

# COLUMBINE LOGGING

Scale: 4.20" / 100'  
Measured Depth Log

**Well Name** Switchman 1647-17-11-H\_VERT

**Location** SWSW Sec17, T16S, R47W

**State** COLORADO

**County** CHEYENNE

**Country** USA

**Rig Number** PIONEER 54

**API Number** 0501707777

**AFE #** 2085288

**Region** LAS ANIMAS ARCH

**Field** WILDCAT

**Spud Date** 1/6/2014

**Drilling Completed** 1/23/2014

**Surface Coordinates** 350' FSL / 600' FWL

**Bottom Hole Coordinates** 650' FSL / 700'FWL

**Ground Elevation** 4185'

**K.B. Elevation** 4204'

**Logged Interval** 960' To 5040'

**Total Depth** 9230'

**Formation** SPERGEN

**Type of Drilling Fluid** FRESH WATER

## Operator

**Company** Anadarko Petroleum

**Address** 1099 18th St. Suite 1800  
Denver, CO 80202

## Geologist

**Name** Mark Lehrer

**Company** Anadarko Petroleum

**Address** 1099 18th St. Suite 1800  
Denver, CO 80202

## Other

## Rock Types

UNKNOWN	NO SAMPLE	GRANITE	SHALE GRAY
ANHYDRITE	BENTONITE	GYPSUM	SHALY SANDSTONE
CHALK	BRECCIA	IGNEOUS	SHALY SILTSTONE
MARLSTONE	CEMENT	SIDERITE or LIMONITE	TILL
DOLOMITE	CHERT	METAMORPHIC	TUFF
LIMESTONE	CLAY CHOKE SAND	SALT	WELDED TUFF
SANDSTONE	CLAYSTONE	SALT- PEPPER SAND	
SILTY SHALE	COAL	SHALE	
SILTSTONE	CONGLOMERATE	SHALE COLORED	

## Accessories

### Fossils

ALGAE
AMPHIPORA
BELEMNITE
BIOCLASTIC
BRACHIOPOD
BRYOZOA
CEPHALOPOD
CORAL
CRINOID
ECHINOID
FISH
FORAMINIFERA

### Fossil

GASTROPOD
INOCERAMUS
OOLITE
OSTRACOD
PELECYPOD
PELLET
PISOLITE
PLANT REMAINS
PLANT SPORES
SCAPHOPOD
STROMATOPOROID

### Minerals

### ANHYDRITIC

ARGILLACEOUS
ARGILLITE GRAIN
BENTONITE
BITUMENOUS SUBSTANCE
BRECCIA FRAGMENTS
CALCAREOUS
CARBONACEOUS FLAKES
CHTDK
CHTLT
COAL - THIN BEDS
DOLOMITIC
FELDSPAR
FERRUGINOUS PELLET

### FERRUGINOUS

GLAUCONITE
GYPSIFEROUS
HEAVY MINERAL
KAOLIN
MARLSTONE
MINERAL CRYSTALS
NODULES
PHOSPHATE PELLETS
PYRITE
SALT CAST
SANDY
SILICEOUS
SILTY

### TUFFACEOUS

### Stringer

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

## Other Symbols

### Oil Show

DEAD
EVEN
QUESTIONABLE
SPOTTED STAINING

### Porosity

E EARTHY
FENESTRAL
FRACTURE
INTERCRYSTALLINE
INTEROOLITIC

### MOLDIC

ORGANIC
PINPOINT
VUGGY

### Engineering

BIT
CONNECTION (LEFT)
CONNECTION (RIGHT)
CONNECTION GAS
CORE - LOST
CORE - RECOVERED
DST INTERVAL

### FAULT

FORMATION TOP
GAS SHOW
MN DEPTH
NORMAL FAULT
OIL SHOW
OVERTURNED STRATA
REVERSE FAULT
SIDEWALL CORE (LEFT)
SIDEWALL CORE (RIGHT)
SLIDE
SURVEY
TRIP GAS

### WIRELINE TESTED - LEFT

### WIRELINE TESTED - RT

### Rounding

ANGULAR
ROUNDED
SUBANG
SUBRND

### Textures

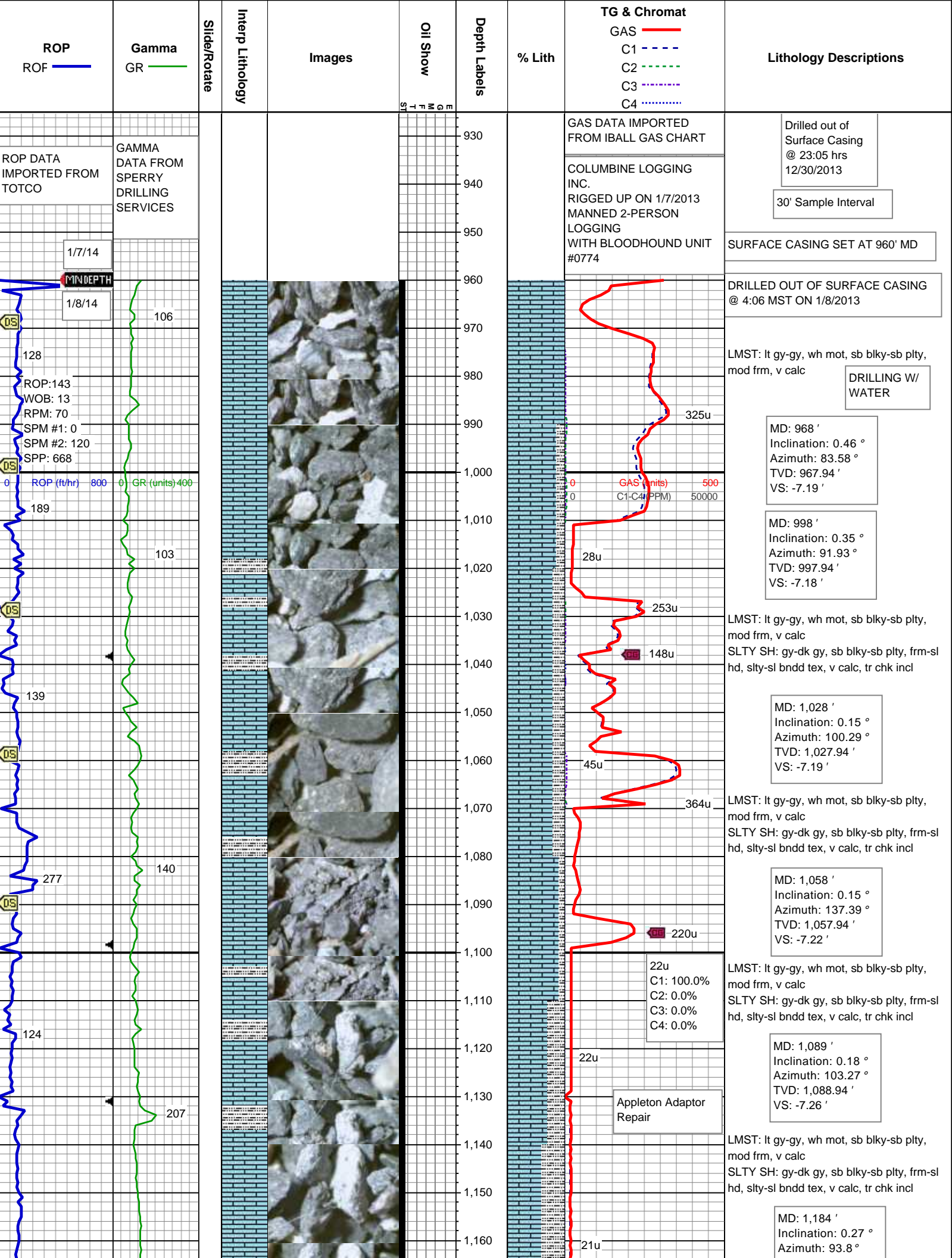
BOUNDSTONE
CHALKY
CRYPTOXLN

### E EARTHY

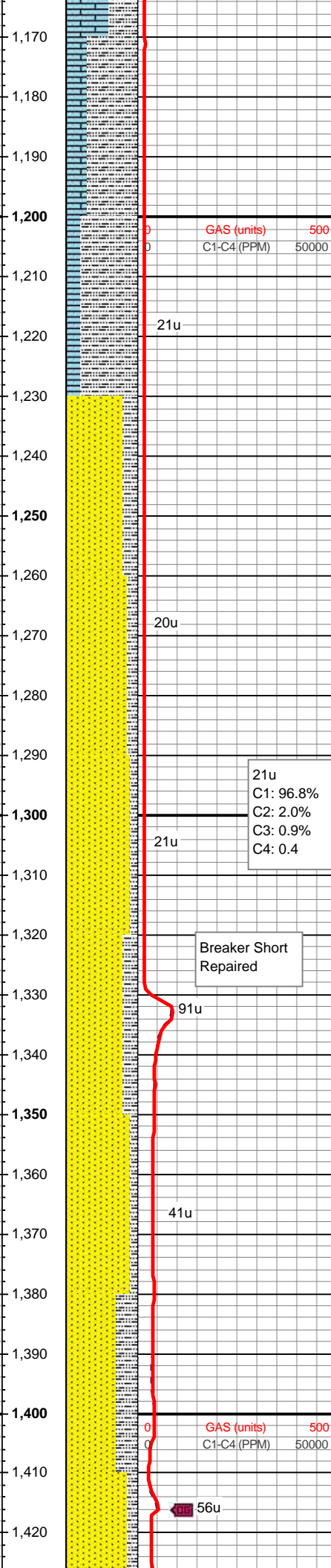
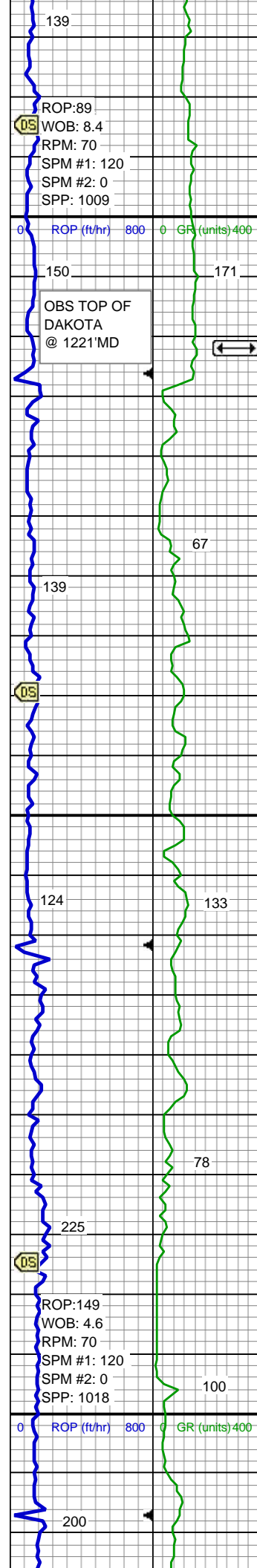
FINELYXLN
GRAINSTONE
L LITHOGRAPHIC
MIX MICROXLN
MUDSTONE
PACKSTONE
WACKESTONE

### Sorting

MODERATE
POOR
WELL







TVD: 1,183.94 '  
VS: -7.31 '

SLTY SH: gy-dk gy, sb blkly-sb plty, frm-sl hd, slty-sl bndd tex, v calc, tr chk incl  
LMST: lt gy-gy, sb blkly-sb plty, mod frm, v calc

**Mud Wt: 8.8 In/ 8.8 Out  
Vis 33 In/ 33 Out**

SLTY SH: gy-dk gy, sb blkly-sb plty, frm-sl hd, slty-sl bndd tex, v calc, tr chk incl  
LMST: lt gy-gy, sb blkly-sb plty, mod frm, v calc

SS: wh-lt gy, occ cl, frm-hd, f-vf gr, sb ang-sb rnd,  
p ind, sl uncons, p por, sil-arg cmt  
SLTY SH: dk gy-blk, sb blkly-sb plty, frm-sl hd, slty-sl bndd tex, v calc

**MD: 1,279 '  
Inclination: 0.24 °  
Azimuth: 114.88 °  
TVD: 1,278.94 '  
VS: -7.41 '**

SS: wh-lt gy, frm-hd, f-vf gr, sb ang-sb rnd, p ind, sl uncons, p por, slty tex ip, sil-arg cmt, tr glau, tr dk lthc frag  
SLTY SH: dk gy-blk, sb blkly-sb plty, frm-sl hd, slty-sl bndd tex, sl calc

**Mud Wt: 8.8 In/ 8.9 Out  
Vis 33 In/ 35 Out**

SS: wh-lt gy, frm-hd, f-vf gr, sb ang-sb rnd, p ind, sl uncons, p por, slty tex ip, sil-arg cmt, tr glau, tr dk lthc frag  
SLTY SH: dk gy-blk, sb blkly-sb plty, frm-sl hd, slty-sl bndd tex, sl calc

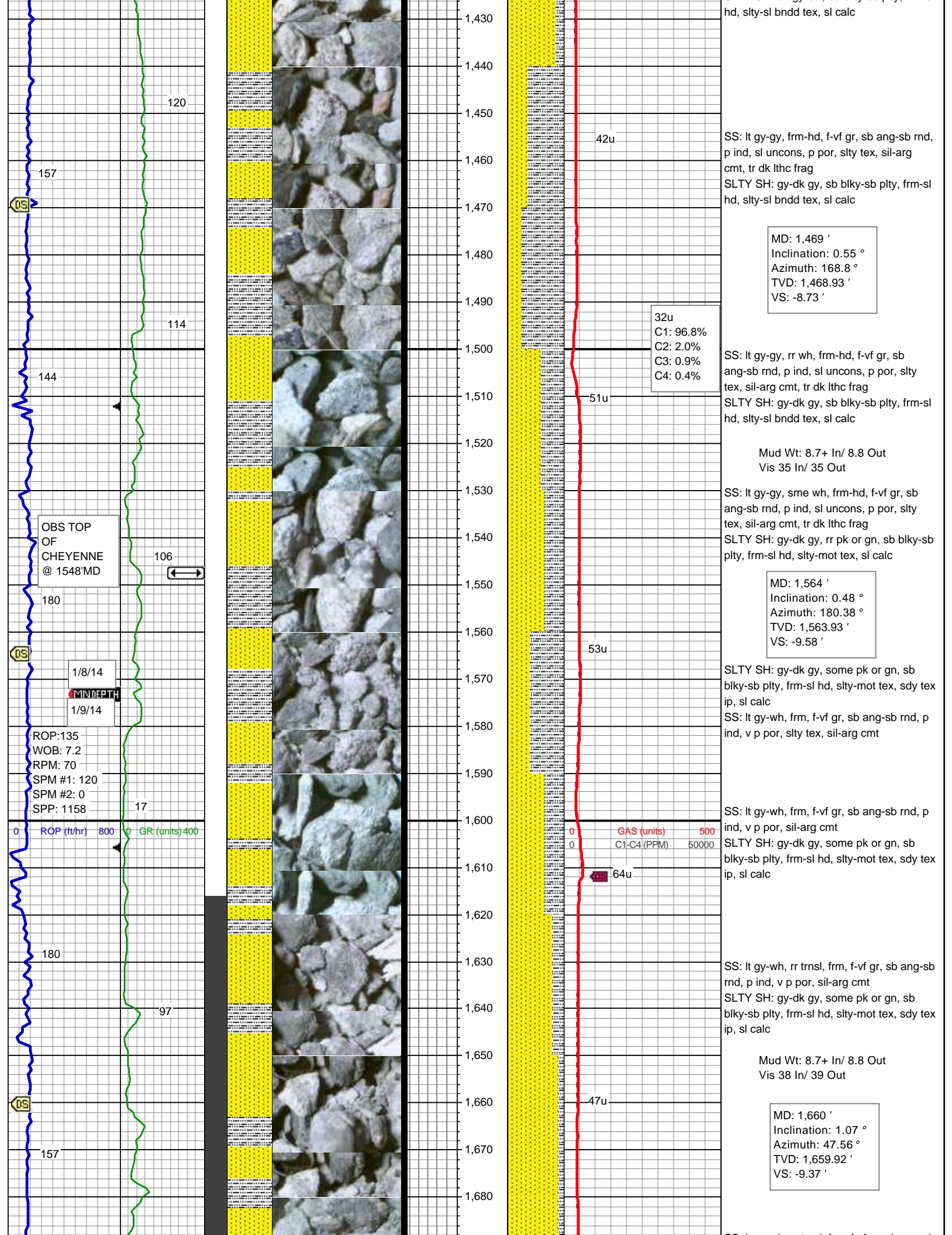
**MD: 1,374 '  
Inclination: 0.49 °  
Azimuth: 166.25 °  
TVD: 1,373.94 '  
VS: -7.89 '**

SS: wh-lt gy, frm-hd, f-vf gr, sb ang-sb rnd, p ind, sl uncons, p por, slty tex ip, sil-arg cmt, tr glau, tr dk lthc frag  
SLTY SH: dk gy-blk, sb blkly-sb plty, frm-sl hd, slty-sl bndd tex, sl calc

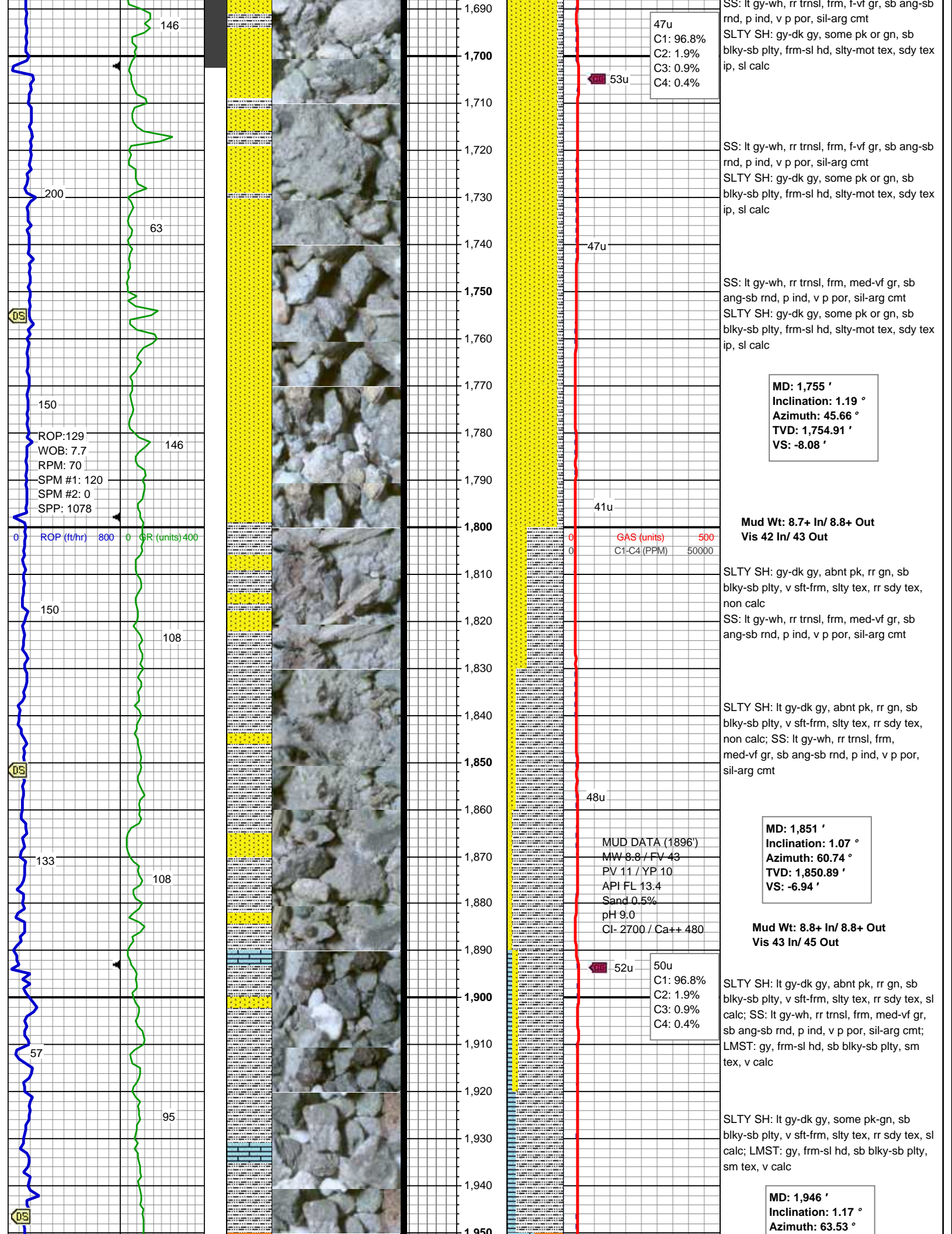
**Mud Wt: 8.8 In/ 8.8 Out  
Vis 33 In/ 34 Out**

SS: wh-lt gy, frm-hd, f-vf gr, sb ang-sb rnd, p ind, sl uncons, p por, slty tex ip, sil-arg cmt, tr glau, tr dk lthc frag  
SLTY SH: dk gy-blk, sb blkly-sb plty, frm-sl

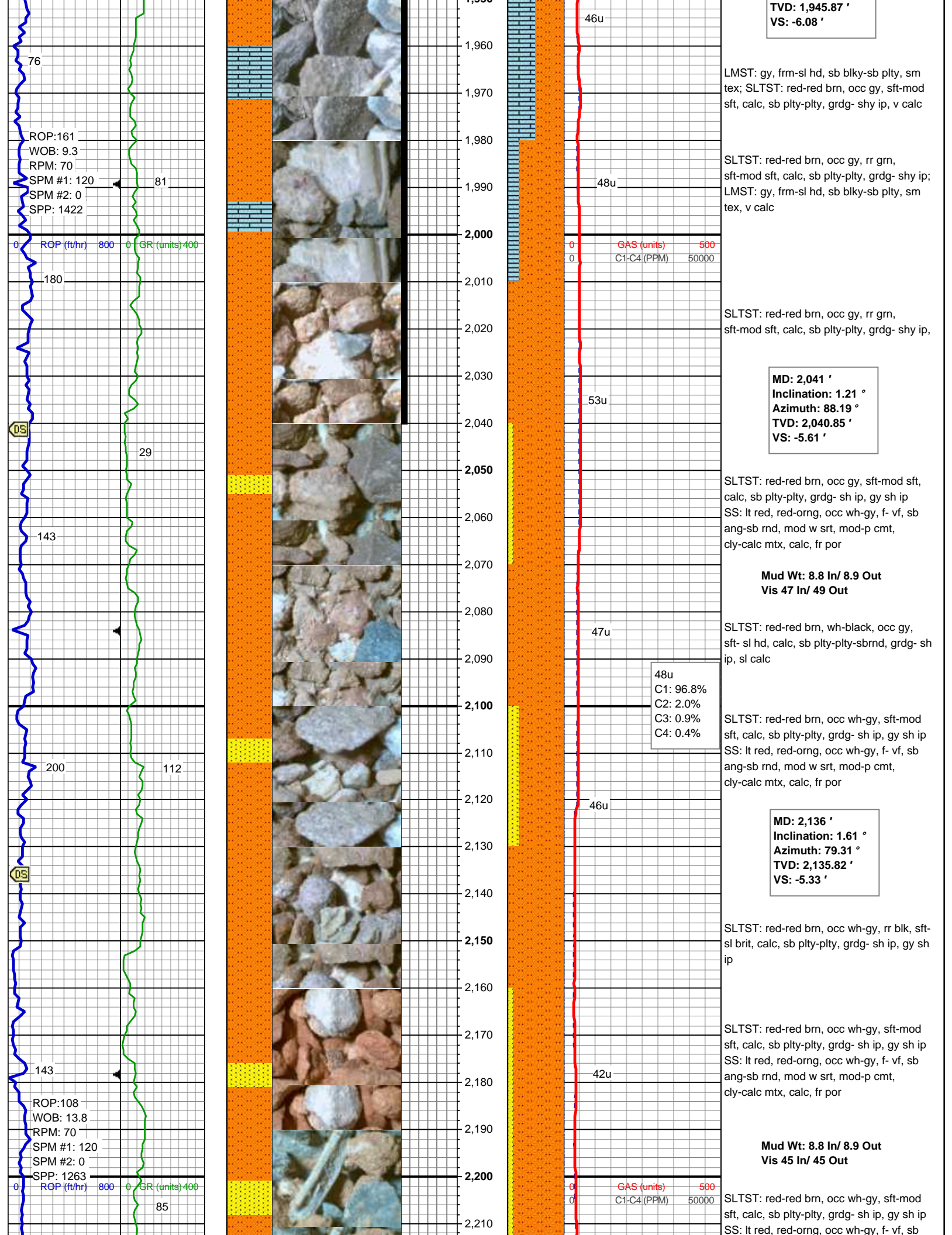


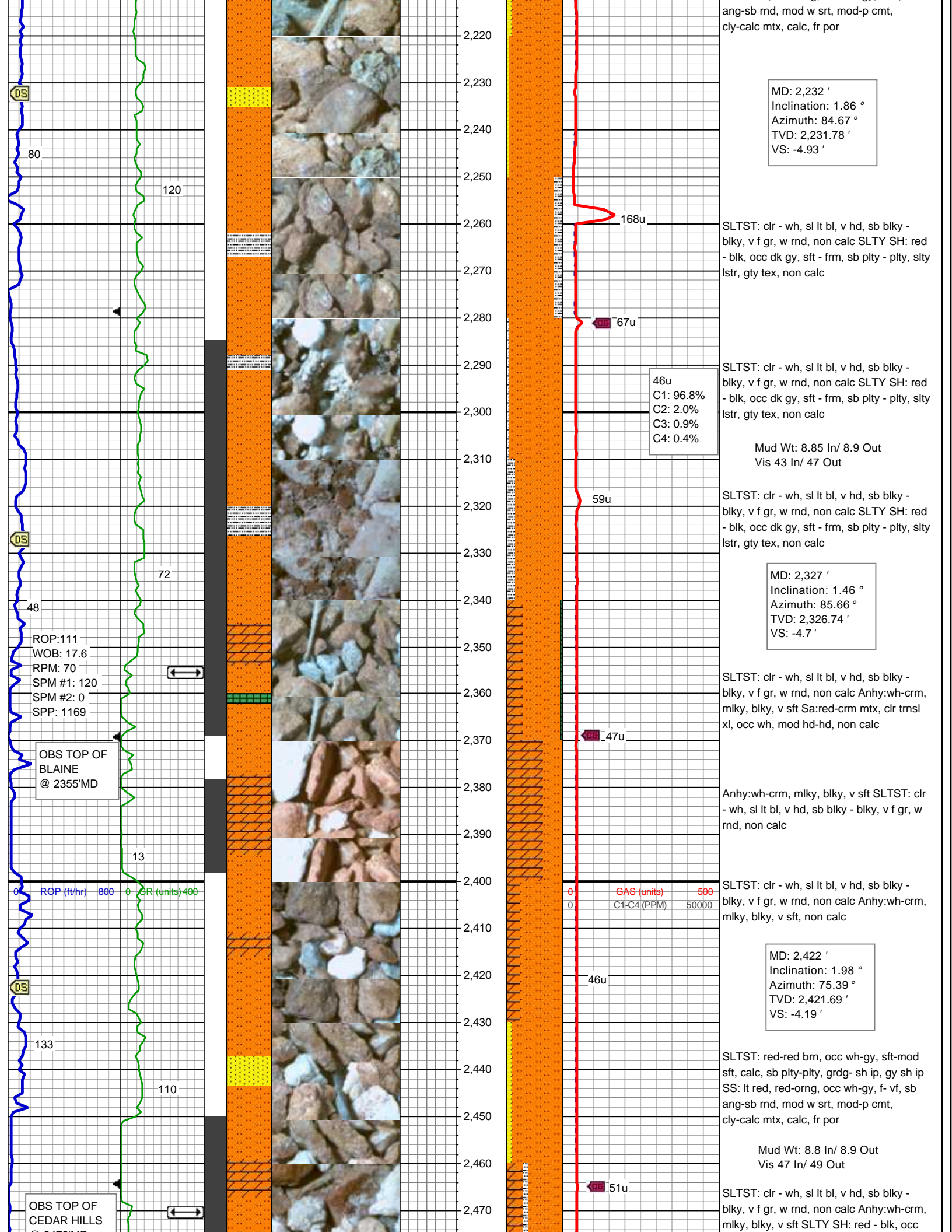




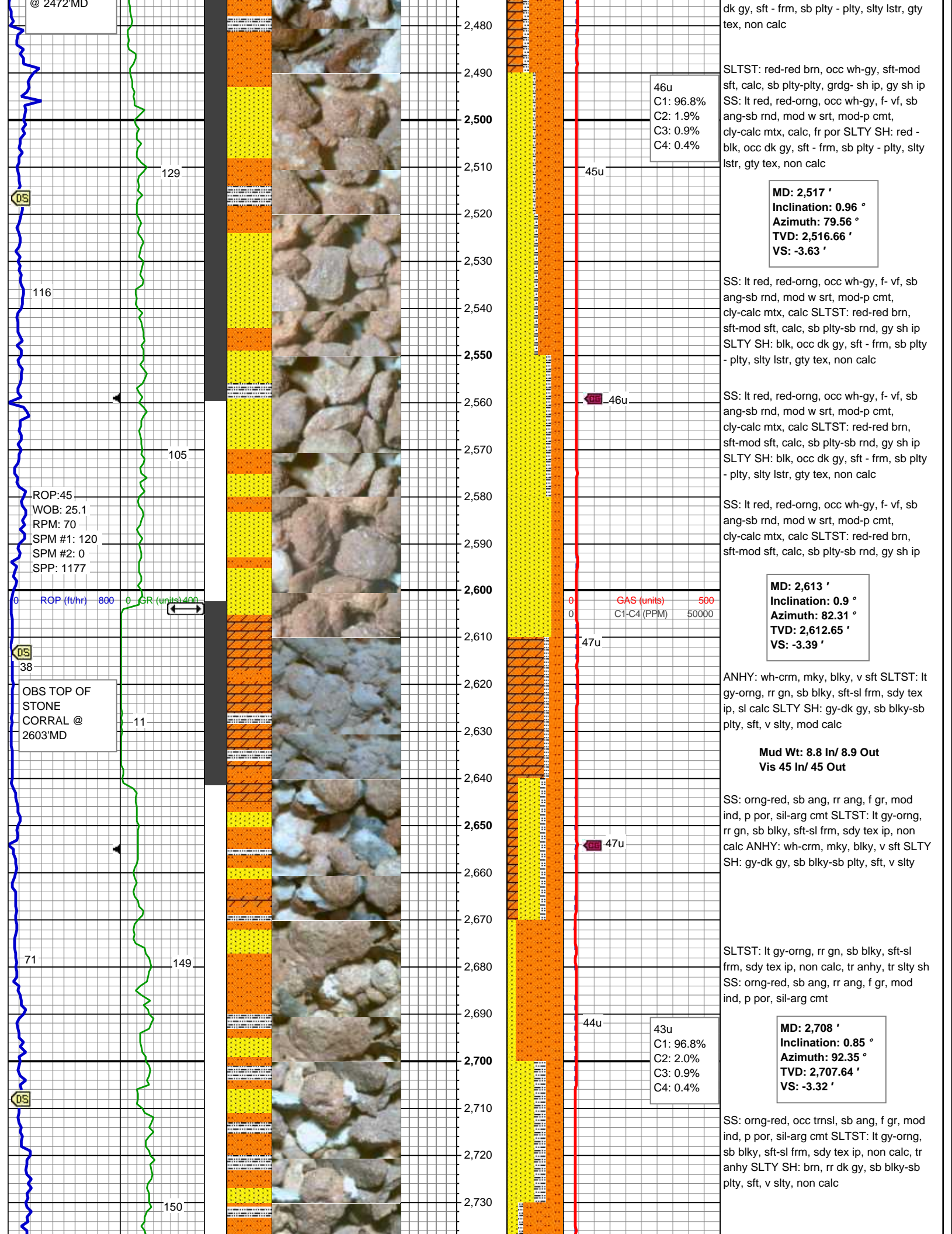




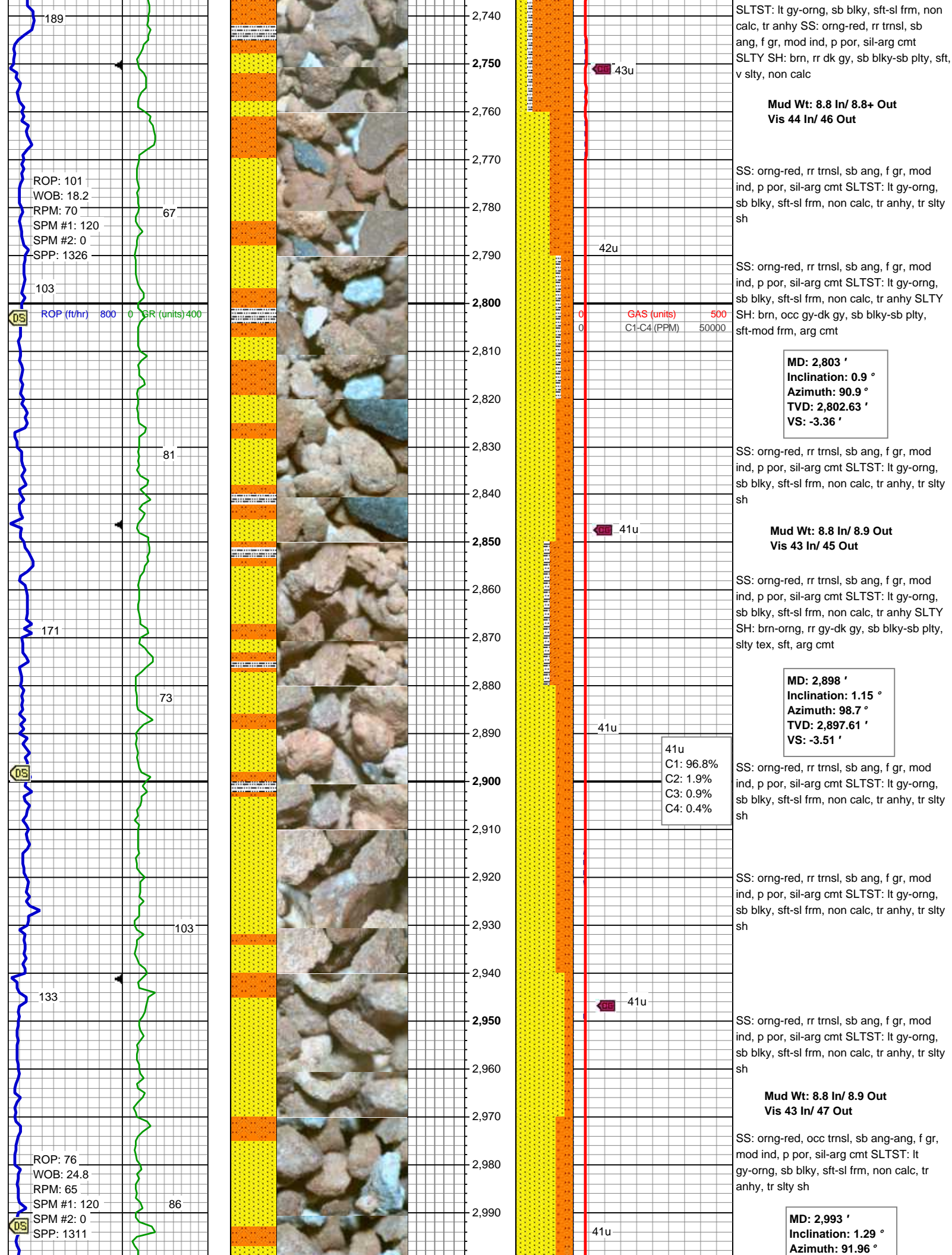




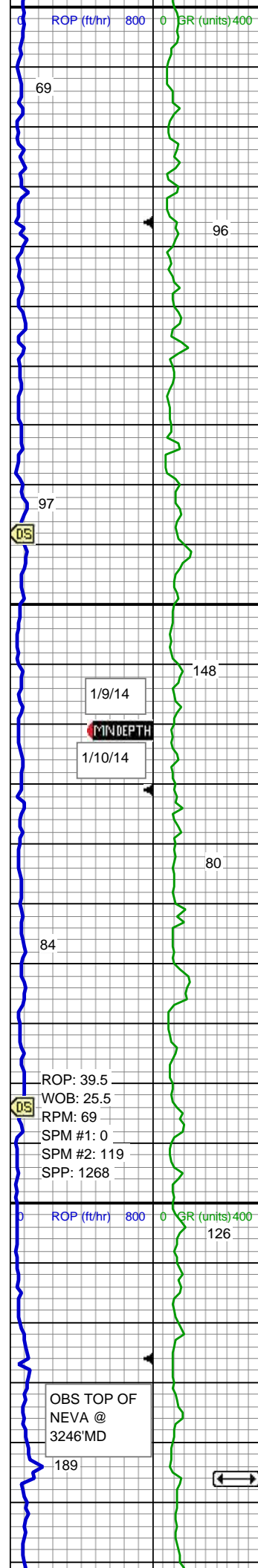












3,000

3,010

3,020

3,030

3,040

3,050

3,060

3,070

3,080

3,090

3,100

3,110

3,120

3,130

3,140

3,150

3,160

3,170

3,180

3,190

3,200

3,210

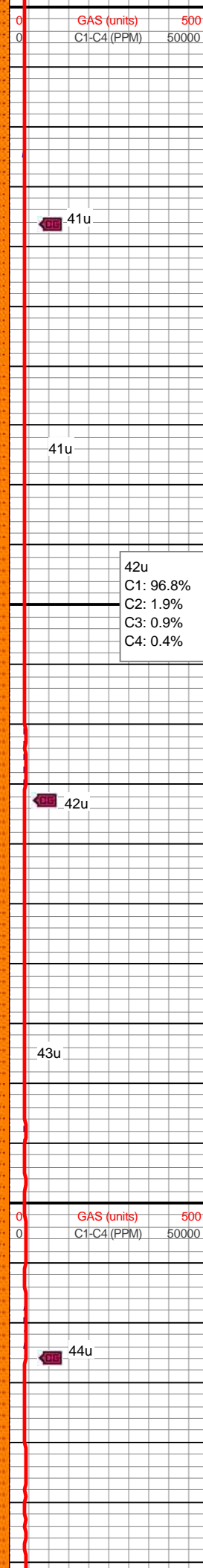
3,220

3,230

3,240

3,250

3,260



TVD: 2,992.59 '  
VS: -3.69 '

SS: orgng-red, occ trnsl, sb ang-ang, f gr, mod ind, p por, sil-arg cmt SLTST: lt gy-orgng, sb blkly, sft-sl frm, non calc, tr anhy, tr slty sh

Mud Wt: 8.8 In/ 8.9 Out  
Vis 44 In/ 47 Out

SS: orgng-red, occ trnsl, sb ang-ang, f gr, mod ind, p por, sil-arg cmt SLTST: lt gy-orgng, sb blkly, sft-sl frm, mod calc, tr slty sh, tr anhy

SS: orgng-red, occ trnsl, sb ang-ang, f gr, mod ind, p por, sil-arg cmt SLTST: lt gy-orgng, sb blkly, sft-sl frm, mod calc, tr slty sh, tr anhy

MD: 3,088 '  
Inclination: 1.36 °  
Azimuth: 97.85 °  
TVD: 3,087.56 '  
VS: -3.88 '

SS: orgng-red, occ trnsl, sb ang-ang, f gr, mod ind, p por, sil-arg cmt SLTST: lt gy-orgng, sb blkly, sft-sl frm, mod calc, tr slty sh, tr anhy

Mud Wt: 8.8 In/ 8.9 Out  
Vis 41 In/ 42 Out

SLTST: lt gy-orgng, sb blkly, sft-sl frm, mod calc, tr anhy SS: orgng-red, rr trnsl, sb ang-ang, f gr, mod ind, p por, sil-arg cmt SLTY SH: brn, rr gy-dk gy, sb blkly-sb plty, sft, non calc

Mud Wt: 8.8+ In/ 8.9 Out  
Vis 41 In/ 42 Out

SLTST: lt gy-orgng, sb blkly, sft-sl frm, mod calc, tr anhy, tr slty sh SS: orgng-red, rr trnsl, sb ang-ang, f gr, mod ind, p por, sil-arg cmt

MD: 3,184 '  
Inclination: 1.42 °  
Azimuth: 99.12 °  
TVD: 3,183.53 '  
VS: -4.23 '

SLTST: lt gy-orgng, sb blkly, sft-sl frm, mod calc, tr anhy, tr slty sh SS: orgng-red, rr trnsl, sb ang-ang, f gr, mod ind, p por, sil-arg cmt

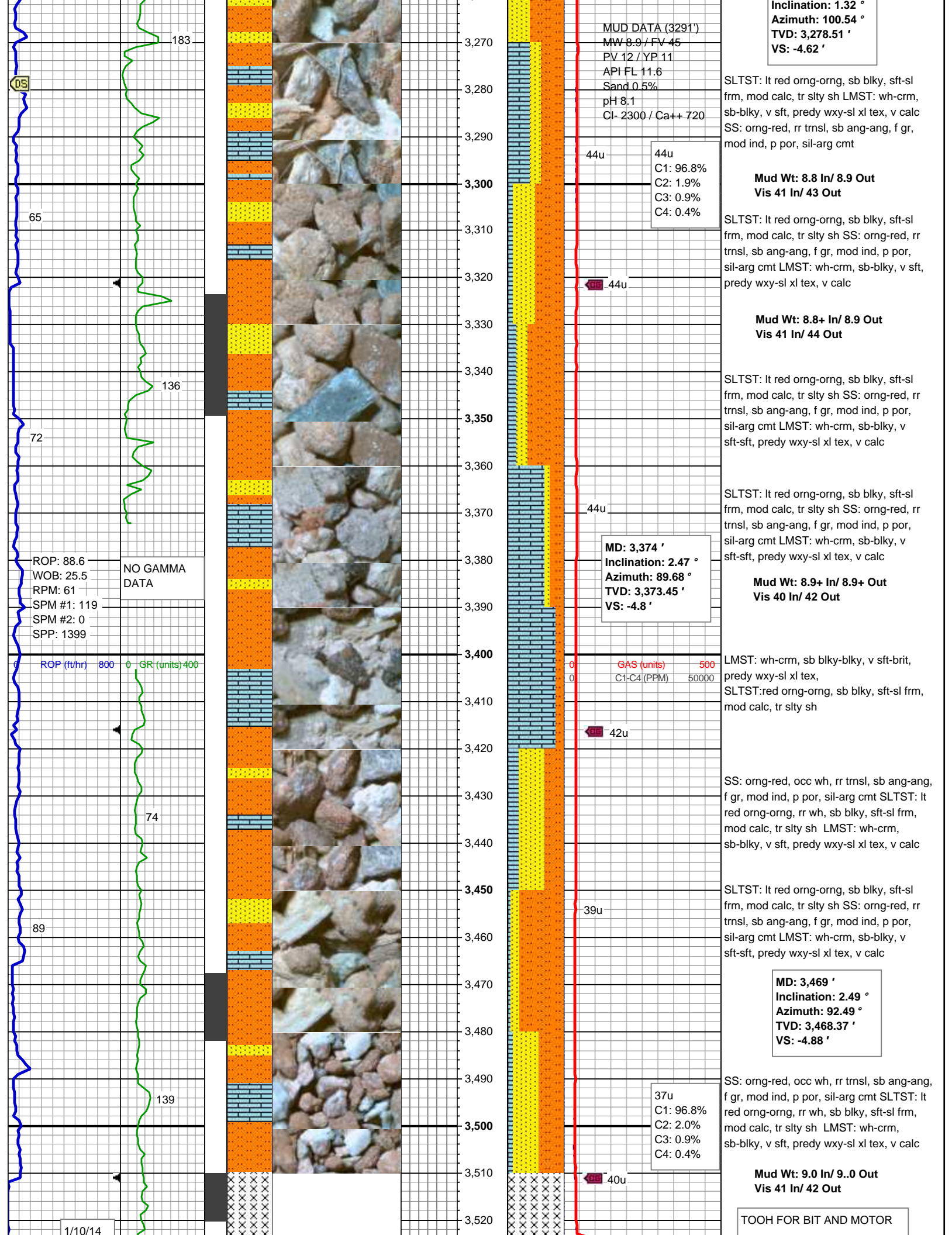
Mud Wt: 8.8+ In/ 8.8+ Out  
Vis 40 In/ 42 Out

SLTST: lt gy-orgng, sb blkly, sft-sl frm, mod calc, tr anhy, tr slty sh SS: orgng-red, rr trnsl, sb ang-ang, f gr, mod ind, p por, sil-arg cmt

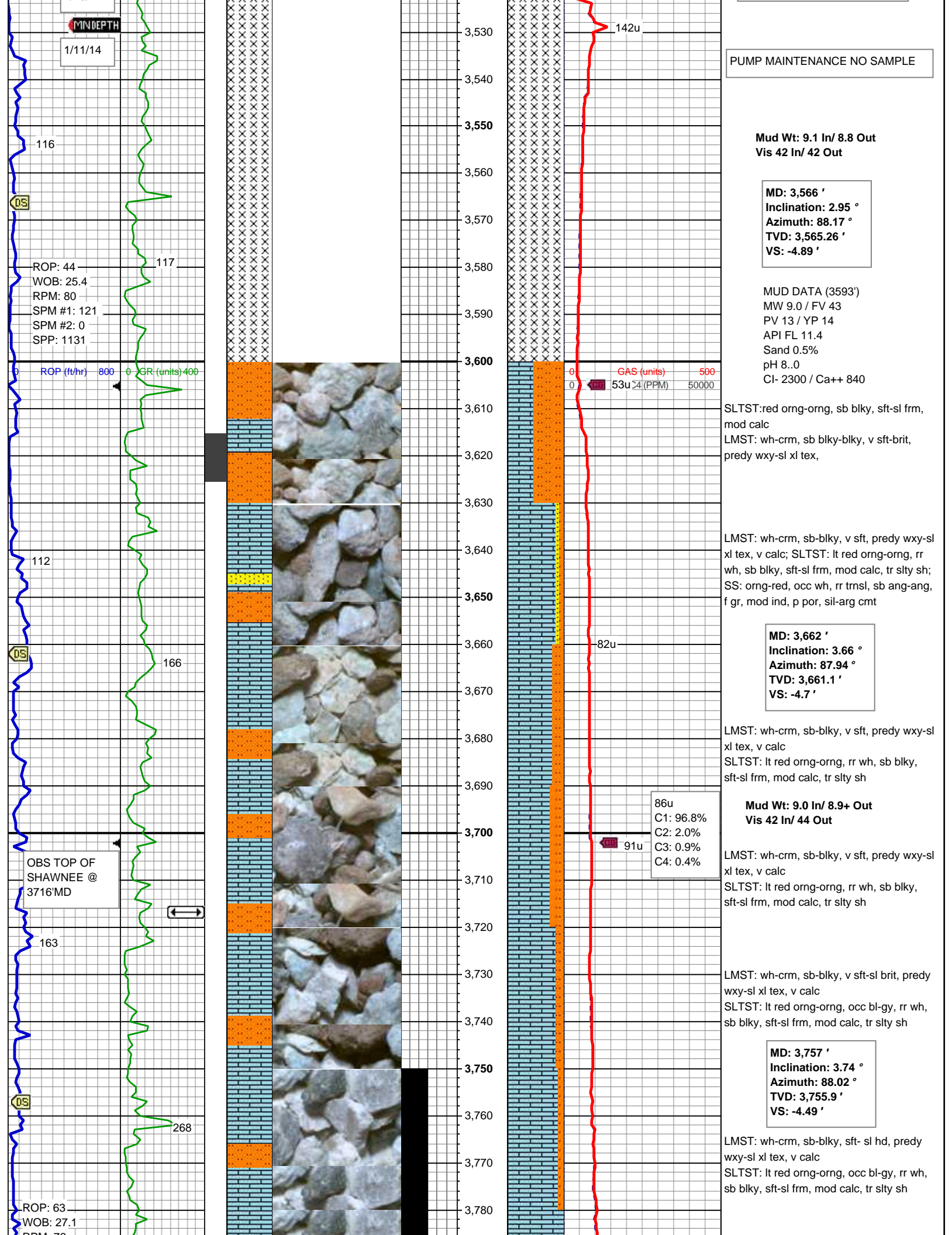
SLTST: lt gy-orgng, sb blkly, sft-sl frm, mod calc, tr anhy, tr slty sh SS: orgng-red, rr trnsl, sb ang-ang, f gr, mod ind, p por, sil-arg cmt

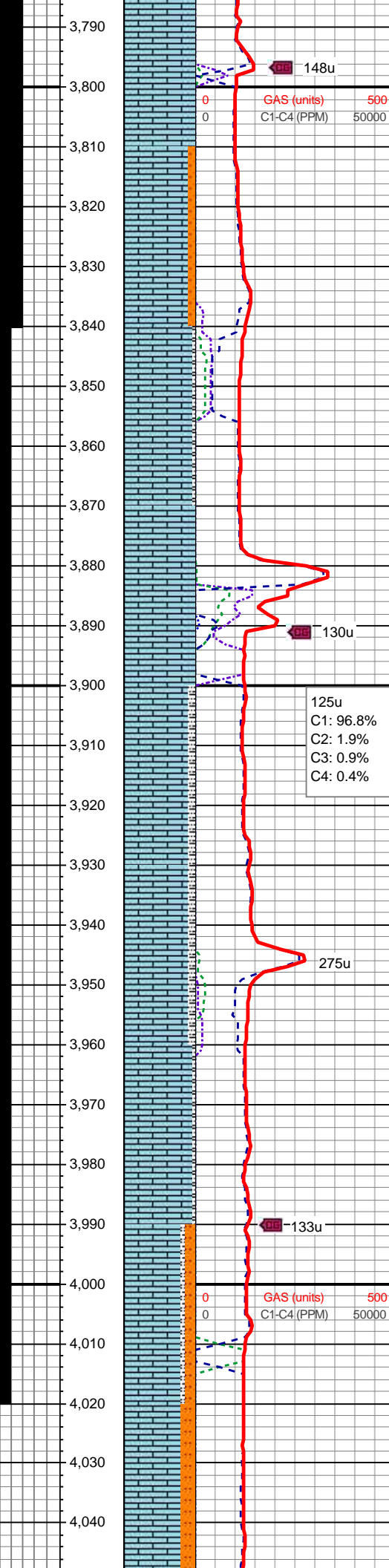
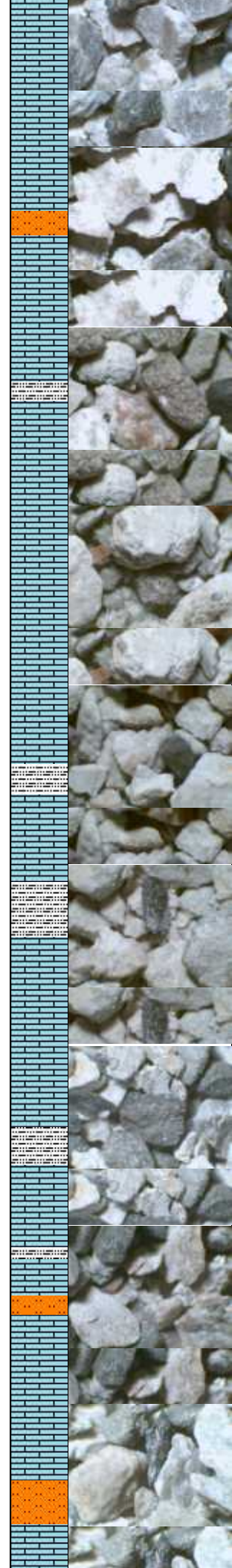
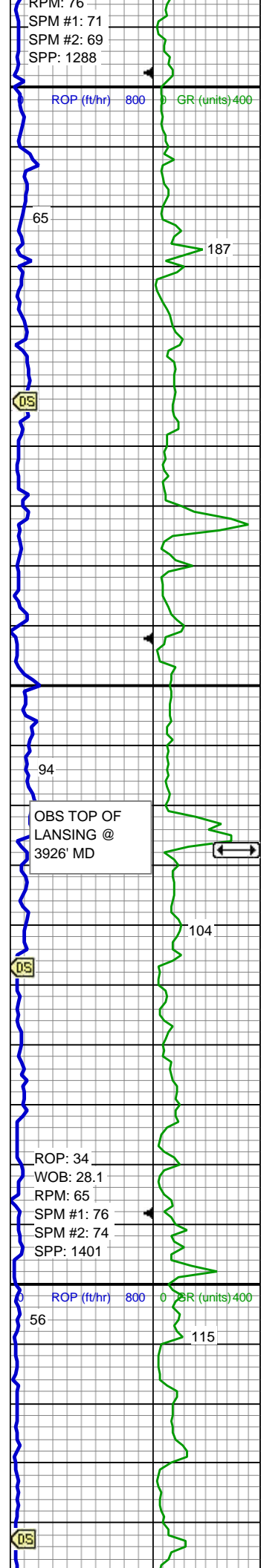
MD: 3,279 '











Mud Wt: 9.0 In/ 9.0 Out  
Vis 42 In/ 41 Out

LMST: wh - crm, occ lt gy, frm-mod hd, sb blkly- sb plty v calc, mic xln, sm-wxy, occ rthy

LMST: wh-crm, sb-blky, sft- sl hd, predy wxy-sl xl tex, v calc  
SLTST: lt red orng-orng, blk, occ bl-gy, rr wh, sb blkly, sft-sl frm, mod calc, tr slty sh

MD: 3,852 '  
Inclination: 3.54 °  
Azimuth: 89.18 °  
TVD: 3,850.71 '  
VS: -4.34 '

LMST: wh - crm, occ lt gy, frm-mod hd, sb blkly- sb plty v calc, mic xln, sm-wxy, occ rthy SLTY SH: red - blk, occ dk gy, sft - frm, sb plty - plty, slty lstr, gty tex, non calc

Mud Wt: 9.0 In/ 9.0 Out  
Vis 38 In/ 41 Out

LMST: wh - crm, occ lt gy, frm-mod hd, sb blkly- sb plty v calc, mic xln, sm-wxy, occ rthy SLTY

LMST: wh - crm, occ lt gy, frm-mod hd, sb blkly- sb plty v calc, mic xln, sm-wxy, occ rthy SLTY SH: blk, occ dk gy, sft - frm, sb plty - plty, slty lstr, gty tex, non calc

MD: 3,947 '  
Inclination: 3.31 °  
Azimuth: 93.72 °  
TVD: 3,945.54 '  
VS: -4.48 '

LMST: wh - crm, occ lt gy, frm-mod hd, sb blkly- sb plty v calc, mic xln, sm-wxy, occ rthy SLTY SH: blk, occ dk gy, sft - frm, sb plty - plty, slty lstr, gty tex, non calc

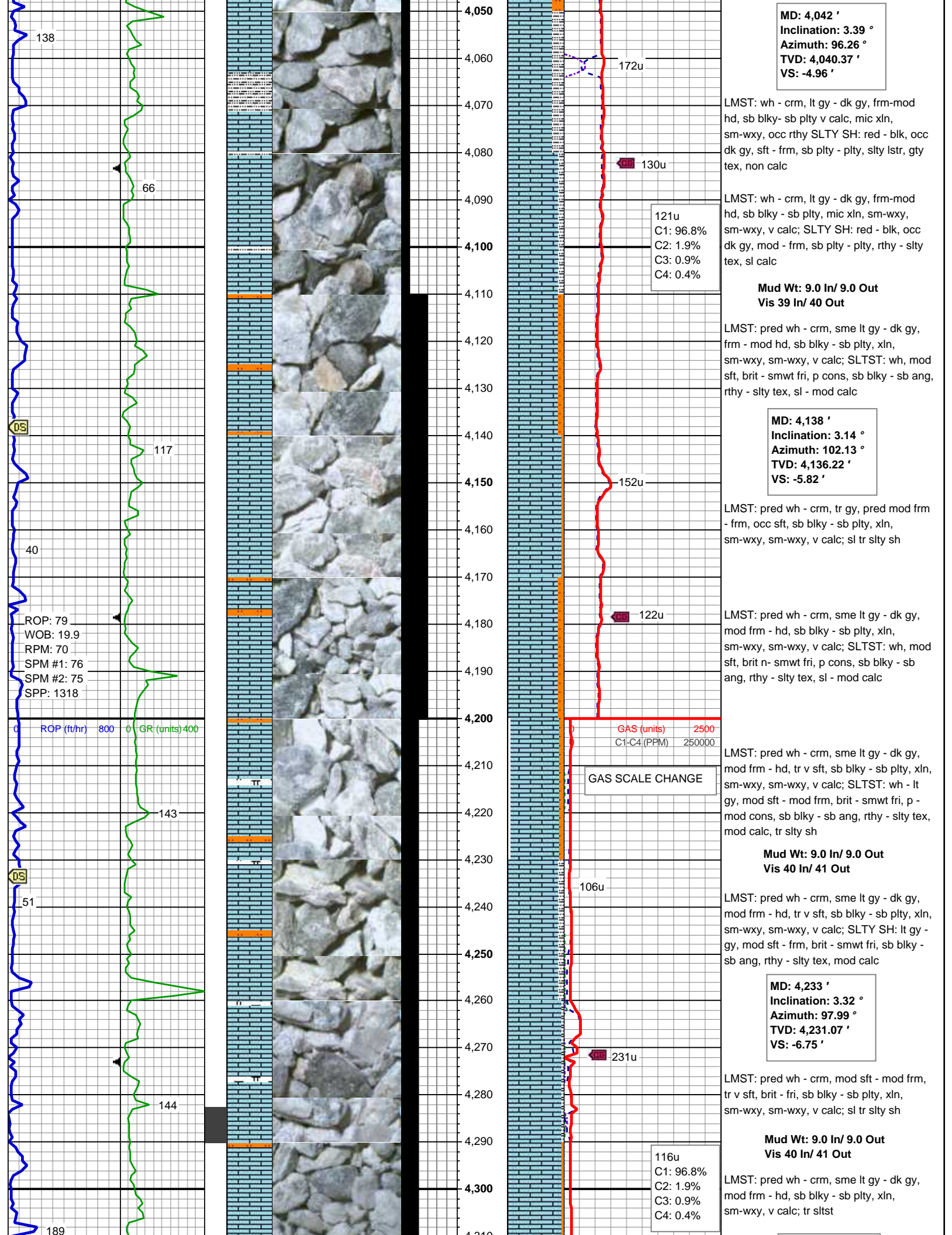
LMST: wh - crm, occ lt gy, frm-mod hd, sb blkly- sb plty v calc, mic xln, sm-wxy, occ rthy SLTY SH: blk, occ dk gy, sft - frm, sb plty - plty, slty lstr, gty tex, non calc

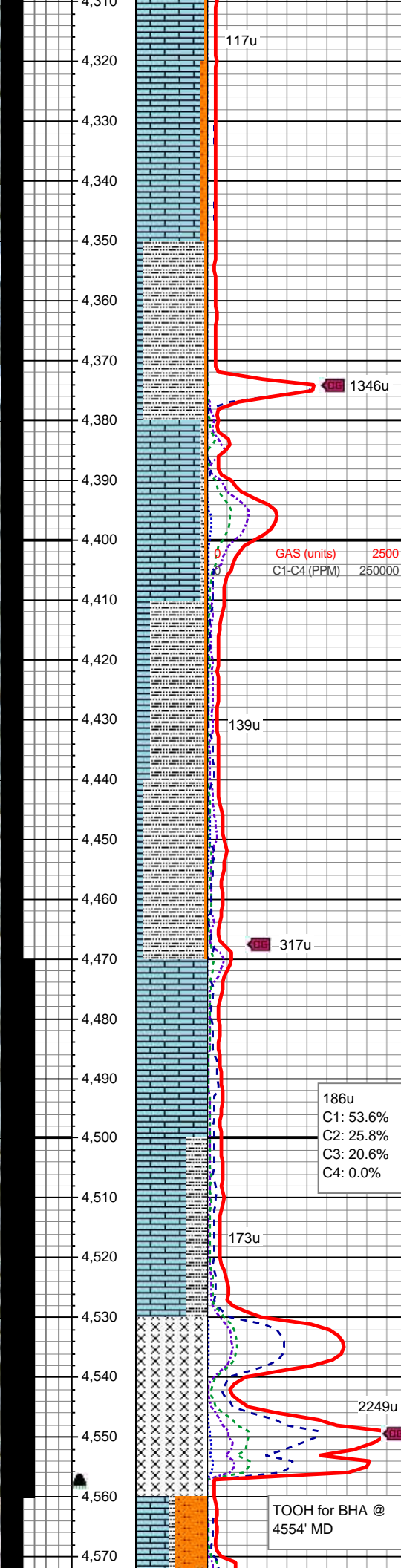
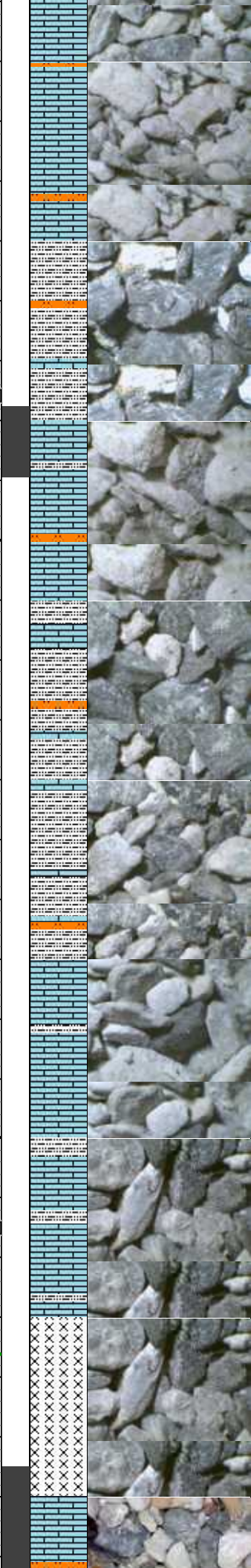
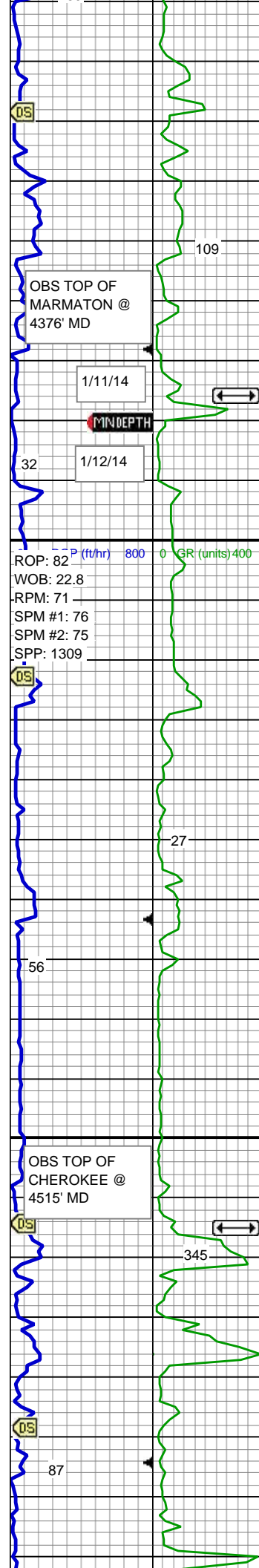
LMST: wh - crm, lt gy - dk gy, frm-mod hd, sb blkly- sb plty v calc, mic xln, sm-wxy SLTST: red- red orng, blk, sl lt bl, v hd, sb blkly - blkly, v f gr, w rnd, non calc ,SLTY SH: red - blk, occ dk gy, sft - frm, sb plty - plty, slty lstr, gty tex, non calc

Mud Wt: 9.0 In/ 9.0 Out  
Vis 40 In/ 40 Out

LMST: wh - crm, lt gy - dk gy, frm-mod hd, sb blkly- sb plty v calc, mic xln, sm-wxy SLTST: red- red orng, blk, sl lt bl, v hd, sb blkly - blkly, v f gr, w rnd, non calc







MD: 4,328 '  
Inclination: 2.8 °  
Azimuth: 97.92 °  
TVD: 4,325.93 '  
VS: -7.45 '

LMST: pred wh - crm, sme lt gy - dk gy, mod frm - hd, tr v sft, sb blkly - sb plty, xln, sm-wxy, sm-wxy, v calc; SLTST: wh - lt gy, mod sft - mod frm, brit, p - mod cons, sb blkly - sb ang, slty tex, mod calc

Mud Wt: 9.1 In/ 9.1 Out  
Vis 40 In/ 41 Out

SLTY SH: lt dkgy - gy blk, mod frm - frm, brit, sb plty - sb ang, rthy - slty tex, calc; LMST: pred wh - crm, sme lt gy - dk gy, mod frm - hd, tr v sft, sb blkly - sb plty, xln, sm-wxy, sm-wxy, v calc, tr sltst

LMST: pred wh - crm, sme lt gy - dk gy, mod frm - hd, sb blkly - sb plty, xln, sm-wxy, v calc; tr slty sh

Mud Wt: 9.0 In/ 9.1 Out  
Vis 40 In/ 42 Out

SLTY SH: lt dkgy - gy blk, mod frm - frm, brit, sb plty - sb ang, rthy - slty tex, calc; LMST: pred wh - crm, occ gy, mod frm - hd, sb blkly - sb plty, xln, sm-wxy, sm-wxy, v calc, tr sltst

MD: 4,423 '  
Inclination: 1.92 °  
Azimuth: 92.95 °  
TVD: 4,420.85 '  
VS: -7.86 '

SLTY SH: lt dkgy - gy blk, mod frm - frm, brit, sb plty - sb ang, rthy - slty tex, calc; LMST: pred wh - crm, occ gy, mod frm - hd, sb blkly - sb plty, xln, sm-wxy, sm-wxy, v calc, tr sltst

Mud Wt: 9.0+ In/ 9.1 Out  
Vis 43 In/ 42 Out

LMST: wh - crm, mod frm - hd, sb blkly - sb plty, xln, sm-wxy, v calc; sl tr slty sh

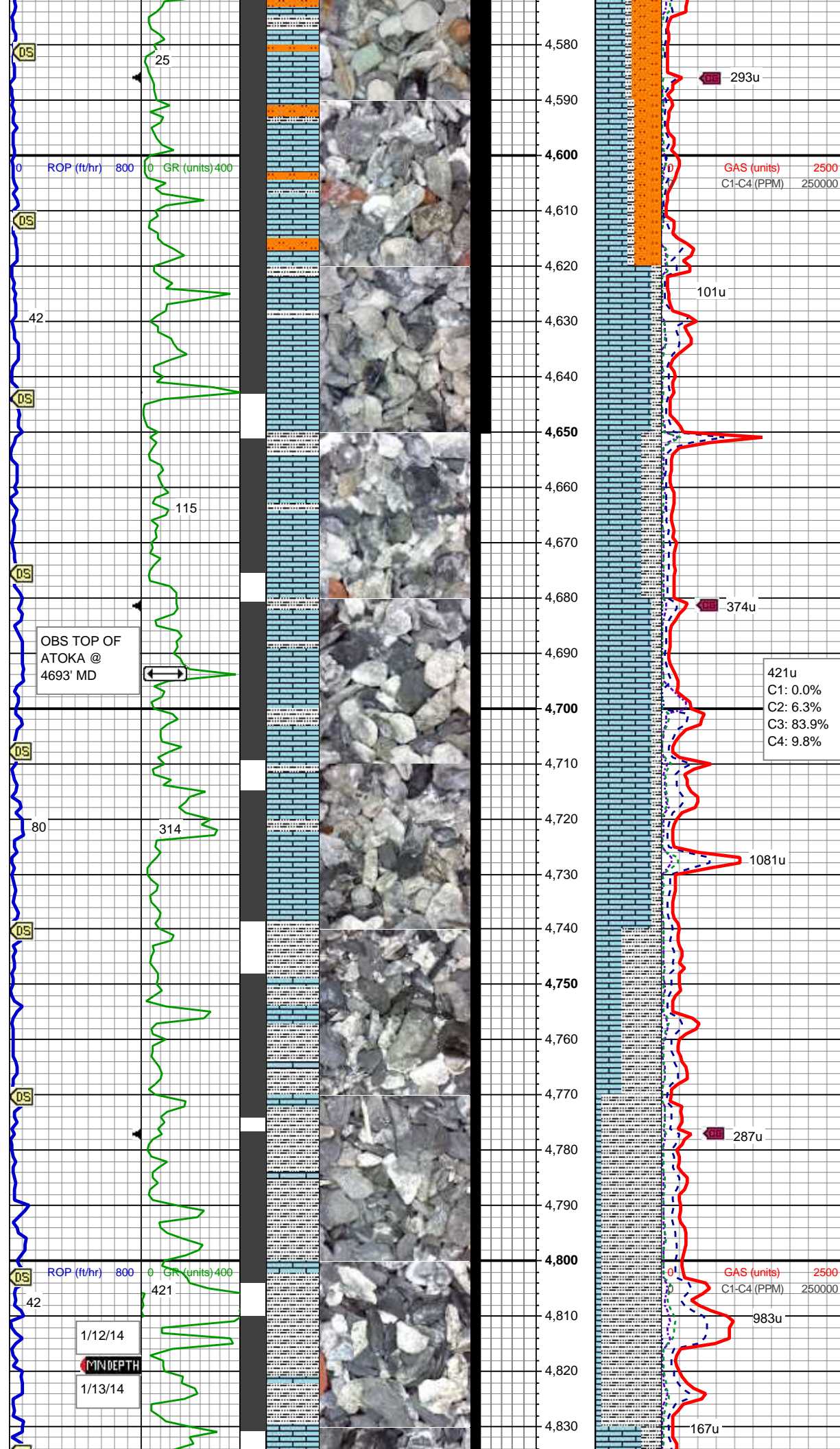
MD: 4,514 '  
Inclination: 1.82 °  
Azimuth: 91.93 °  
TVD: 4,511.8 '  
VS: -7.98 '

LMST: pred wh - crm, occ gy, mod frm - hd, sb blkly - sb plty, xln, sm-wxy, sm-wxy, v calc; SLTY SH: lt dkgy - gy blk, mod frm - frm, brit, sb plty - sb ang, rthy - slty tex, calc

Bit #: 3  
Type: SDi611  
Size: 8.75  
Depth In: 4,554 '  
Jets: 6x18  
S/N: JH7247

MD: 4,549 '  
Inclination: 1.51 °  
Azimuth: 63.66 °  
TVD: 4,546.79 '  
VS: -7.8 '





MD: 4,581 '  
Inclination: 5.12 °  
Azimuth: 31.72 °  
TVD: 4,578.73 '  
VS: -6.4 '

LMST: wh - crm, lt gy - dk gy, frm-mod  
hd, sb blkly - sb plty, v calc, mic xln,  
sm-wxy, occ rthy; SLTST: clr - wh, red, dk  
gy-blk, sl lt bl, v hd, sb blkly - blkly, v f gr, w  
rnd, non calc; SLTY SH: red - blk, occ dk  
gy, sft - frm, sb plty - plty, slty lstr, gty tex,  
non calc; pale grn min flor, slow difse sl  
stmng dull bl wh cut, no stn, no od

MD: 4,644 '  
Inclination: 12.59 °  
Azimuth: 19.07 °  
TVD: 4,640.89 '  
VS: 2.75 '

MD: 4,612 '  
Inclination: 9.36 °  
Azimuth: 24.19 °  
TVD: 4,609.48 '  
VS: -2.92 '

MD: 4,676 '  
Inclination: 15.65 °  
Azimuth: 15.58 °  
TVD: 4,671.92 '  
VS: 10.21 '

LMST: wh - crm, lt gy - dk gy, mod frm -  
hd, sb blkly - sb plty, v calc, mic xln,  
sm-wxy, occ rthy; SLTY SH: pred blk, occ  
dk gy, sft - mod frm, sb plty - plty, slty -  
rthy tex, sl calc; pale orng min flor, slow  
difse sl stmng dull bl wh cut, no stn, no  
od

Mud Wt: 9.0 In/ 9.1 Out  
Vis 41 In/ 42 Out

MD: 4,708 '  
Inclination: 18.36 °  
Azimuth: 13.26 °  
TVD: 4,702.52 '  
VS: 19.28 '

MD: 4,740 '  
Inclination: 21.68 °  
Azimuth: 13.4 °  
TVD: 4,732.58 '  
VS: 29.93 '

SLTY SH: pred blk, occ dk gy, sft - mod  
frm, sb plty - plty, slty - rthy tex, sl calc;  
LMST: wh - crm, lt gy - dk gy, mod frm -  
hd, sb blkly - sb plty, v calc, mic xln,  
sm-wxy, occ rthy; occ pale orng min flor,  
slow difse sl stmng dull bl wh cut, no stn,  
no od

MD: 4,771 '  
Inclination: 25.8 °  
Azimuth: 11.46 °  
TVD: 4,760.95 '  
VS: 42.12 '

SLTY SH: pred blk, occ dk gy, sft - mod  
frm, sb plty - plty, slty - rthy tex, sl calc;  
LMST: wh - crm, lt gy - dk gy, mod frm -  
hd, sb blkly - sb plty, v calc, mic xln,  
sm-wxy, occ rthy; occ pale orng min flor,  
slow difse sl stmng dull bl wh cut, no stn,  
no od

Mud Wt: 9.1 In/ 9.0+ Out  
Vis 40 In/ 44 Out

MD: 4,803 '  
Inclination: 29.18 °

