



Scale: 5" / 100'  
Measured Depth Log

**Well Name** Ottesen LE 09-368HC Mudlog

**Location** SECTION 33, T1N, R66W

**State** COLORADO

**County** WELD

**Country** UNITED STATES

**Rig Number** PRECISION 460

**API Number** 051234434300

**AFE #** 18DC0199

**Geographic Region** DJ BASIN

**Field** WATTENBERG

**Ground Elevation** 5076.5'

**K.B. Elevation** 5096.5'

**Logged Interval** 6000' MD To 17980' MD

**Total Depth** 17980' 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, Mark Sowinski

**Company** Terra Guidance

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



Other

MUDLOG START DATE 12/12/2018  
MUDLOG END DATE 12/15/2018

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

- GASTROPOD
- BENTON
- BITUME
- ALGAE
- OSTRACOD
- PELECYPOD
- BELEMNITE
- BIOLASTIC
- PISOLITE
- BRACHIOPOD
- PLANT REMAINS
- BR YOZOA
- PLANT SPORES
- CEPHALOPOD
- SCAPHOPOD
- CORAL
- STROMATOPOROID
- CRINOID
- FERRUC
- FERRU
- ECHINOID
- FISH
- ANHYDRITIC
- GLAUC
- GYPSIF
- HEAVY
- FORAMINIFERA
- ARGILLACEOUS
- ARGILLITE GRAIN
- F FOSSIL

Minerals

Oil Show

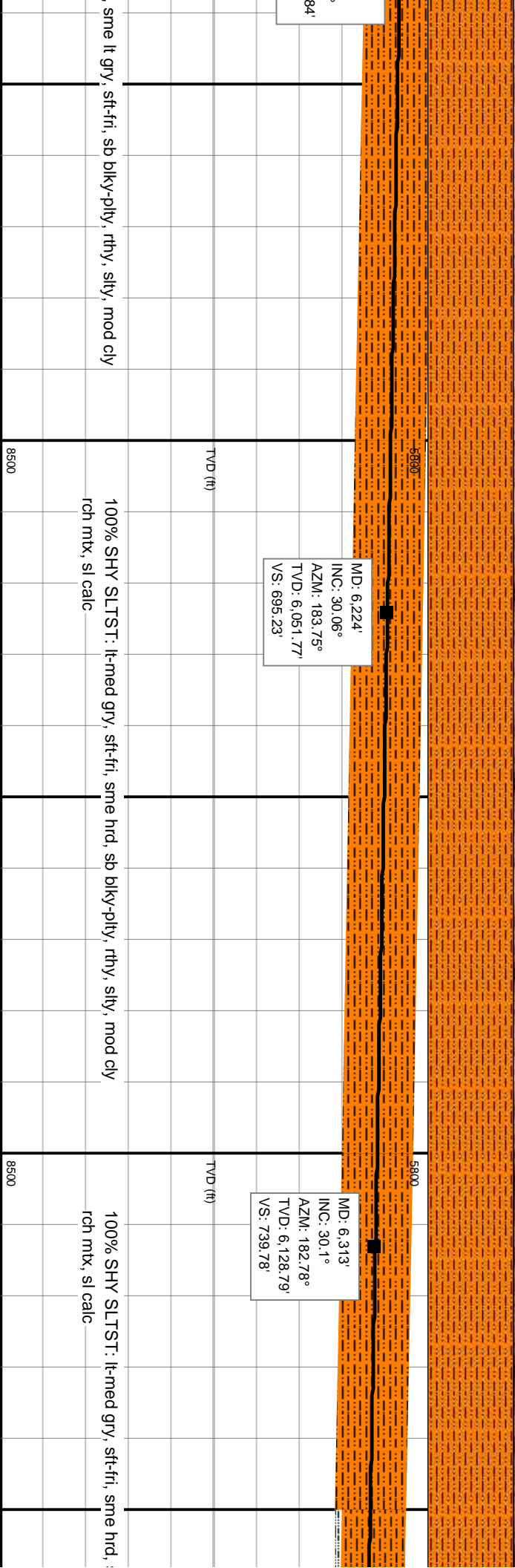
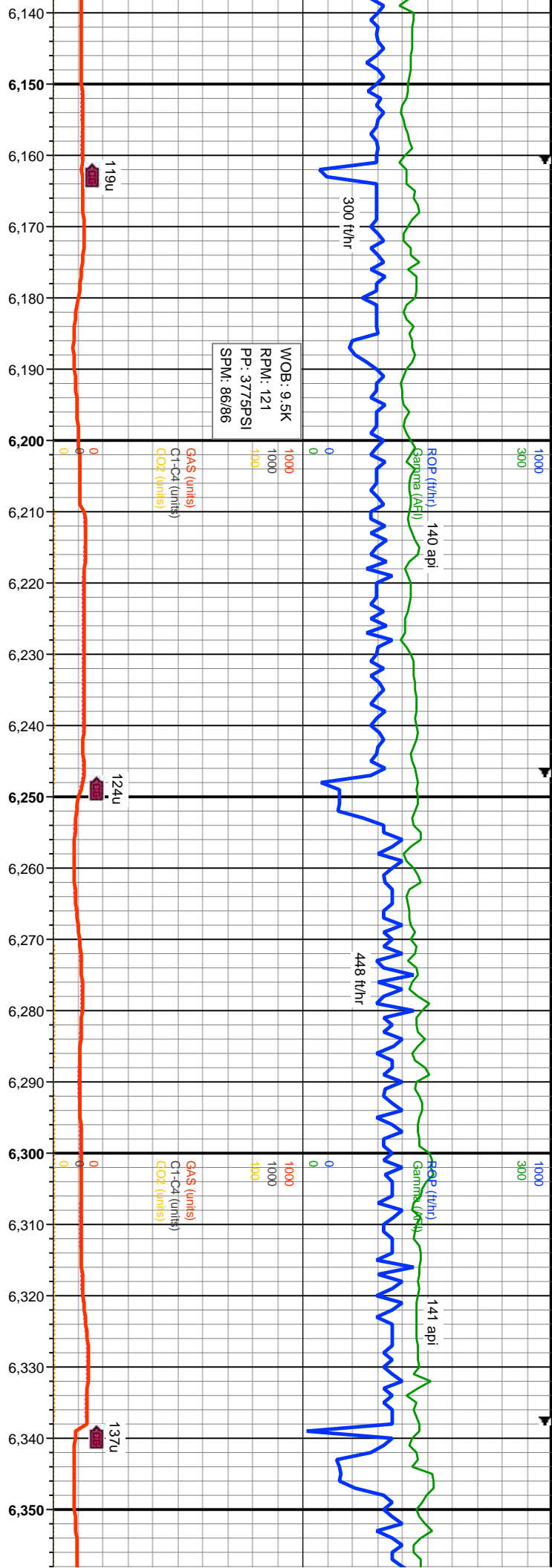
- ORGANIC
- PINPOINT
- VUGGY
- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING
- BIT

Engineering

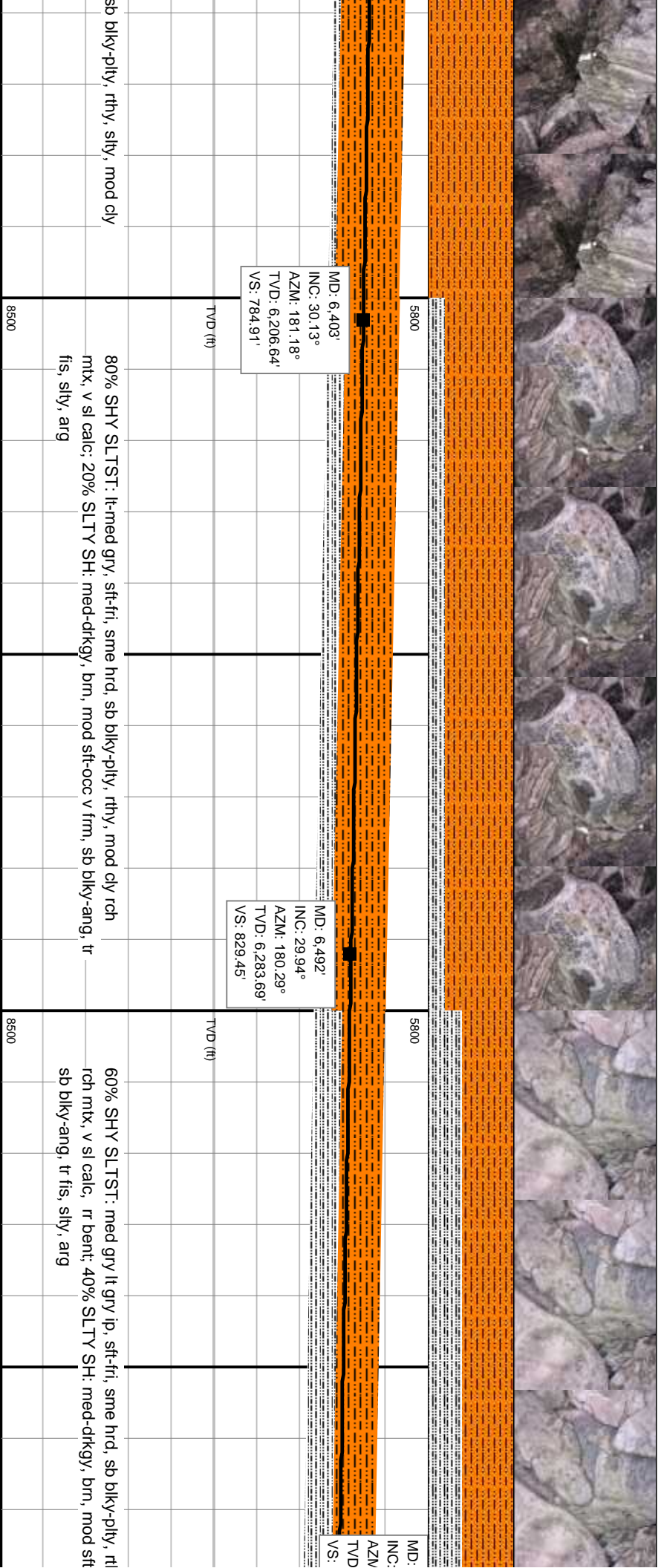
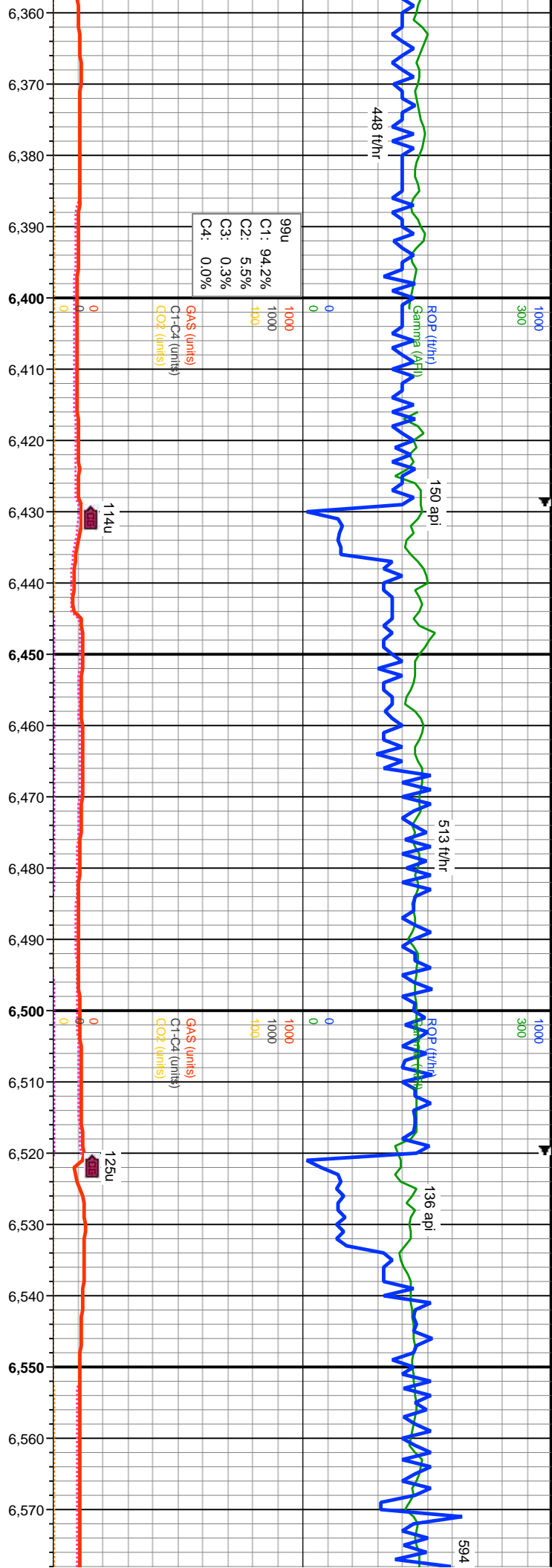
- CASING
- CONNECTION (LEFT)
- CONNECTION (RIGHT)
- CONNECTION GAS
- CORE - LOST
- CORE - RECOVERED
- DST INTERVAL
- FAULT
- INTERCRYSTALLINE
- INTEROOLITIC
- MOLDIC
- Porosity
- E EARTHY
- F FENESTRAL
- F FRACTURE
- INTERCRYSTALLINE
- CORE - RECOVERED
- DST INTERVAL
- FAULT

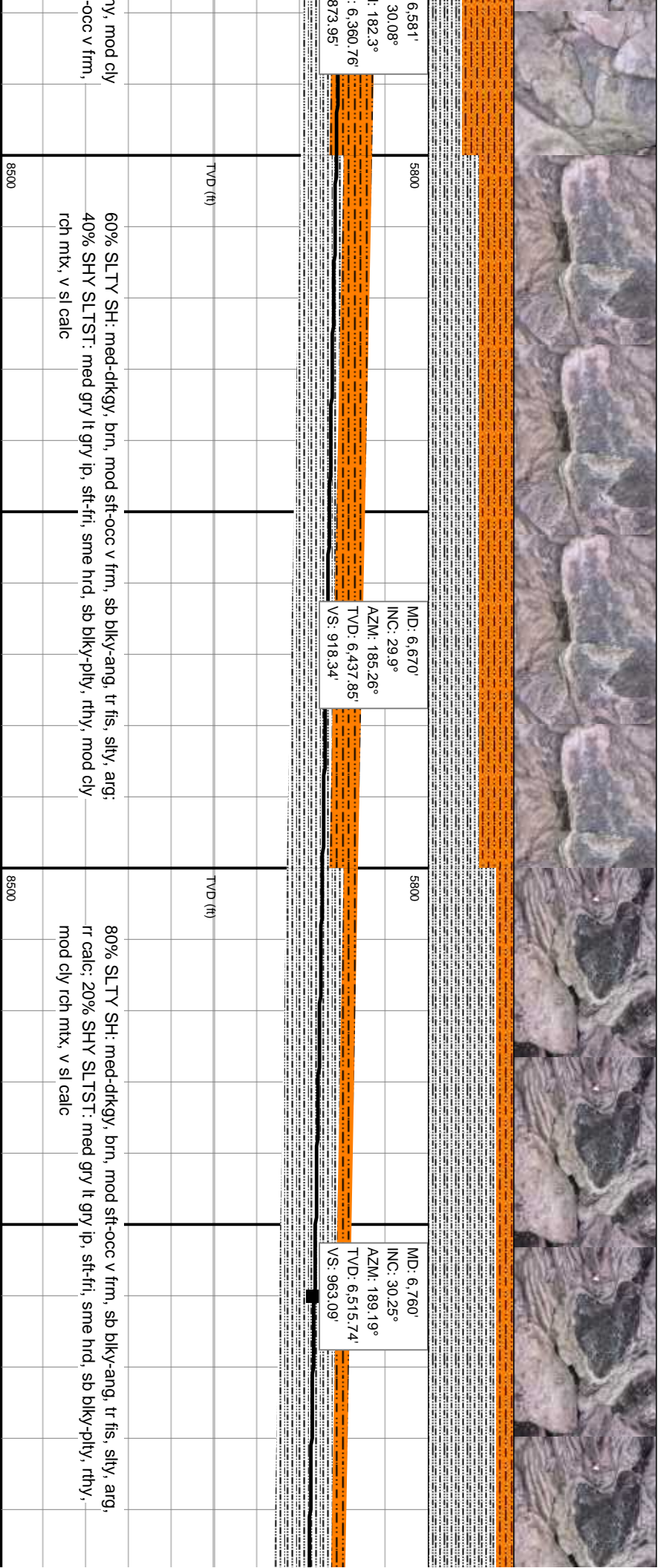
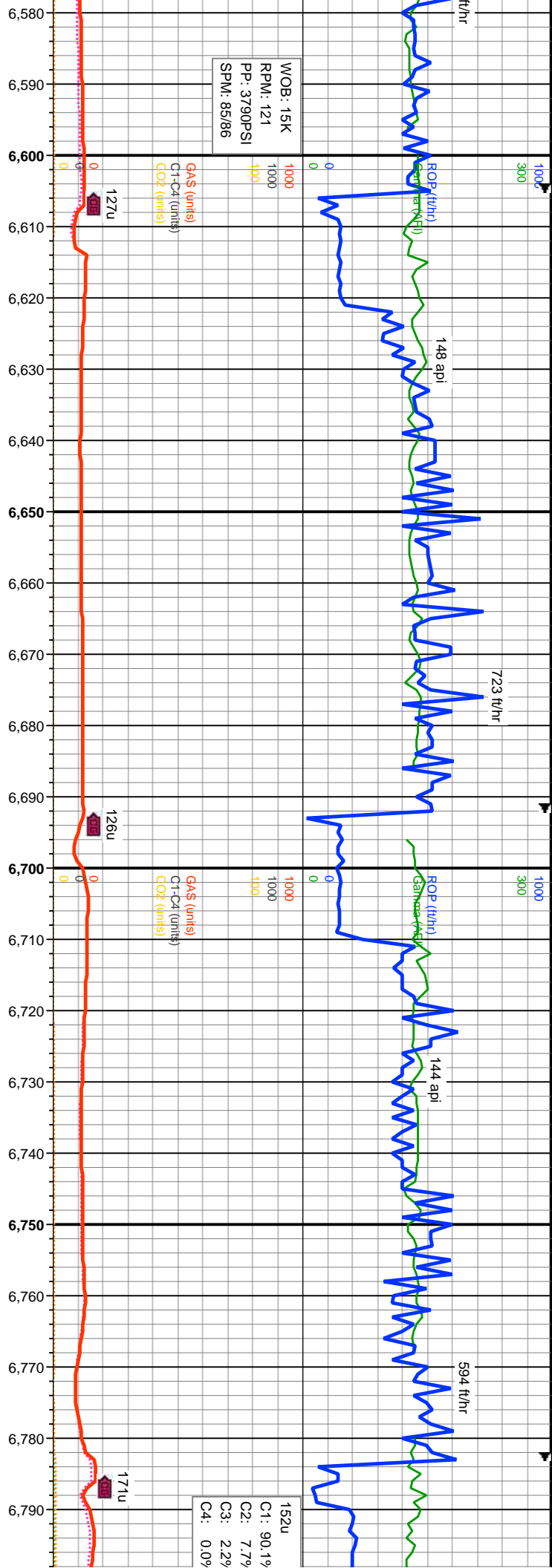




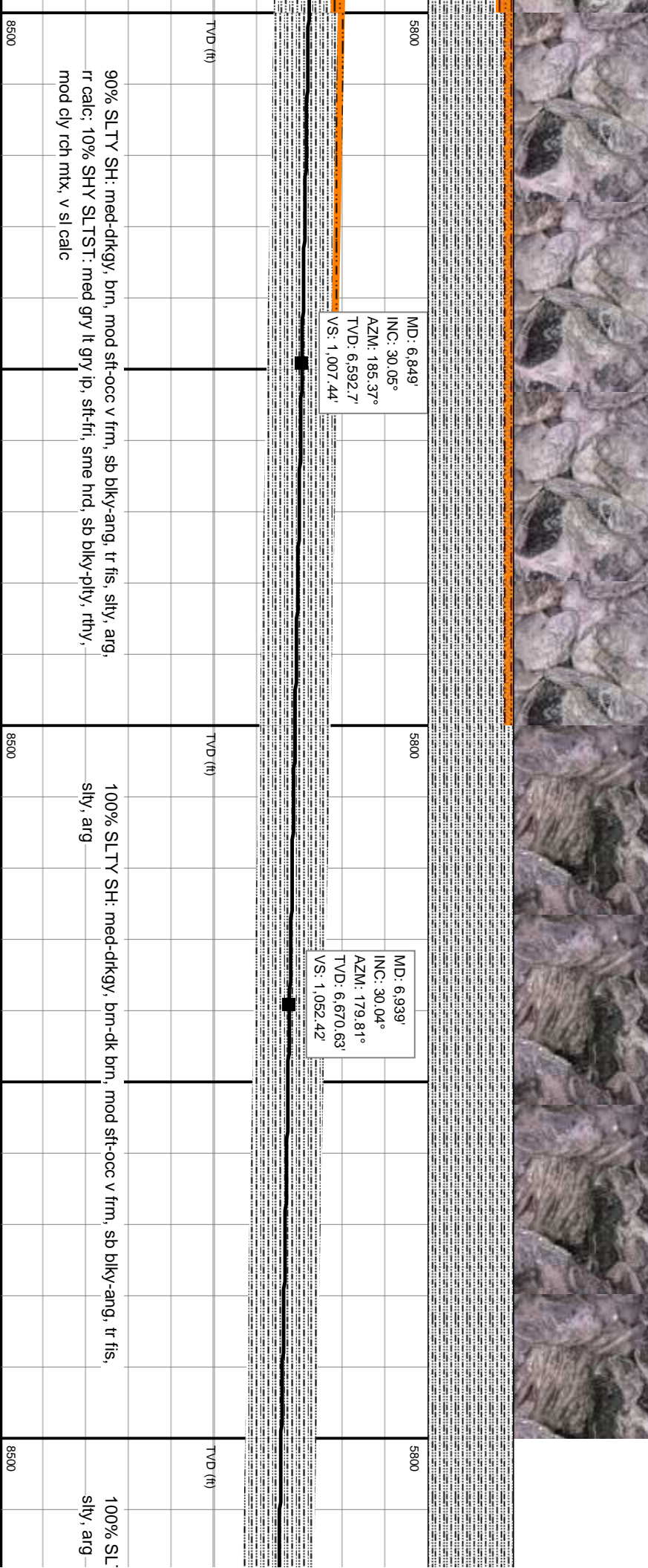
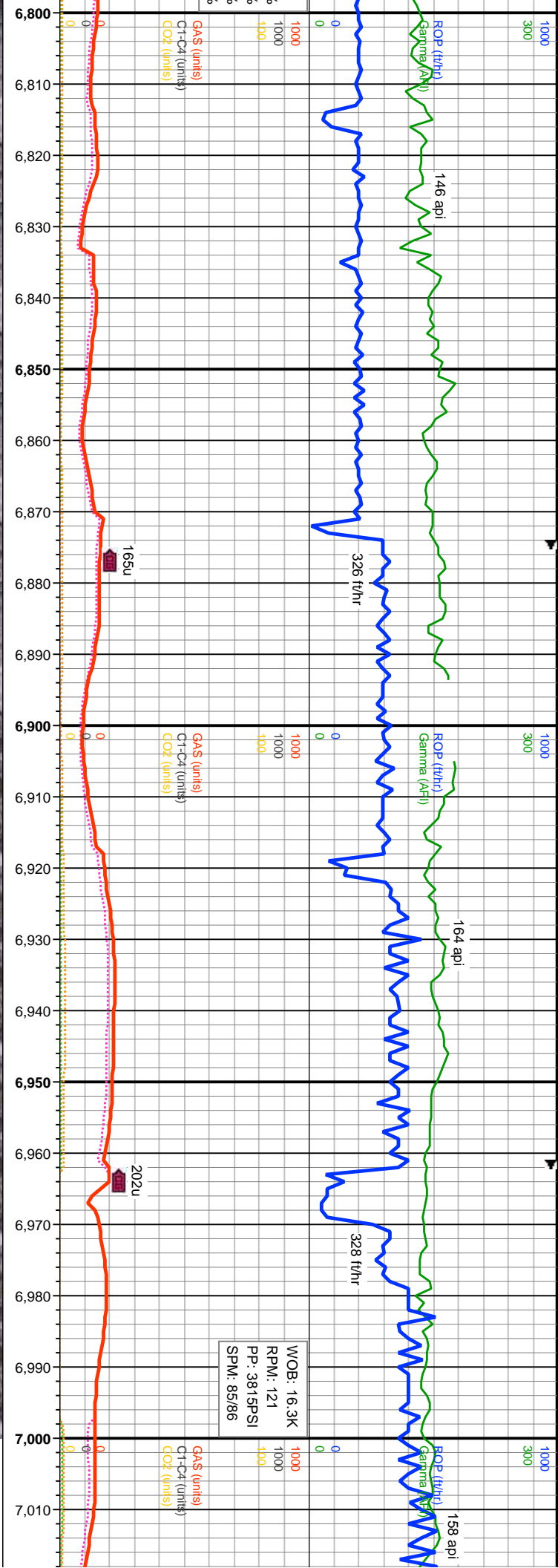




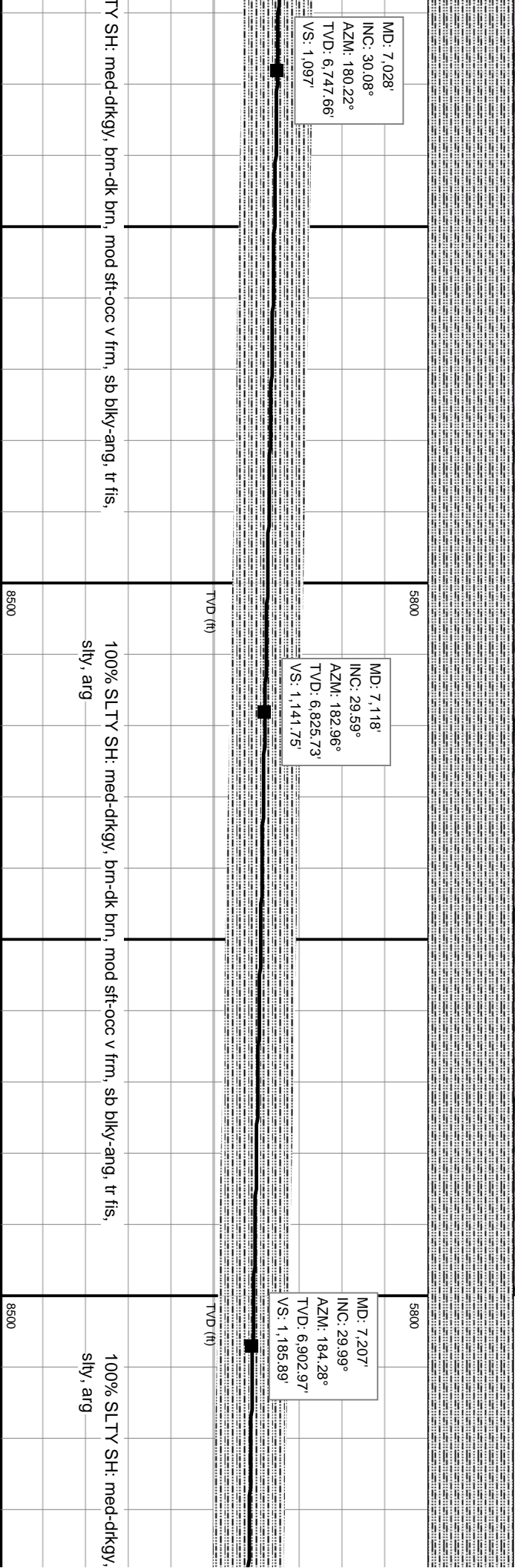
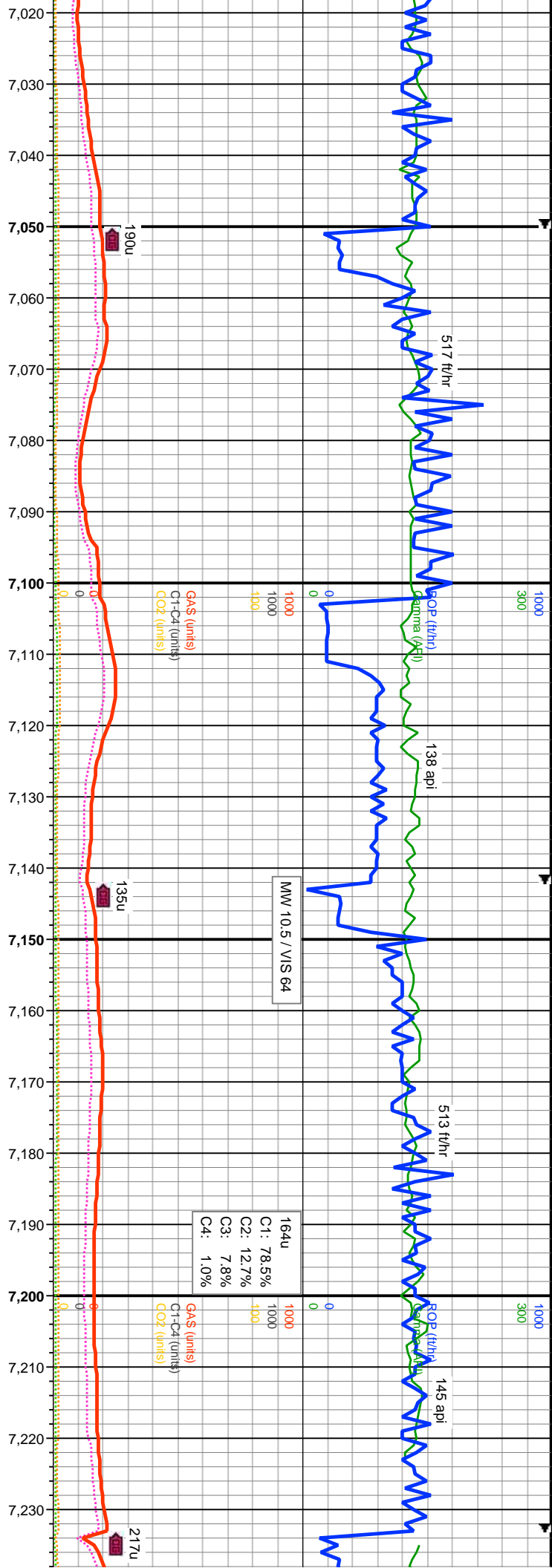


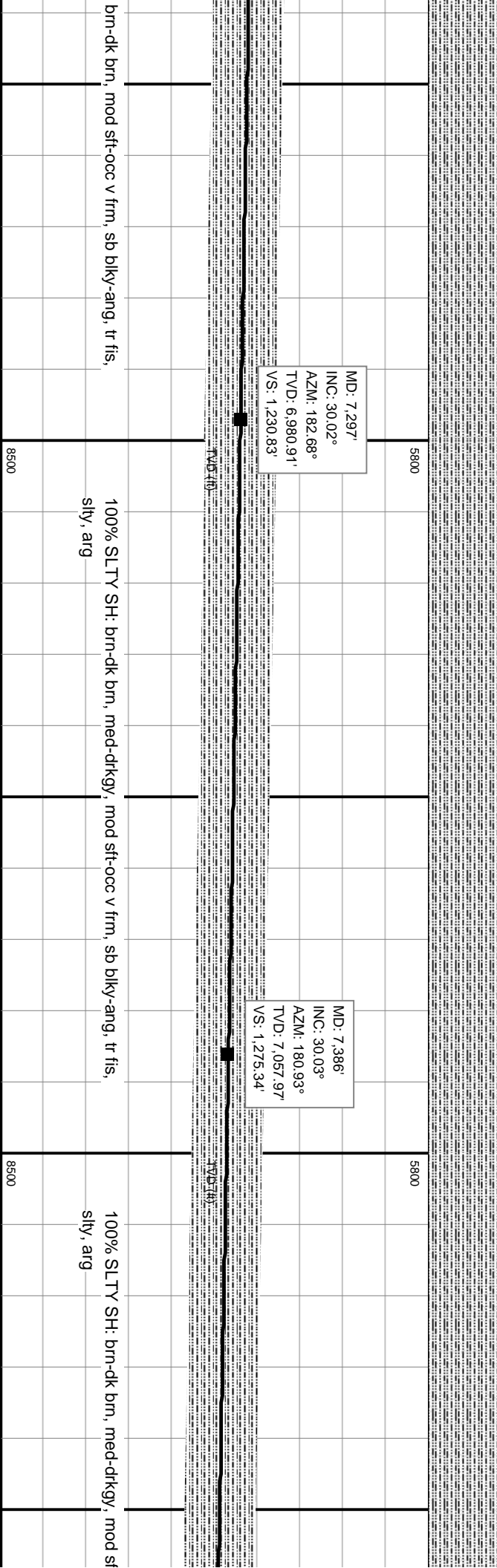
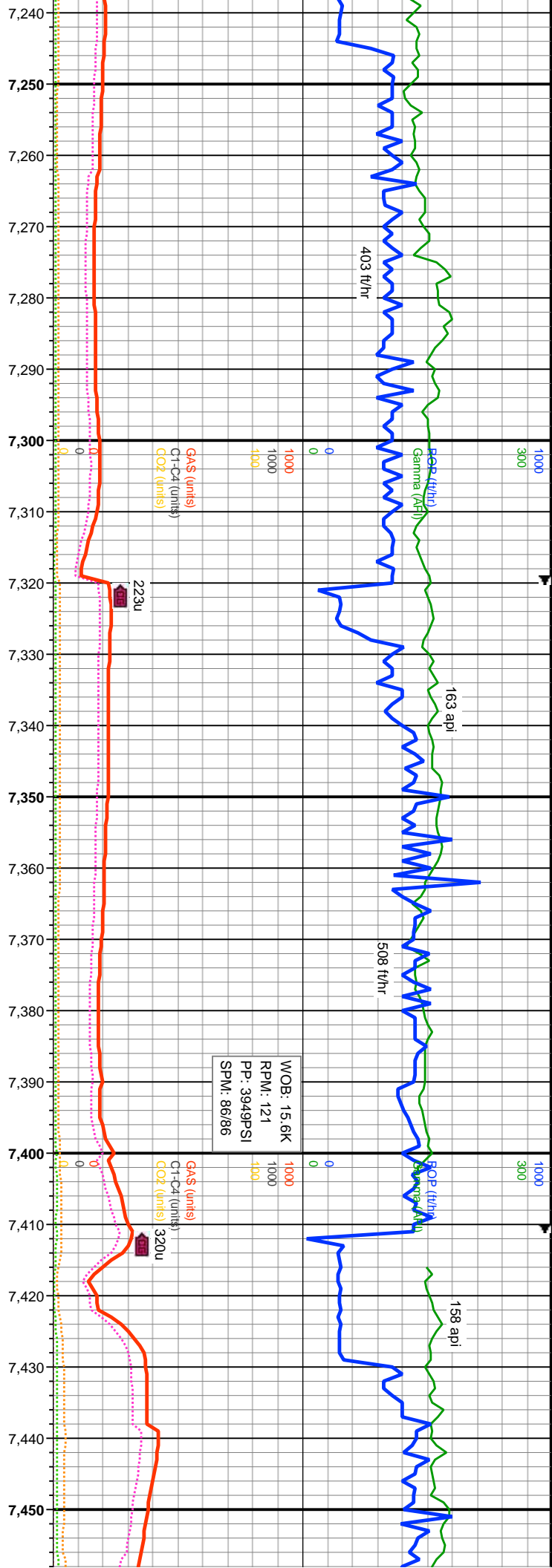










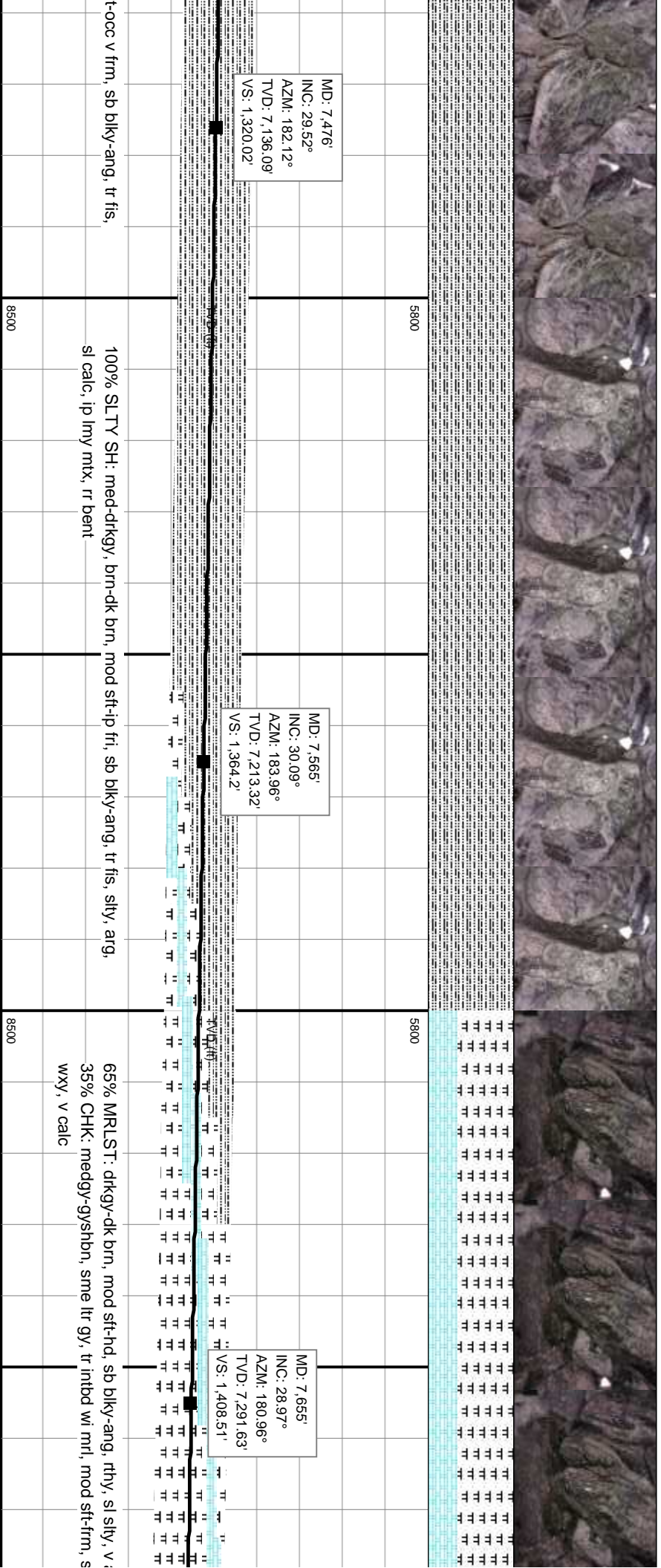
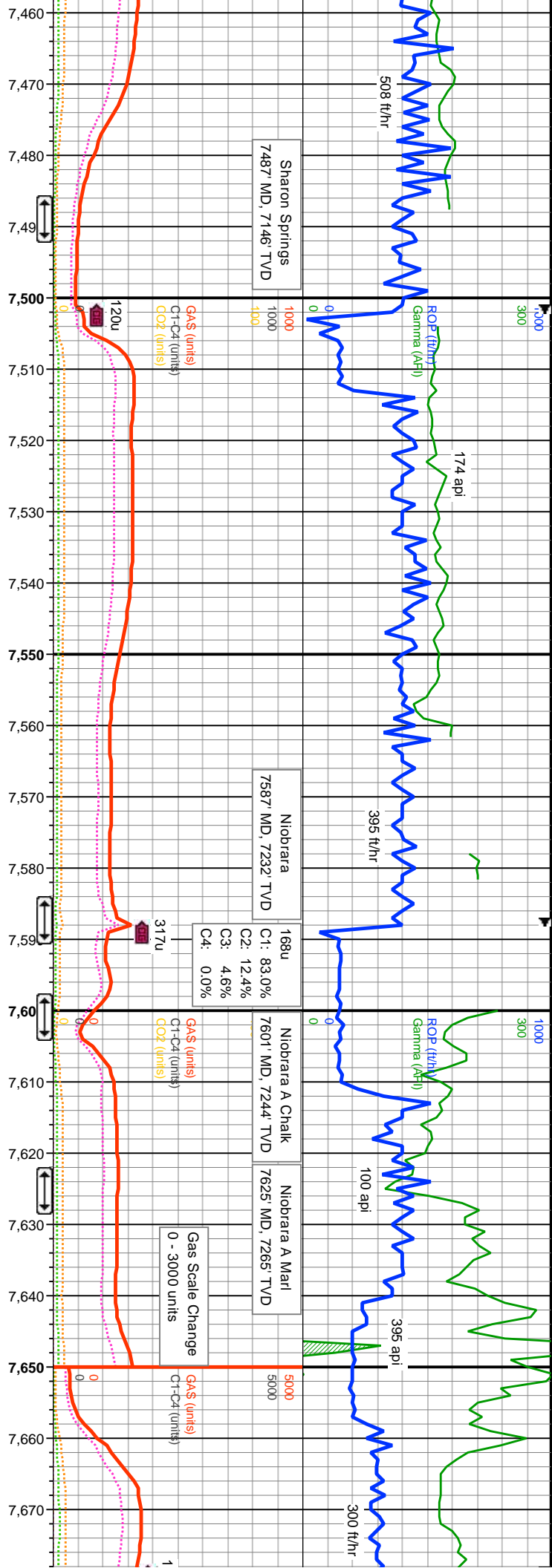


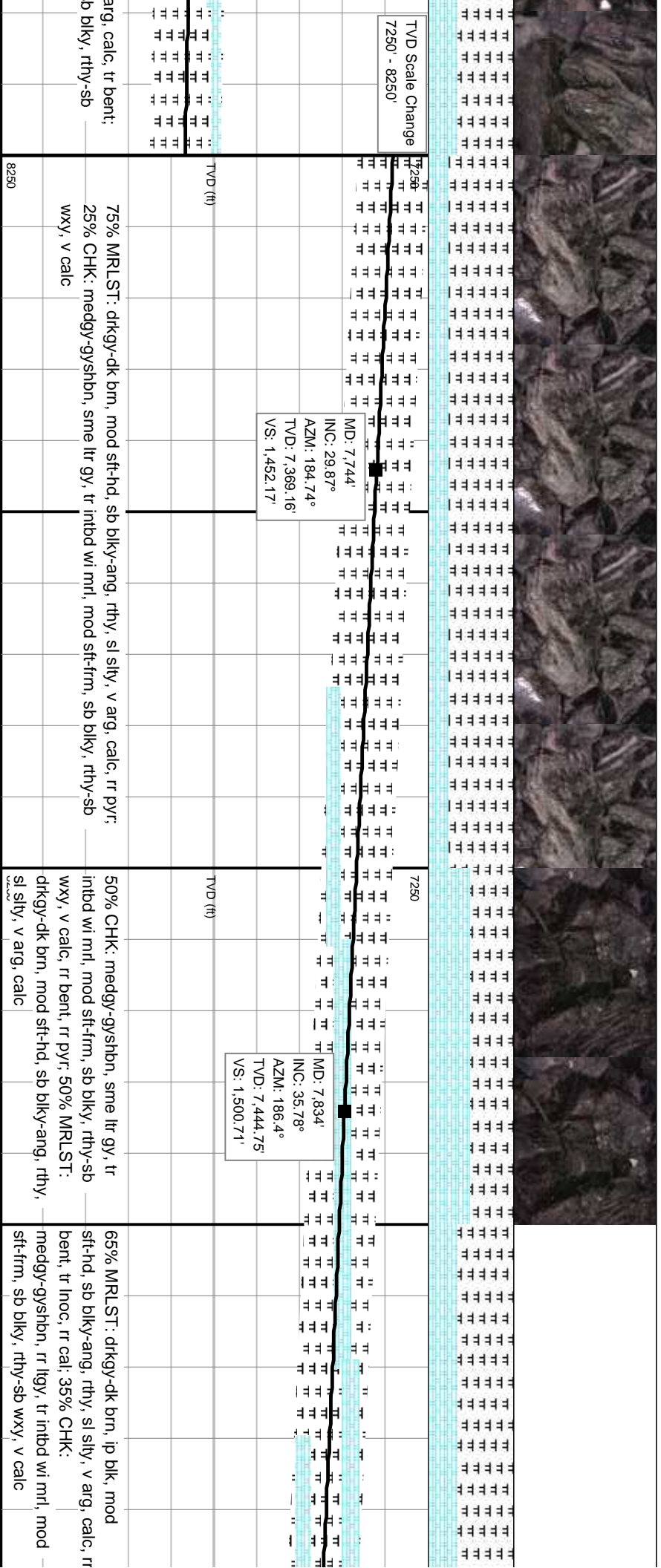
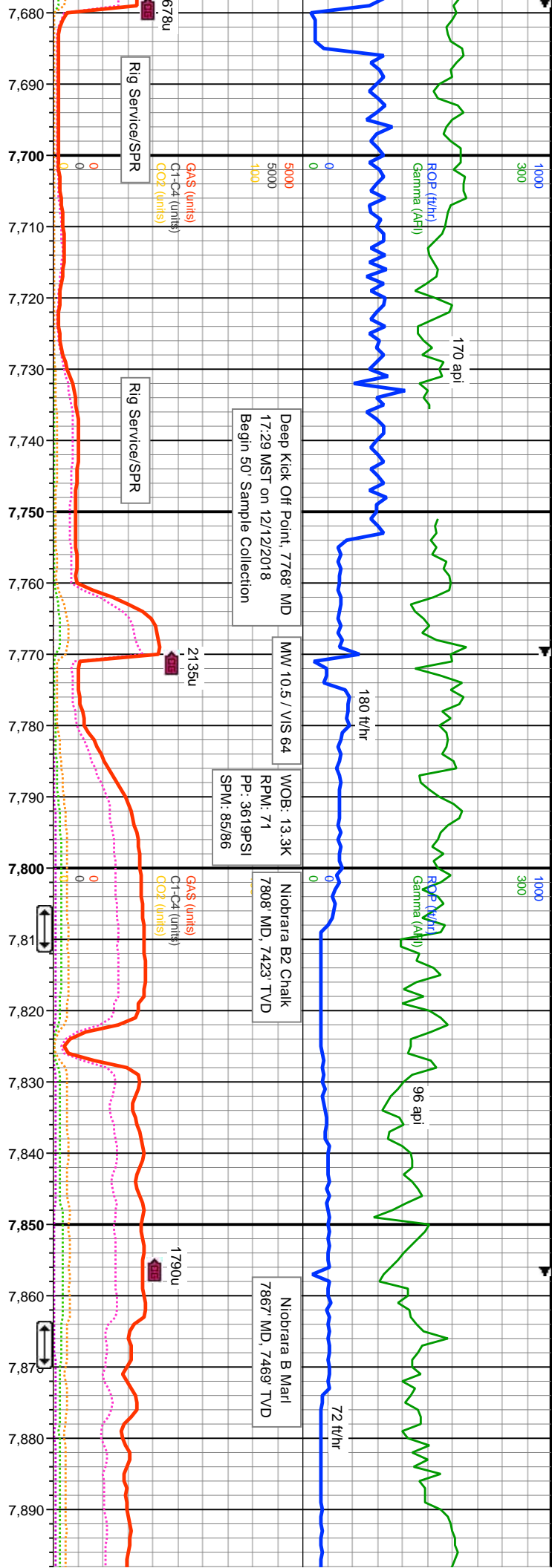
brn-dk brn, mod sft-occ v frm, sb blk-y-ang, tr fis,

100% SLTY SH: brn-dk brn, med-drkgy, mod sft-occ v frm, sb blk-y-ang, tr fis, sily, arg

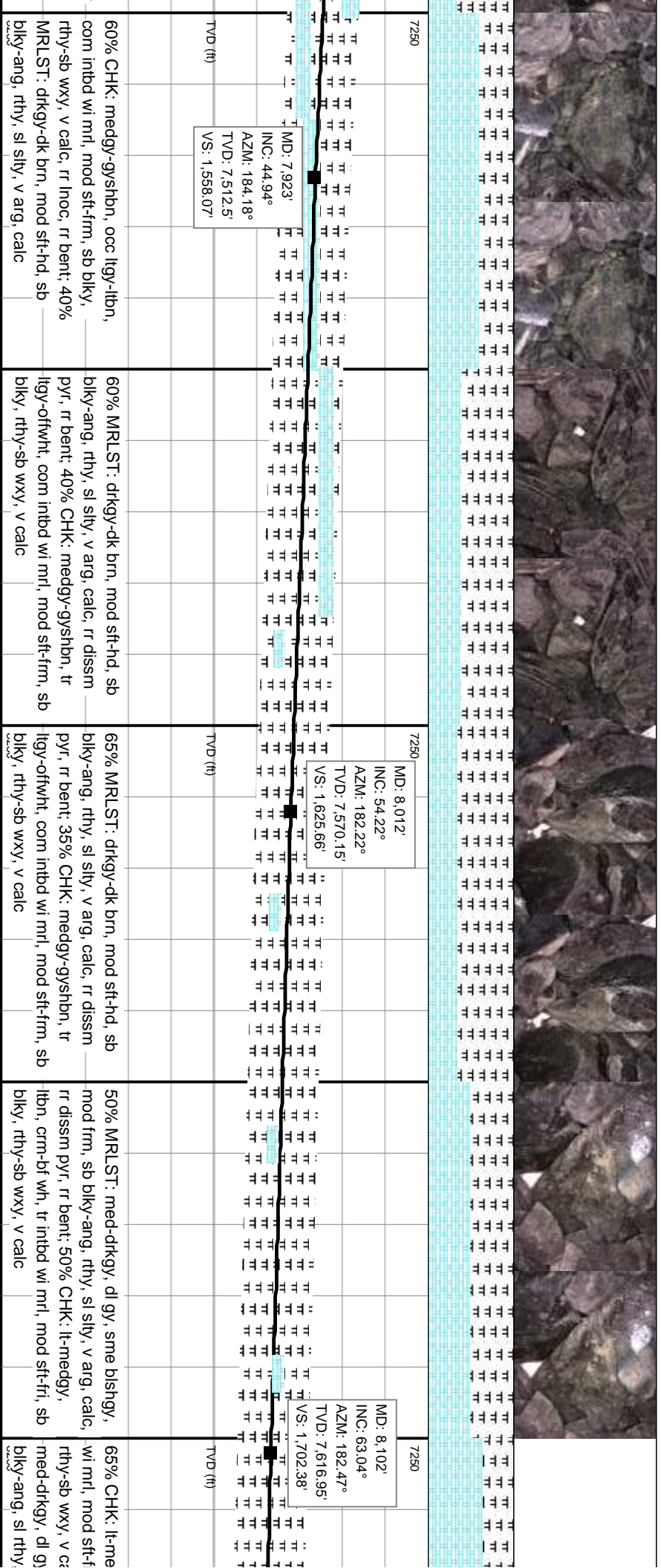
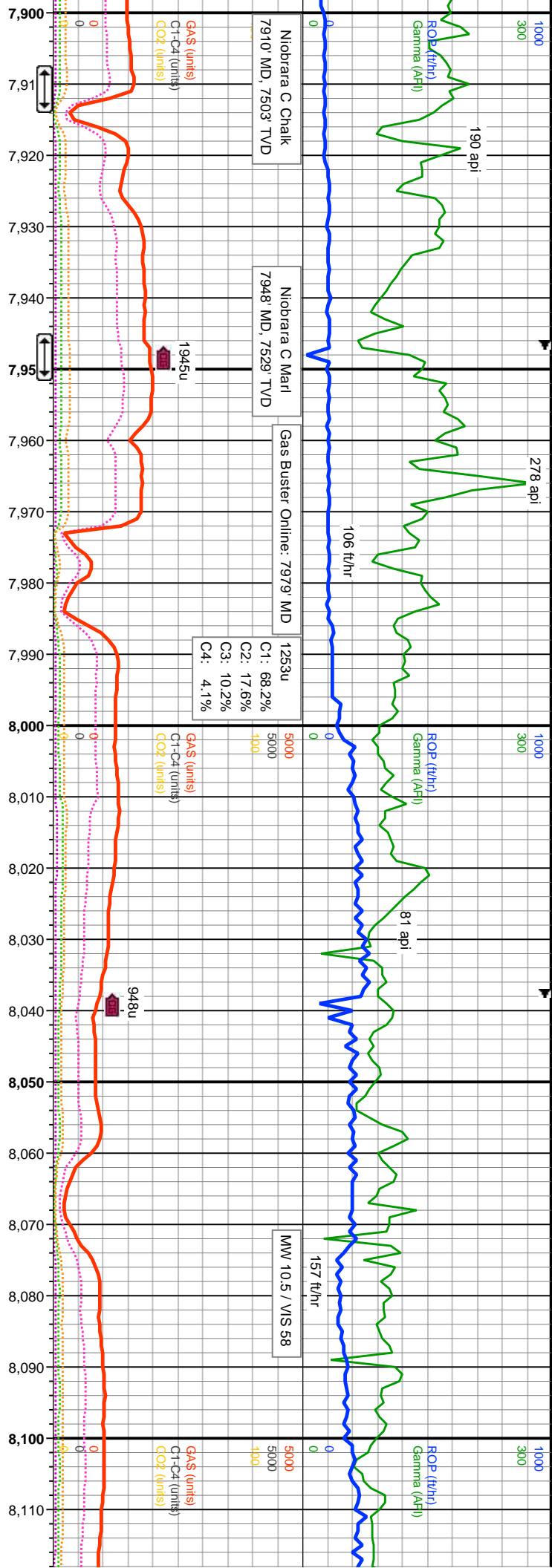
100% SLTY SH: brn-dk brn, med-drkgy, mod sft-occ v frm, sb blk-y-ang, tr fis, sily, arg

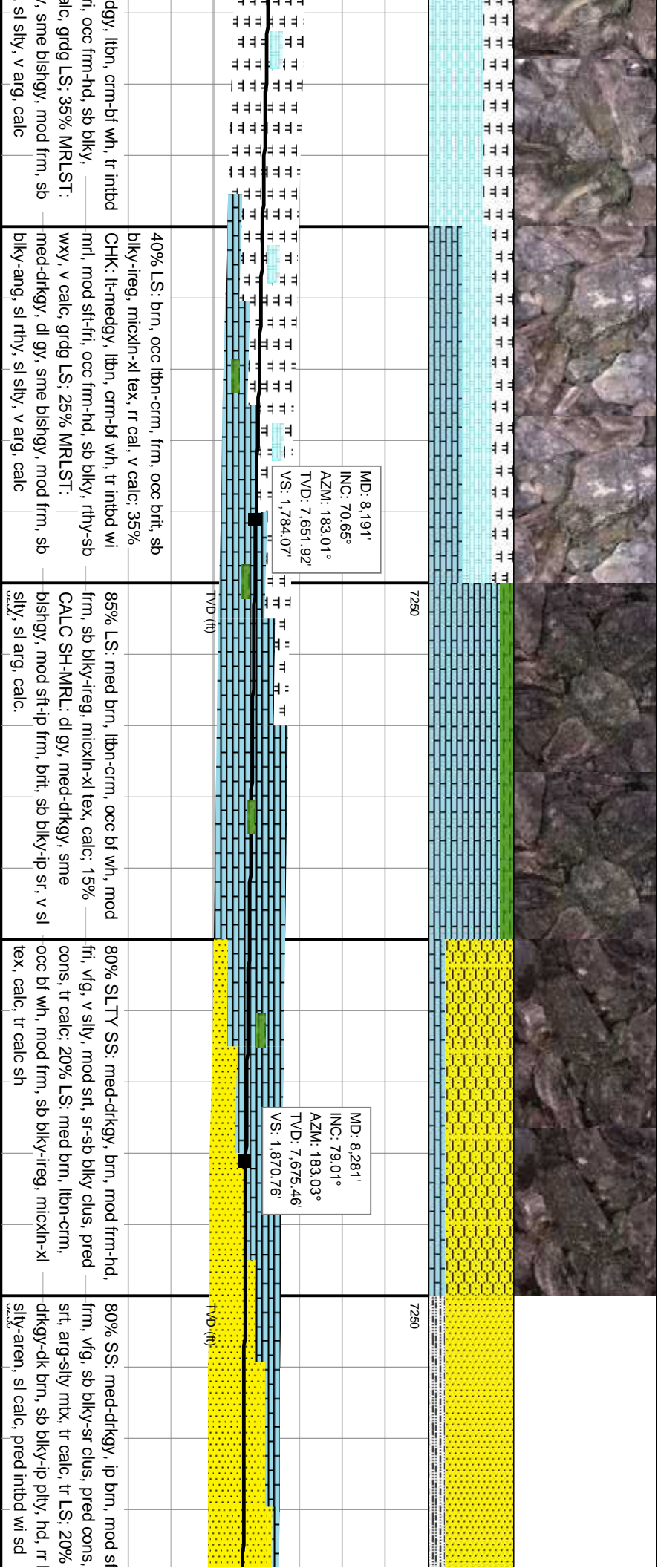
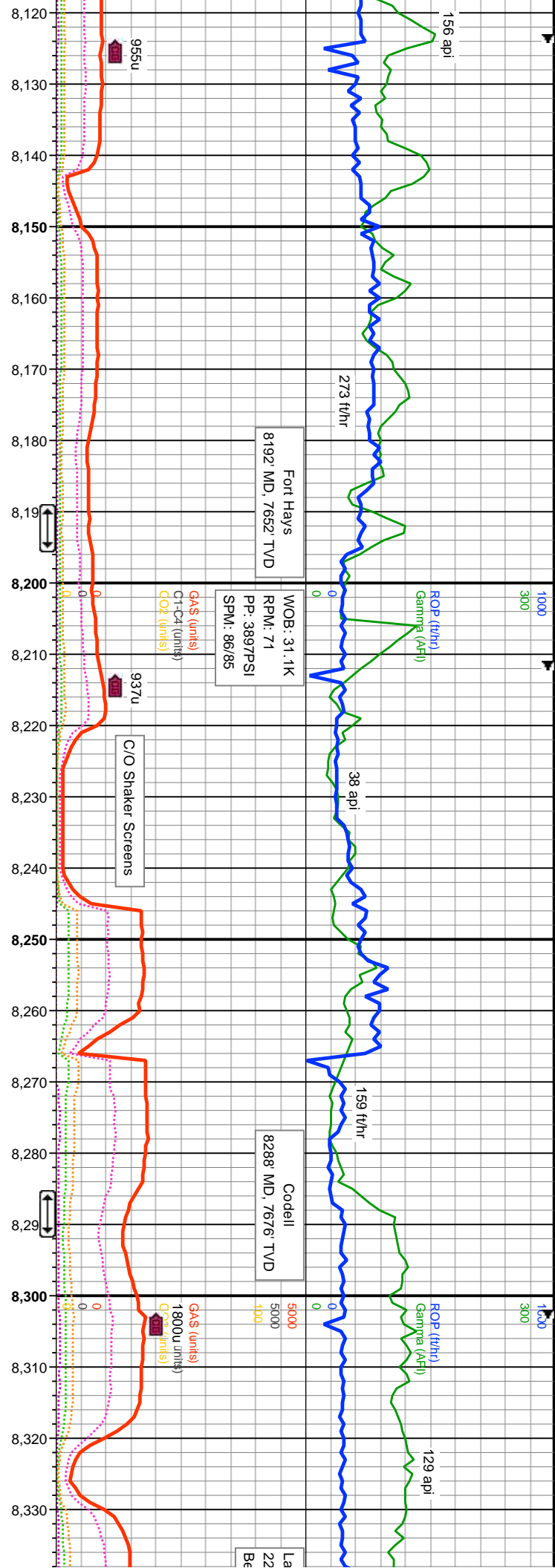




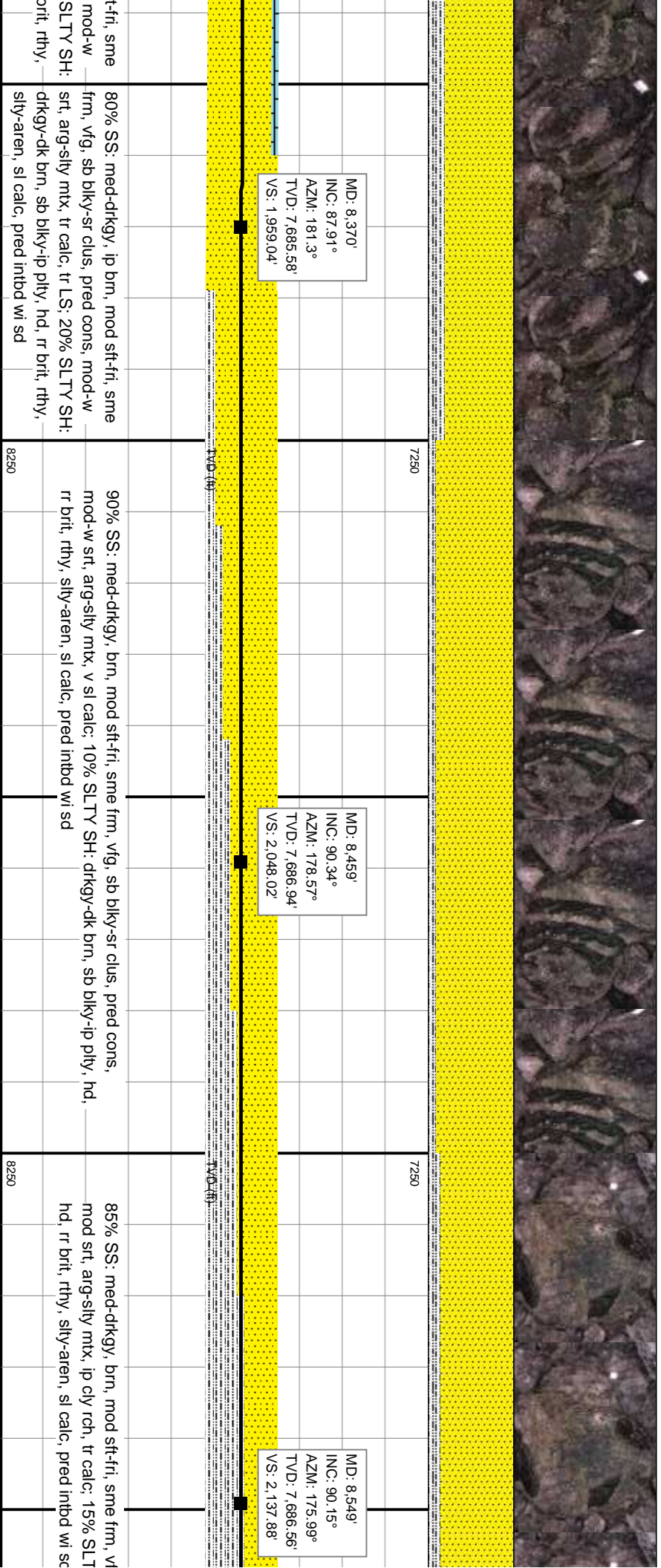
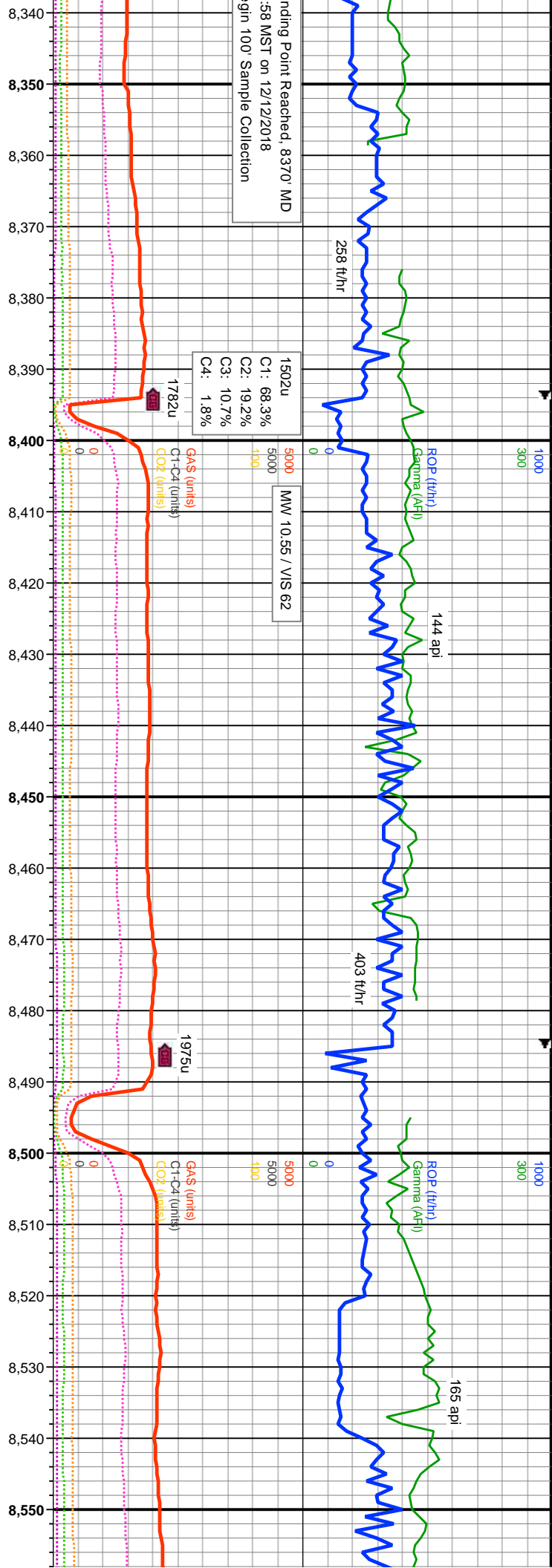


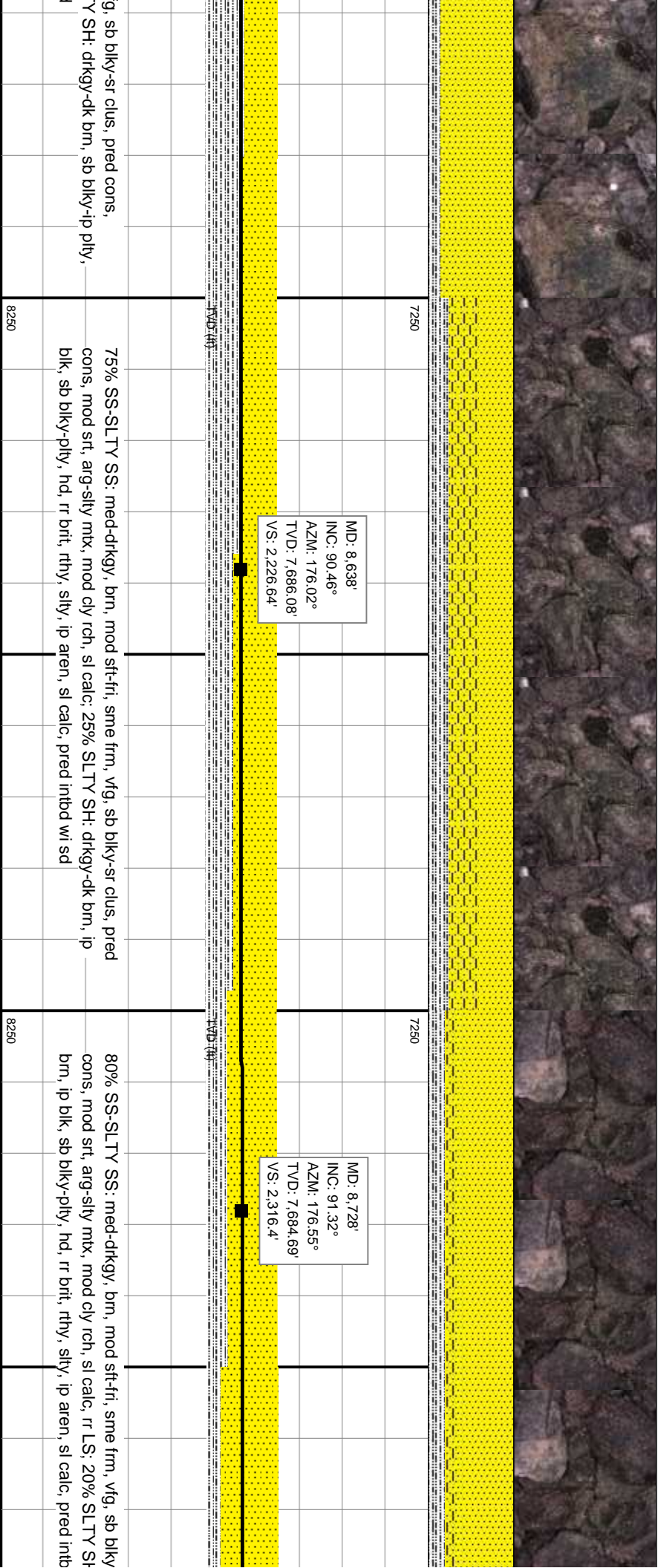
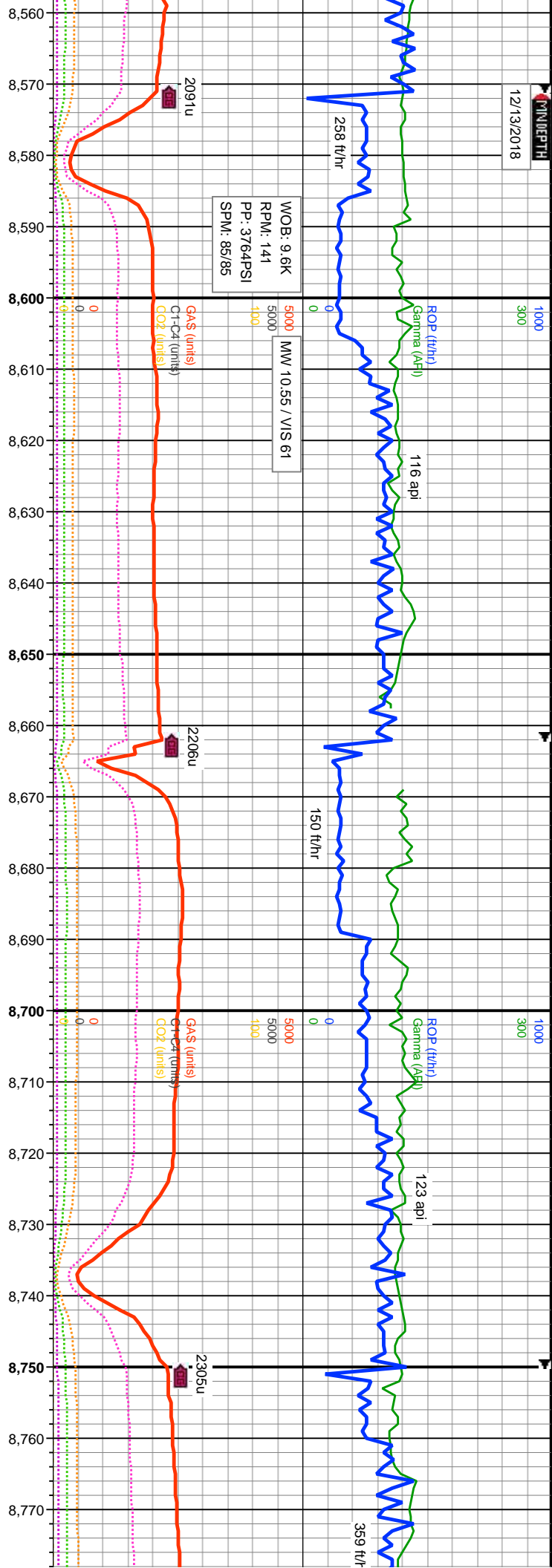




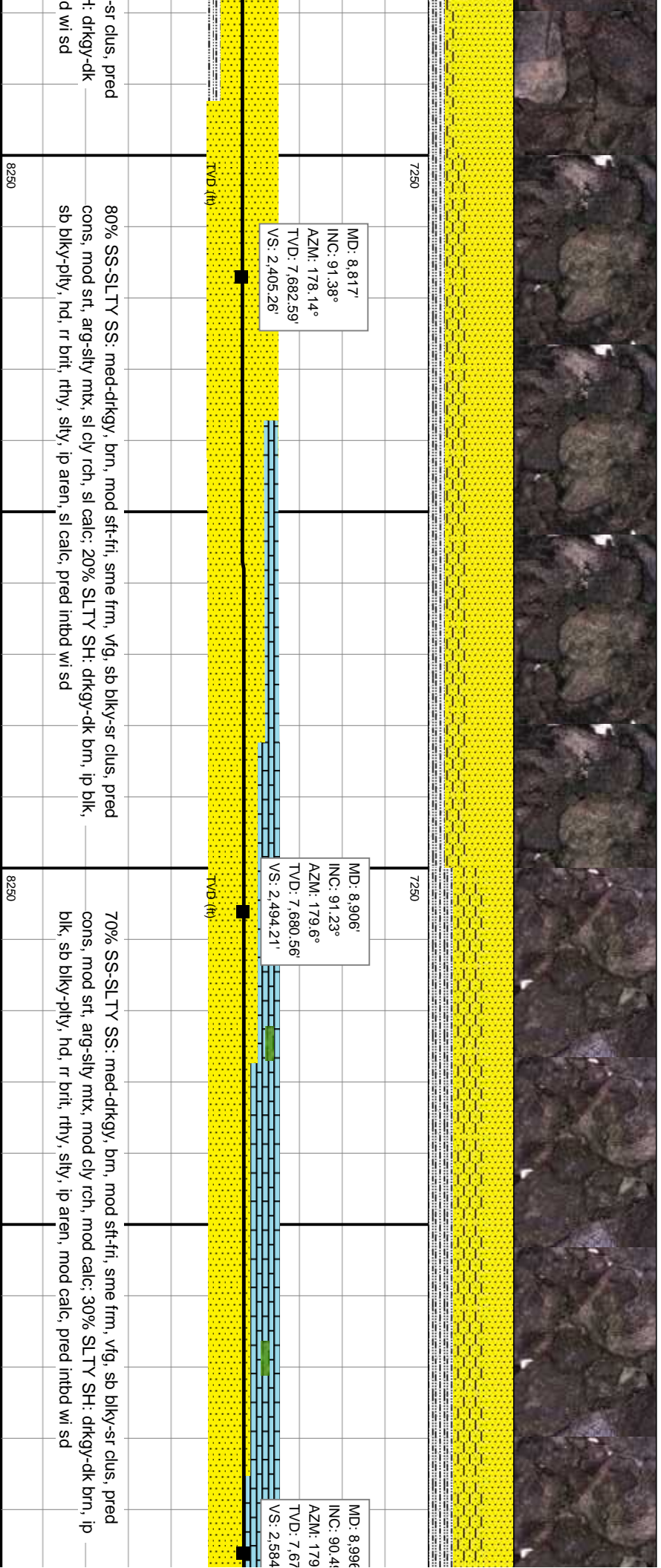
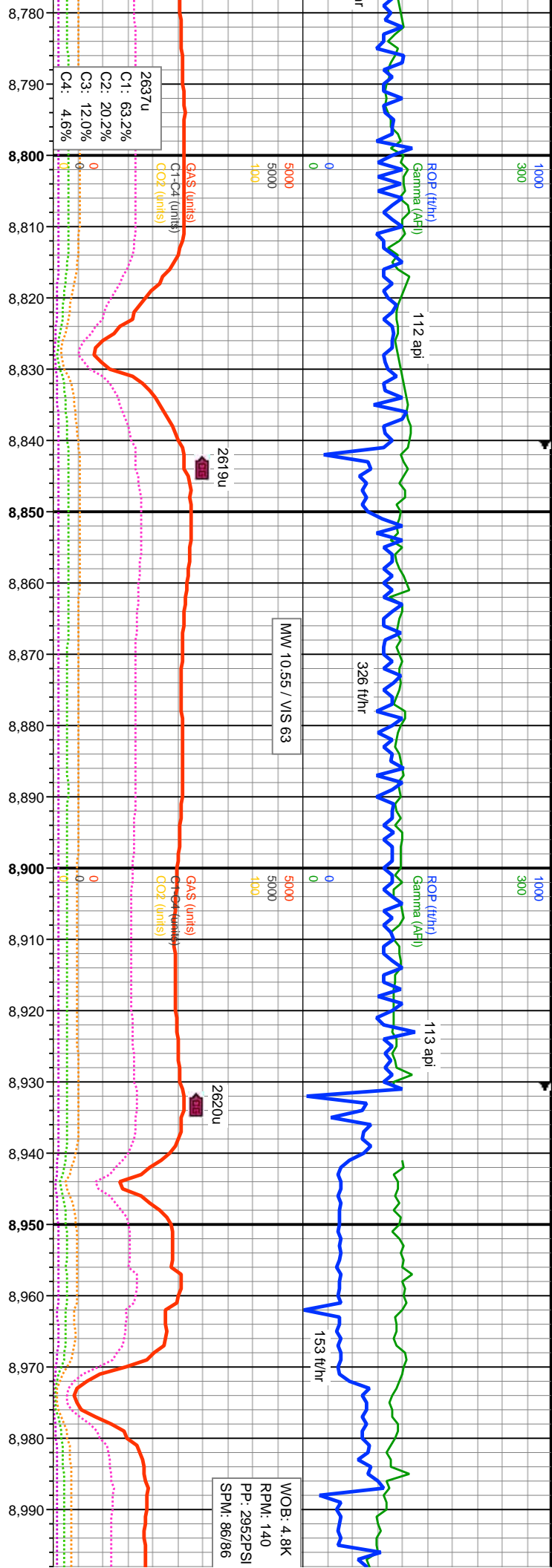


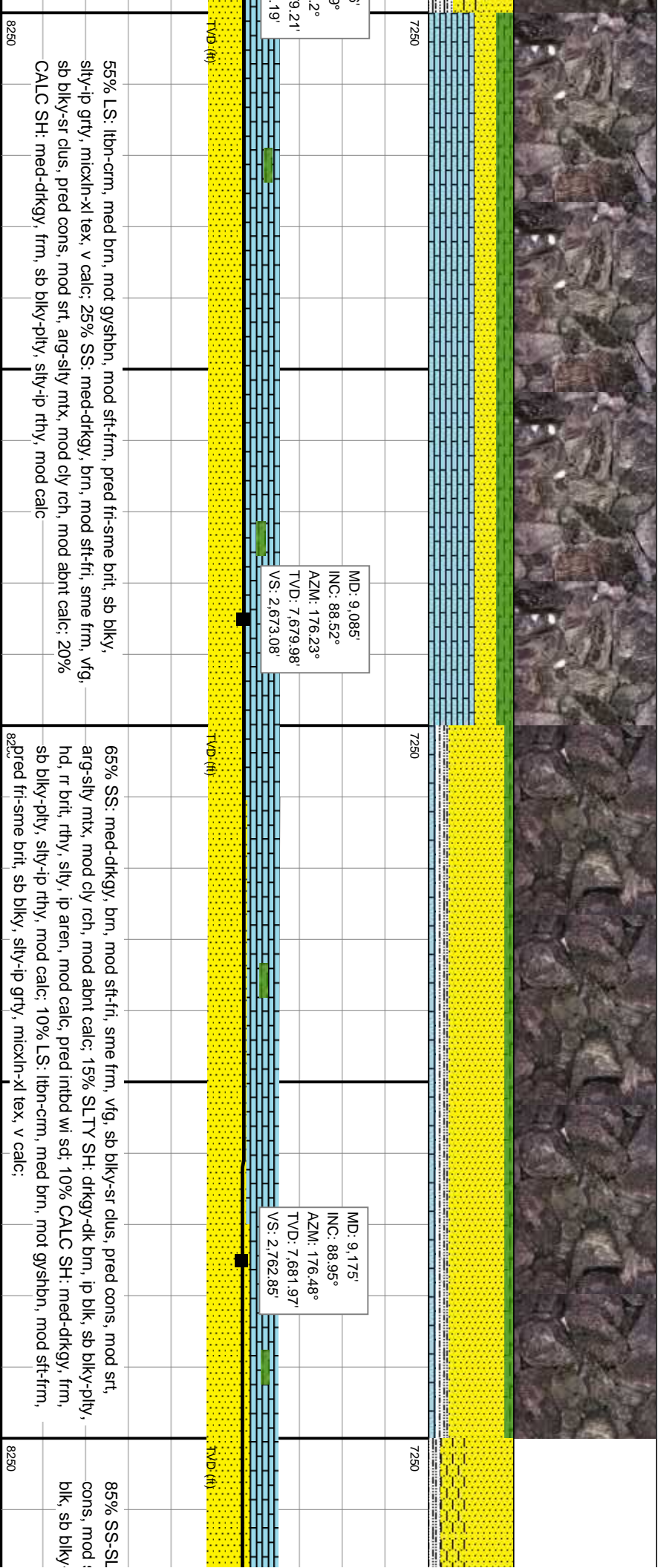
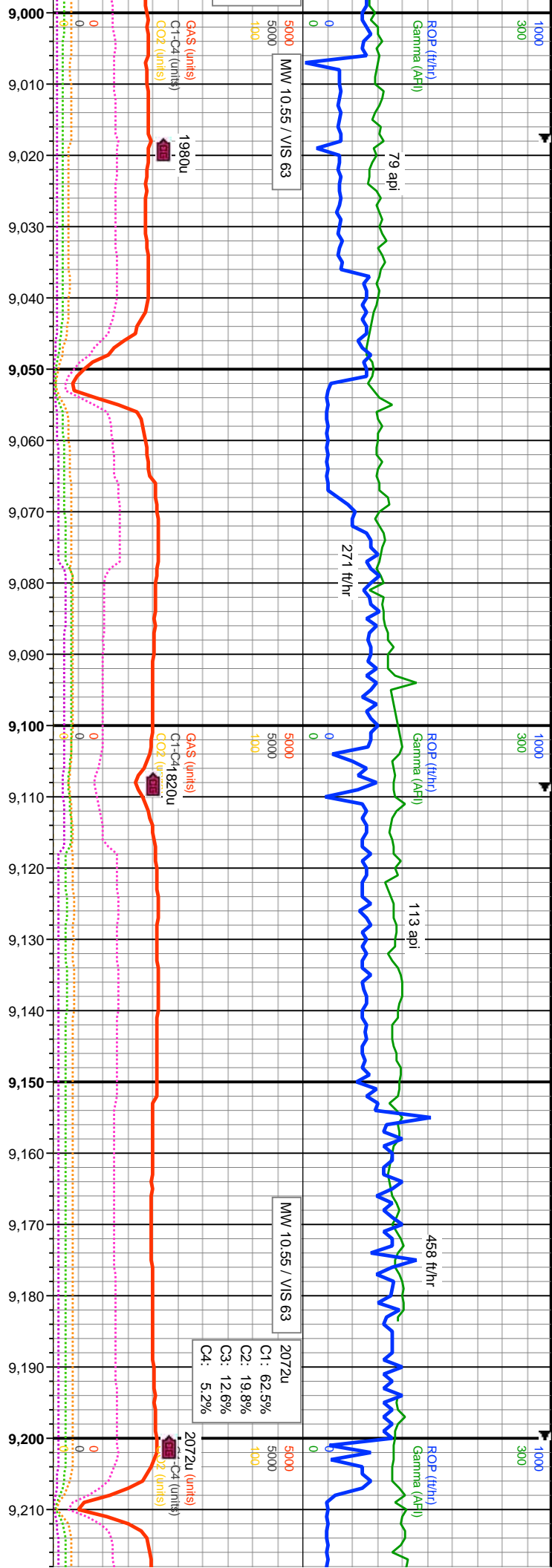




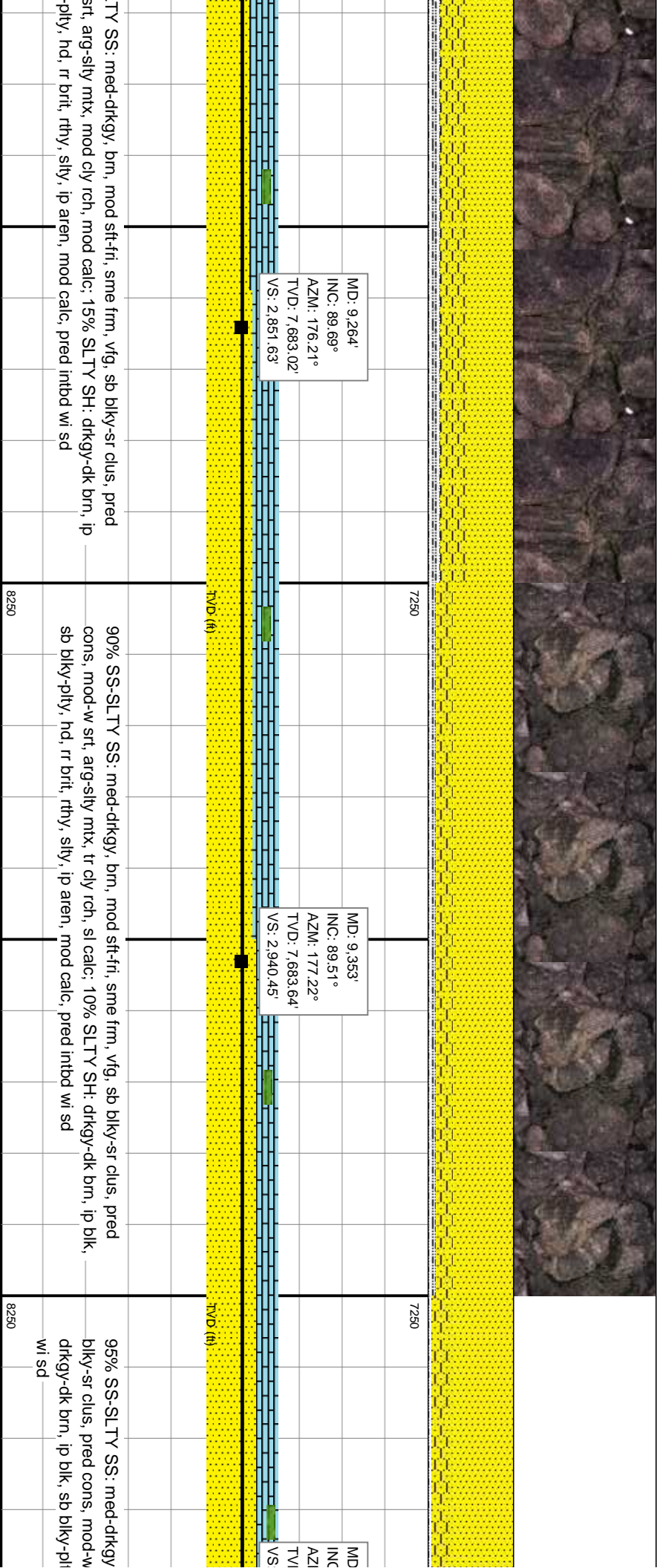
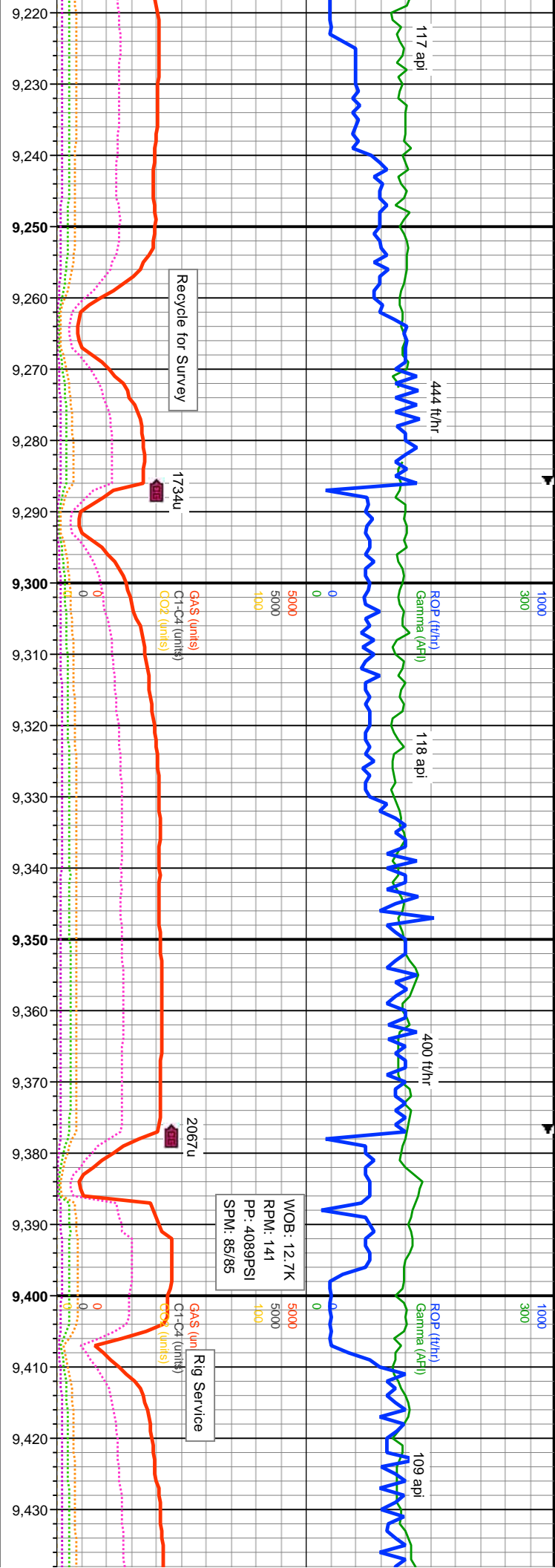


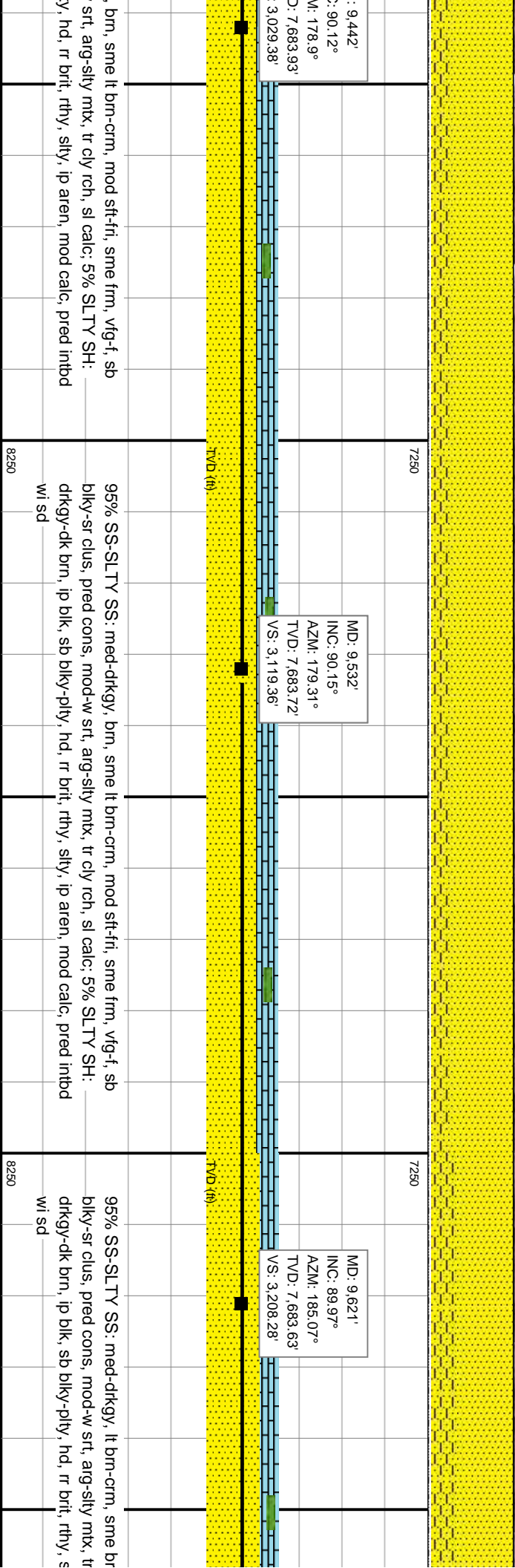
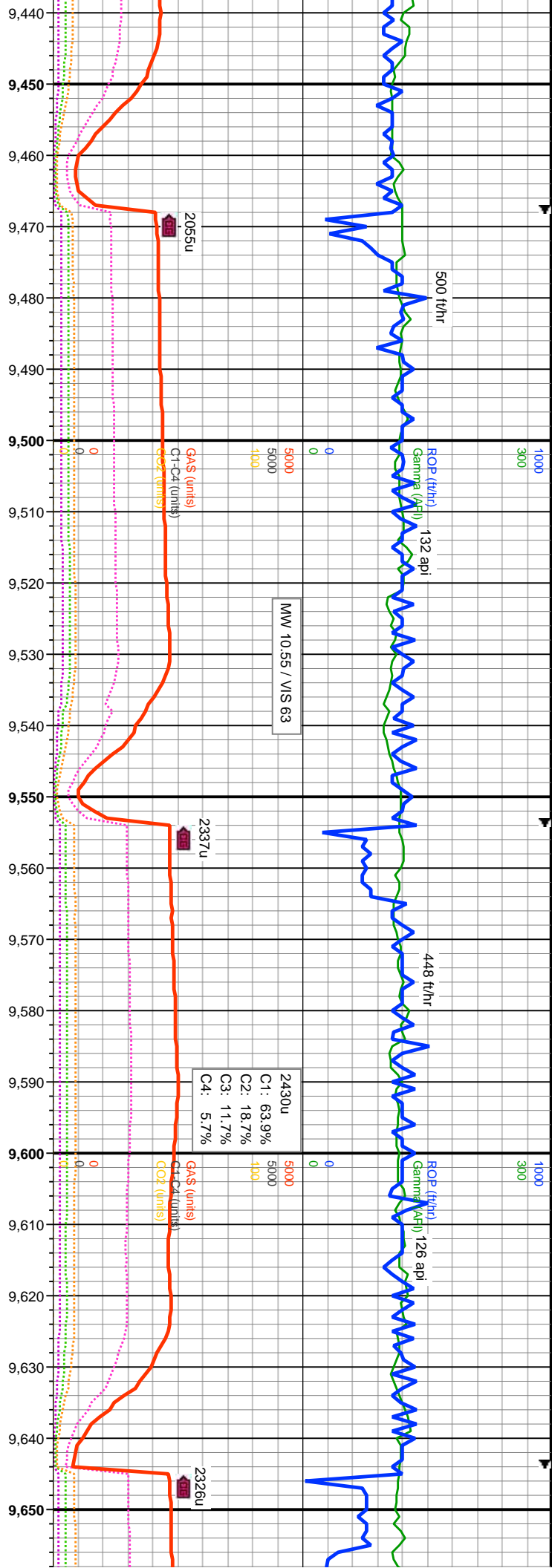




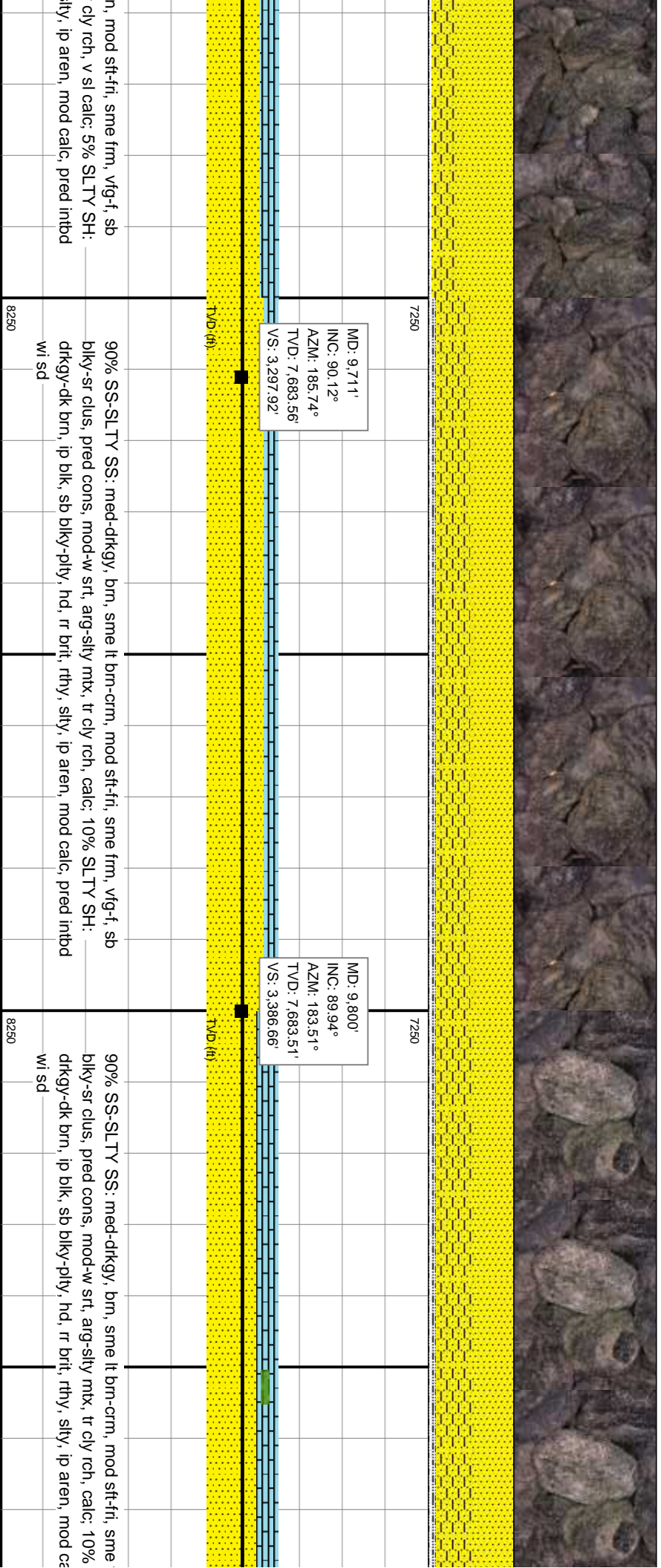
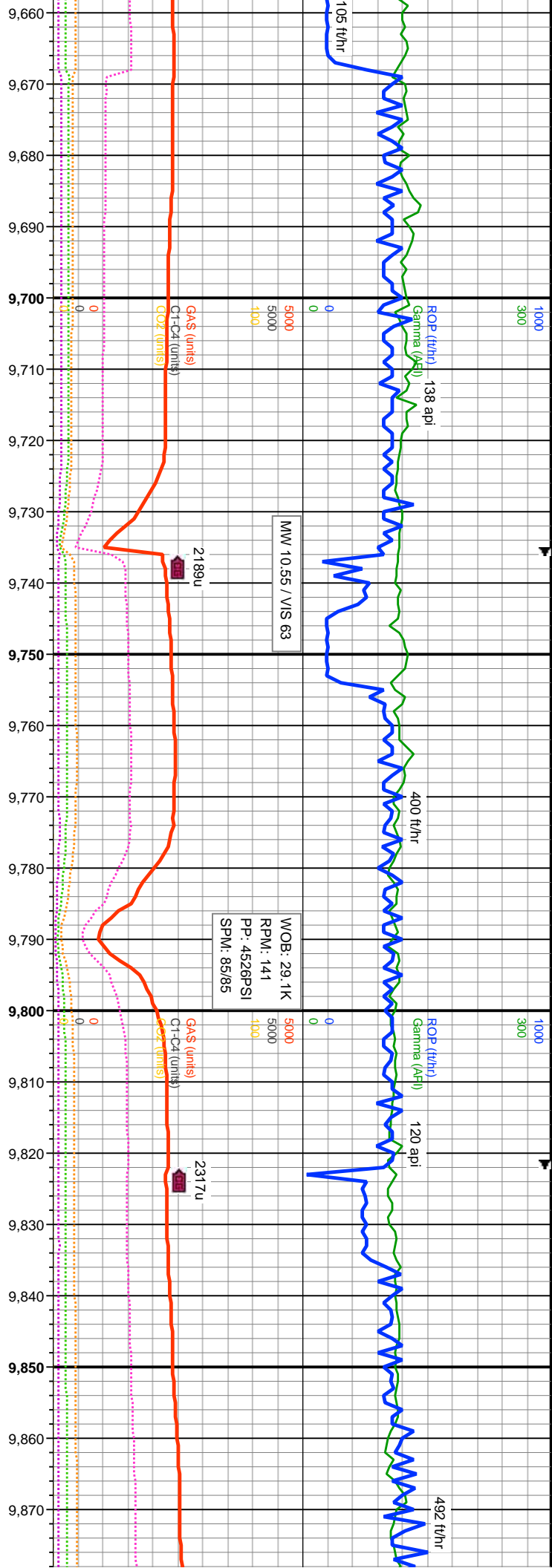


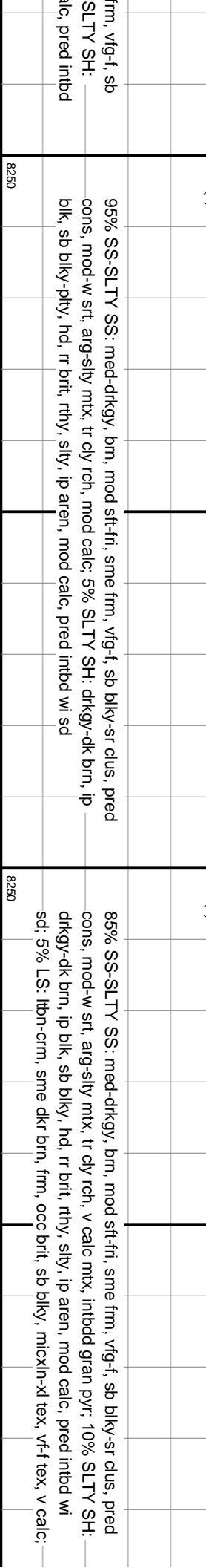




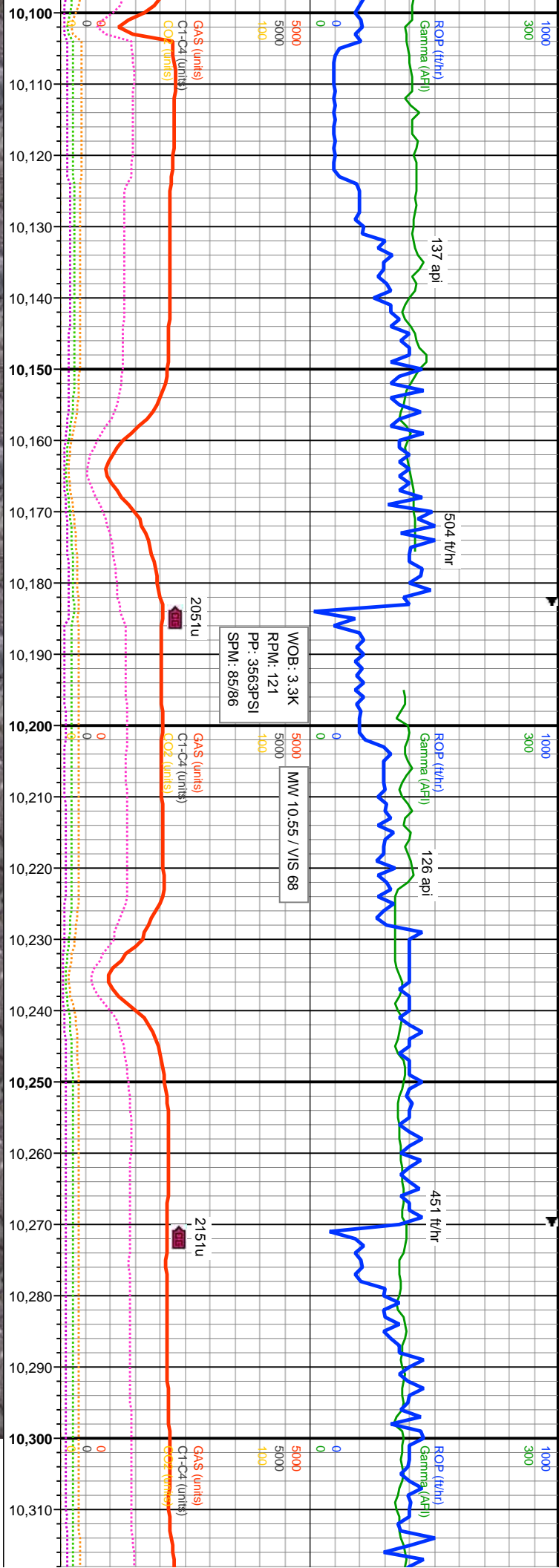




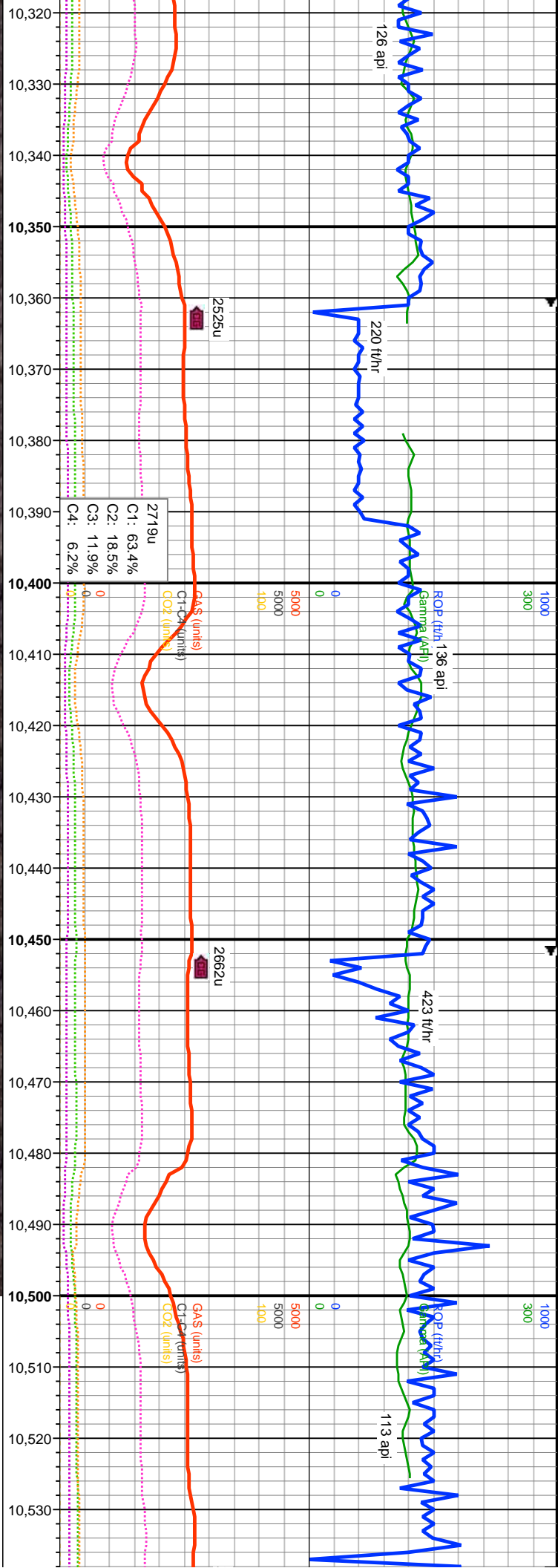








<div>MD: 10.158' INC: 90° AZM: 174.75° TVD: 7.683.27' VS: 3.744.18'</div>	<div>MD: 10.247' INC: 89.88° AZM: 175.69° TVD: 7.683.37' VS: 3.832.83'</div>	<div>MD: 10.247' INC: 89.88° AZM: 175.69° TVD: 7.683.37' VS: 3.832.83'</div>
<div>80% SS-SLTY SS: med-dkgy, brn, mod sft-fri, sme frm, vfg-f, sb blk-y-sr clus, pred cons, mod-w srt, arg-sily mix, tr cly rch, v calc mtz, intbdd gran pyr, 10% SLTY SH: dkgy-dk brn, ip blk, sb blk-y, hd, rr brt, rthy, sily, ip aren, mod calc, pred intbd wi sd; 10% LS: ltbn-crm, sme dkr brn, frm, occ brt, sb blk-y, micxn-xl tex, vf-f tex, v calc;</div>	<div>80% SS-SLTY SS: med-dkgy, brn, mod sft-fri, sme frm, vfg-f, sb blk-y-sr clus, pred cons, mod-w srt, arg-sily mix, tr cly rch, v calc mtz, 10% SLTY SH: dkgy-dk brn, ip blk, sb blk-y, hd, rr brt, rthy, sily, ip aren, mod calc, pred intbd wi sd; 10% LS: ltbn-crm, sme dkr brn, frm, occ brt, sb blk-y, micxn-xl tex, vf-f gr, v calc;</div>	<div>80% SS-SLTY SS: med-dkgy, brn, mod sft-fri, sme frm, vfg-f, sb blk-y-sr clus, pred cons, mod-w srt, arg-sily mix, tr cly rch, v calc mtz, 10% SLTY SH: dkgy-dk brn, ip blk, sb blk-y, hd, rr brt, rthy, sily, ip aren, mod calc, pred intbd wi sd; 10% LS: ltbn-crm, sme dkr brn, frm, occ brt, sb blk-y, micxn-xl tex, vf-f gr, v calc;</div>



MD: 10,337'  
INC: 90°  
AZM: 178.87°  
TVD: 7,683.46'  
VS: 3,922.7'

MD: 10,426'  
INC: 89.97°  
AZM: 181.7°  
TVD: 7,683.48'  
VS: 4,011.69'

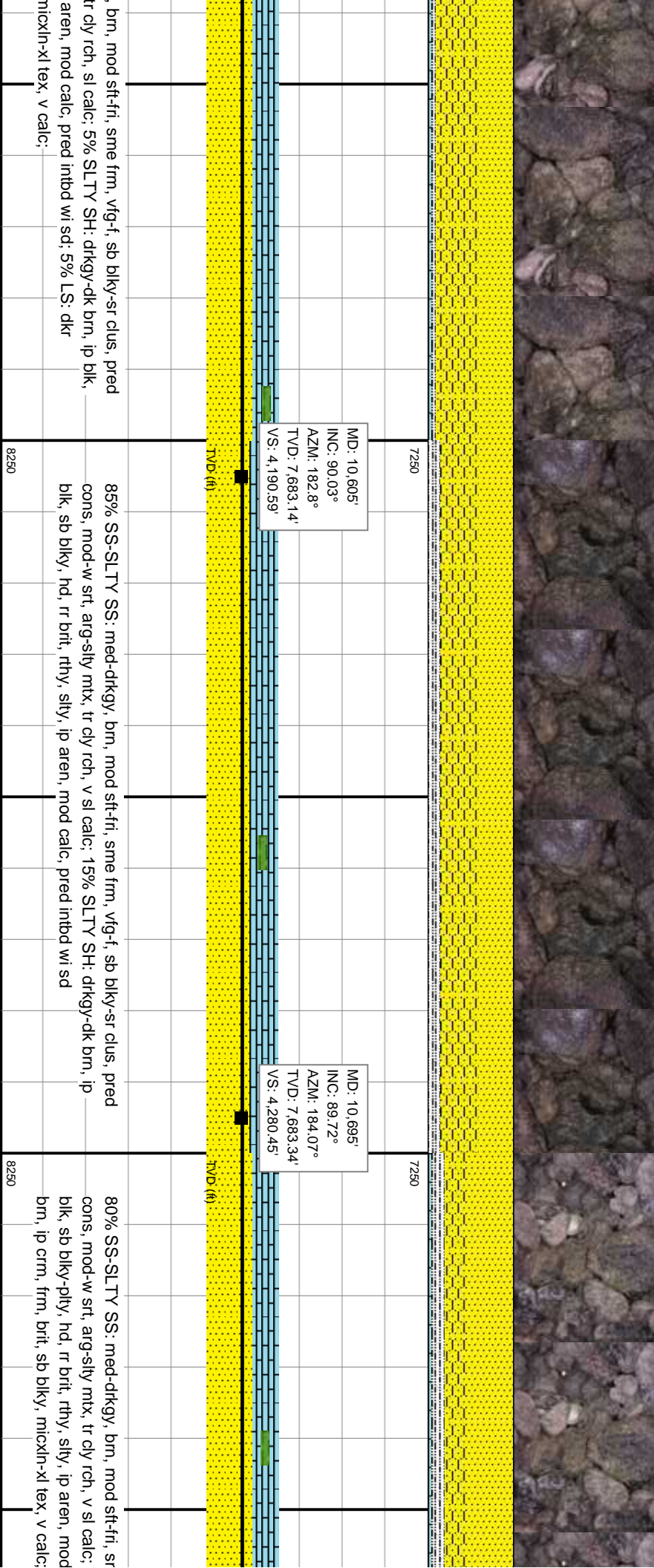
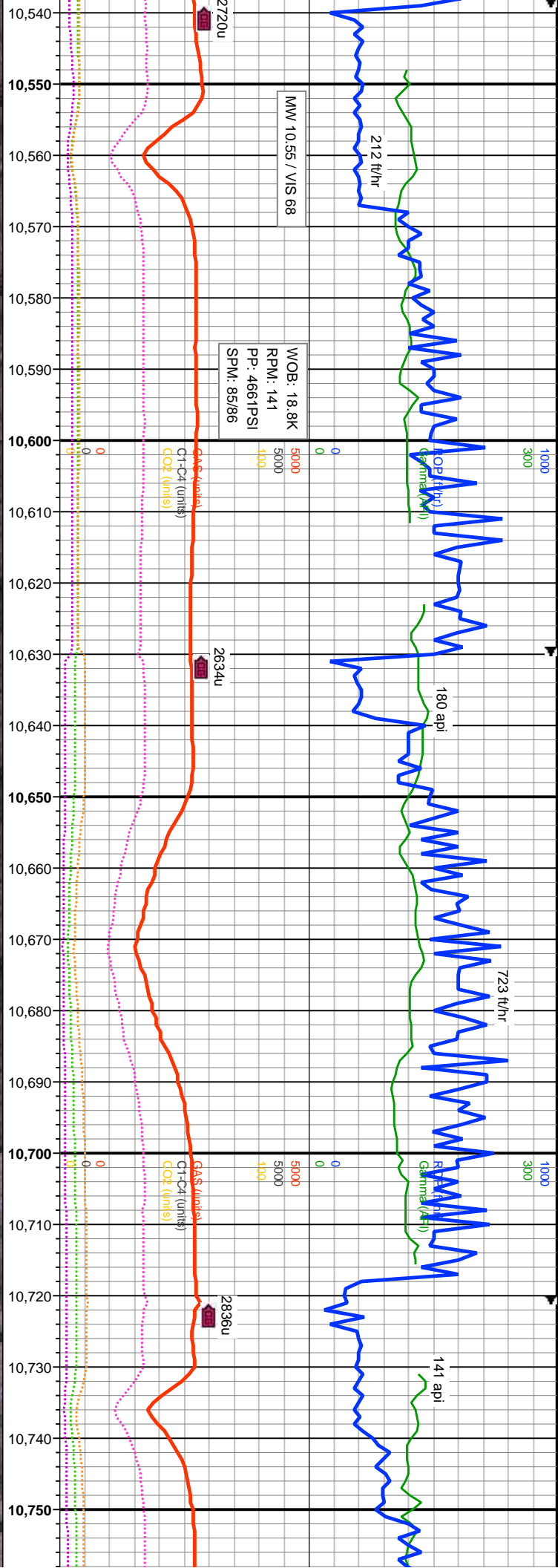
MD: 10,516'  
INC: 90.22°  
AZM: 182.02°  
TVD: 7,683.34'  
VS: 4,101.65'

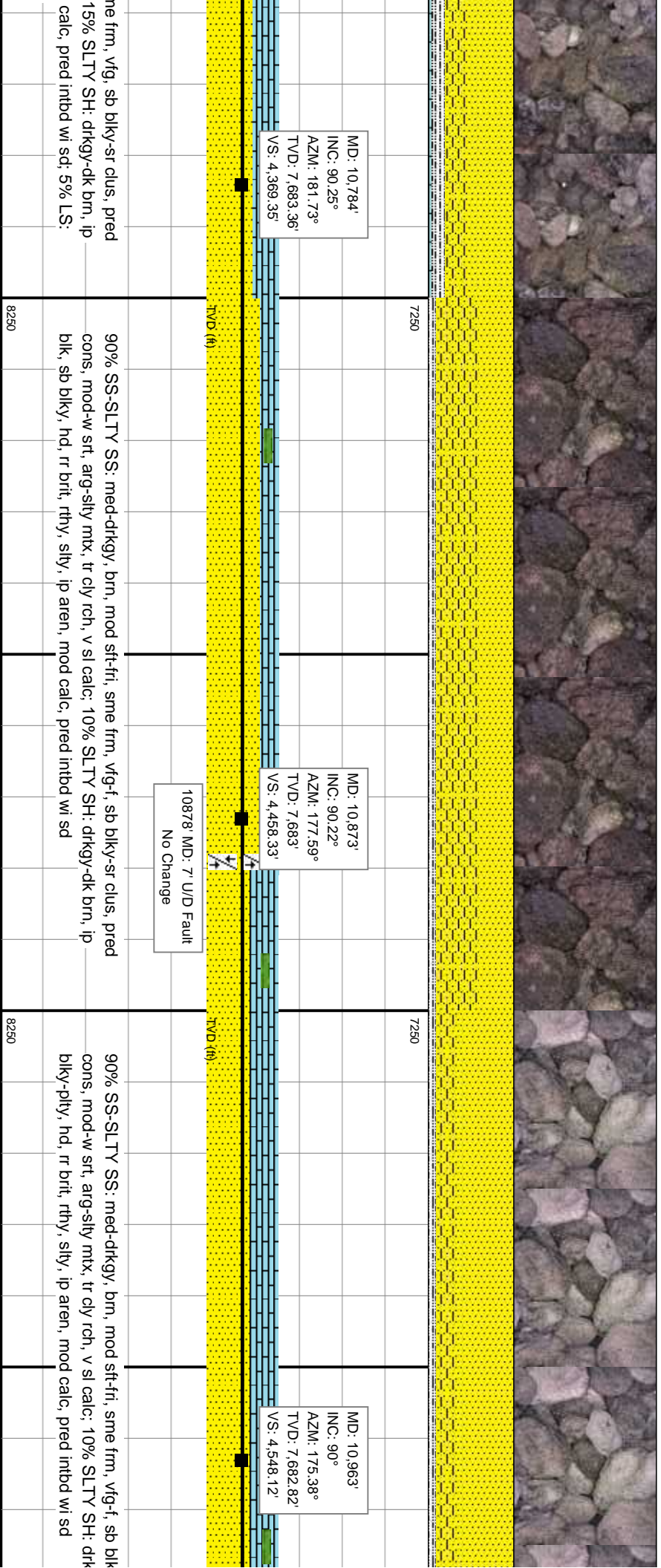
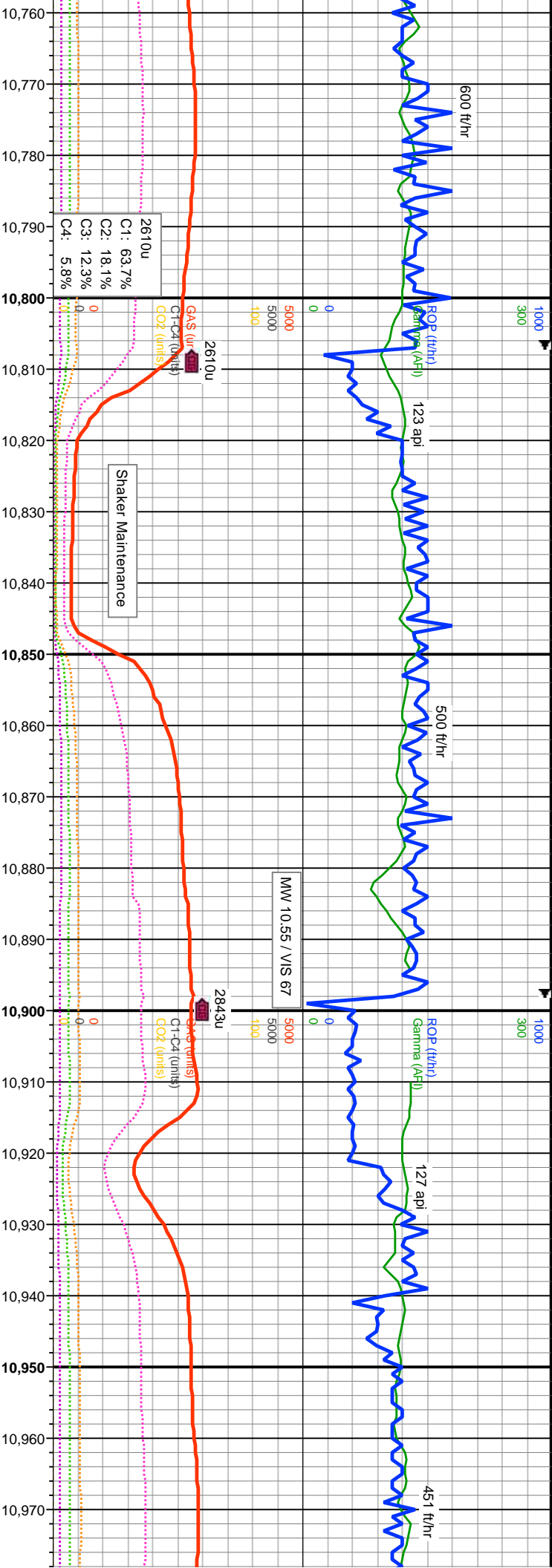
TY SS: med-dkgy, bn, mod sft-fri, sme frm, vfg-i, sb blk, sr clus, pred w srt, arg-sily mix, mod calc; 10% SLTY SH: drkgy-dk brn, ip blk, sb brt, rthy, sily, ip aren, mod calc, pred inbd wi sd; 10% LS: dkr brn, frm, blk, micxn-xl tex, v calc;

90% SS-SLTY SS: med-dkgy, bn, mod sft-fri, sme frm, vfg-i, sb blk, sr clus, pred cons, mod-w srt, arg-sily mix, tr cly rch, sl calc; 5% SLTY SH: drkgy-dk brn, ip blk, sb blk, hd, tr brt, rthy, sily, ip aren, mod calc, pred inbd wi sd; 5% LS: dkr gry-brn, frm, occ brt, sb blk, micxn-xl tex, v calc;

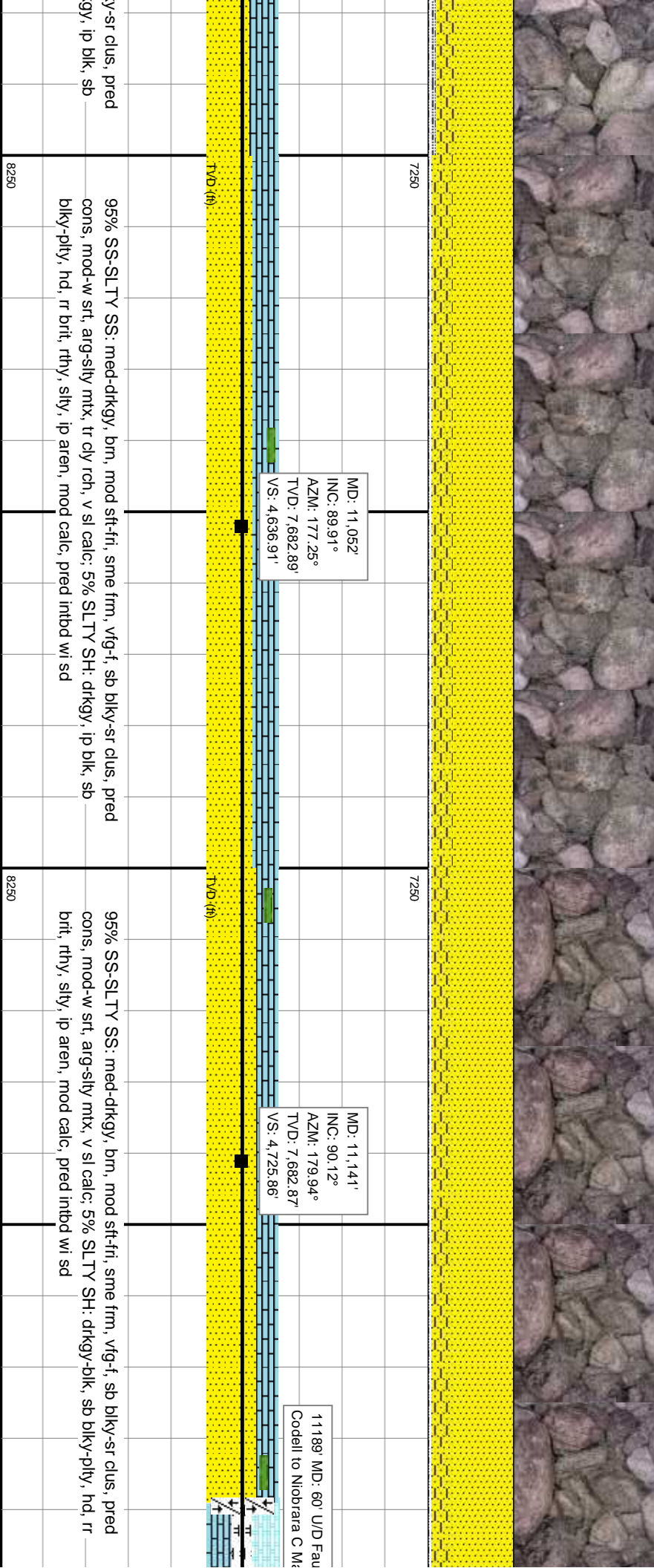
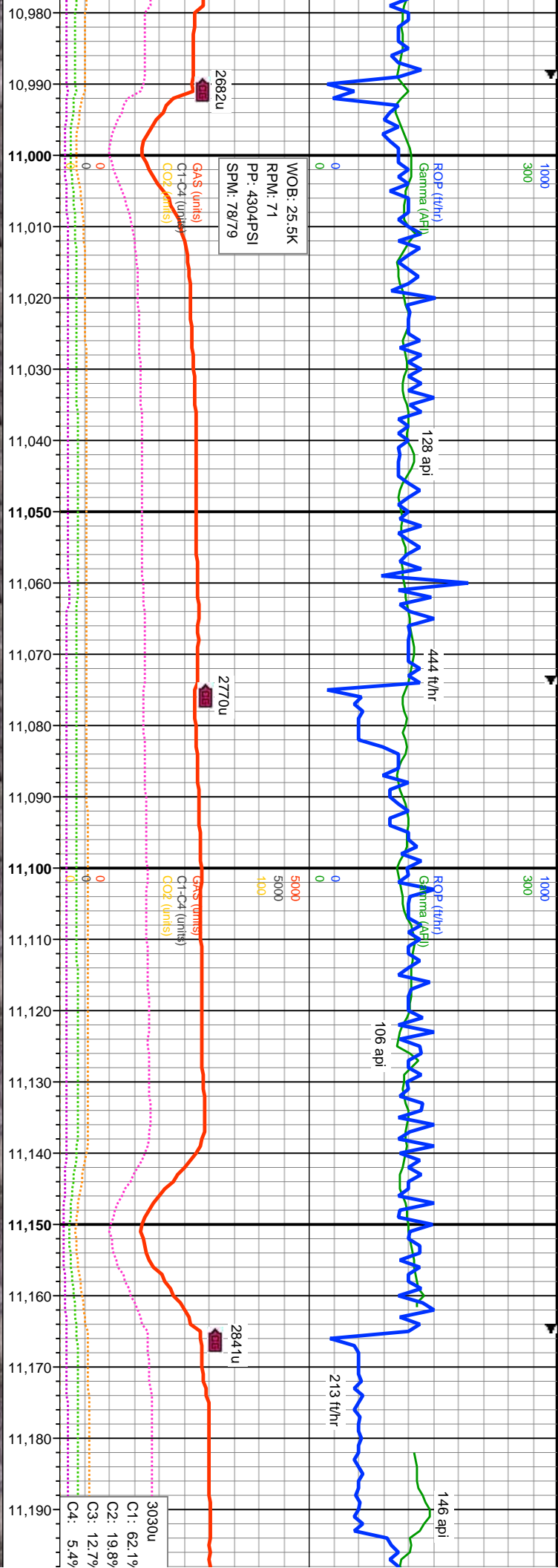
90% SS-SLTY SS: med-dkgy, bn, mod sft-fri, sme frm, vfg-i, sb blk, sr clus, pred cons, mod-w srt, arg-sily mix, tr cly rch, sl calc; 5% SLTY SH: drkgy-dk brn, ip blk, sb blk, hd, tr brt, rthy, sily, ip aren, mod calc, pred inbd wi sd; 5% LS: dkr gry-brn, frm, occ brt, sb blk, micxn-xl tex, v calc;



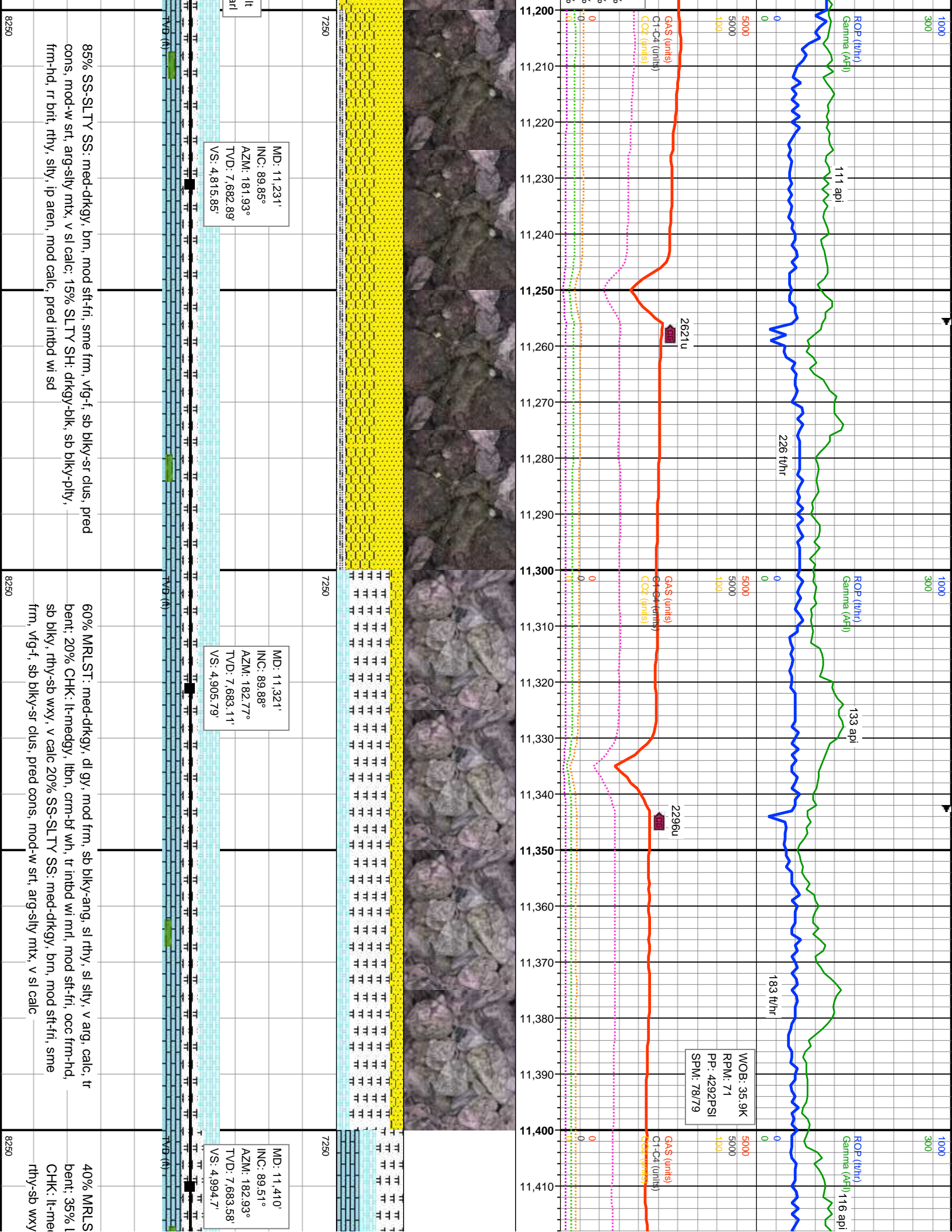


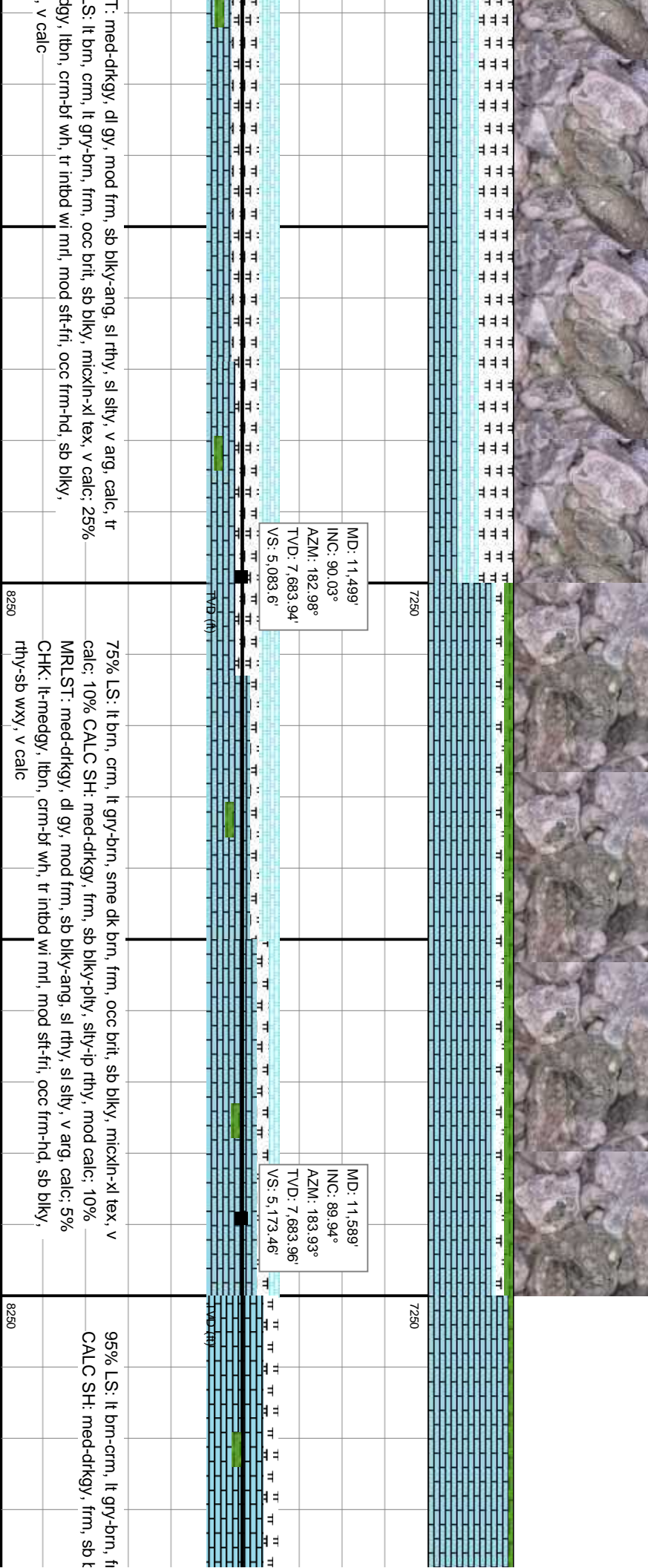
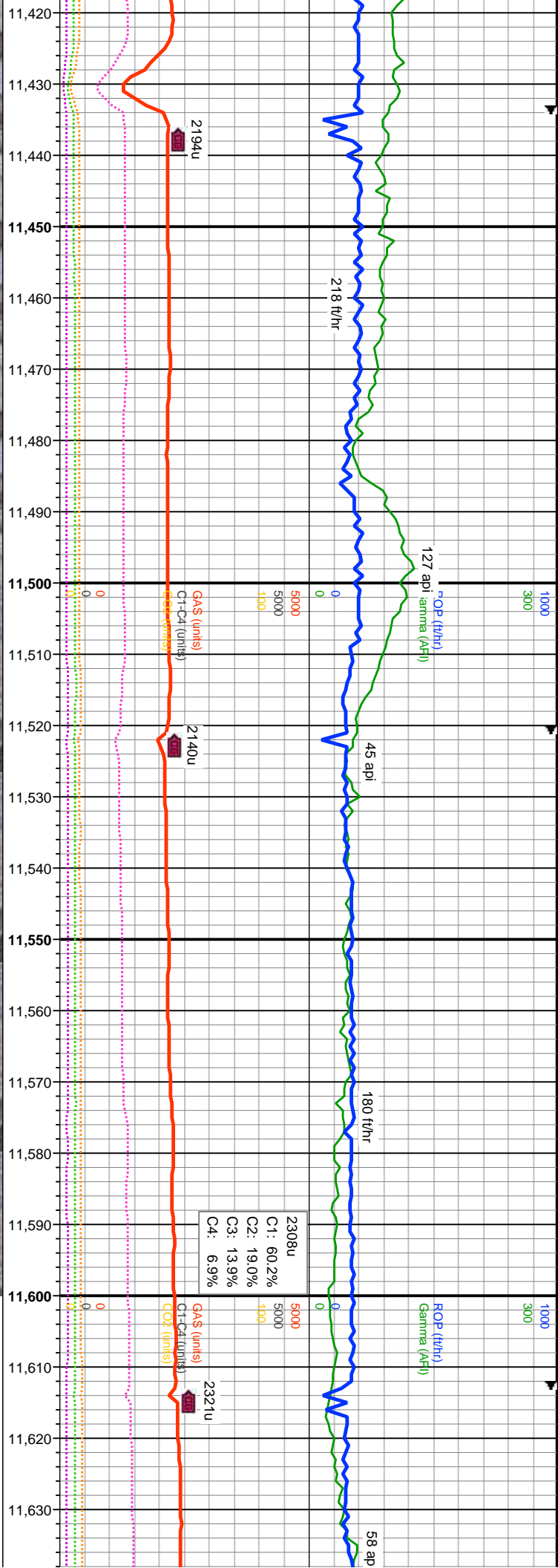




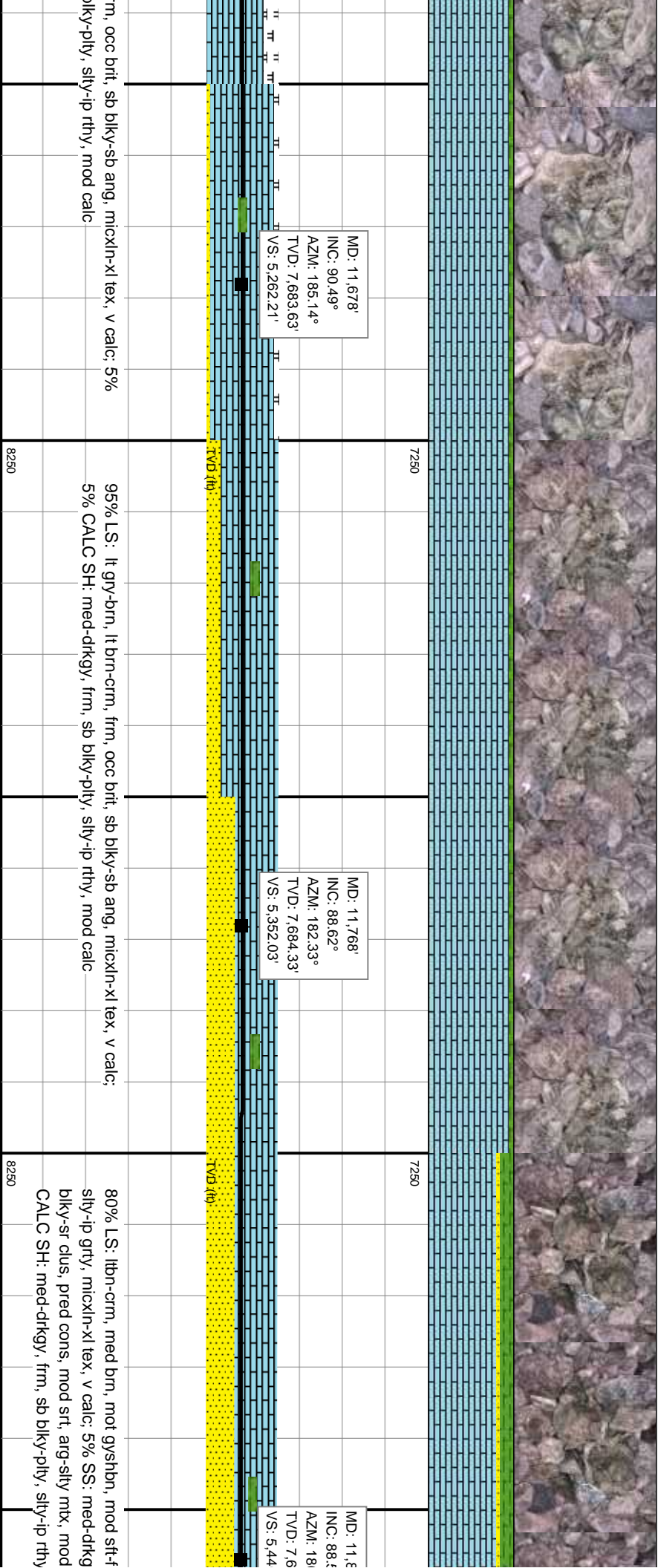
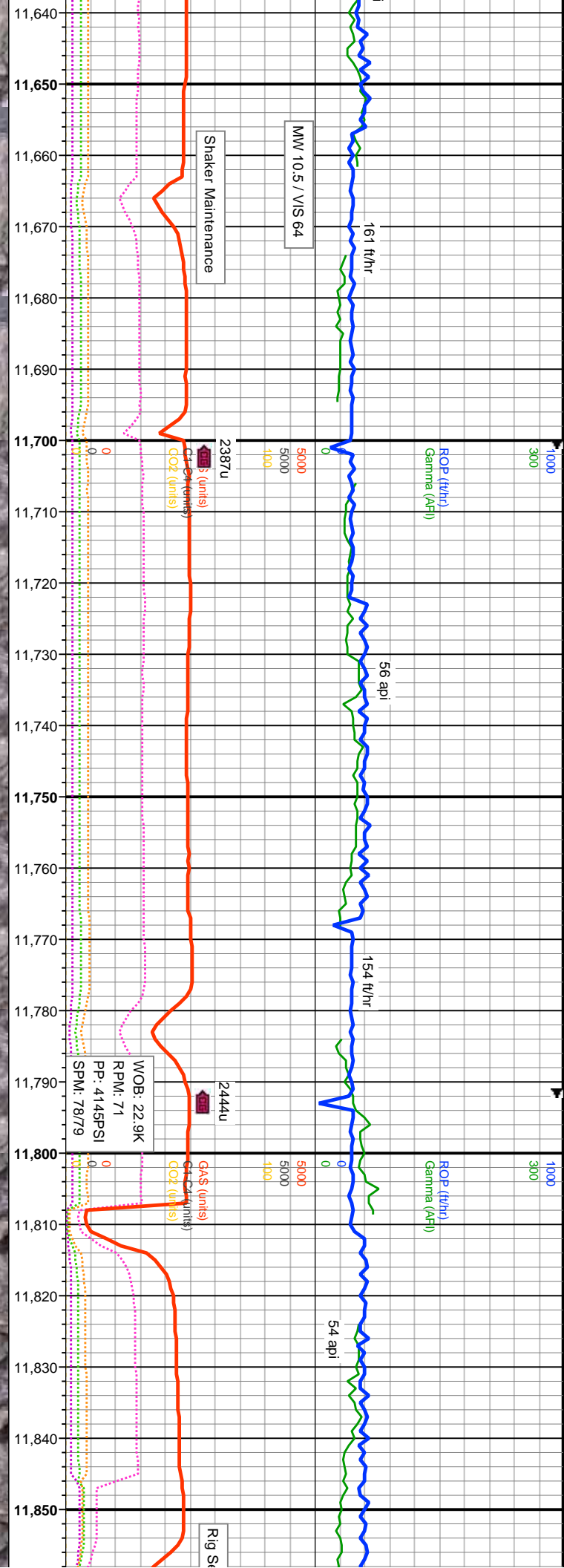




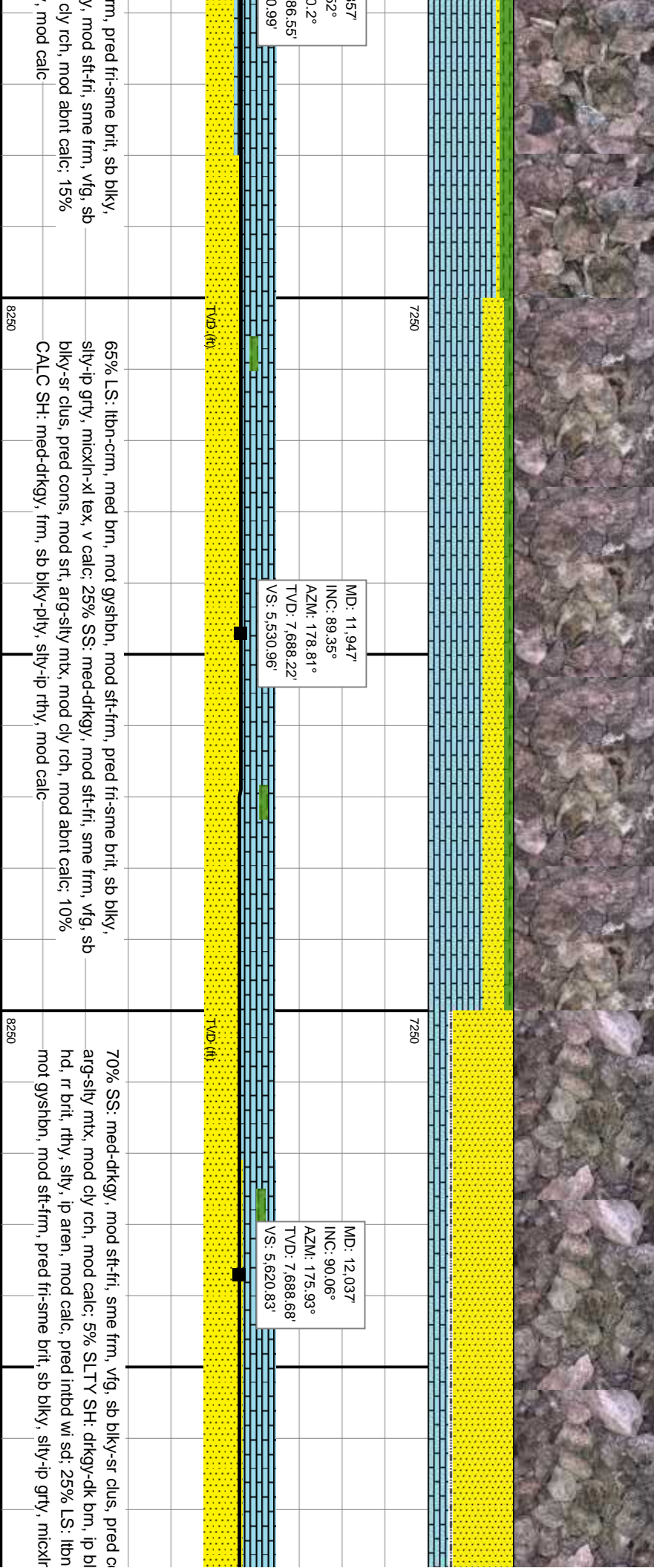
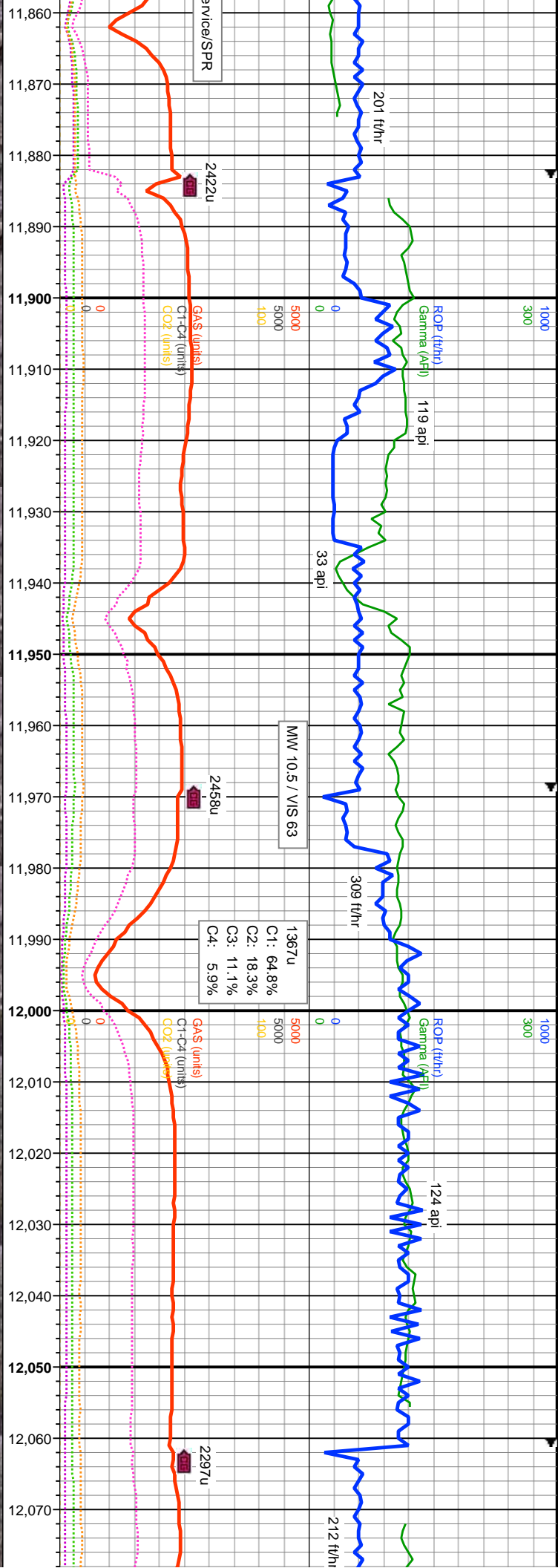


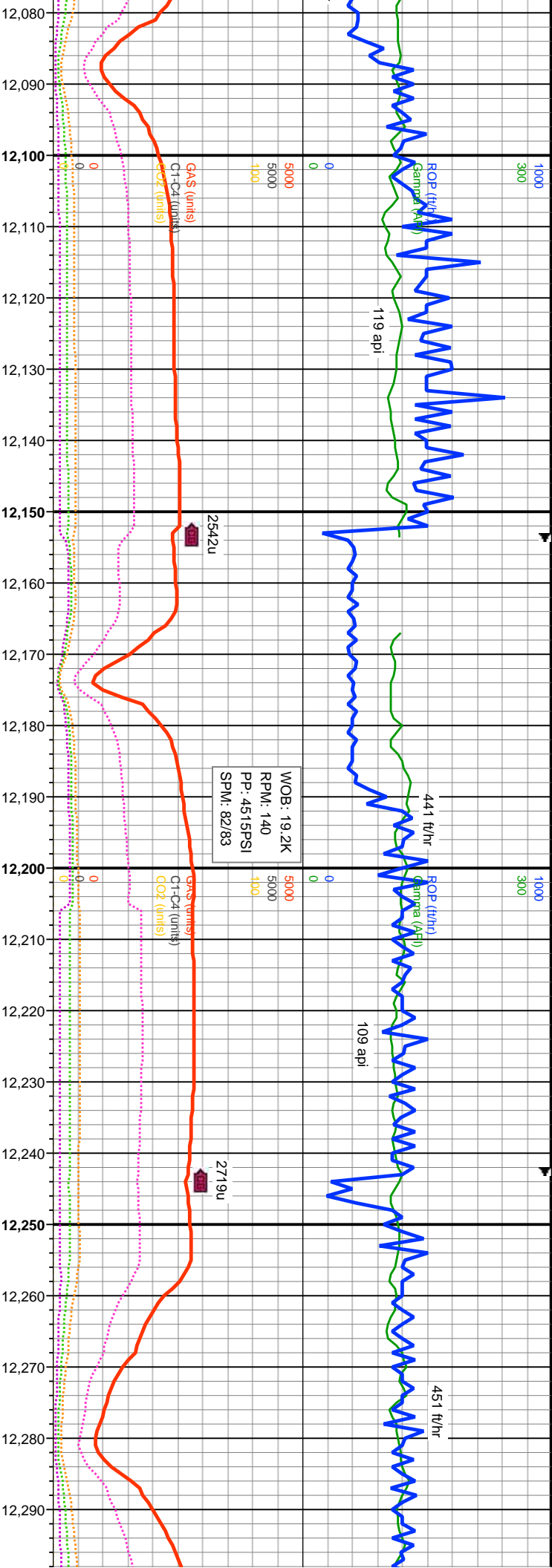












MD: 12,126'  
INC: 90°  
AZM: 173.86°  
TVD: 7,688.64'  
VS: 5,709.44'

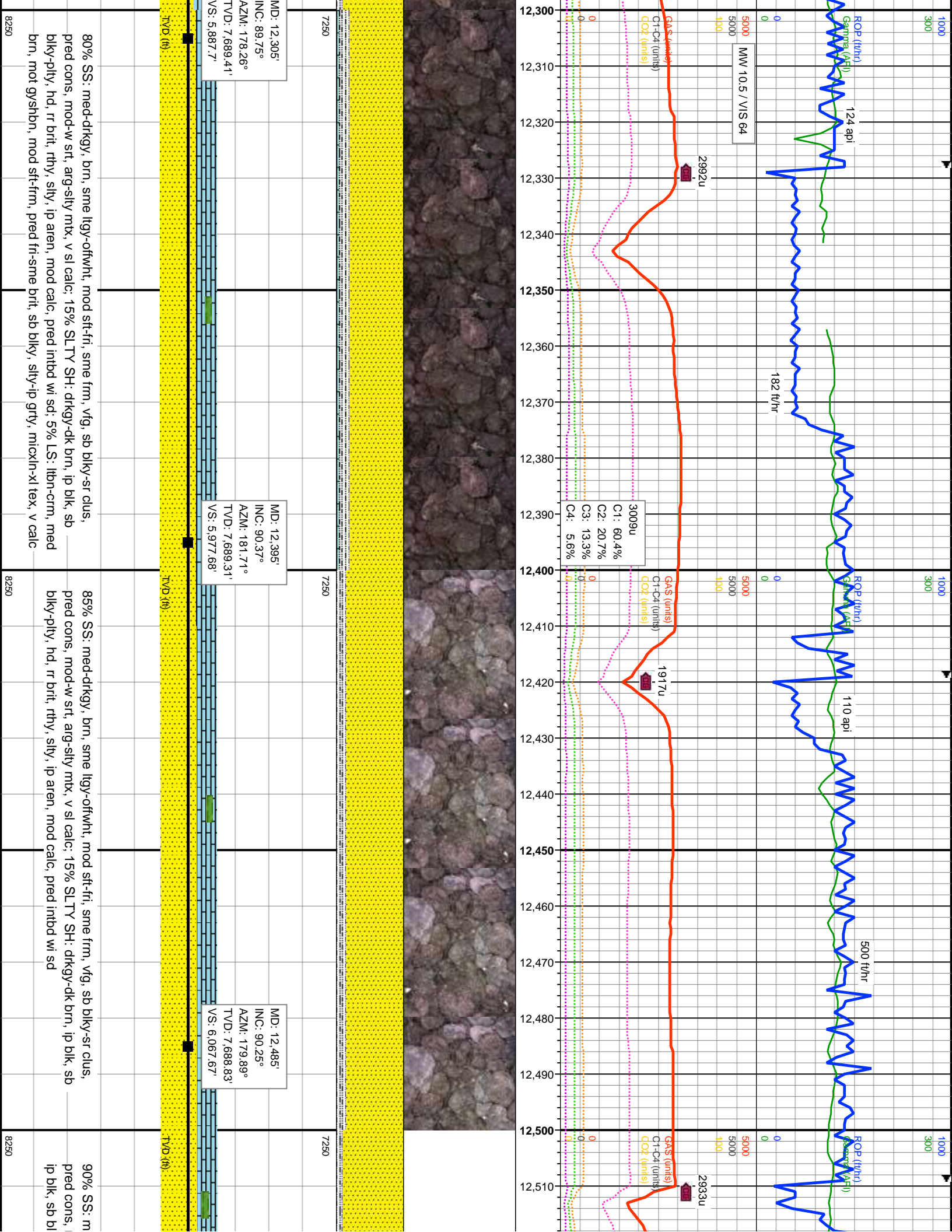
MD: 12,216'  
INC: 89.63°  
AZM: 174.46°  
TVD: 7,688.93'  
VS: 5,798.92'

ons, mod srt, k, sb blkly-pty, crm, med brn, -xl tex, v calc

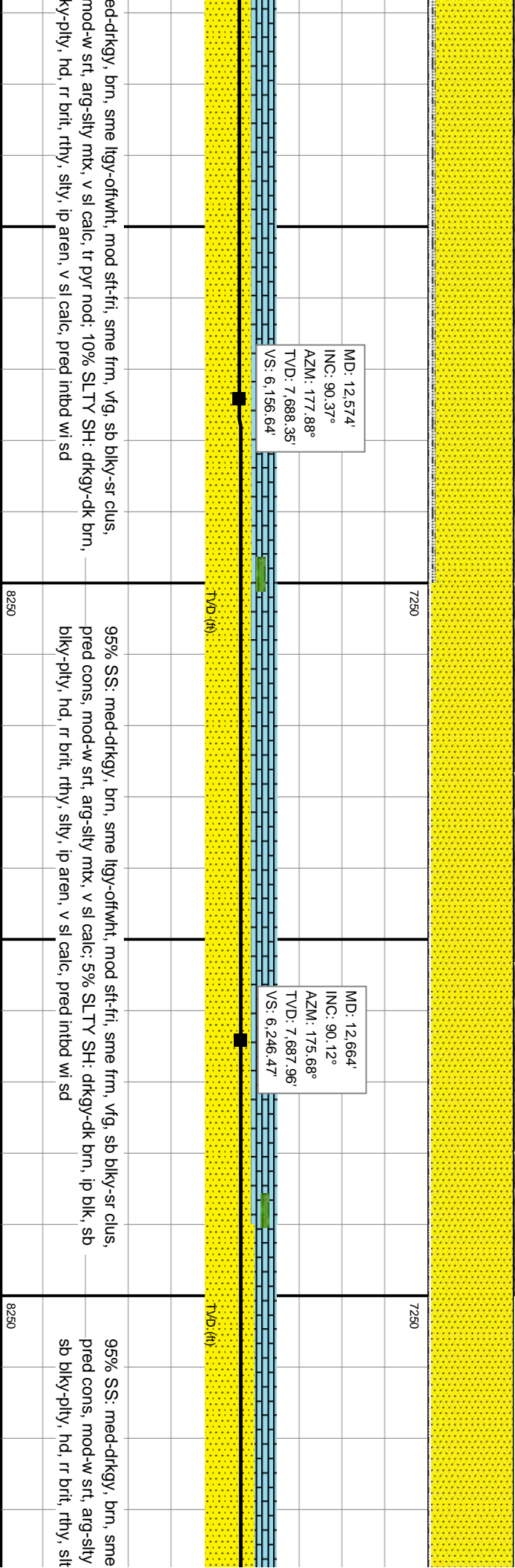
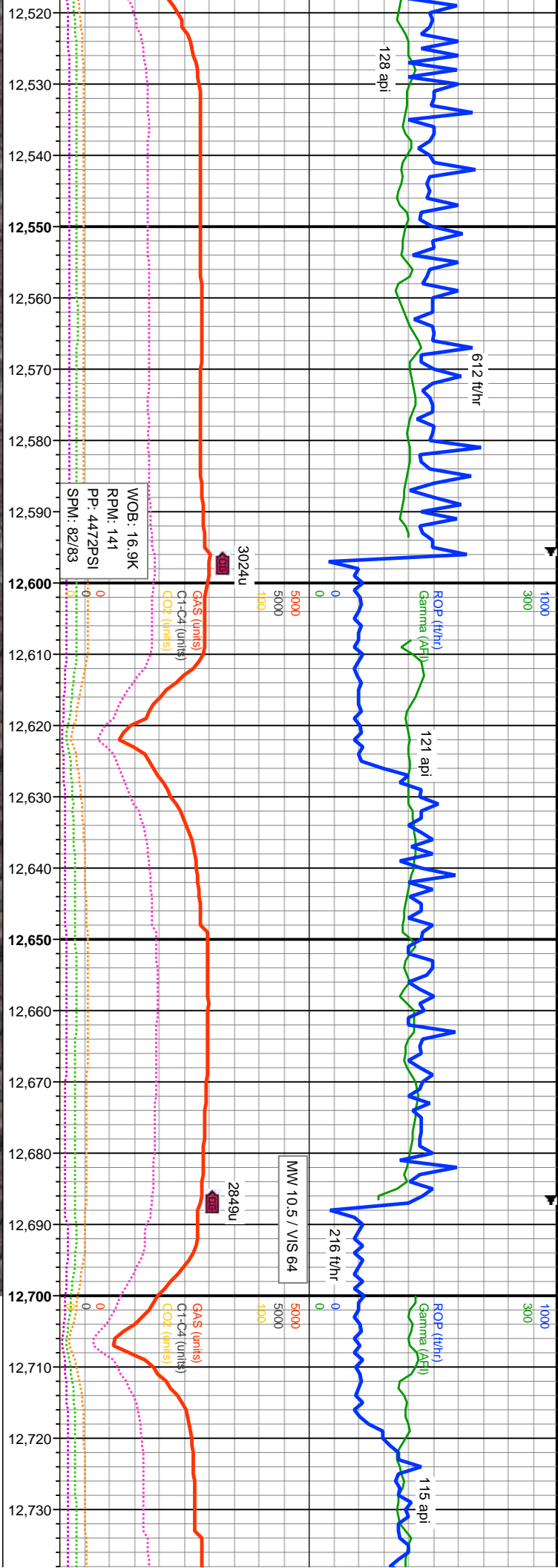
80% SS: med-drkgy, brn, mod sft-frt, sme frm, vfg, sb blkly-sr clus, pred cons, mod srt, arg-sily mtz, sl cly rch, tr calc, tr pyr nod; 10% SLTY SH: drkgy-dk brn, ip blk, sb blkly-pty, hd, rr brit, rthy, sily, ip aren, mod calc, pred inbd wi sd; 10% LS: libn-crm, med brn, mot gysbhn, mod sft-frm, pred fr-sme brit, sb blkly, sily-ip grty, micxn-xl tex, v calc

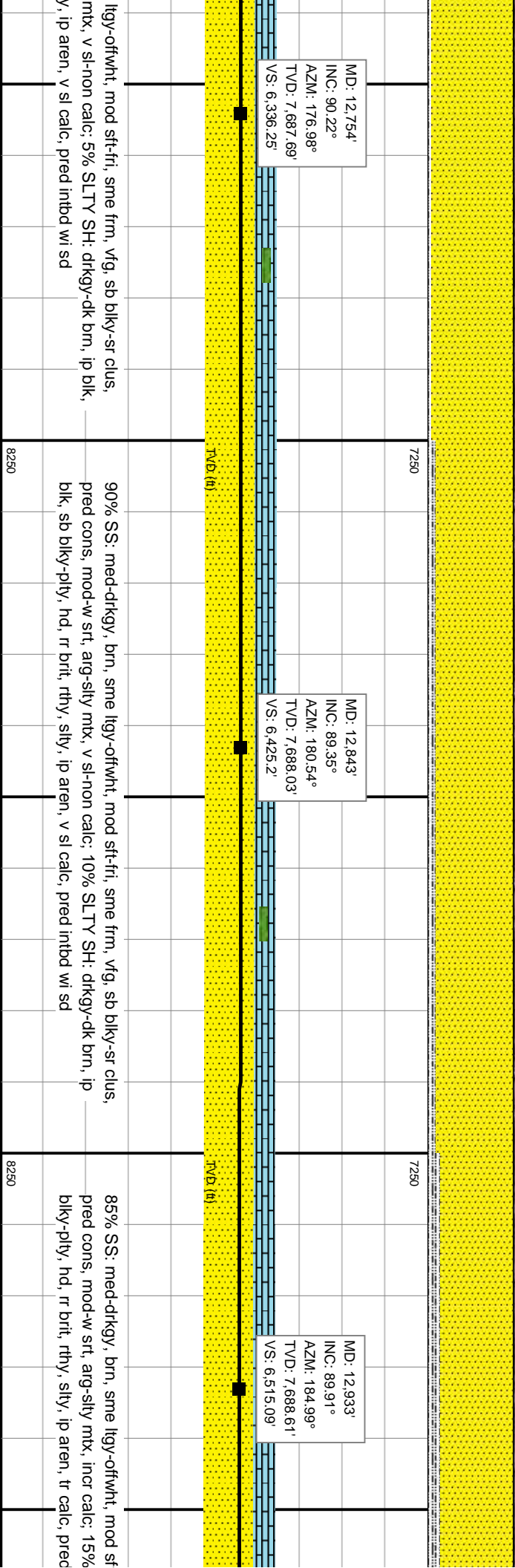
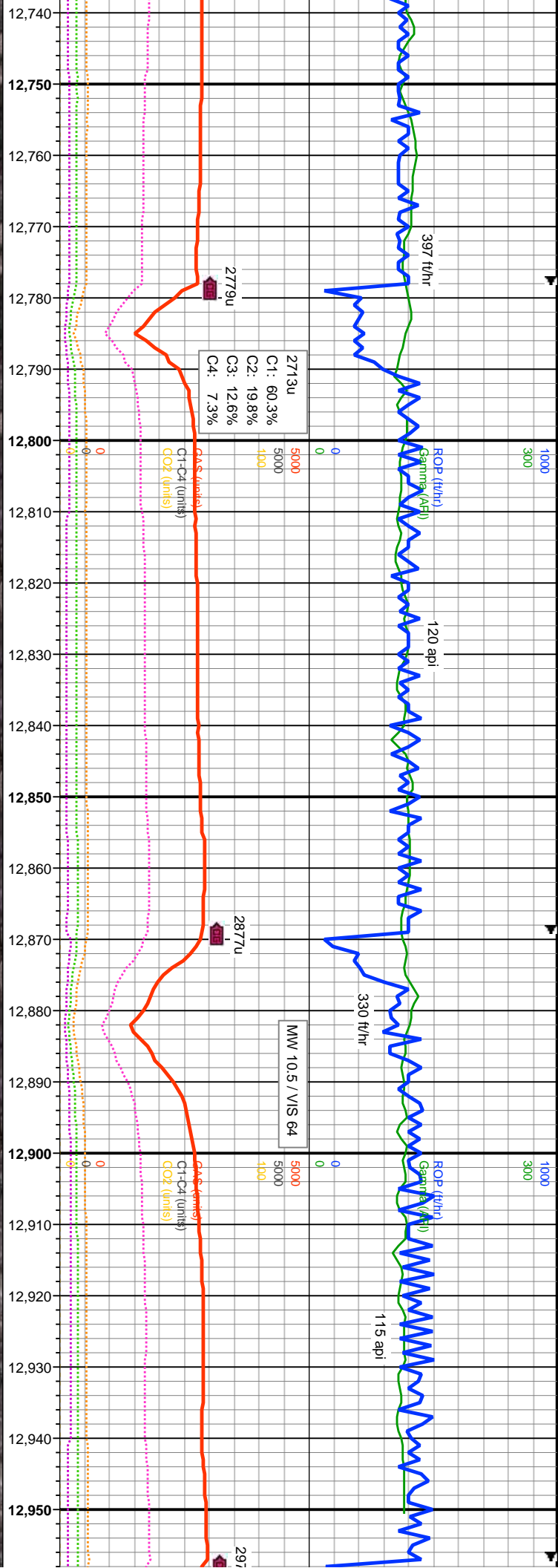
90% SS: med-drkgy, brn, sme lgy-offwht, mod sft-frt, sme frm, vfg, sb blkly-sr clus, pred cons, mod-w srt, arg-sily mtz, v sl calc, rr LS; 10% SLTY SH: drkgy-dk brn, sb blkly-ip pty, hd, rr brit, rthy, sily-aren, sl calc, pred inbd wi sd



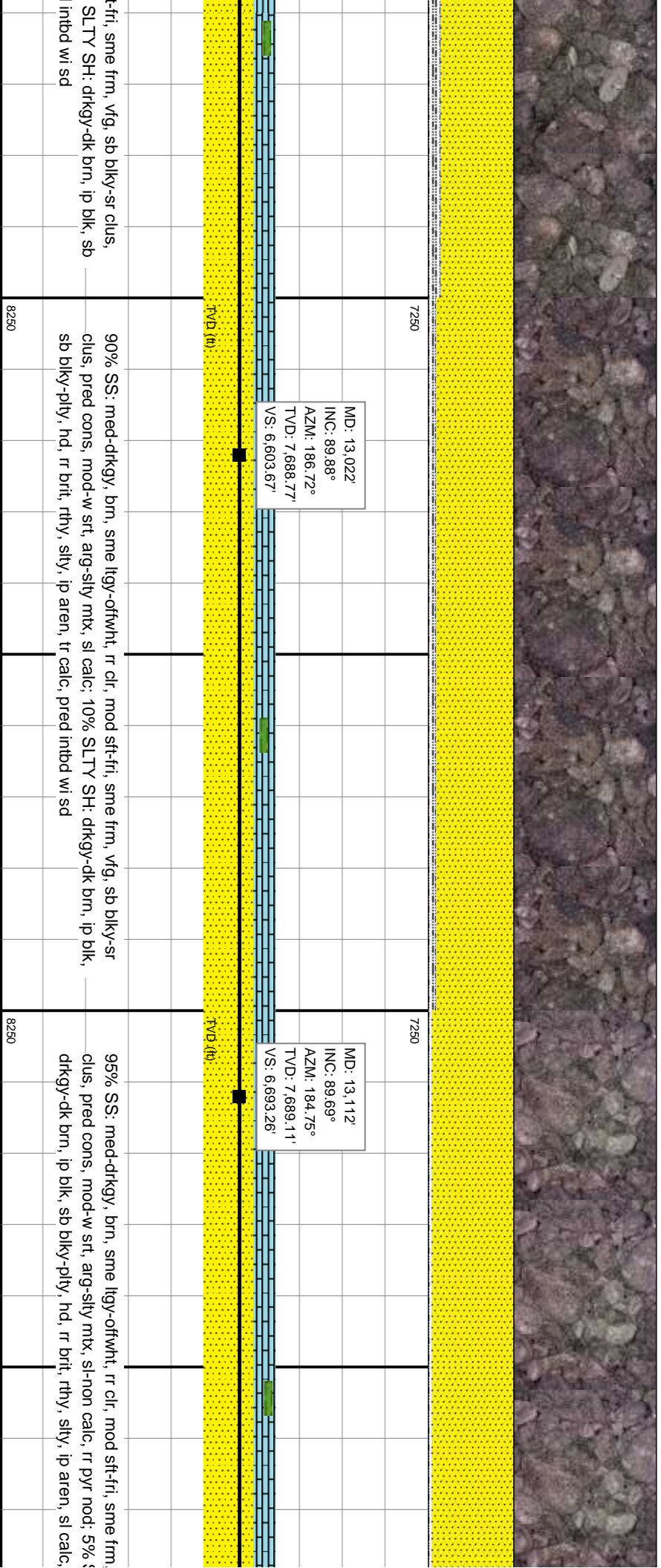
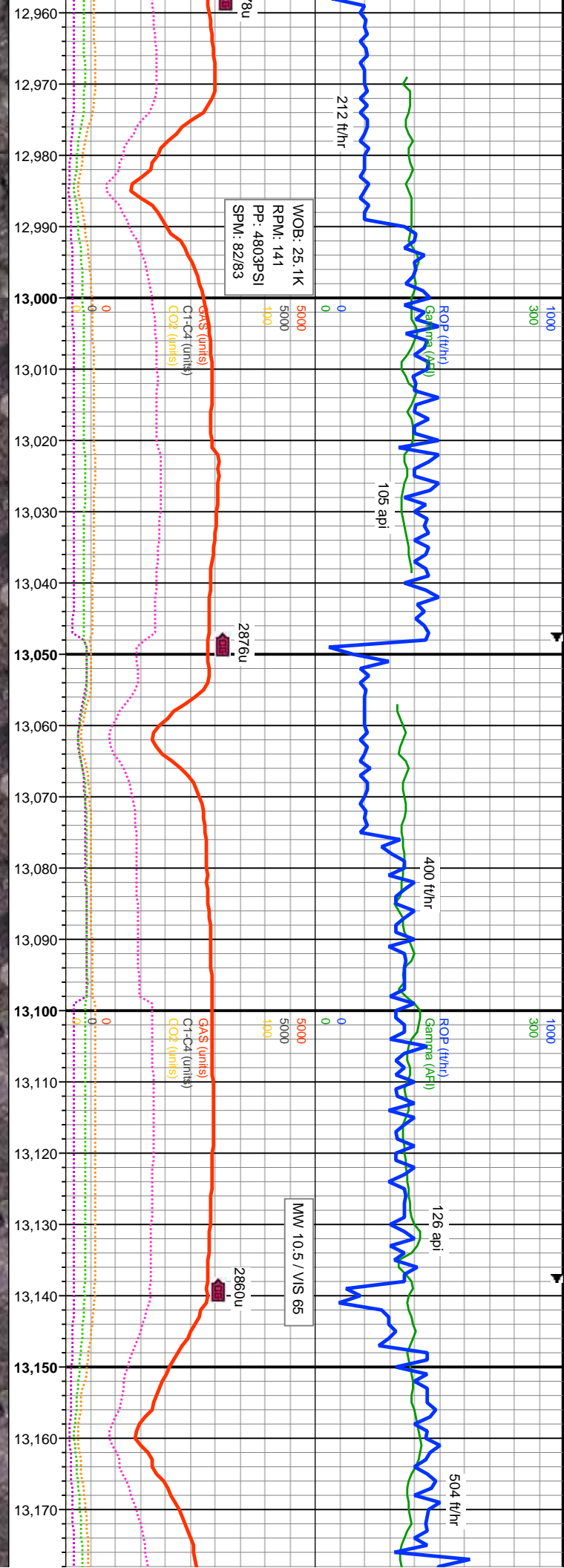


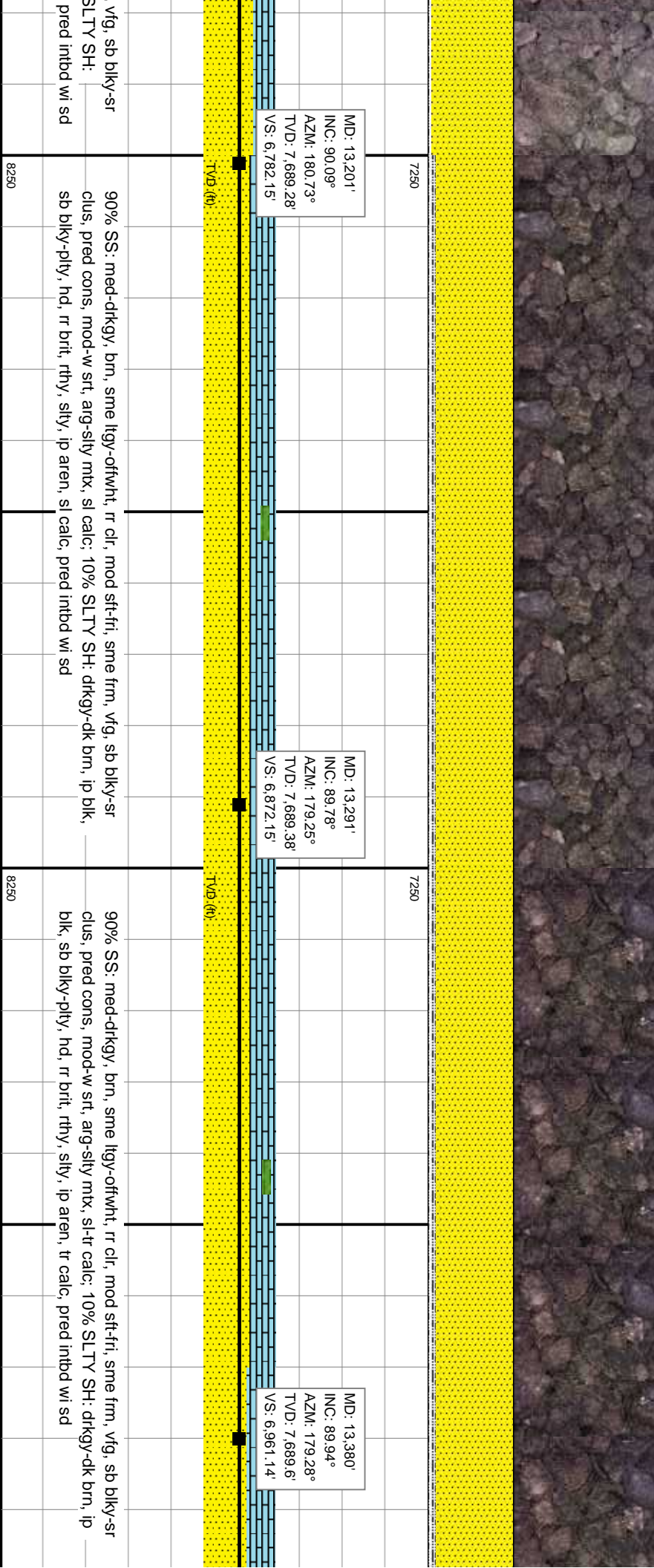
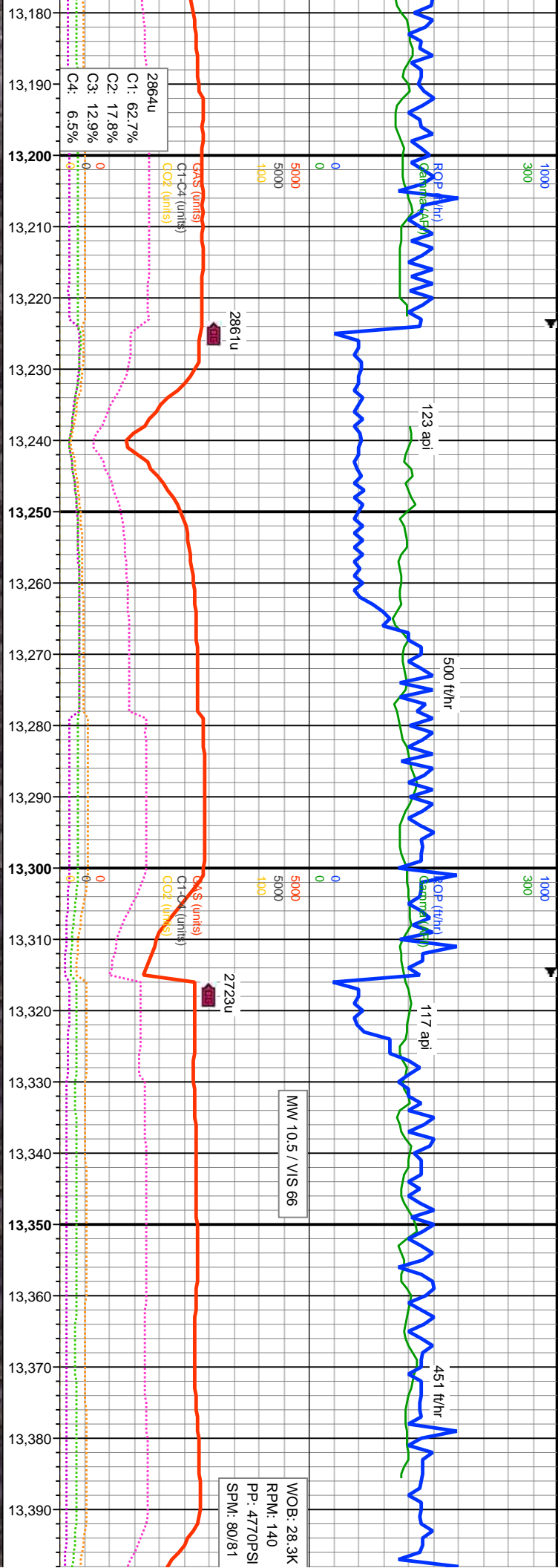












MD: 13,201'  
INC: 90.09°  
AZM: 180.73°  
TVD: 7,689.28'  
VS: 6,782.15'

MD: 13,291'  
INC: 89.78°  
AZM: 179.25°  
TVD: 7,689.38'  
VS: 6,872.15'

MD: 13,380'  
INC: 89.94°  
AZM: 179.28°  
TVD: 7,689.6'  
VS: 6,961.14'

TVD (ft)

TVD (ft)

vfg, sb blkly-sr  
SLTY SH:  
pred intbd wi sd

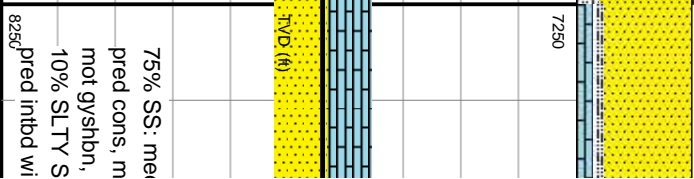
90% SS: med-dkgy, brn, sme ltgy-offwht, rr clr, mod sft-fri, sme frm, vfg, sb blkly-sr  
clus, pred cons, mod-w srt, arg-sily mx, sl calc, 10% SLTY SH: dkgy-dk brn, ip blk,  
sb blkly-pty, hd, rr brit, rthy, sily, ip aren, sl calc, pred intbd wi sd

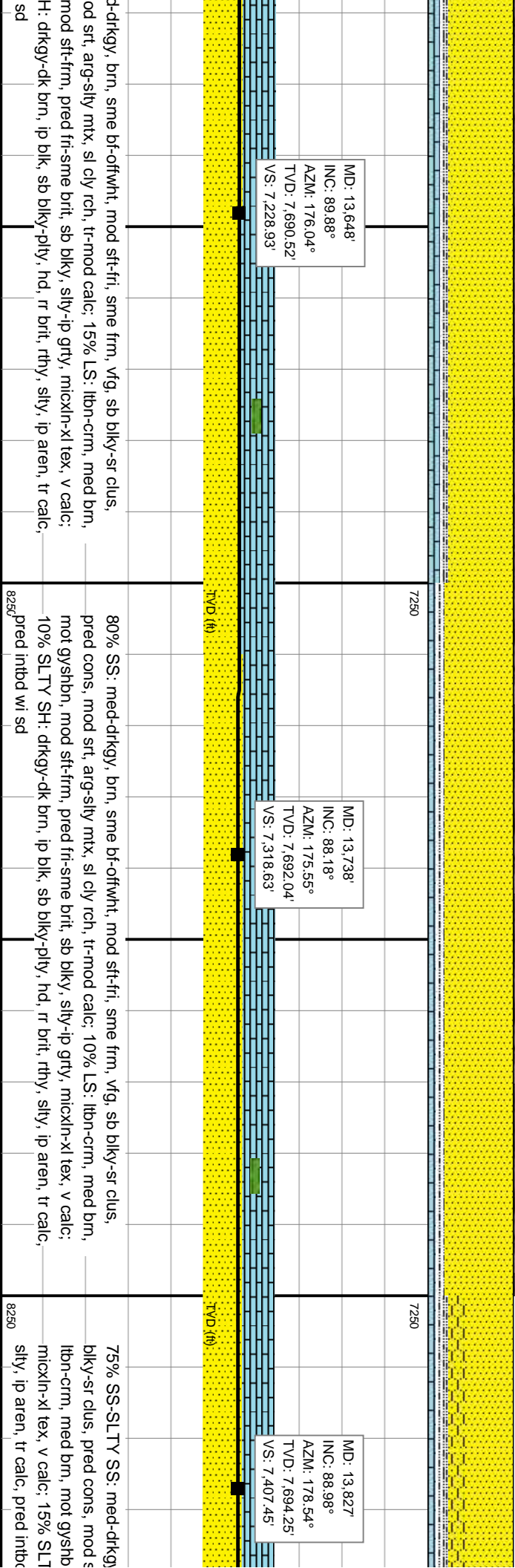
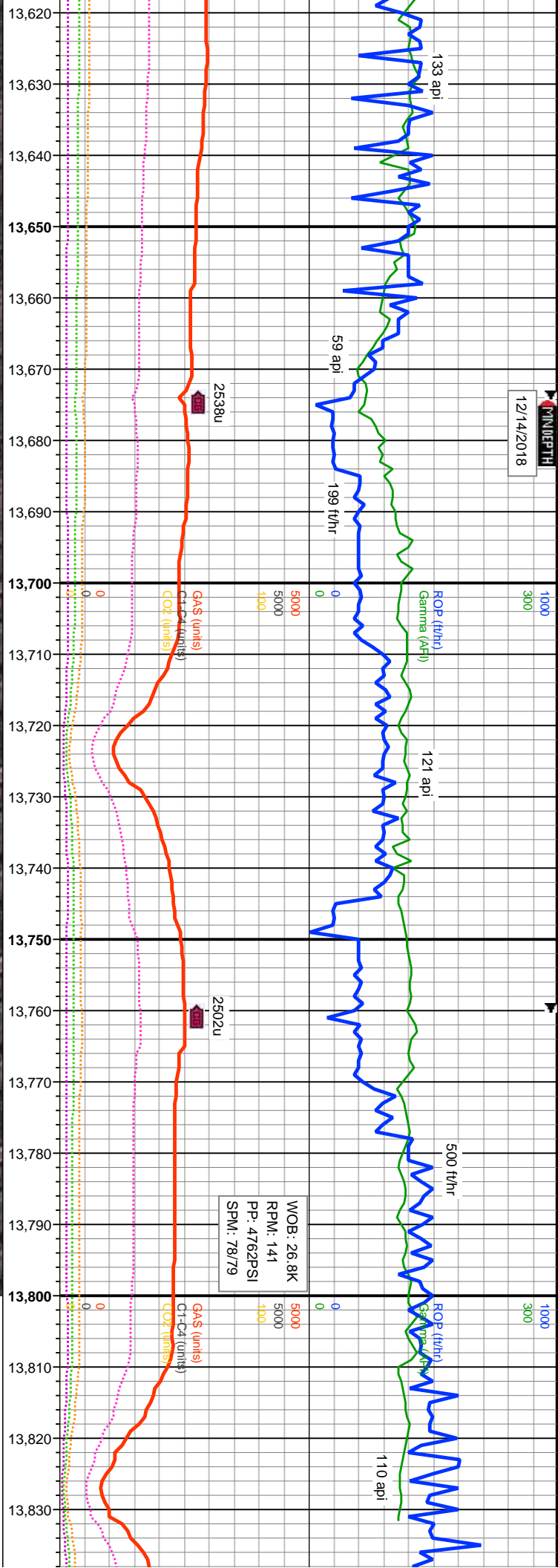
90% SS: med-dkgy, brn, sme ltgy-offwht, rr clr, mod sft-fri, sme frm, vfg, sb blkly-sr  
clus, pred cons, mod-w srt, arg-sily mx, sl-tr calc, 10% SLTY SH: dkgy-dk brn, ip  
blk, sb blkly-pty, hd, rr brit, rthy, sily, ip aren, tr calc, pred intbd wi sd

8250

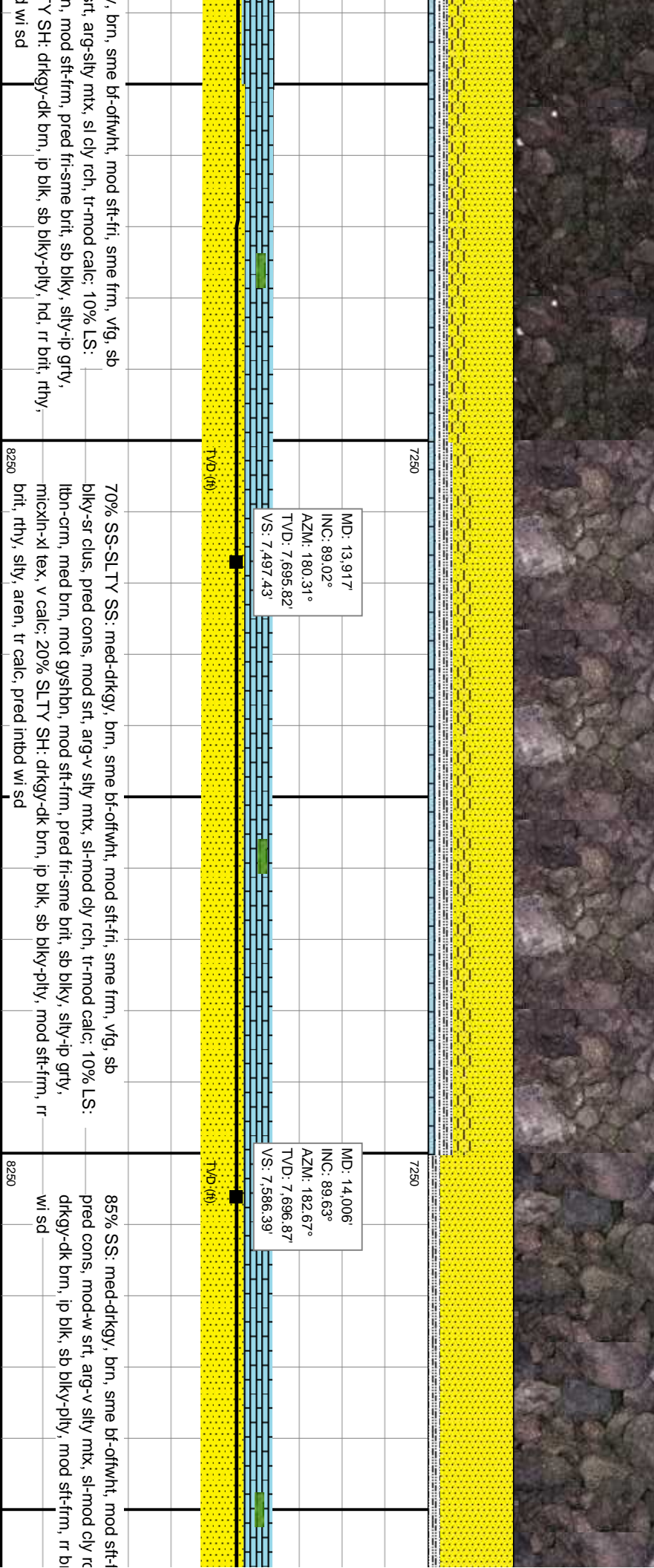
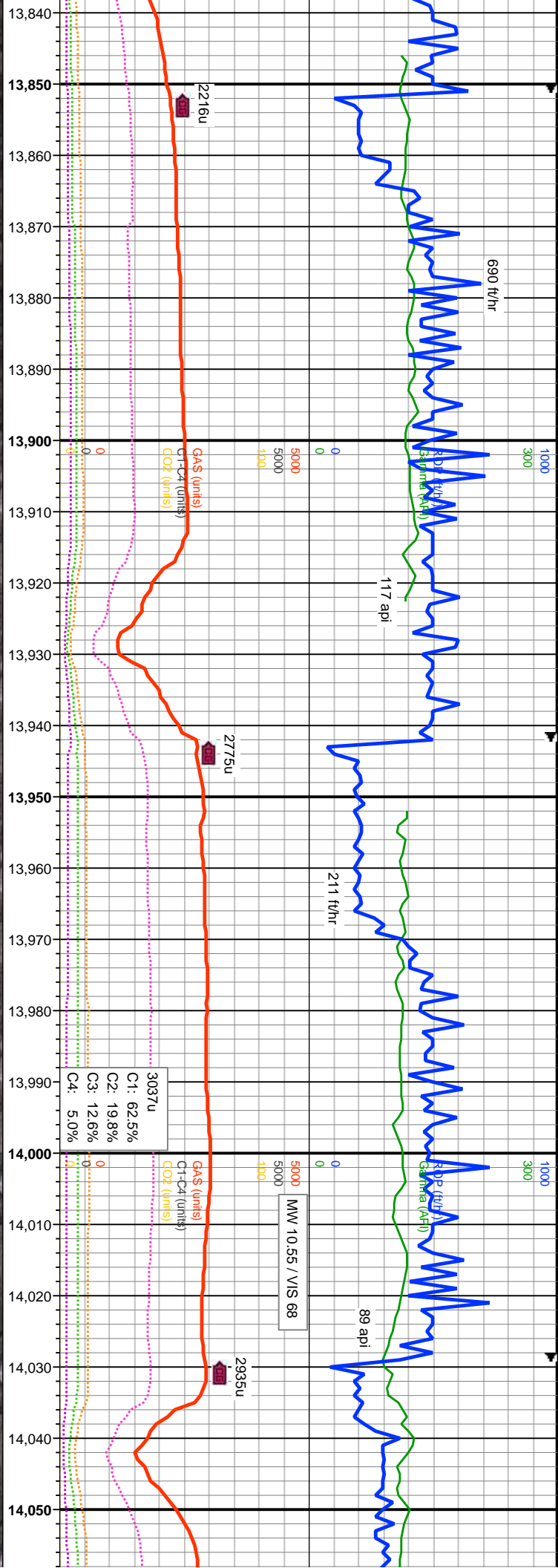
8250





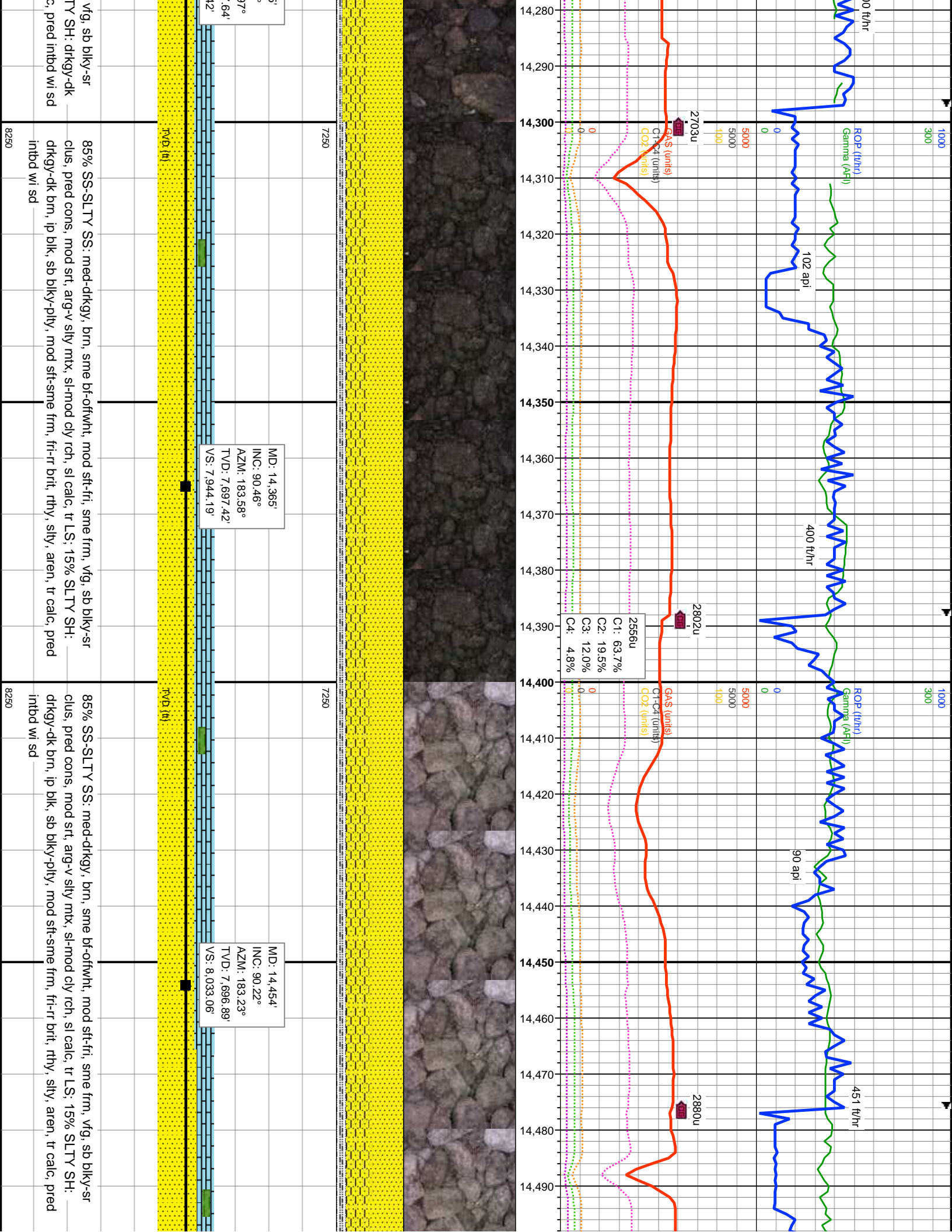


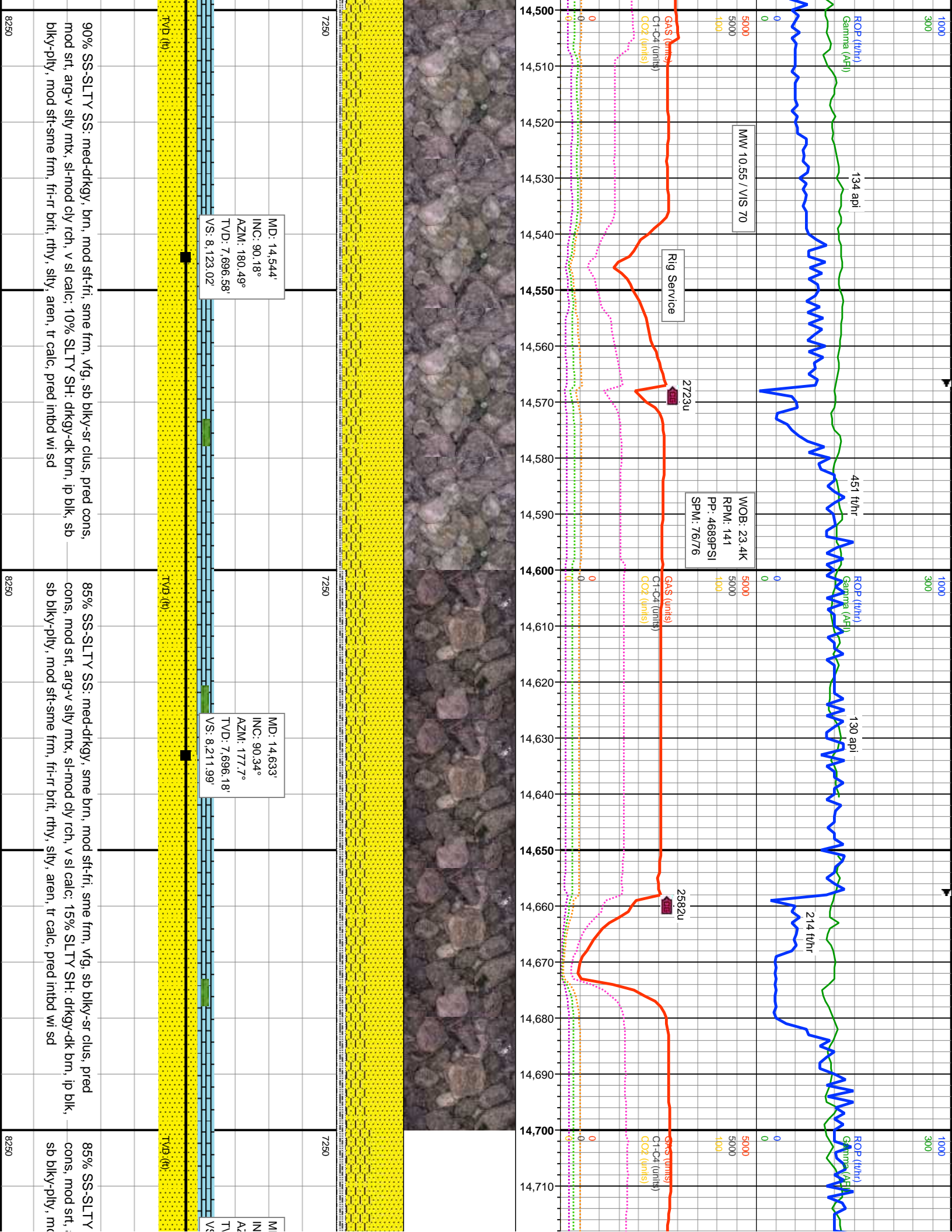




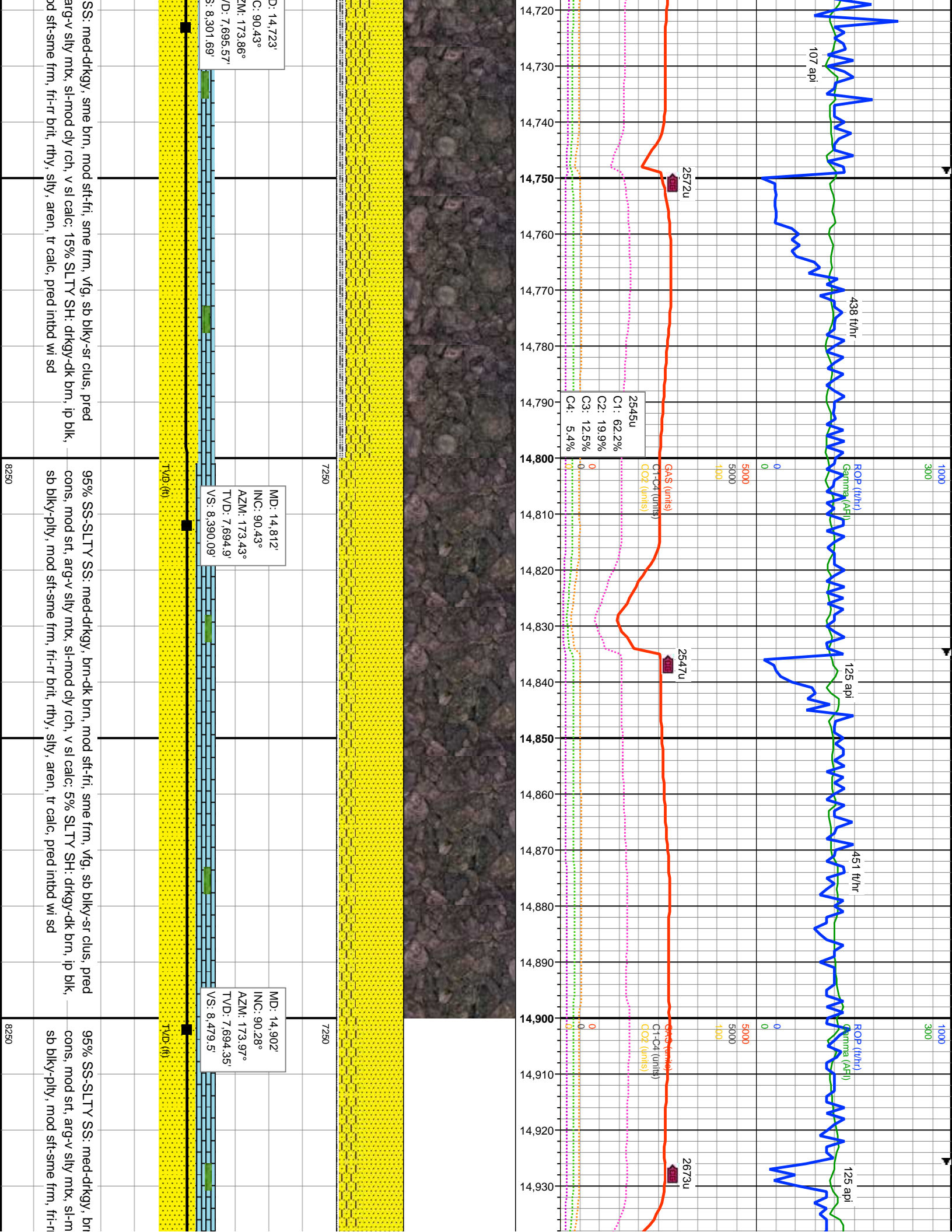


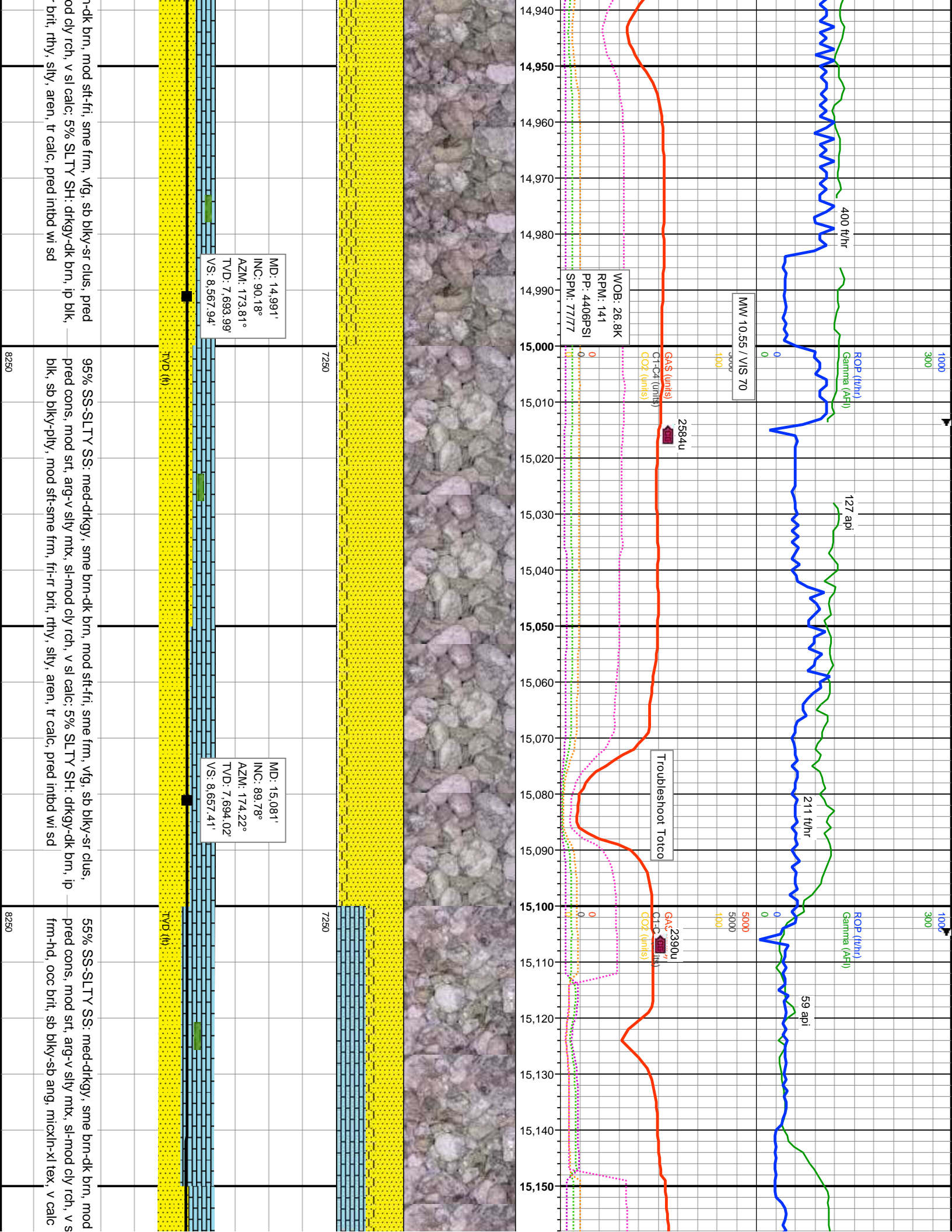




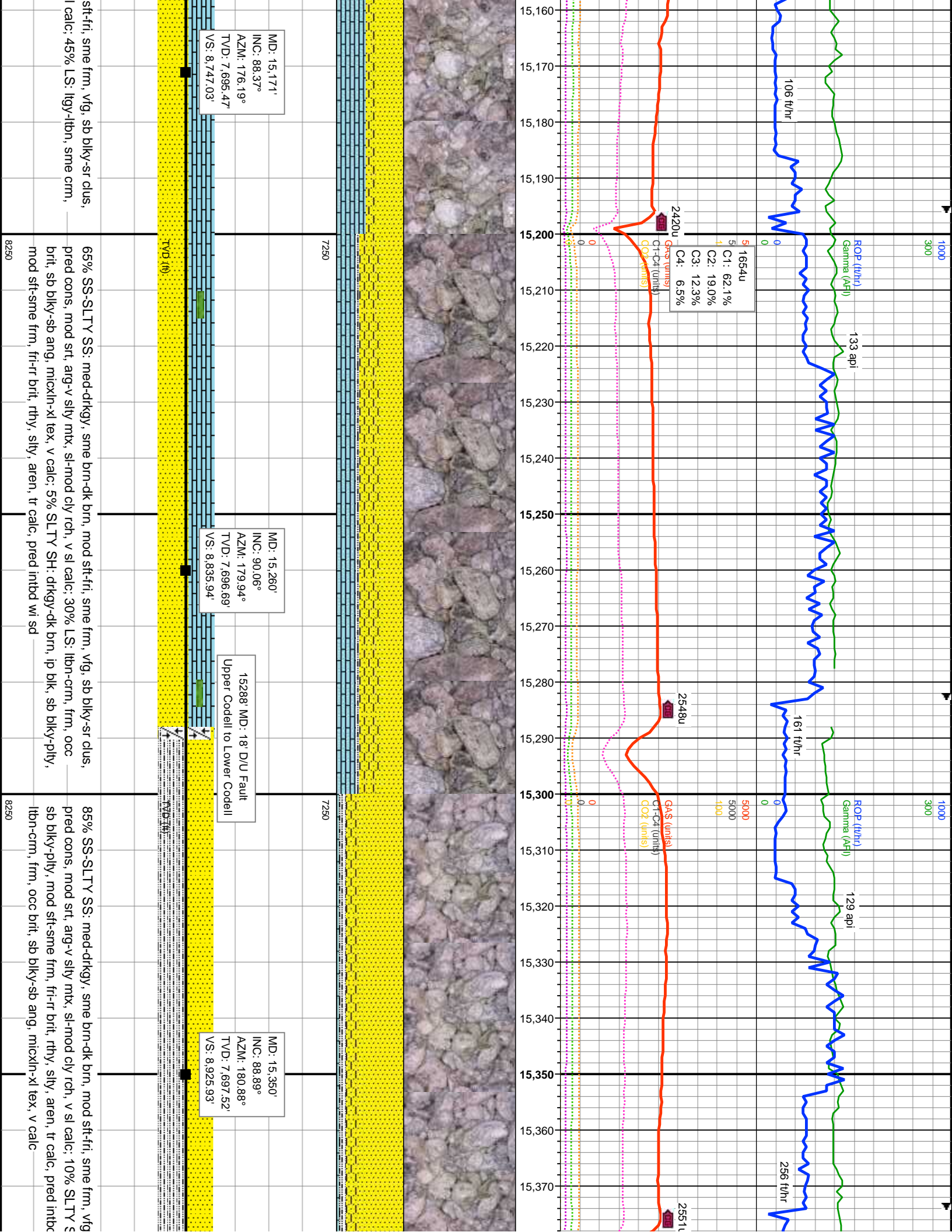


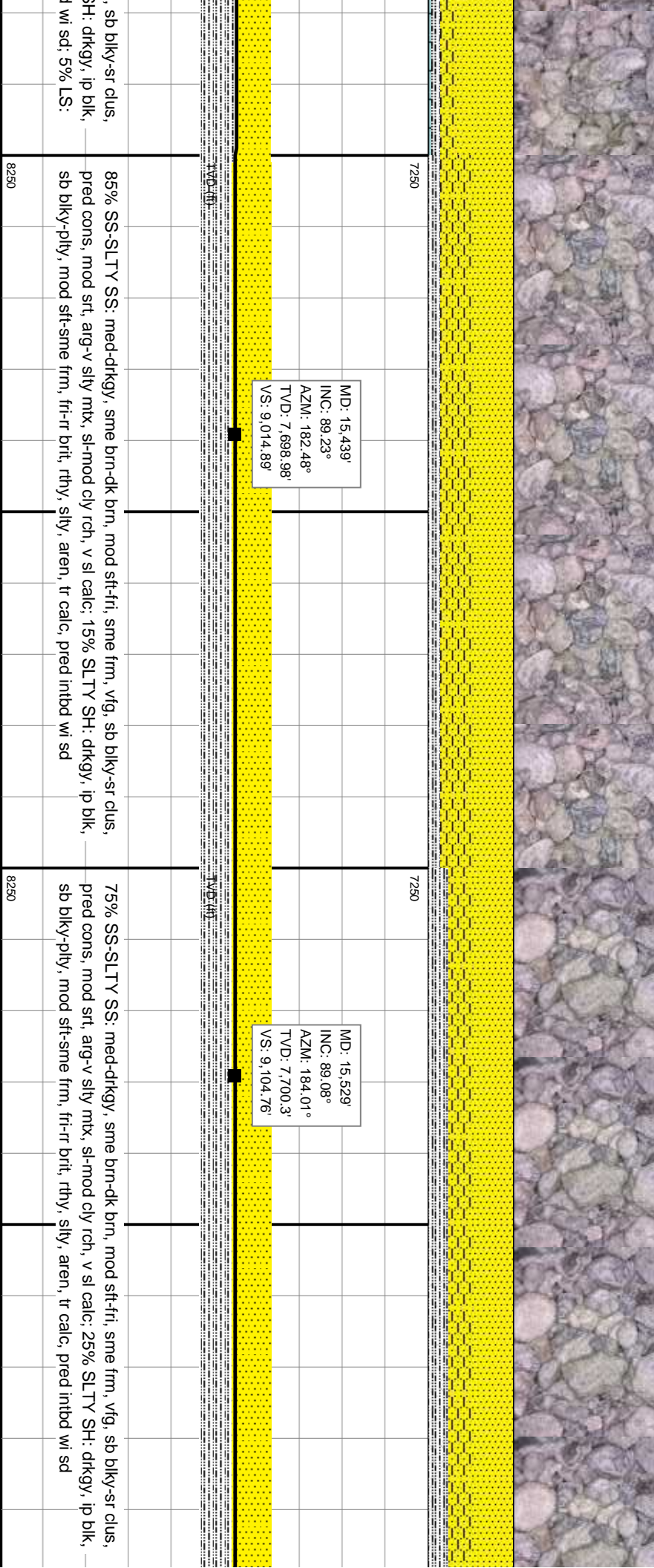
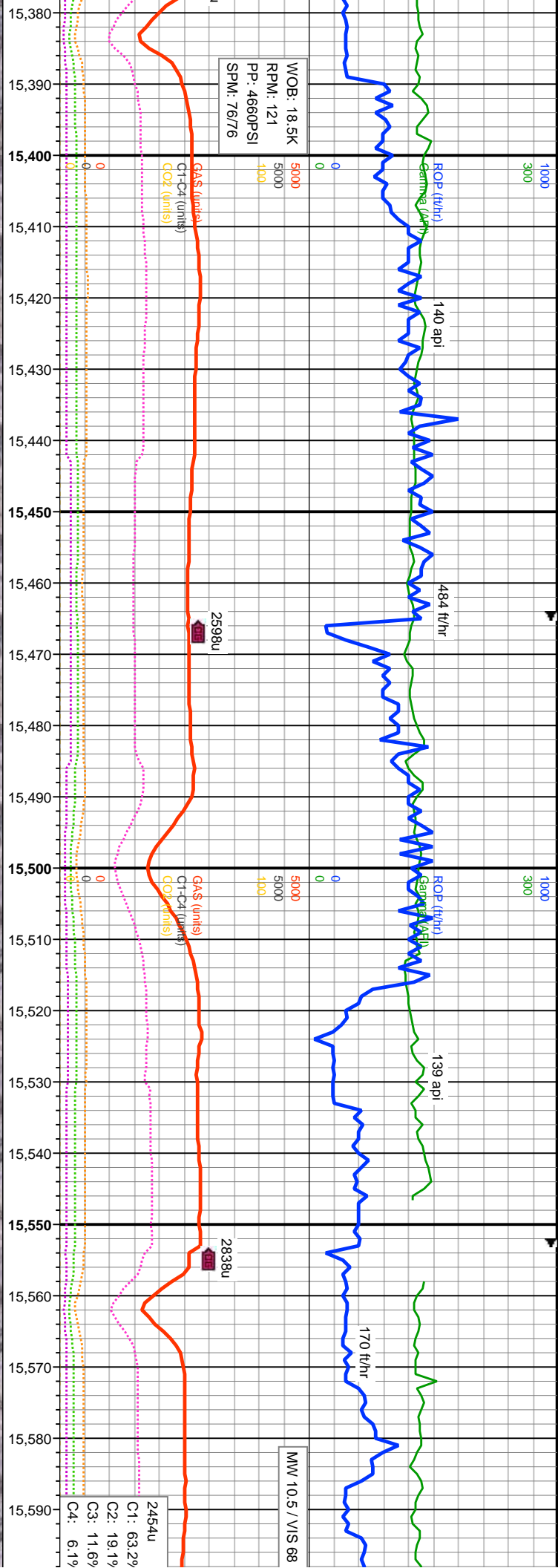




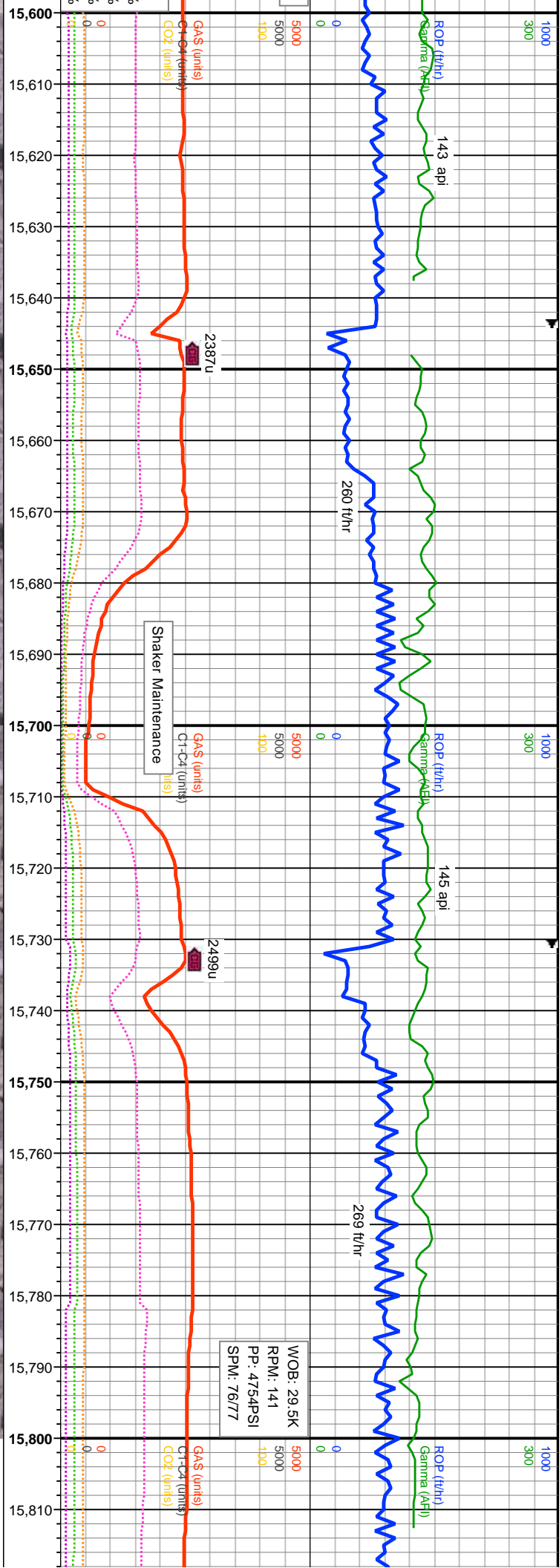




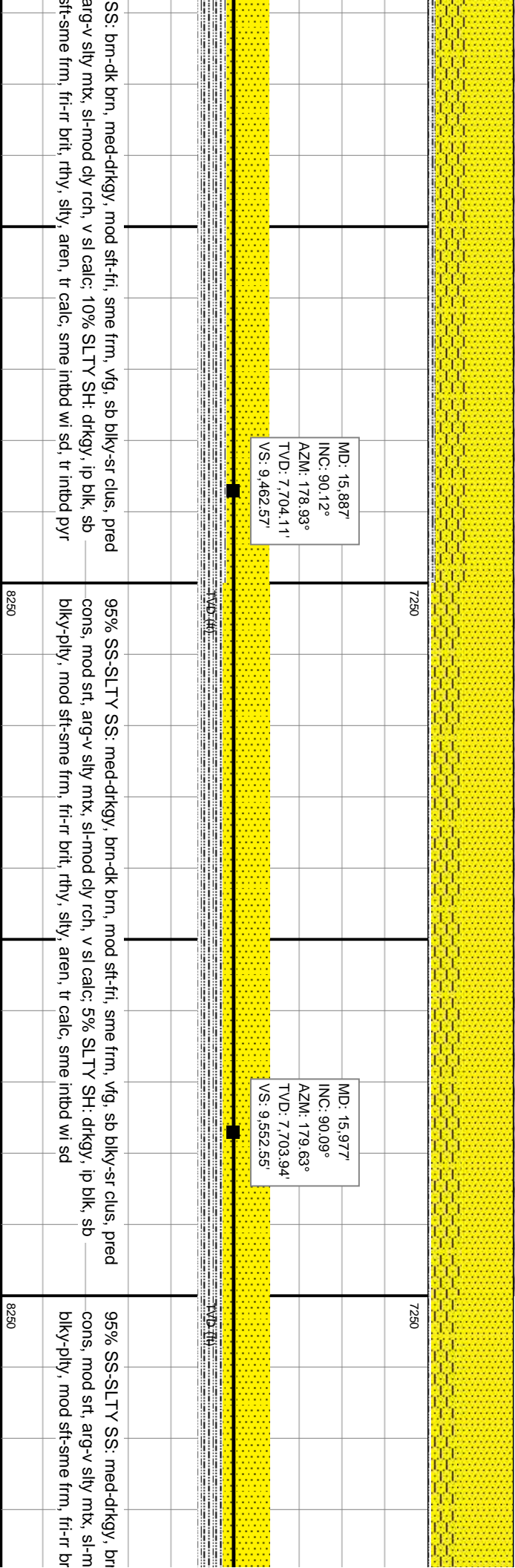
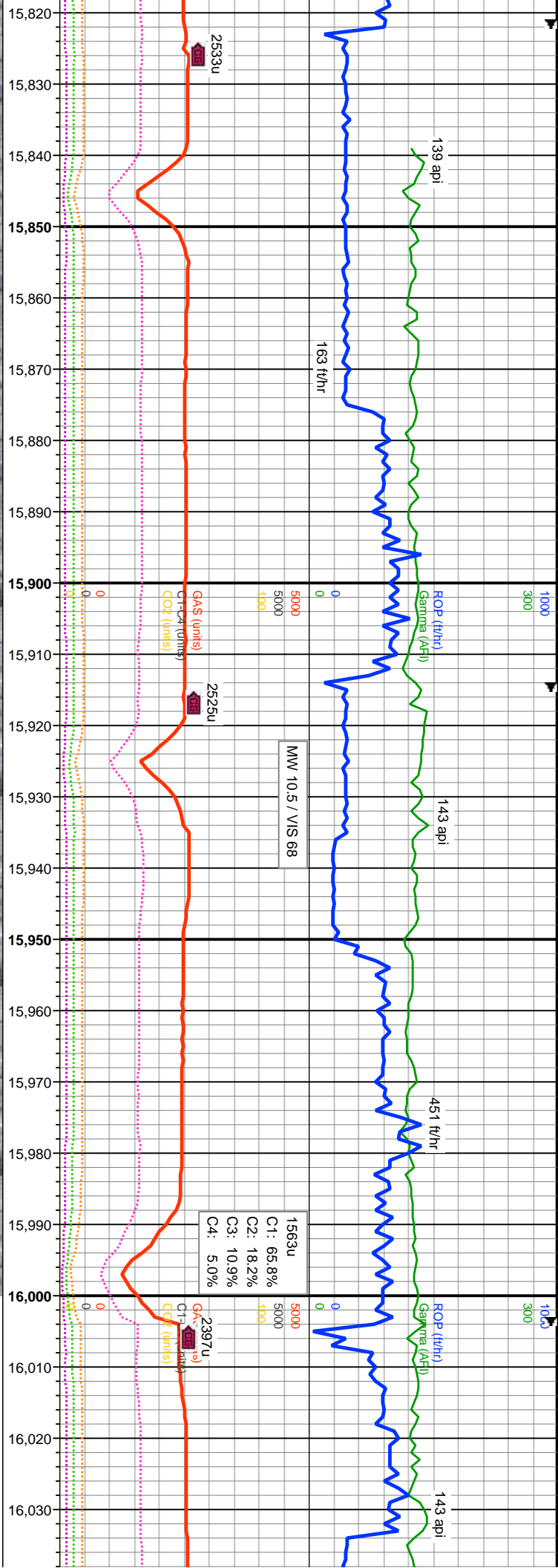








<p>MD: 15,619' INC: 89.23° AZM: 182.39° TVD: 7,701.63' VS: 9,194.63'</p>	<p>MD: 15,708' INC: 89.54° AZM: 180.74° TVD: 7,702.59' VS: 9,283.6'</p>	<p>MD: 15,798' INC: 89.2° AZM: 179.13° TVD: 7,703.58' VS: 9,373.59'</p>
<p>85% SS-SLTy SS: med-dkgy, sme brn-dk brn, mod sft-fri, sme frm, vfg, sb blk-sr clus, pred cons, mod srt, arg-v silty mtx, sl-mod cly rch, v sl calc; 15% SLTY SH: dkgy, ip blk, sb blk-pty, mod sft-sme frm, fri-r brt, rthy, silty, aren, tr calc, pred intbd wi sd</p>	<p>95% SS-SLTy SS: brn-dk brn, med-dkgy, mod sft-fri, sme frm, vfg, sb blk-sr clus, pred cons, mod srt, arg-v silty mtx, sl-mod cly rch, v sl calc; 5% SLTY SH: dkgy, ip blk, sb blk-pty, mod sft-sme frm, fri-r brt, rthy, silty, aren, tr calc, sme intbd wi sd</p>	<p>90% SS-SLTy SS: brn-dk brn, med-dkgy, mod sft-fri, sme frm, vfg, sb blk-sr clus, pred cons, mod srt, arg-v silty mtx, sl-mod cly rch, v sl calc; 5% SLTY SH: dkgy, ip blk, sb blk-pty, mod sft-sme frm, fri-r brt, rthy, silty, aren, tr calc, sme intbd wi sd</p>

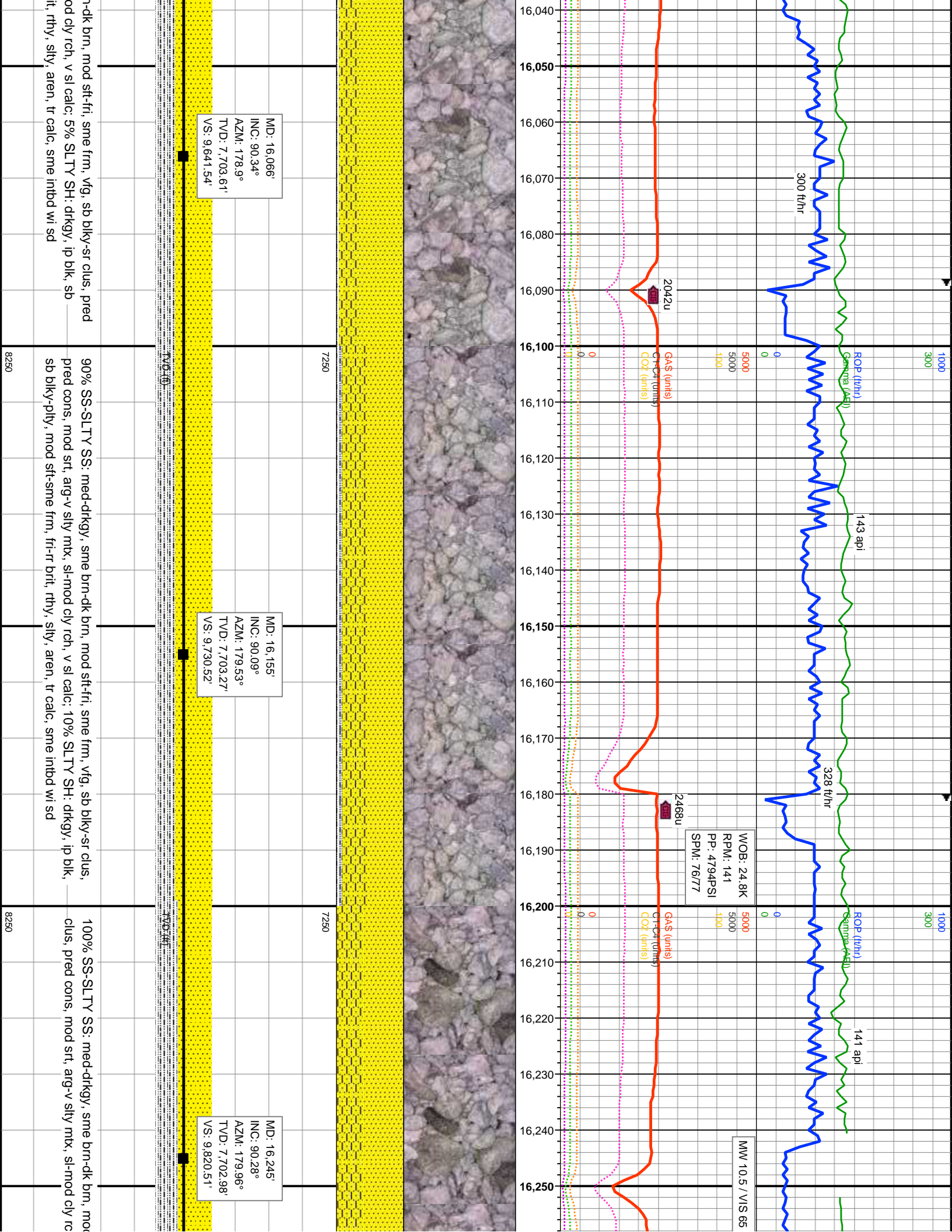


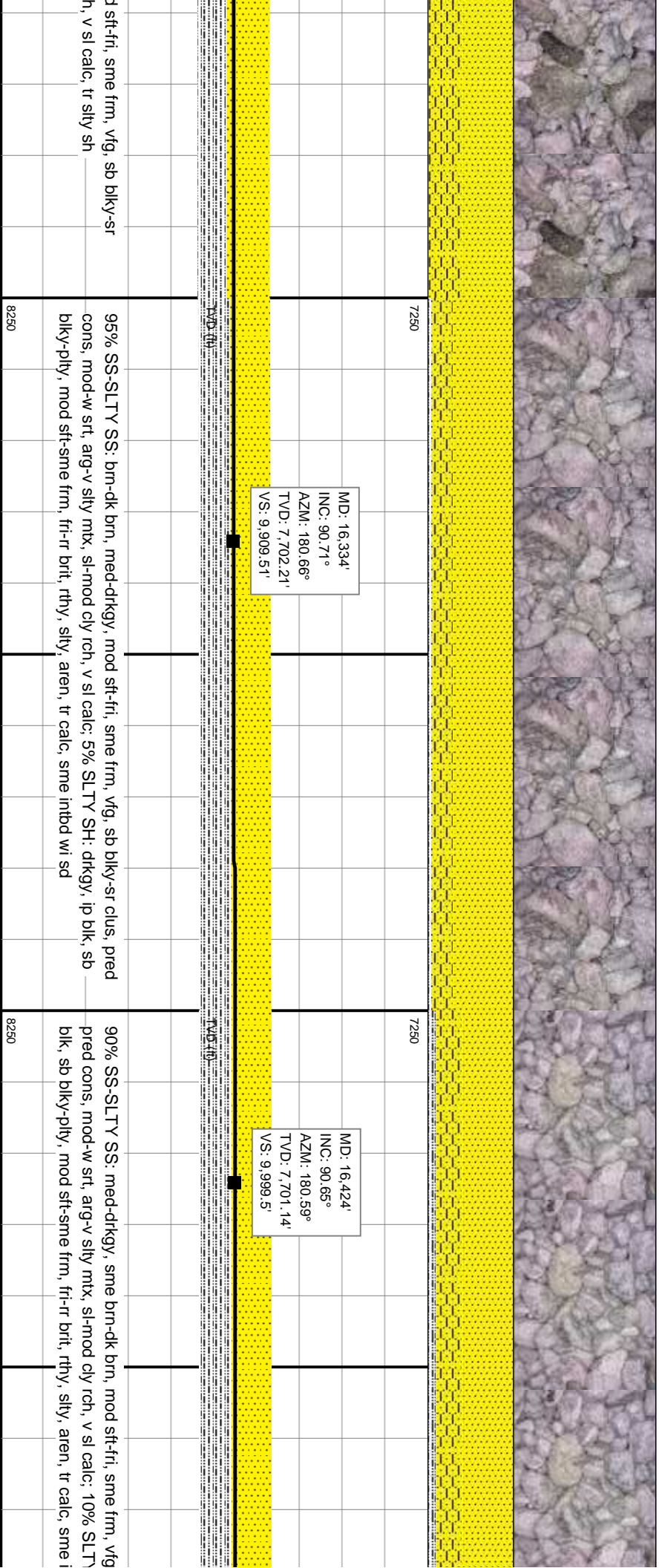
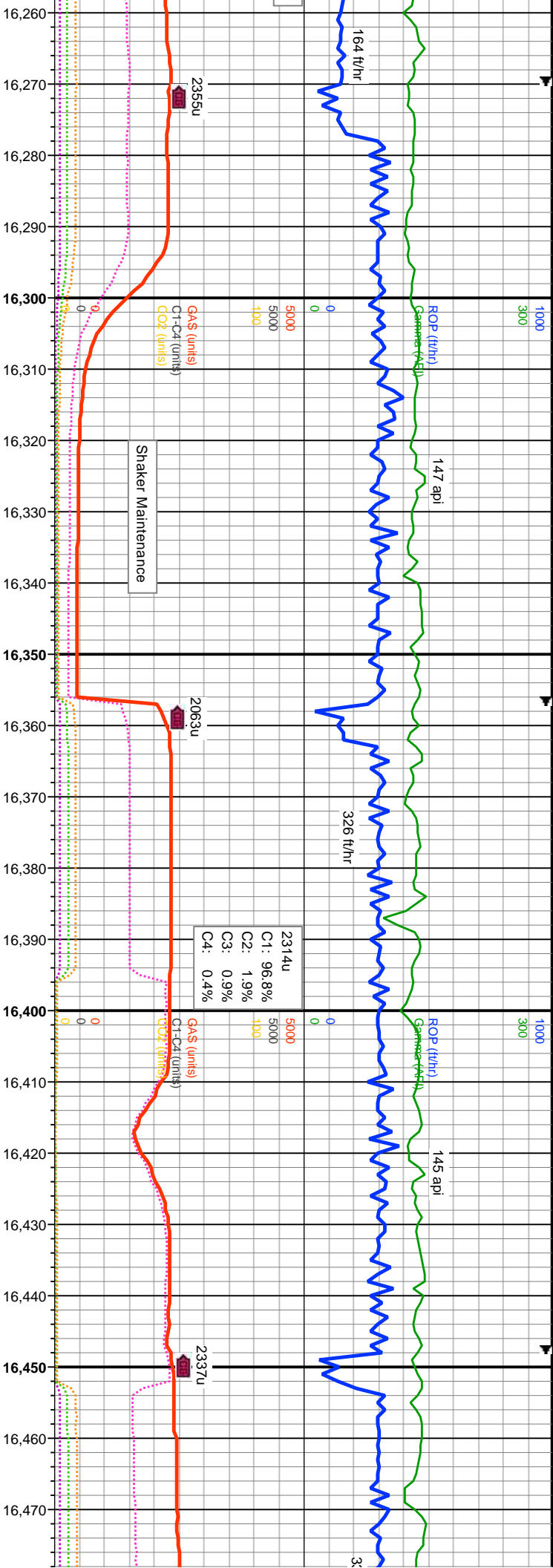
SS: brn-dk brn, med-dkgy, mod sft-fri, sme frm, vfg, sb blk-sr clus, pred  
arg-v slty mtb, sl-mod cly rch, v sl calc; 10% SLTY SH: drkgy, ip blk, sb  
sft-sme frm, fri-r brt, rhy, slty, aren, tr calc, sme intbd wi sd, tr intbd pyr

95% SS-SLTY SS: med-dkgy, brn-dk brn, mod sft-fri, sme frm, vfg, sb blk-sr clus, pred  
cons, mod srt, arg-v slty mtb, sl-mod cly rch, v sl calc; 5% SLTY SH: drkgy, ip blk, sb  
blk-ply, mod sft-sme frm, fri-r brt, rhy, slty, aren, tr calc, sme intbd wi sd

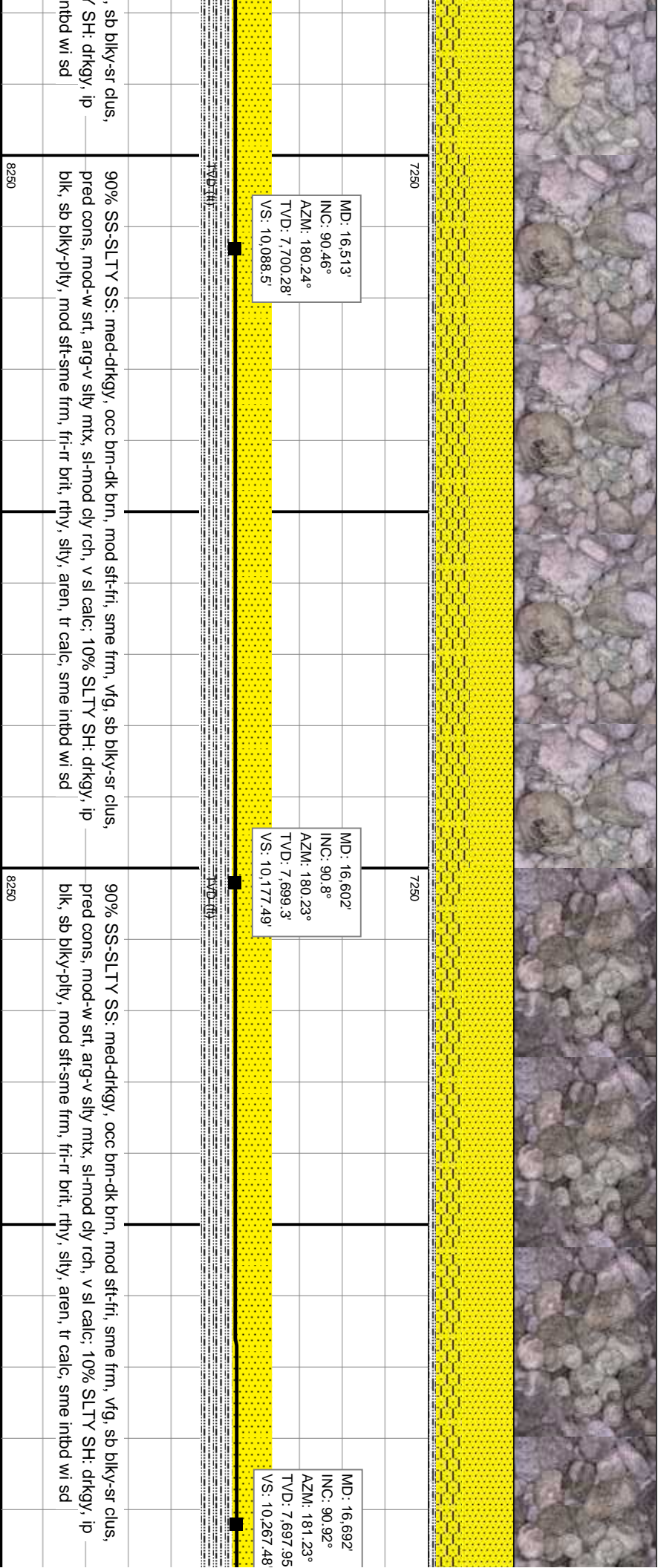
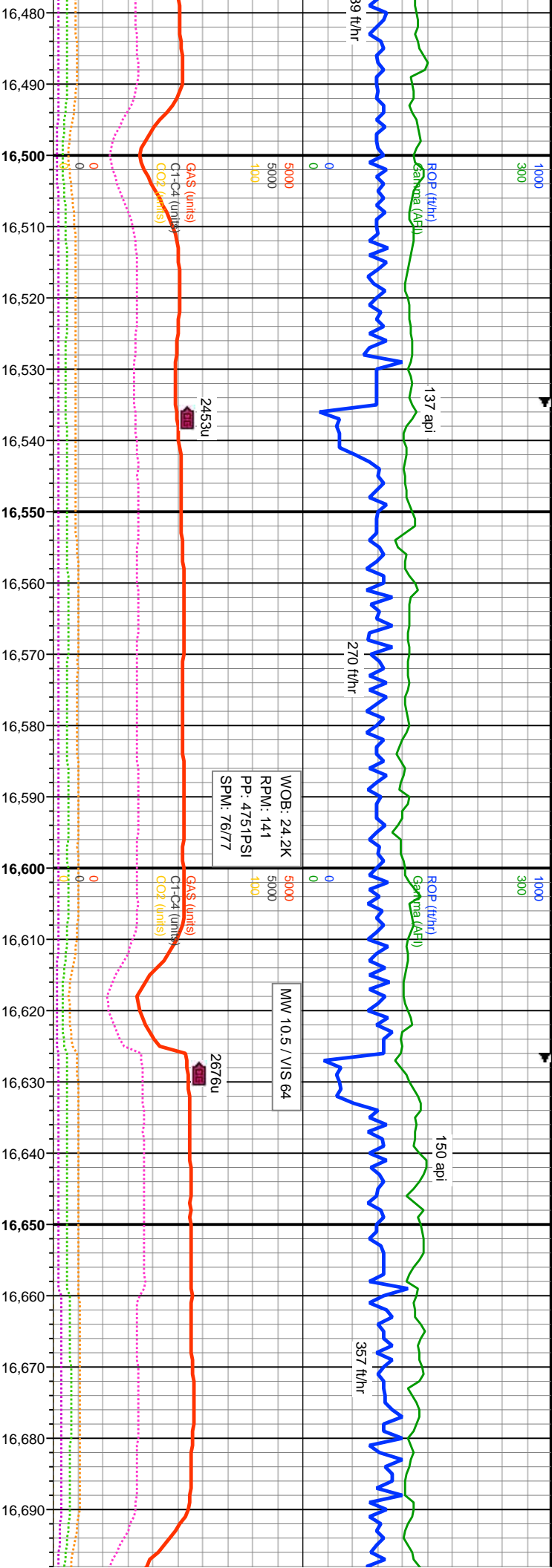
95% SS-SLTY SS: med-dkgy, brn-dk brn, mod sft-fri, sme frm, vfg, sb blk-sr clus, pred  
cons, mod srt, arg-v slty mtb, sl-mod cly rch, v sl calc; 5% SLTY SH: drkgy, ip blk, sb  
blk-ply, mod sft-sme frm, fri-r brt, rhy, slty, aren, tr calc, sme intbd wi sd

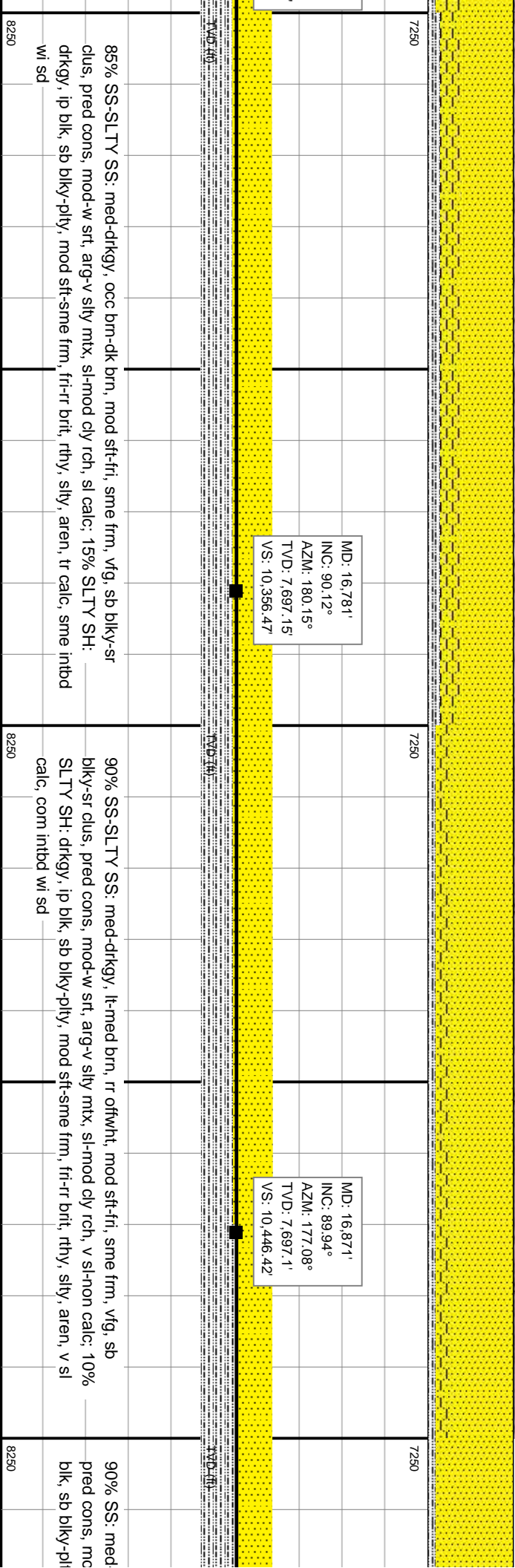
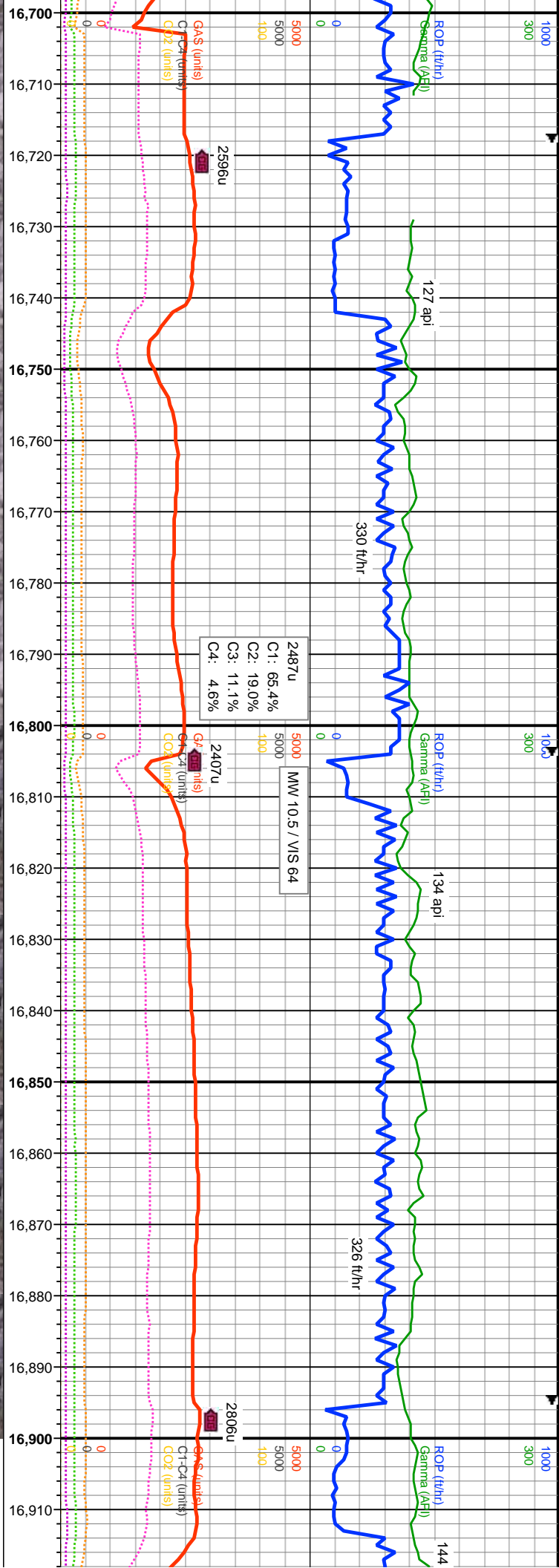




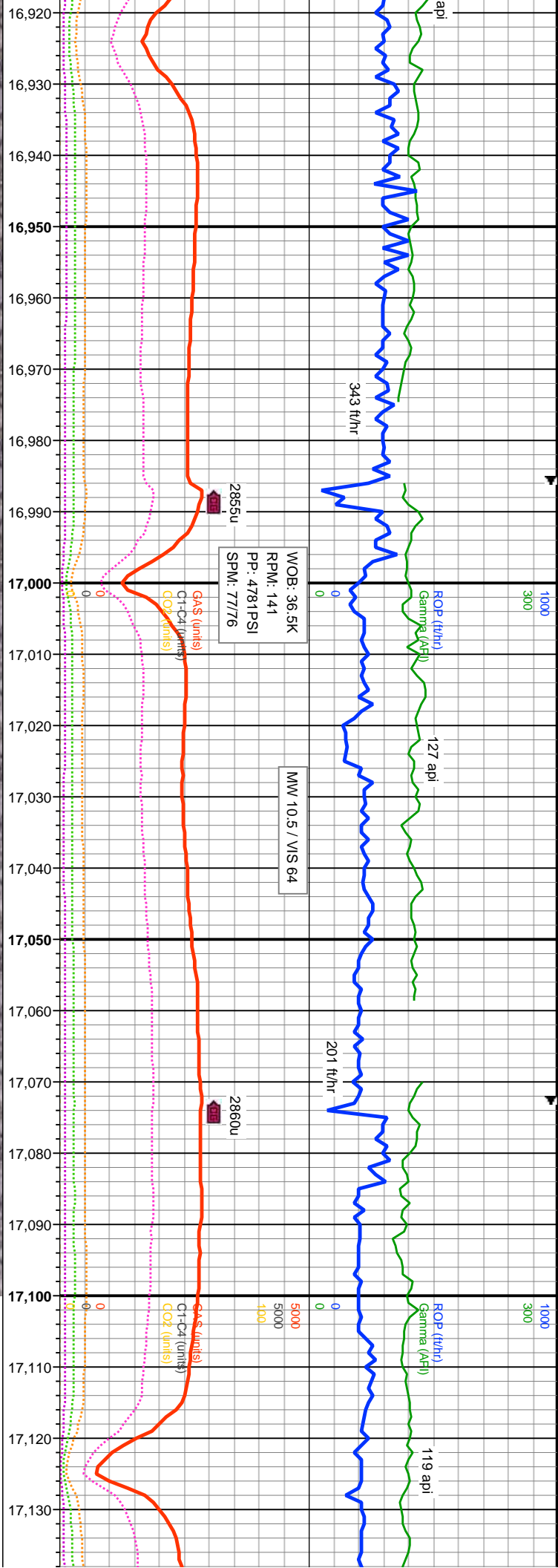












drkgy, lt-med brn, rr offwht-cl, mod sft-fri, sme frm, vfg, sb blkv-sr clus, mod-w srt, arg-sily mtb, sl cly rch, v sl-non calc, 10% SLTY SH: drkgy, ip y, mod sft-sme frm, fri-rr brlt, rthy, sily, aren, v sl calc, com intbd wi sd	<div>MD: 16,961' INC: 89.72° AZM: 176.8° TVD: 7,697.37' VS: 10,536.27'</div>	7250	7250	85% SS: med-drkgy, lt-med brn, rr offwht-cl, mod sft-fri, sme frm, vfg, sb blkv-sr clus, pred cons, mod-w srt, arg-sily mtb, sl cly rch, v sl-non calc, 15% SLTY SH: drkgy, ip blk, sb blkv-plty, mod sft-sme frm, fri-rr brlt, rthy, sily, aren, v sl-non calc, com intbd wi sd
drkgy, lt-med brn, rr offwht-cl, mod sft-fri, sme frm, vfg, sb blkv-sr clus, mod-w srt, arg-sily mtb, sl cly rch, v sl-non calc, 10% SLTY SH: drkgy, ip y, mod sft-sme frm, fri-rr brlt, rthy, sily, aren, v sl calc, com intbd wi sd	<div>MD: 17,050' INC: 90.03° AZM: 177.98° TVD: 7,697.56' VS: 10,625.15'</div>	7250	7250	85% SS: med-drkgy, lt-med brn, rr offwht-cl, mod sft-fri, sme frm, vfg, sb blkv-sr clus, pred cons, mod-w srt, arg-sily mtb, sl cly rch, v sl-non calc, 15% SLTY SH: drkgy, ip blk, sb blkv-plty, mod sft-sme frm, fri-rr brlt, rthy, sily, aren, v sl-non calc, com intbd wi sd

