



Scale: 5" / 100'

## Measured Depth Log

**Well Name** Rio LC12-332HN

**Location** NWNW Sec 6, T1S, R67W

**State** COLORADO

**County** ADAMS

**Country** UNITED STATES

**Rig Number** PRECISION 460

**API Number** 050011046100

**AFE #** 19DC0171

**Geographic Region** DJ BASIN

**Field** WATTENBERG

**Ground Elevation** 5068.4'

**K.B. Elevation** 5088.4'

**Logged Interval** 6000' MD To 13772' ND

**Total Depth** 13772' MD

**Formation** NIOBRARA C CHALK

**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



**MUDDLOG END DATE 08/27/2019**

	Sandstone		SILTSTONE			CONGLOMERATE
	LIMESTONE		SANDSTONE			BRECCIA
	Chalk		BENTONITE			TILL
	Marl		CEMENT			TUFF
	Shale		UNKNOWN			IGNEOUS
	Silty Shale		ANHYDRITE			METAMORPHIC
	Shaly Siltstone		GYPSUM			CALCAREOUS SHALE
	Silty Sandstone		SALT			

[illegible]

- ORGANIC
- PINPOINT



BIT

## 4



CASING

**CONNECTION (LEFT)**

**CONNECTION (RIGHT**

 CONNECTION GAS

CORE - LOST

■ CORE - RECOVERED

DST INTERVAL

**FAULT**

**ORGANIC**

## PINPOINT



BIT



CASING

**CONNECTION (LEFT)**

**CONNECTION (RIGHT**

 CONNECTION GAS

CORE - LOST

■ CORE - RECOVERED

DST INTERVAL

**FAULT**

# Other Symbols

 FORMATION TOP      L LITHOGRAPHIC


## Rounding

GAS SHOW       MICROXLN

 MN DEPTH       MUDSTONE

NORMAL FAULT       ROUNDED       PACKSTONE



OIL SHOW       SUBANG       WACKSTONE

OVERTURNED STRATA       SUBRND

REVERSE FAULT

## Textures

SIDEMALL CORE (LEFT)       MODERATE

SIDEMALL 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 @ 18:02 MDT 08/24/2019  
BLOODHOUND GAS CHROMATOGRAPH #5927  
100' Sample Collection

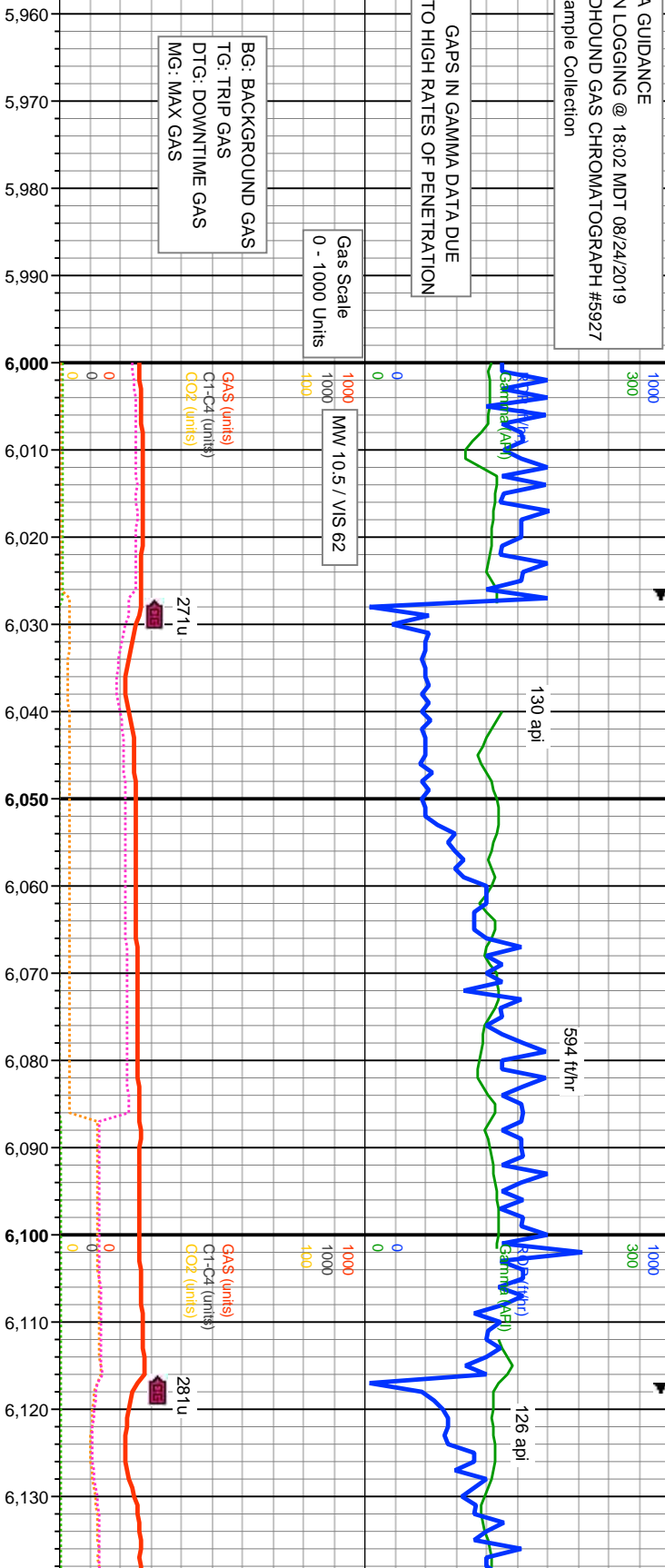
ROP  
ROP  
Gamma

GAPS IN GAMMA DATA DUE  
TO HIGH RATES OF PENETRATION

Total Gas & Chromatograph

GAS  
C1  
C2  
C3  
C4  
CO2

Depth



Images



% Lithology

TVD Scale  
5500' - 8500'

MD: 6.004'  
INC: 29.87°  
AZM: 276.9°  
TVD: 5.688.64'  
VS: 378.06'

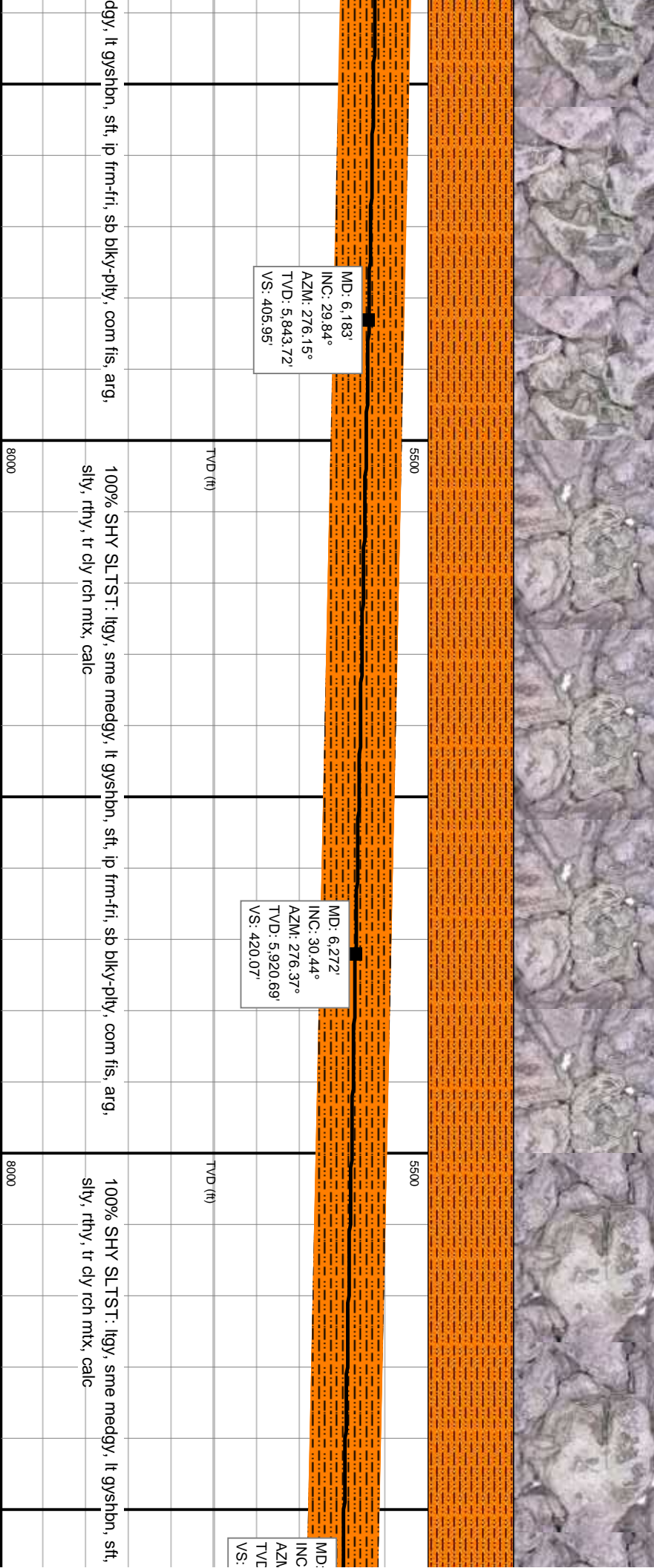
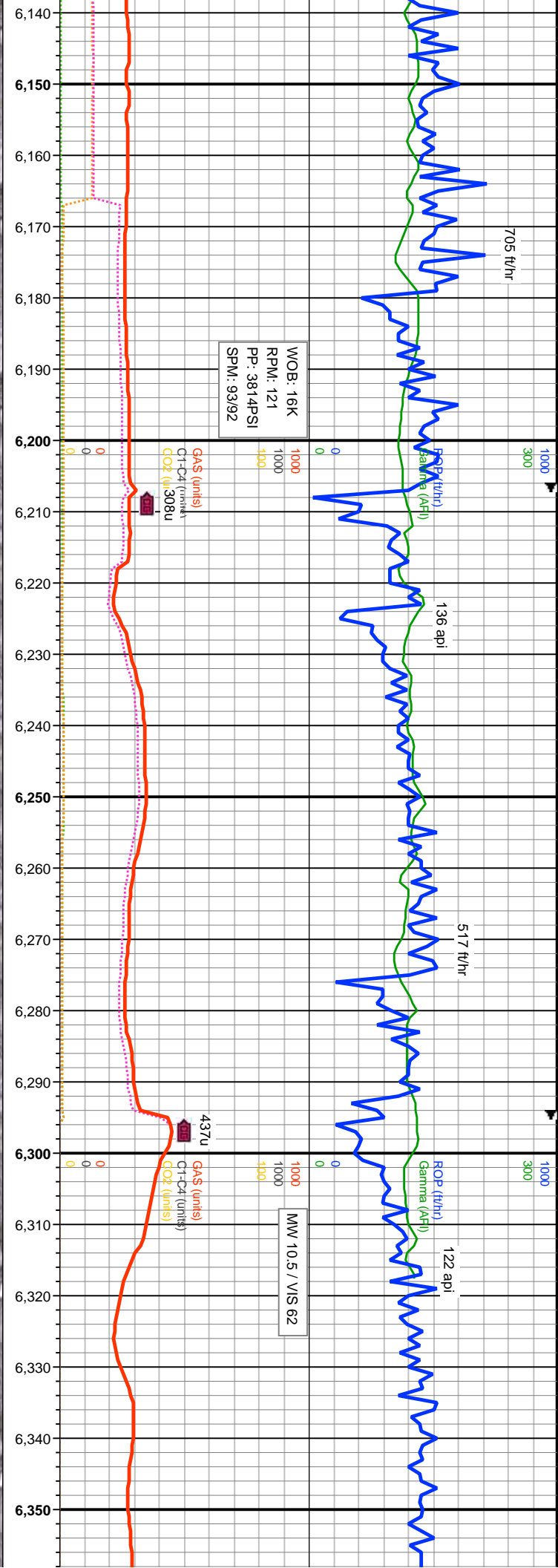
MD: 6.094'  
INC: 30.06°  
AZM: 276.47°  
TVD: 5.766.61'  
VS: 391.95'

Well Bore  
TVD

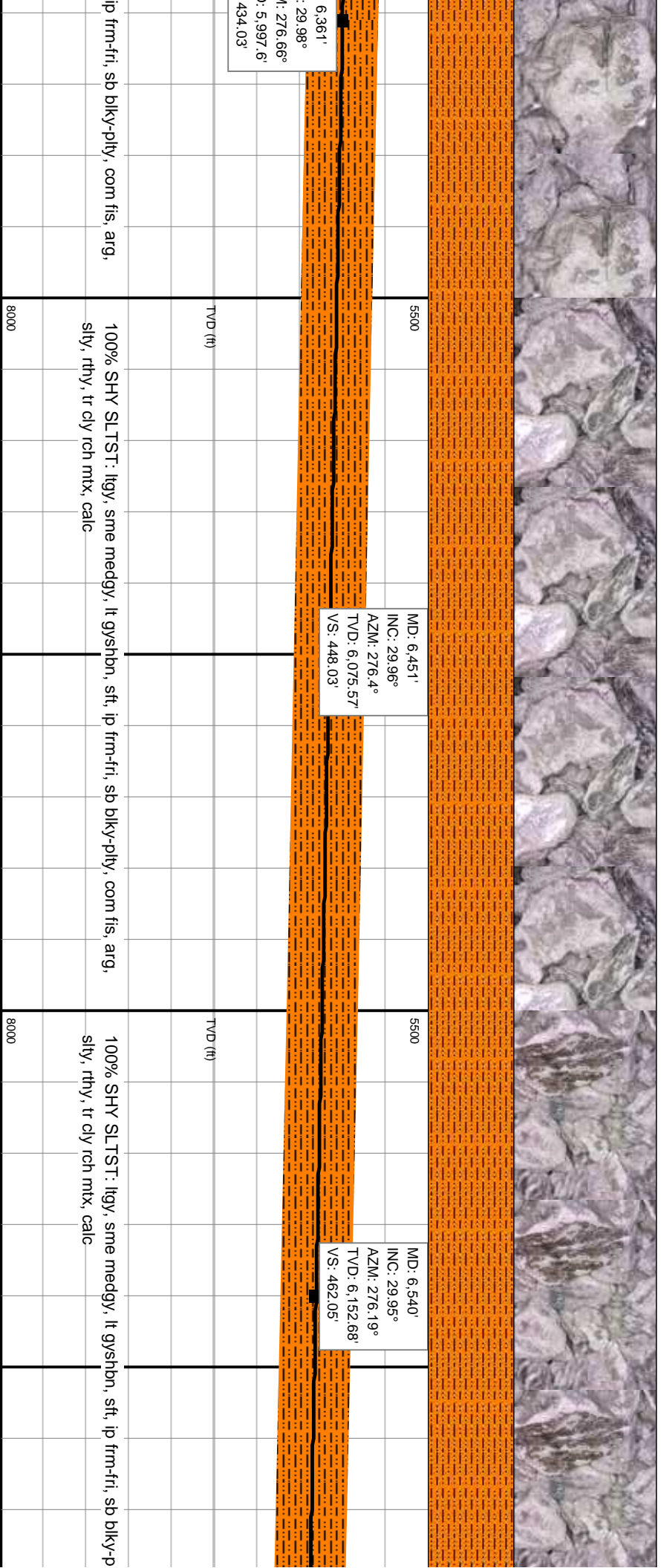
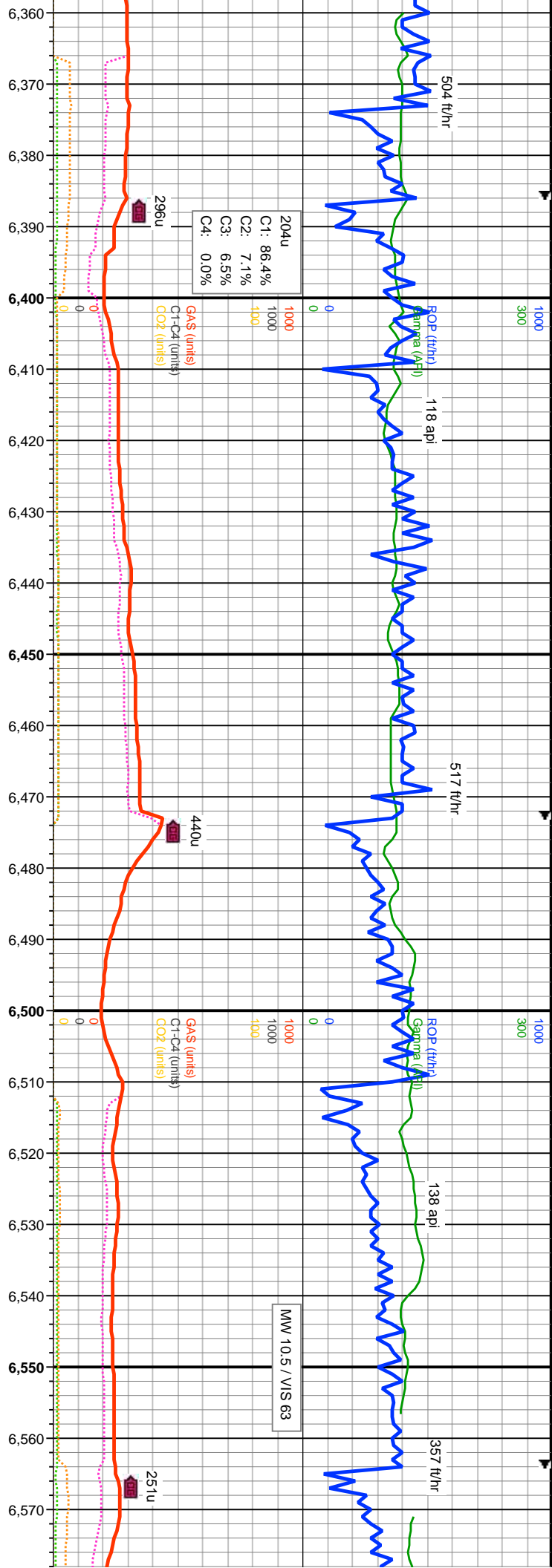
Bit #: 1  
Size: 8.5  
Make: HCC  
Model: ATD505T  
Depth In: 1,772  
Jets: 5x15  
S/N: 5283815

100% SHY SLTST: lly, sme medgy, lt gysrhn, sft, lp frm-fri, sb blkly-plty, com fis, arg,  
sily, rthy, tr cly rch mtX, calc

100% SHY SLTST: lly, sme medgy, lt gysrhn, sft, lp frm-fri, sb blkly-plty, com fis, arg,  
sily, rthy, tr cly rch mtX, calc





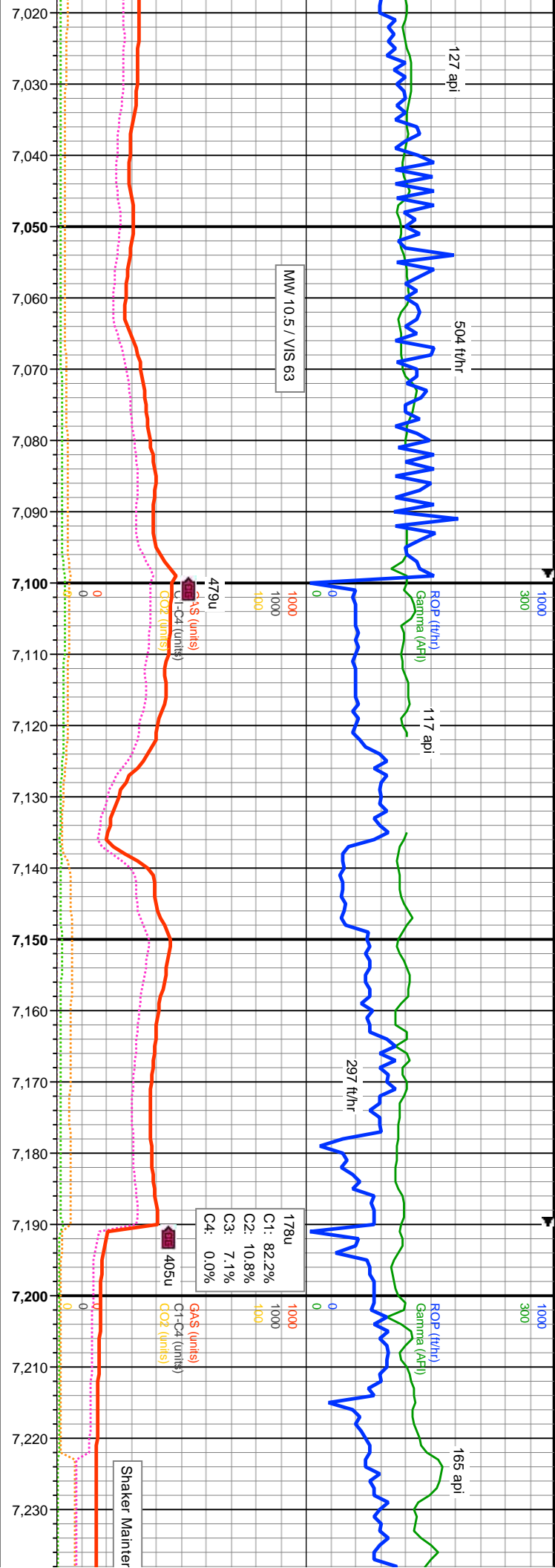












MD: 7,077'  
INC: 28.73°  
AZM: 276.89°  
TVD: 6,619.06'  
VS: 545.06'

MD: 7,166'  
INC: 30.03°  
AZM: 276.34°  
TVD: 6,696.61'  
VS: 558.6'

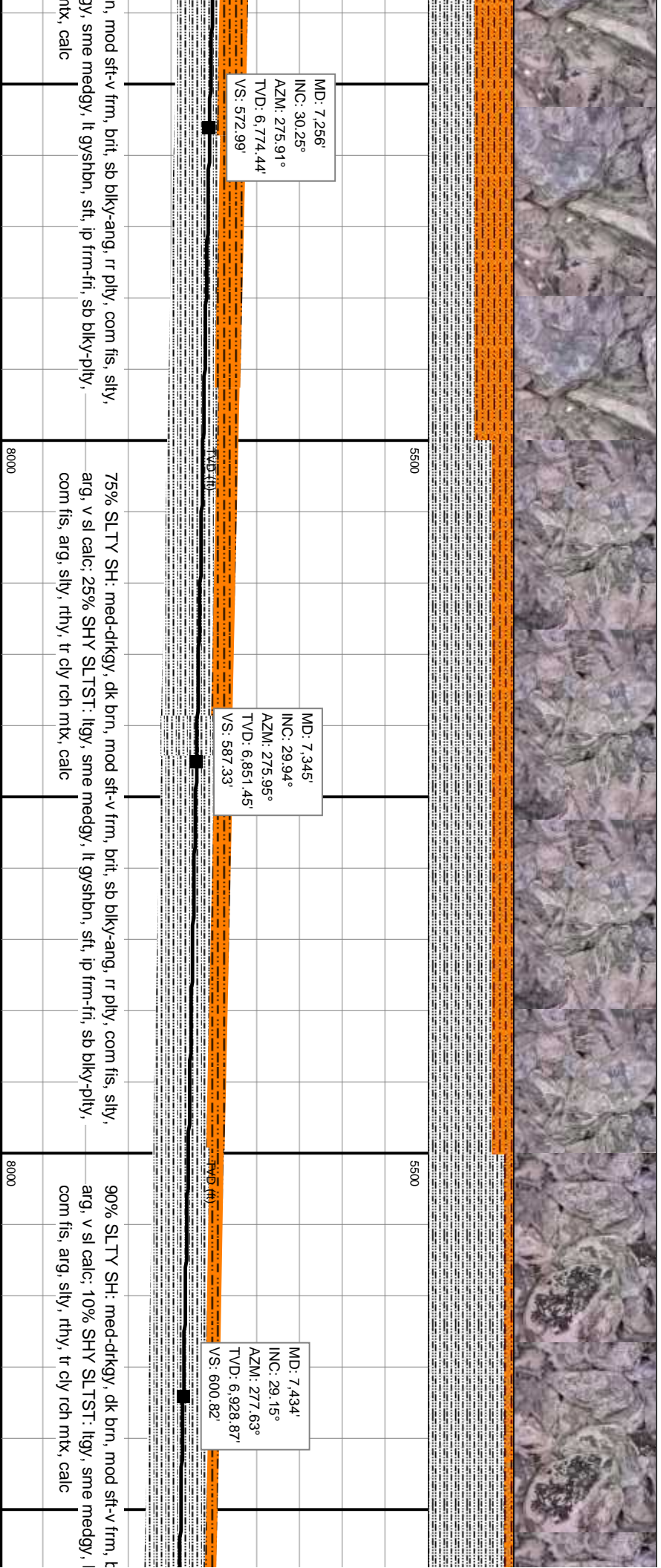
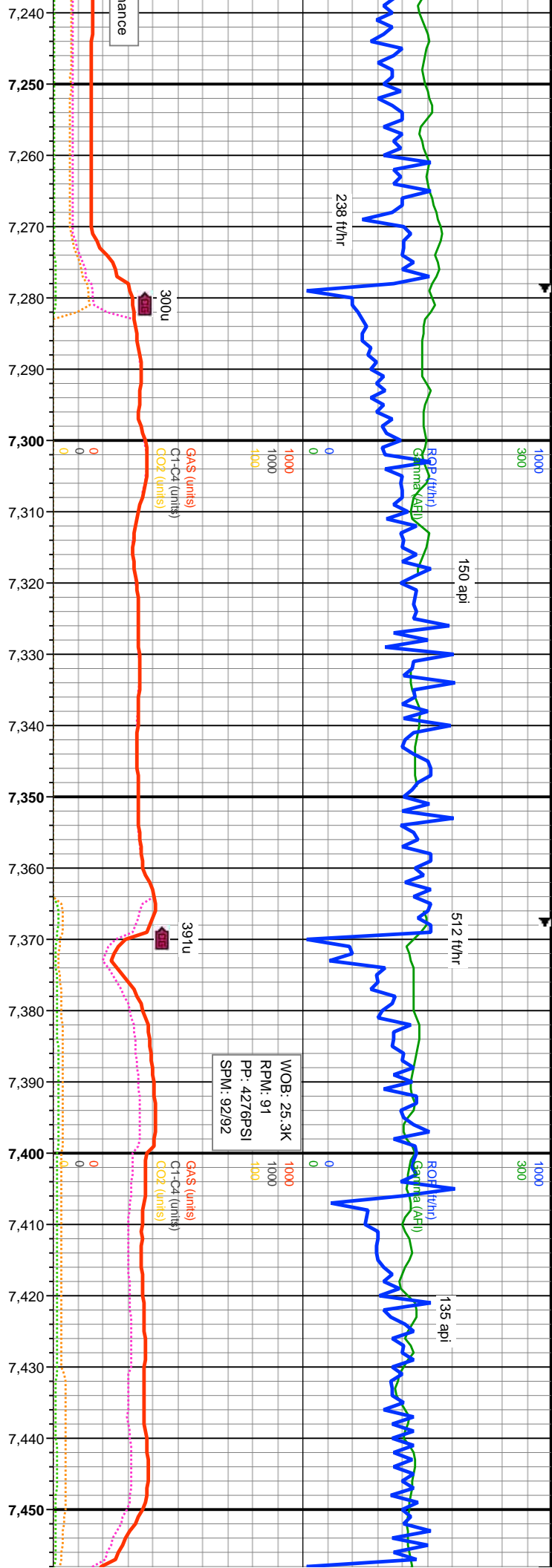
TVD (ft)

TVD (ft)

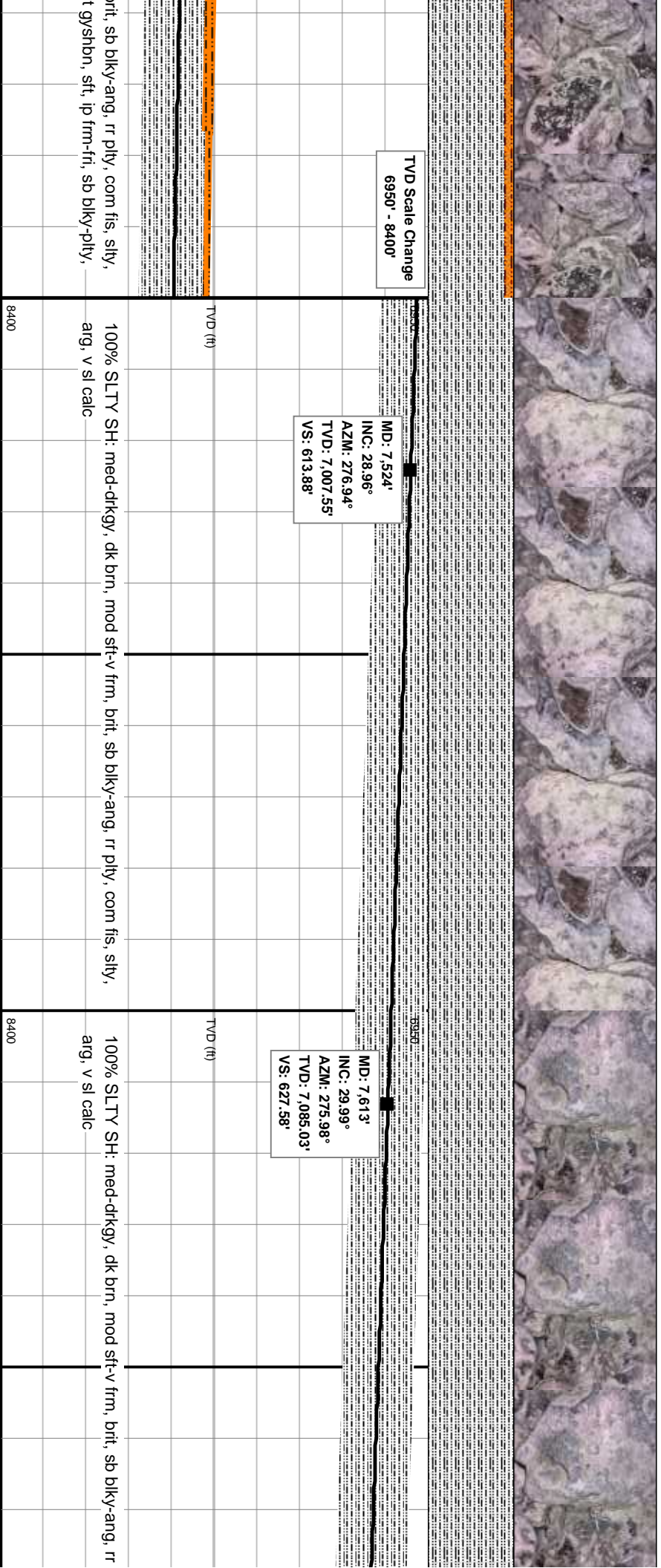
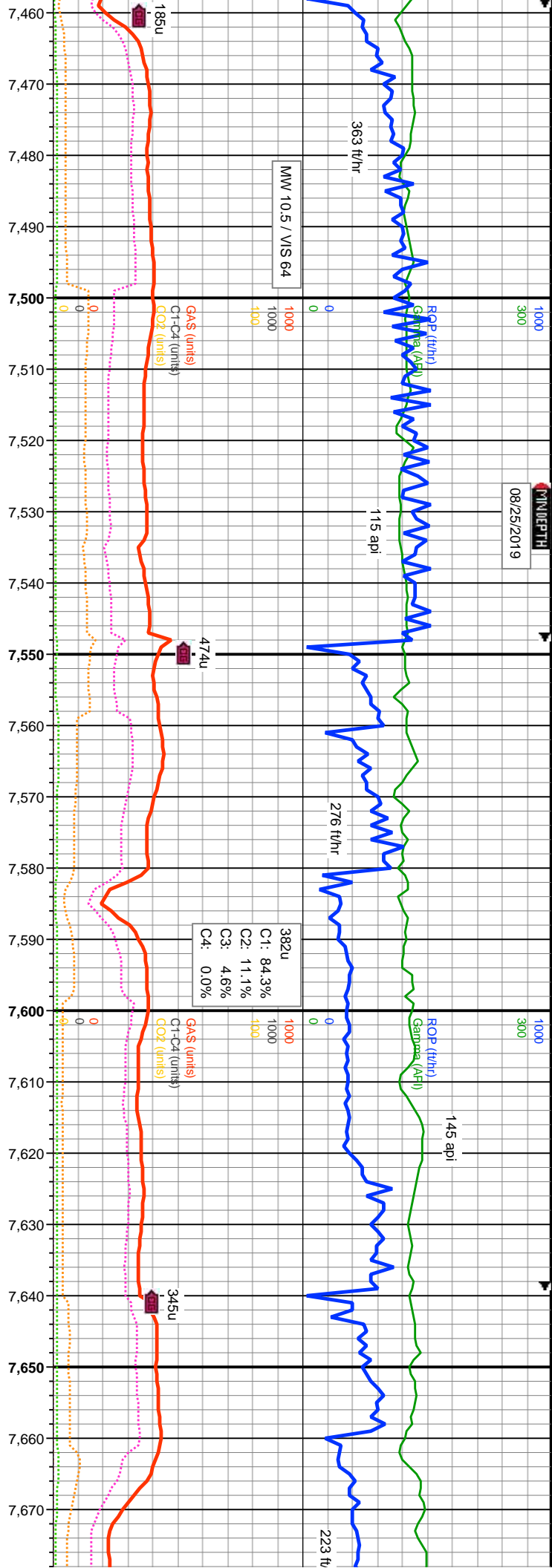
ST: ltgy, sme medgy, lt gysbhn, sft, lp frm-fri, sb blkly-plty, com fis, arg, / rch mtz, calc; 20% SLTY SH: med-dkgy, dk brn, mod sft-v frm, brit, sb /y, com fis, slty, arg, v sl calc

60% SHY SLTST: ltgy, sme medgy, lt gysbhn, sft, lp frm-fri, sb blkly-plty, com fis, arg, slty, rthy, tr cly rch mtz, calc; 40% SLTY SH: med-dkgy, dk brn, mod sft-v frm, brit, sb blkly-ang, rr plty, com fis, slty, arg, v sl calc

55% SLTY SH: med-dkgy, dk brn, mod sft-v frm, brit, sb blkly-ang, rr plty, com fis, slty, arg, v sl calc

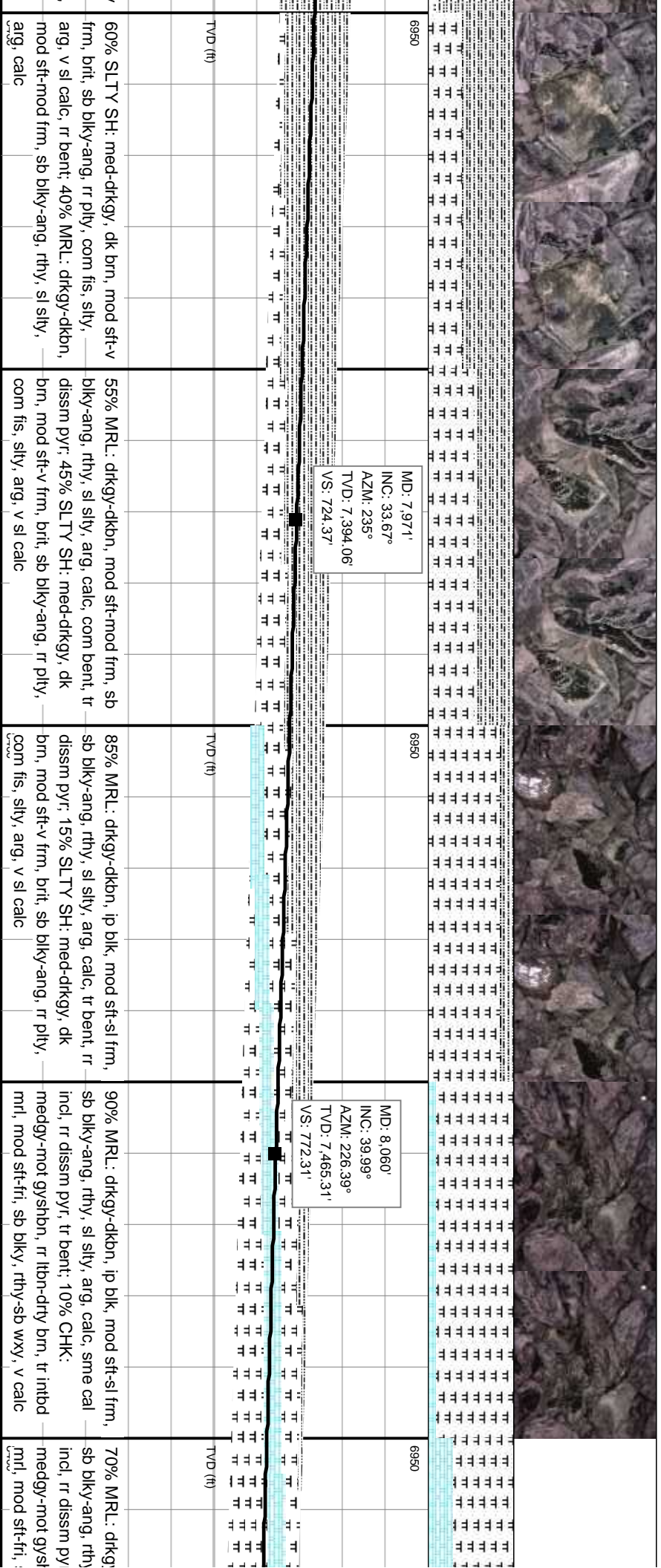
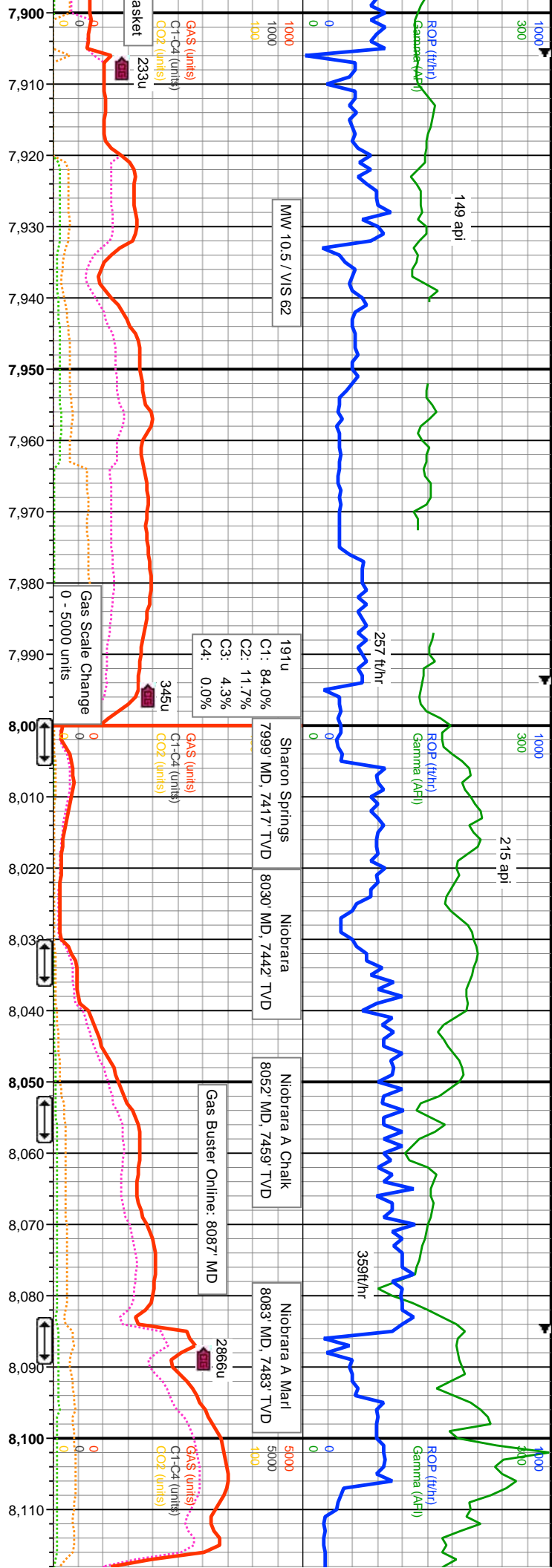








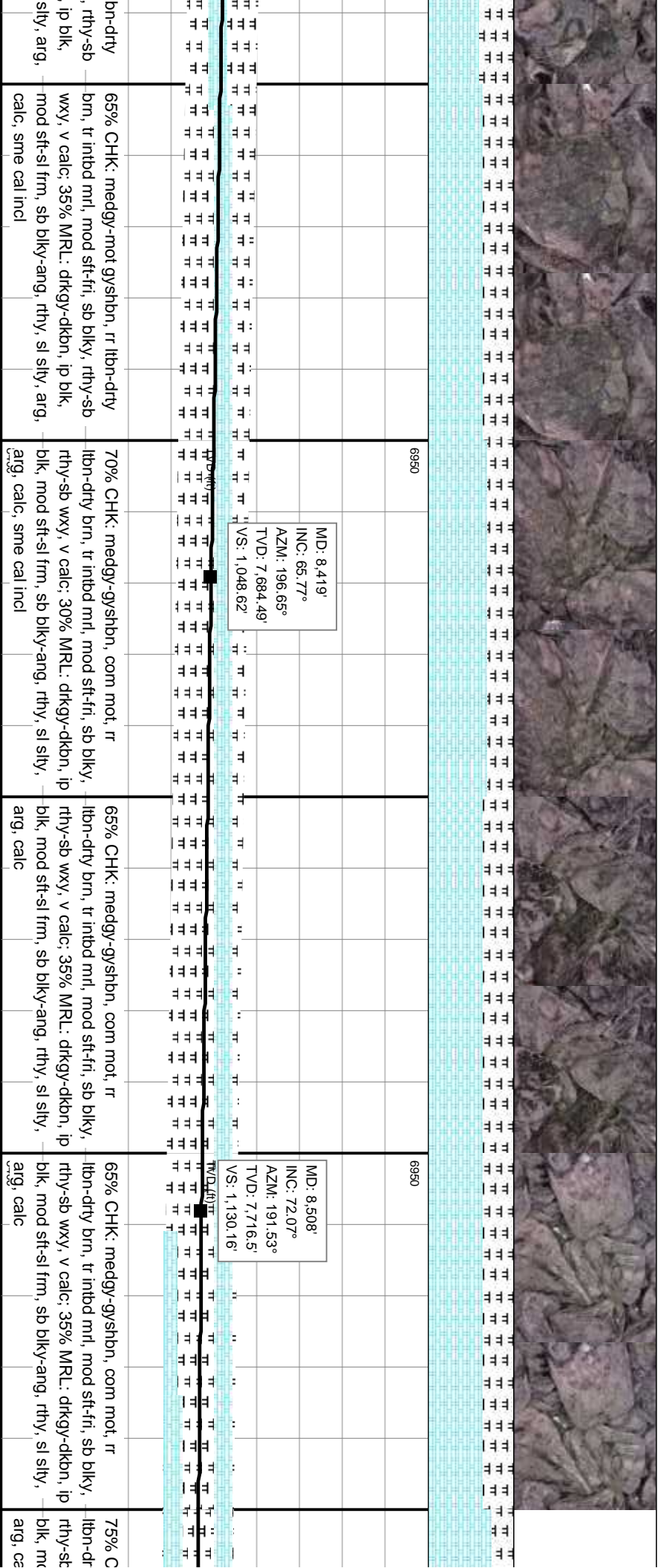
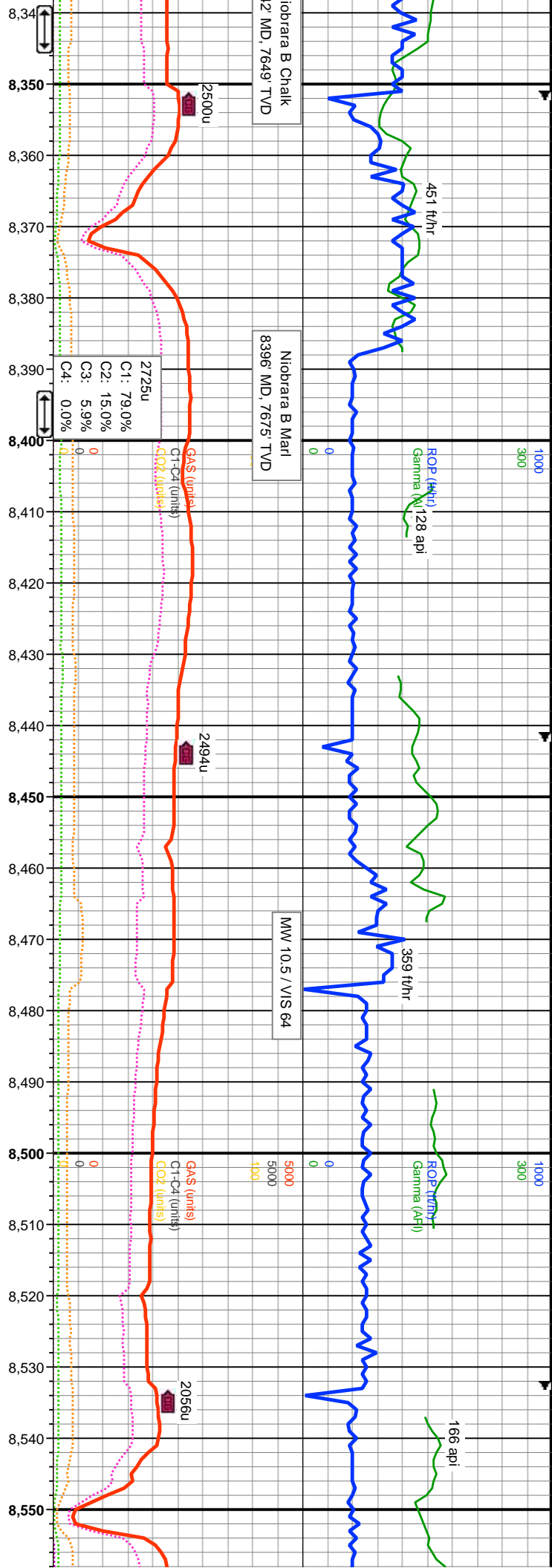


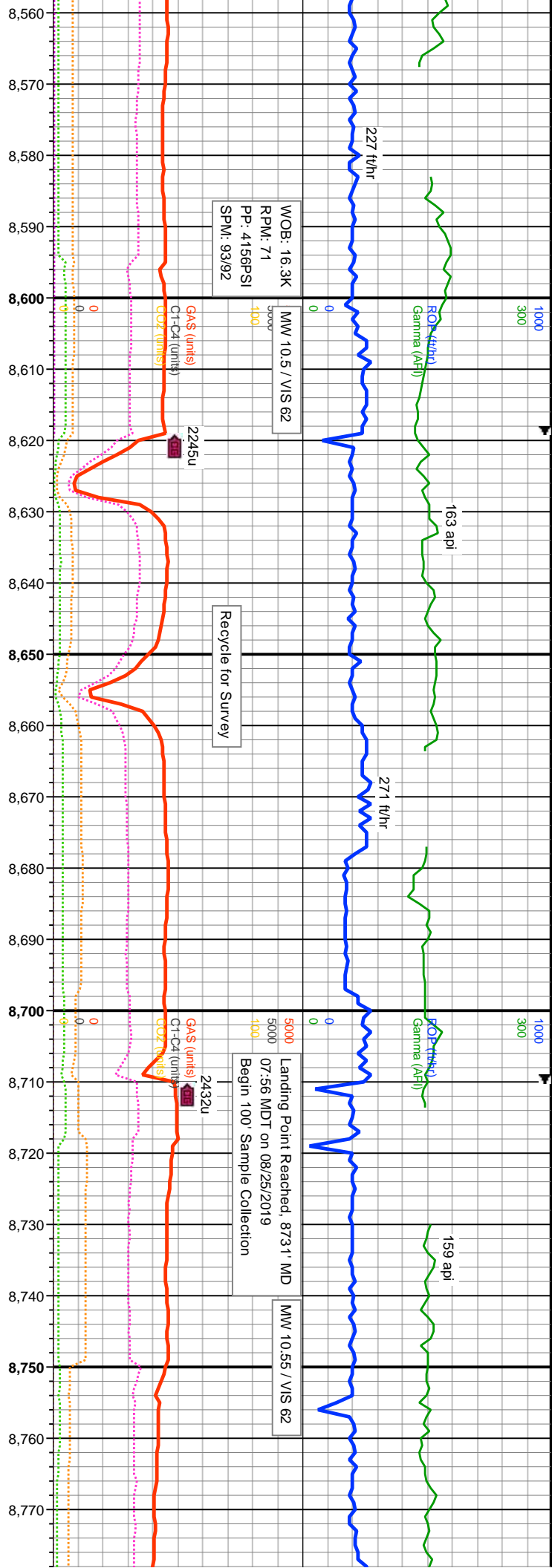












WOB: 16.3K  
RPM: 71  
PP: 4156PSI  
SPM: 93/92

MMW 10.5 / VIS 62

Recycle for Survey

Landing Point Reached, 8731' MD  
07:56 MDT on 08/25/2019  
Begin 100' Sample Collection

MMW 10.55 / VIS 62



MD: 8.597'  
INC: 79.25°  
AZM: 187.02°

TVD: 7.738.54'

VS: 1.213.2'

TVD Scale Change  
7650' - 8000'

MD: 8.687'  
INC: 87.97°  
AZM: 183.58°

TVD: 7.748.55'

VS: 10.41'

MD: 8.731'  
INC: 89.72°  
AZM: 182.35°

TVD: 7.749.44'

VS: 1.338.34'

MD: 8.776'  
INC: 89.31°  
AZM: 182°

TVD: 7.74

VS: 1.380

CHK: medgy-gyshbn, com mot, sme  
lbn-dry brn, tr inbd mtl, mod sft-fr, sb blk, rthy-sb wxy, v calc; 25% MRL: dtkgy-dkbn, ip blk, mod sft-sl frm, sb blk-ang, rthy, sl sily, arg, calc

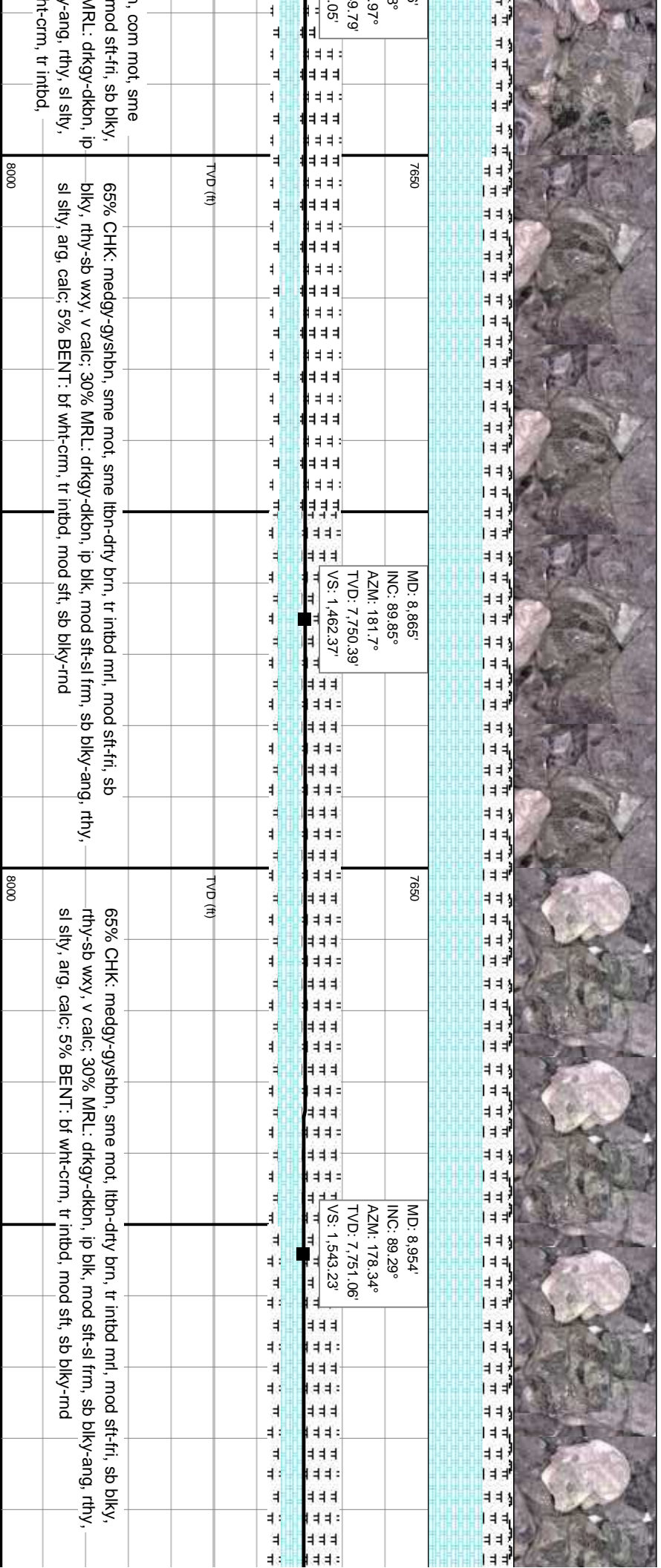
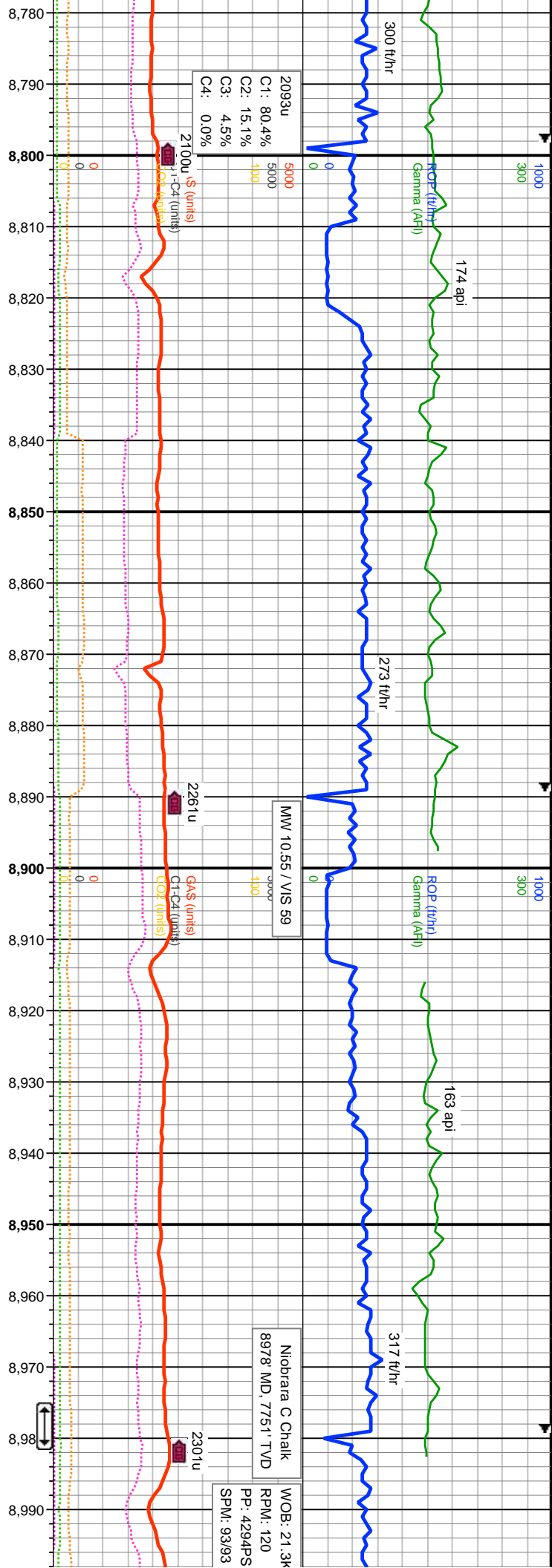
65% CHK: medgy-gyshbn, com mot, sme  
lbn-dry brn, tr inbd mtl, mod sft-fr, sb blk, rthy-sb wxy, v calc; 35% MRL: dtkgy-dkbn, ip blk, mod sft-sl frm, sb blk-ang, rthy, sl sily, arg, calc

75% CHK: medgy-gyshbn, com mot, sme  
lbn-dry brn, tr inbd mtl, mod sft-fr, sb blk, rthy-sb wxy, v calc, com bent; 25% MRL: dtkgy-dkbn, ip blk, mod sft-sl frm, sb blk-ang, rthy, sl sily, arg, calc

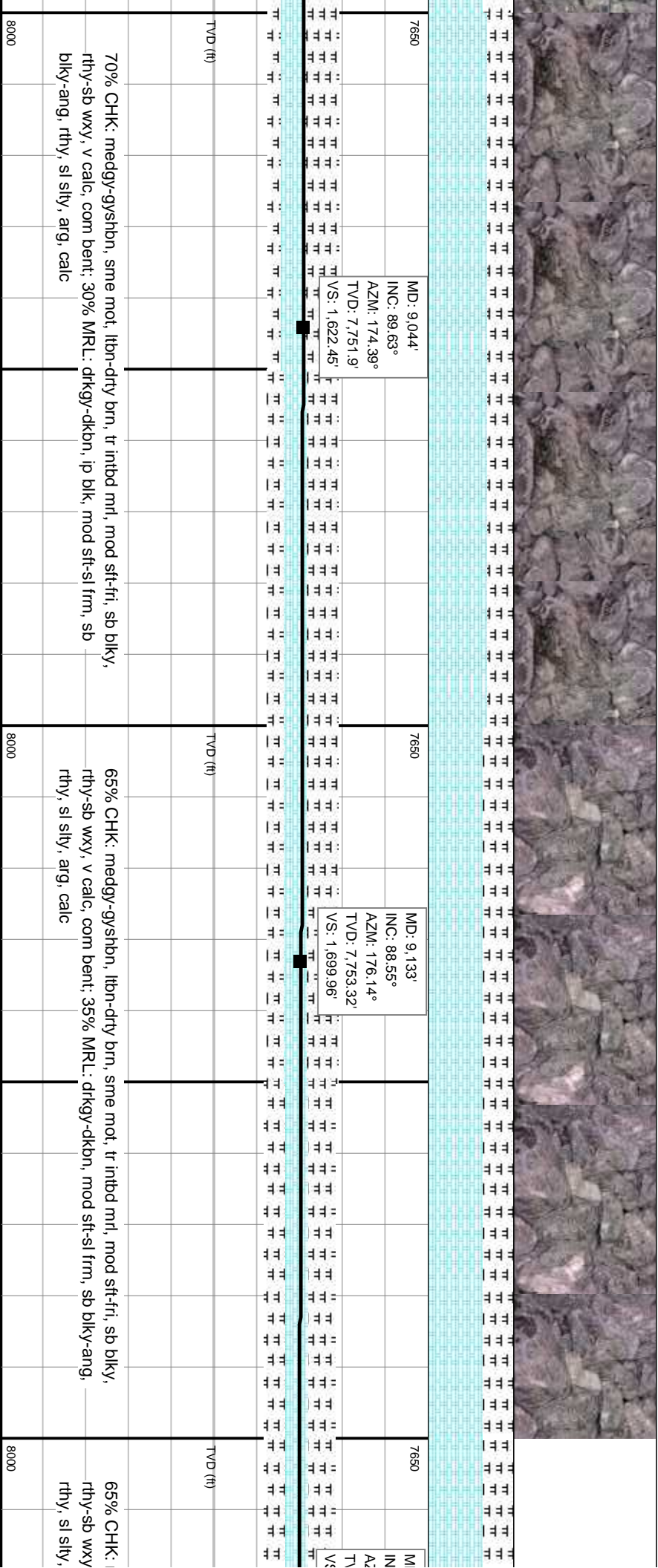
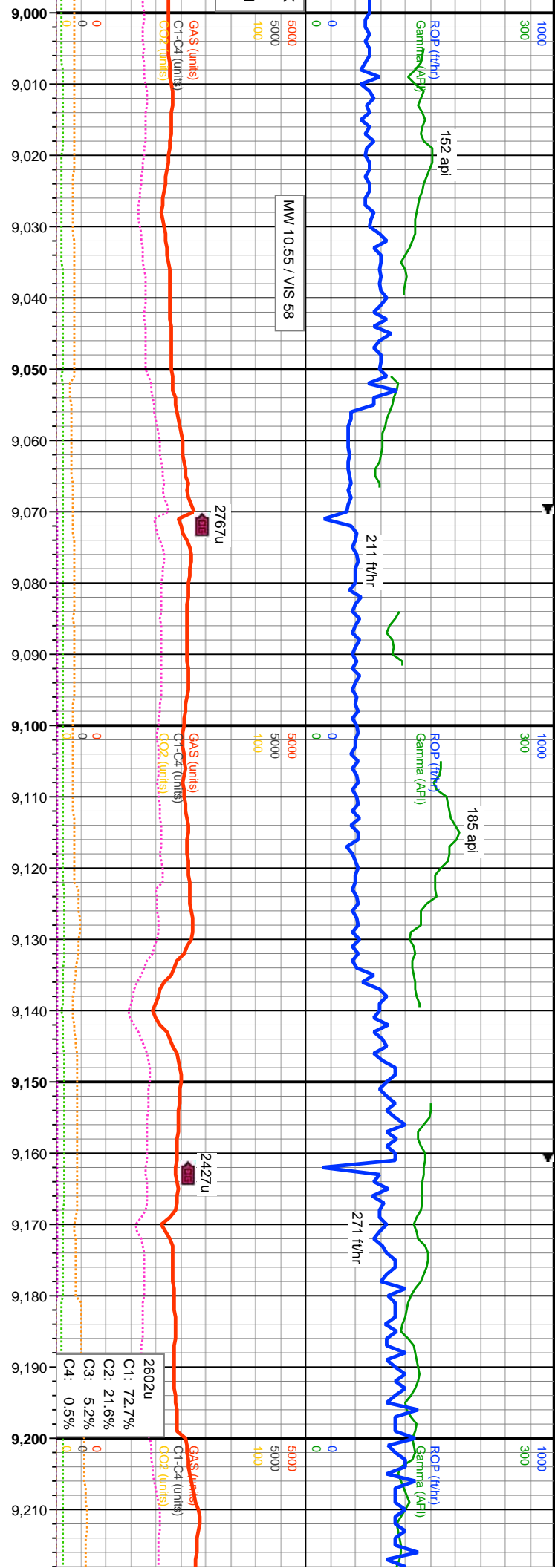
75% CHK: medgy-gyshbn, com mot, sme  
lbn-dry brn, tr inbd mtl, mod sft-fr, sb blk, rthy-sb wxy, v calc, com bent; 25% MRL: dtkgy-dkbn, ip blk, mod sft-sl frm, sb blk-ang, rthy, sl sily, arg, calc

75% CHK: medgy-gyshbn, com mot, sme  
lbn-dry brn, tr inbd mtl, mod sft-fr, sb blk, rthy-sb wxy, v calc; 20% MRL: dtkgy-dkbn, ip blk, mod sft-sl frm, sb blk-ang, rthy, sl sily, arg, calc; 5% BENT: bf w mod sft, sb blk-nd



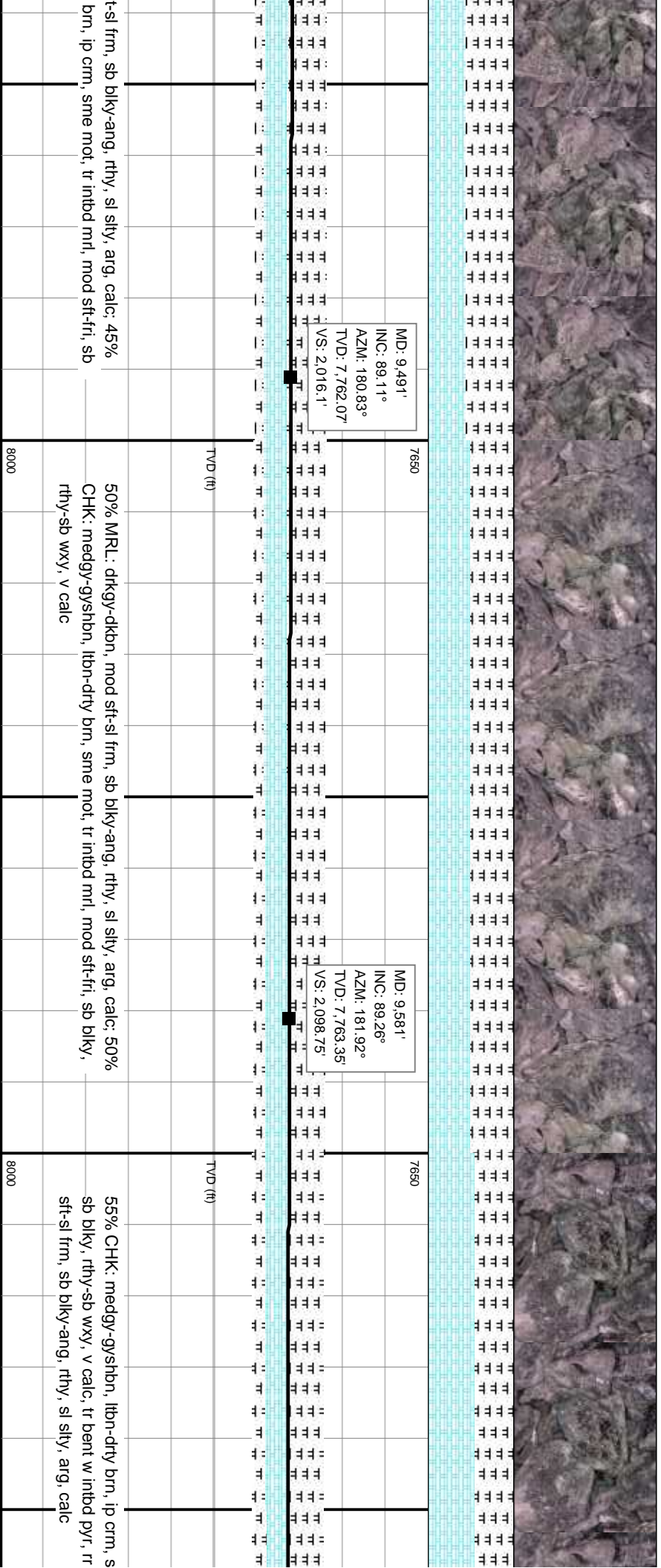
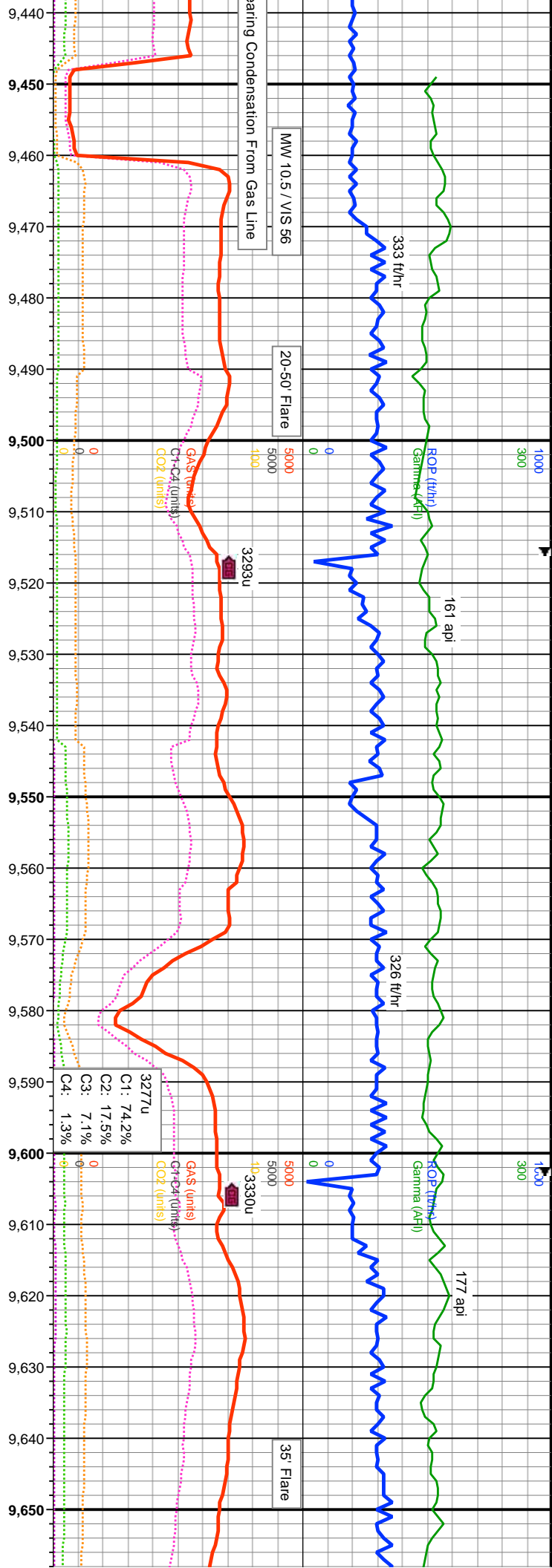




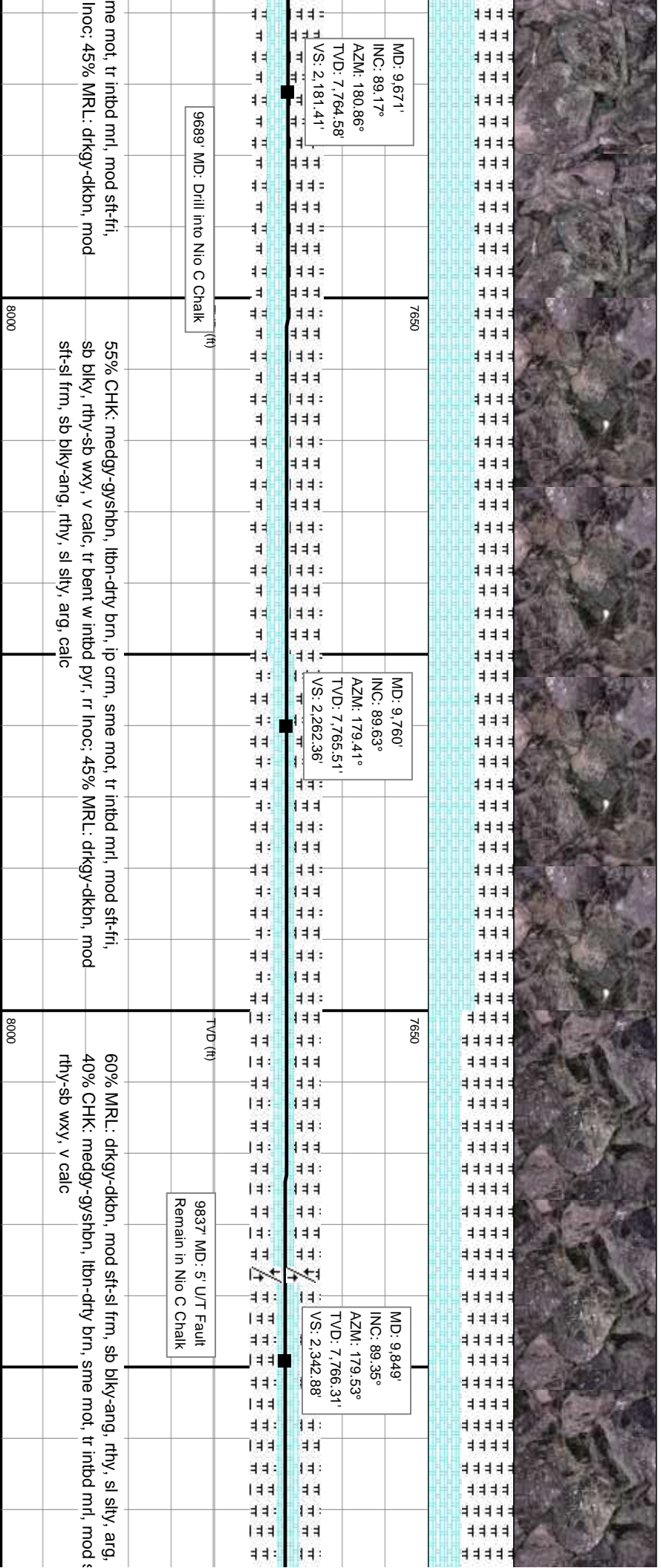
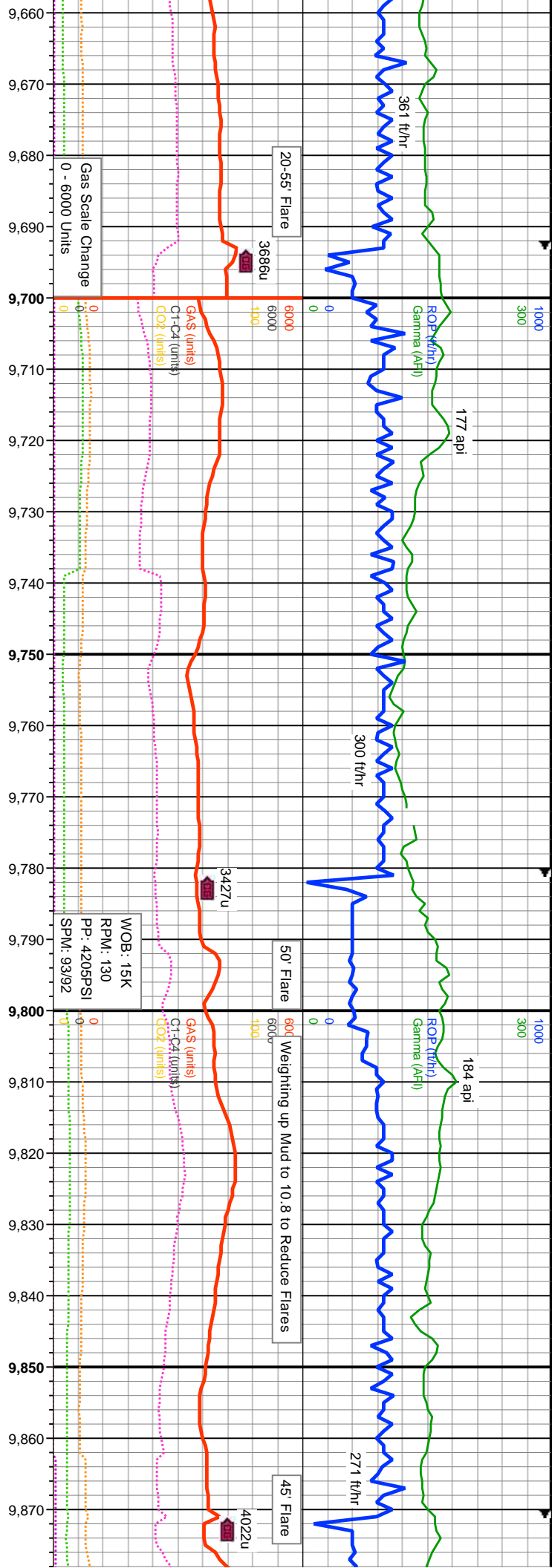


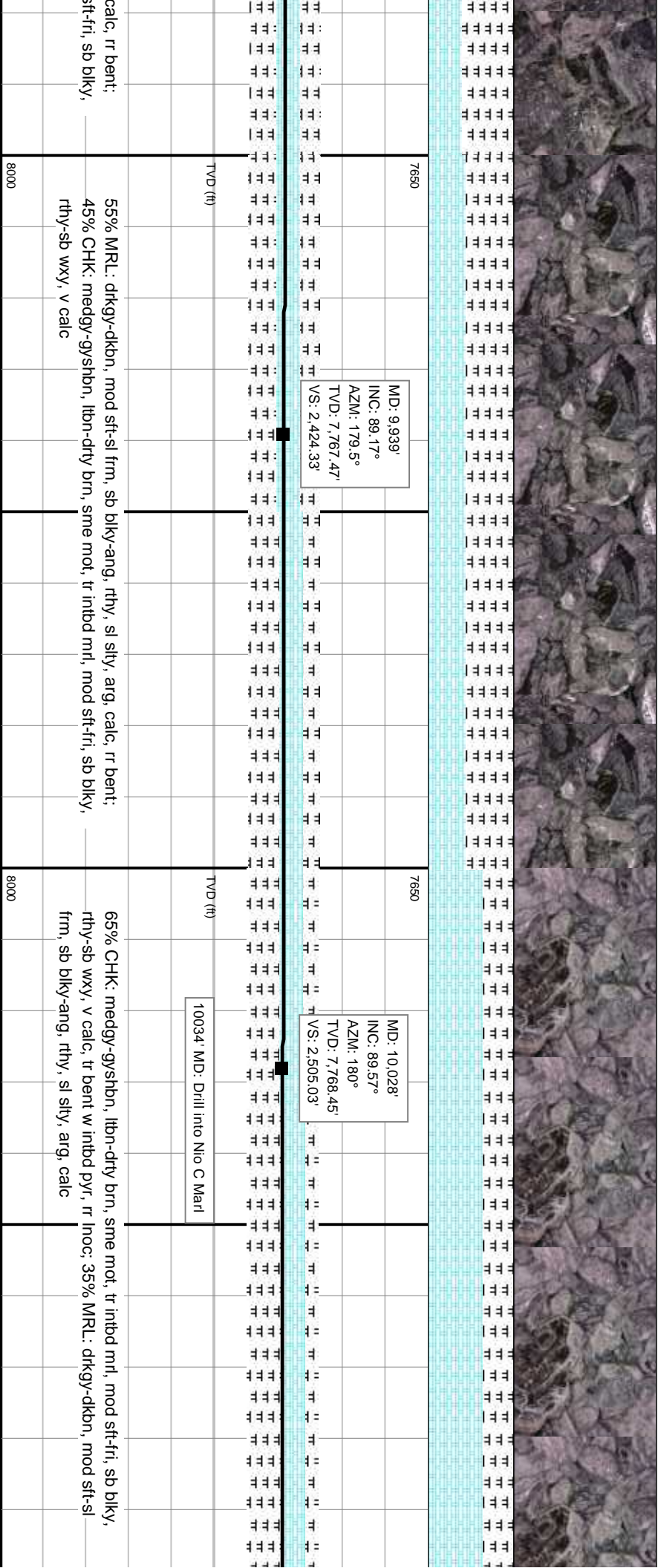
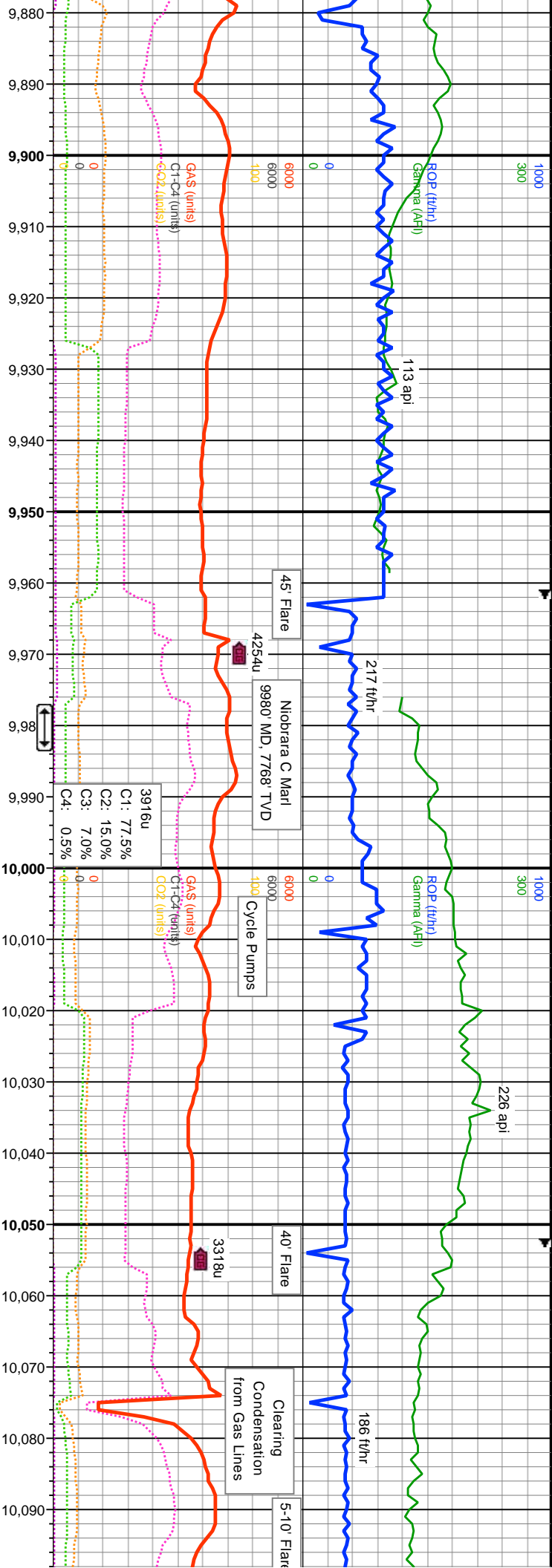




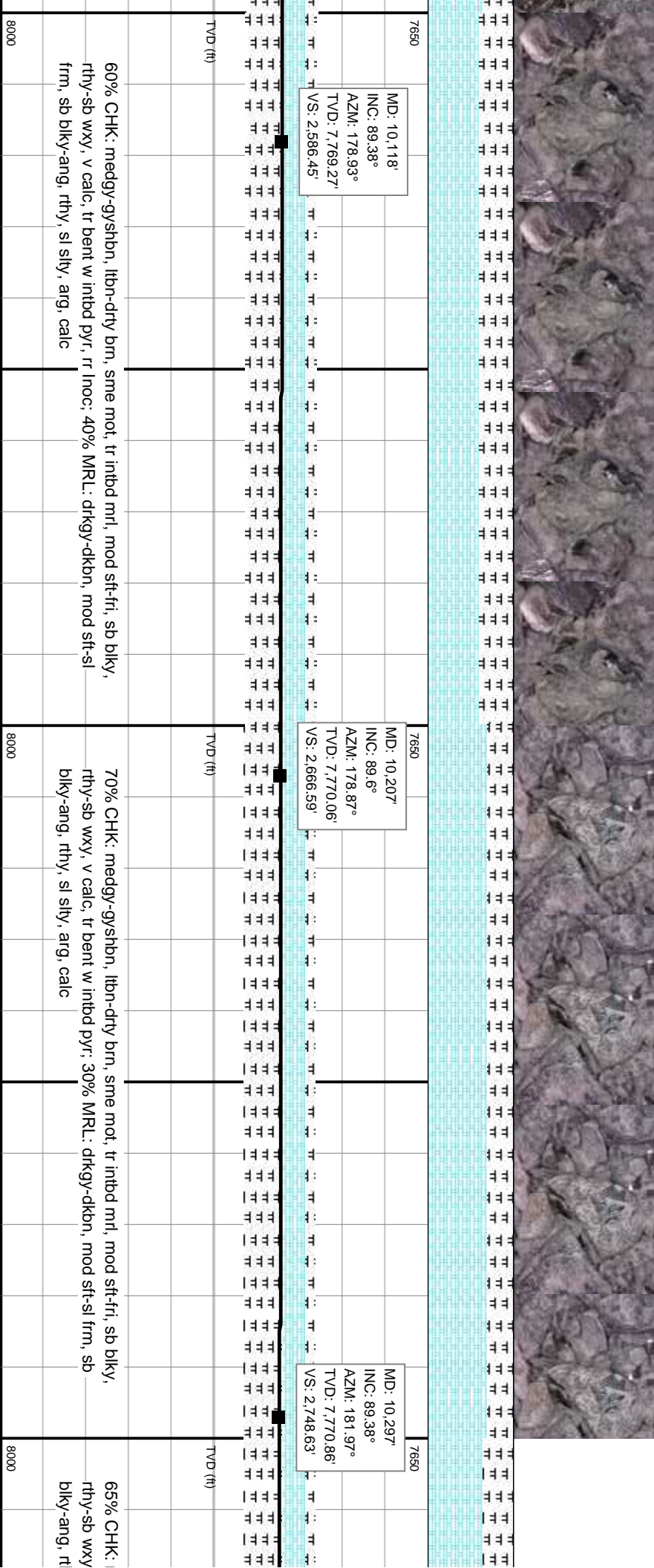
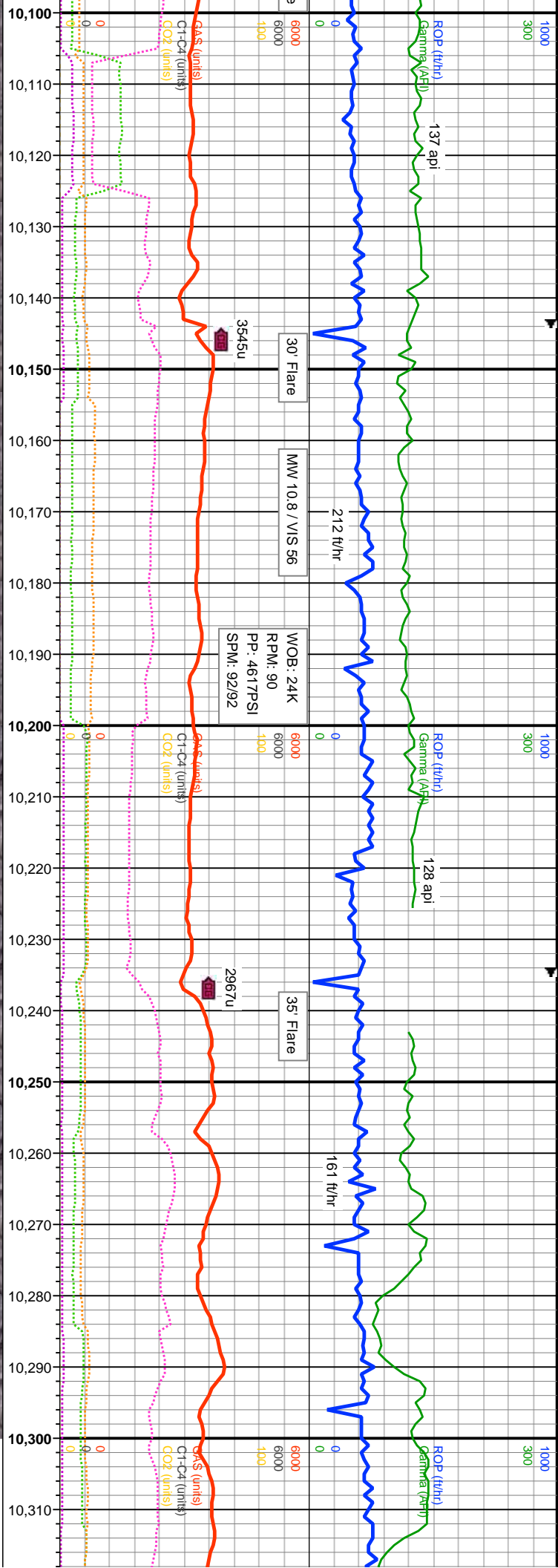






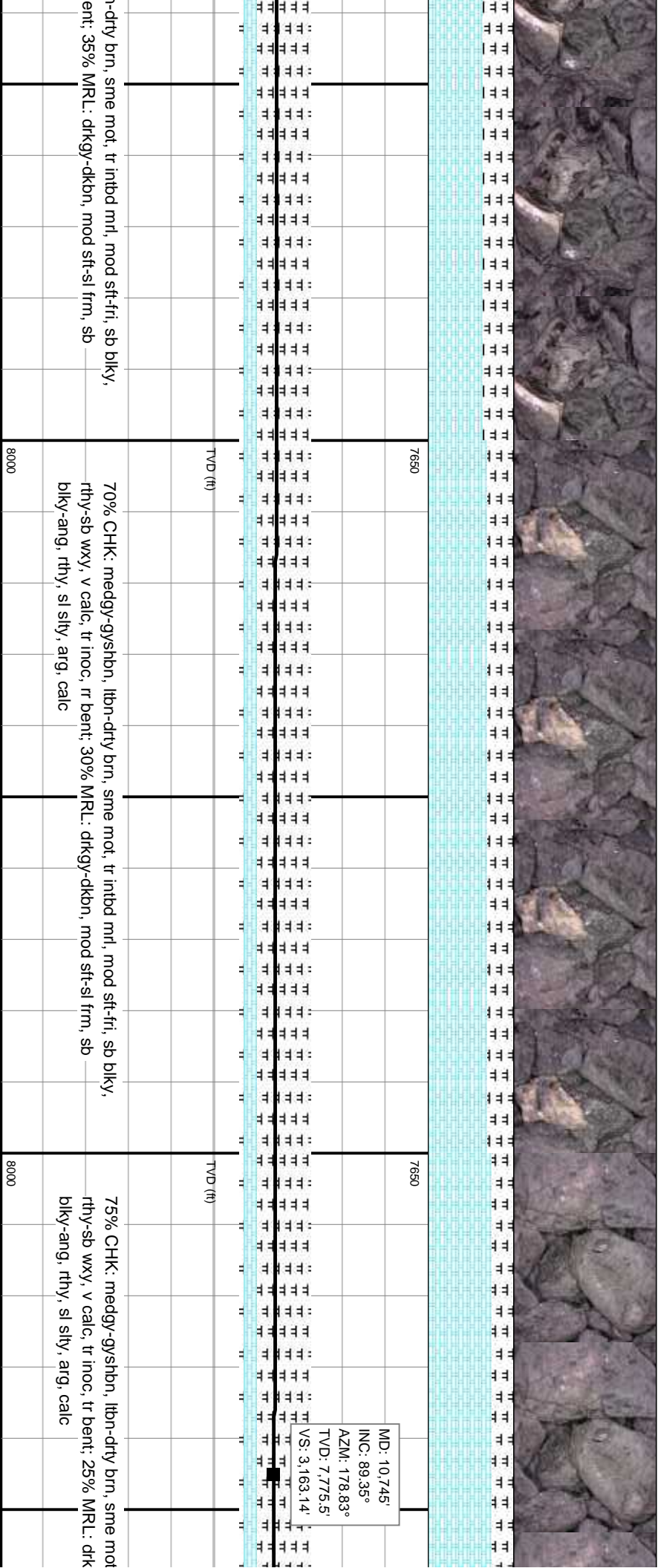
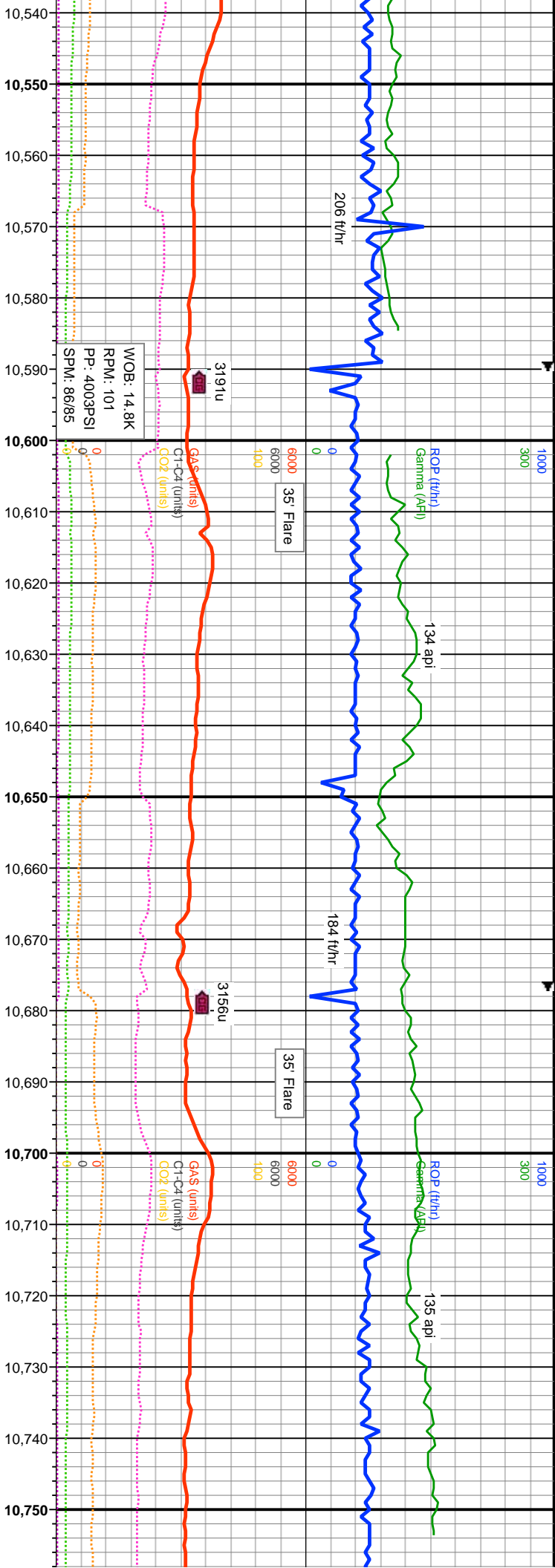




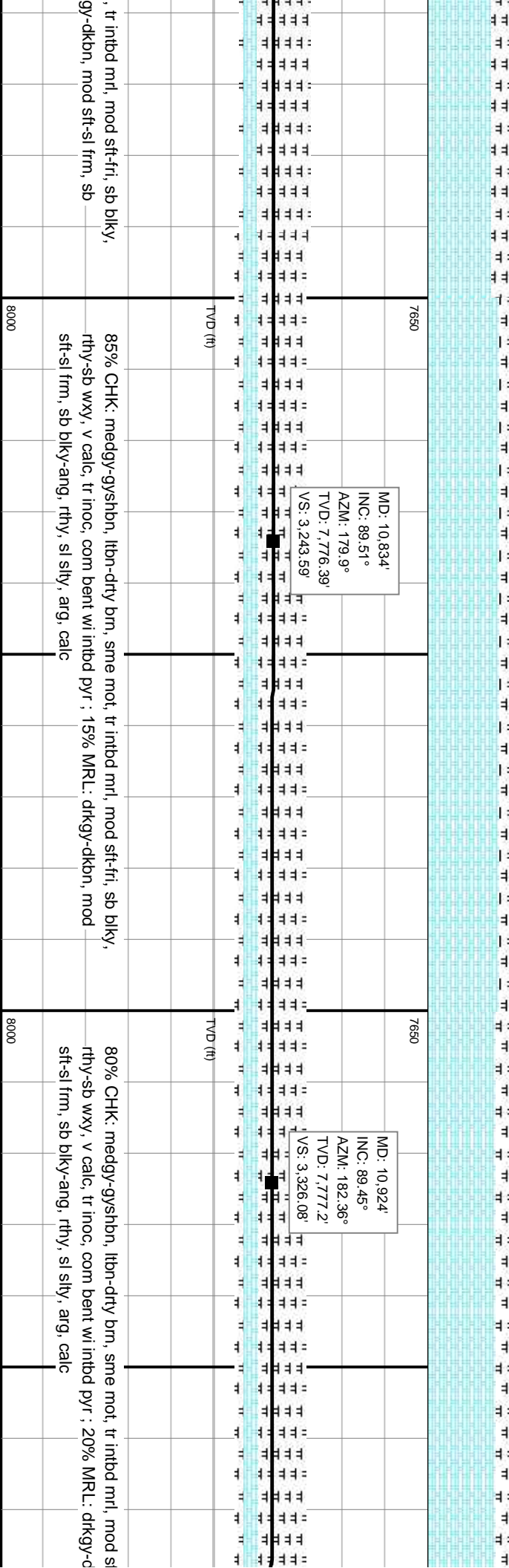
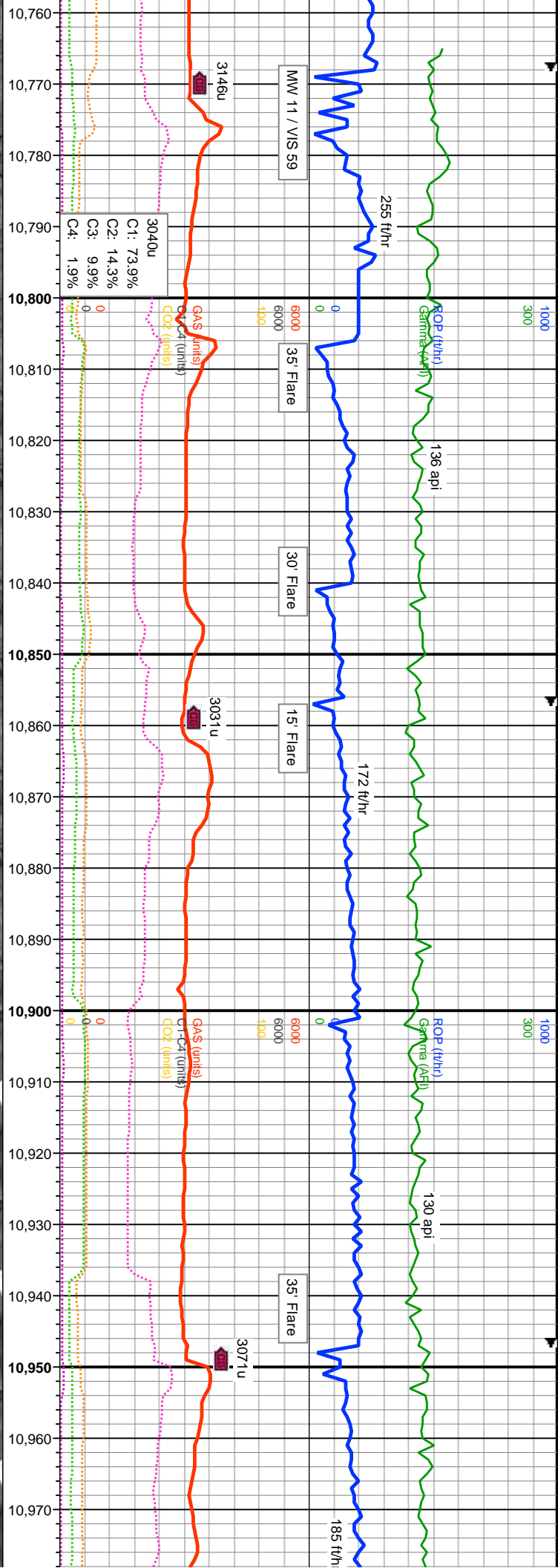




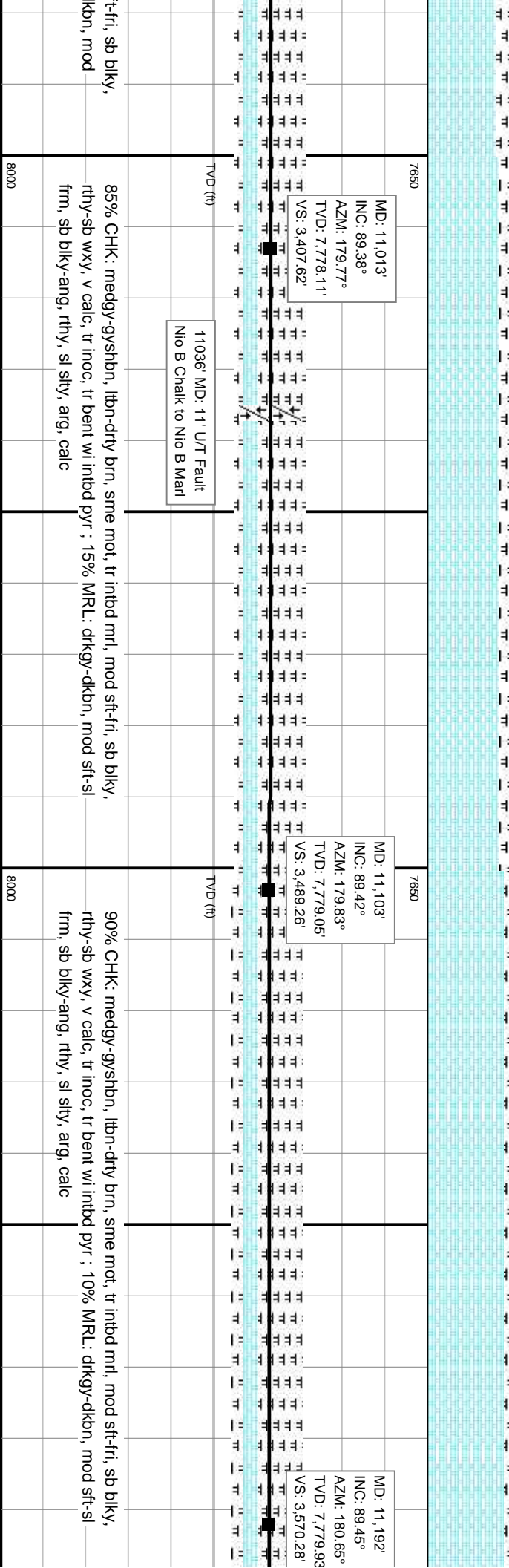
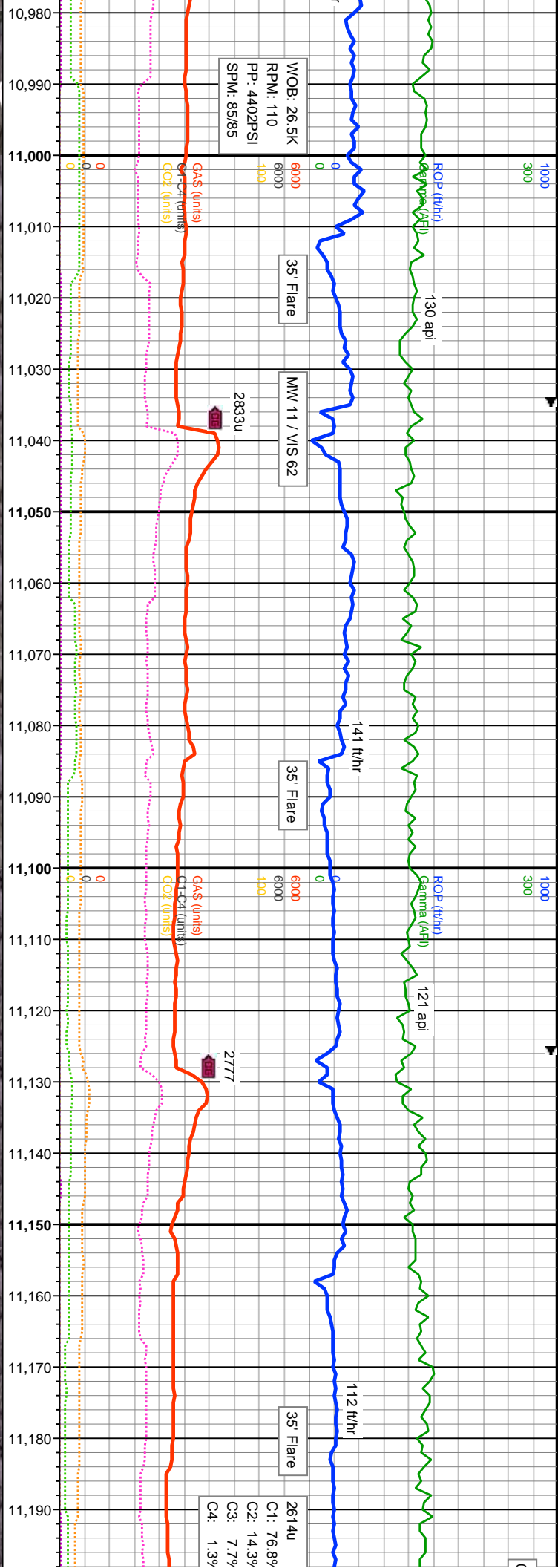


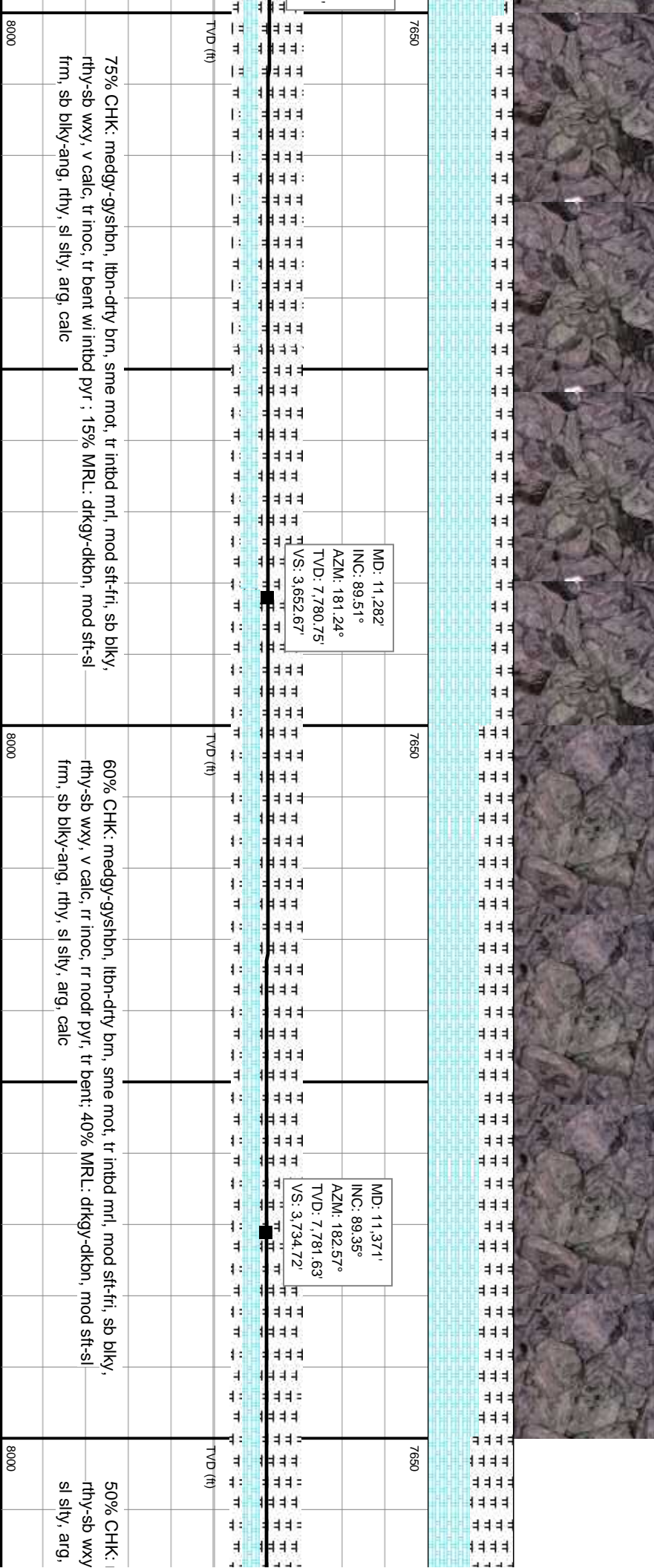
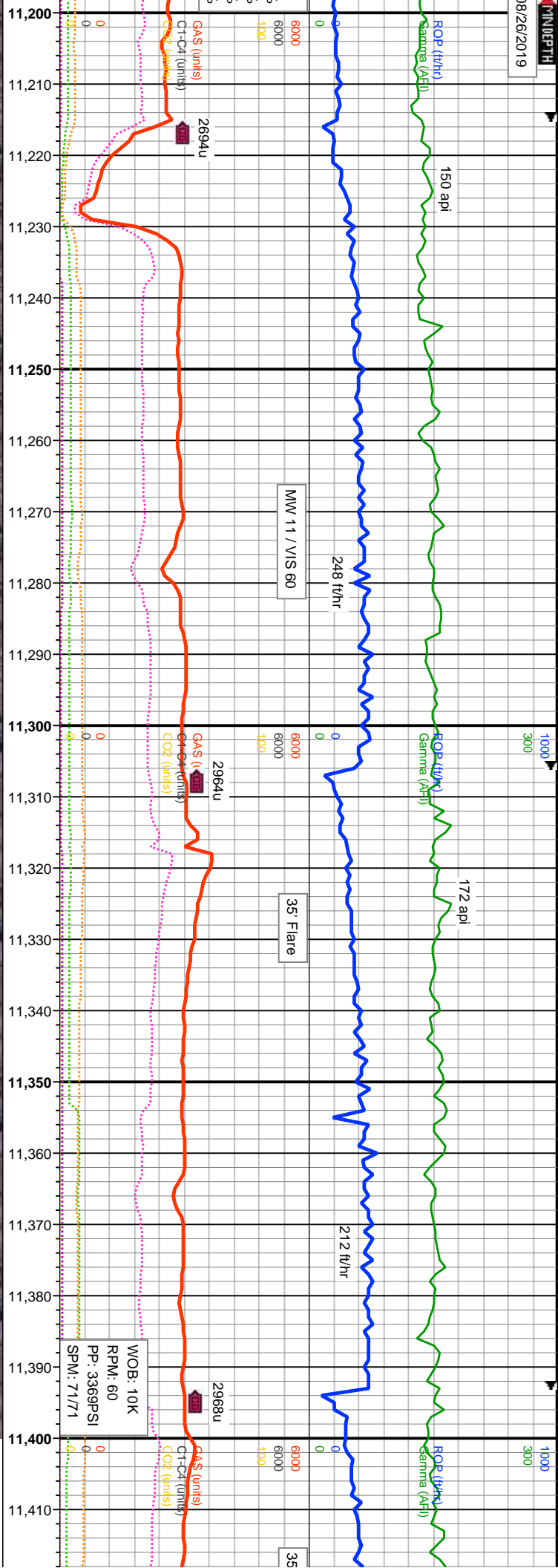




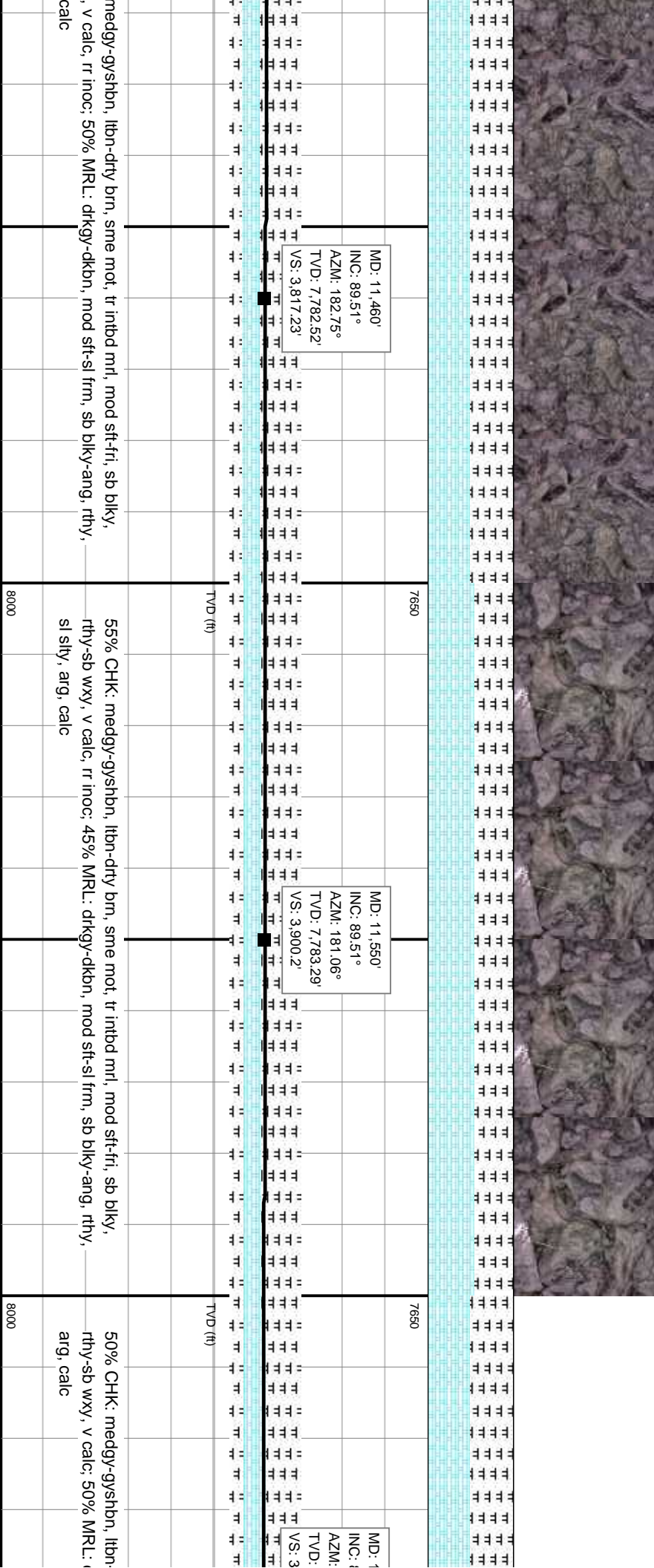
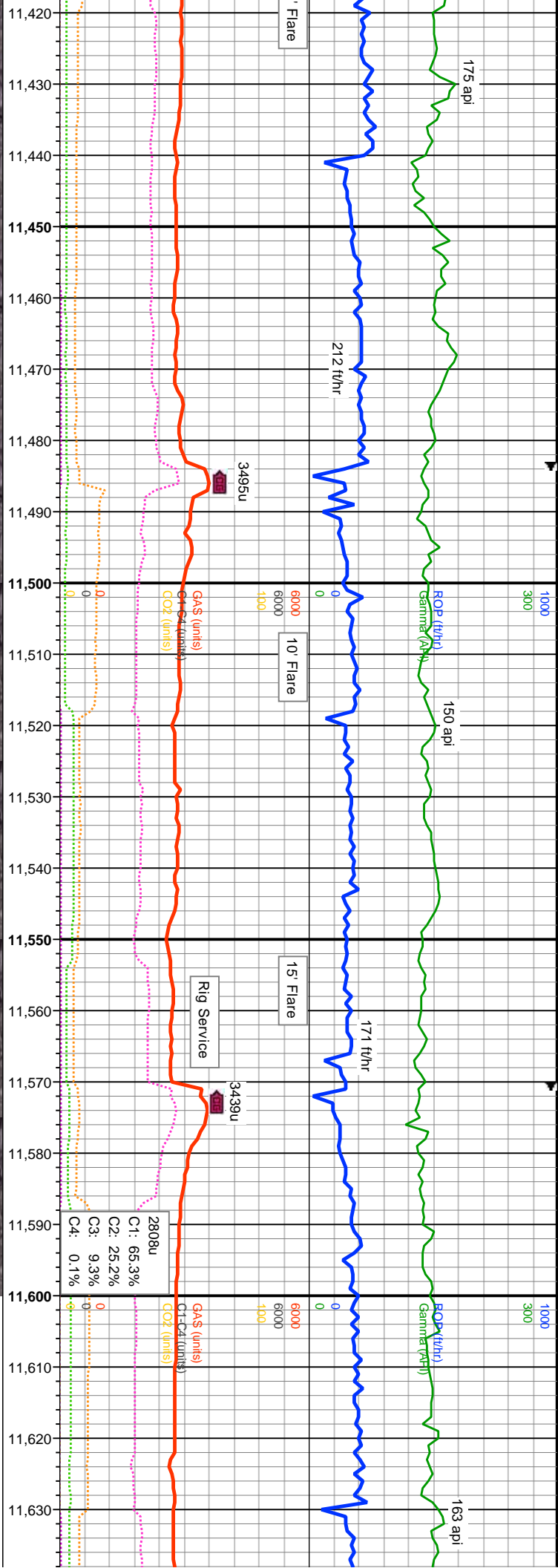




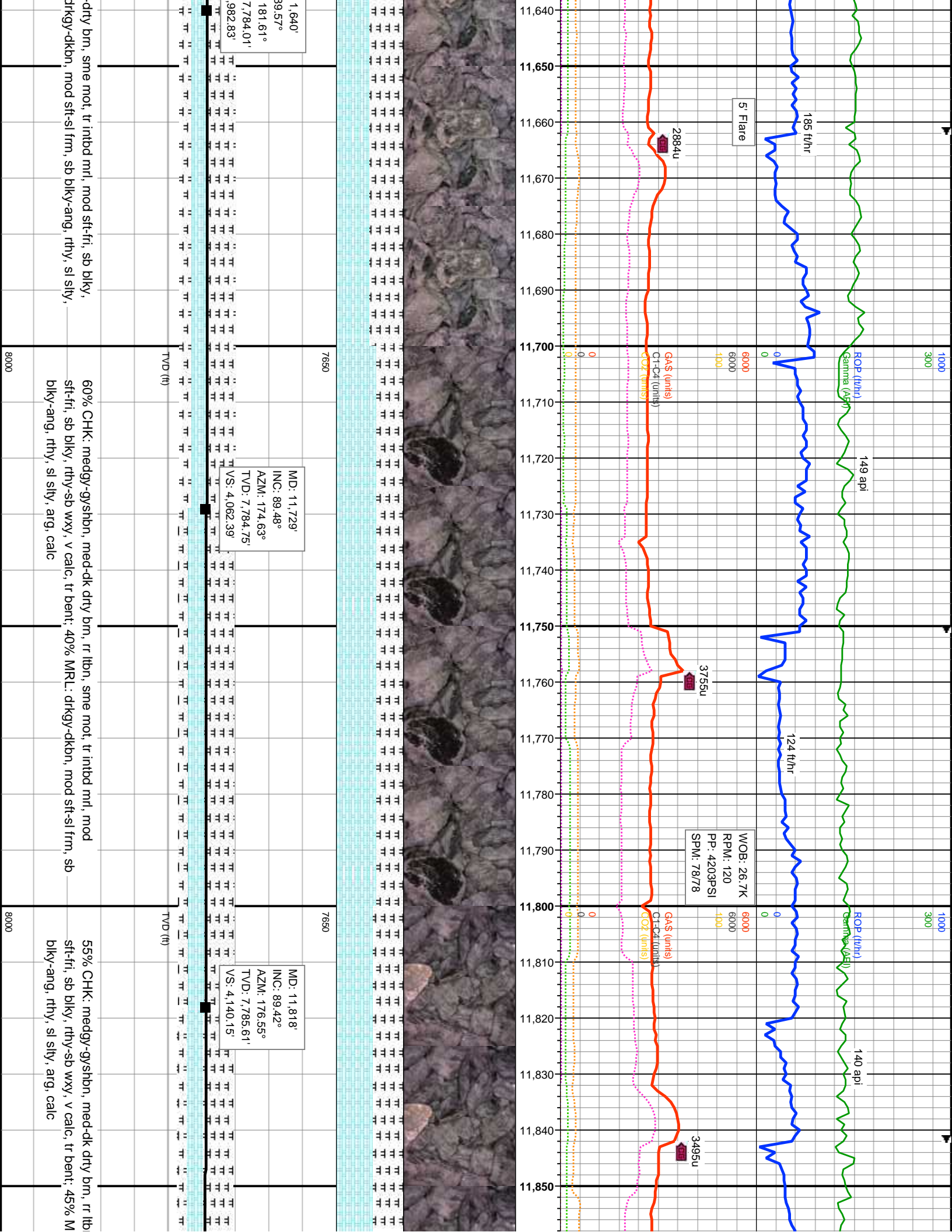


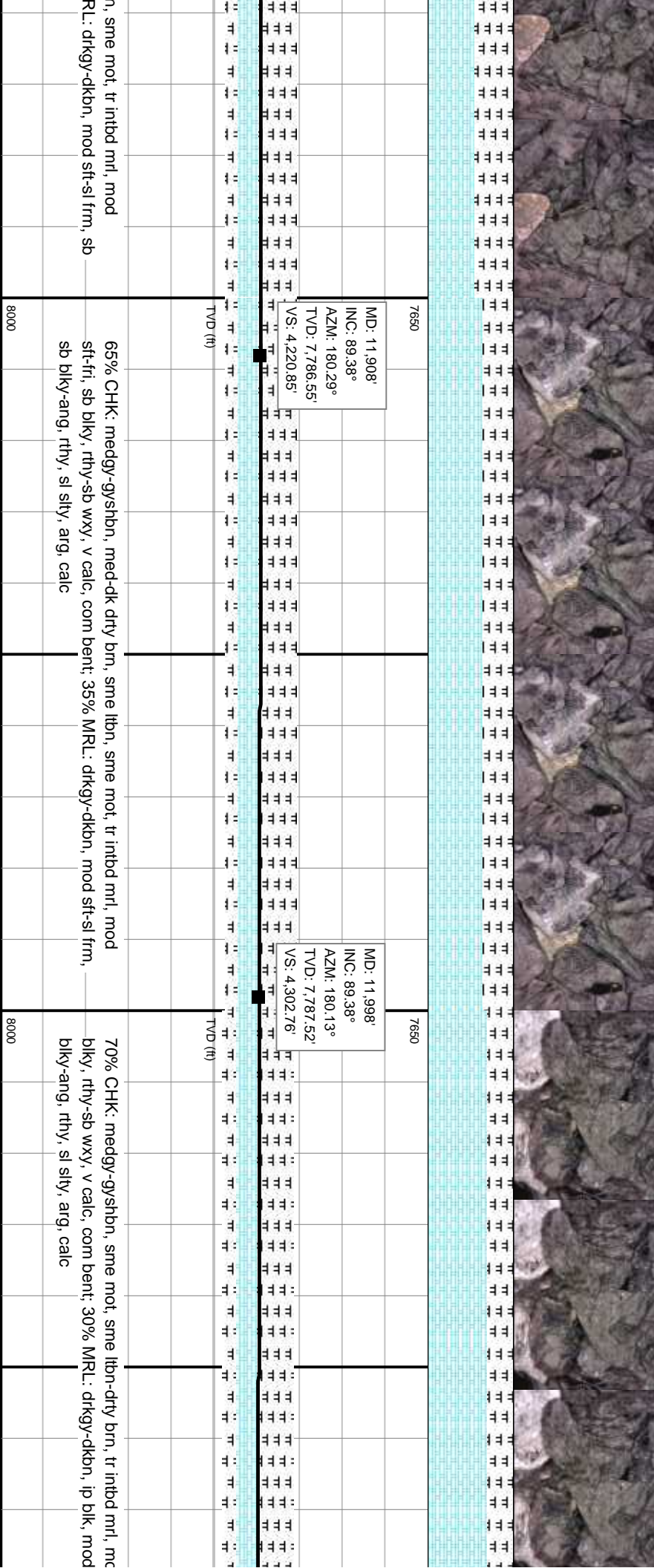
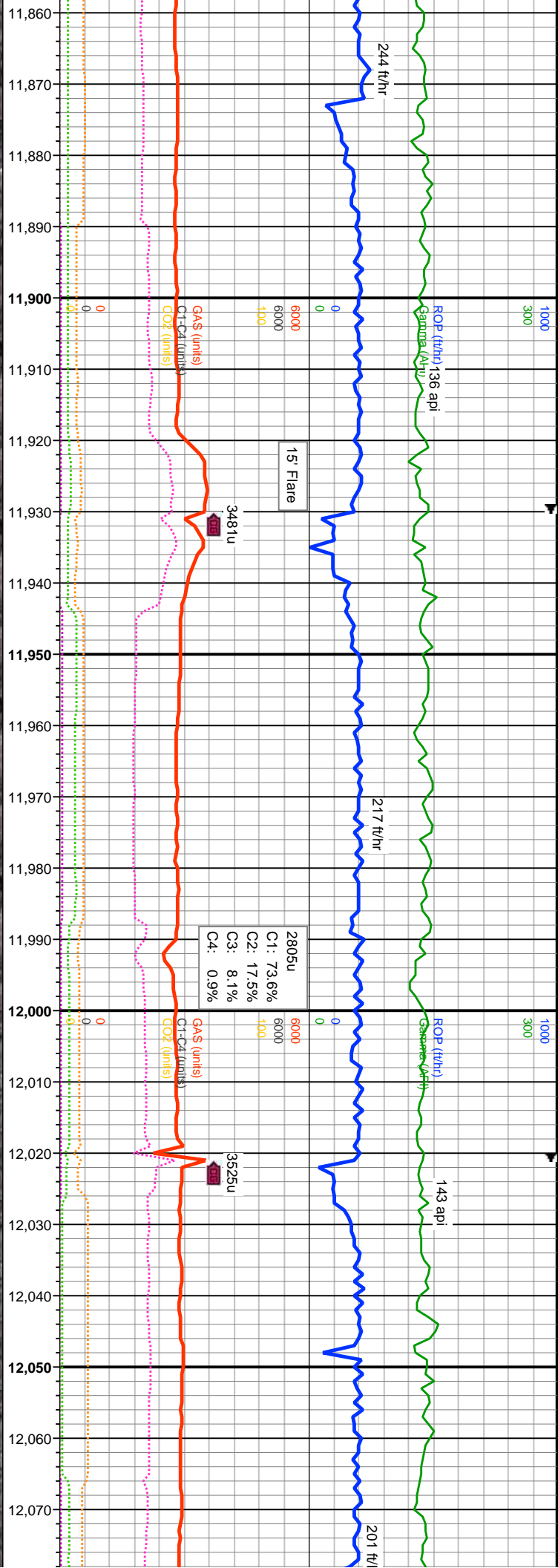




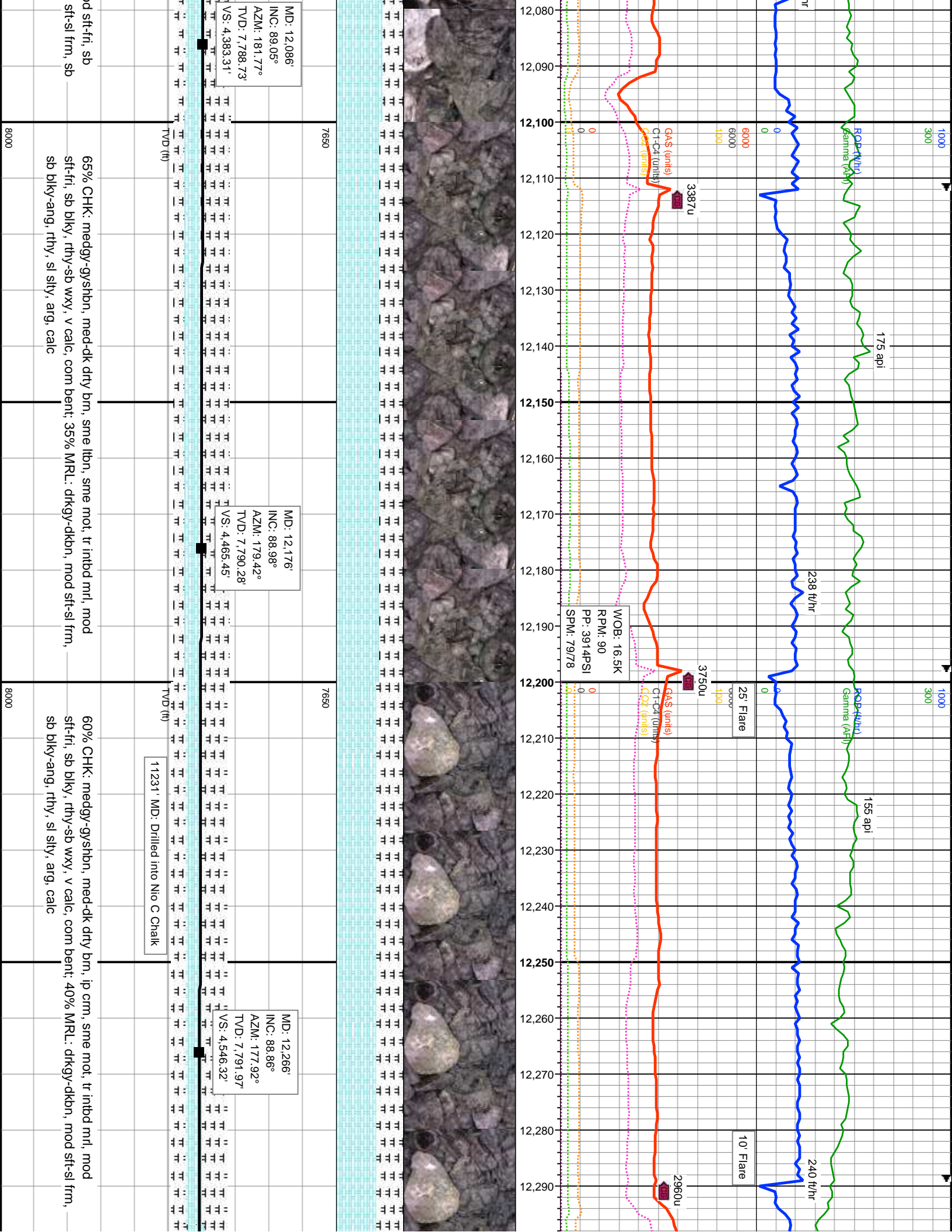


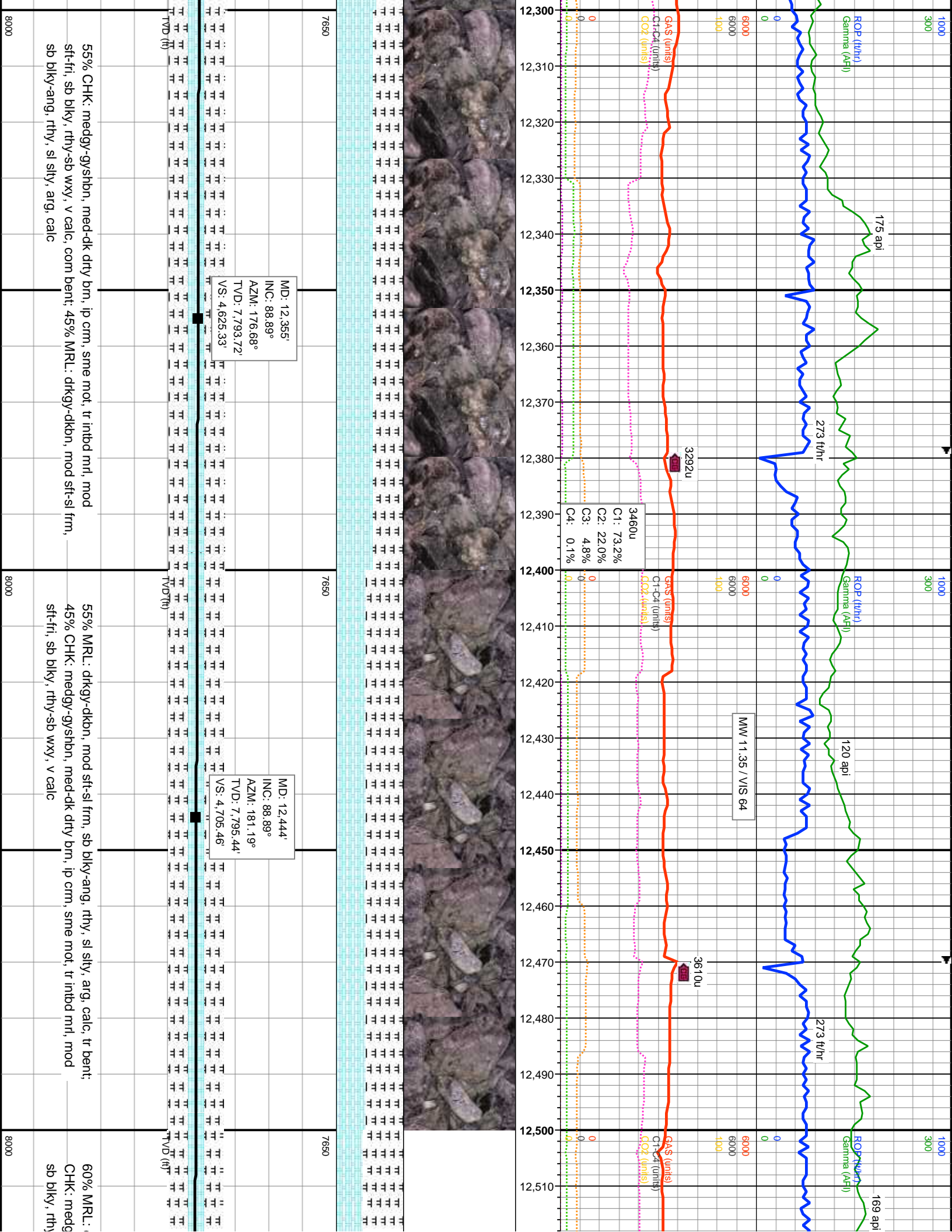




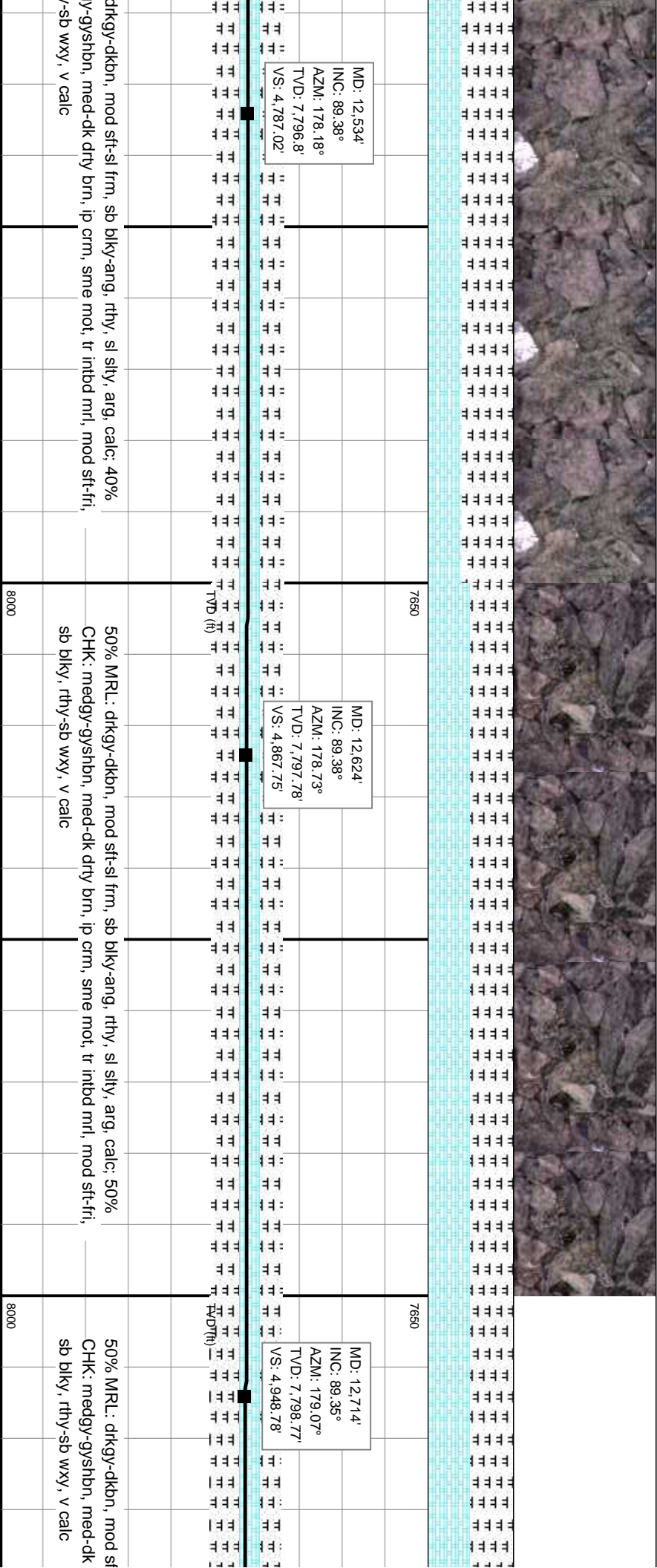
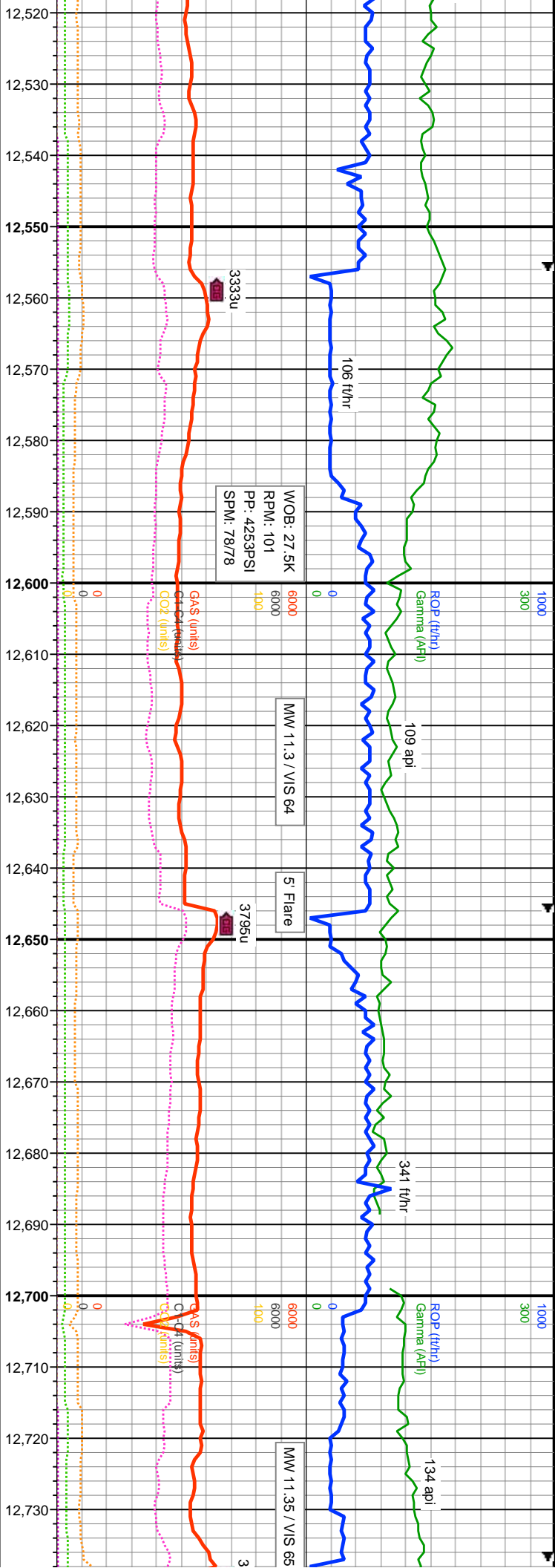


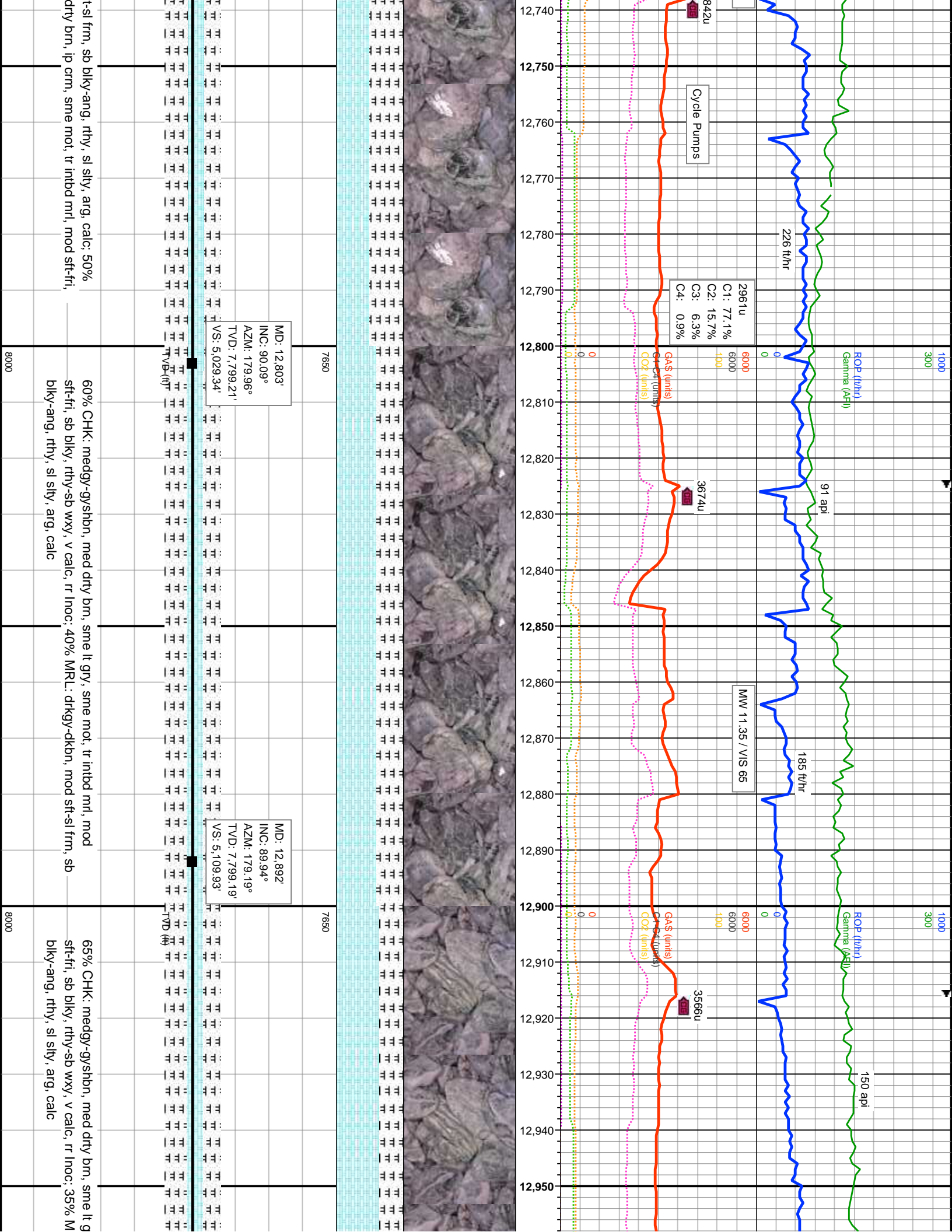




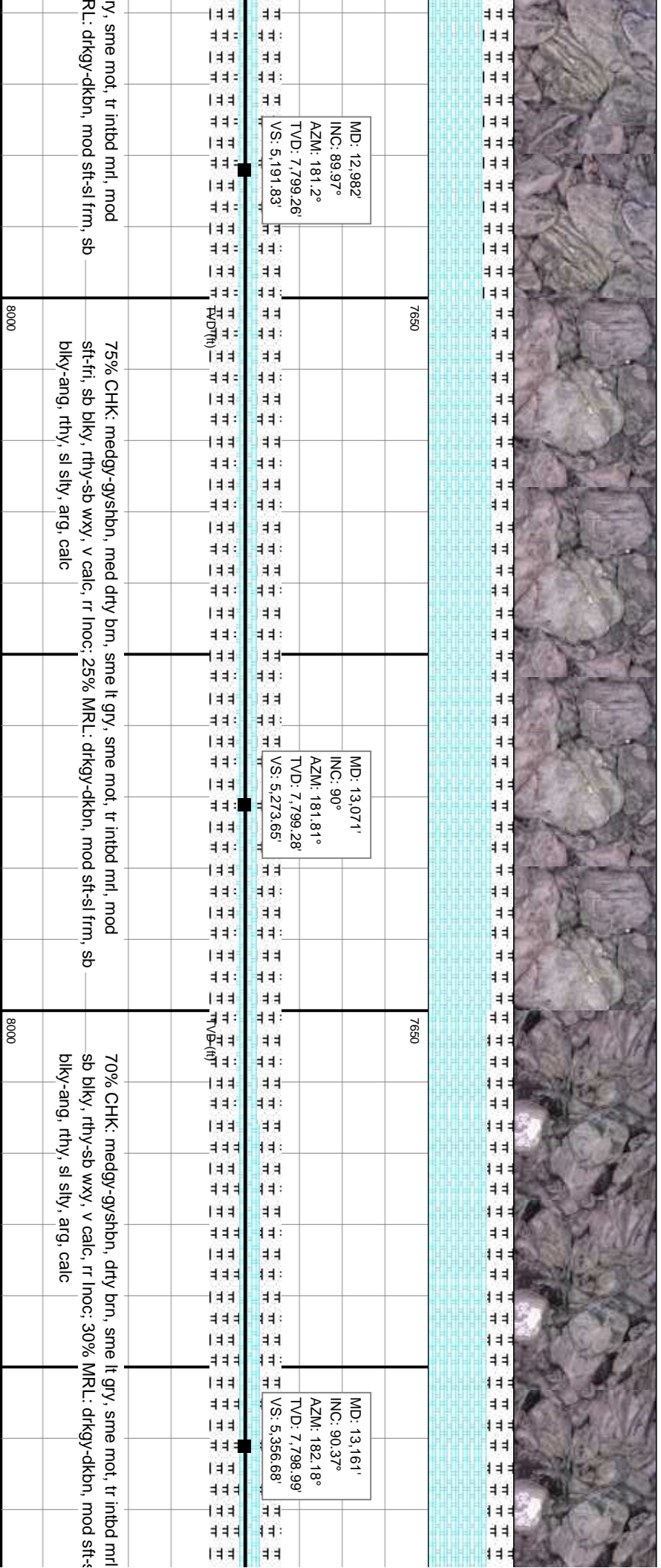
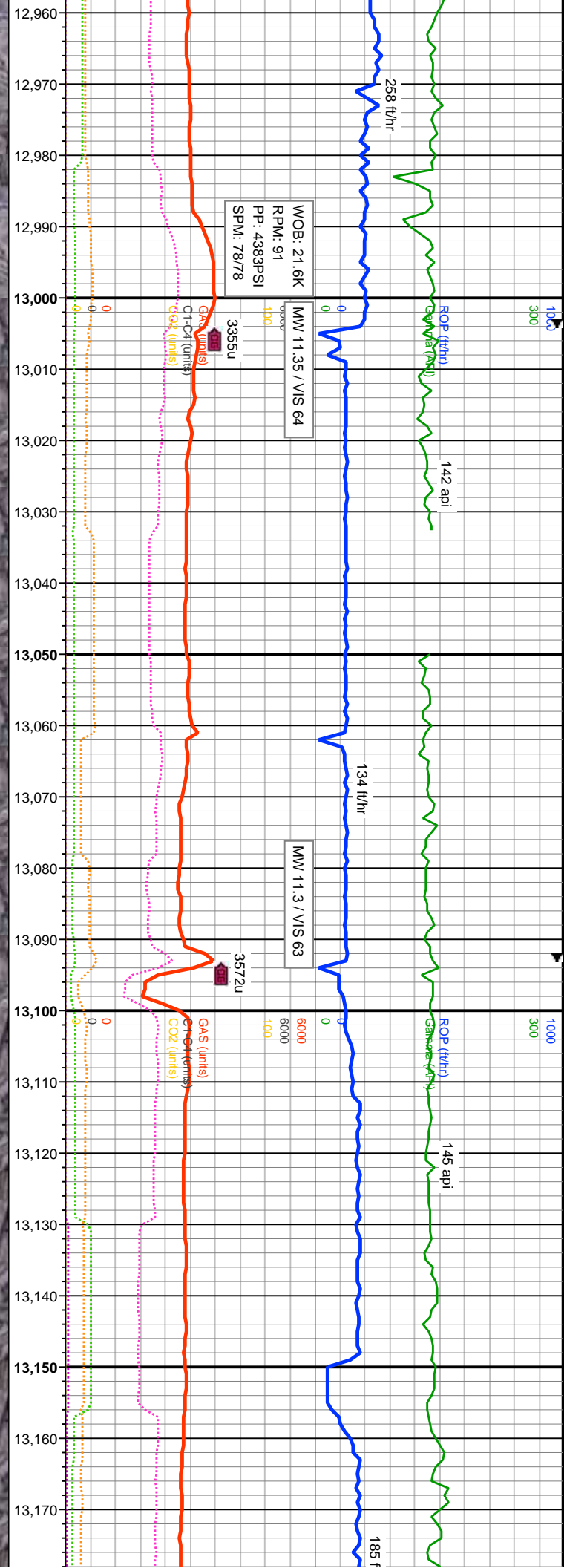


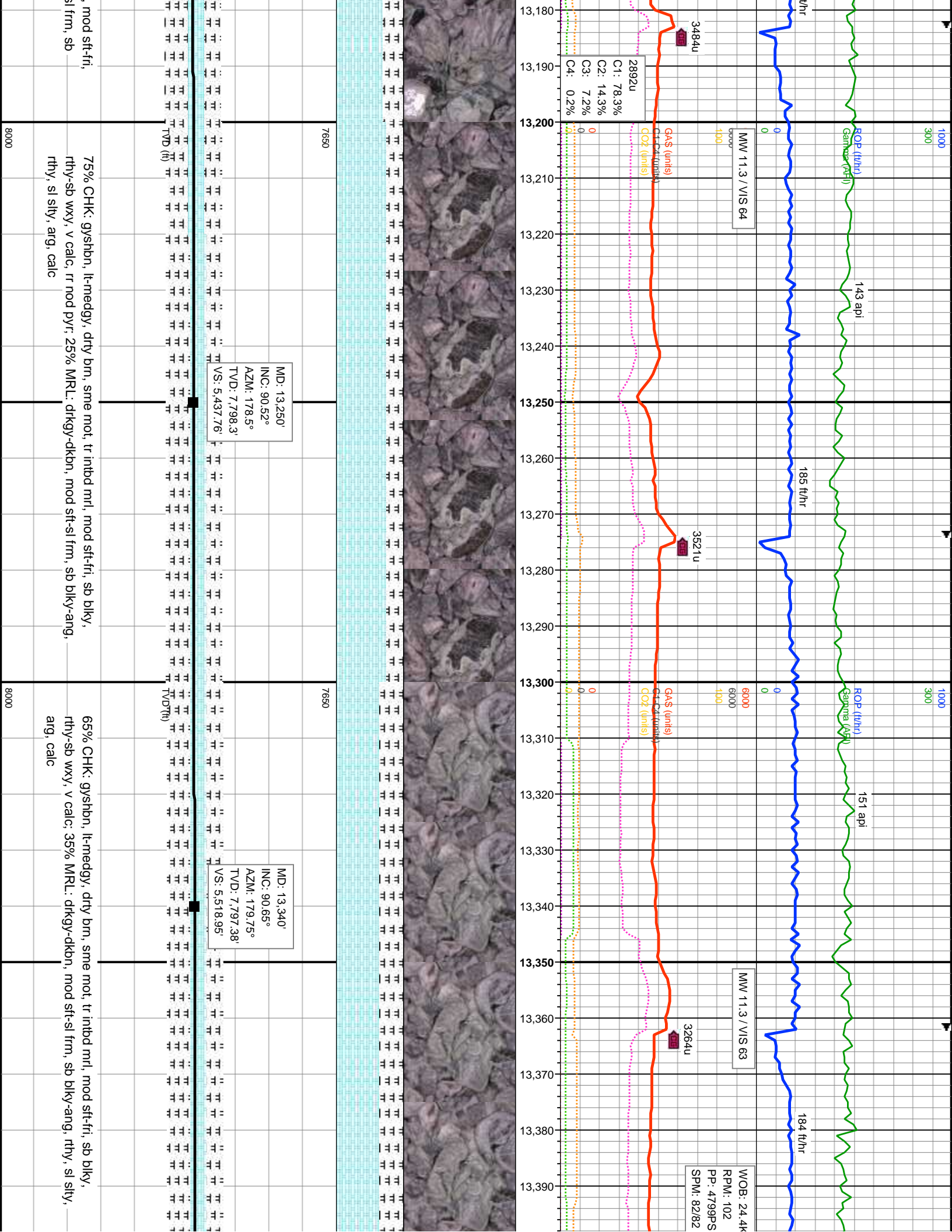




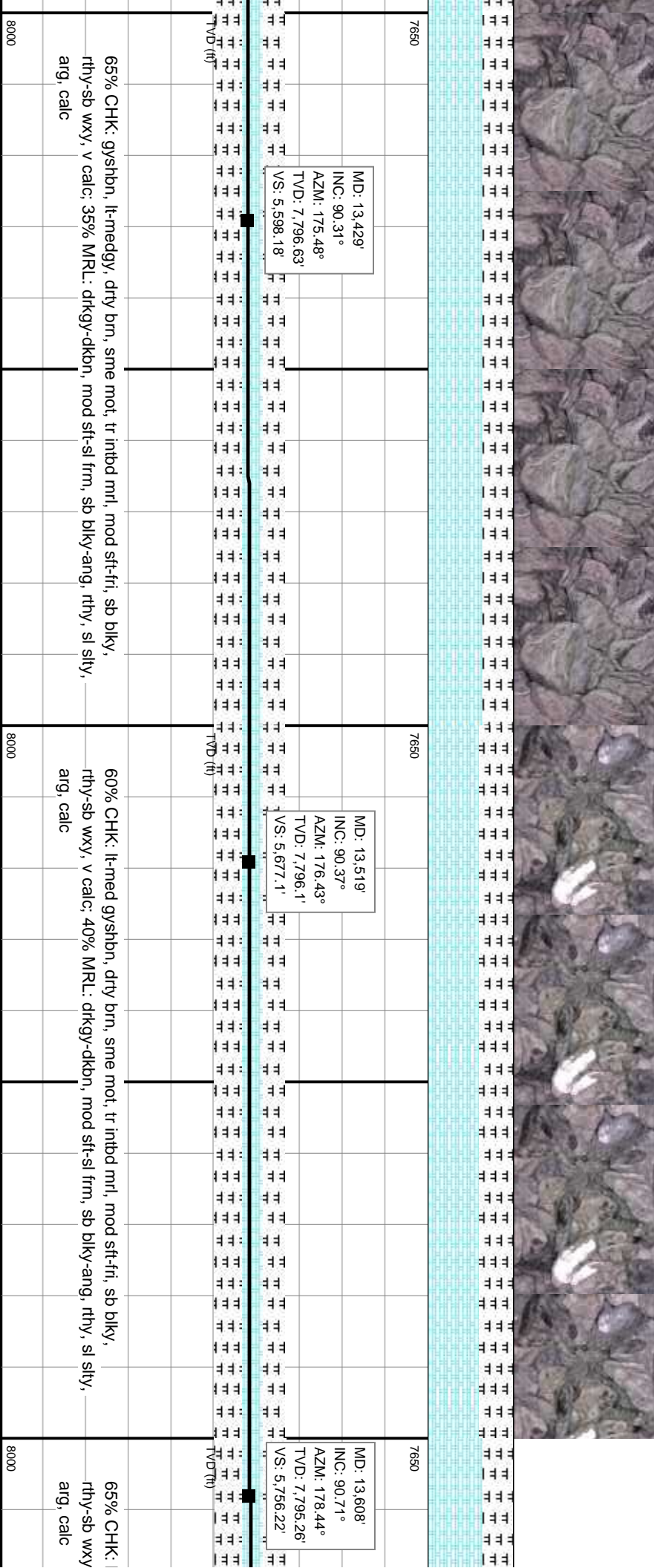
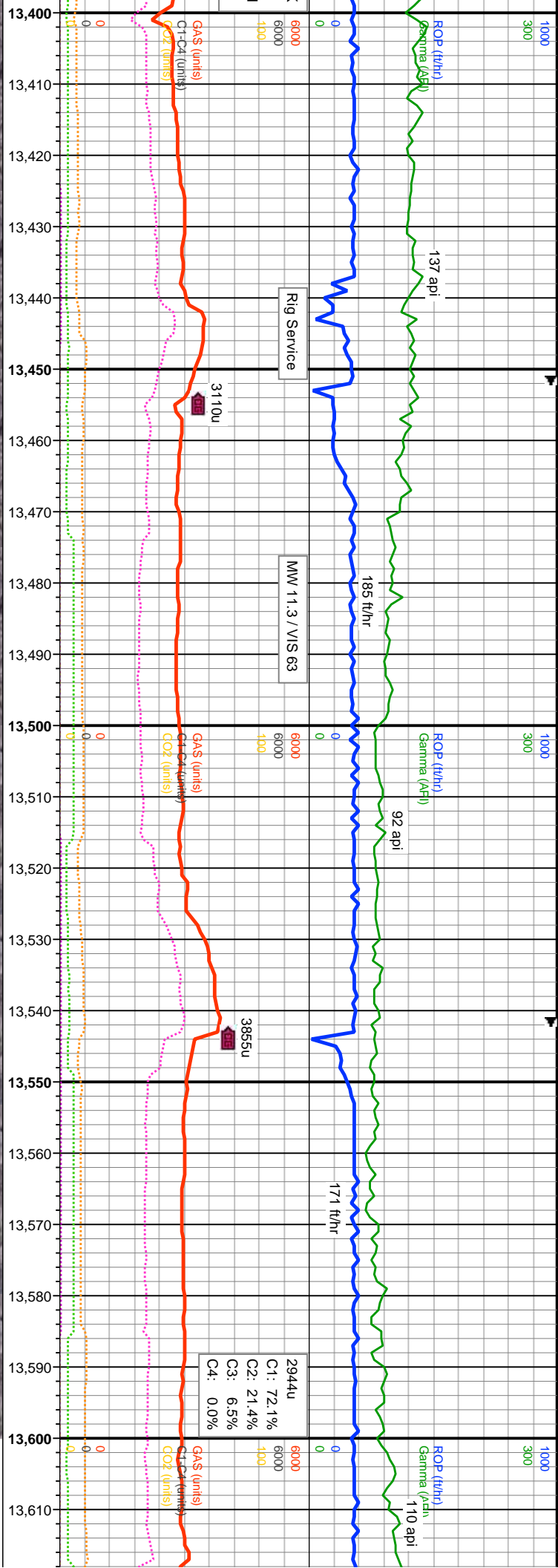


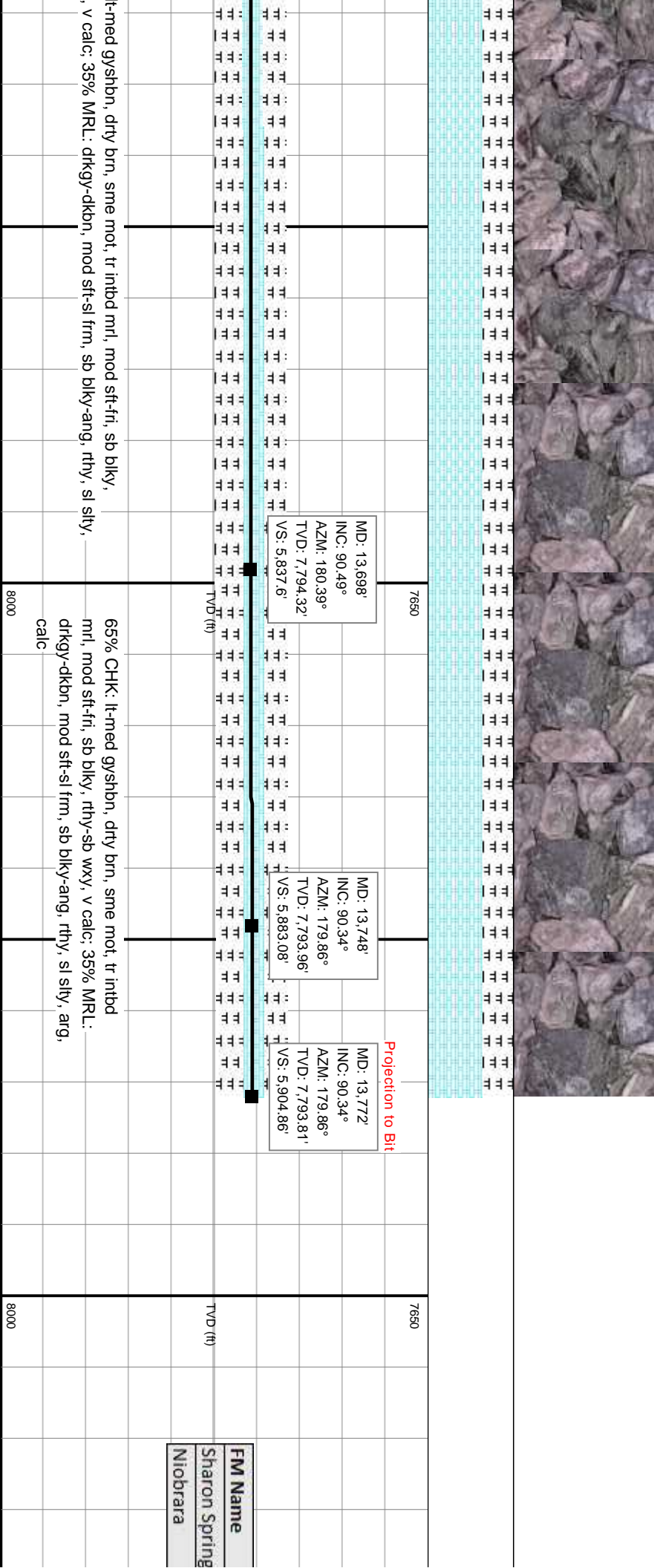
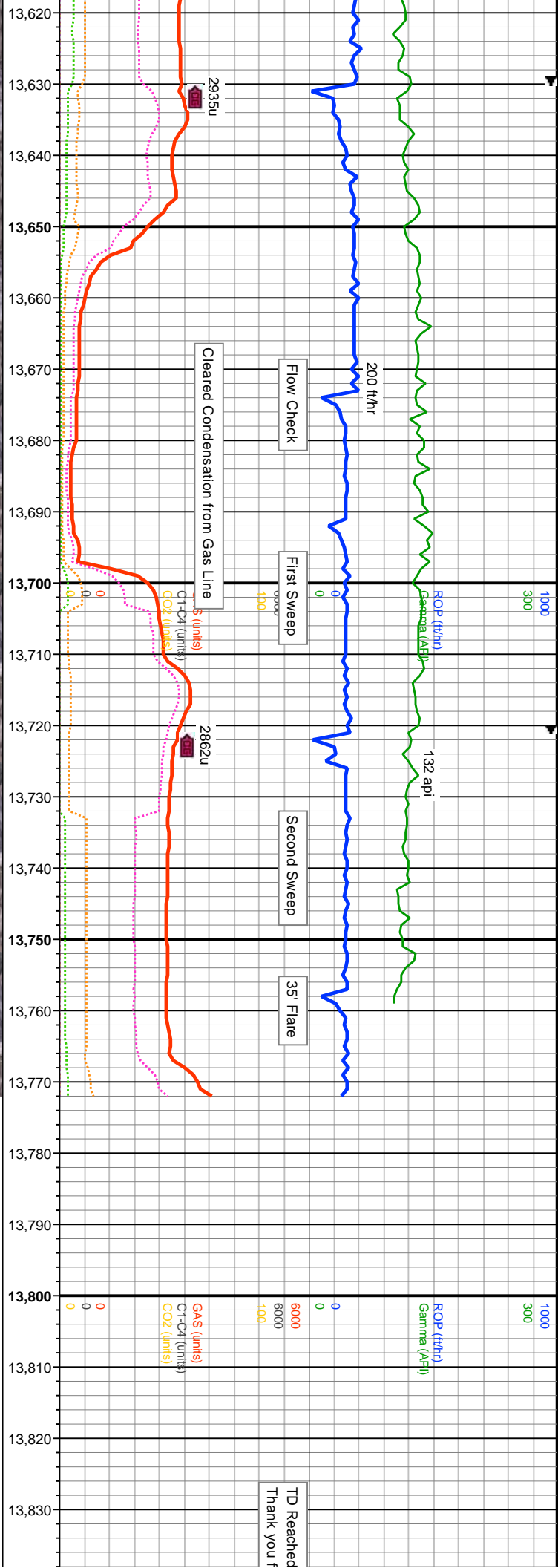




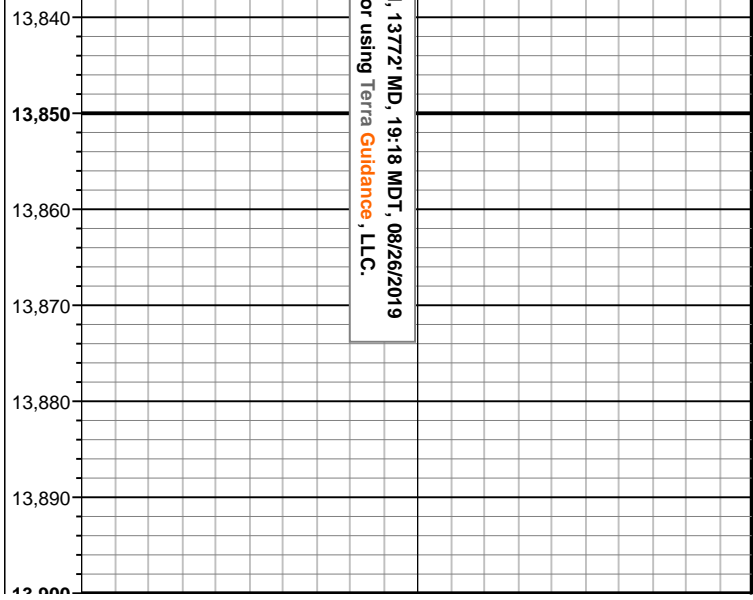












Excursion Depths ('MD)	
7999' MD	
8030' MD	