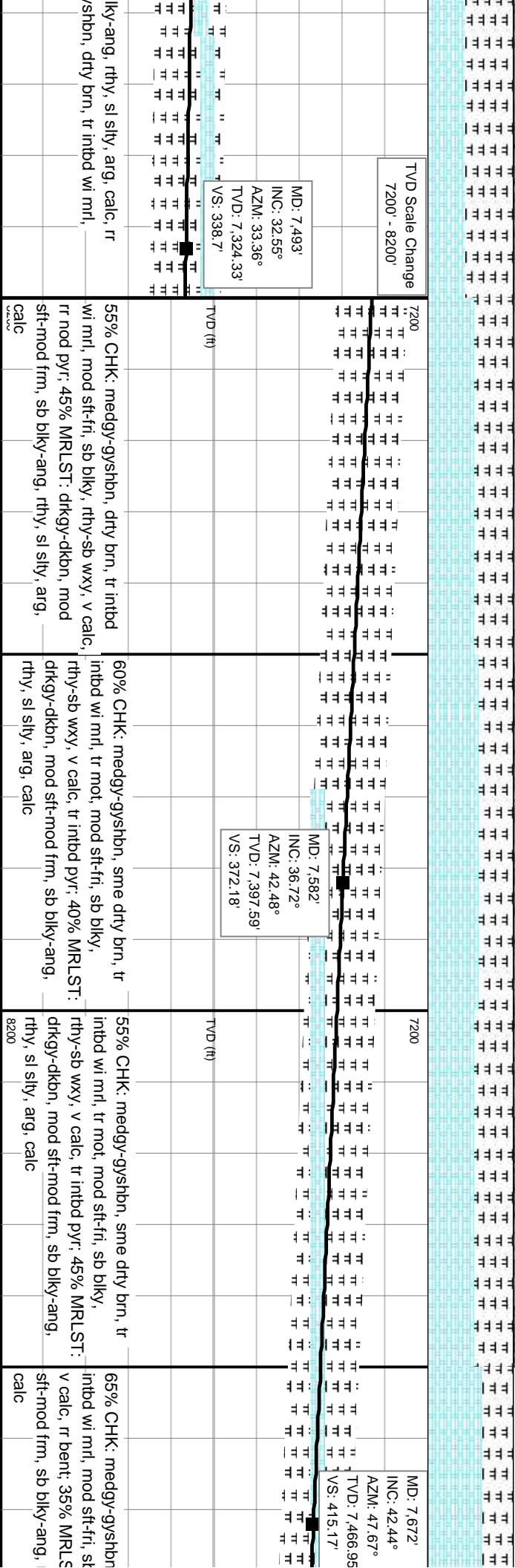
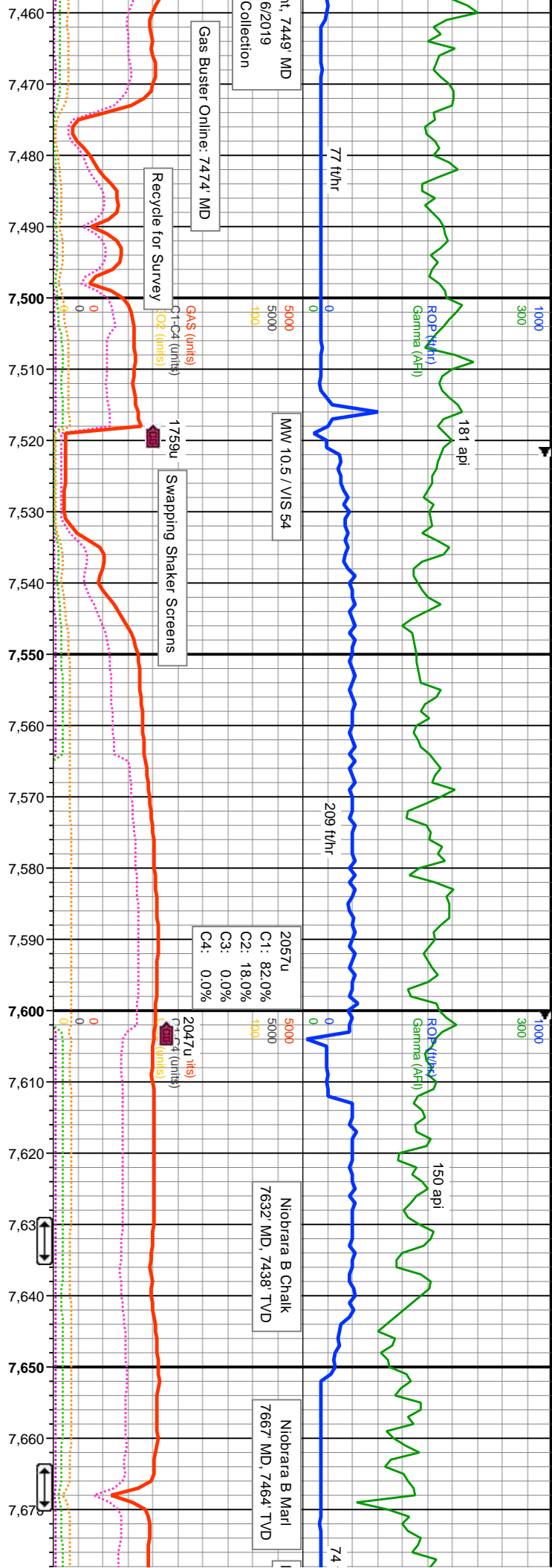




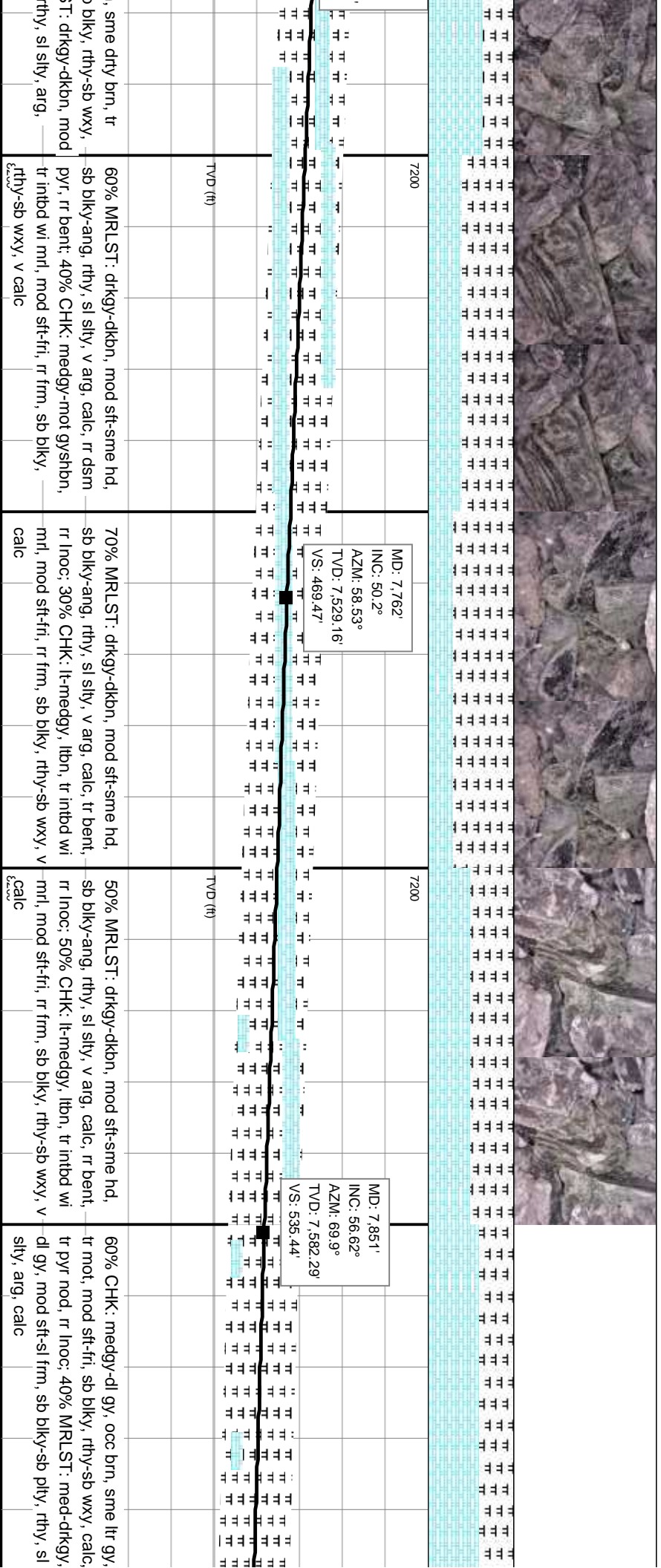
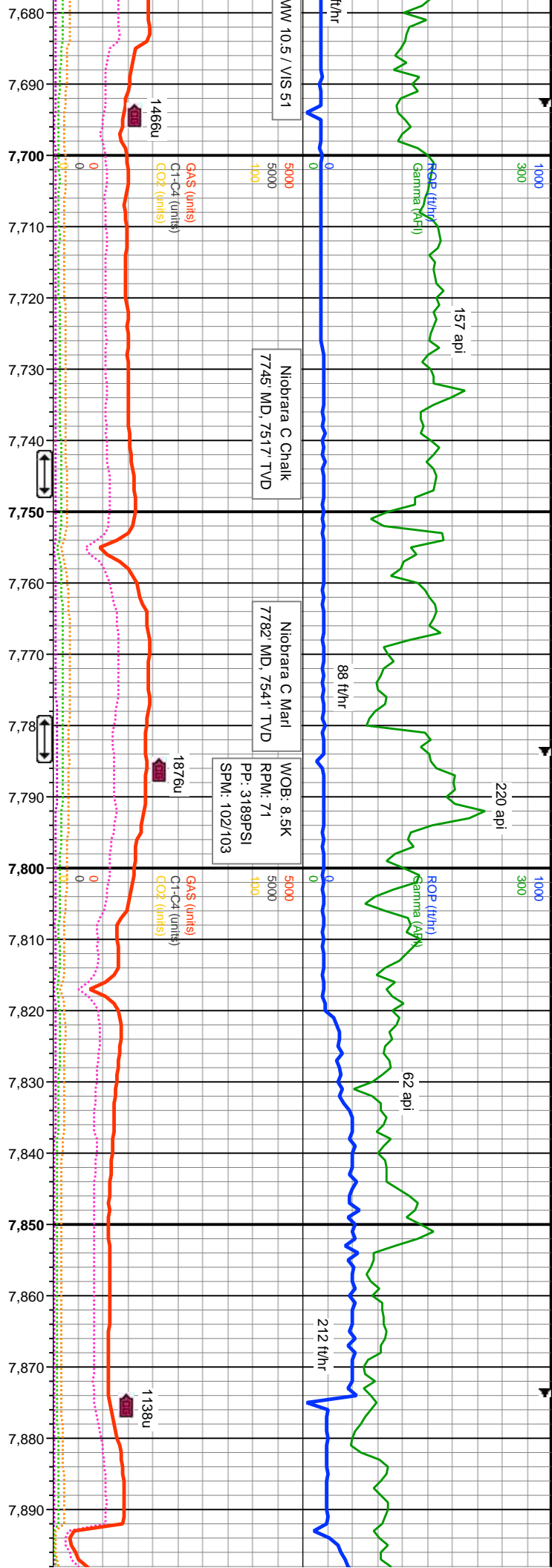


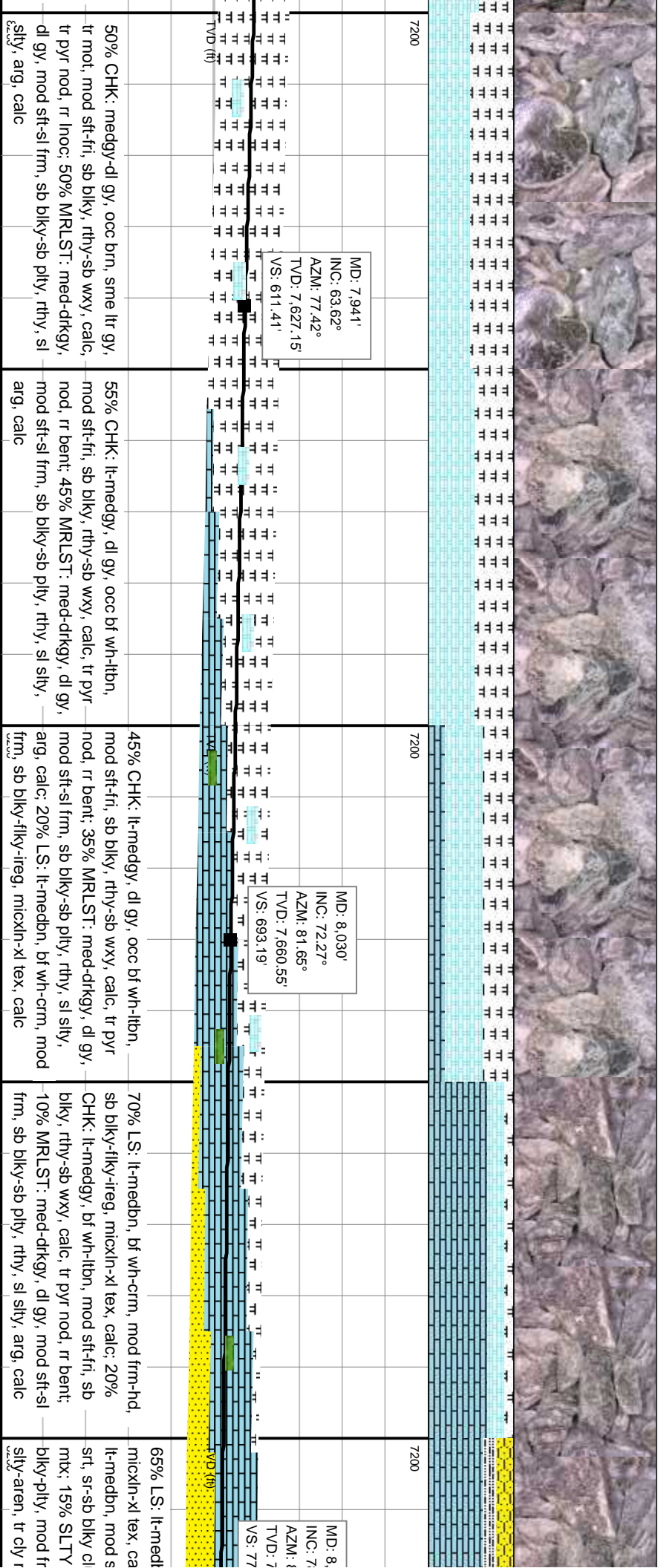
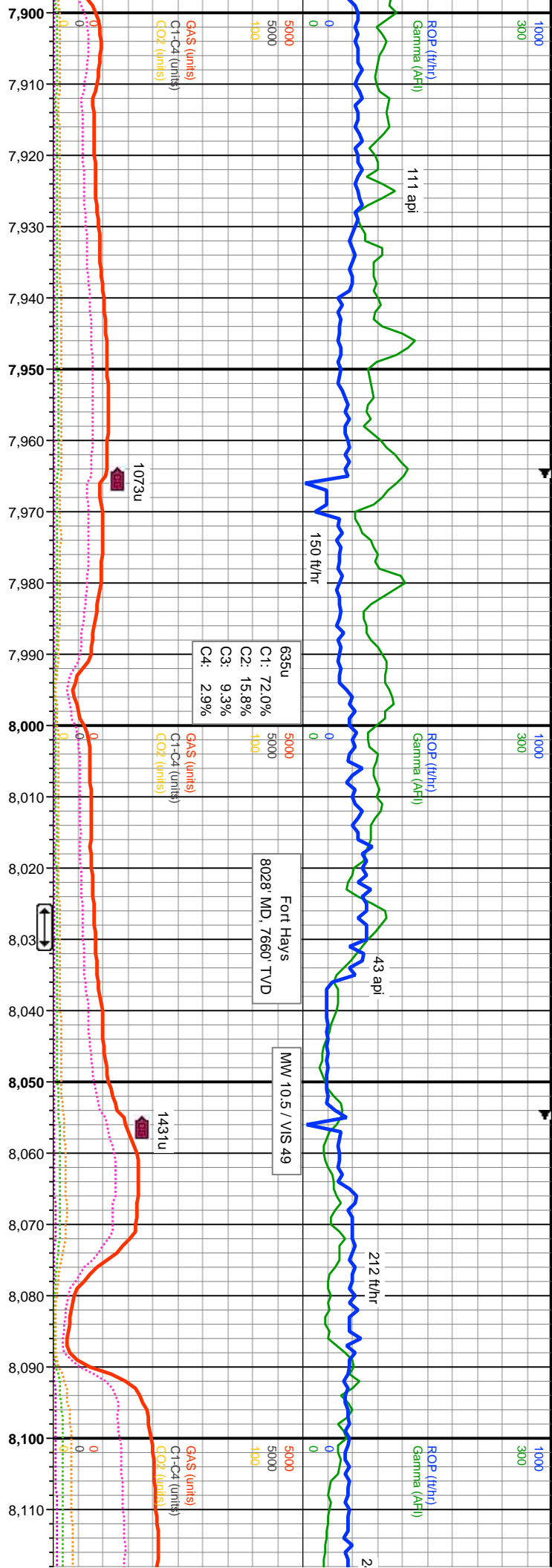




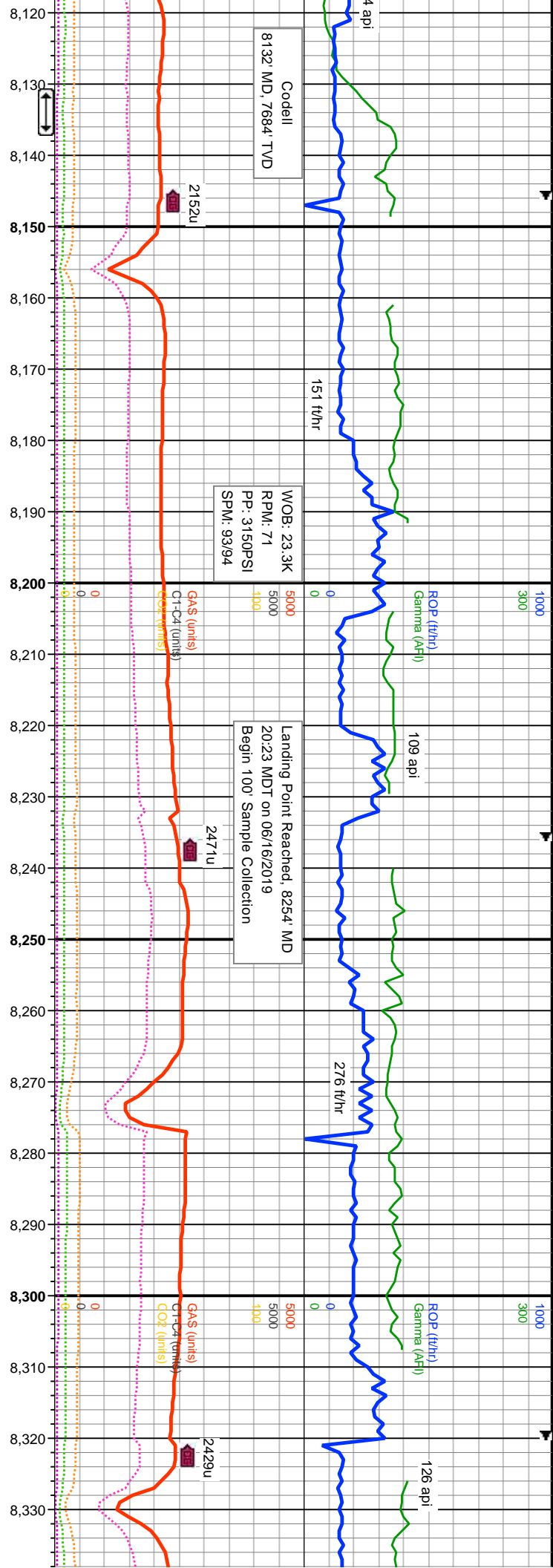




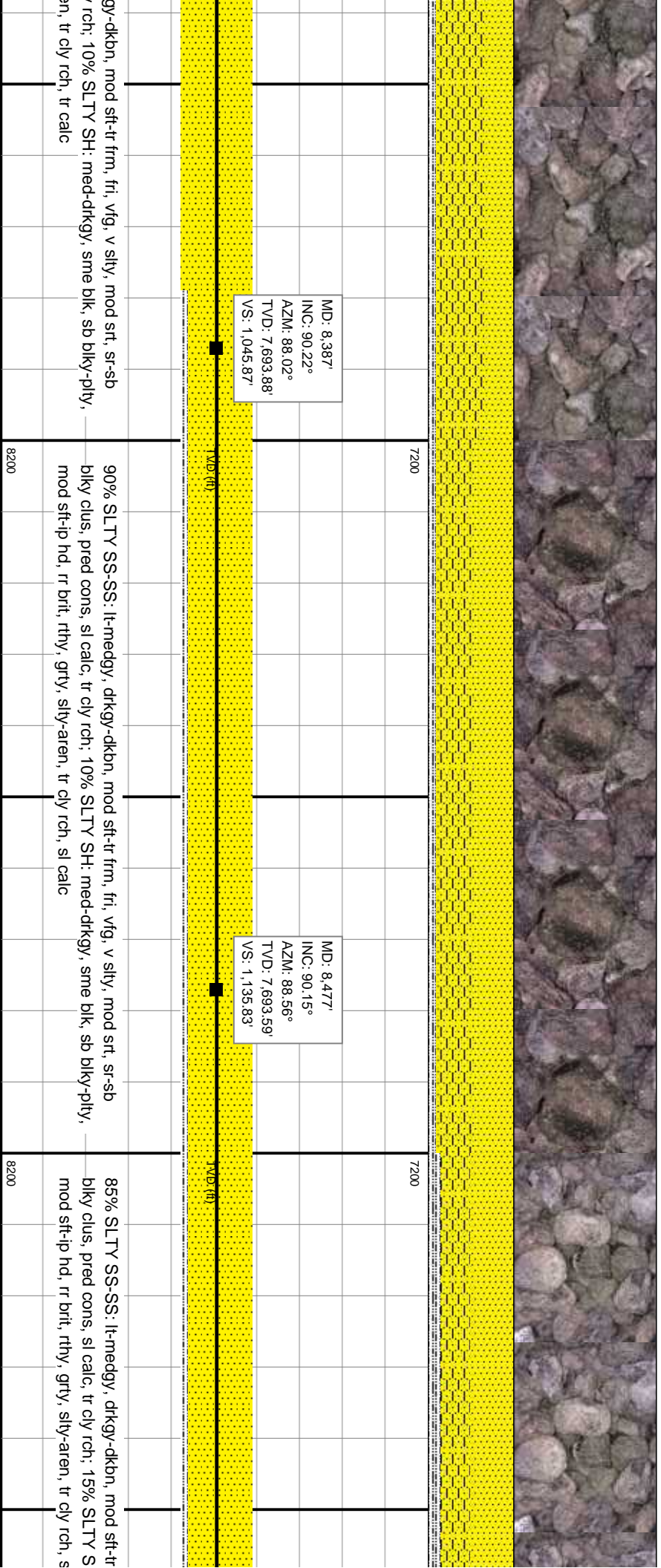
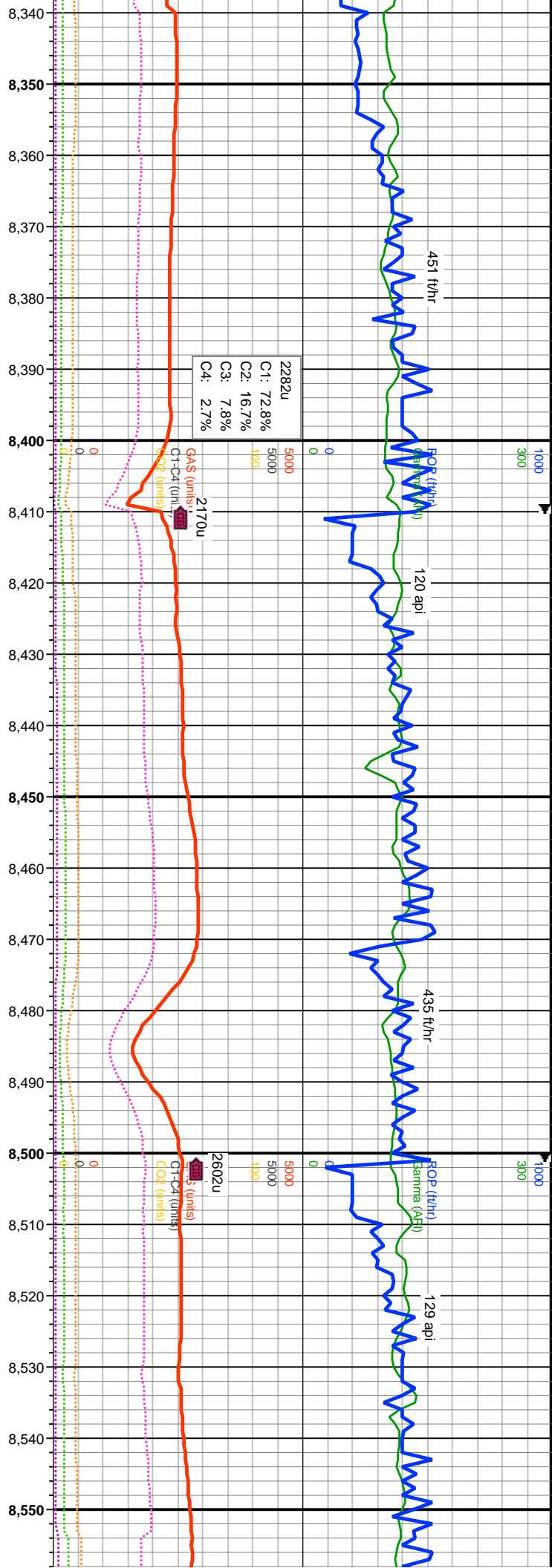




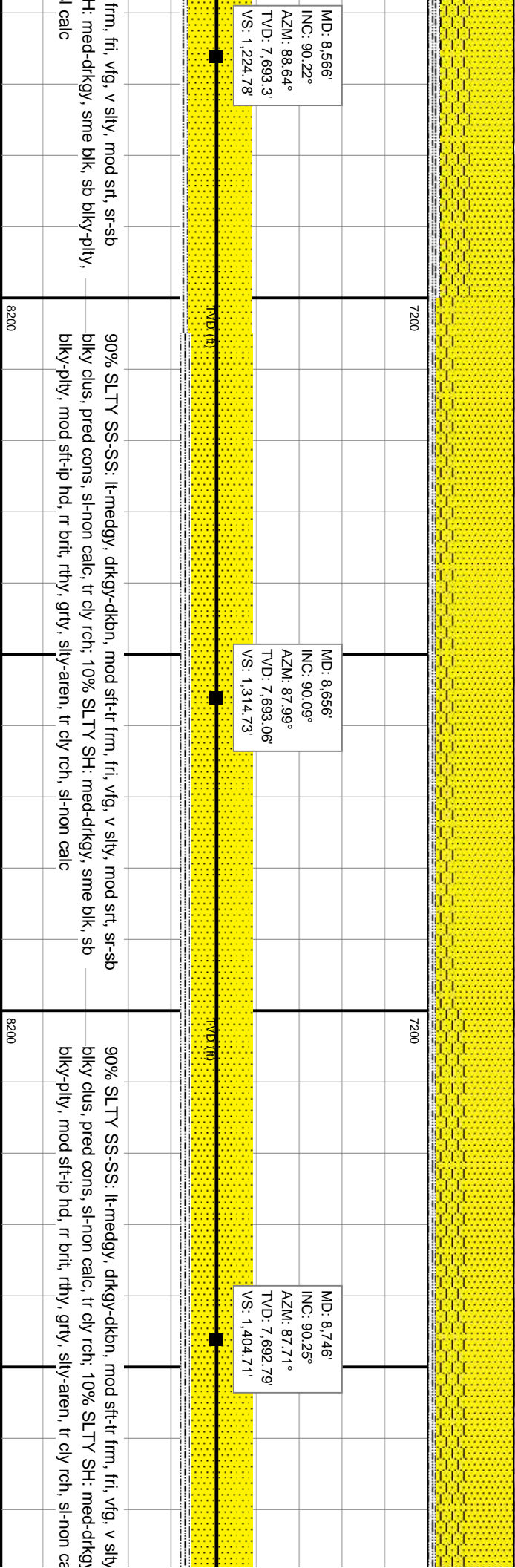
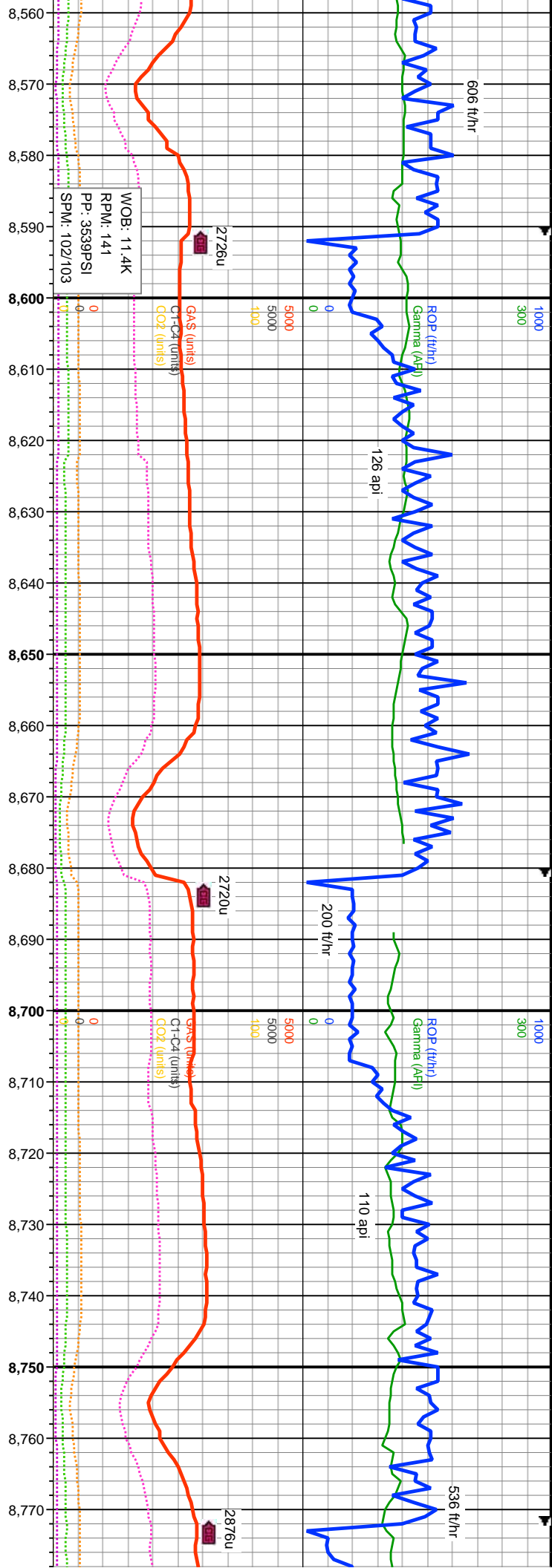


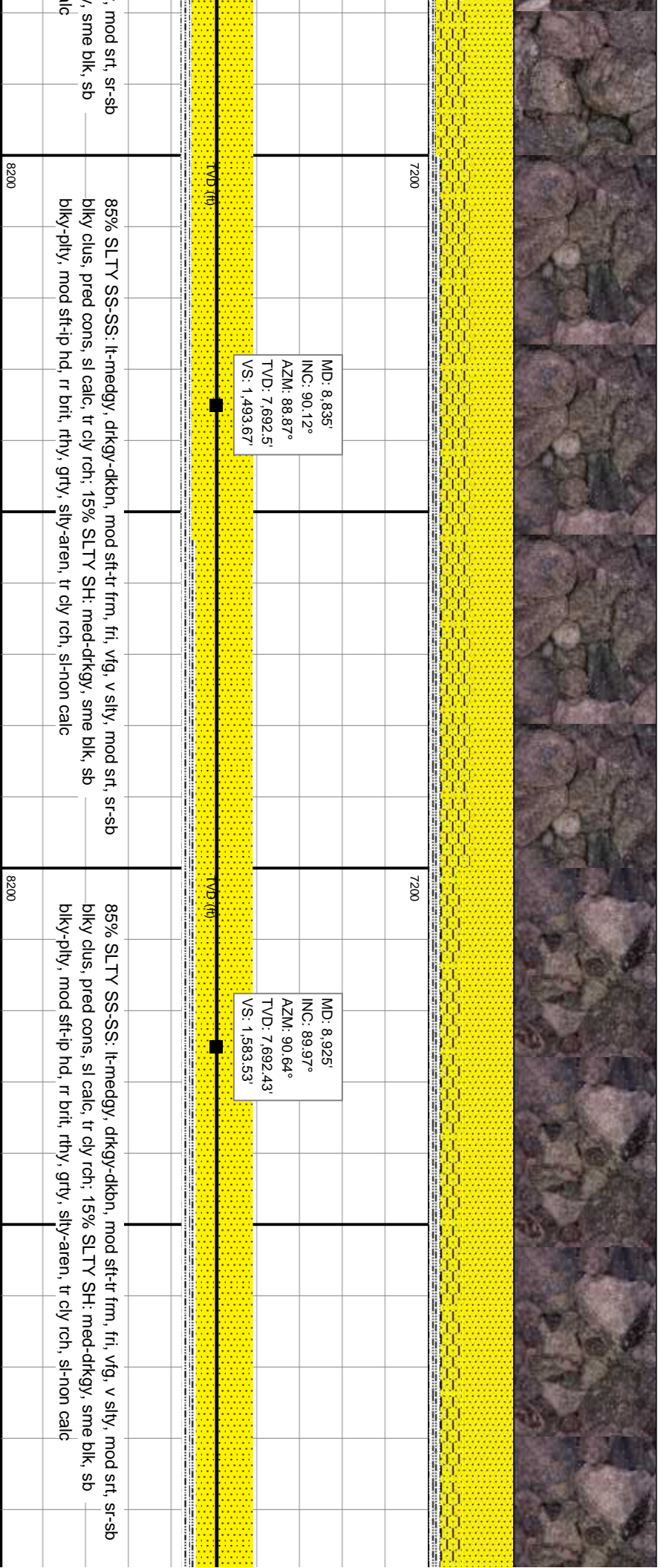
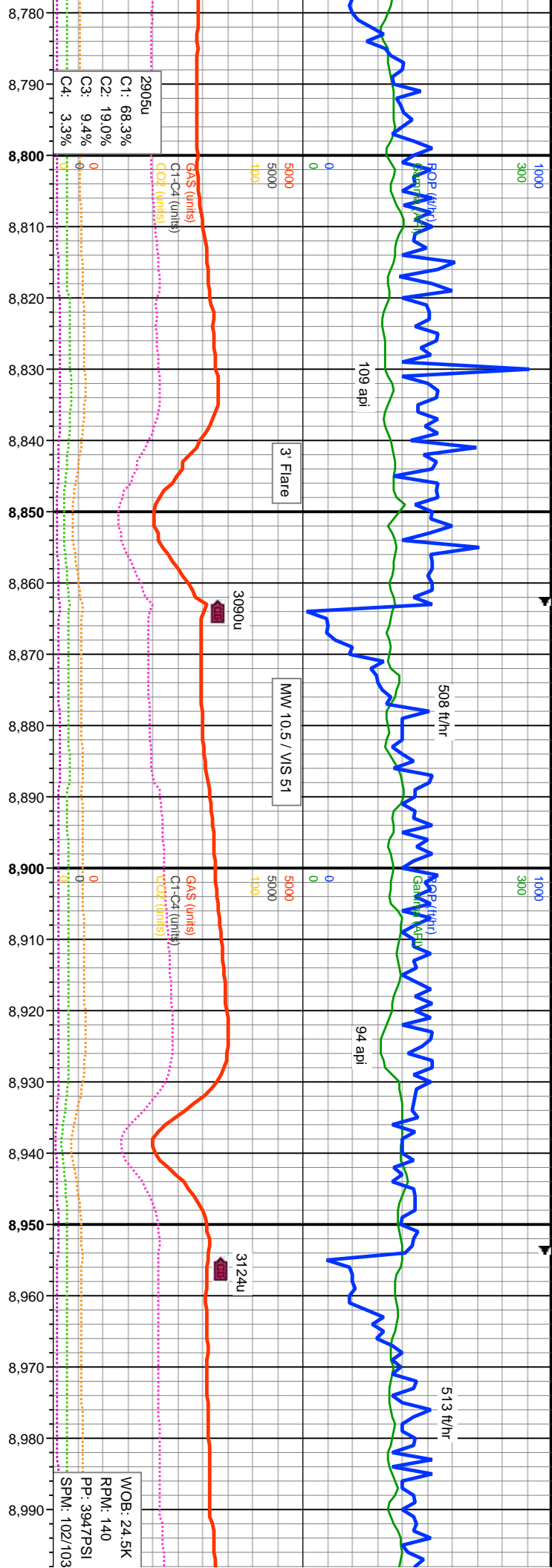


on, mod frm-hd, sb blkly-pty, ic; 20% SLTY SS: lt-medgy, cft-tr frm, fri, vfg, v silty, mod clus, pred cons, tr calc, lmy/cly SH: med-drkgy, sme blk, sb blkly-pty, mod sft, rr brit, rthy, chn, tr calc	7200	7200	8200
75% SLTY SS-SS: lt-medgy, lt-medbn, mod sft-tr frm, fri, vfg, v silty, mod srt, sr-sb blkly clus, pred cons, tr calc, lmy/cly mx; 15% SLTY SH: med-drkgy, sme blk, sb blkly-pty, mod frm-occ mod sft, rr brit, rthy, silty-aren, tr cly rch, tr calc; 10% LS: lt-medbn, mod frm-hd, sb blkly-pty, micxln-xl tex, calc	7200	7200	8200
90% SLTY SS-SS: lt-medgy, drkgy-dkbn, mod sft-tr frm, fri, vfg, v silty, mod srt, sr-sb blkly clus, pred cons, tr calc, tr cly rch, tr LS; 10% SLTY SH: med-drkgy, sme blk, sb blkly-pty, mod sft-ip hd, rr brit, rthy, silty-aren, tr cly rch, tr calc	7200	7200	8200
85% SLTY SS-SS: lt-medgy, drkgy-dkbn, mod sft-tr frm, fri, vfg, v silty, mod srt, sr-sb blkly clus, pred cons, tr calc, tr cly rch, tr LS; 15% SLTY SH: med-drkgy, sme blk, sb blkly-pty, mod sft-ip hd, rr brit, rthy, silty-aren, tr cly rch, tr calc	7200	7200	8200
90% SLTY SS-SS: lt-medgy, drk blkly clus, pred cons, tr calc, tr cly mod sft-ip hd, rr brit, rthy, silty-are	7200	7200	8200
119' 8.94° 30.8° 682.66' 8.96'	MD: 8,209' INC: 87.05° AZM: 83.35° TVD: 7,693.63' VS: 867.93'	MD: 8,254' INC: 90.4° AZM: 86.29° TVD: 7,694.63' VS: 912.89'	MD: 8,298' INC: 90.37° AZM: 87.28° TVD: 7,694.34' VS: 956.89'

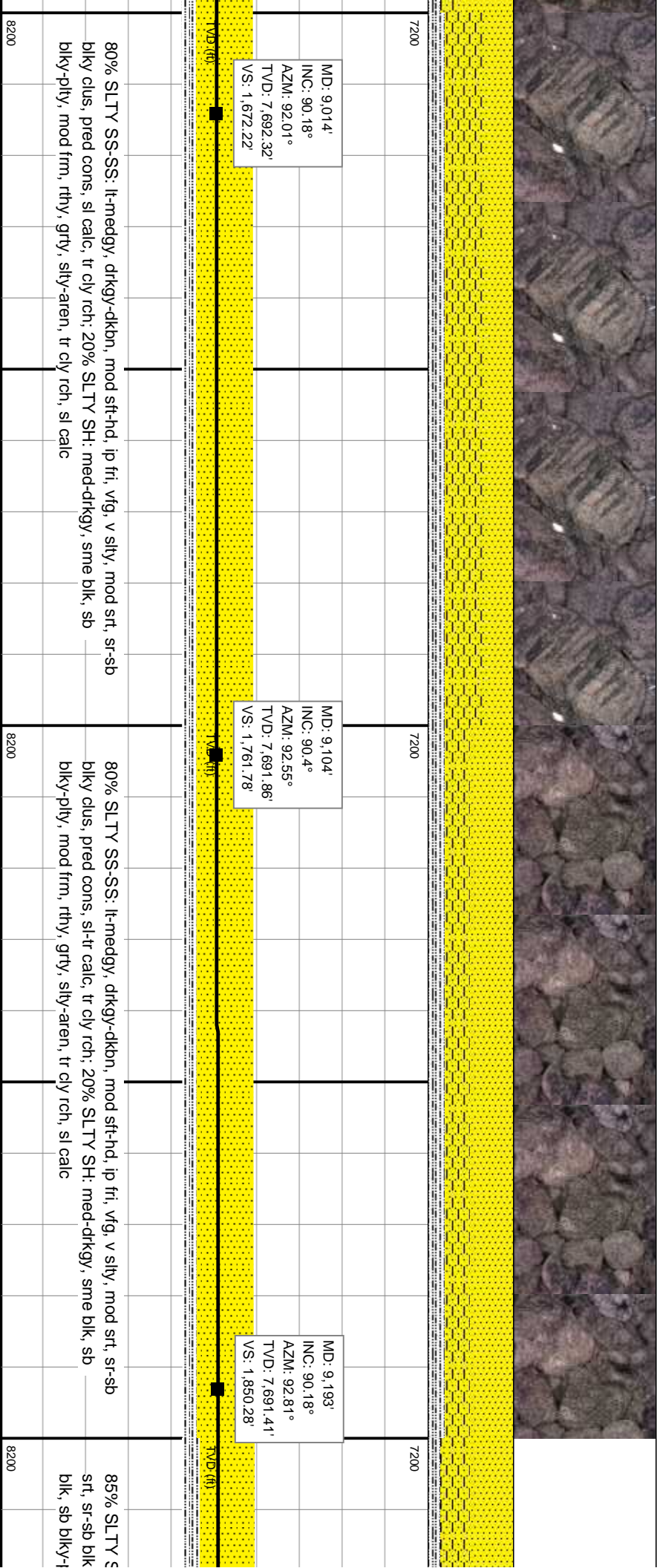
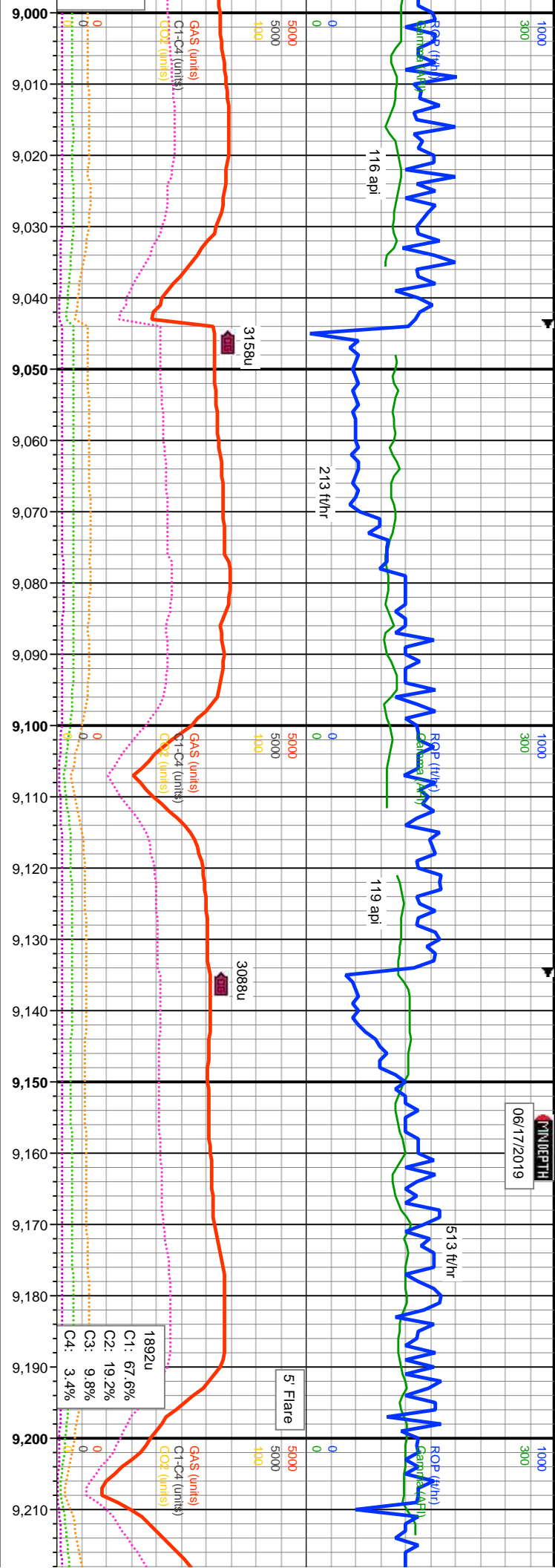




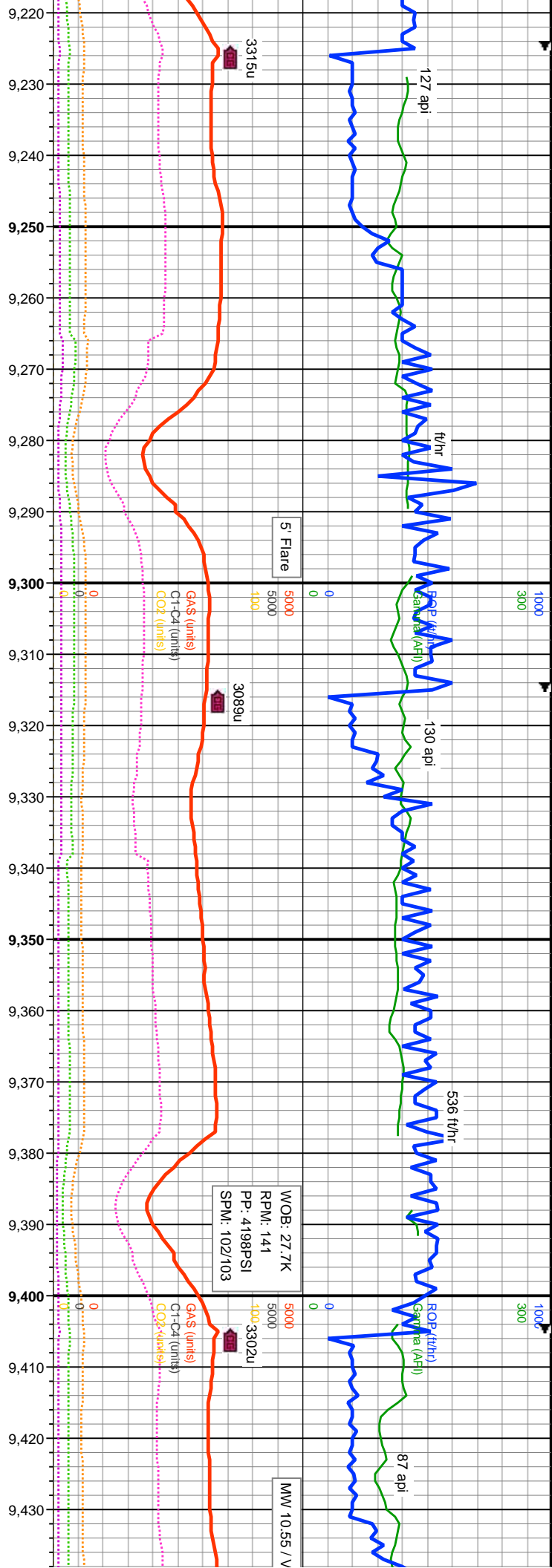












MD: 9.282'  
INC: 90.37°  
AZM: 92.53°  
TVD: 7.690.98'  
VS: 1.938.77'

MD: 9.372'  
INC: 90.37°  
AZM: 90.99°  
TVD: 7.690.4'  
VS: 2.028.4'

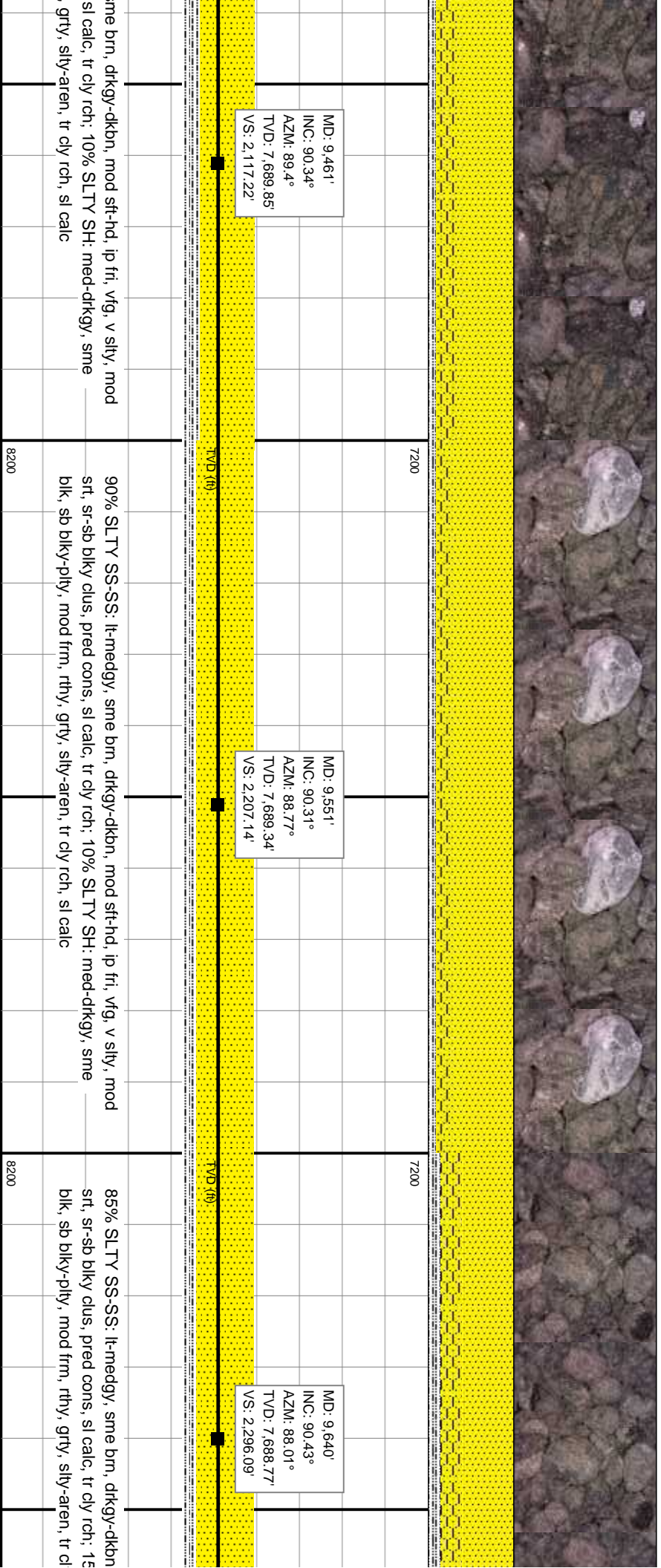
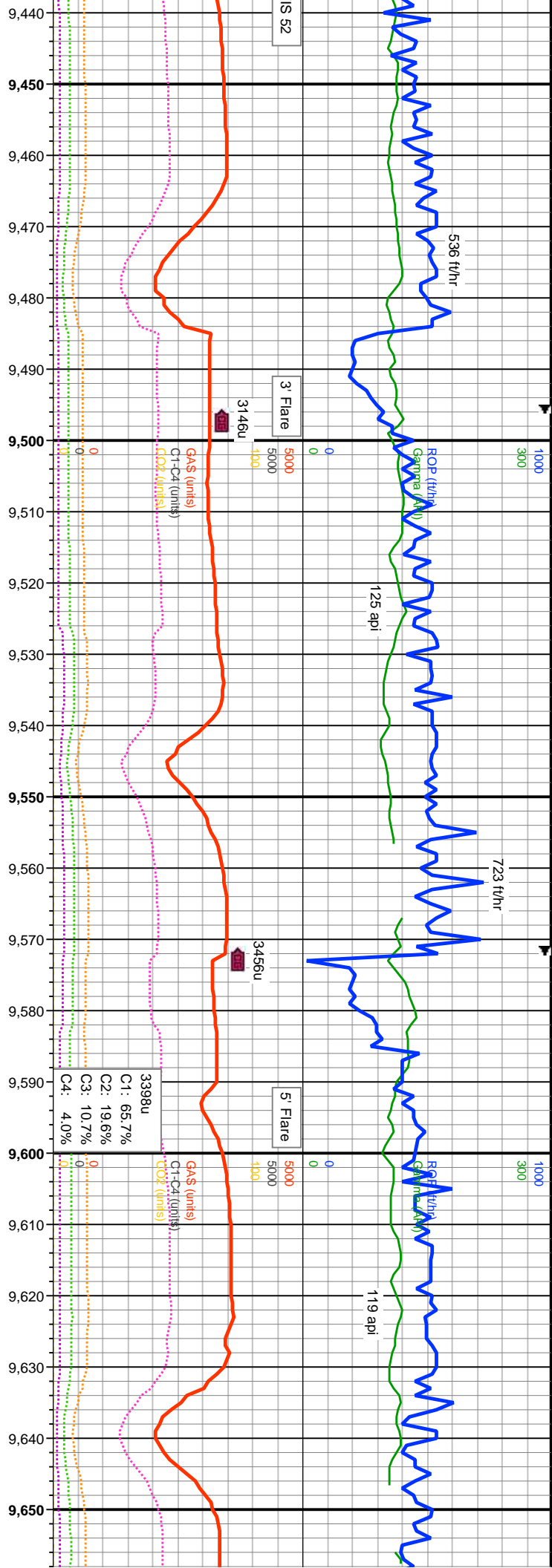
SS-S: lt-medgy, sme brn, dkgy-dkbn, mod sft-hd, ip fri, vfg, v silty, mod  
clus, pred cons, sl-tr calc, tr cly rch; 15% SLTY SH: med-dkgy, sme  
silty, mod frm, rthy, grty, silty-aren, tr cly rch, sl calc

85% SLTY SS-S: lt-medgy, sme brn, dkgy-dkbn, mod sft-hd, ip fri, vfg, v silty, mod  
srt, sr-sb blkly clus, pred cons, sl calc, tr cly rch; 15% SLTY SH: med-dkgy, sme  
blk, sb blkly-plty, mod frm, rthy, grty, silty-aren, tr cly rch, sl calc

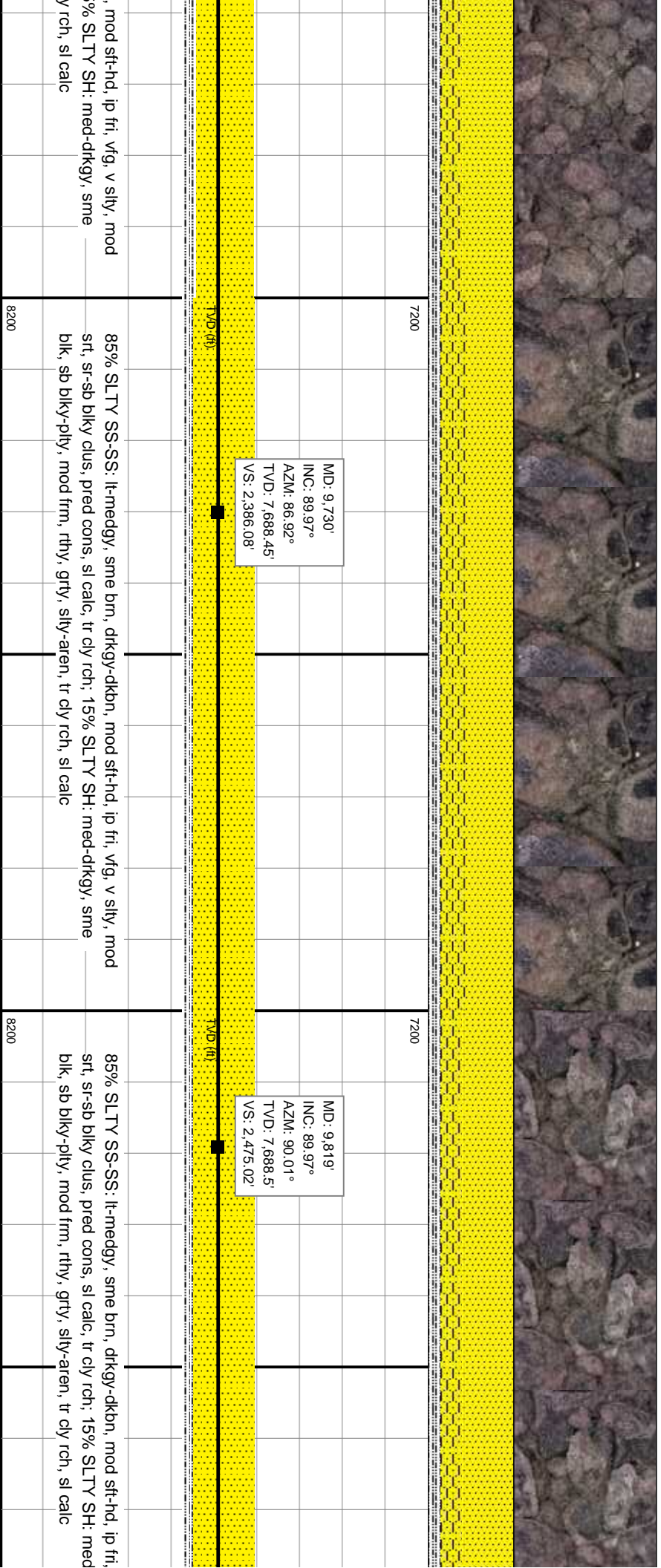
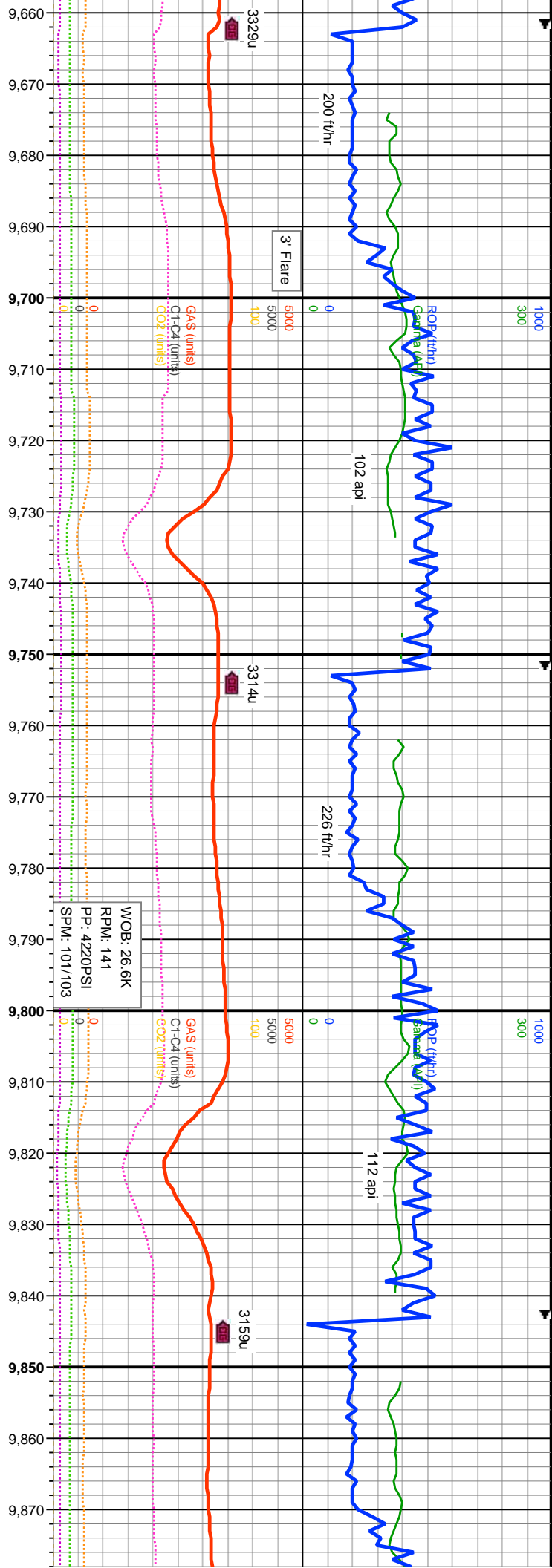
90% SLTY SS-S: lt-medgy, s  
srt, sr-sb blkly clus, pred cons,  
blk, sb blkly-plty, mod frm, rthy

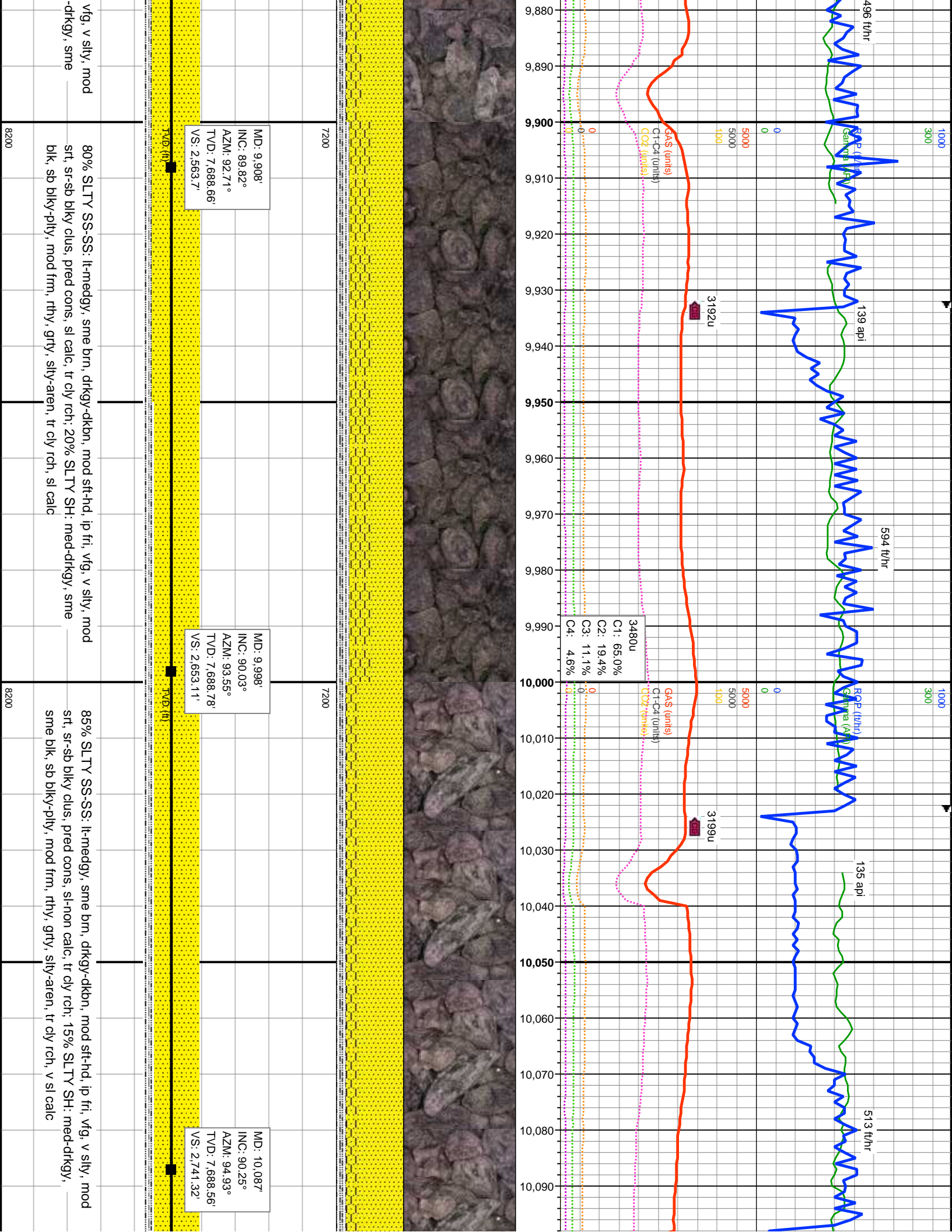
7200  
8200

TVD (ft)

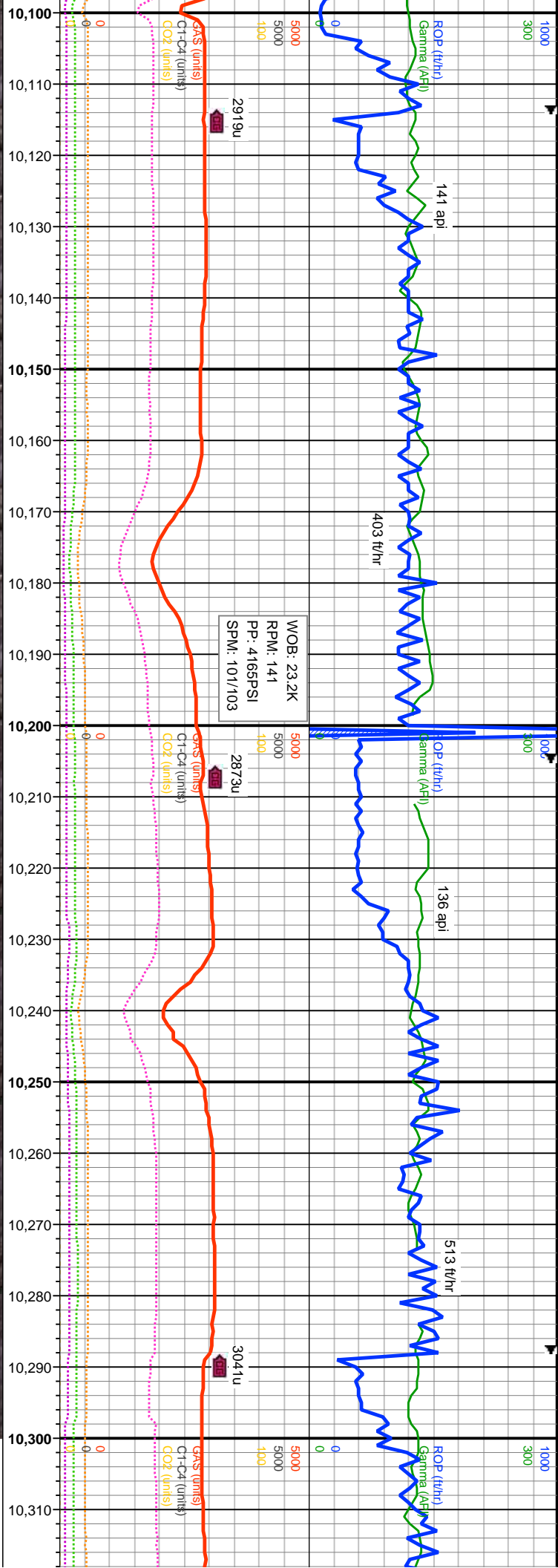




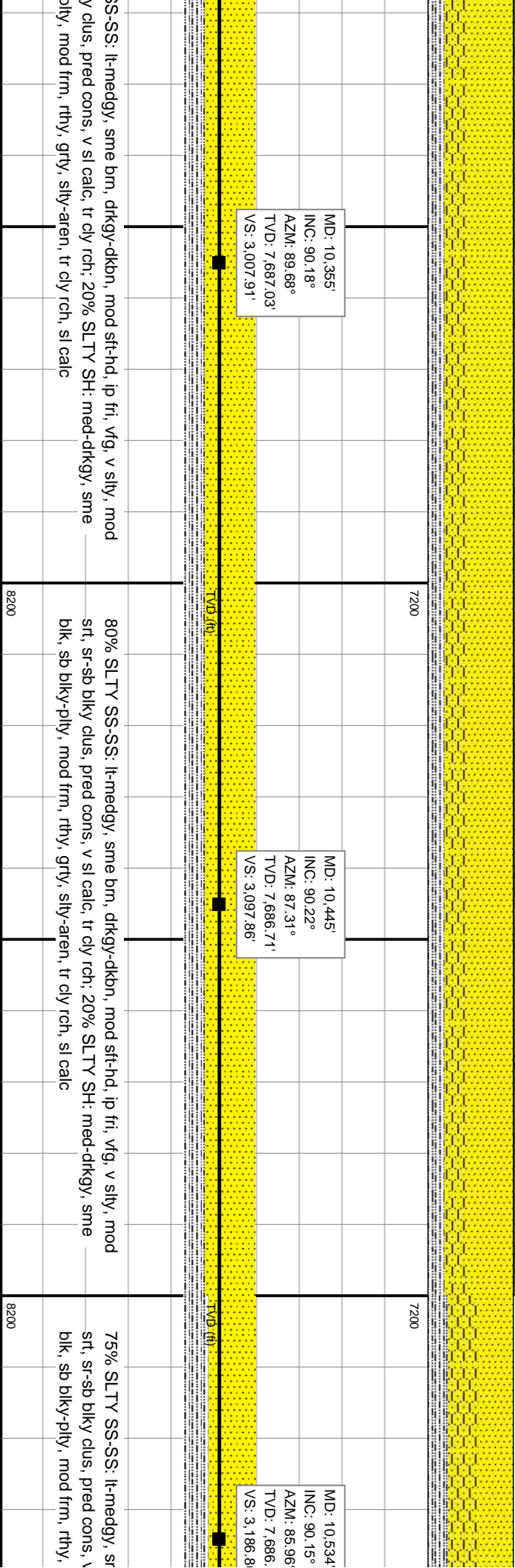
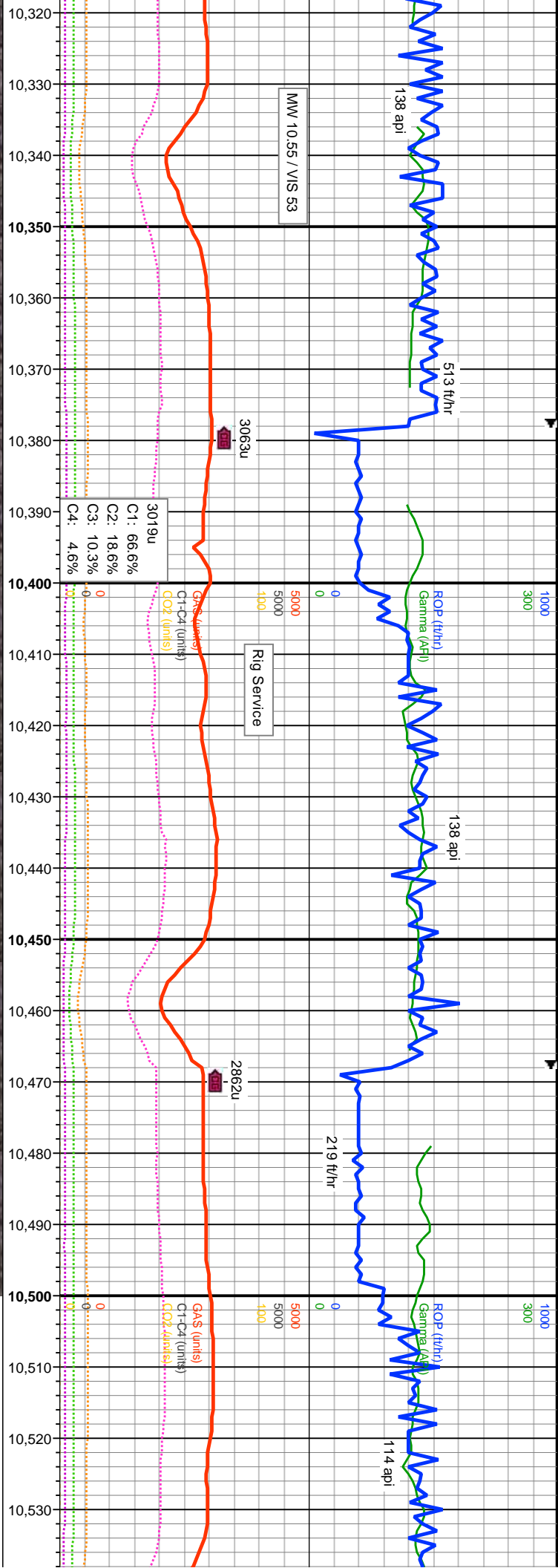




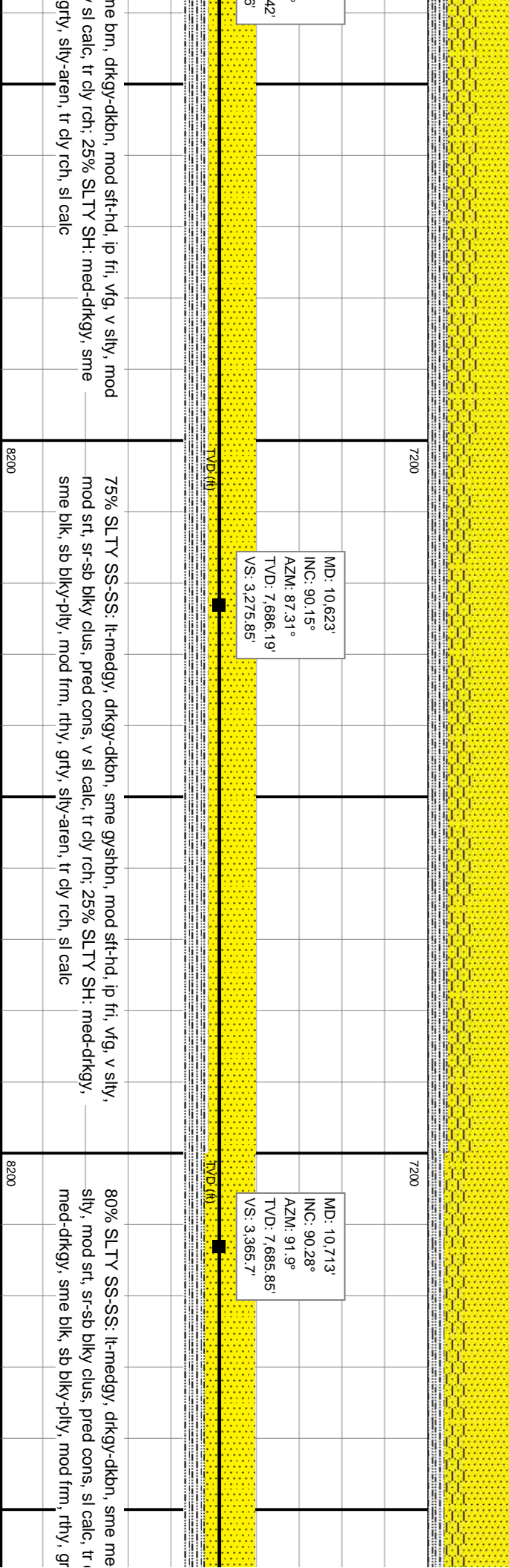
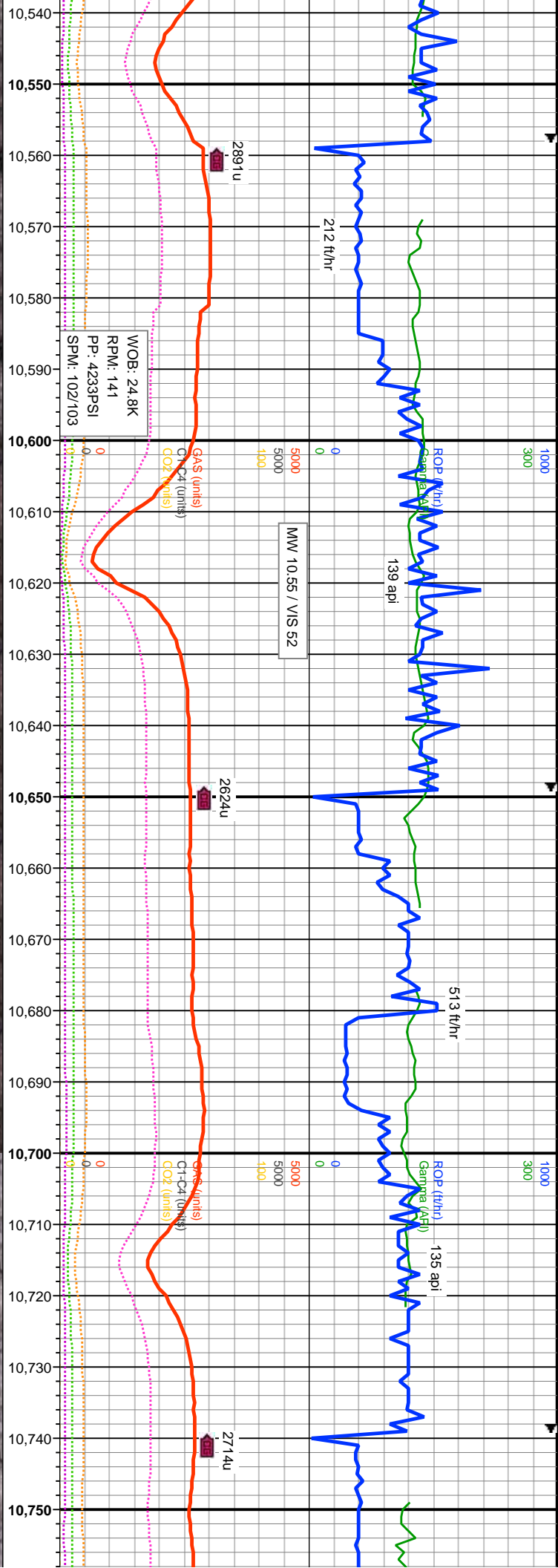




80% SLTY SS-SS: lt-medgy, sme brn, dkgy-dkbn, mod sft-hd, ip fri, vfg, v silty, mod srt, sr-sb blkly clus, pred cons, sl calc, tr cly rch, 20% SLTY SH: med-dkgy, sme blk, sb blkly-pily, mod frm, rthy, grty, silty-aren, tr cly rch, sl calc		85% SLTY SS-SS: lt-medgy, sme brn, dkgy-dkbn, mod sft-hd, ip fri, vfg, v silty, mod srt, sr-sb blkly clus, pred cons, v sl calc, tr cly rch, 15% SLTY SH: med-dkgy, sme blk, sb blkly-pily, mod frm, rthy, grty, silty-aren, tr cly rch, sl calc		80% SLTY SS-SS: lt-medgy, sme brn, dkgy-dkbn, mod sft-hd, ip fri, vfg, v silty, mod srt, sr-sb blkly clus, pred cons, sl calc, tr cly rch, 20% SLTY SH: med-dkgy, sme blk, sb blkly-pily, mod frm, rthy, grty, silty-aren, tr cly rch, sl calc	
MD: 10,177' INC: 90.43° AZM: 92.72° TVD: 7,688.03' VS: 2,830.6'		MD: 10,266' INC: 90.34° AZM: 91.83° TVD: 7,687.43' VS: 2,919.16'		MD: 10,266' INC: 90.34° AZM: 91.83° TVD: 7,687.43' VS: 2,919.16'	
TVD (ft)		TVD (ft)		TVD (ft)	
7200		7200		7200	
8200		8200		8200	





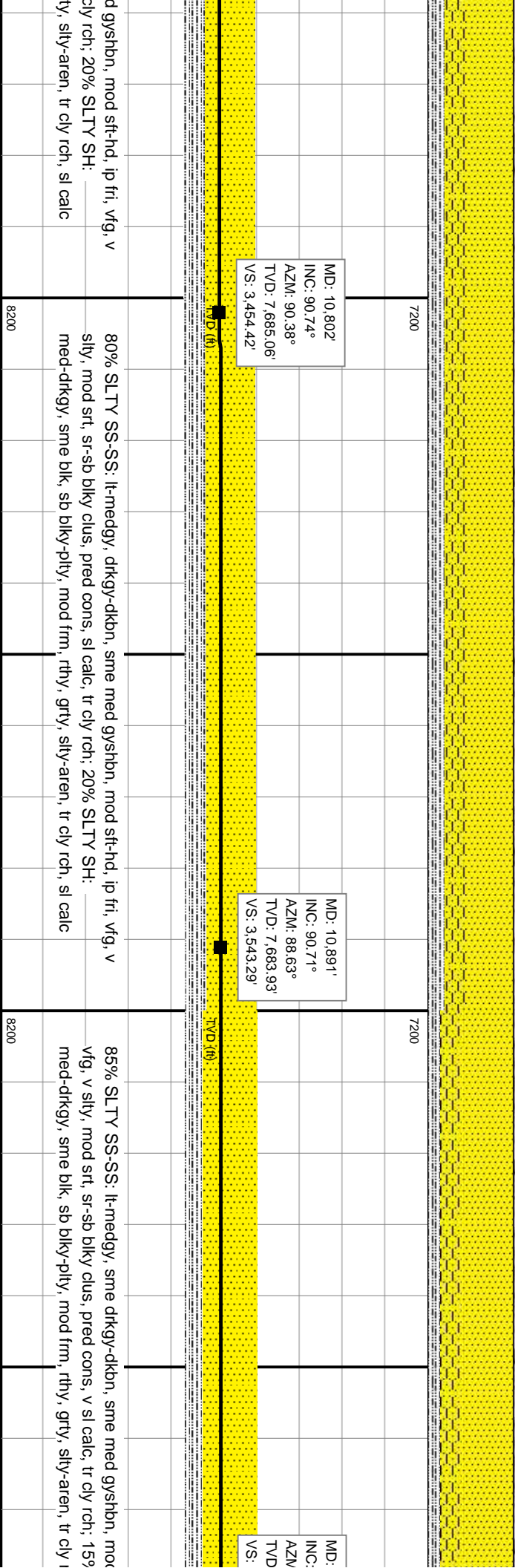
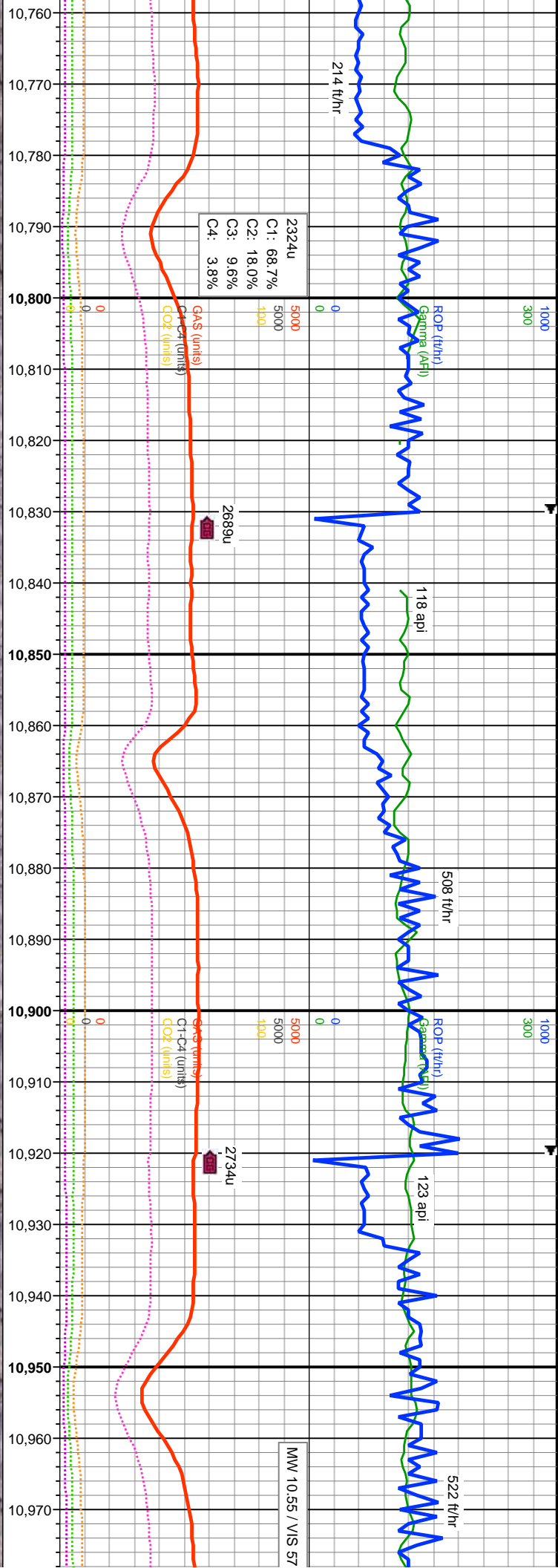


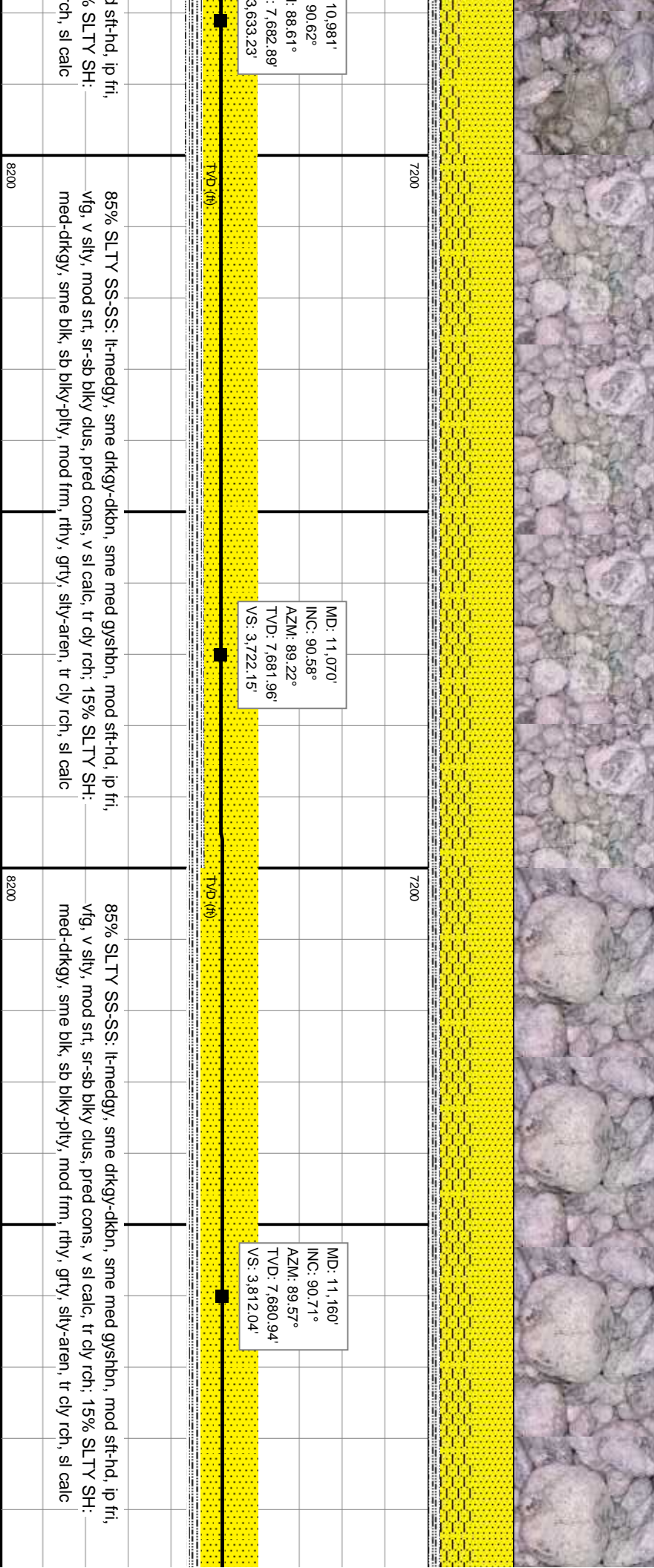
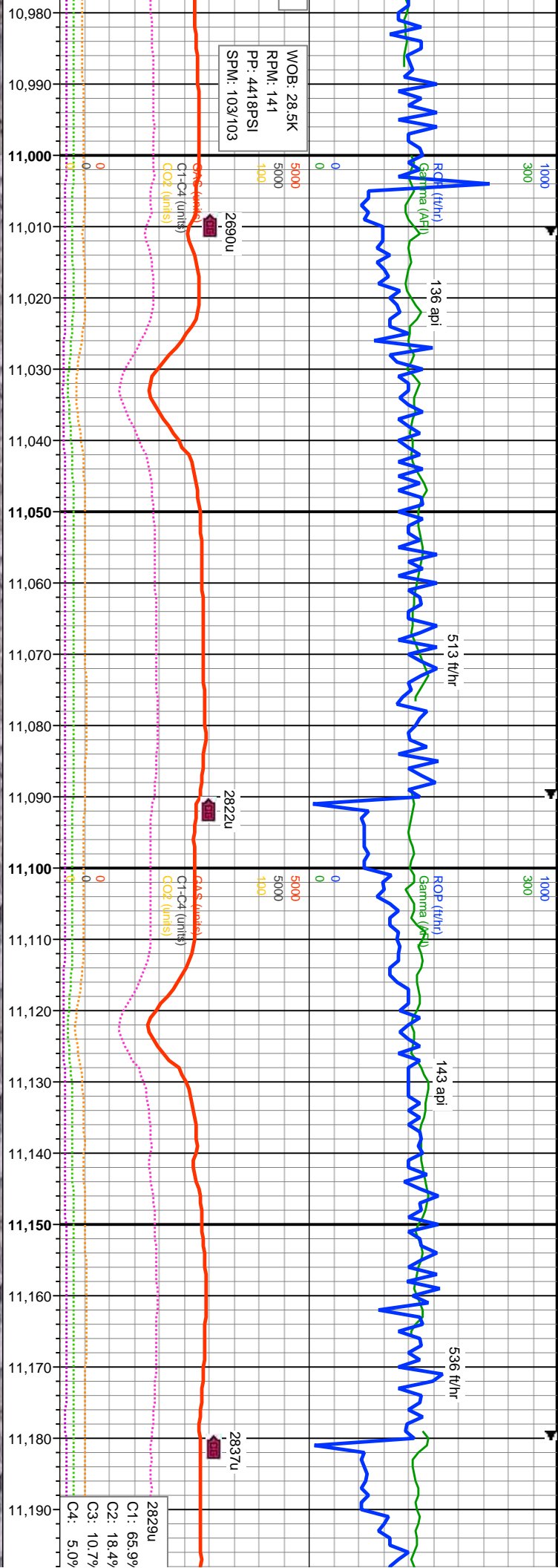
me brn, drkgy-dkbn, mod sft-hd, ip fri, vfg, v silty, mod  
sl calc, tr cly rch, 25% SLTY SH: med-drkgy, sme  
grty, silty-aren, tr cly rch, sl calc

75% SLTY SS-SS: lt-medgy, drkgy-dkbn, sme gysbhn, mod sft-hd, ip fri, vfg, v silty,  
mod srt, sr-sb blkly clus, pred cons, v sl calc, tr cly rch, 25% SLTY SH: med-drkgy,  
sme blk, sb blkly-pty, mod frm, rthy, grty, silty-aren, tr cly rch, sl calc

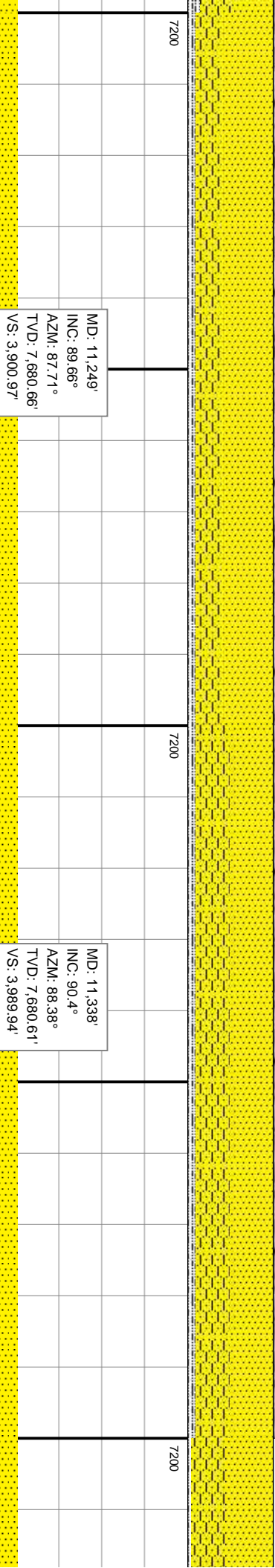
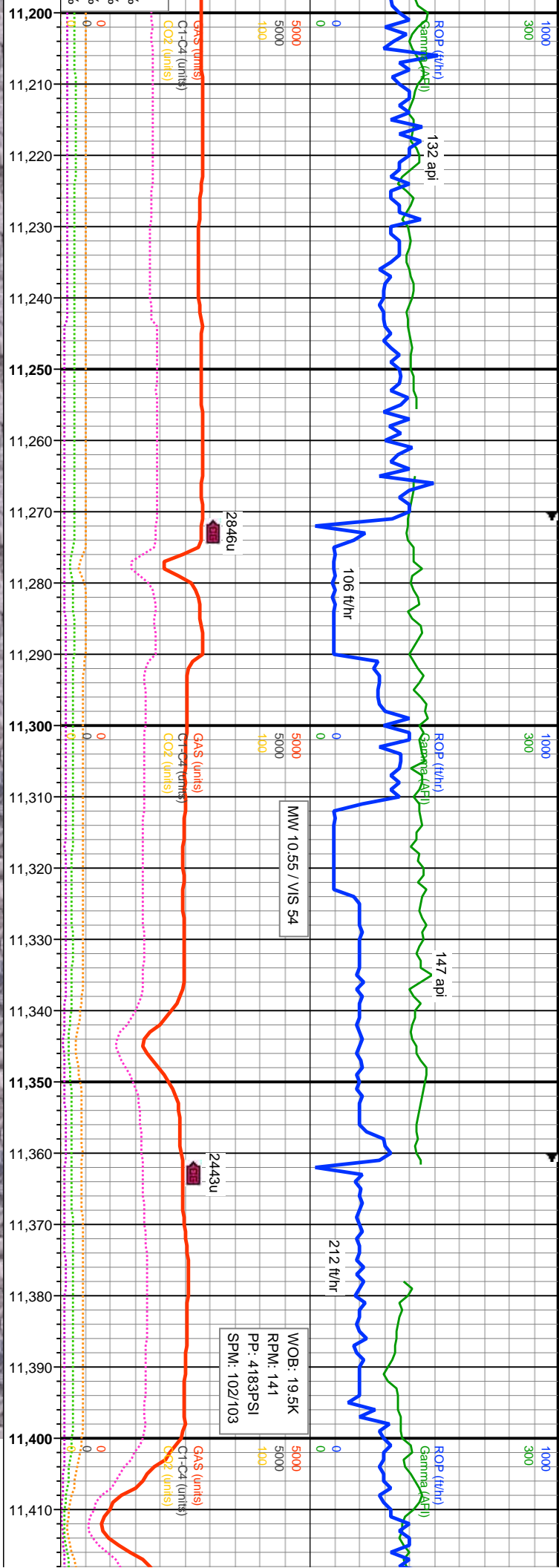
80% SLTY SS-SS: lt-medgy, drkgy-dkbn, sme me  
silty, mod srt, sr-sb blkly clus, pred cons, sl calc, tr  
med-drkgy, sme blk, sb blkly-pty, mod frm, rthy, gr







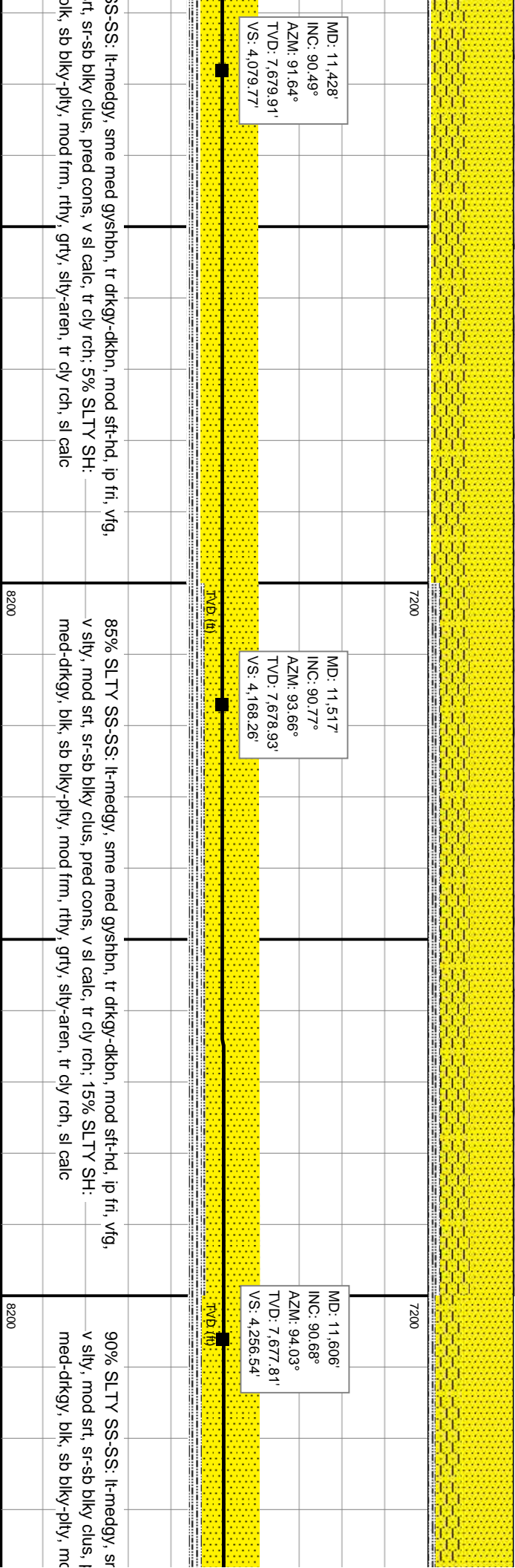
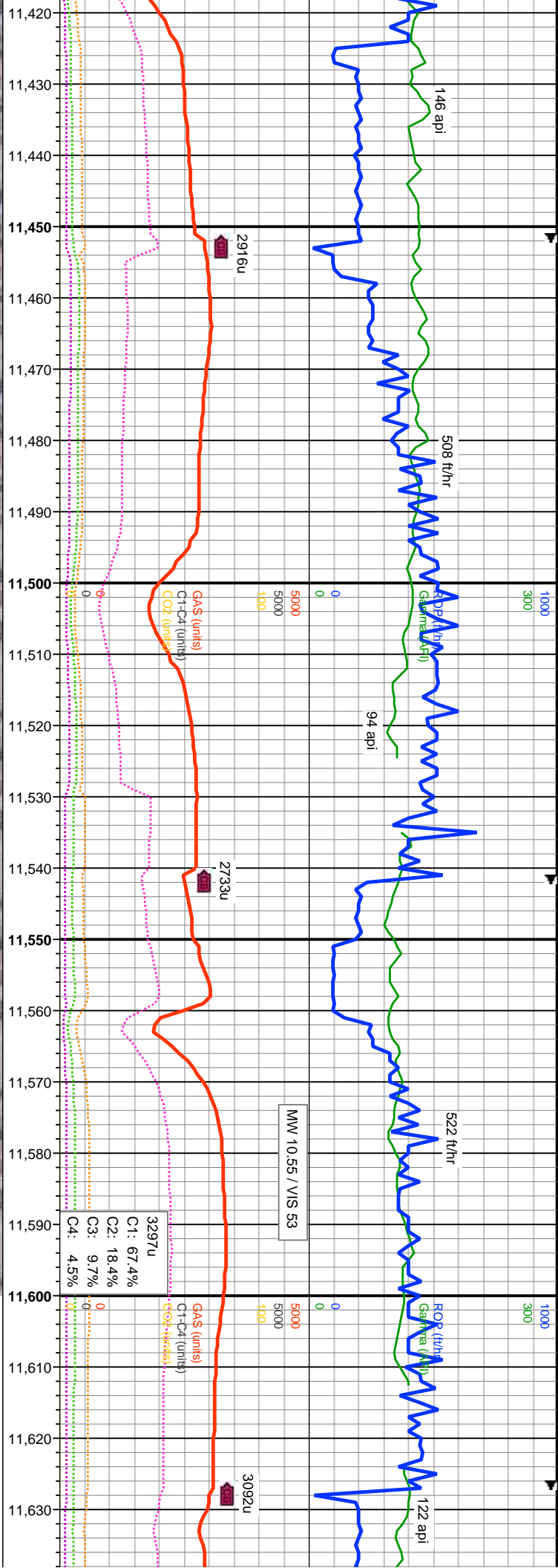




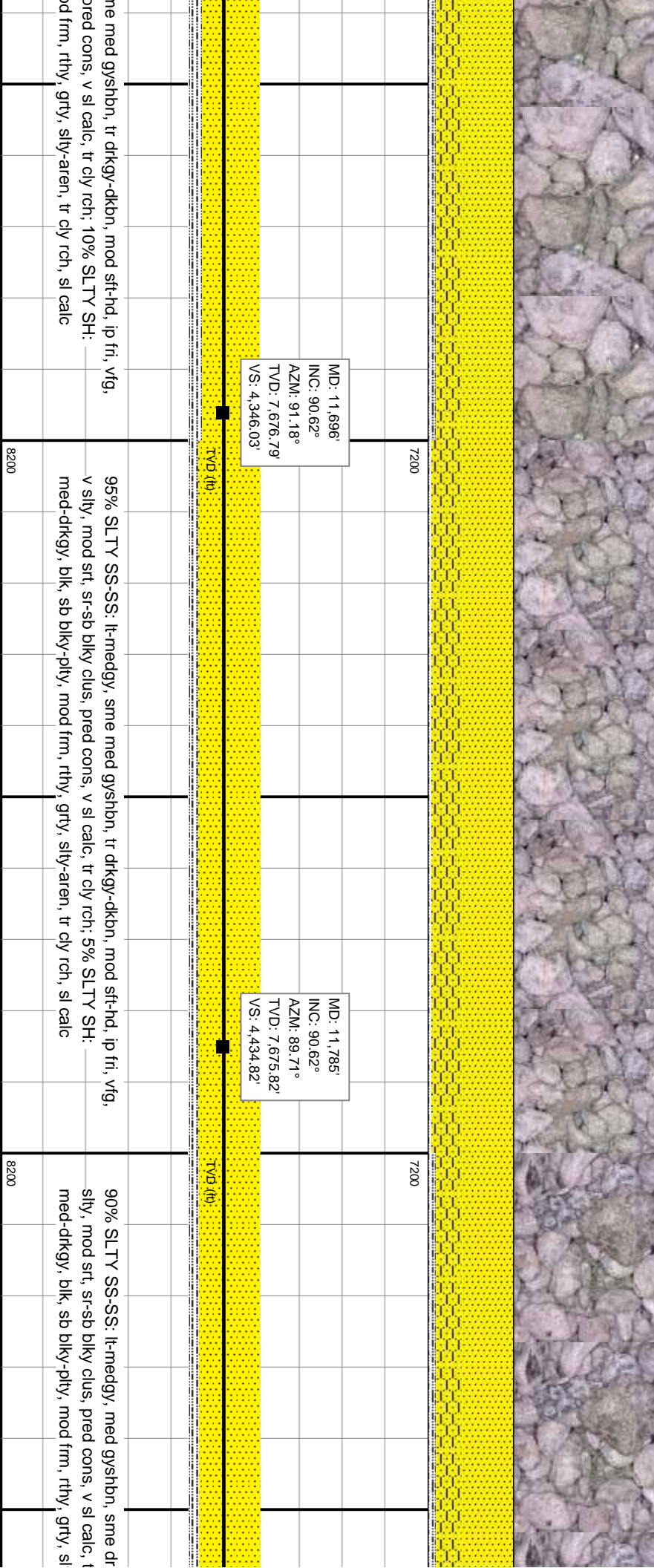
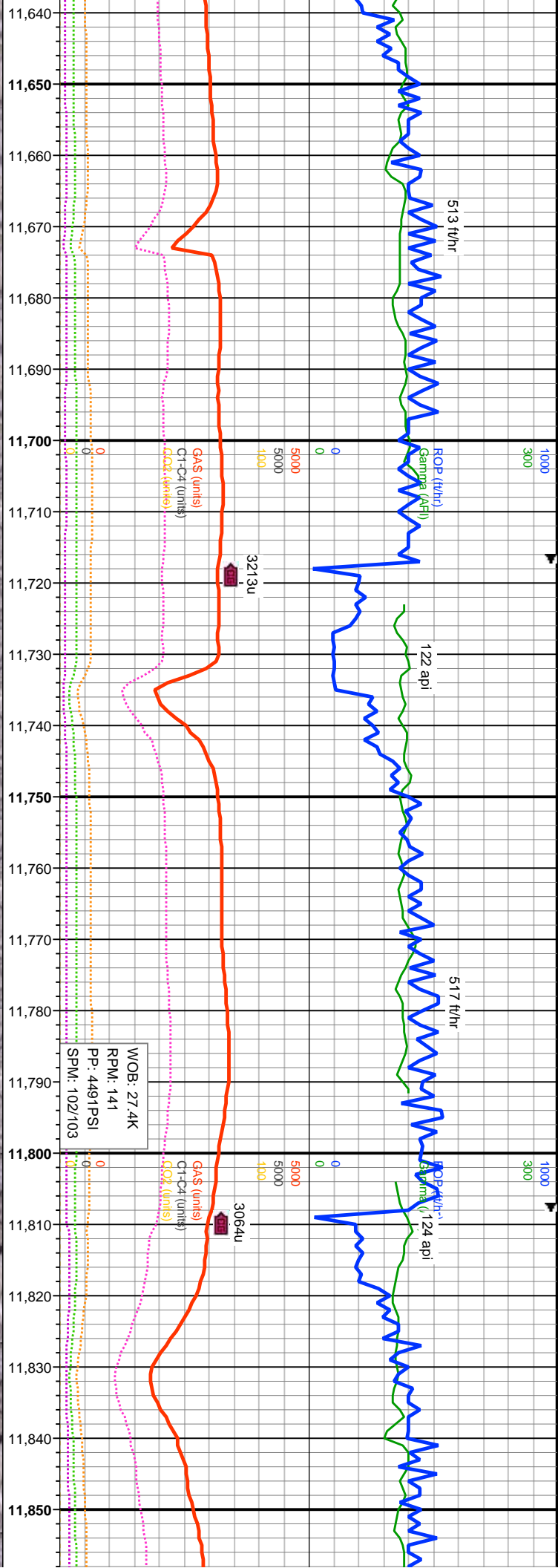
90% SLTY SS-SS: lt-medgy, sme drkgy-dkbn, sme med gysbhn, mod sft-hd, ip fri, vfg, v silty, mod srt, sr-sb blkly clus, pred cons, v sl calc, tr cly rch, 10% SLTY SH: med-drkgy, sme blk, sb blkly-pty, mod frm, rthy, grty, silty-aren, tr cly rch, sl calc

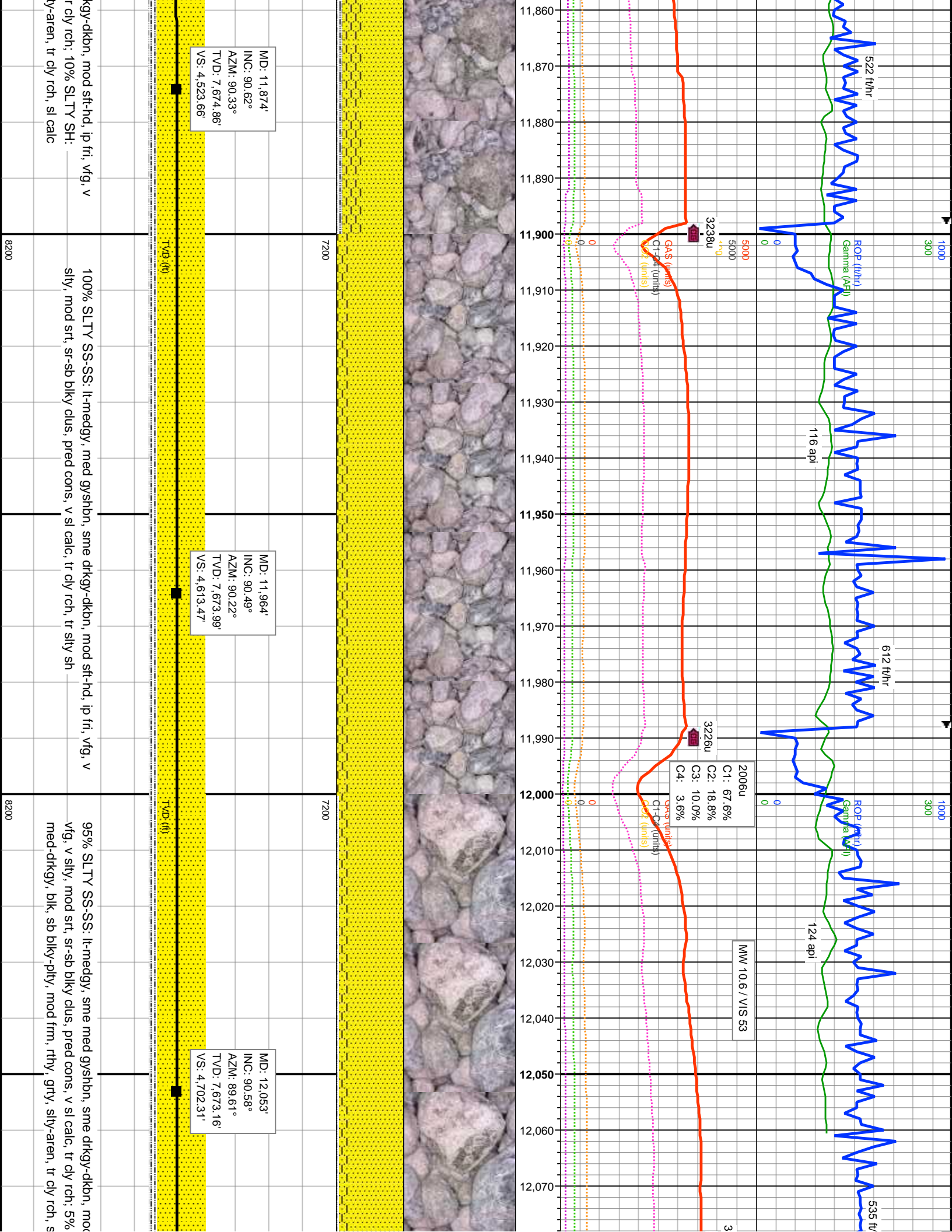
90% SLTY SS-SS: lt-medgy, sme drkgy-dkbn, sme med gysbhn, mod sft-hd, ip fri, vfg, v silty, mod srt, sr-sb blkly clus, pred cons, v sl calc, tr cly rch, 10% SLTY SH: med-drkgy, sme blk, sb blkly-pty, mod frm, rthy, grty, silty-aren, tr cly rch, sl calc

95% SLTY SS-SS: lt-medgy, sme drkgy-dkbn, sme med gysbhn, mod sft-hd, ip fri, vfg, v silty, mod srt, sr-sb blkly clus, pred cons, v sl calc, tr cly rch, 10% SLTY SH: med-drkgy, sme blk, sb blkly-pty, mod frm, rthy, grty, silty-aren, tr cly rch, sl calc

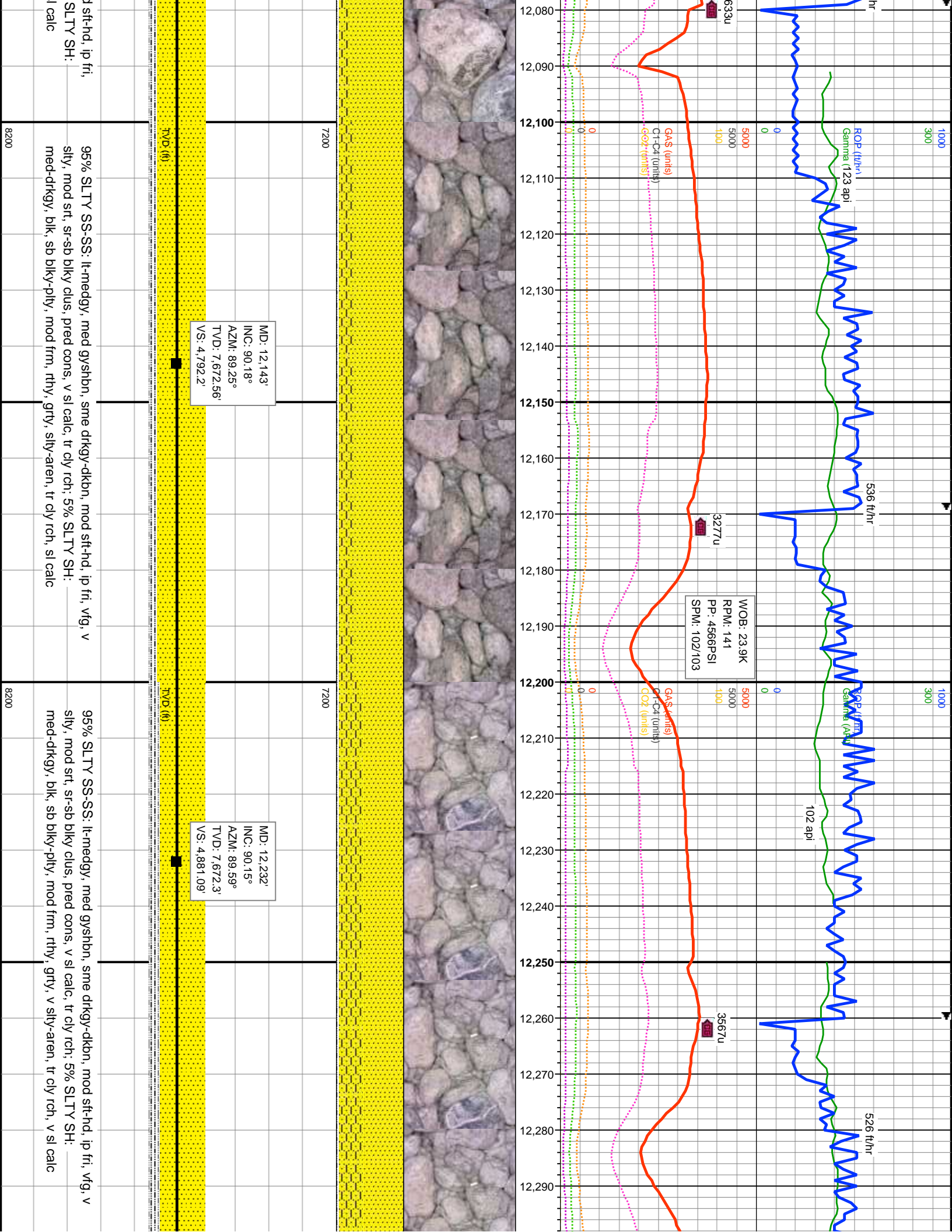




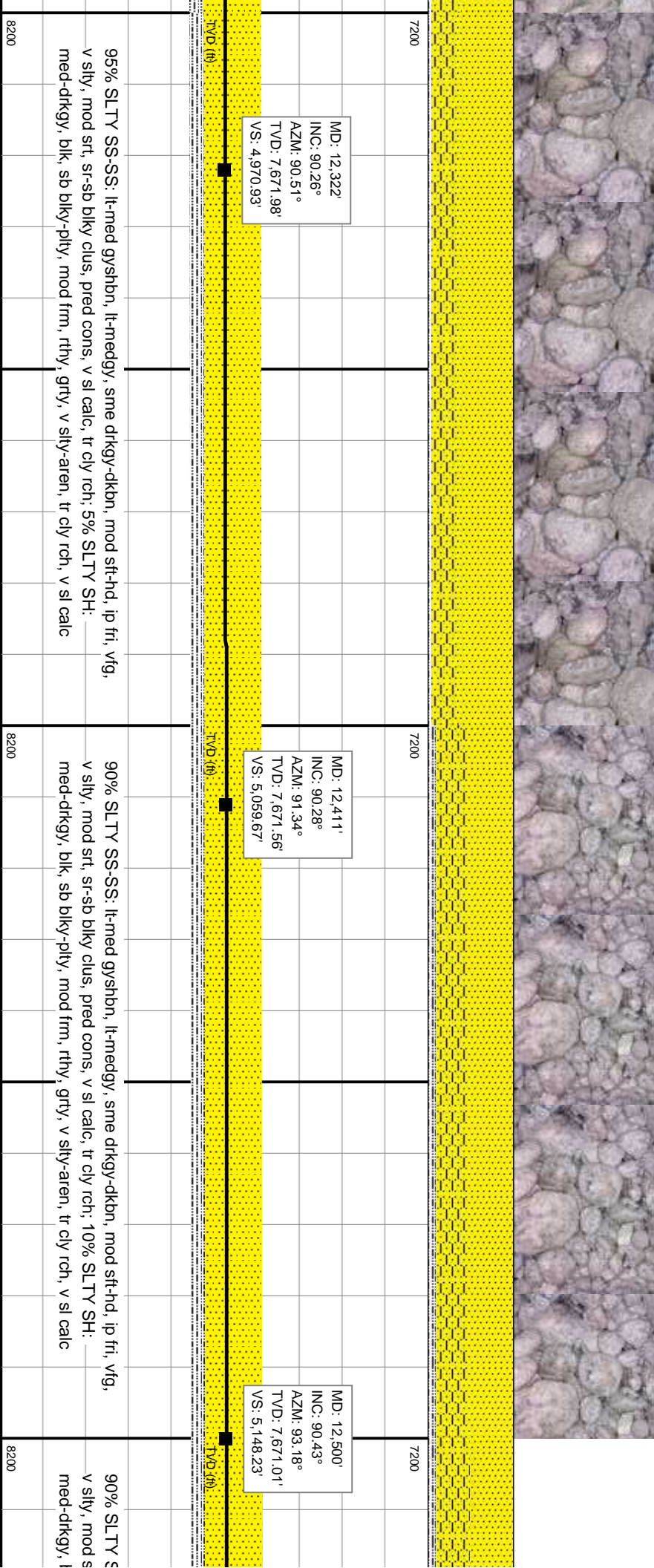
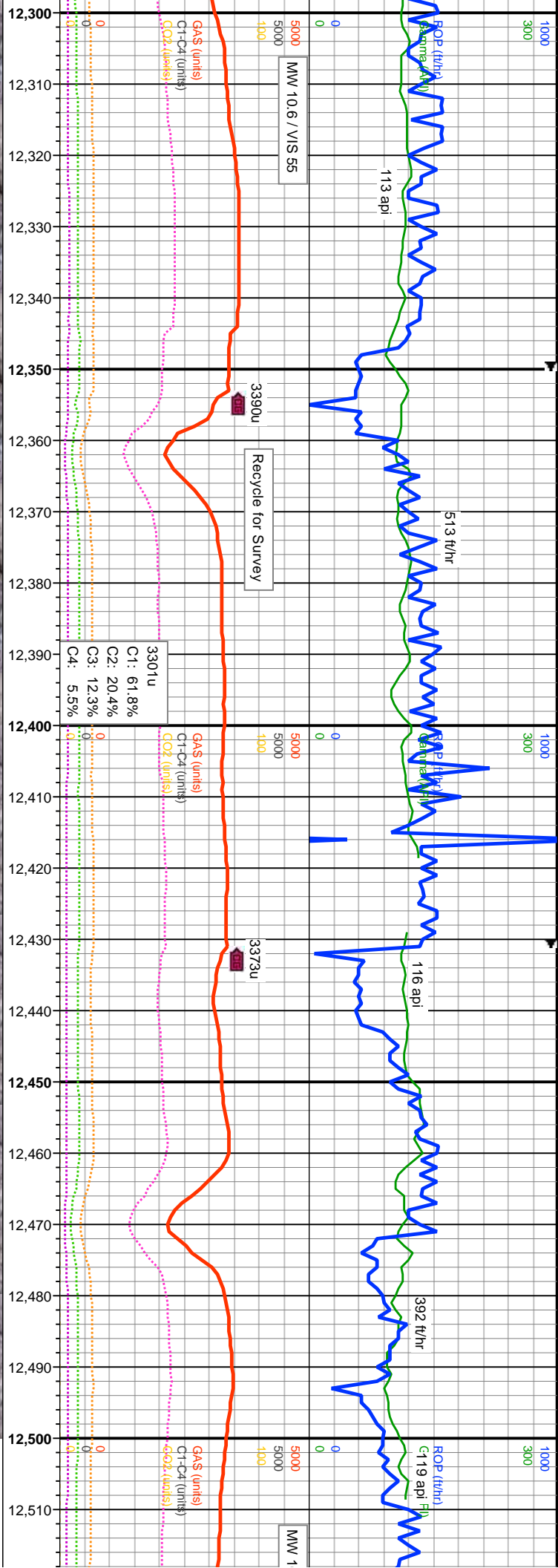


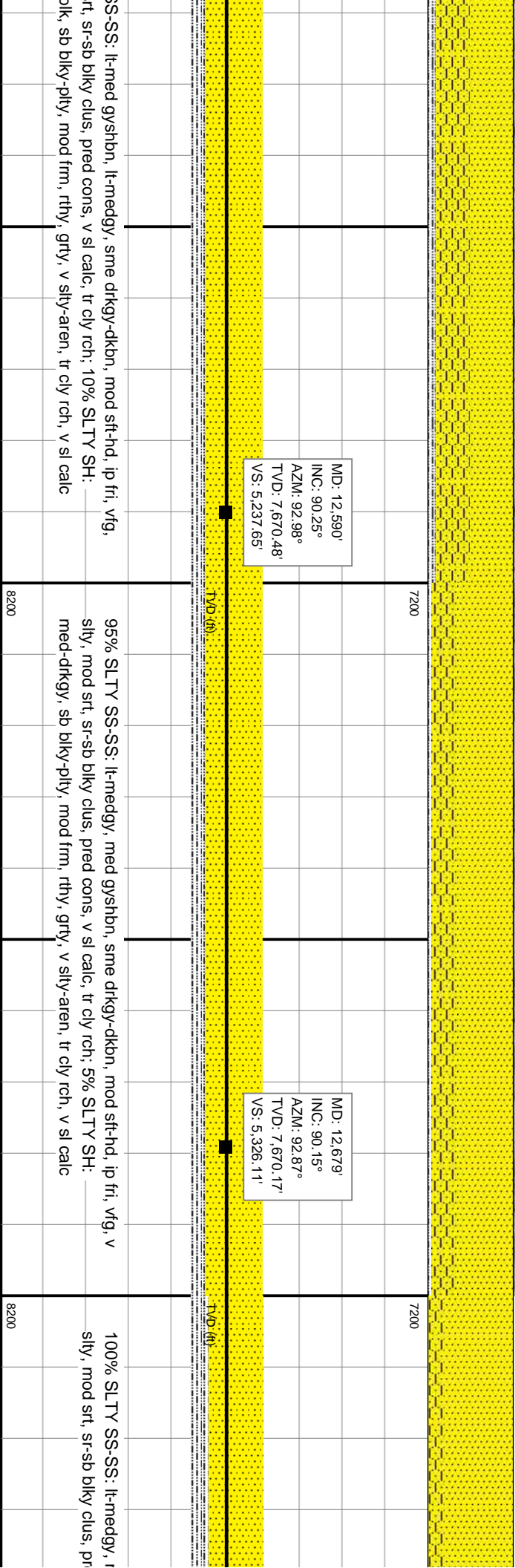
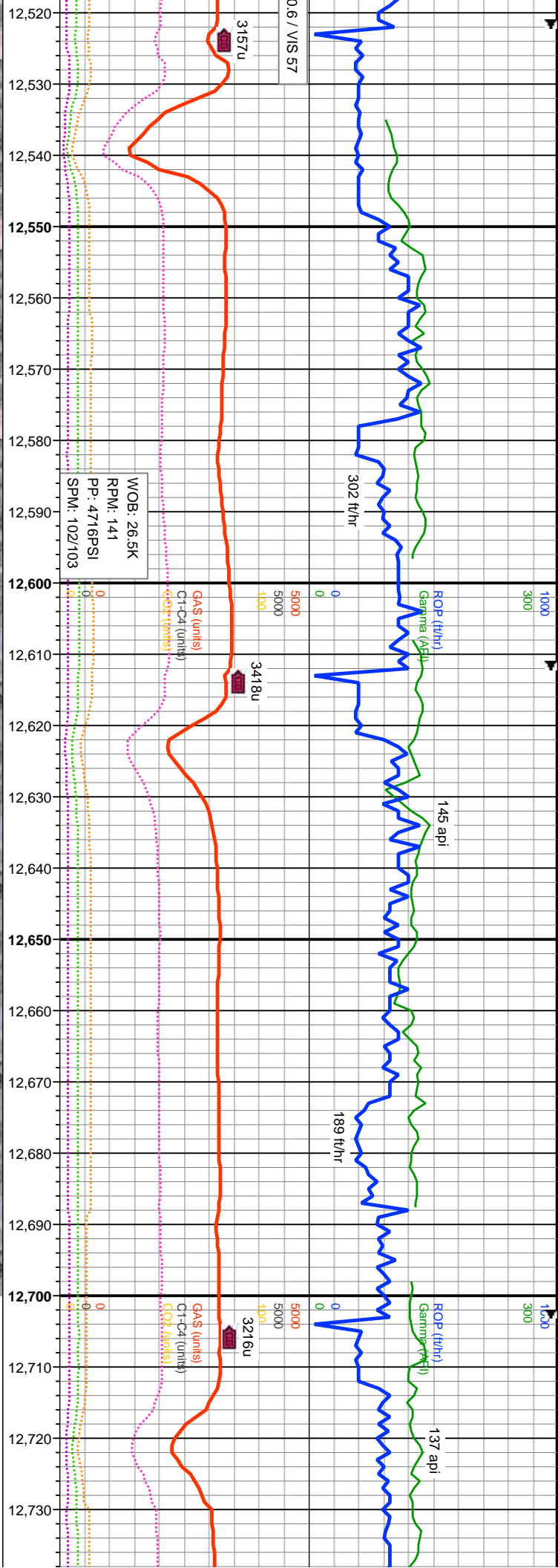




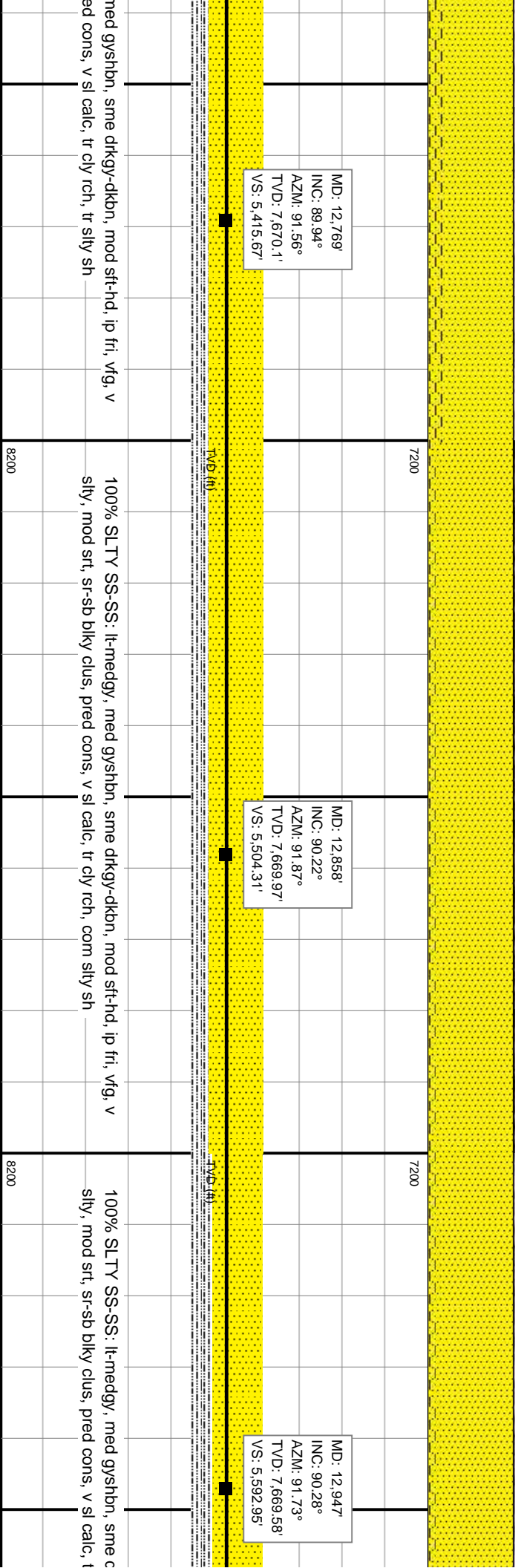
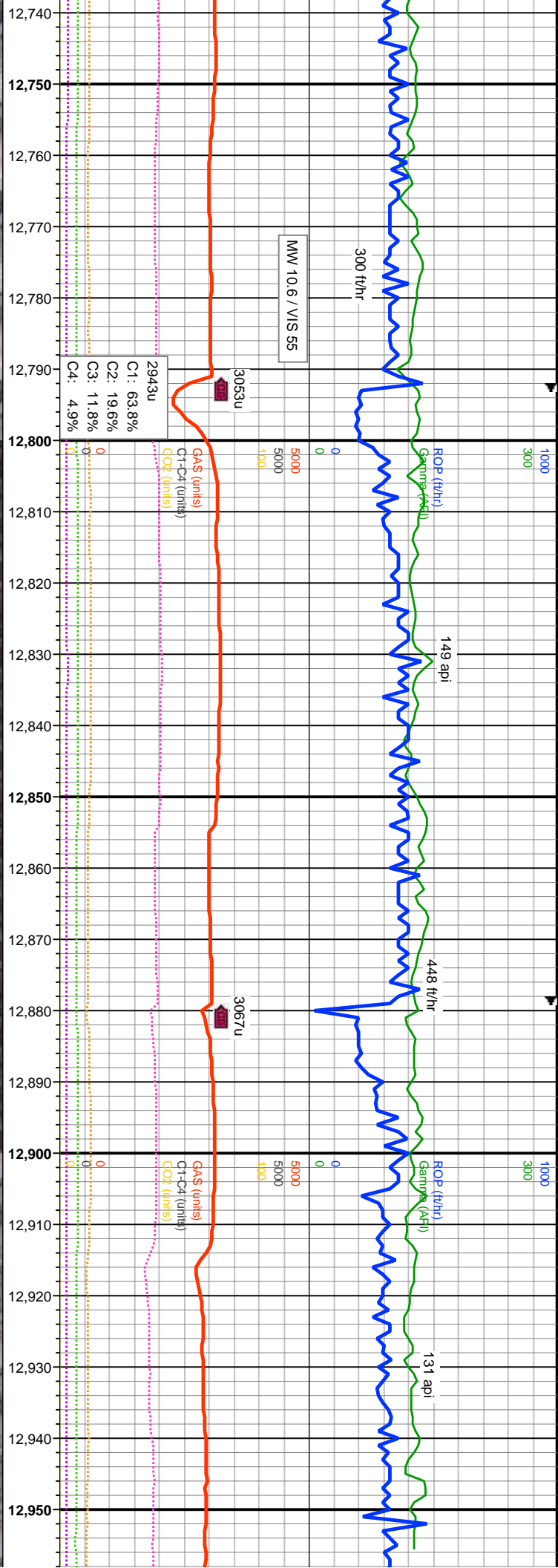


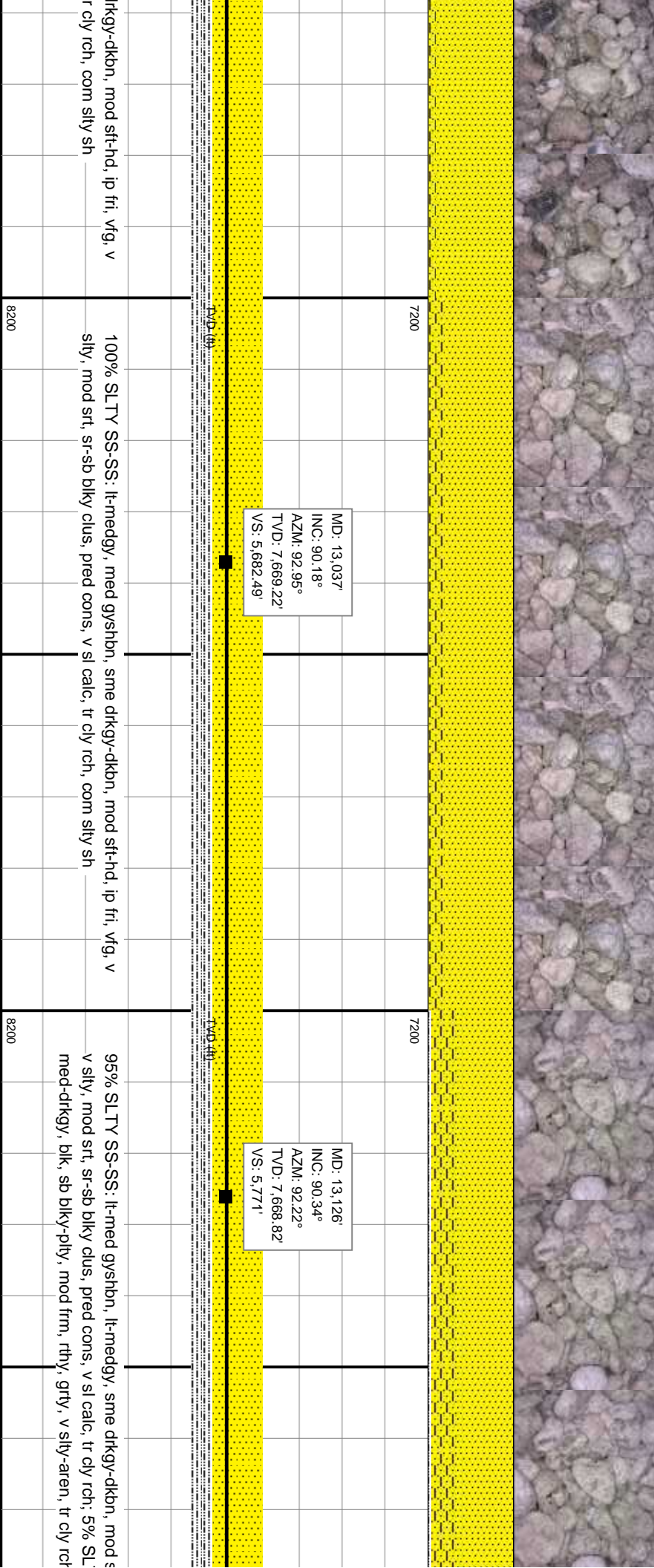
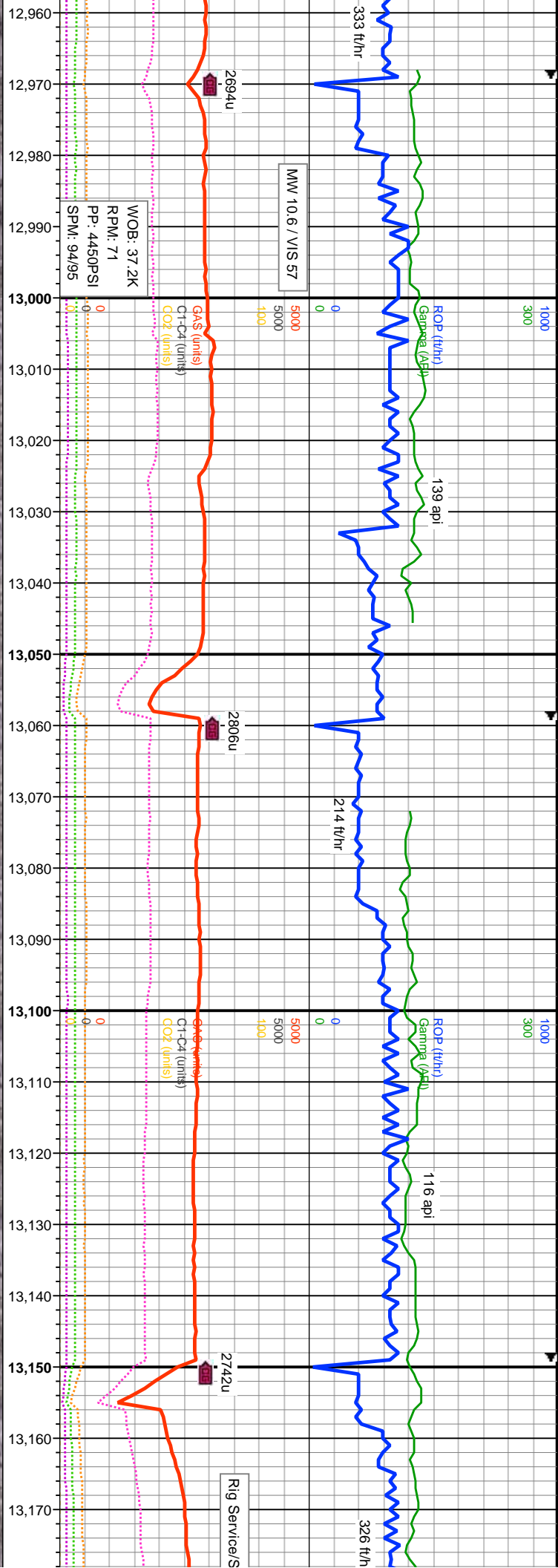




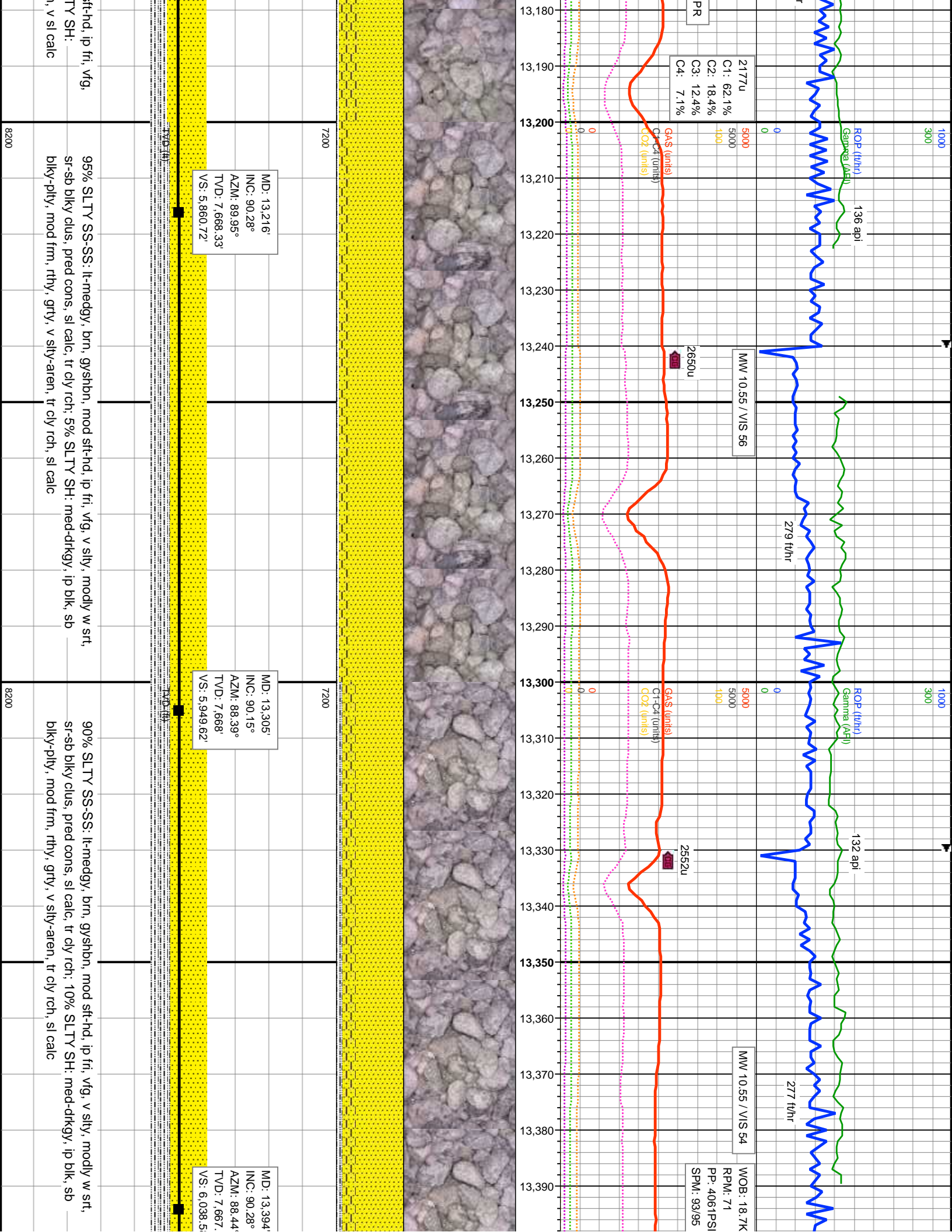


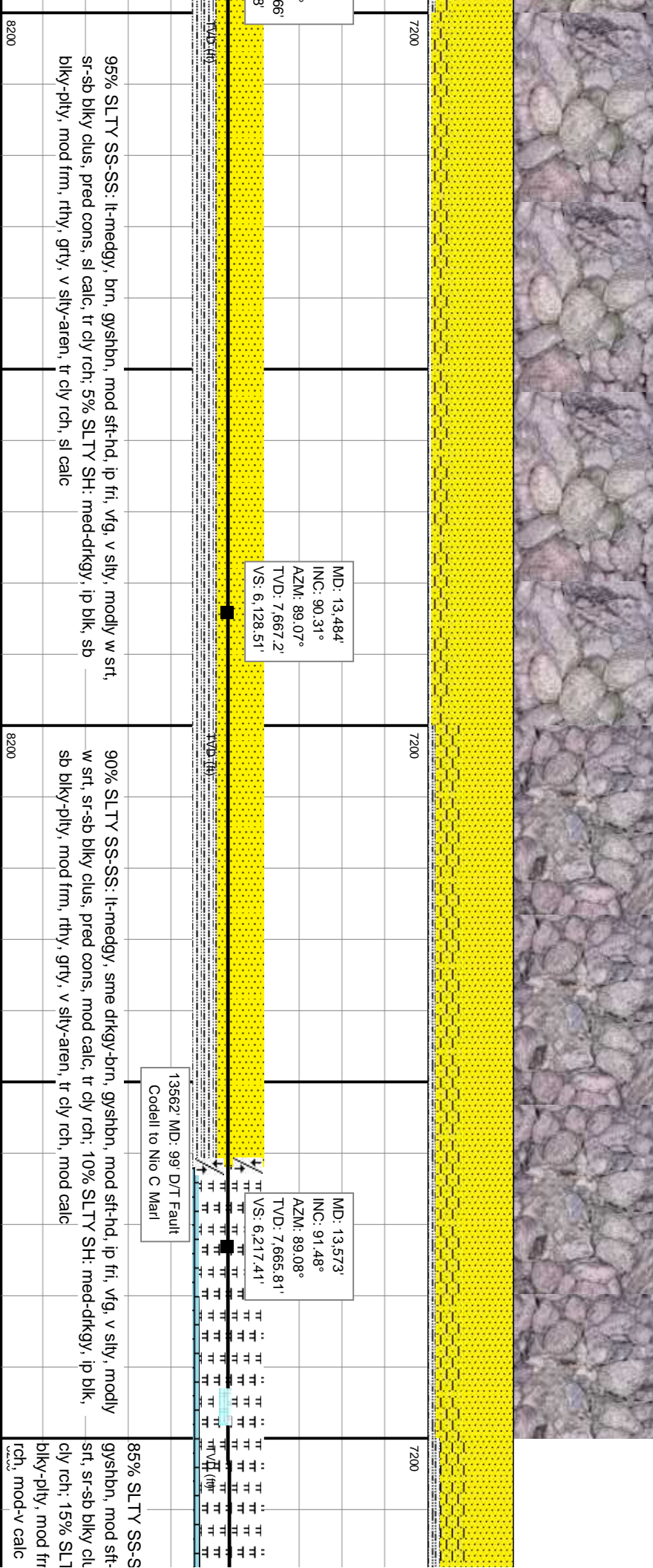
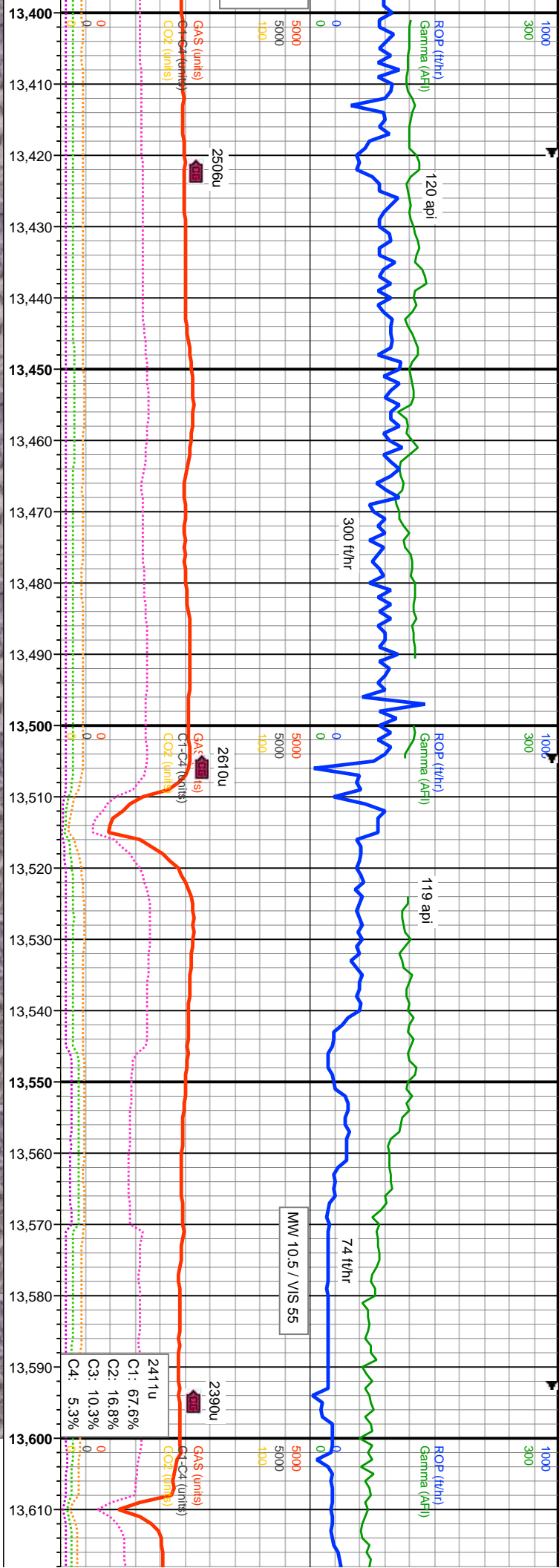




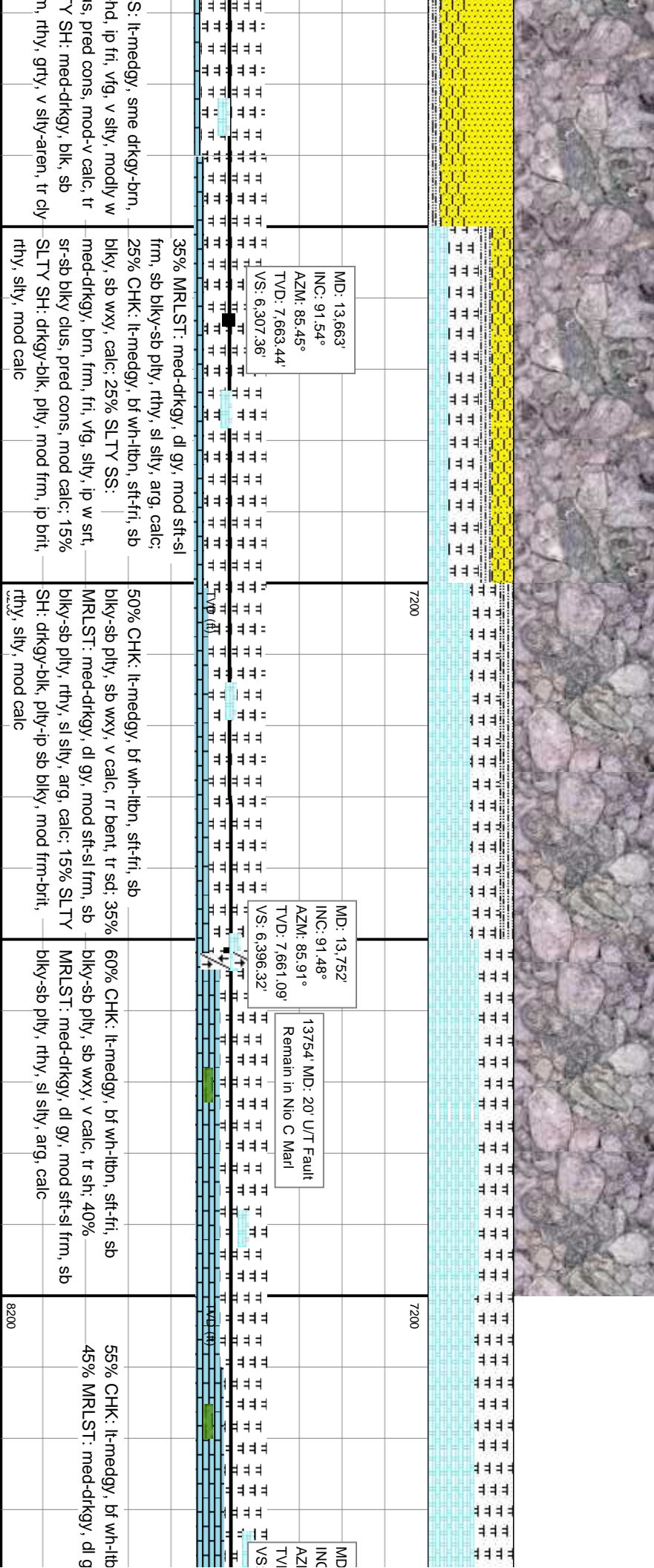
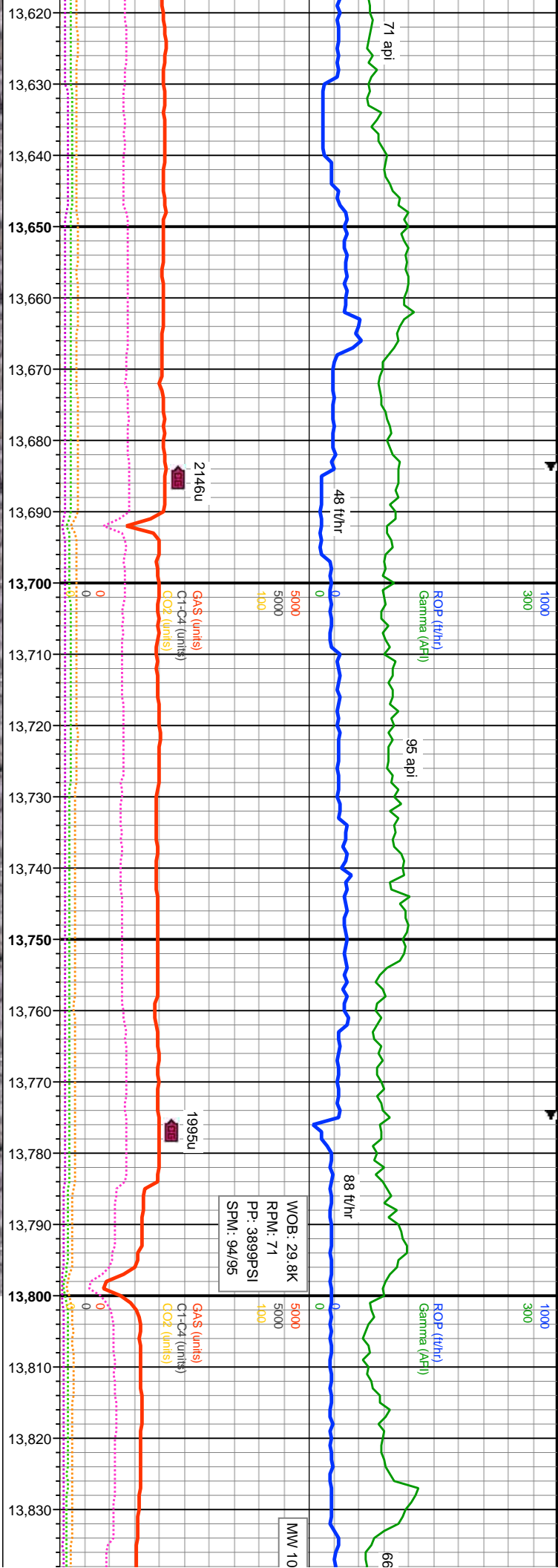


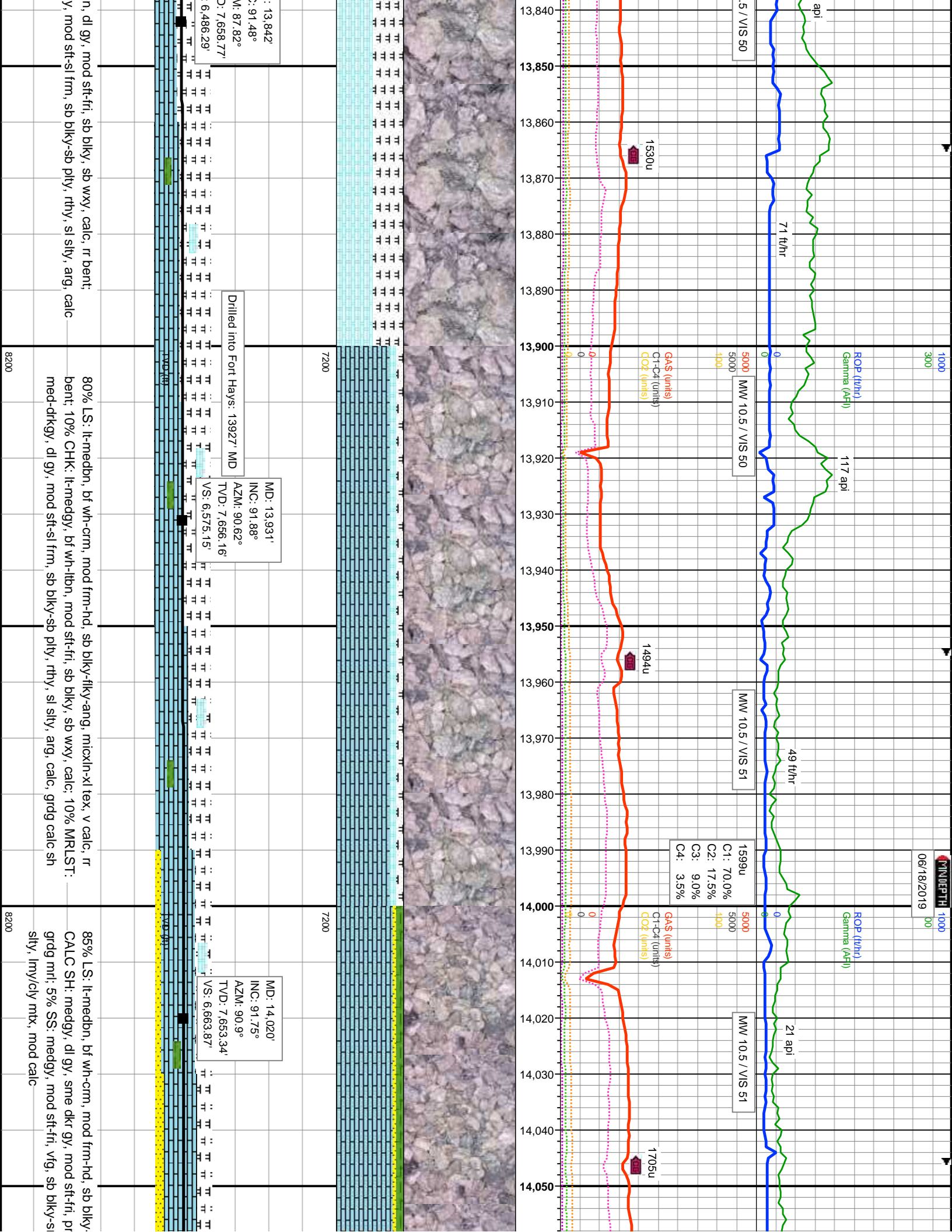




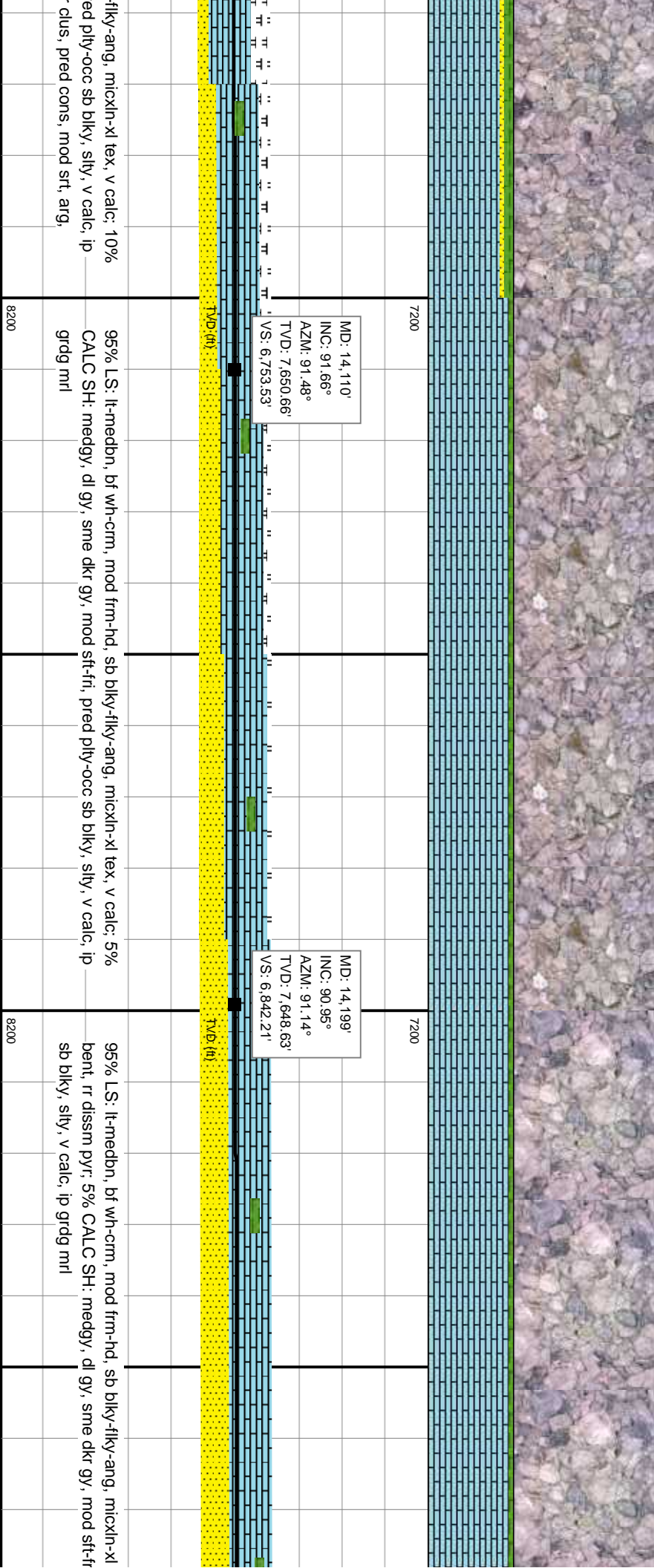
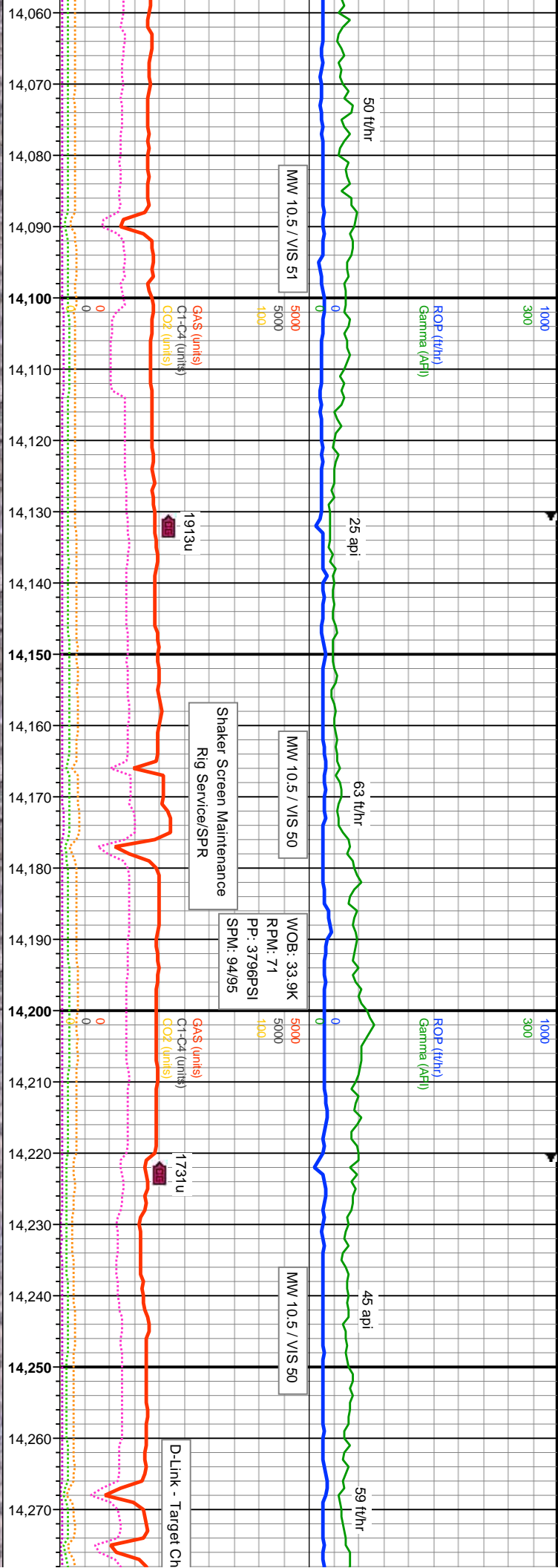


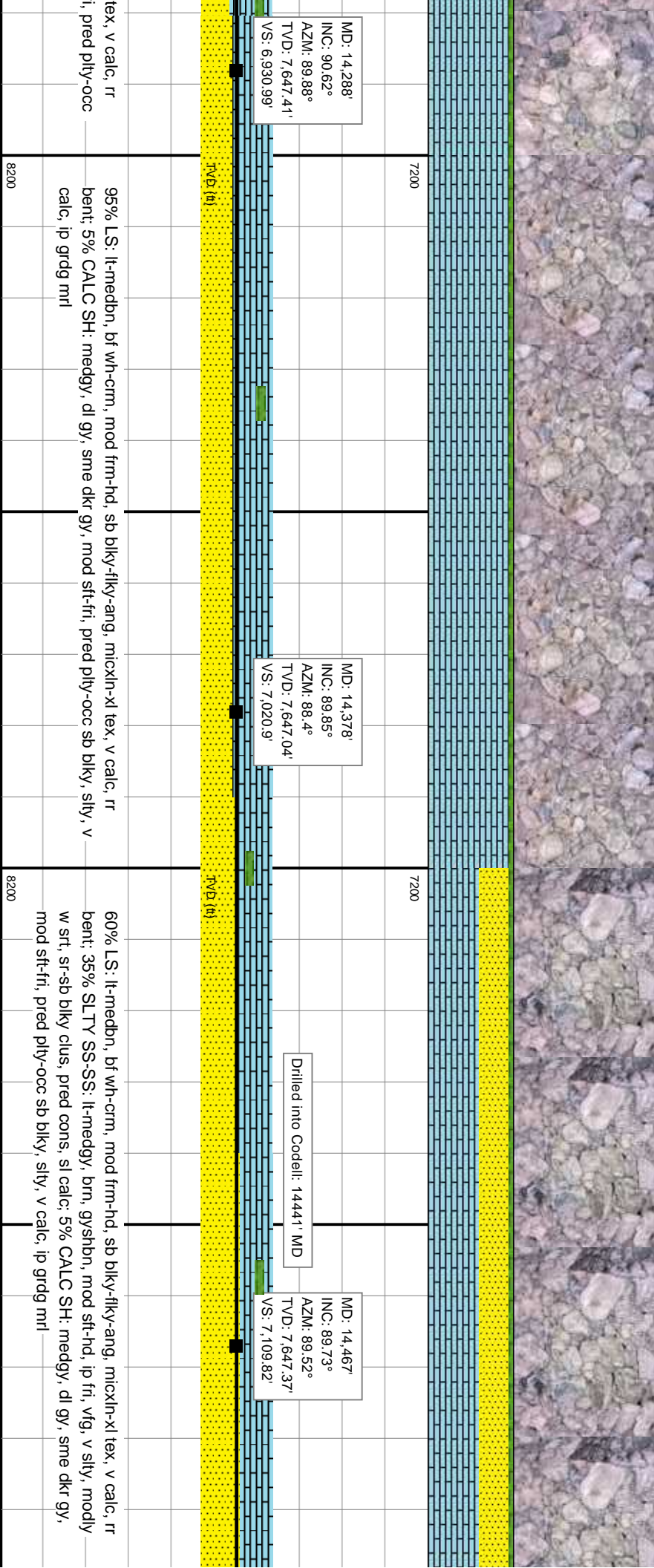
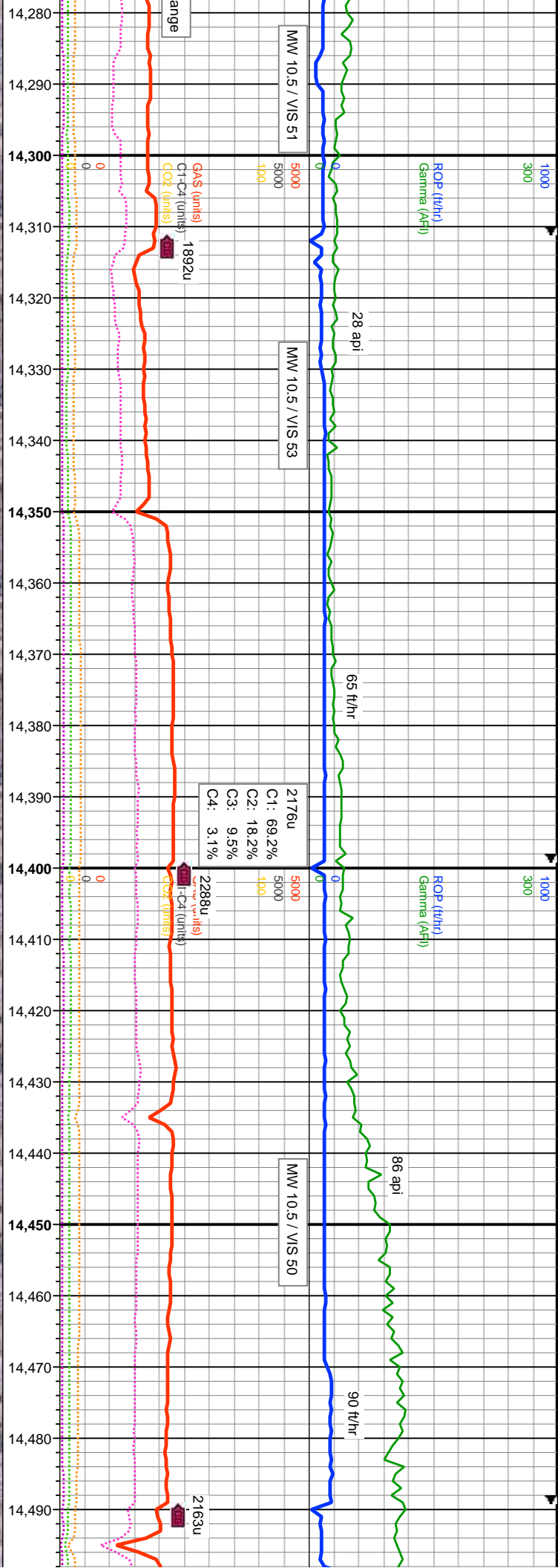






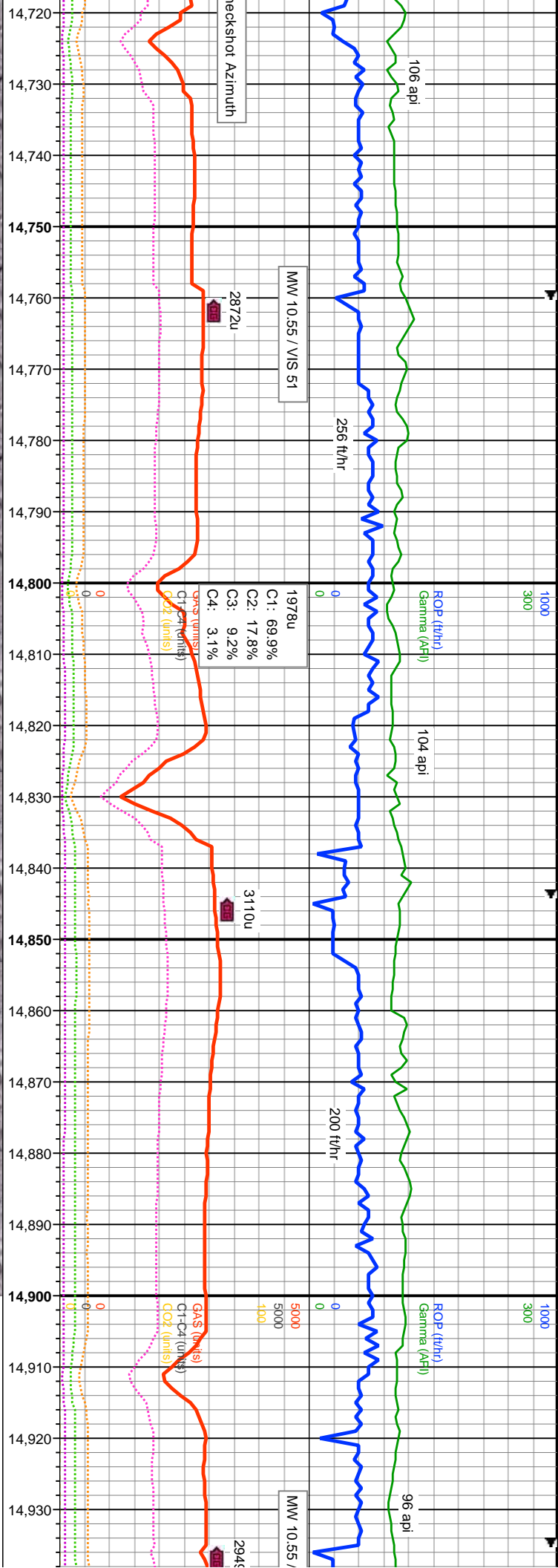












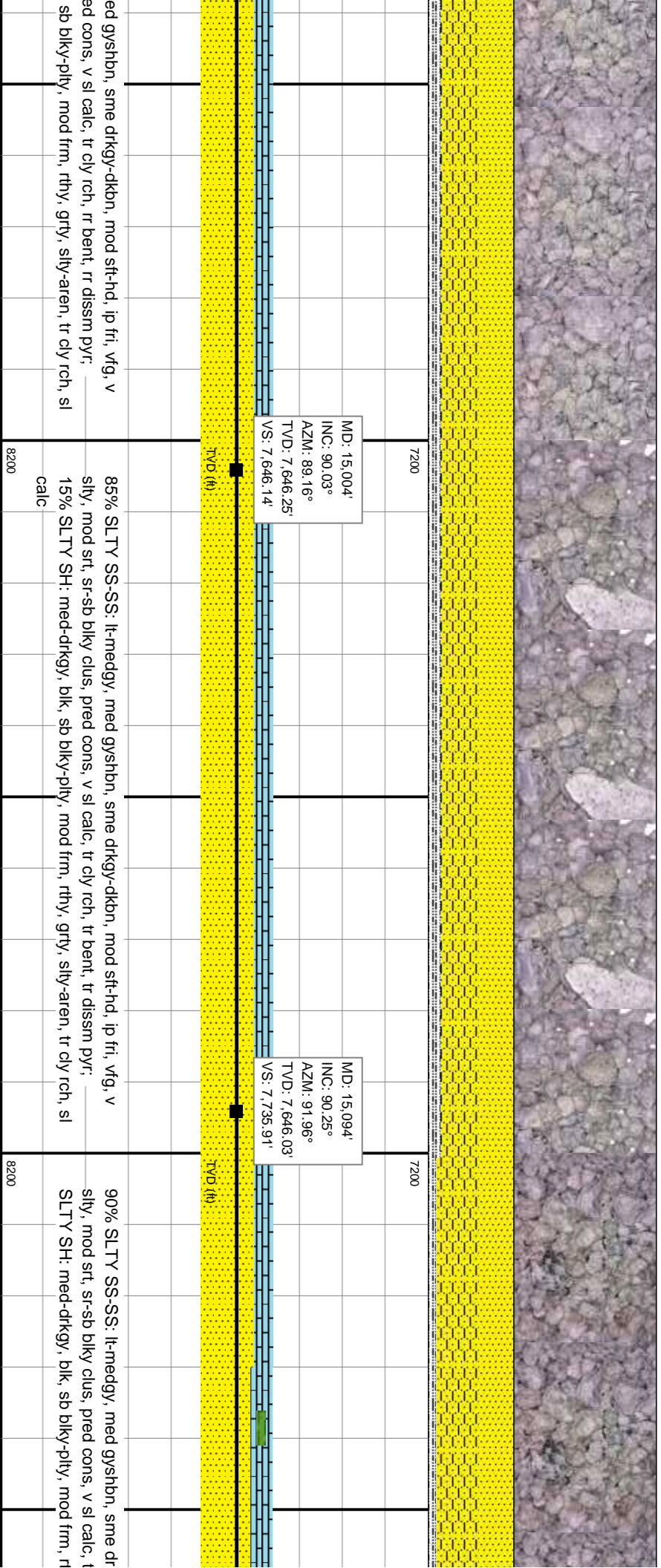
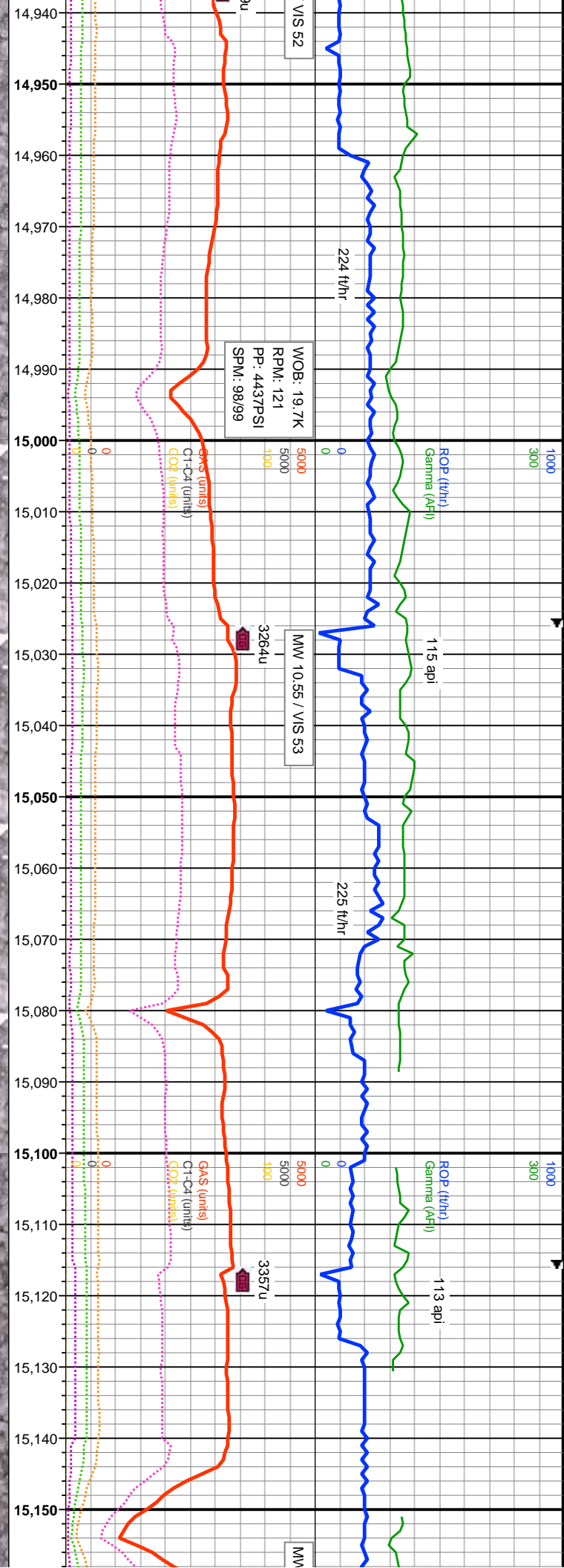
MD: 14,735'  
INC: 89.88°  
AZM: 89.35°  
TVD: 7,646.62'  
VS: 7,377.26'

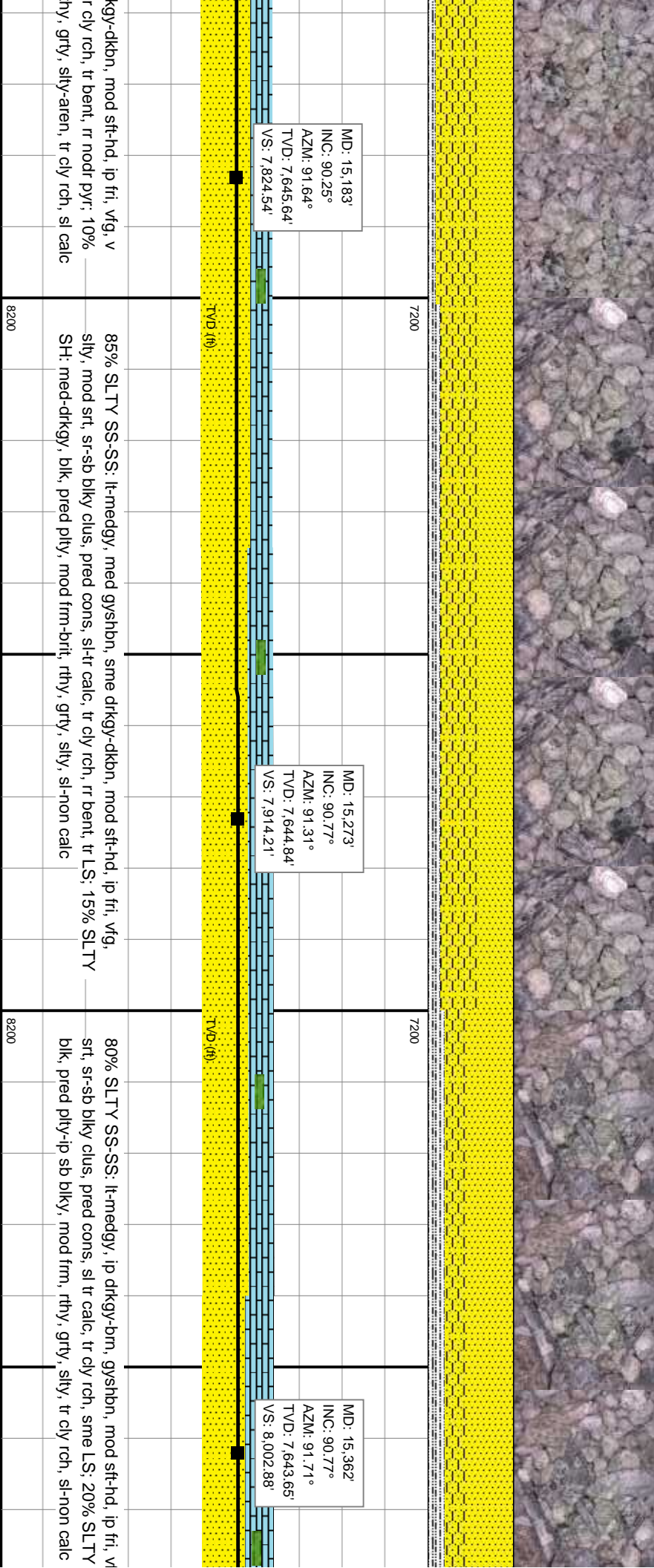
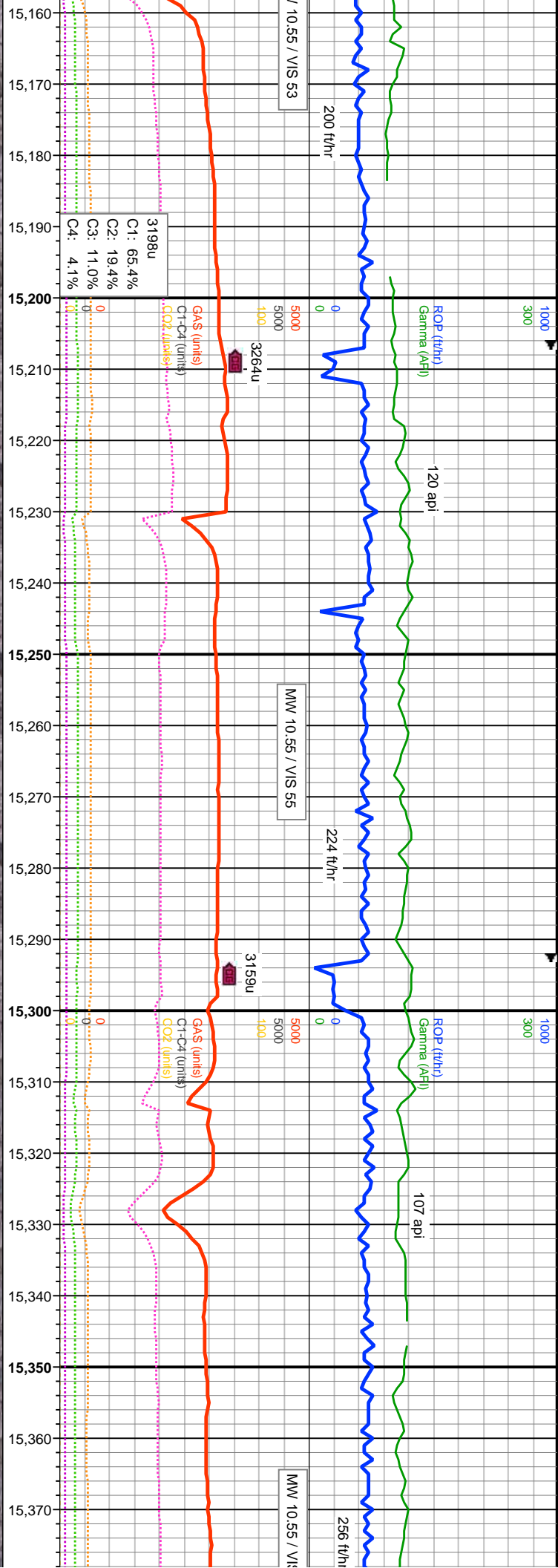
MD: 14,825'  
INC: 90.43°  
AZM: 88.24°  
TVD: 7,646.38'  
VS: 7,467.2'

MD: 14,915'  
INC: 89.85°  
AZM: 87.21°  
TVD: 7,646.16'  
VS: 7,557.18'

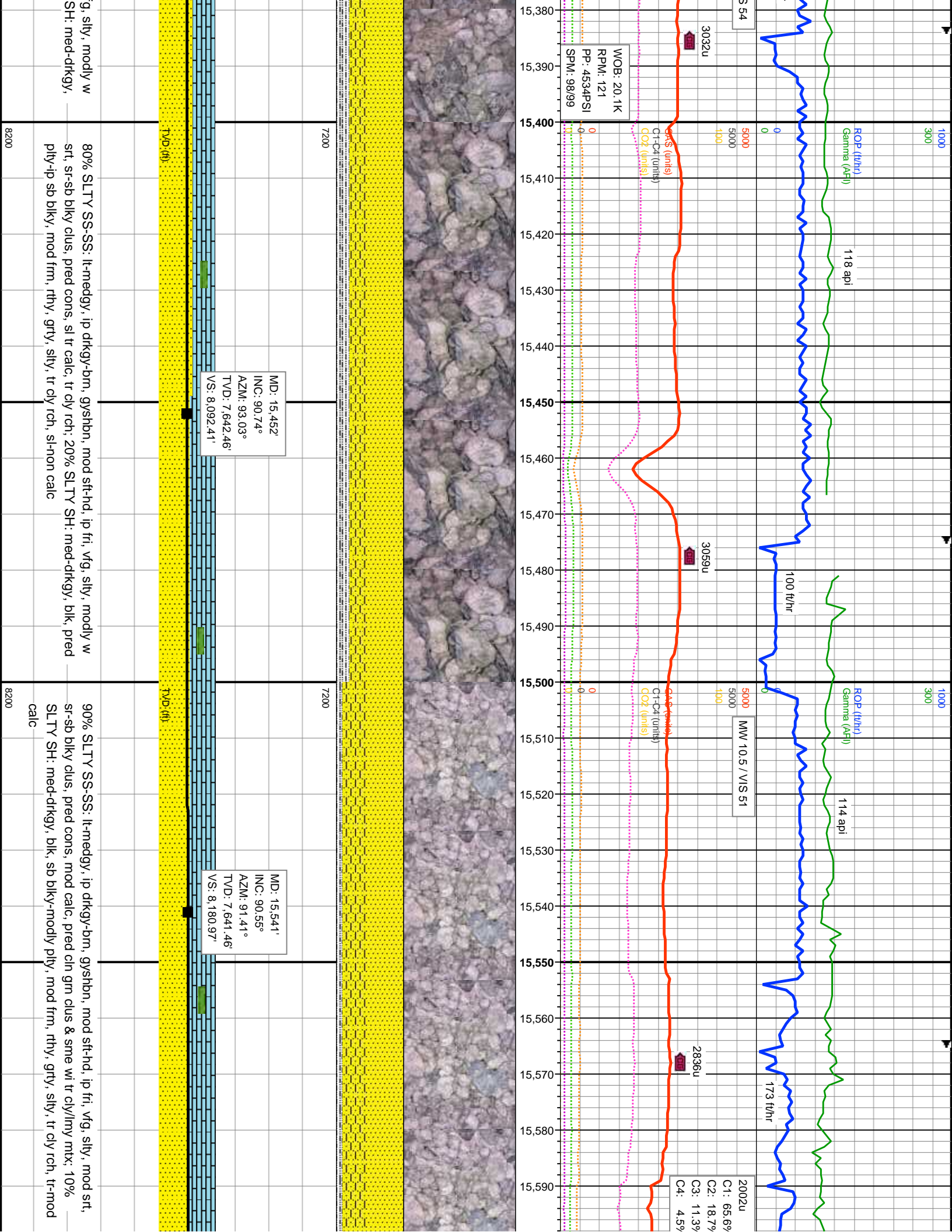
S-SS: lt-medgy, med gysbhn, sme drkgy-dkbn, mod sft-hd, ip fri, vfg, v  
sr-sb blkly clus, pred cons, v sl calc, tr cly rch, v rr bent, tr nodr pyr, 10%  
calc  
85% SLTY SS-SS: lt-medgy, med gysbhn, sme drkgy-dkbn, mod sft-hd, ip fri, vfg, v  
silty, mod srt, sr-sb blkly clus, pred cons, v sl calc, tr cly rch, tr bent, rr dissn pyr,  
15% SLTY SH: med-drkgy, blk, sb blkly-pltly, mod frm, rthy, grty, silty-aren, tr cly rch, sl  
calc  
85% SLTY SS-SS: lt-medgy, med gysbhn, sme drkgy-dkbn, mod sft-hd, ip fri, vfg, v  
silty, mod srt, sr-sb blkly clus, pred cons, v sl calc, tr cly rch, tr bent, rr dissn pyr,  
15% SLTY SH: med-drkgy, blk, sb blkly-pltly, mod frm, rthy, grty, silty-aren, tr cly rch, sl  
calc

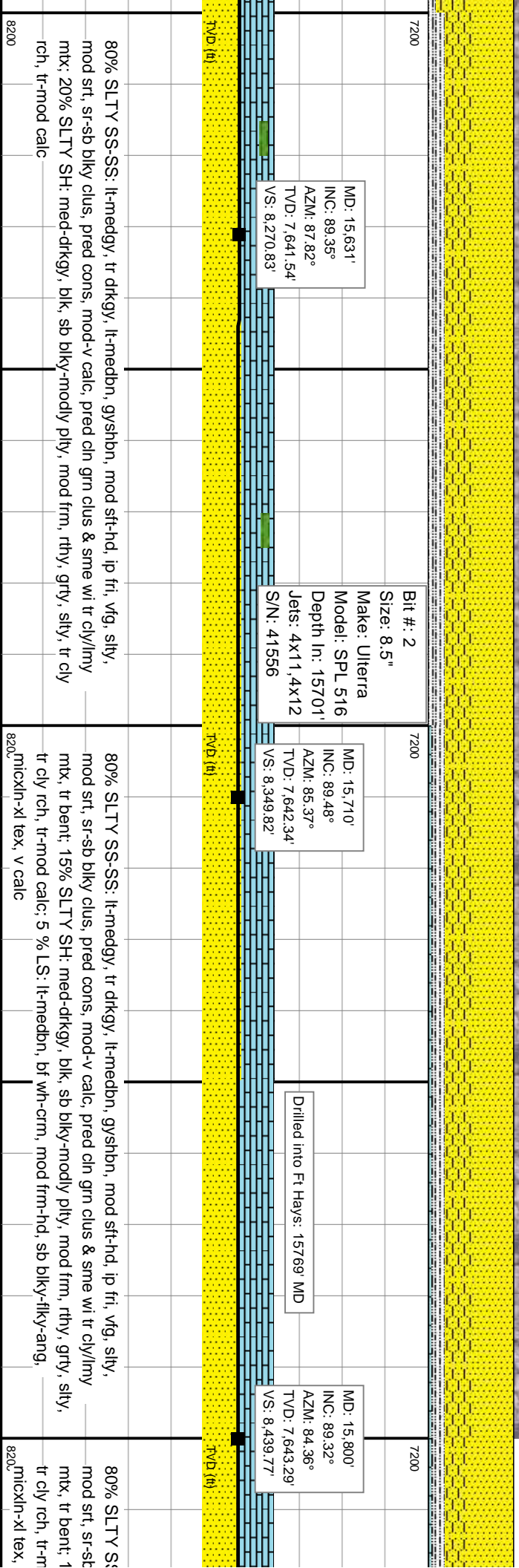
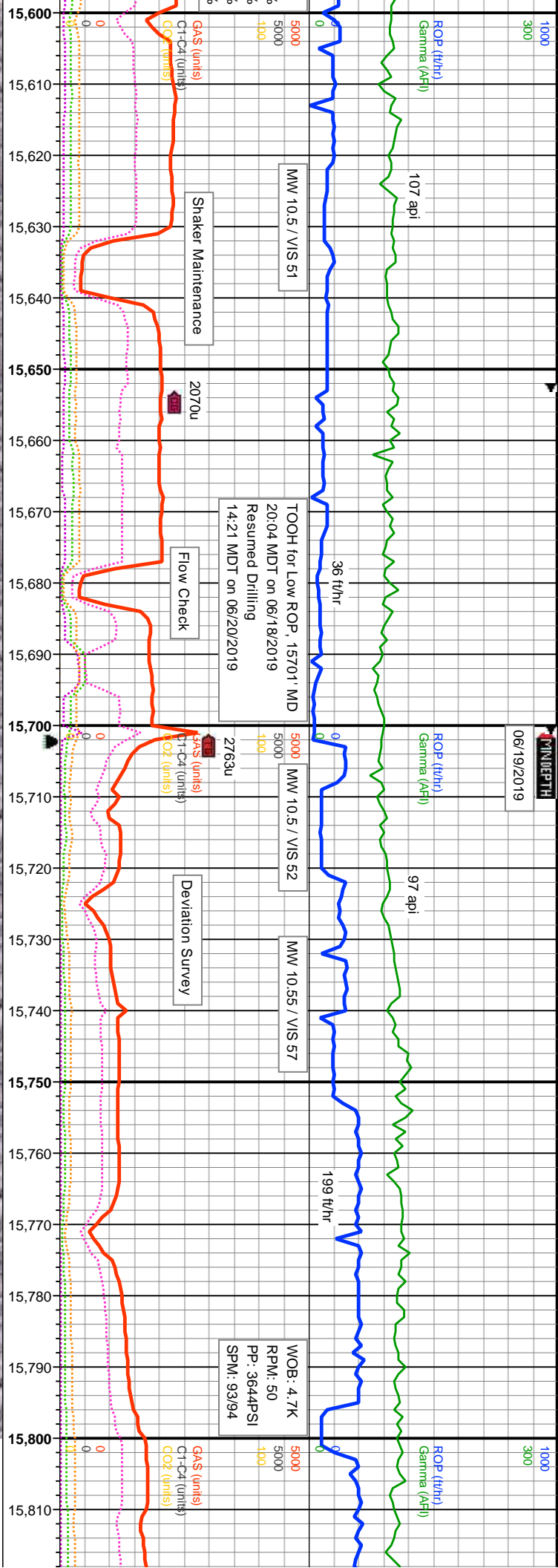




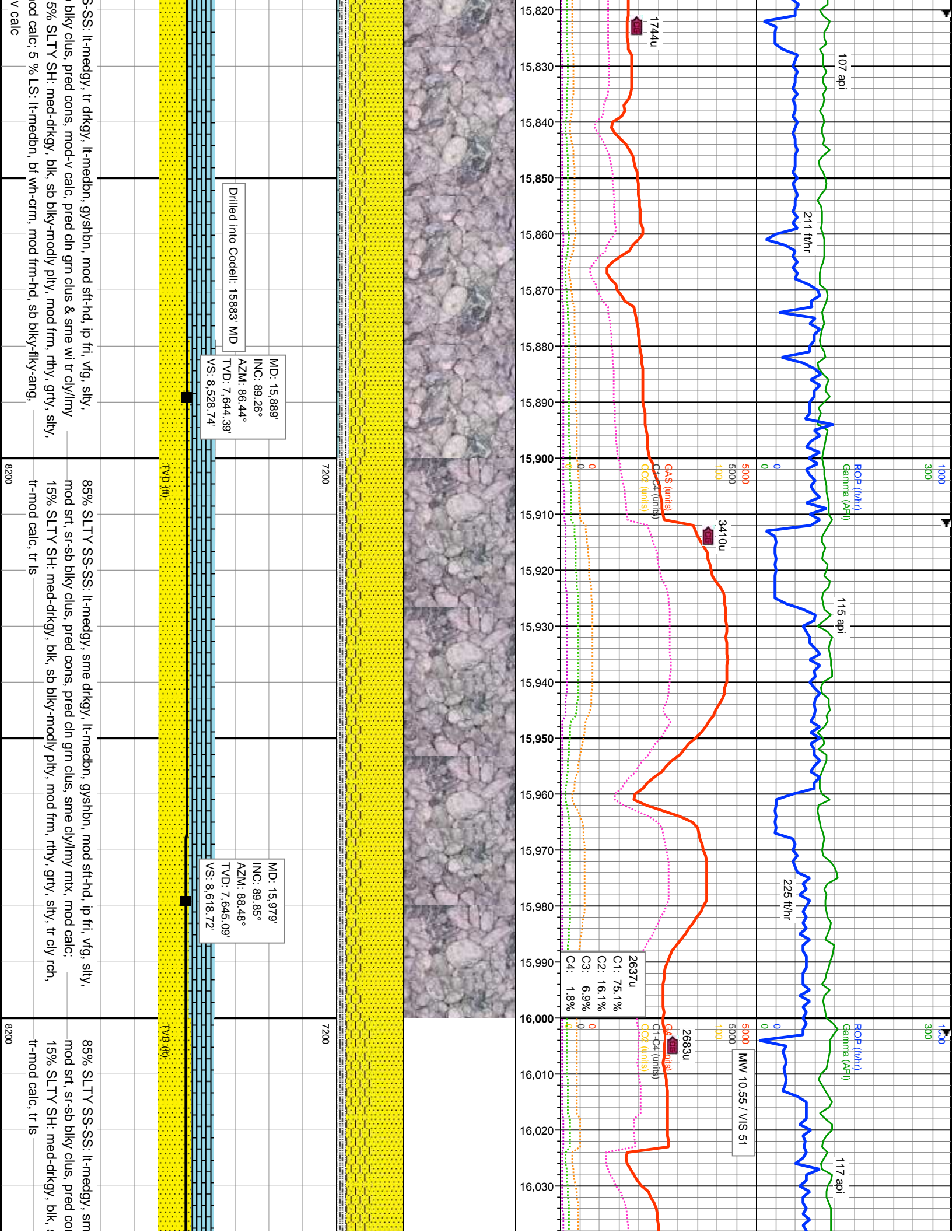


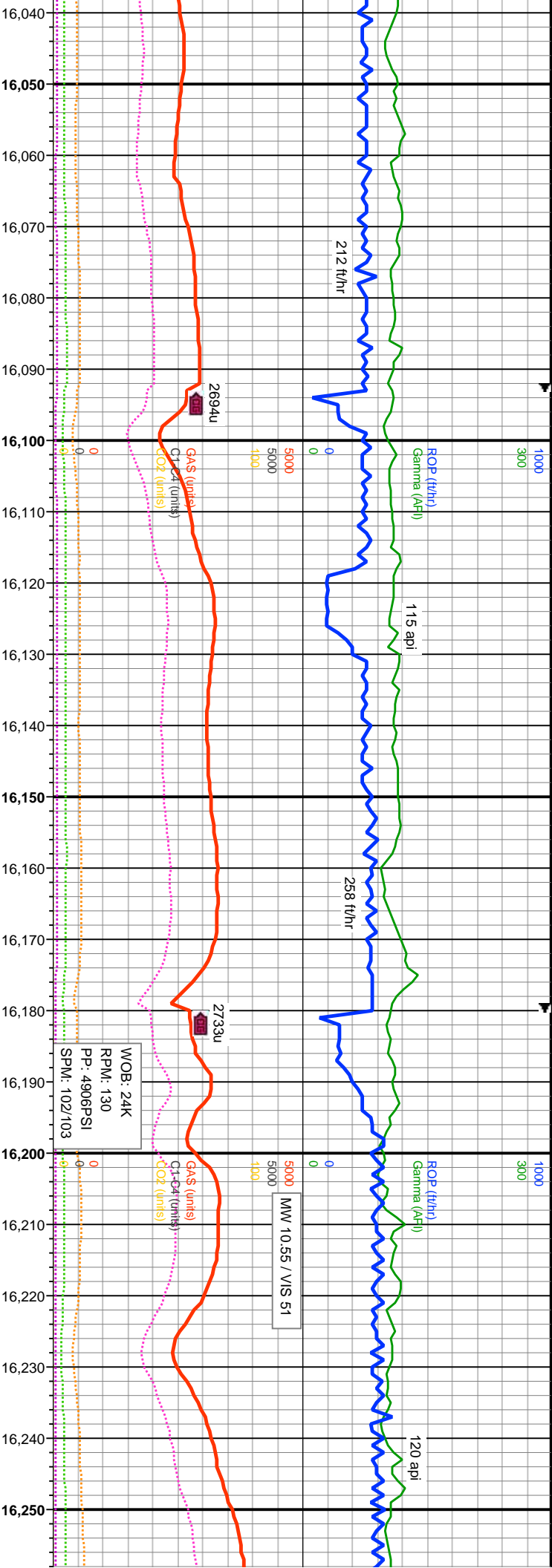












MD: 16,068'  
INC: 90.06°  
AZM: 88.58°  
TVD: 7,645.16'  
VS: 8,707.67'

MD: 16,158'  
INC: 89.94°  
AZM: 88.93°  
TVD: 7,645.16'  
VS: 8,797.61'

MD: 16,247'  
INC: 90.12°  
AZM: 90.7°  
TVD: 7,645.11'  
VS: 8,886.46'

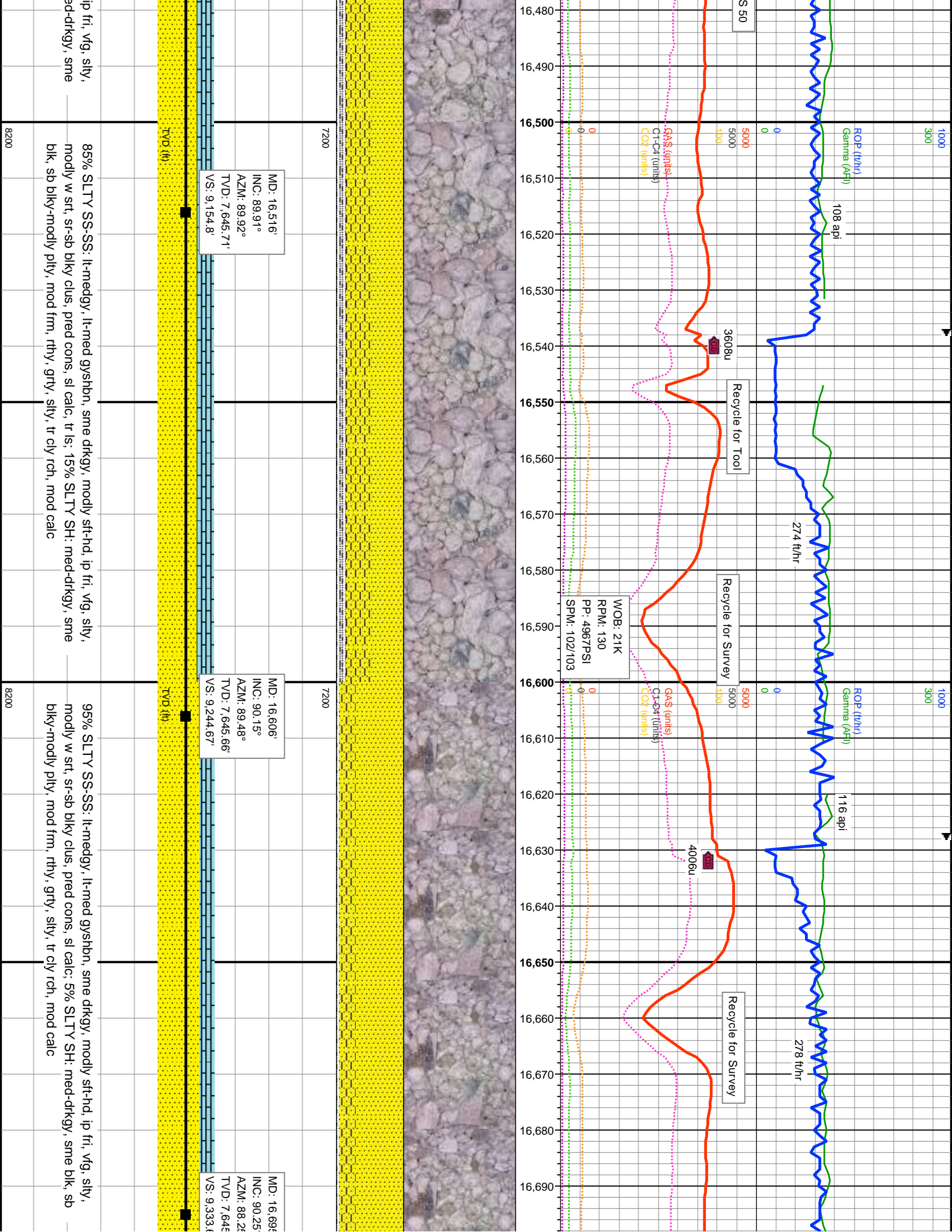
e drkgy, lt-medbn, gysbhn, mod sft-hd, ip fri, vfg, slty,  
s, pred chn grn clus, sme cly/lmy mtx, mod calc;

85% SLTY SS-SS: lt-medgy, lt-med gysbhn, sme drkgy, mod sft-hd, ip fri, vfg, slty,  
mod srt, sr-sb bly clus, pred cons, mod calc; 15% SLTY SH: med-drkgy, blk, sb  
bly-mody ply, mod frm, rthy, grty, slty, tr cly rch, tr mod calc, tr ls

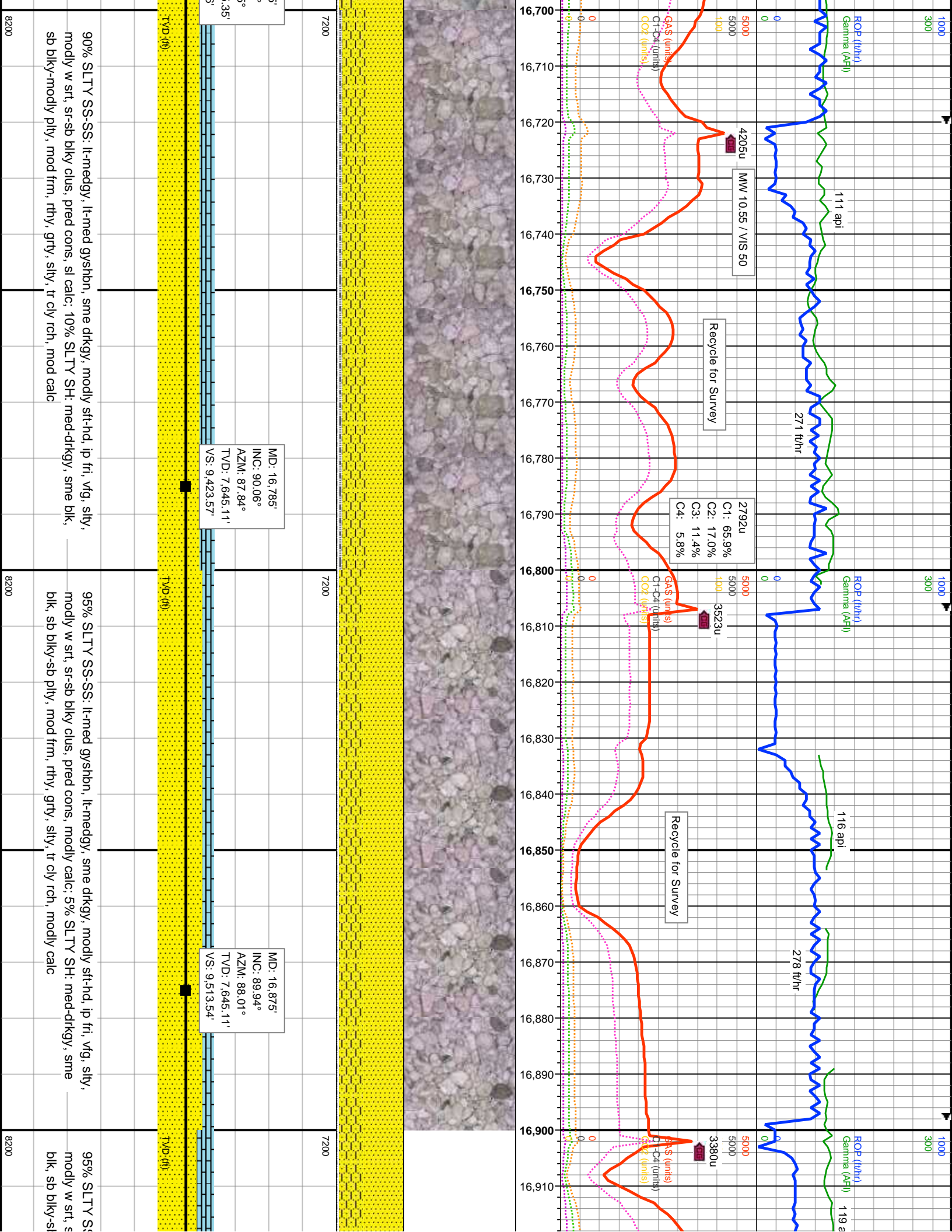
85% SLTY SS-SS: lt-medgy, lt-med gysbhn, sme d  
mod srt, sr-sb bly clus, pred cons, mod calc; 15%  
bly-mody ply, mod frm, rthy, grty, slty, tr cly rch, tr

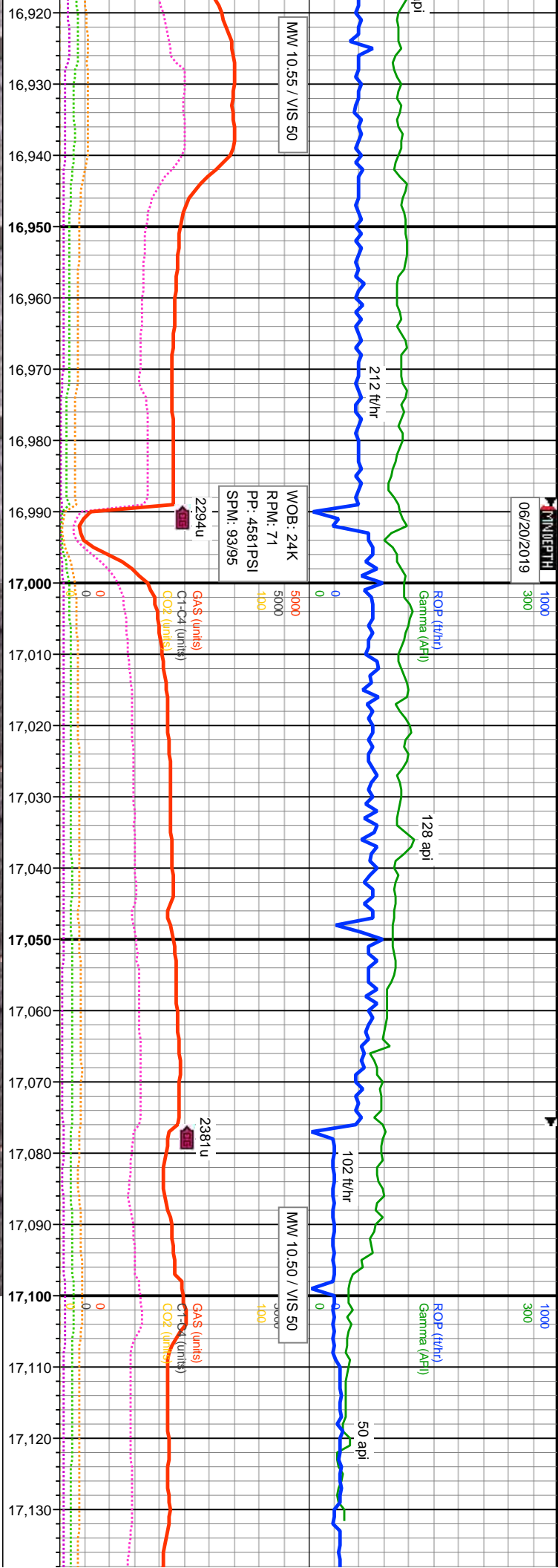








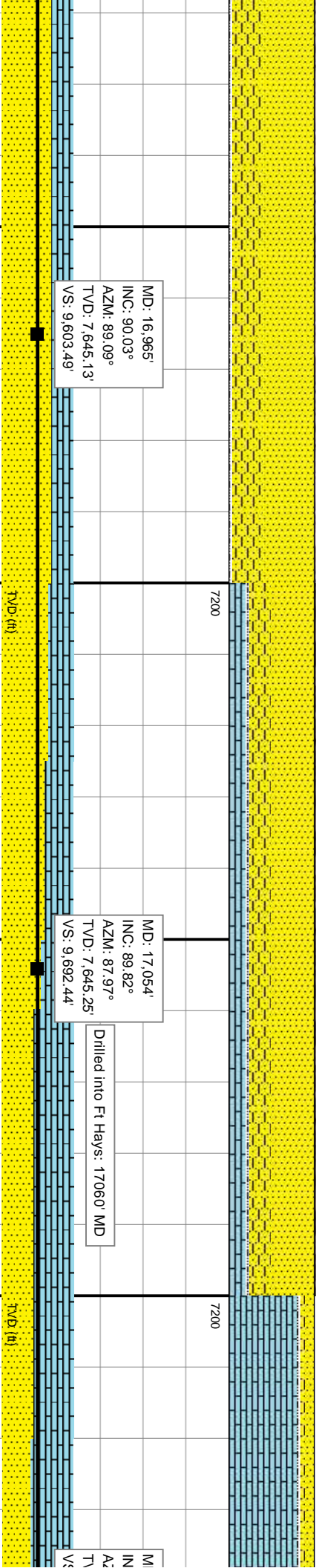




MD: 16,965'  
INC: 90.03°  
AZM: 89.09°  
TVD: 7,645.13'  
VS: 9,603.49'

MD: 17,054'  
INC: 89.82°  
AZM: 87.97°  
TVD: 7,645.25'  
VS: 9,692.44'

Drilled into Ft Hays: 17060' MD

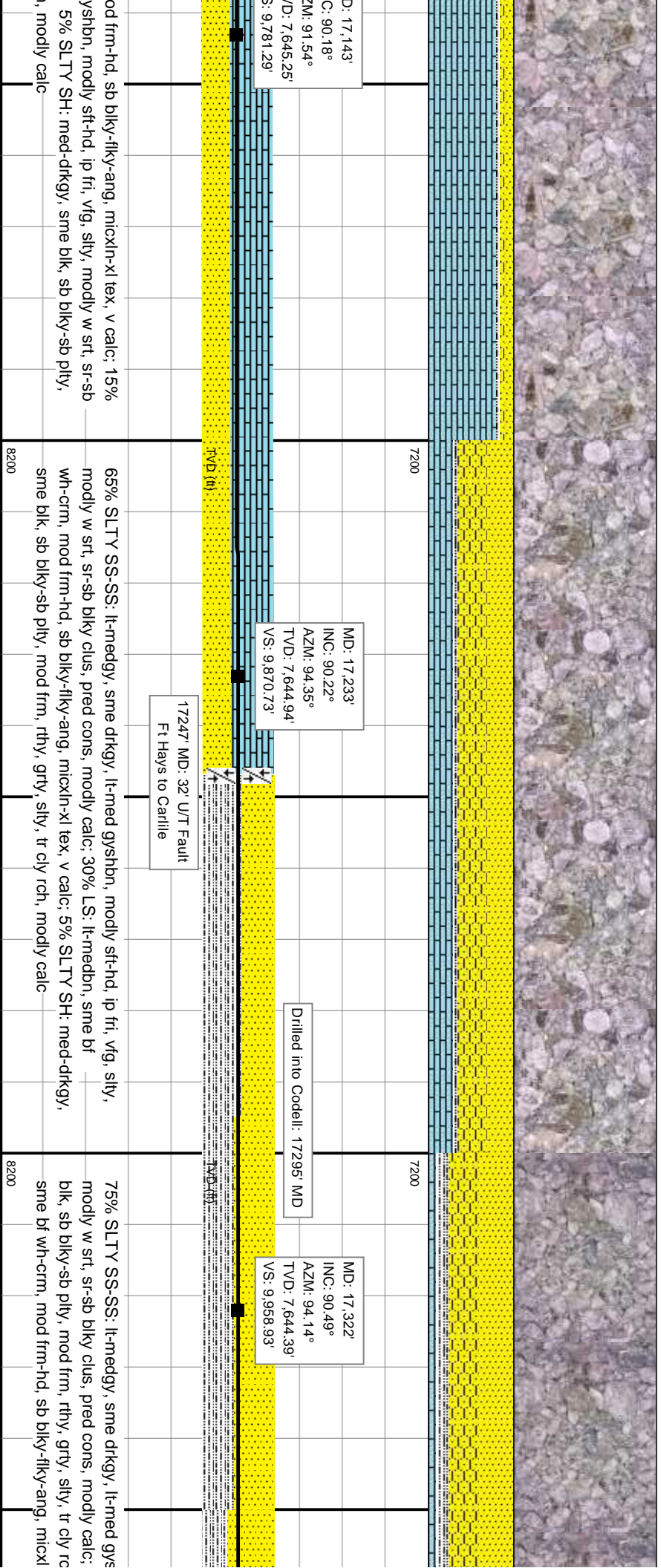
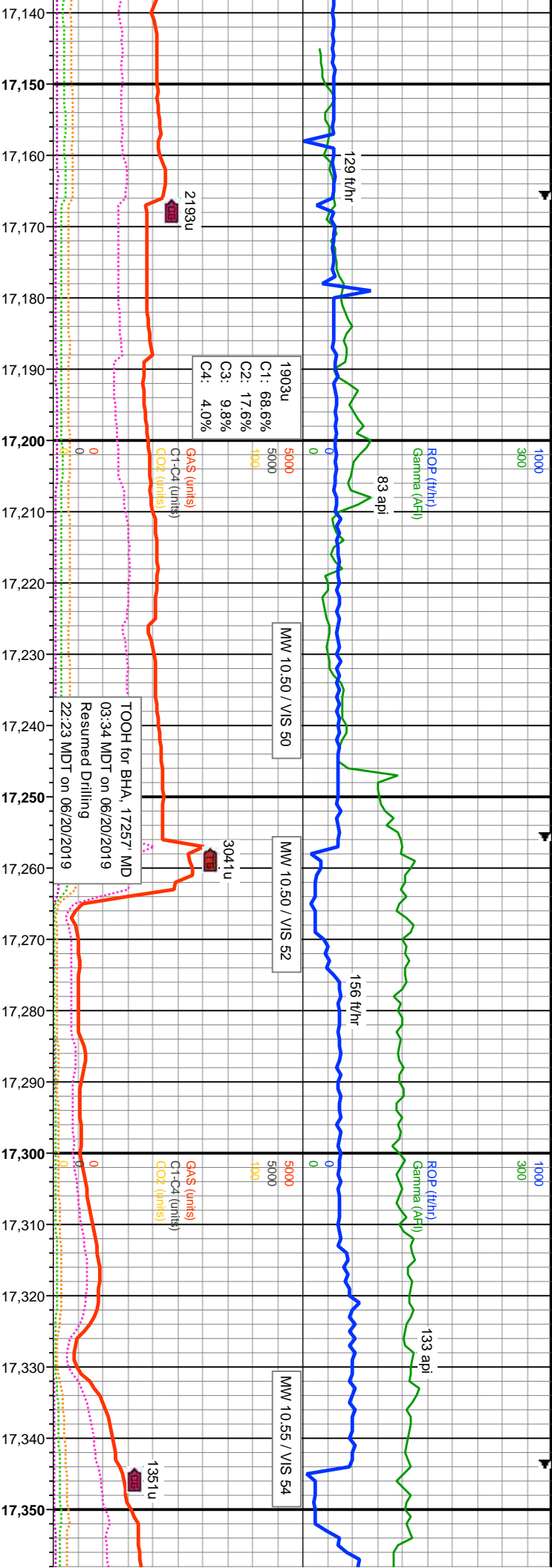


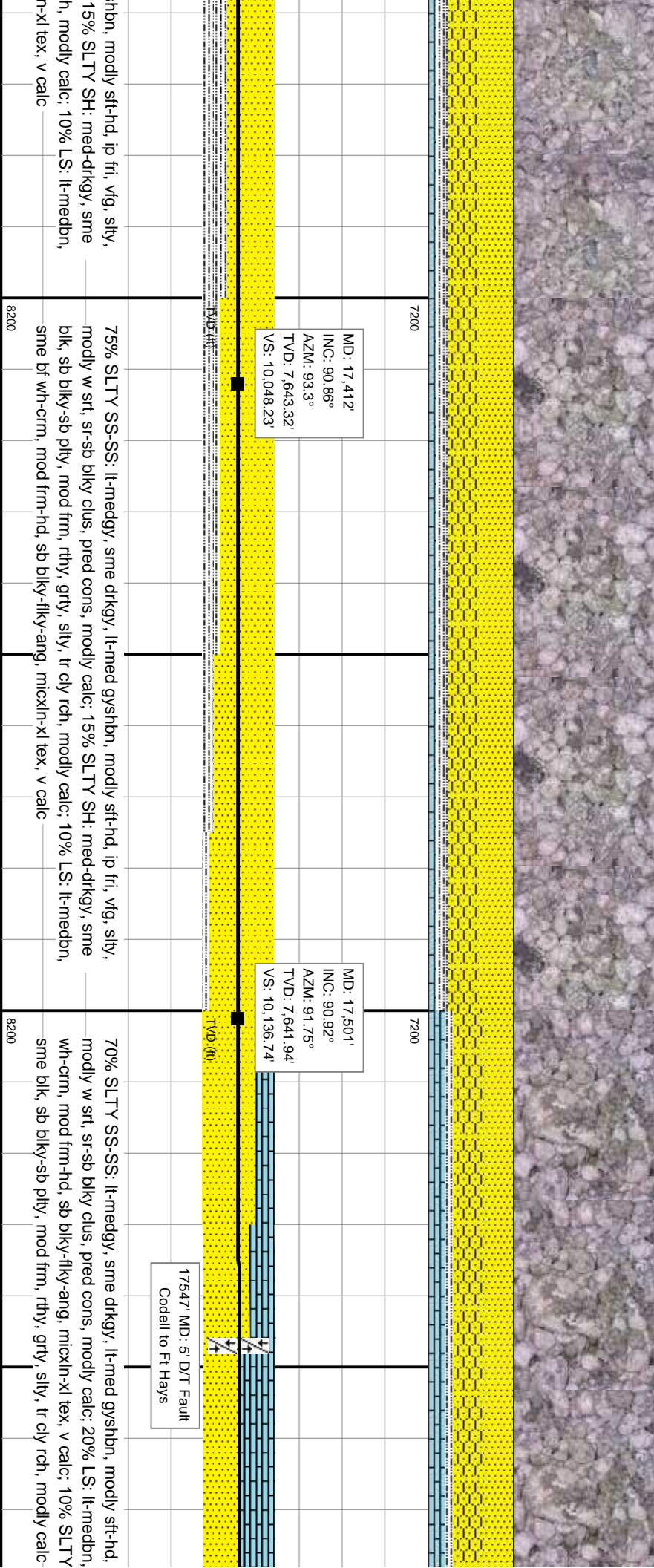
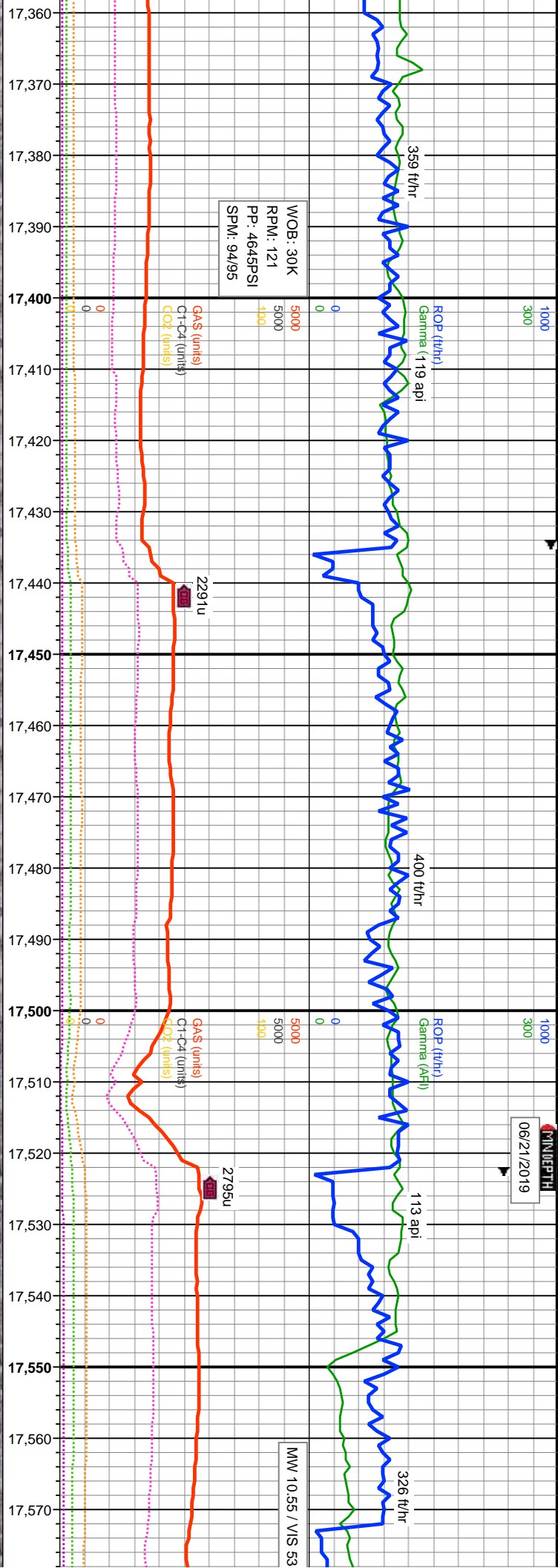
SS: lt-med gyshtn, lt-medgy, sme drkgy, modly sft-hd, lp fri, vfg, slty, tr-sb blkly clus, pred cons, modly calc; 5% SLTY SH: med-drkgy, sme ply, mod frm, rthy, grty, slty, tr cly rch, modly calc

75% SLTY SS-SS: lt-med gyshtn, lt-medgy, sme drkgy, modly sft-hd, lp fri, vfg, slty, modly w srt, sr-sb blkly clus, pred cons, modly calc; 20 % LS: lt-medbn, bf wh-crm, mod frm-hd, sb blkly-flky-ang, miccln-xl tex, v calc; 5% SLTY SH: med-drkgy, sme blk, sb blkly-sb ply, mod frm, rthy, grty, slty, tr cly rch, modly calc

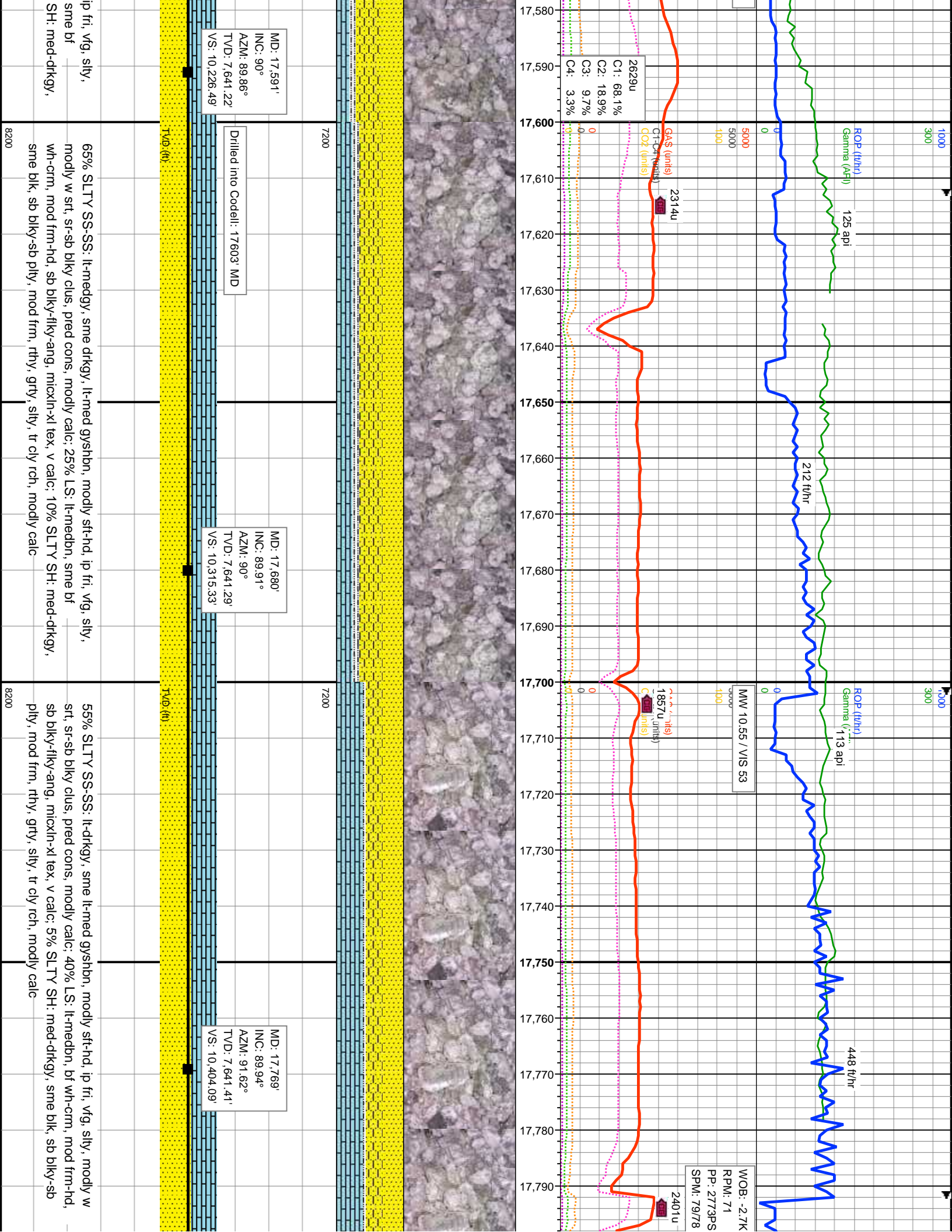
80% LS: lt-medbn, bf wh-crm, m SLTY SS-SS: lt-medgy, lt-med g blkly clus, pred cons, modly calc; mod frm, rthy, grty, slty, tr cly rch

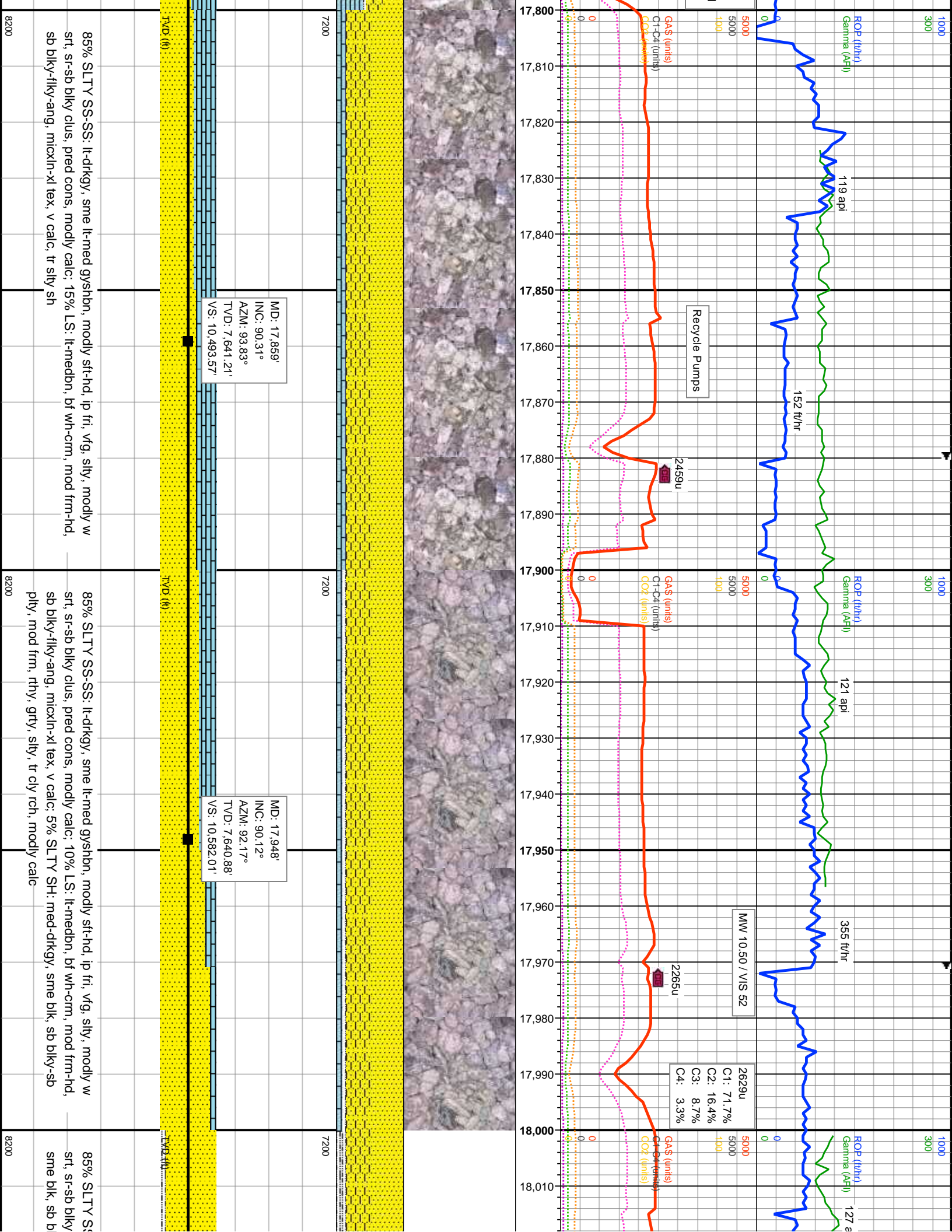




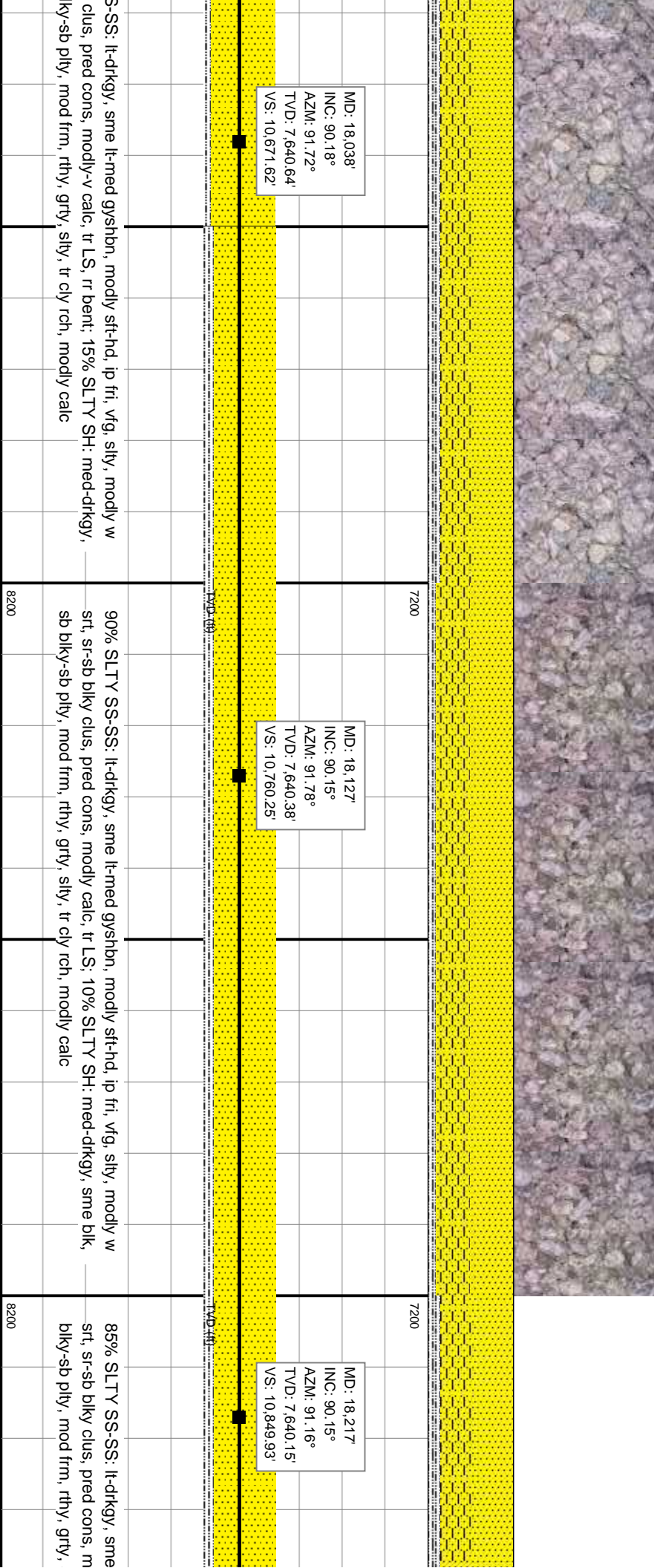
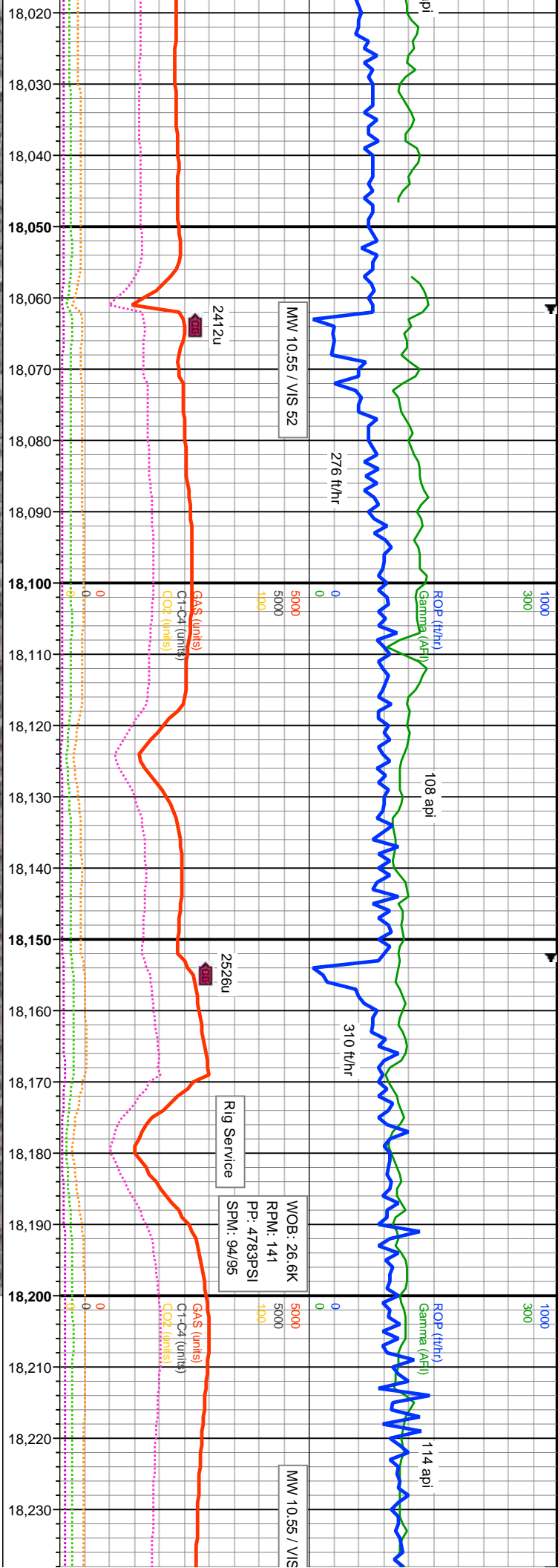


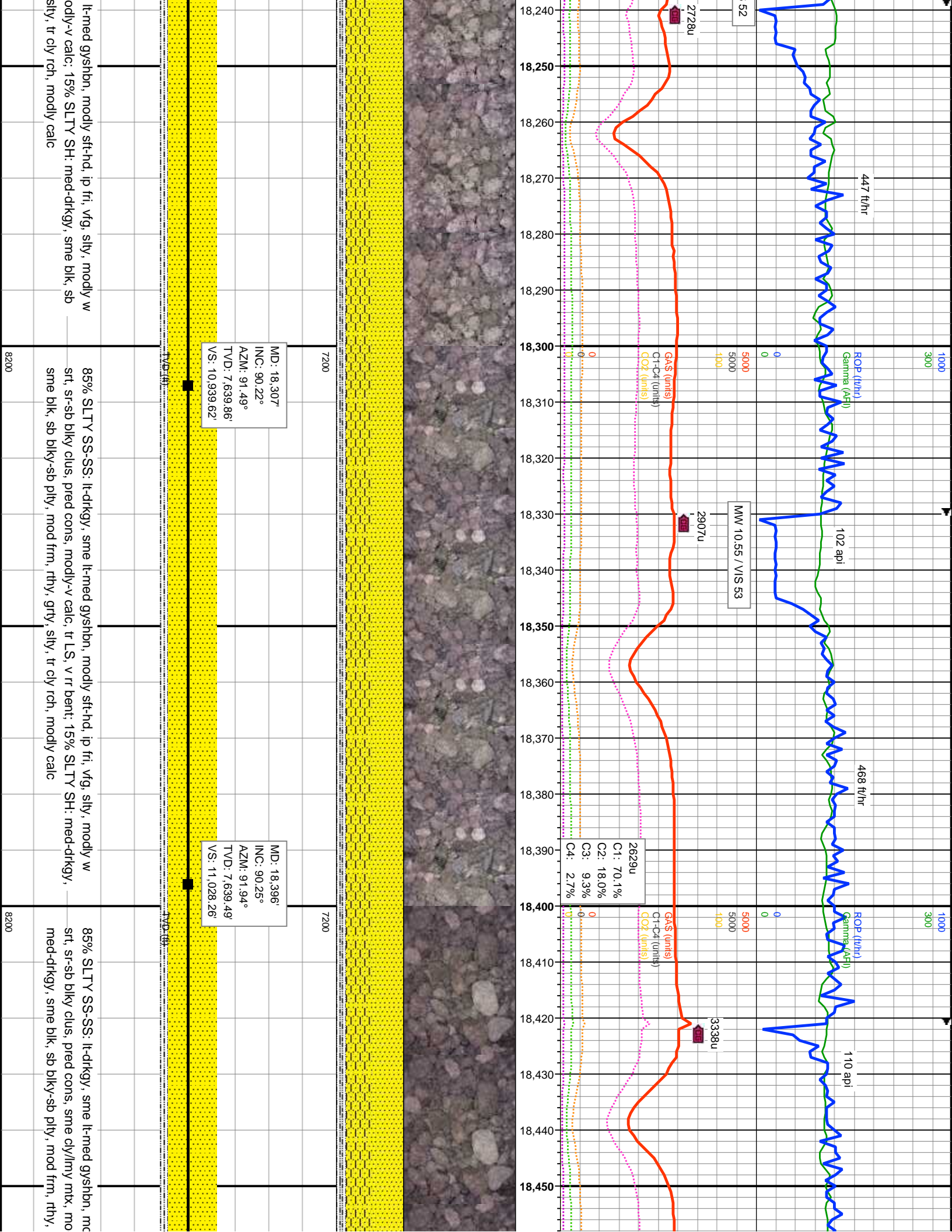




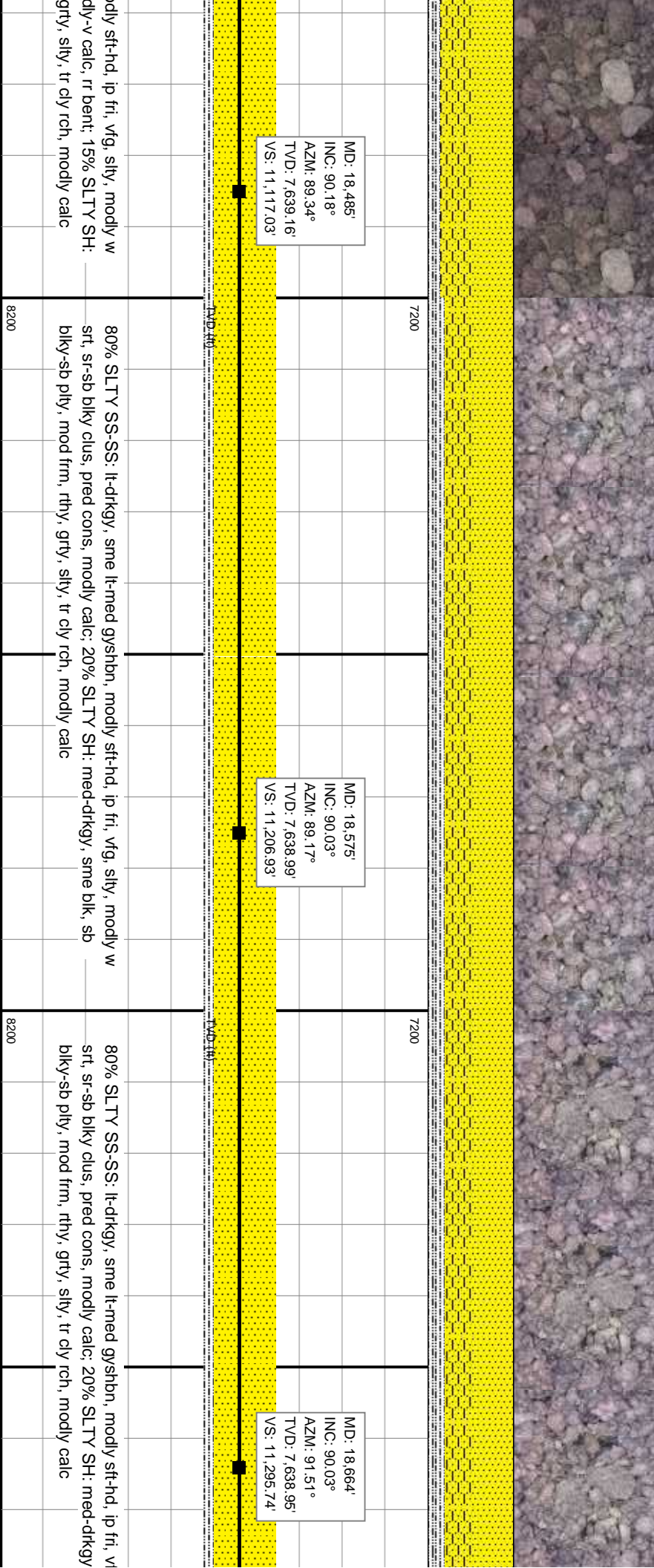
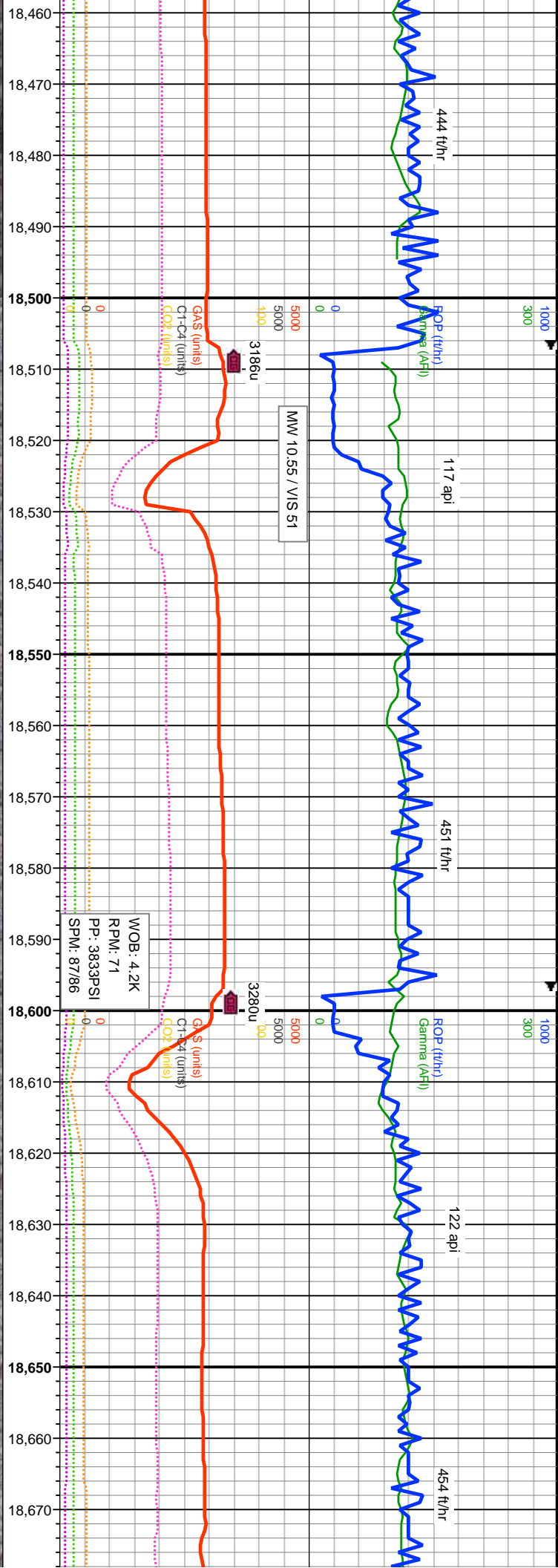


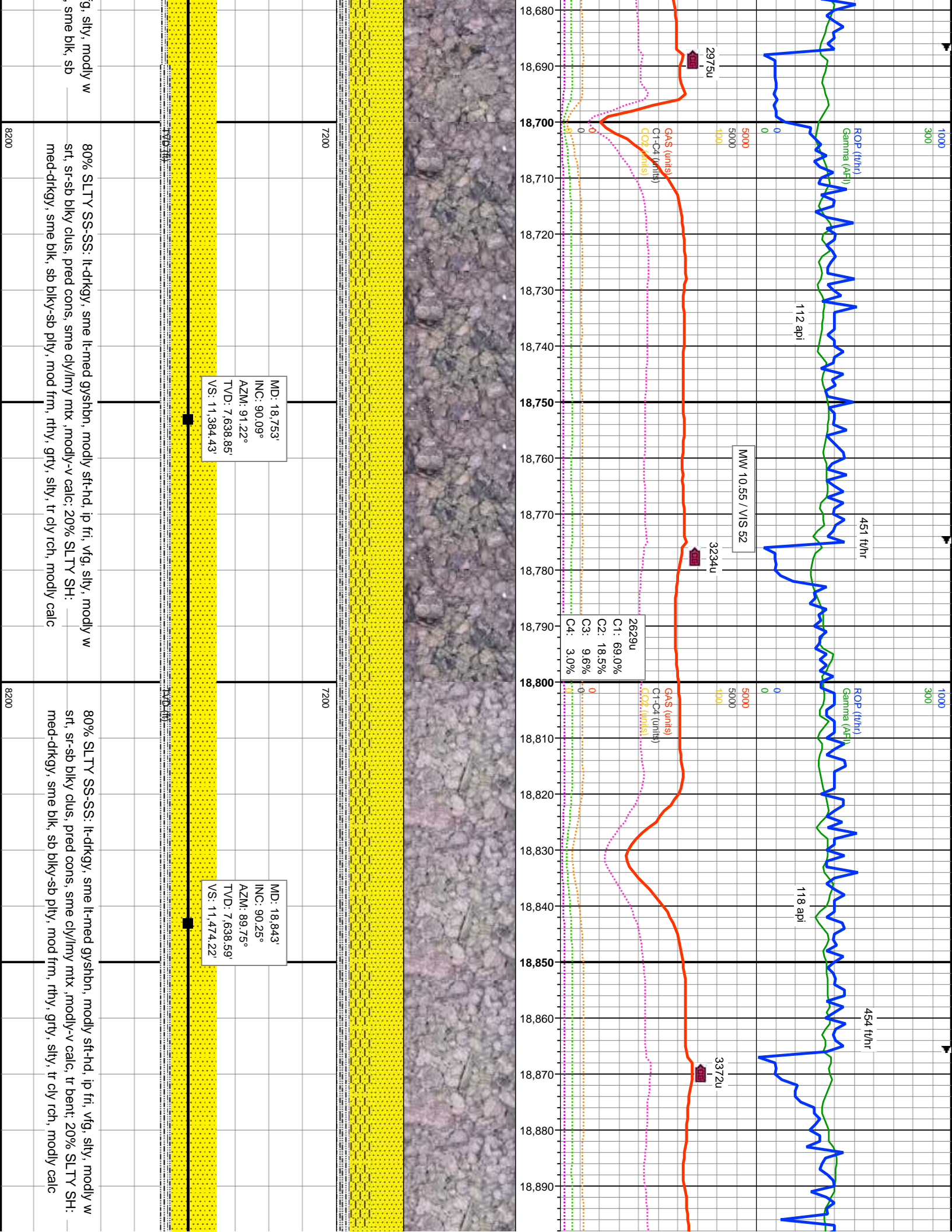




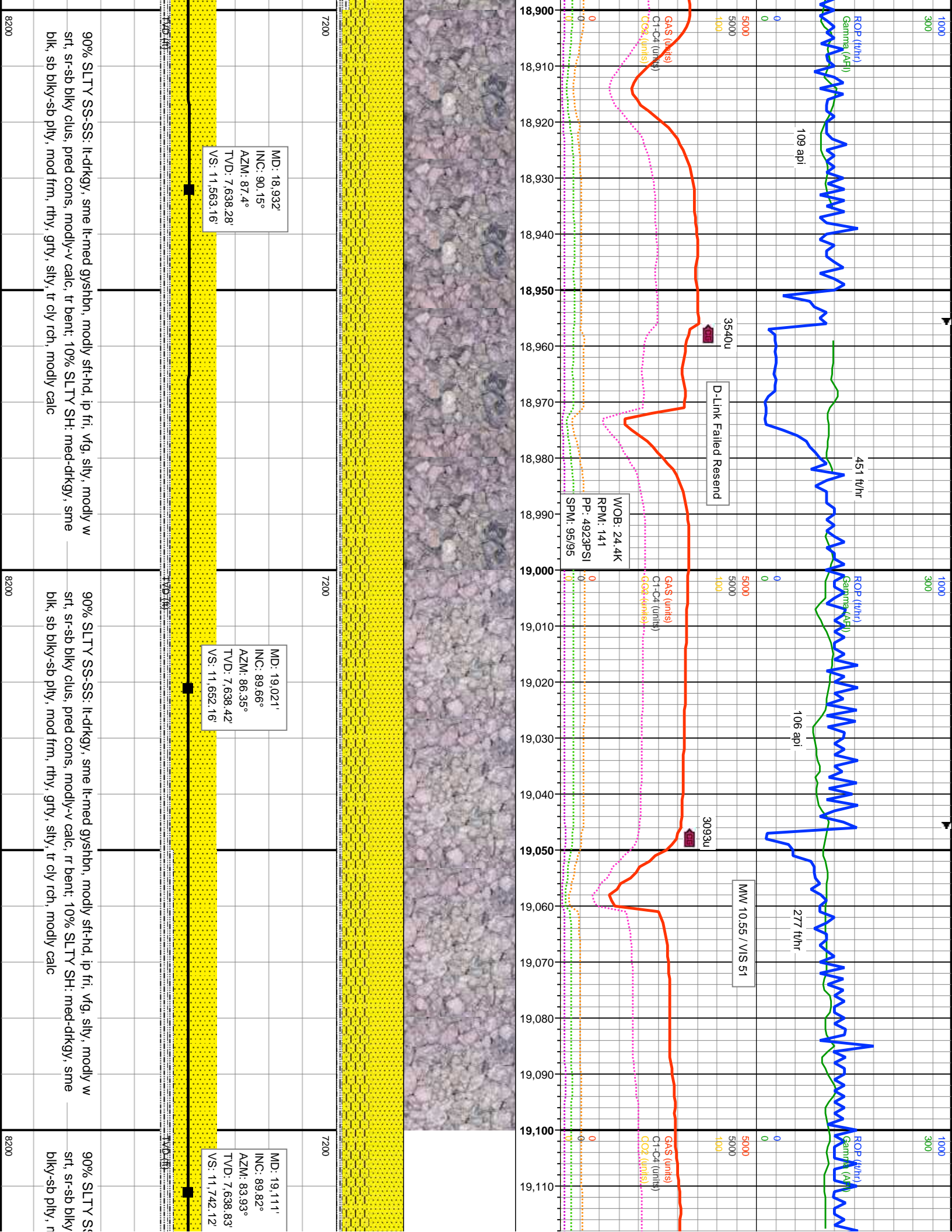


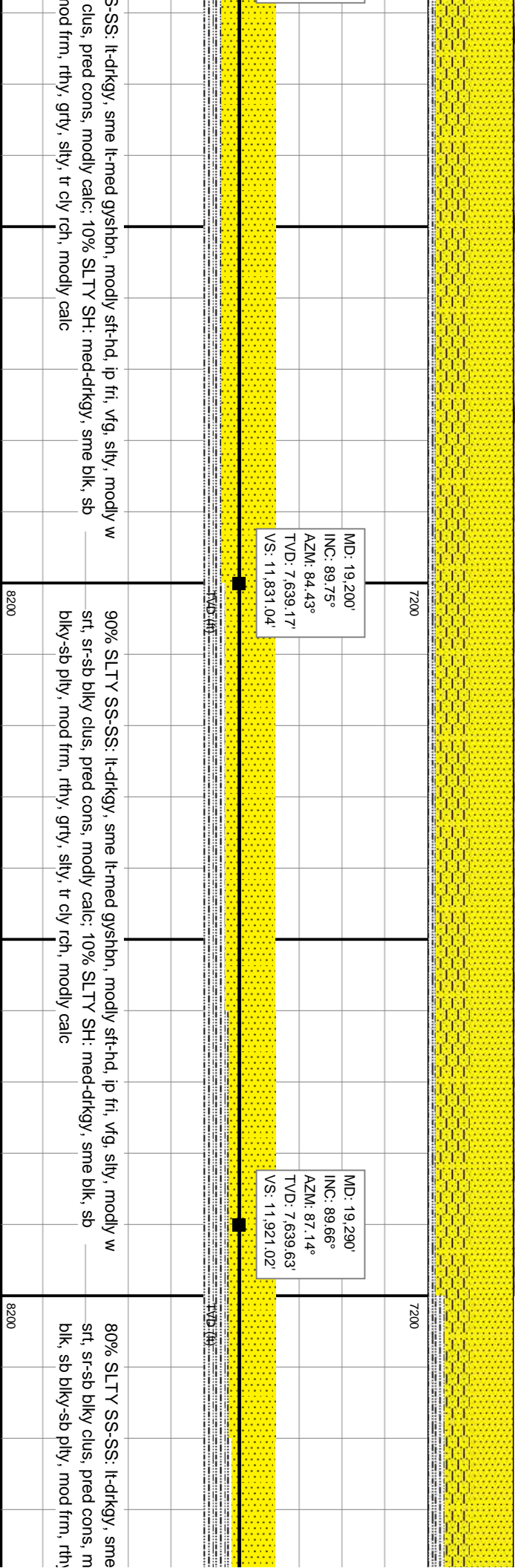
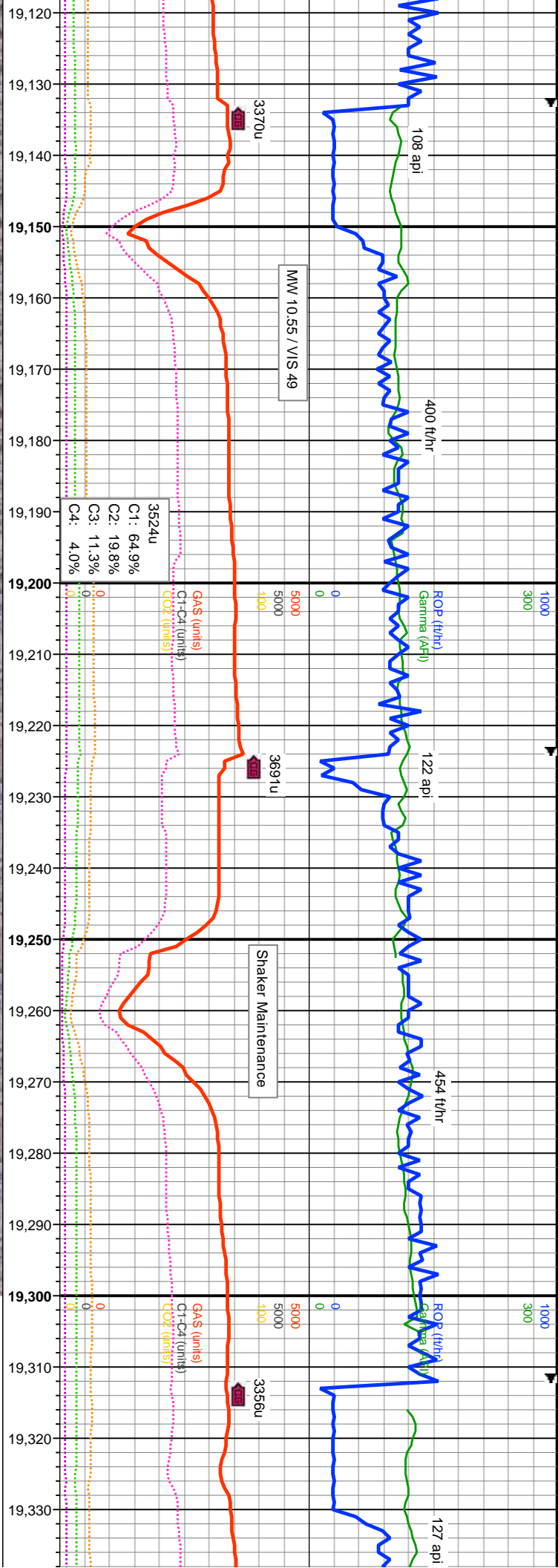










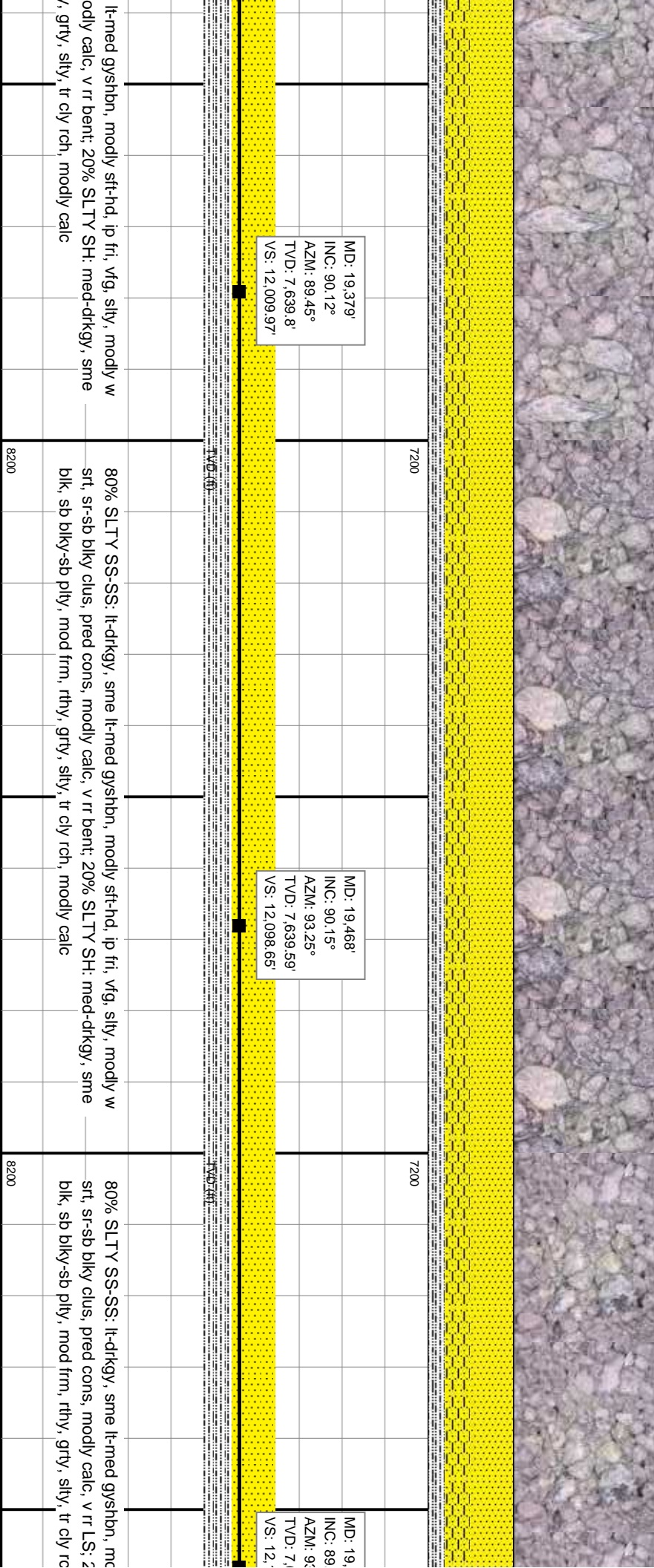
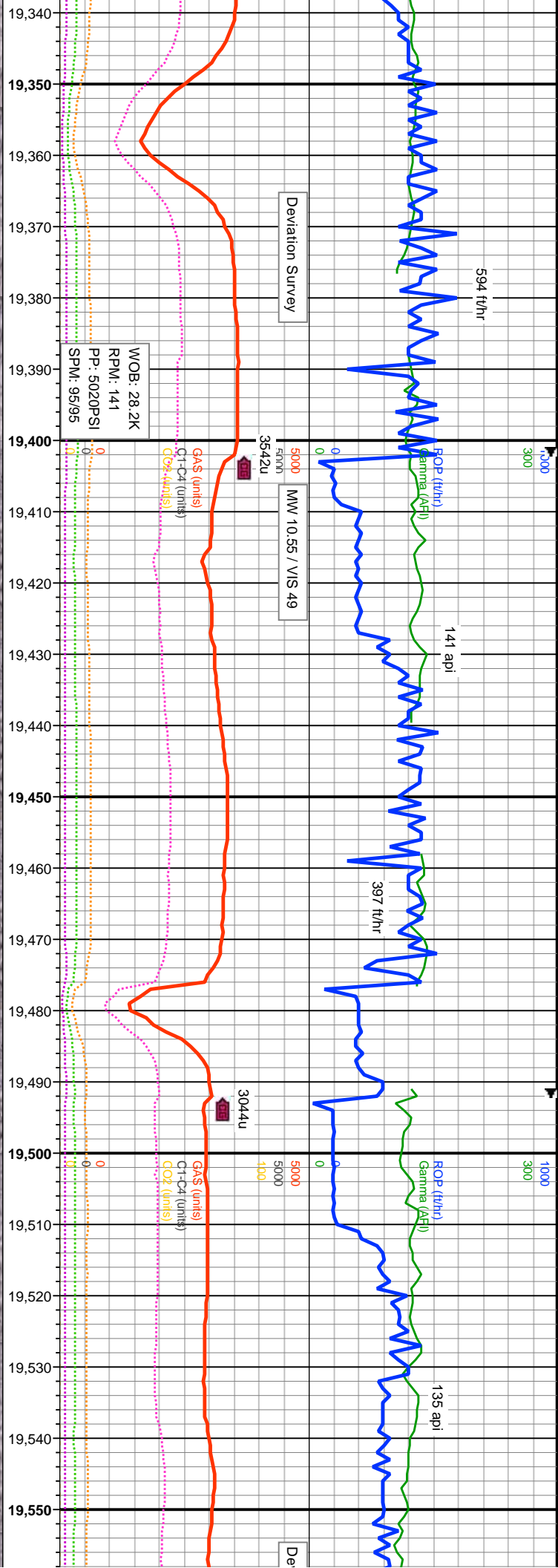


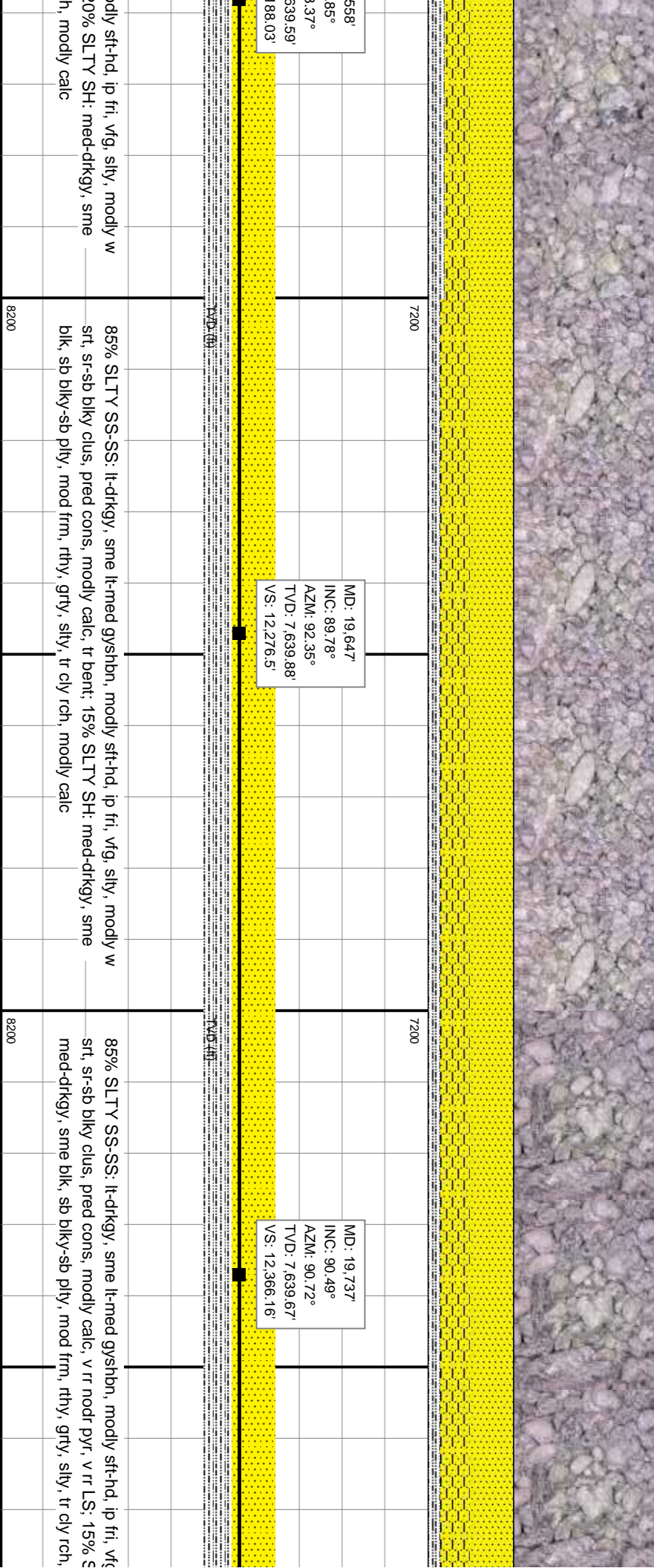
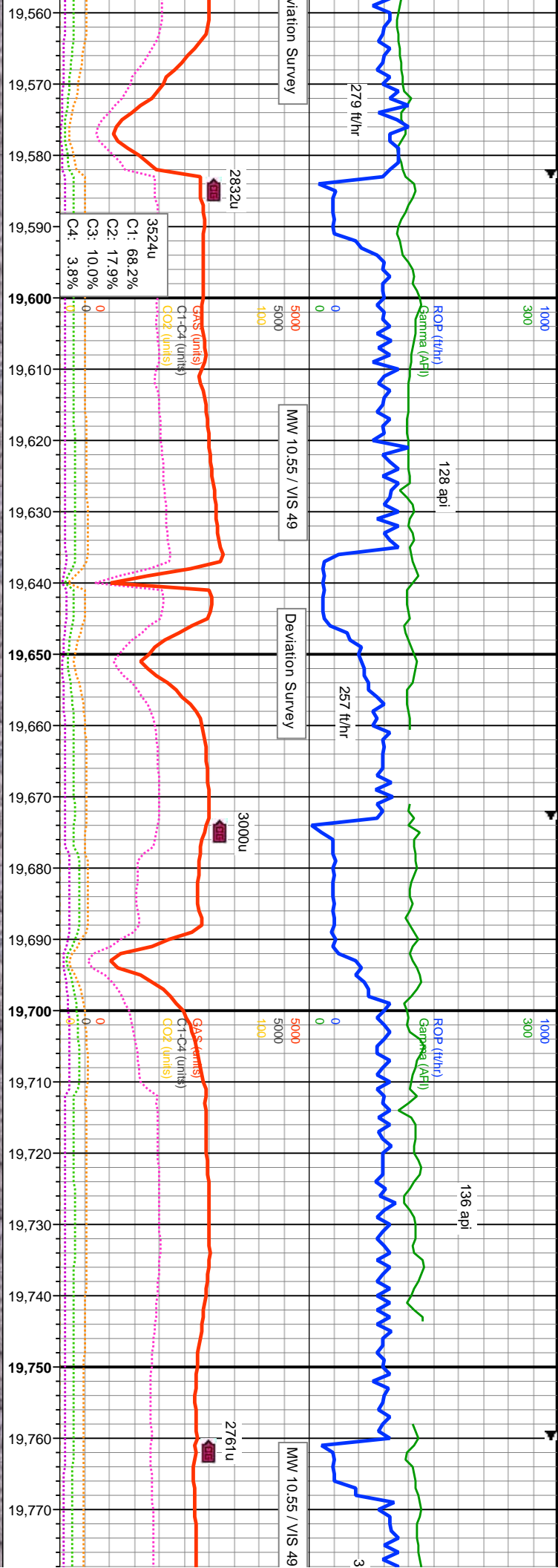
SS: lt-dkgy, sme lt-med gysbhn, modly sft-hd, ip fri, vfg, silty, modly w  
clus, pred cons, modly calc; 10% SLTY SH: med-dkgy, sme blk, sb  
mod frm, rthy, grty, silty, tr cly rch, modly calc

90% SLTY SS-SS: lt-dkgy, sme lt-med gysbhn, modly sft-hd, ip fri, vfg, silty, modly w  
srt, sr-sb blkly clus, pred cons, modly calc; 10% SLTY SH: med-dkgy, sme blk, sb  
blkly-sb plty, mod frm, rthy, grty, silty, tr cly rch, modly calc

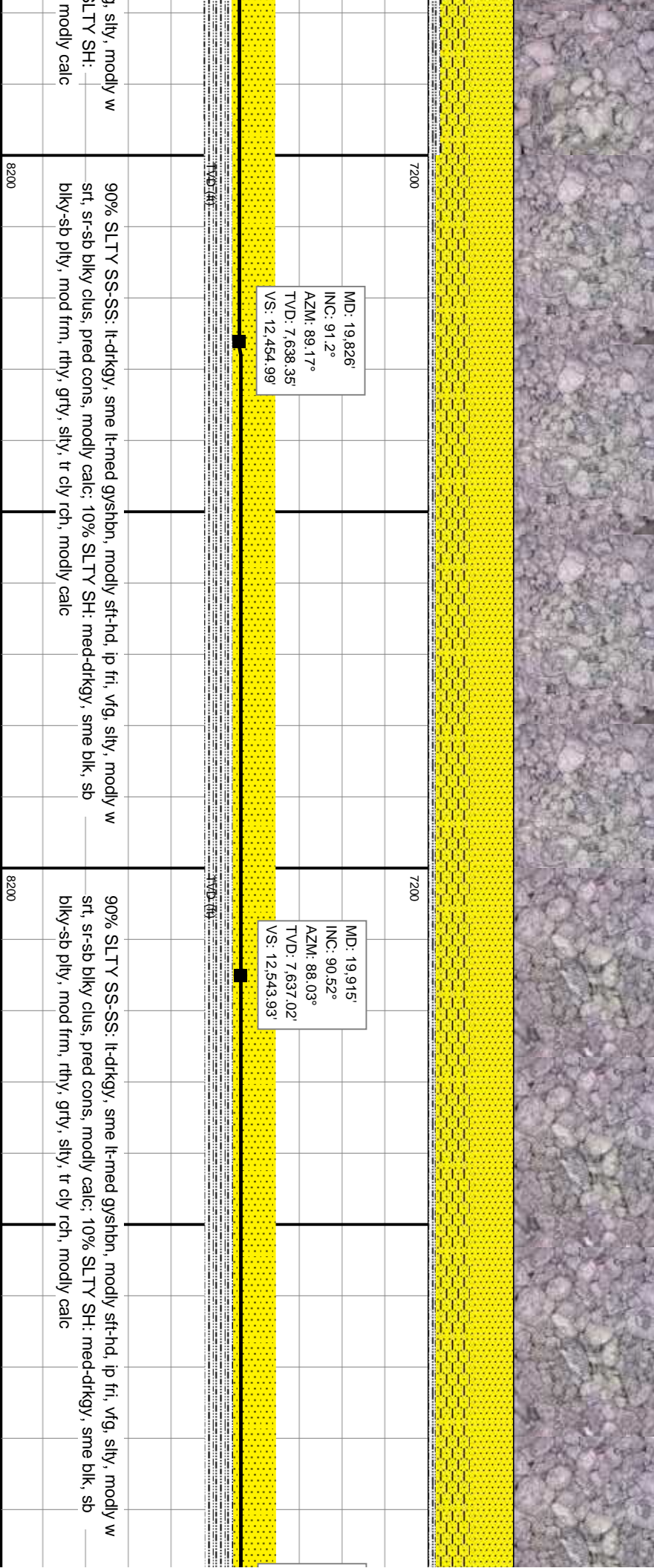
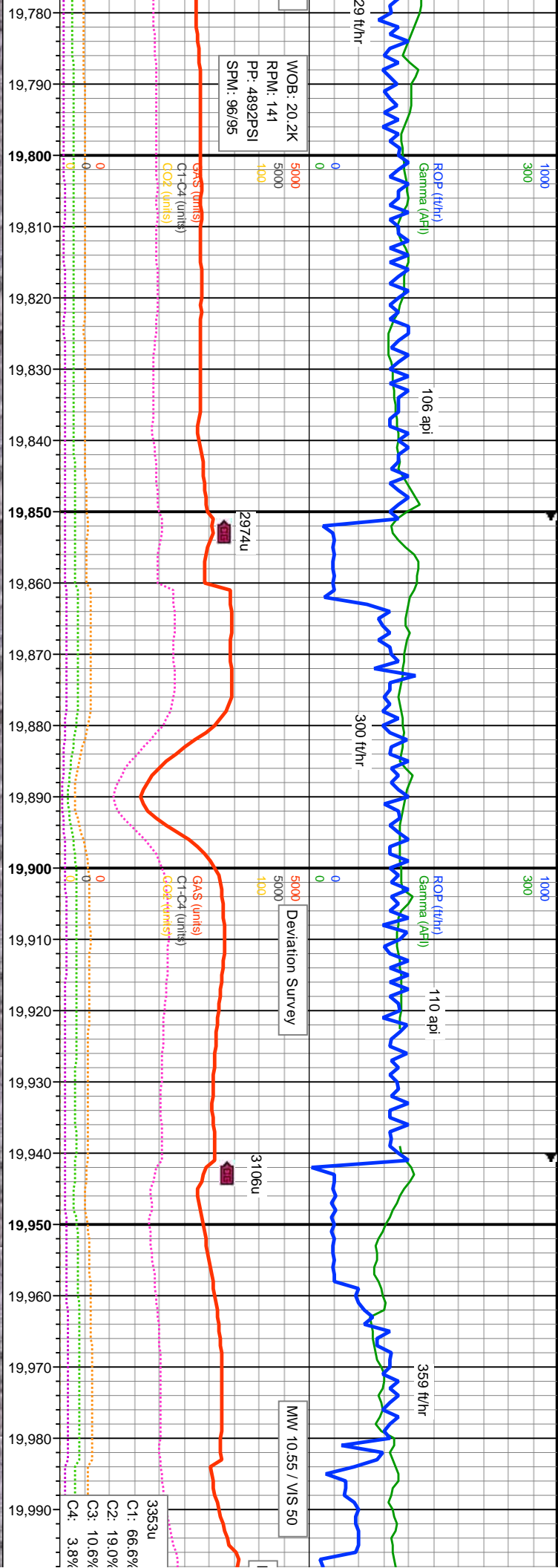
80% SLTY SS-SS: lt-dkgy, sme  
srt, sr-sb blkly clus, pred cons, m  
blk, sb blkly-sb plty, mod frm, rthy,

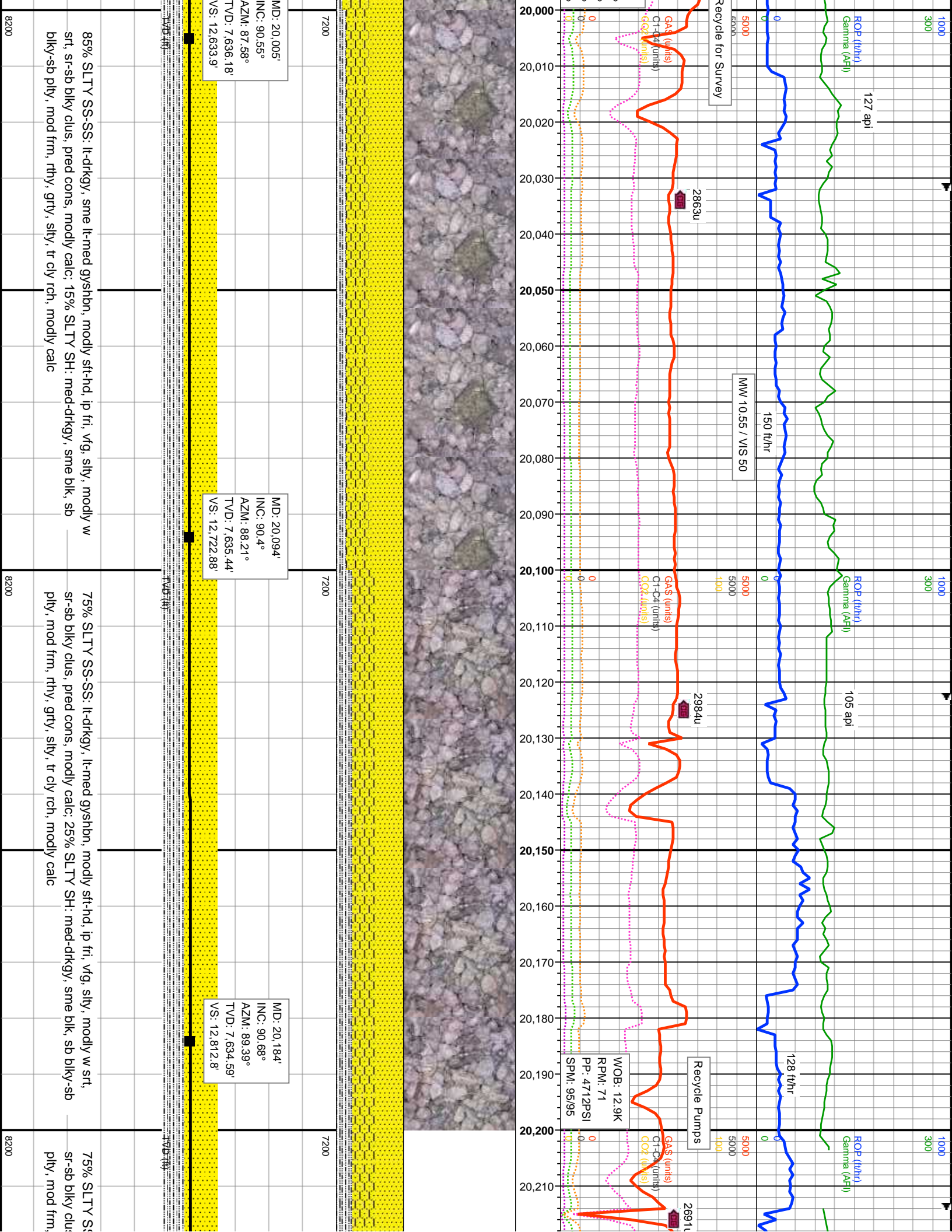






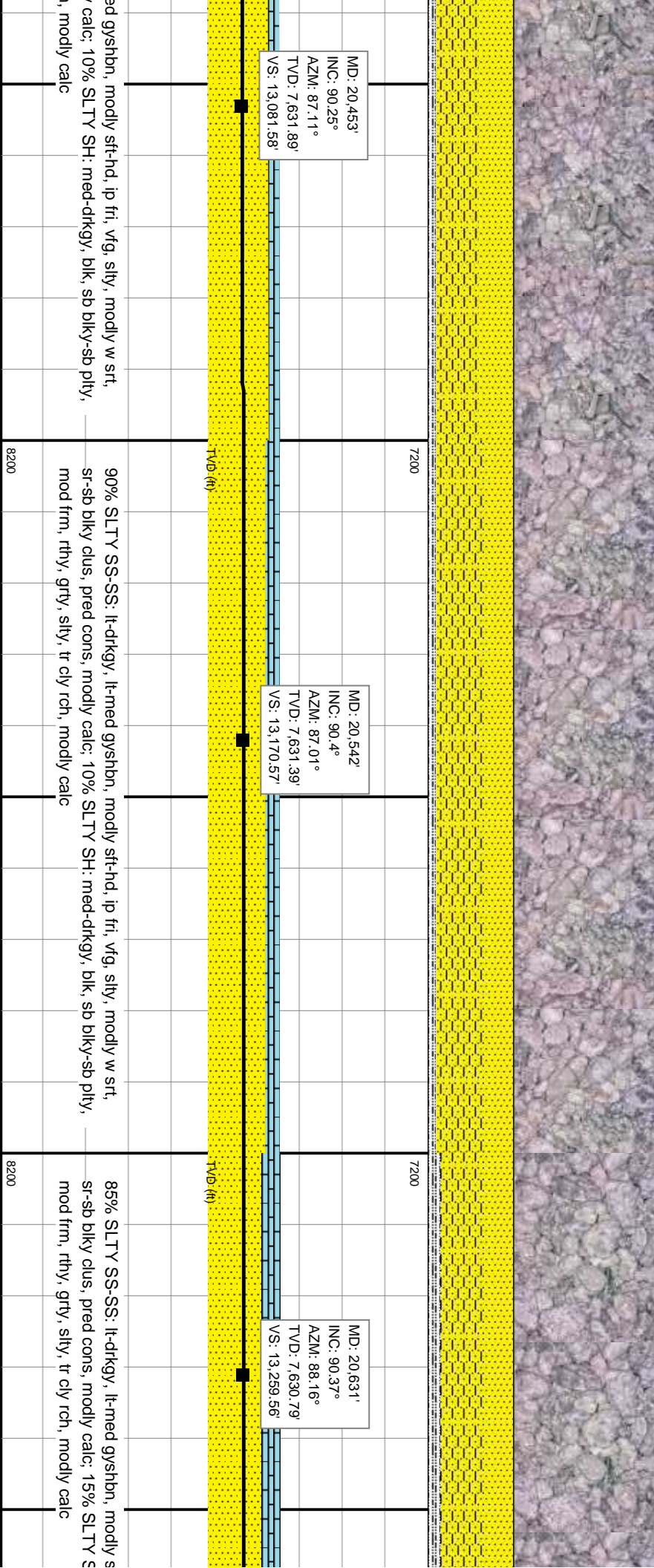
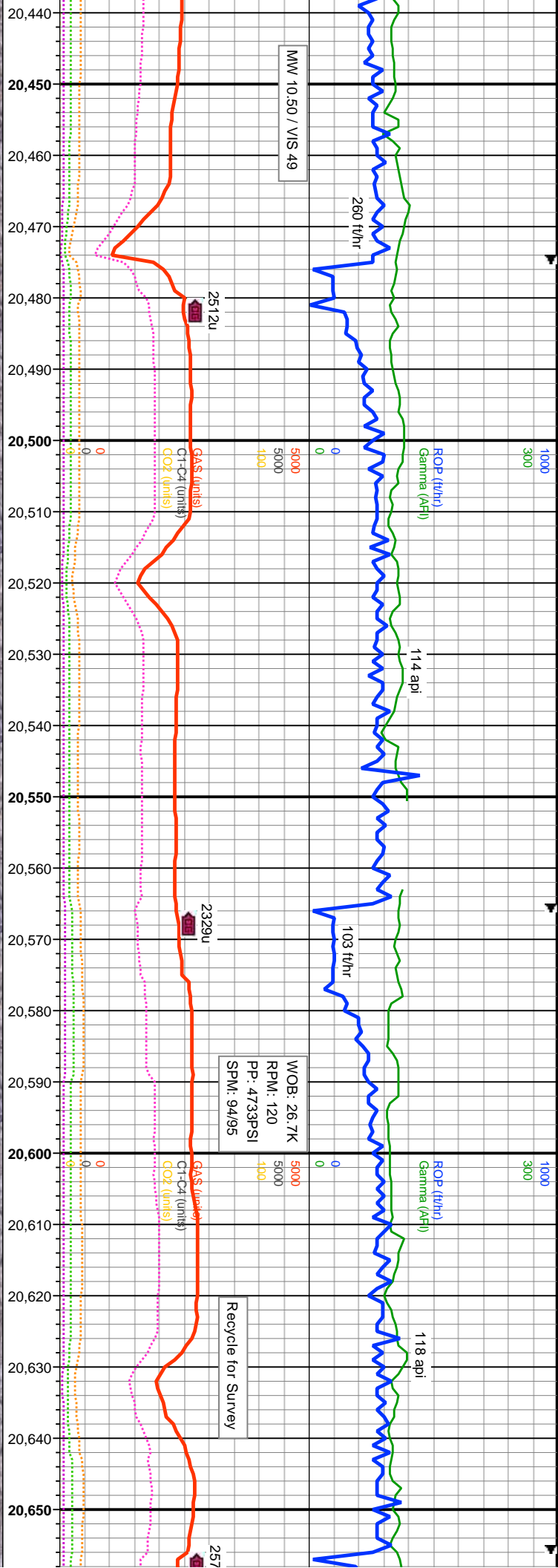




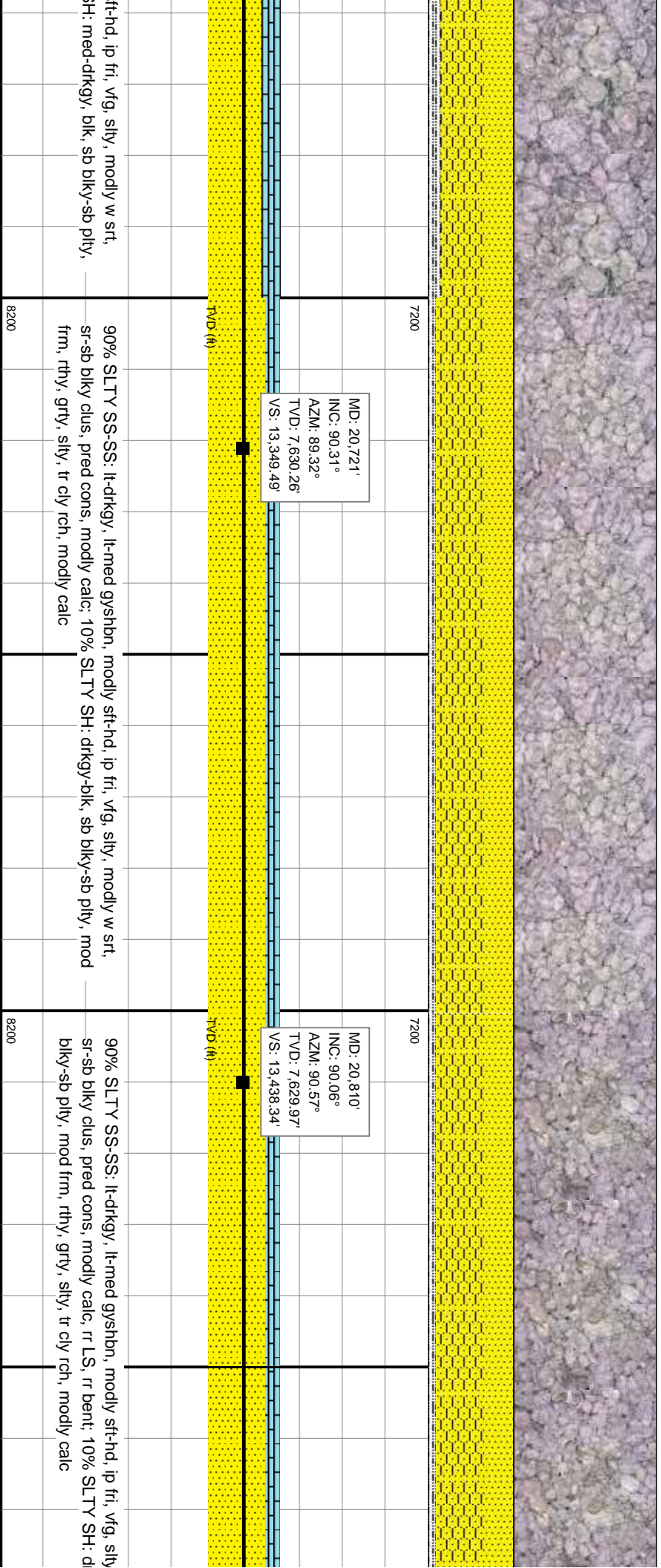
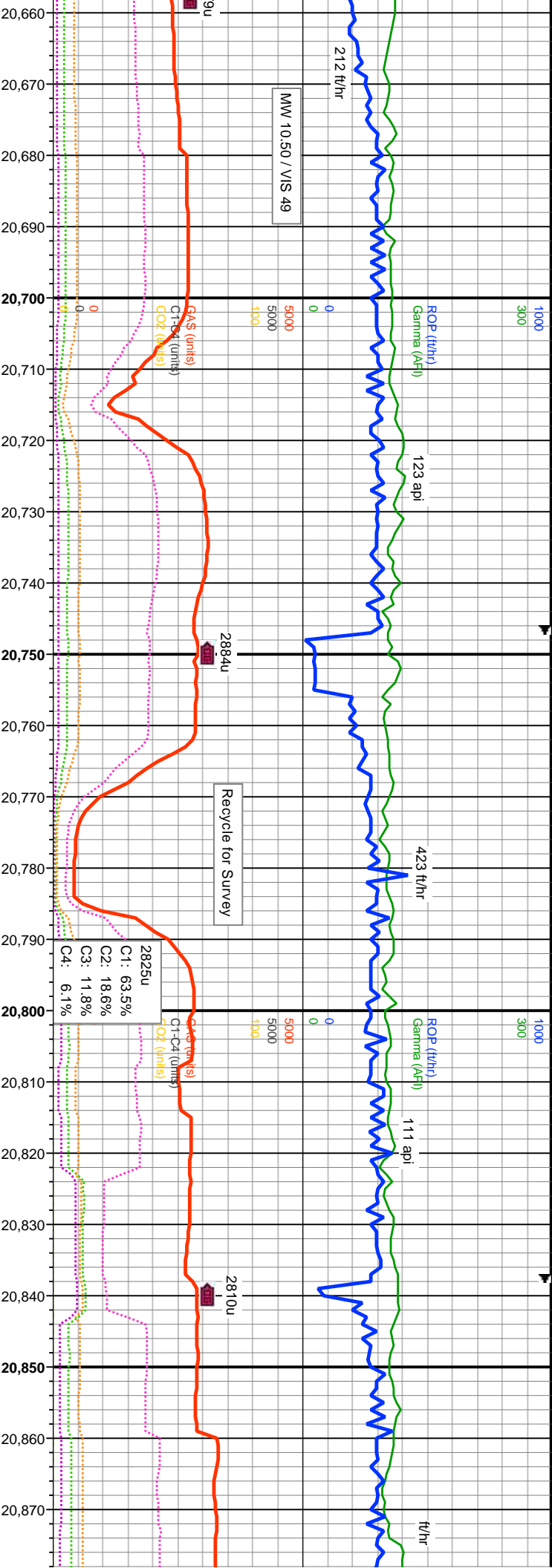


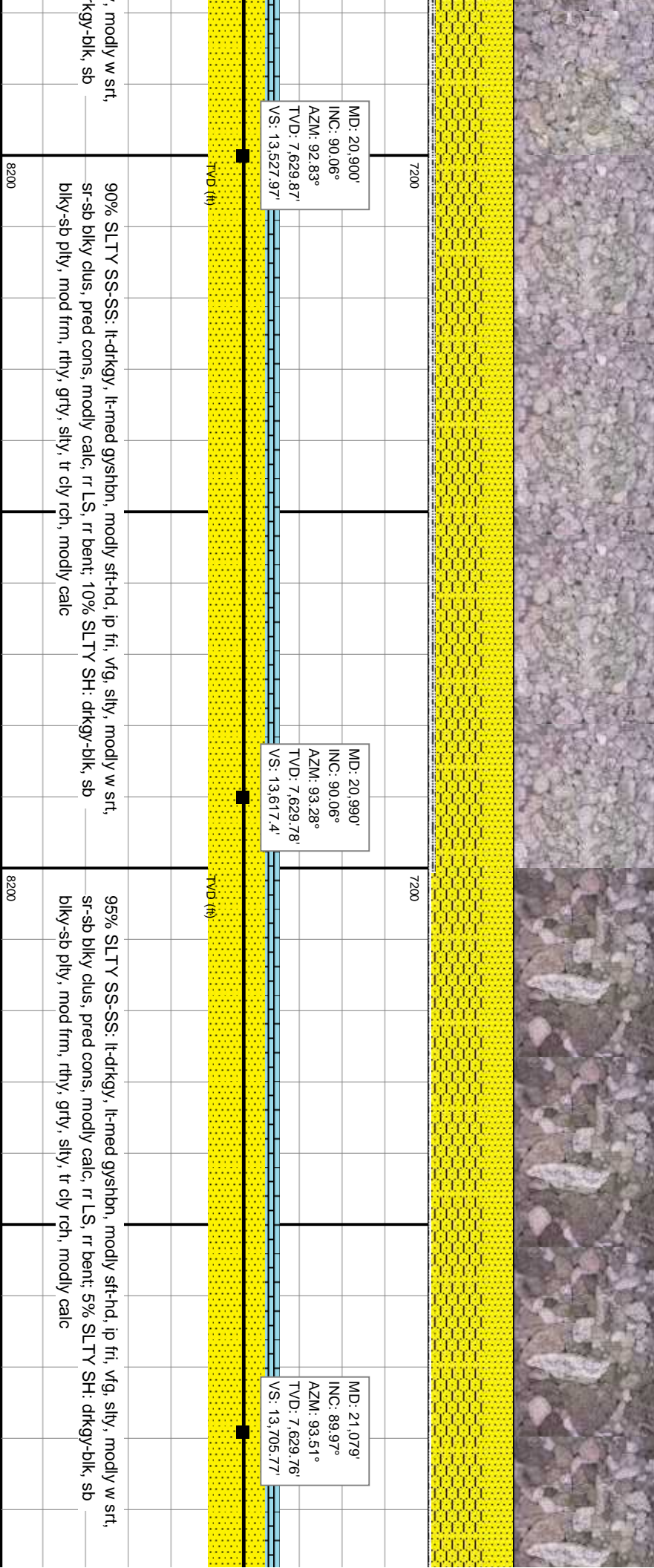
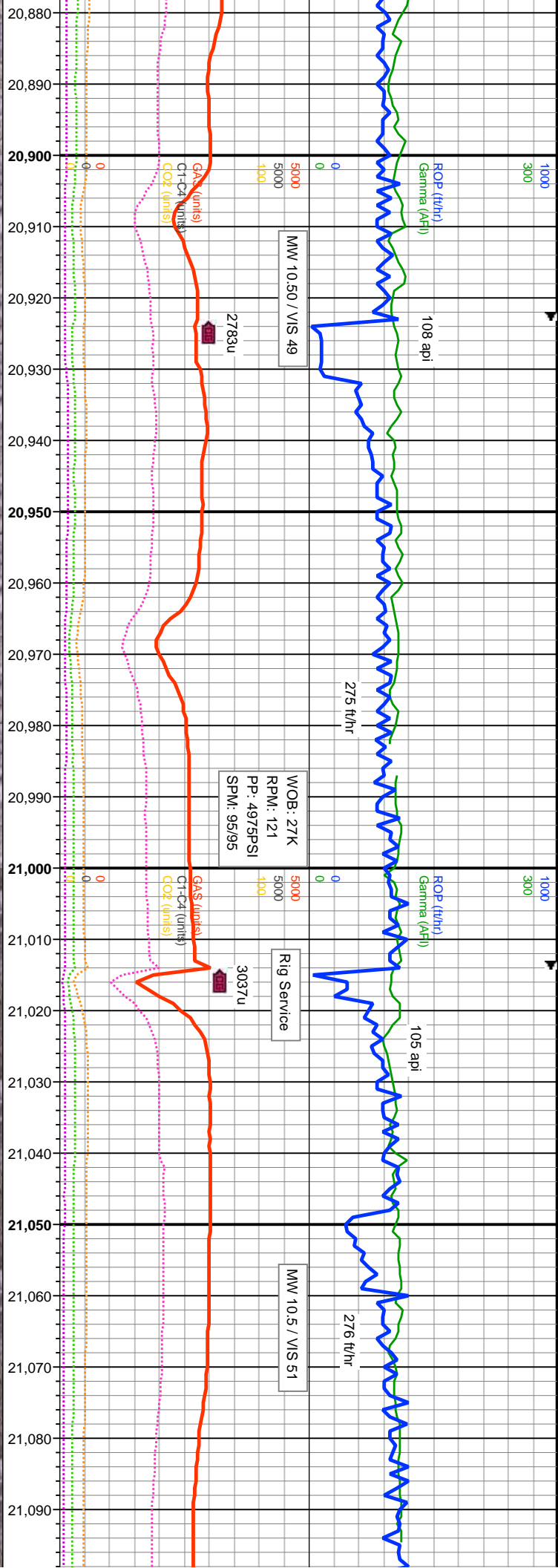




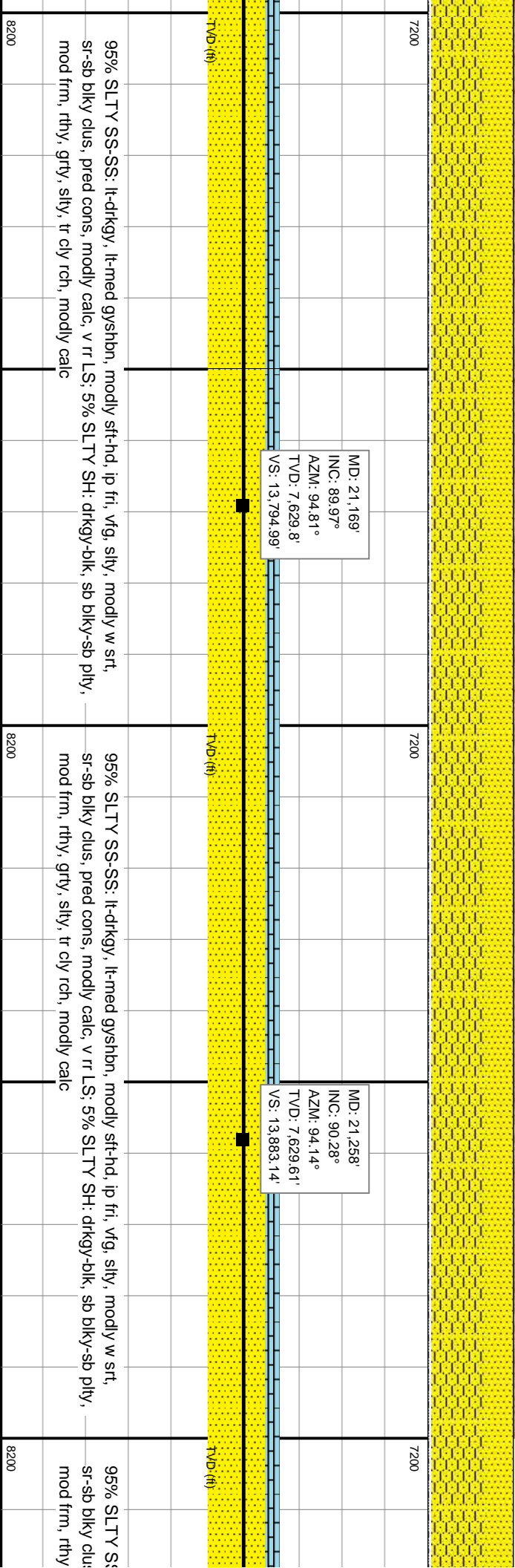
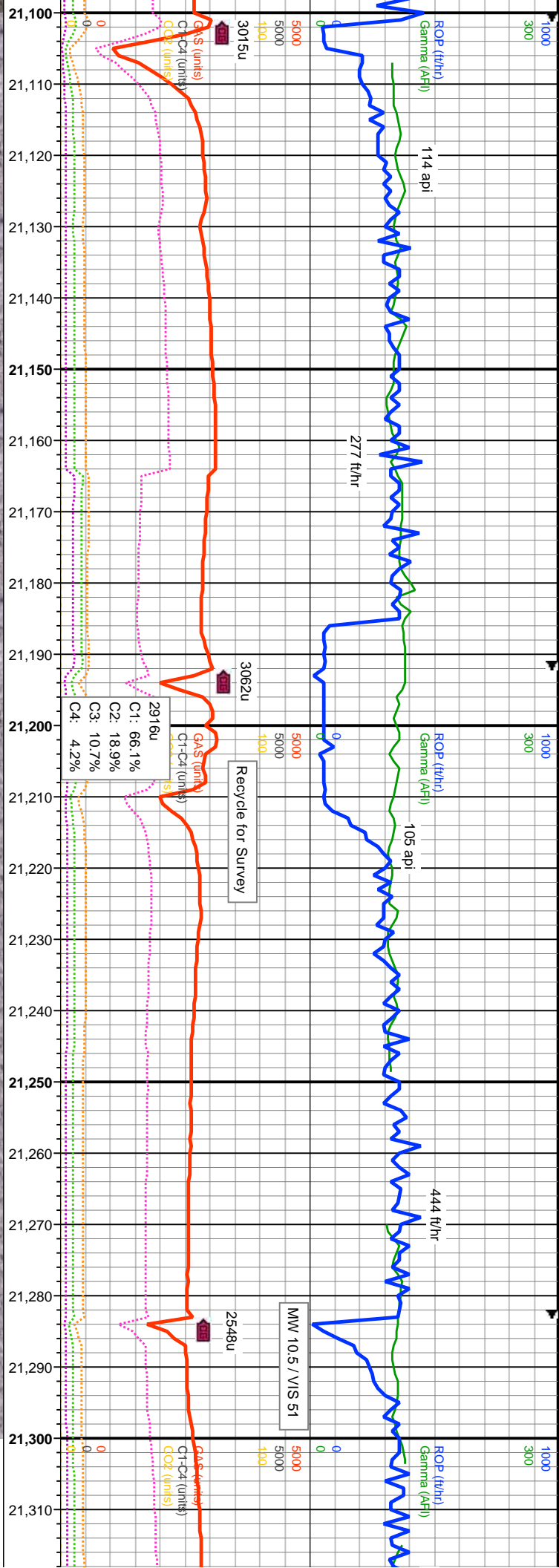


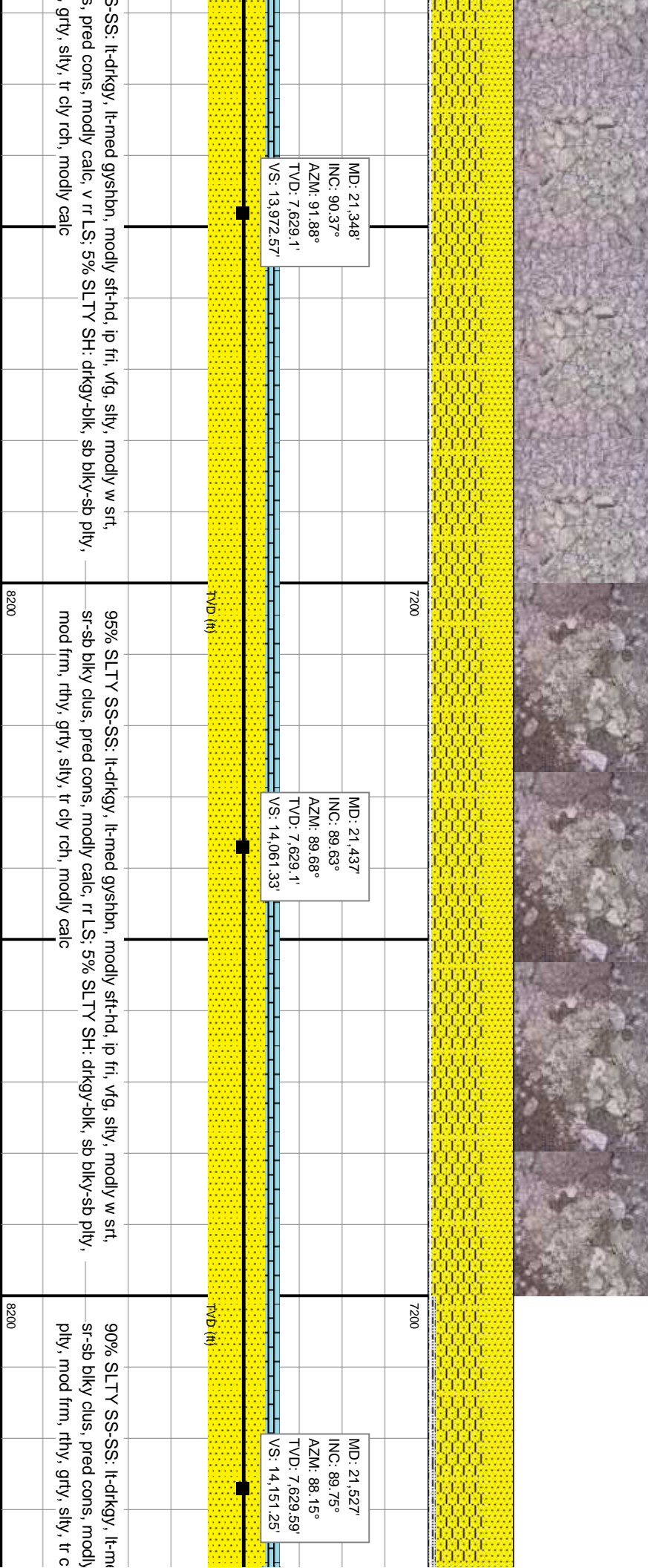
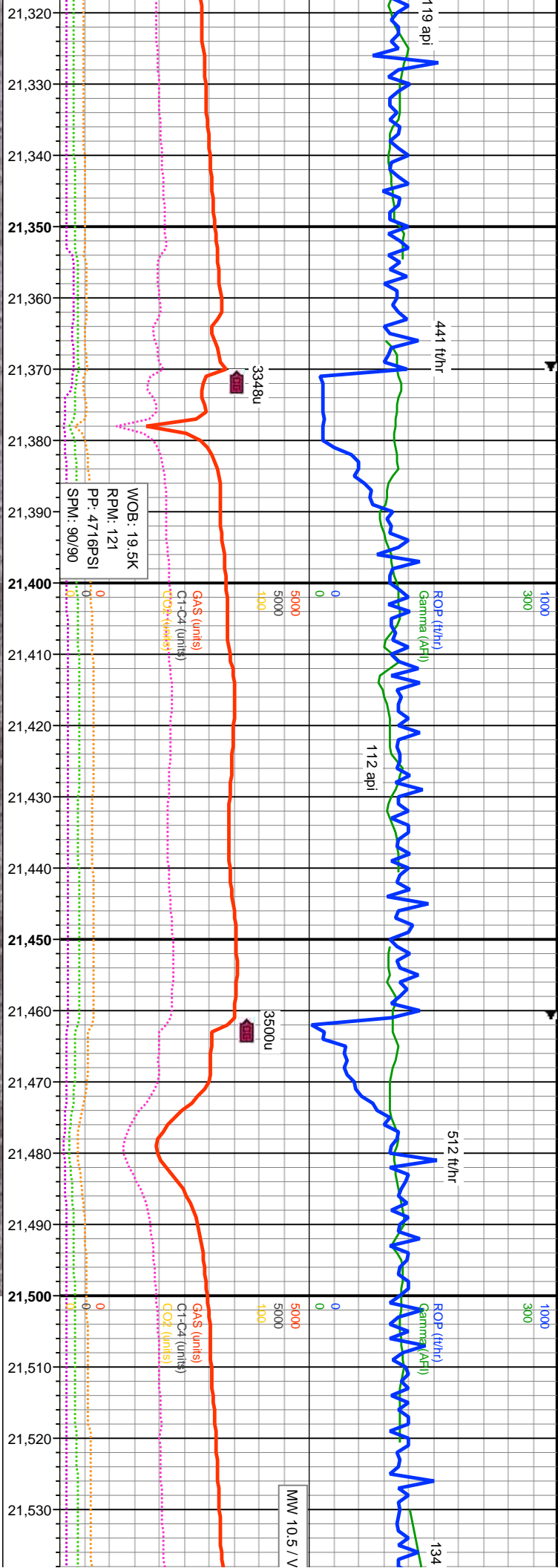




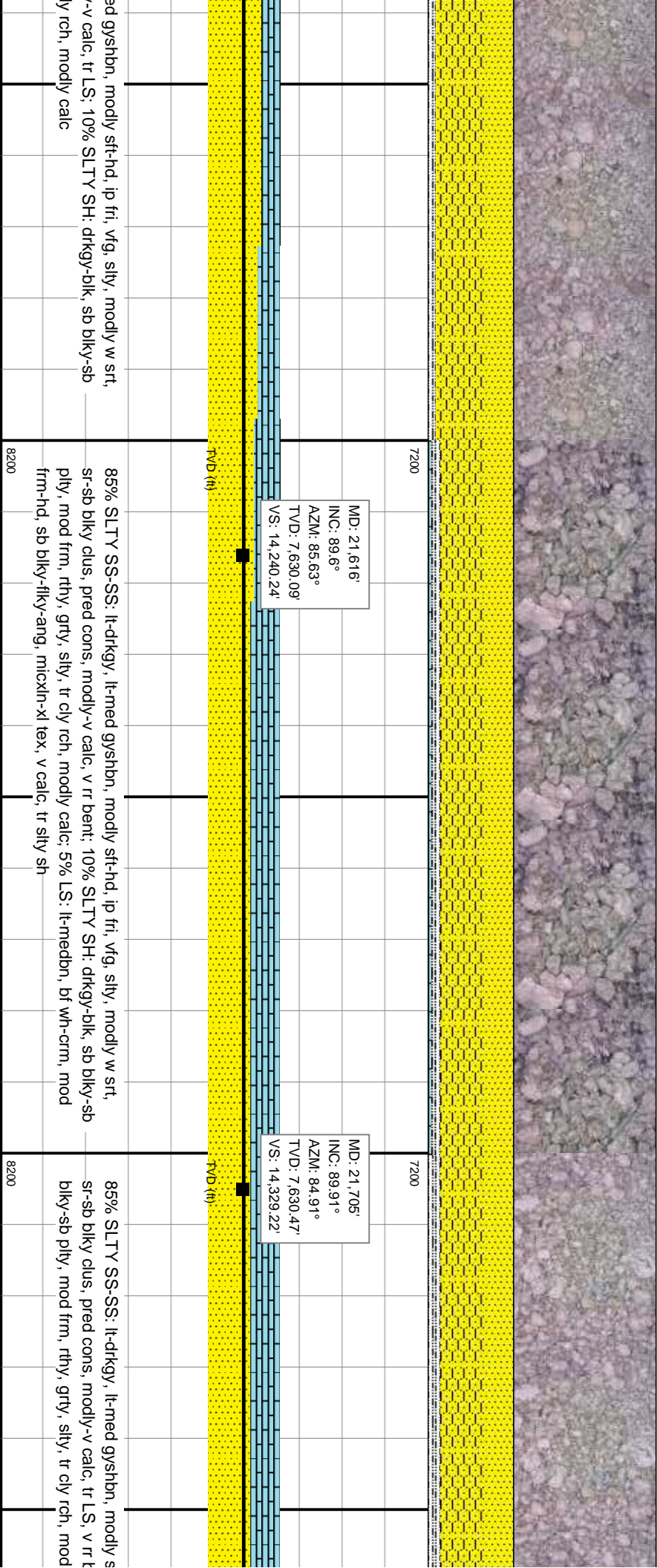
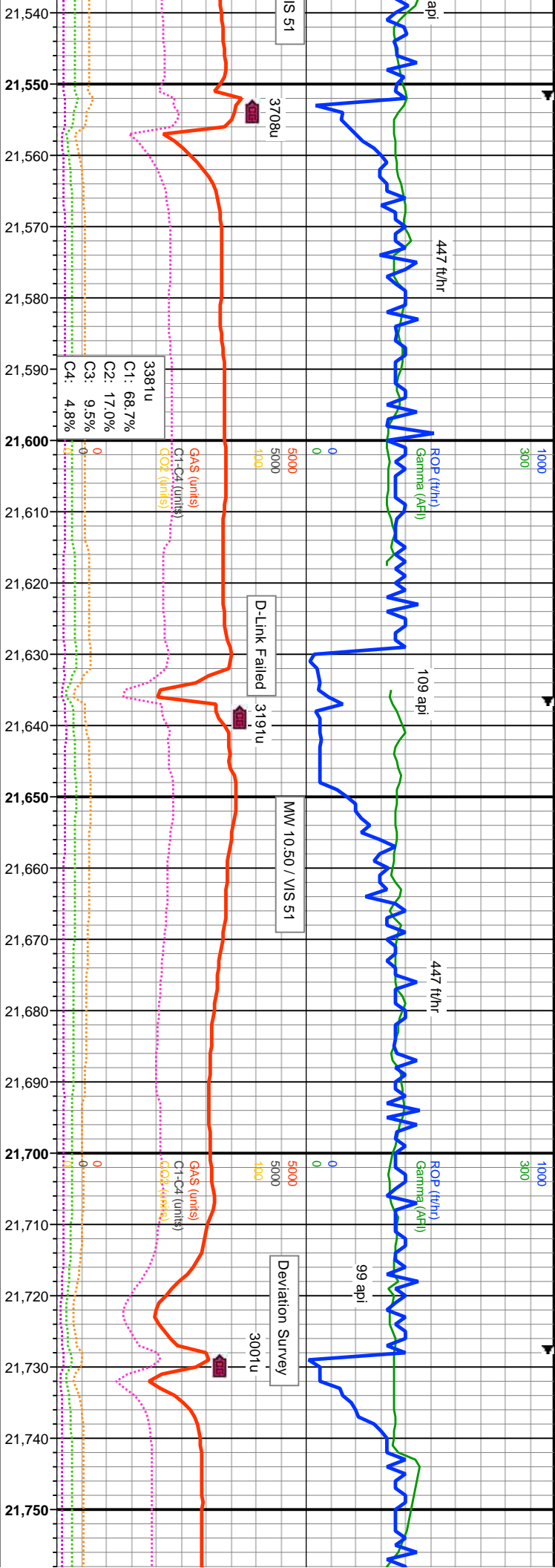


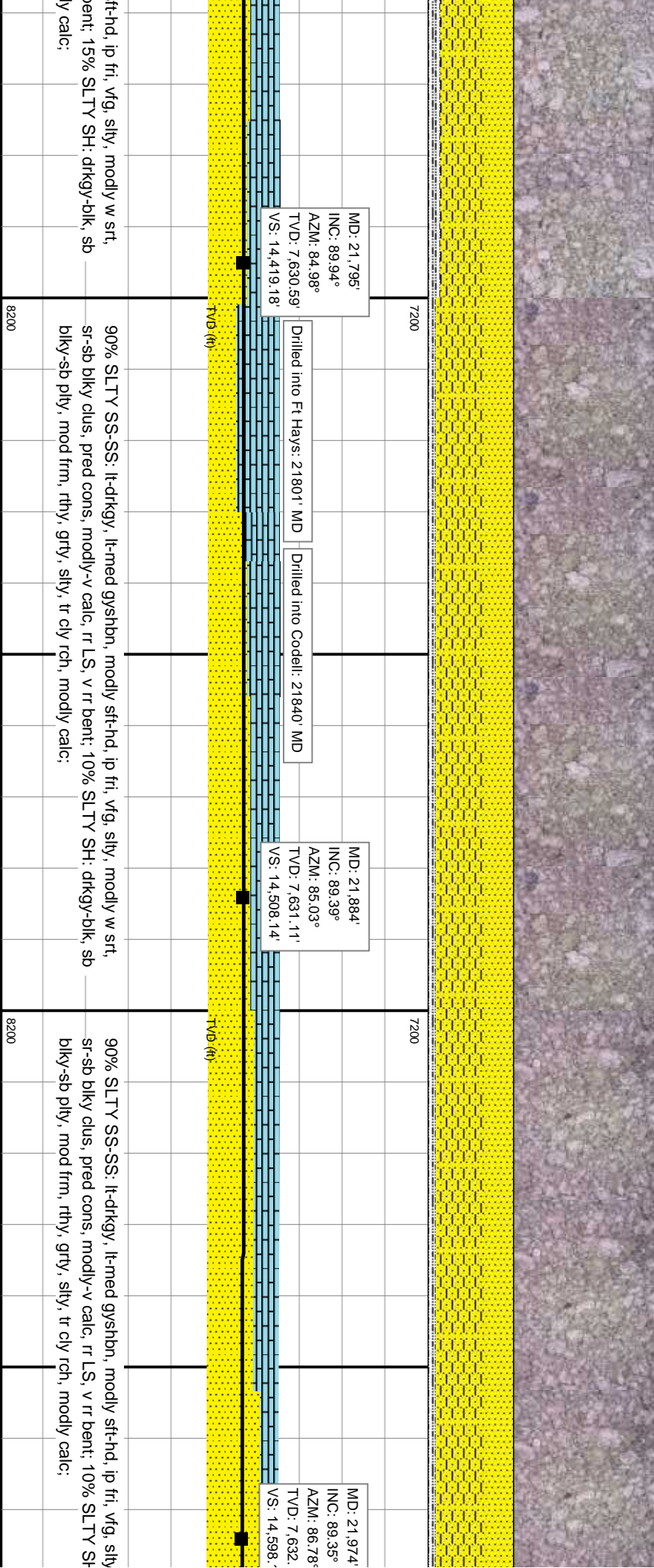
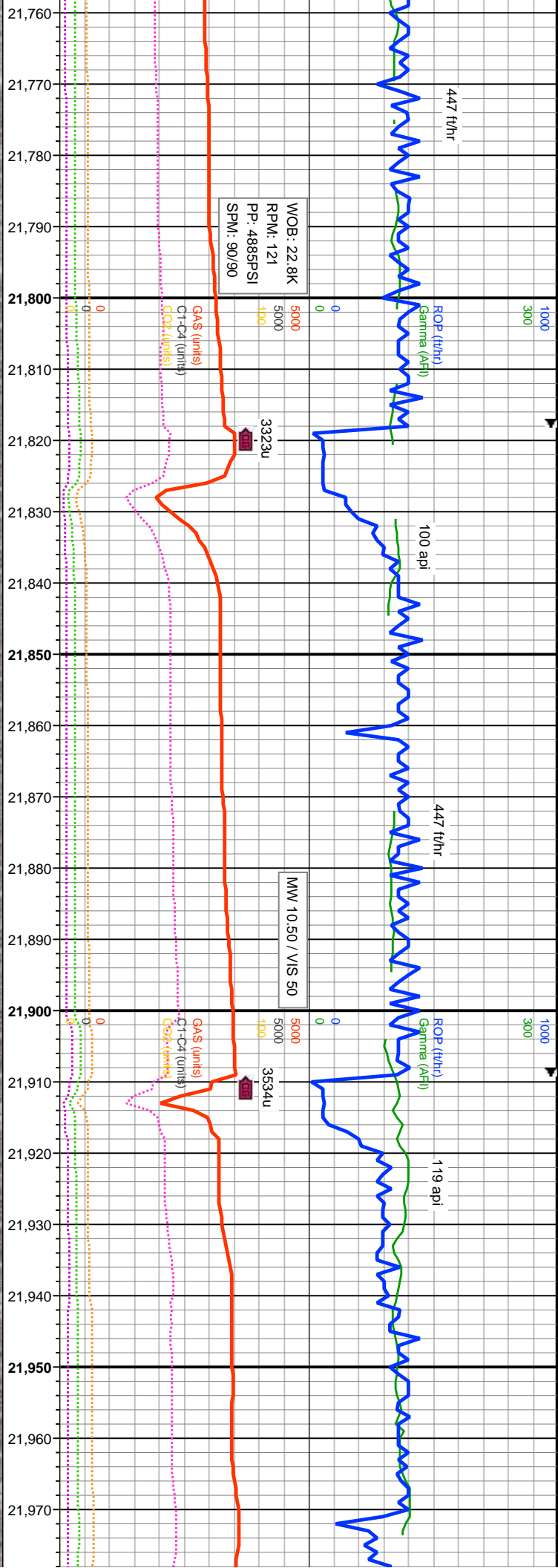




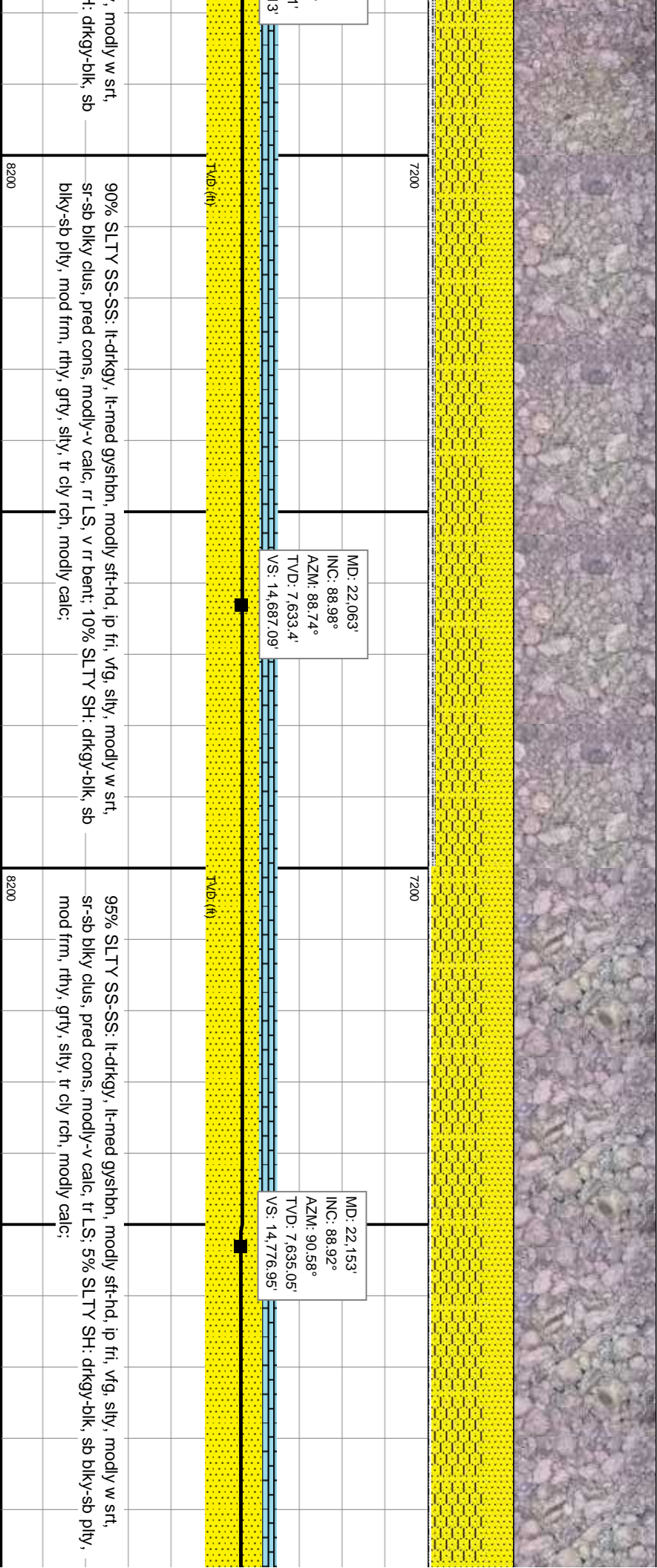
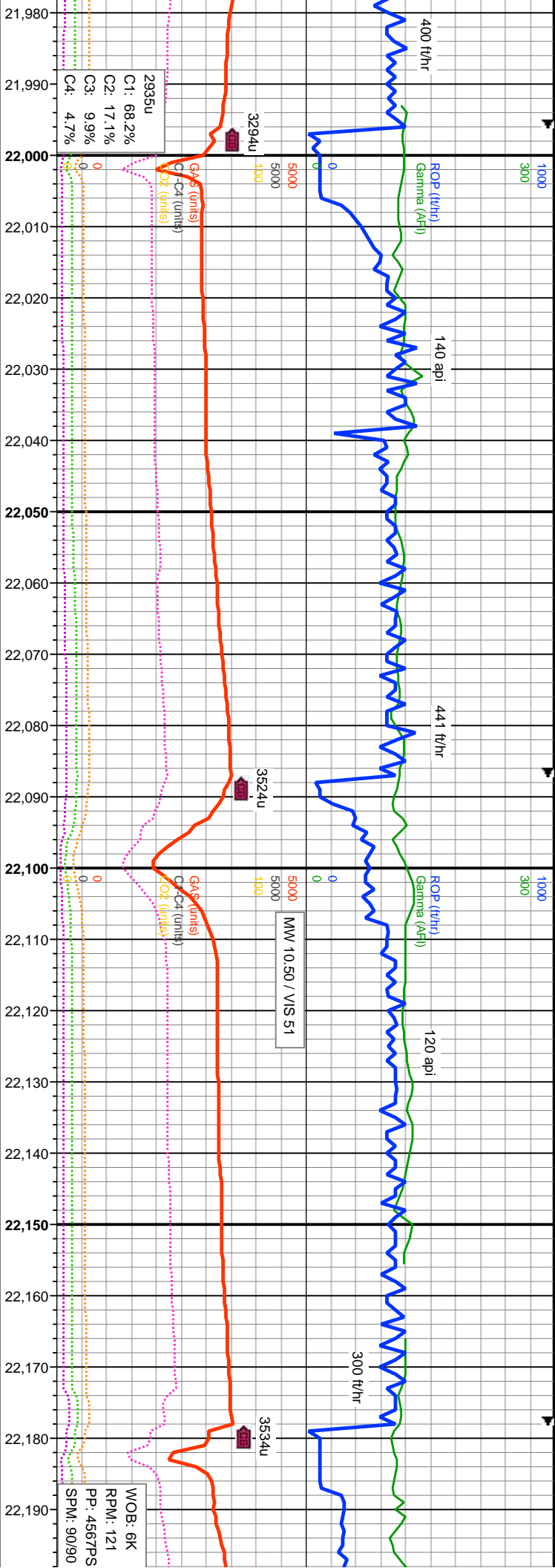


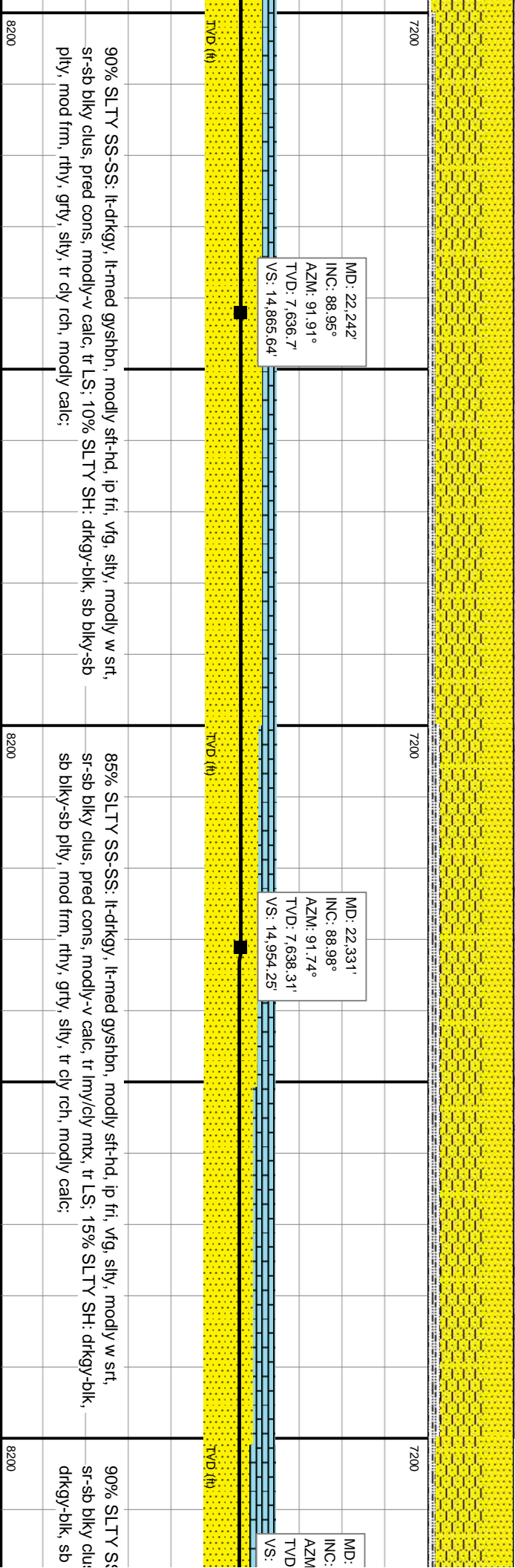
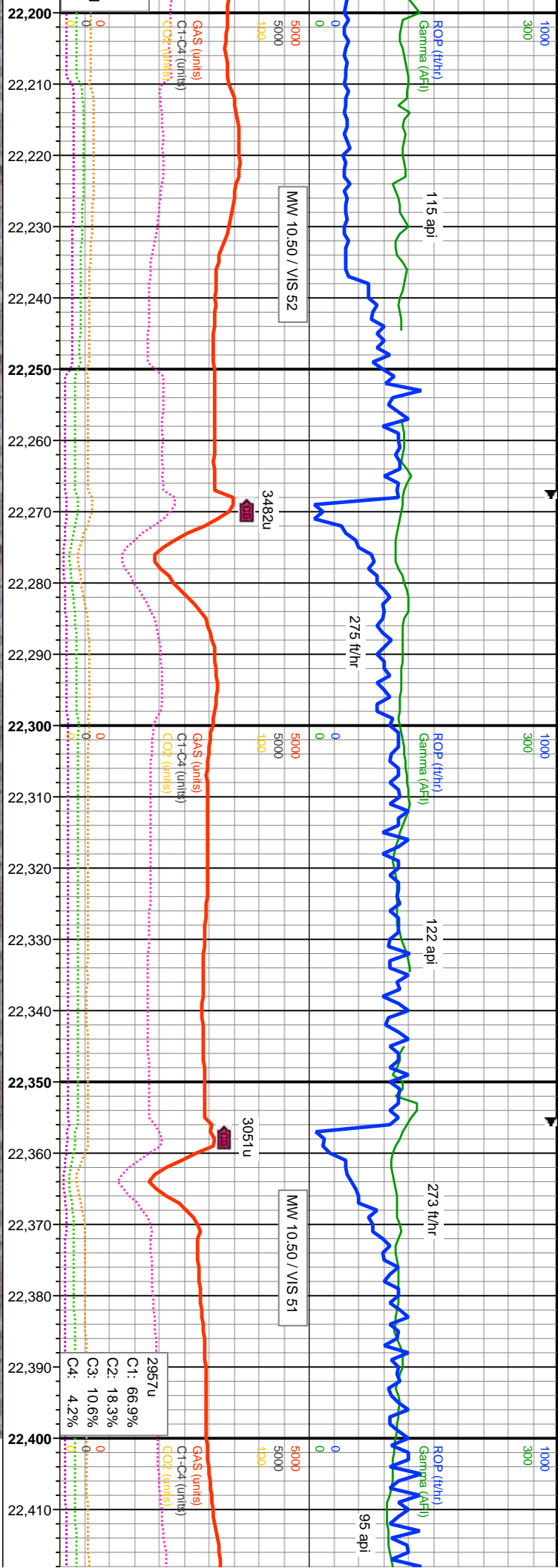




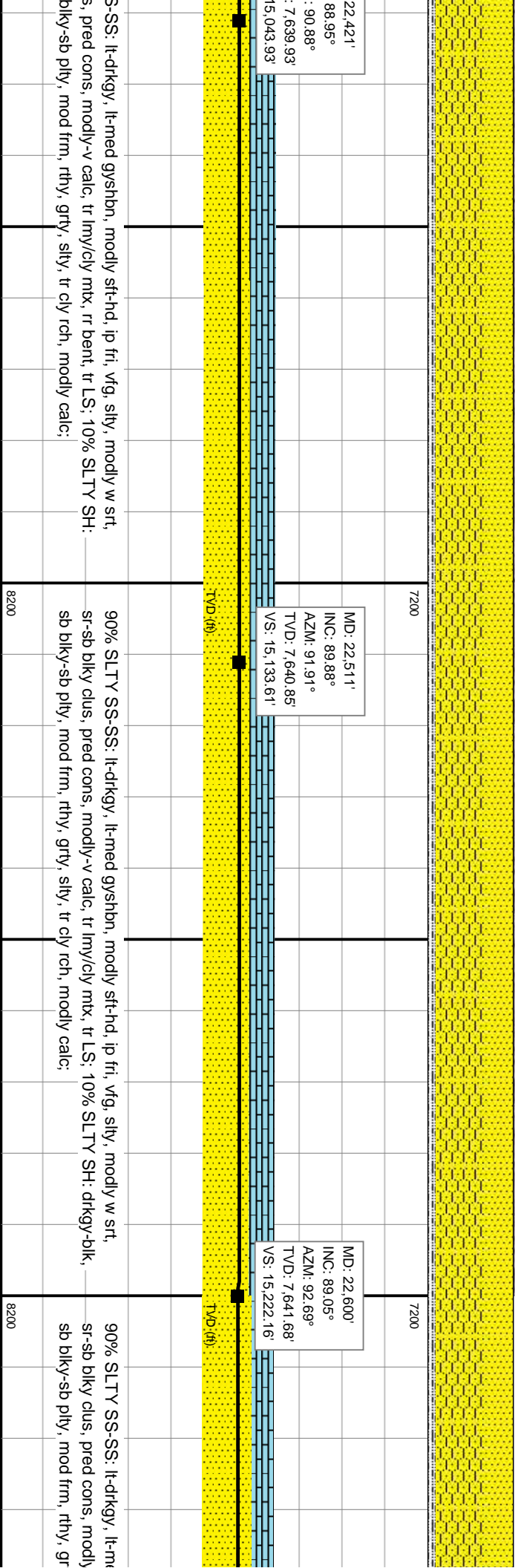
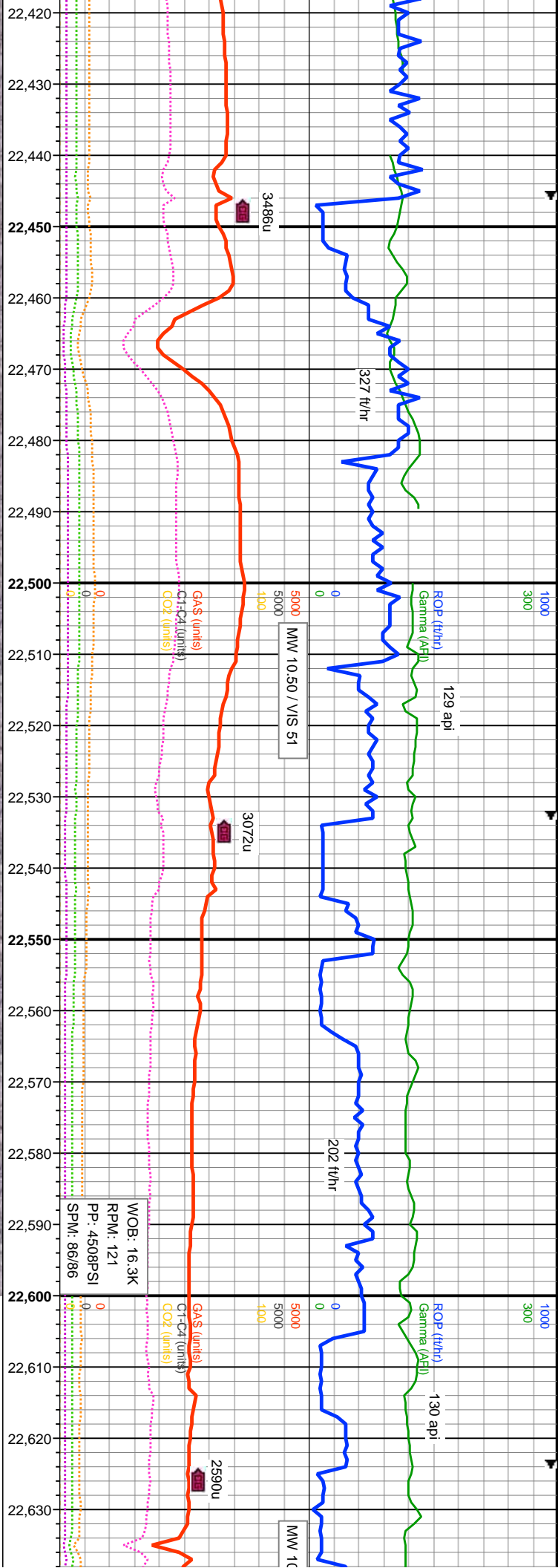


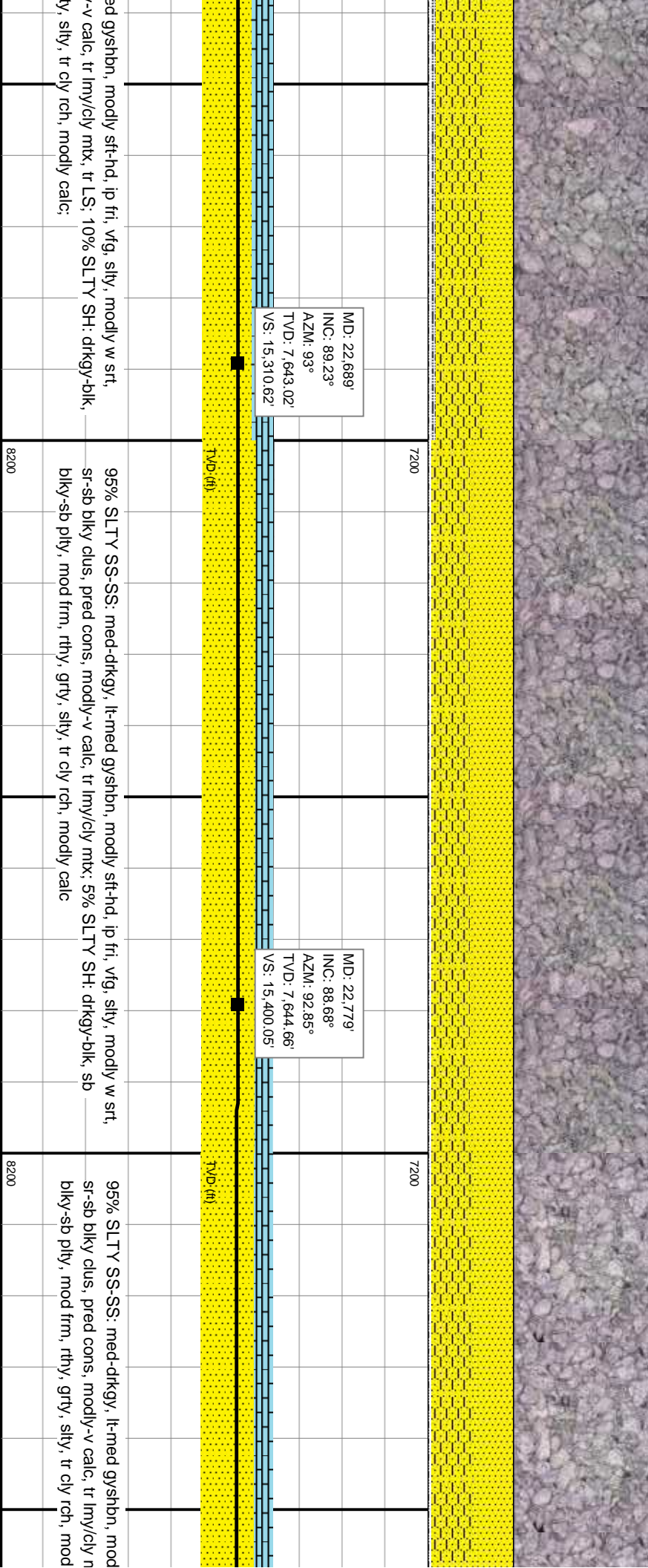
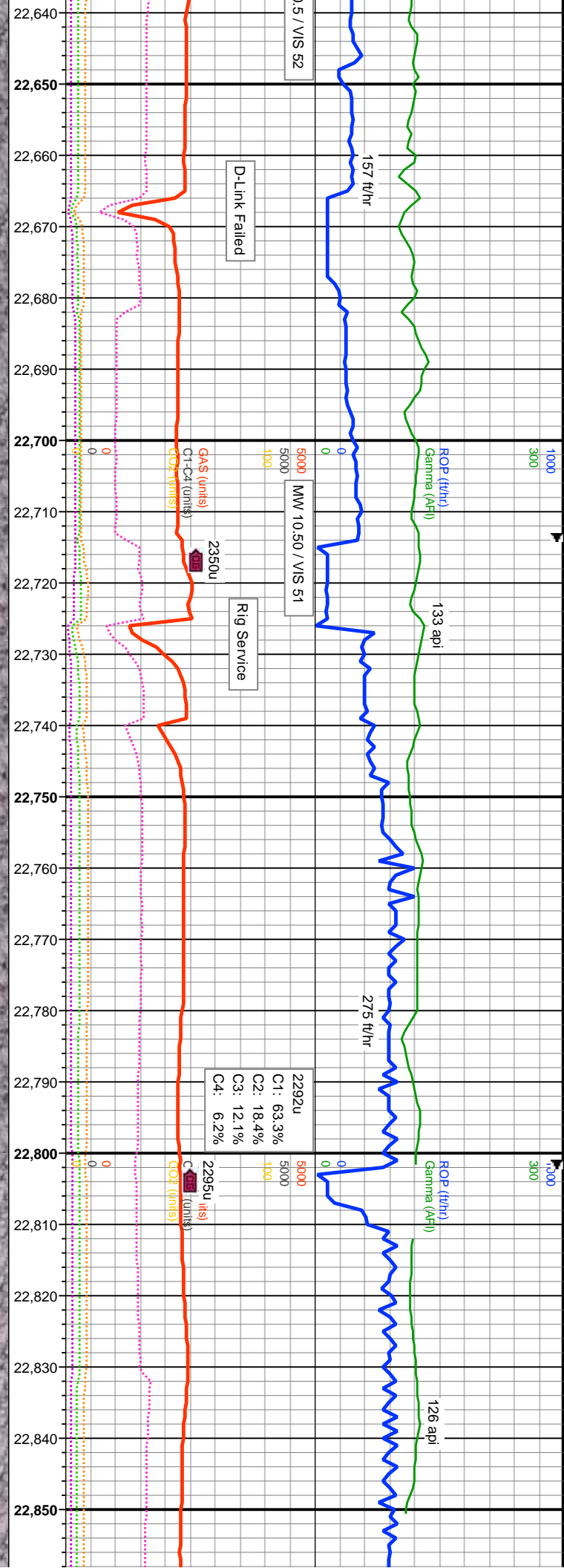




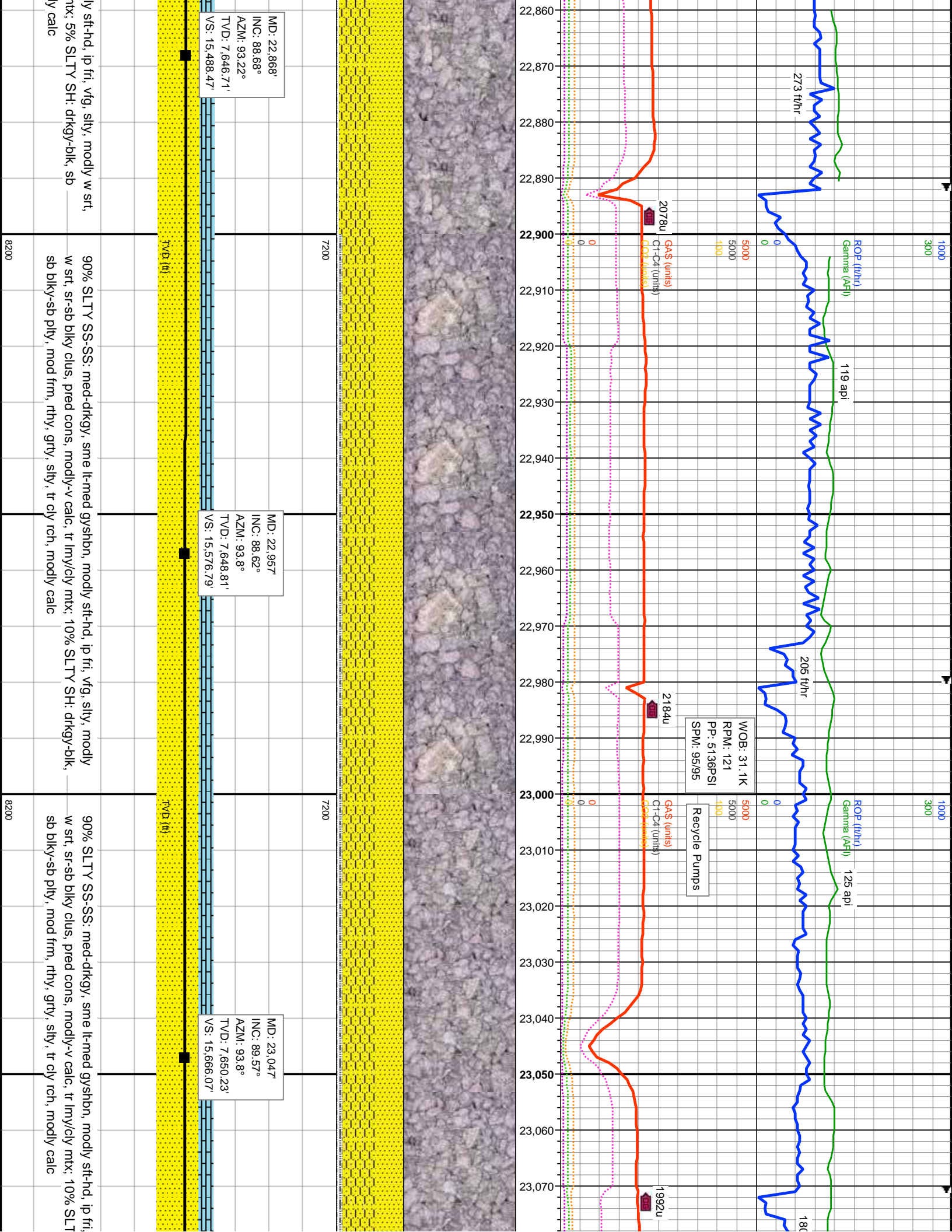


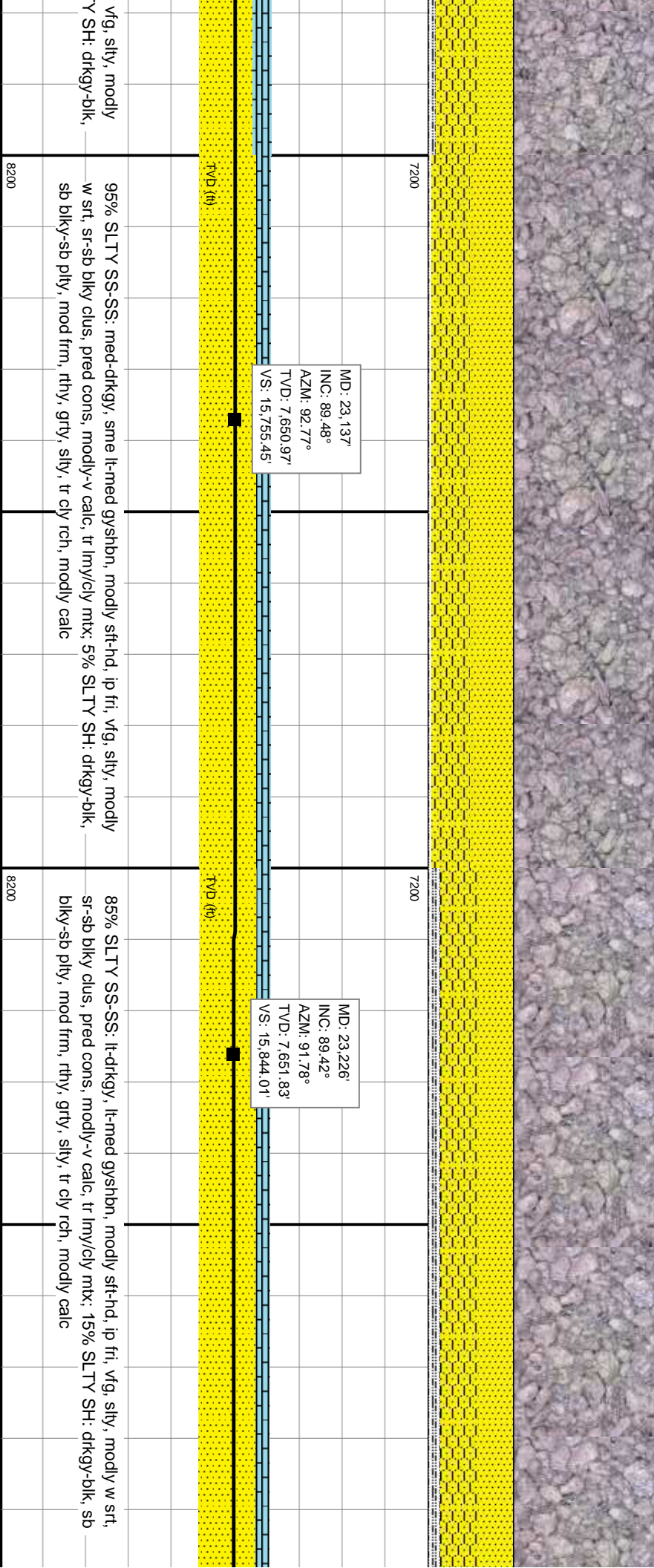
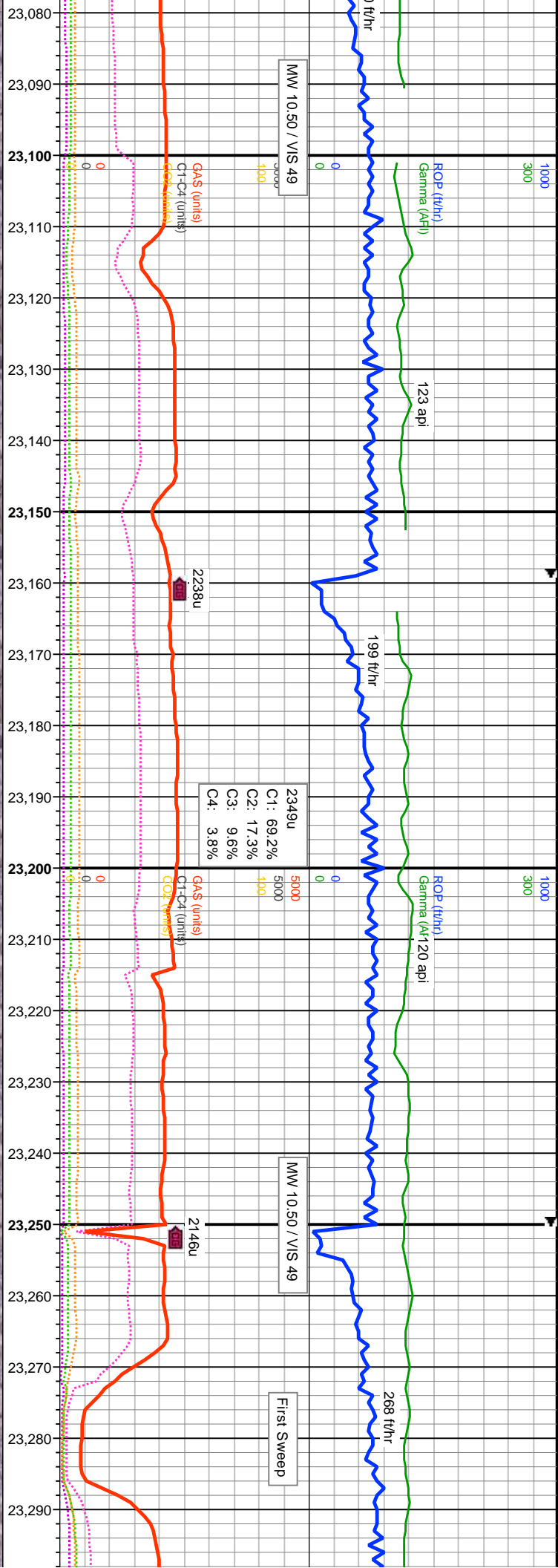




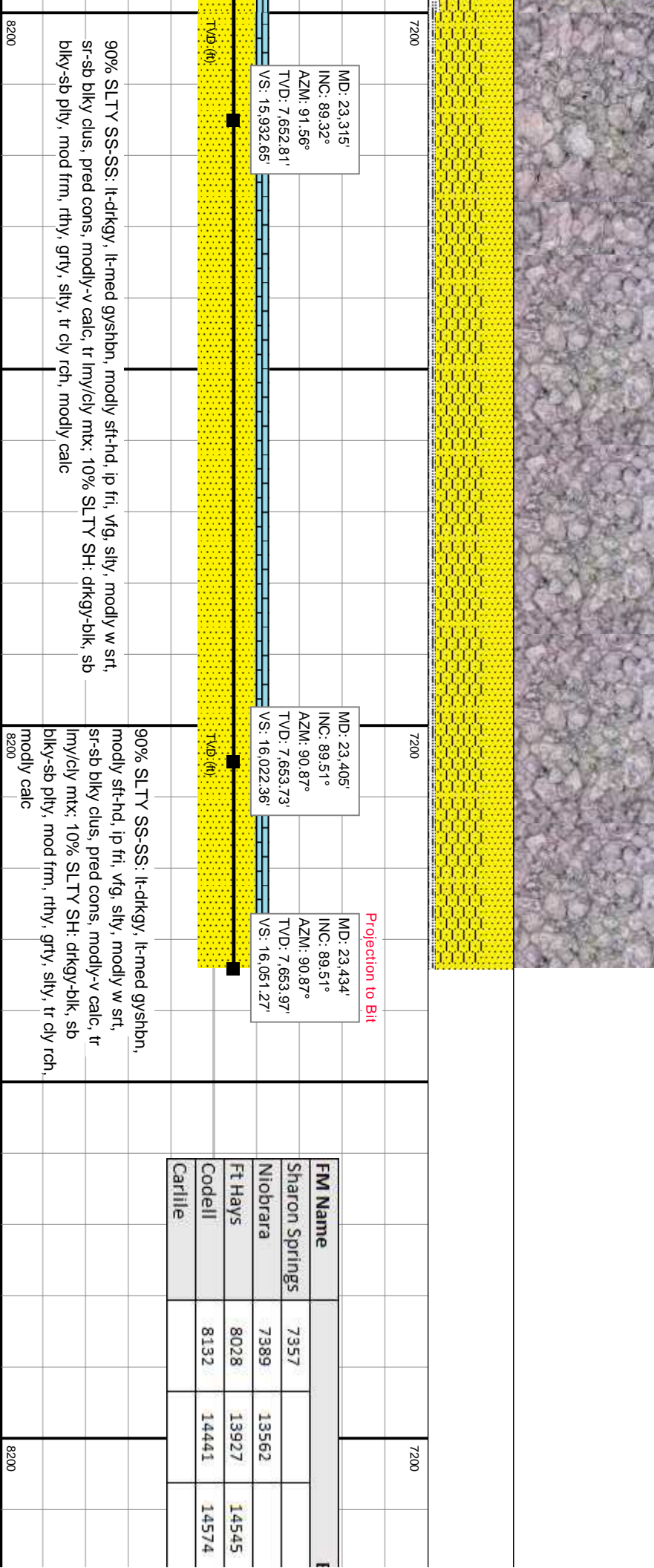
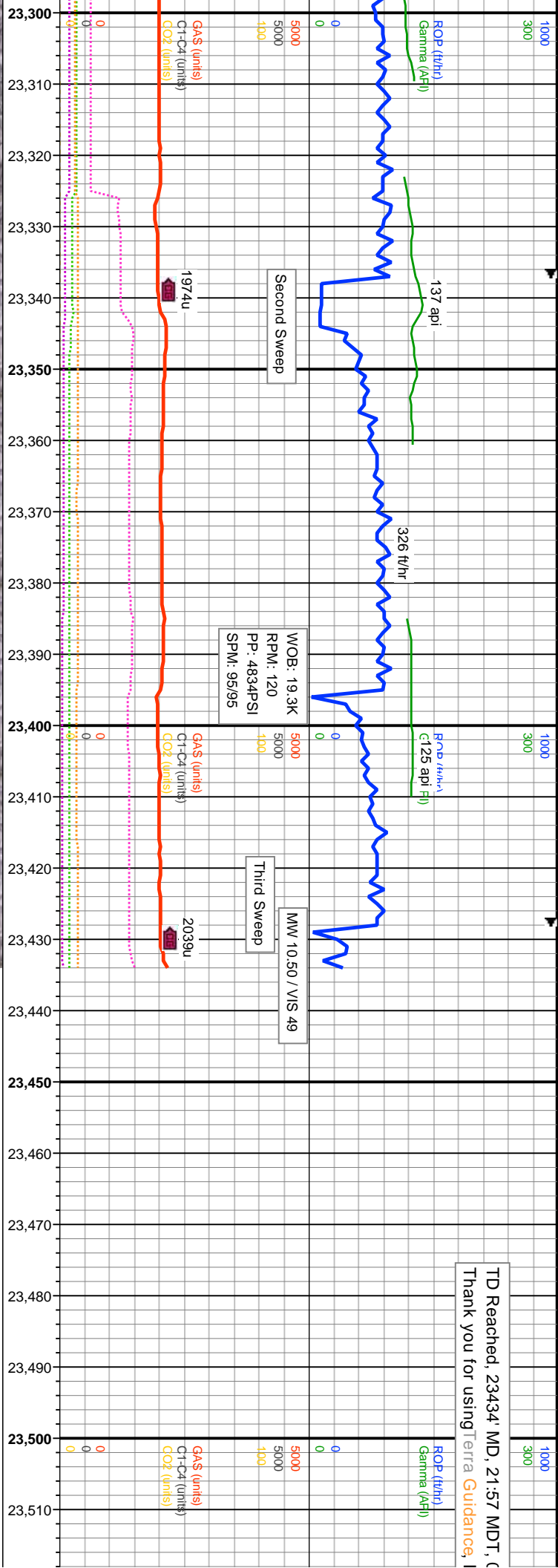




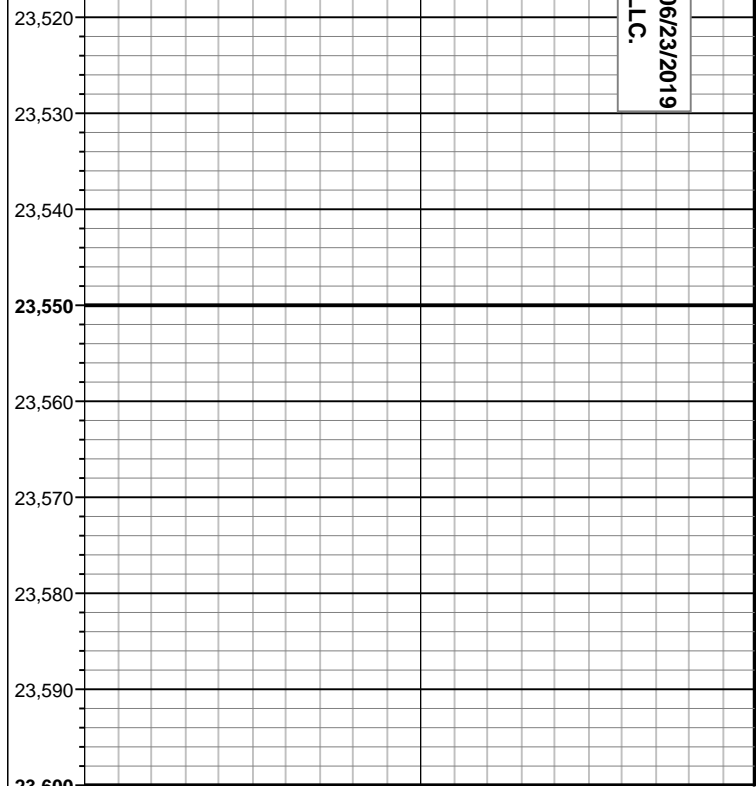








FM Name			
Sharon Springs	7357		
Niobrara	7389	13562	
Ft Hays	8028	13927	14545
Codell	8132	14441	14574
Carlile			

06/23/2019  
-LC.

Excursion Depths ('MD)				
15769	17060	17550	21801	
15883		17295	17603	21840
		17249		