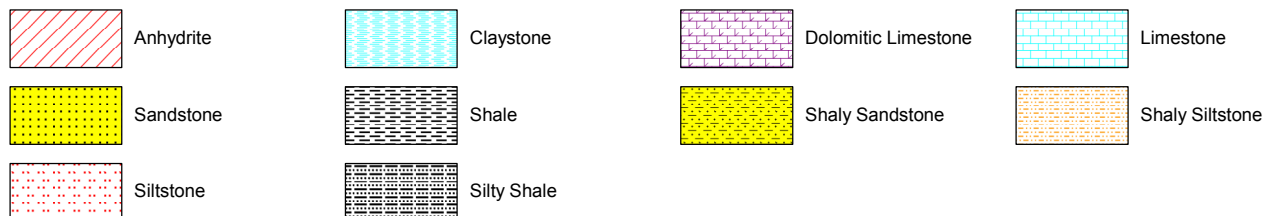


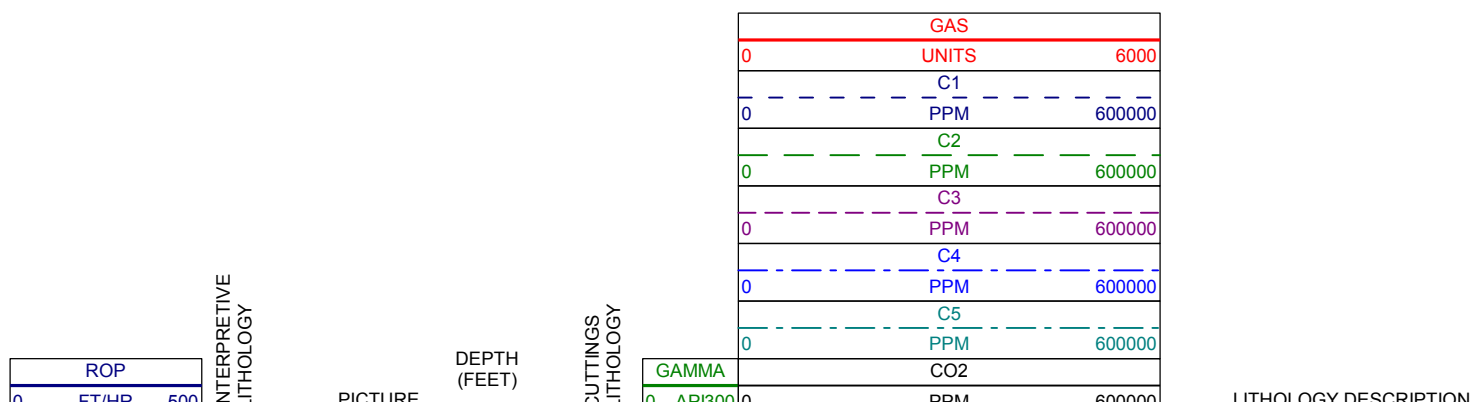
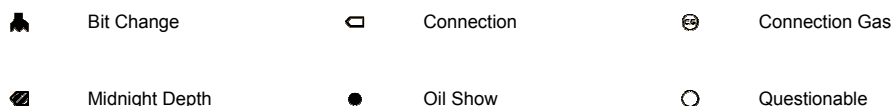
LOG created using Lplot VH Version 3.0, June 29, 2013, Copyright (C) 1999-2009 Pason Systems Corp.

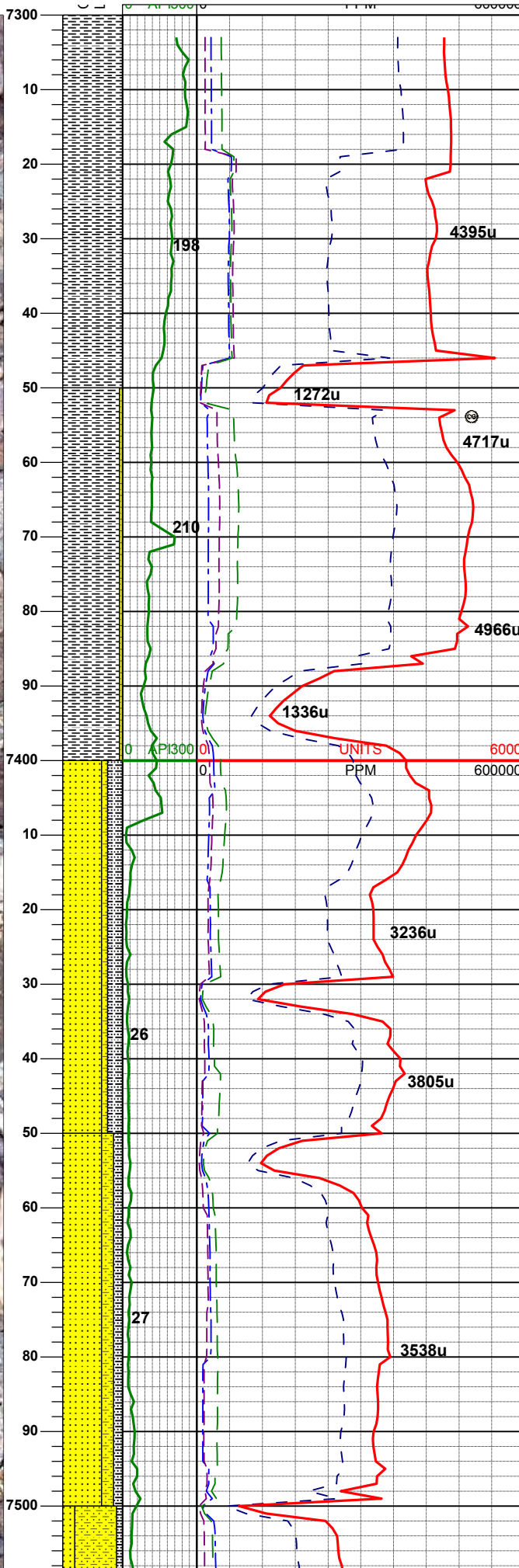
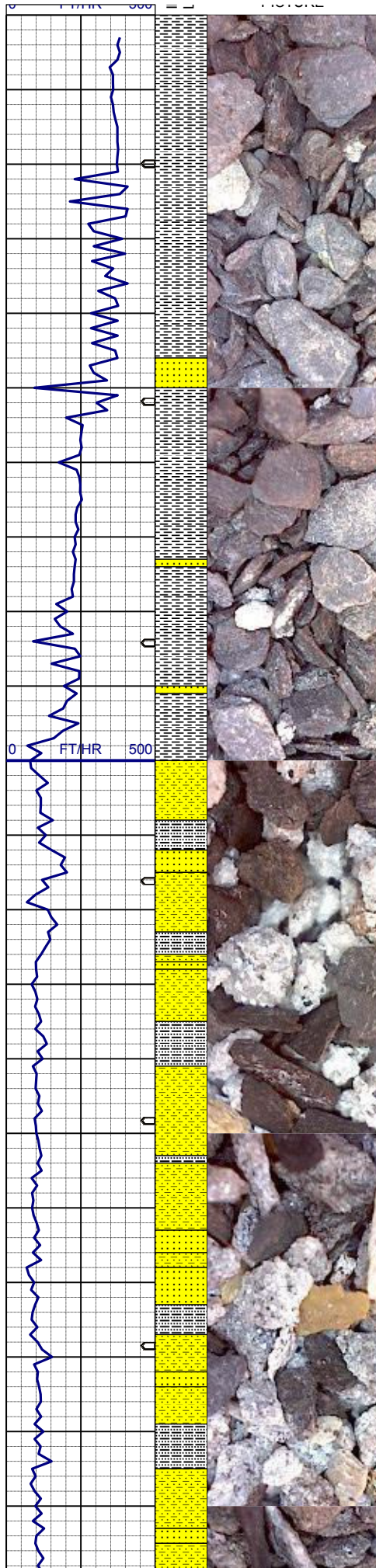
OPERATOR: NOBLE ENERGY INC.
WELL: VIGILANT STATE AC16-01
LOCATION: NE NE SEC 16, T7N, R63W
COUNTY: WELD
STATE: COLORADO
SPOT: 745' FNL 679' FEL
ELEVATION: 4866' GL, 4879' KB
FIELD: WATTENBERG
SPUD DATE: 6/19/13
TD DATE: 6/27/13
DATES LOGGED: 6/23/13 - 6/27/13
DEPTHS LOGGED: 7300' - 8990'
LOGGERS: TERRY ACOMB, RYAN SULLIVAN
DRILLING FLUID: LSND MUD
DRILLING RIG: ENSIGN #121
API: 05-123-37246-00
LOG TYPE: VERTICAL
SCALE: 1:240 (5 inches per 100 feet)
REMARKS: Wellsite Geological Services Provided By Columbine Logging Inc.
 Latitude: N40.57937, Longitude: W104.43436

LITHOLOGIES



ENGINEERING SYMBOLS





**COLUMBINE LOGGING INC
RIGGED UP ON 6/23/2013
MANNED 2-PERSON LOGGING
WITH BLOODHOUND GAS
CHROMATOGRAPH UNIT #0570
BEGAN ON 6/23/2013**

**SURVEY
MD 7304'
INC 0.1°
AZI 132.3°**

SH: dkgy, gyblk, sbblk, sbfis - sbplty,
firm hom, rthy-grty, mtx; arg -slty, tr
dism pyr, sl-m calc

**MUD WT: 8.8 VIS: 31 IN
MUD WT: 8.8 VIS: 30 OUT**

SH: pred lt - med gy, occ dkgy - gyblk,
sbbkly, sbfis - sbplty, firm hom, rthy-
grty, mtx; arg -slty, tr ss, tr pyr clus, tr
bent, v sl calc, tr bri yel mnrl flr

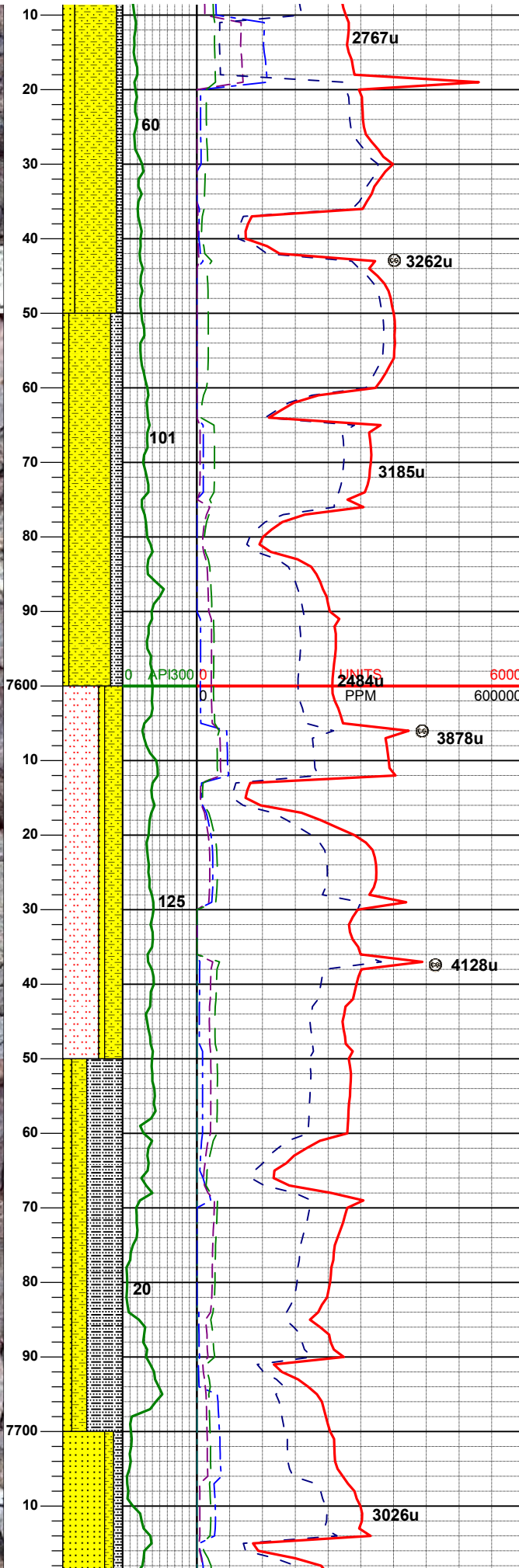
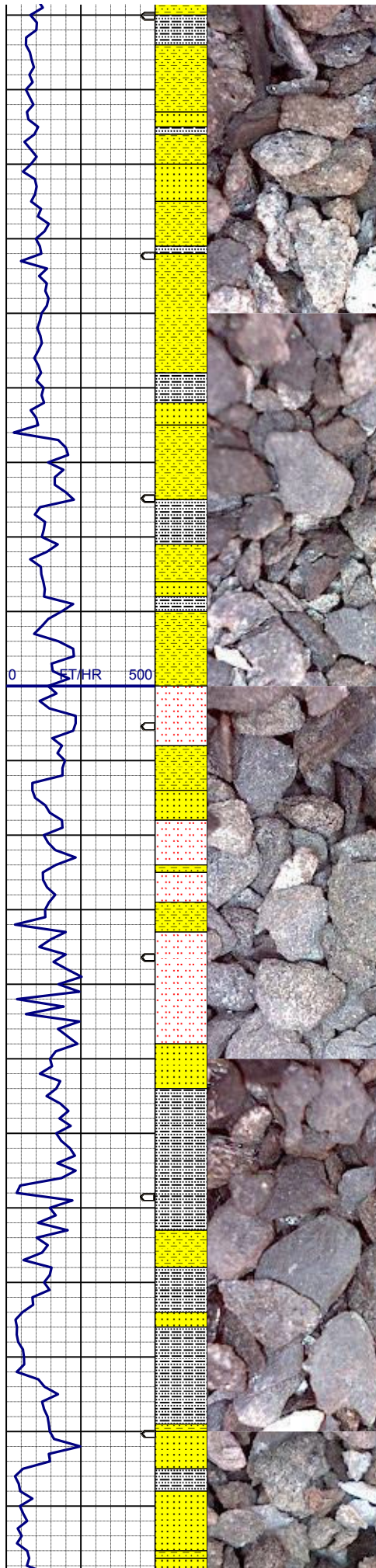
**SURVEY
MD 7398'
INC 0.2°
AZI 146.2°**

**LOGGER'S TOP J SAND
@ 7395' MD (PROG - 7390')**

SS: trnsl to mlky wh, sbbkly - sbang, tt
f to m gr qtz ss, hd, brit, p - m srt,
spec w/ mica frag, non calc; SLTYSH:
lt-mgy, sbbkly, sbfis - sbplty, firm
hom, rthy-grty, arg, vsly, sl calc, com
bent, com bri yel-org mnrl flr

SS: trnsl to mlky wh, sbbkly - sbang, tt
f to m gr qtz ss, hd, brit, p - m srt,
spec w/ mica frag, non calc; SHY: SS:
m gy, f gr, grdg from cln ss, sbang -
sbbkly, firm, brit, w srt, sme mica len,
SLTYSH: lt-mgy, sbbkly, sbfis -
sbplty, firm hom, rthy-grty, arg, vsly,
sl calc, abnt bent, abnt bri yel-org
mnrl flr

**SURVEY
MD 7493'
INC 0.4°
AZI 114.1°**



SHY: SS: m gy, f gr, grdg from cln ss, sbang - sbblky, firm, brit, w srt, sme mica len, SS: trnsi to mlky wh, sbblky - sbang, tt f to m gr qtz ss, hd, brit, p - m srt, spec w/ glauc & mica frag, non calc; SLTYSH: lt-mgy, sbblky, sbfis - sbplty, firm hom, rthy-grty, arg, vslty, sl calc, abnt bent, abnt bri yel-orgn mnrl flr

SHY: SS: m gy - dk gy, f gr, sbang - sbblky, firm, brit, w srt, SLTYSH: lt-mgy, sbblky, sbfis - sbplty, firm hom, rthy-grty, arg, vslty, sl calc, tr bent, tr bri yel-orgn mnrl flr

MUD WT: 8.8 VIS: 34 IN
MUD WT: 8.8 VIS: 34 OUT

SURVEY
MD 7588'
INC 0.2°
AZI 5.4°

SLTST: mgy - dkgy, sbblky, sbfis - sbplty, frm hom, rthy-grty, arg, vslty, sl-m calc; SHY: SS: m gy - dk gy, f gr, sbang - sbblky, firm, brit, w srt, non calc, tr ss, tr dism pyr, tr bent, tr dul orgn mnrl flr

LOGGER'S TOP DAKOTA
@ 7685' MD (PROG - 7656')

SLTYSH: lt-mgy, sbblky, sbfis - sbplty, frm hom, rthy-grty, arg, dism pyr, non calc; SHY: SS: m gy - dk gy, f gr - m gr, sbang - sbblky, firm, brit, p - mod srt, non calc, SS: mlky wh-crm wh-lt gn wh, sbplty-sbblky, sl calc, p srt, w/ dism pyr, ang-sbang qtz, v f-m gr; sl tr bent, sl tr dul orgn mnrl flr

SURVEY
MD 7683'
INC 0.2°
AZI 12.6°

2767u

3262u

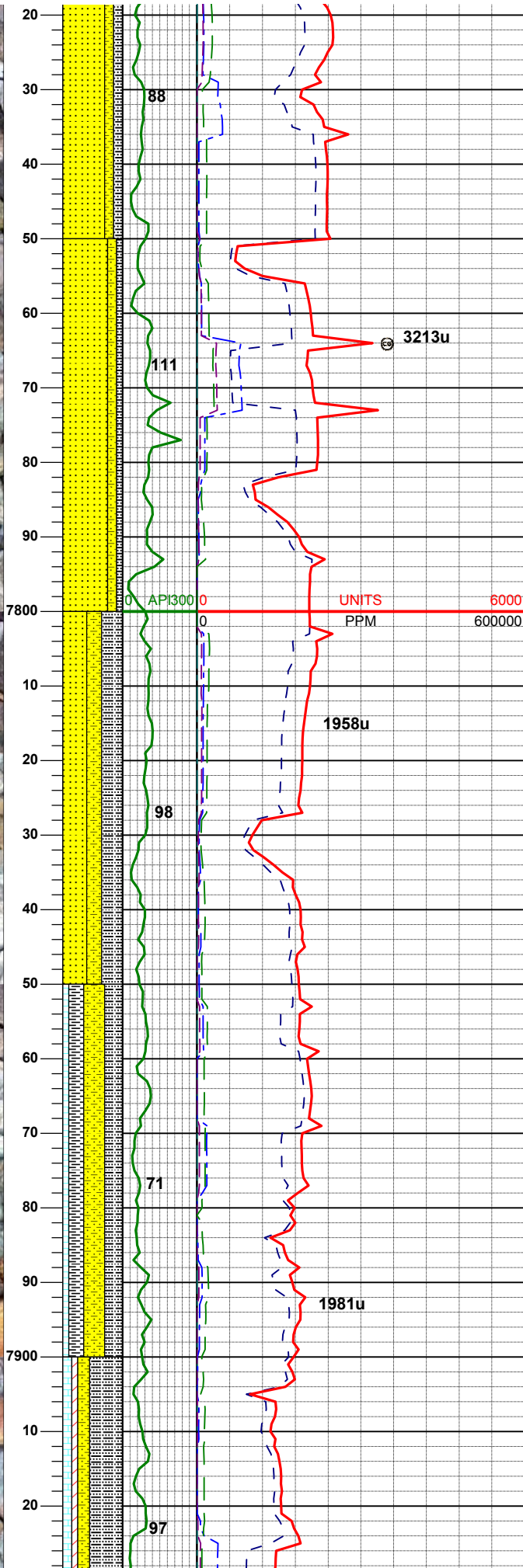
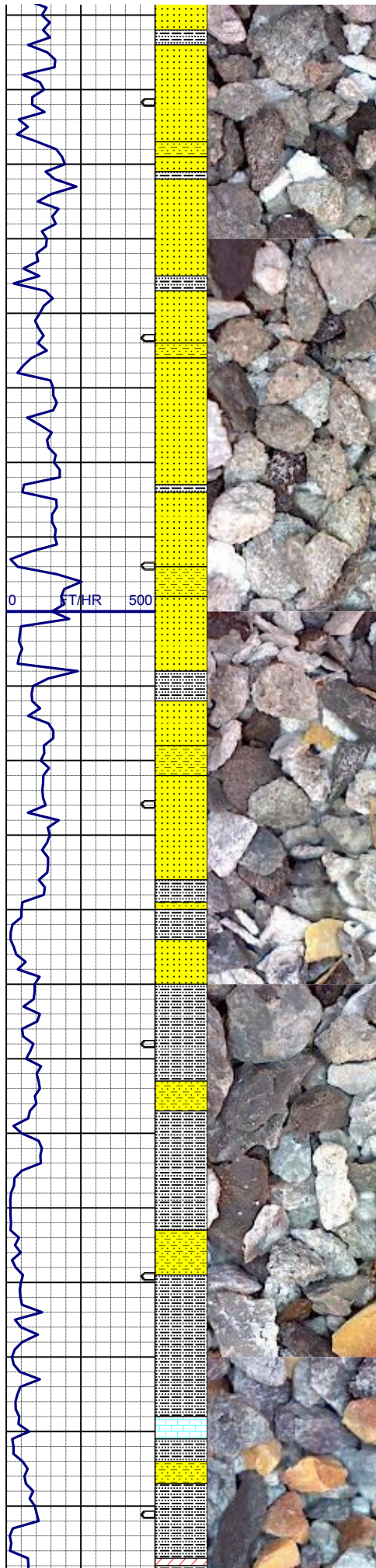
3185u

2484u

3878u

4128u

3026u



SS: wh, pale gn, sbply-sbblky, non calc, p srt, w/ dism pyr, v-vfgr, ang-sbang; SHLYSS: offwh, lt-mgy, vf gr, grdg ss; SLTYSH: lt-mgy, sbblky, sbfis - sbply, frm hom, rthy-grty, arg, dism pyr, sl-m calc

MUD WT: 8.8 VIS: 34 IN
MUD WT: 8.8 VIS: 34 OUT

SS: wh, pale gn, sbply-sbblky, non calc, p srt, w/ dism pyr, v-vfgr, ang-sbang; SHLYSS: offwh, lt-mgy, vf gr, grdg ss; SLTYSH: lt-mgy, sbblky, sbfis - sbply, frm hom, rthy-grty, arg, dism pyr, sl-m calc

SURVEY
MD 7778'
INC 0.1°
AZI 322.2°

SS: wh, tr pale gn, sbply-sbblky, non calc, p srt, w/ dism pyr, v-vfgr, ang-sbang; SHLYSS: offwh, lt-mgy, vf gr, grdg ss; SLTYSH: pale gn, lt-mgy, sbblky, sbfis - sbply, frm hom, rthy-grty, arg, sl-m calc

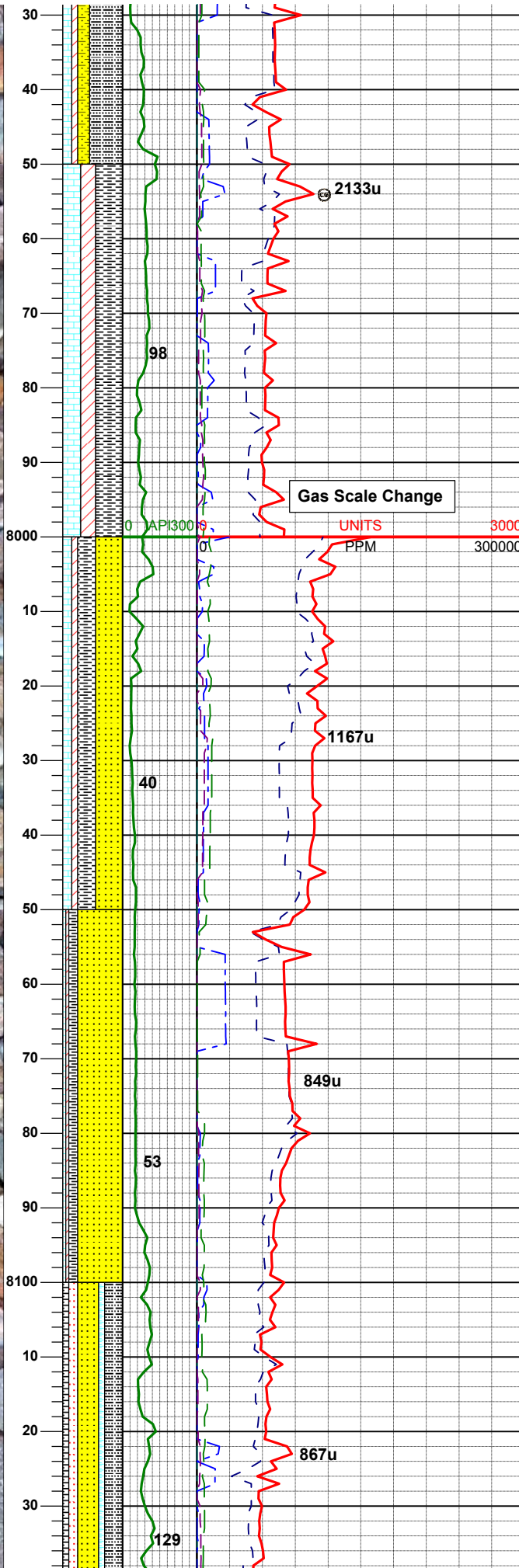
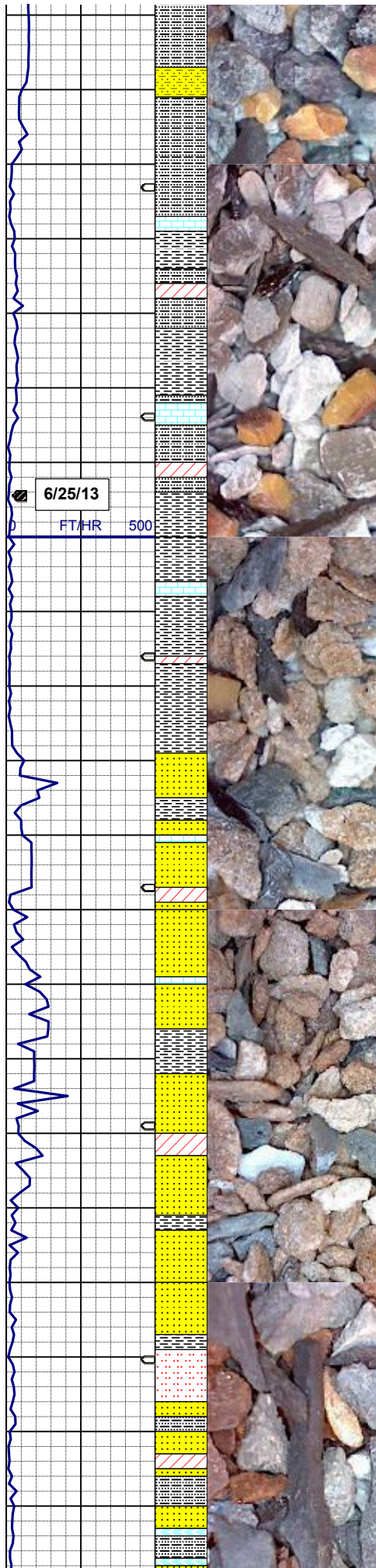
LOGGER'S TOP MORRISON
@ 7840' MD (PROG - 7780')

SURVEY
MD 7873'
INC 0.3°
AZI 95.8°

SHLYSS: offwh, ltgy, tr pale gn, sbply-sbblky, non calc, p srt, w/ dism pyr, v-vfgr, ang-sbang; SLTYSH: offwh, pale gn, lt-mgy, sbblky, sbfis - sbply, frm hom, rthy-grty, arg, sl-m calc; LS: tan-lt brn gy, sbply-sbblky

MUD WT: 8.7 VIS: 35 IN
MUD WT: 8.8 VIS: 35 OUT

SLTYSH: multi colored offwh, pale gn, purple, lt-mgy, sbblky, sbfis - sbply, frm hom, rthy-grty, arg, sl-m calc; SHLYSS: offwh, ltgy, tr pale gn, sbply-sbblky, non calc, p srt, w/ dism pyr, v



-vfgr, ang-sbang; LS: tan-lt brn gy, sbplty-sbblky; ANHY: wh, sbblky, rddd, v sft

**SURVEY
MD 7967'
INC 0.1°
AZI 341.5°**

SLTYSH: multi colored offwh, pale gn, purple, lt-mgy, sbblky, sbfis - sbplty, frm hom, rthy-grty, arg, sl-m calc; LS: tan-lt brn gy, sbplty-sbblky; ANHY: wh, sbblky, rddd, v sft

**LOGGER'S TOP ENTRADA
@ 7984' MD (PROG - 7971')**

**MUD WT: 8.6 VIS: 38 IN
MUD WT: 8.7 VIS: 37 OUT**

RED BEDS START

SS: pale orng, vfgr, sbrnd-sbang, occ slty, non calc; SH: offwh, pale gn, lt-mgy, sbblky, sbfis - sbplty, frm hom, rthy-grty, arg, sl-m calc; LS: tan-lt brn gy, sbplty-sbblky; ANHY: wh, sbblky, rddd, v sft

**MUD WT: 8.6 VIS: 38 IN
MUD WT: 8.7 VIS: 38 OUT**

SS: pred pale orng, tr crm - blgy, vfgr, sbrnd-sbang, firm, brit, w sort, occ slty, non calc; SH: offwh, pale gn - purp - mgy, sbblky, sbfis - sbplty, frm hom, rthy-grty, arg, sl-m calc; tr ls, tr anhy, tr dul yel mnrl flr

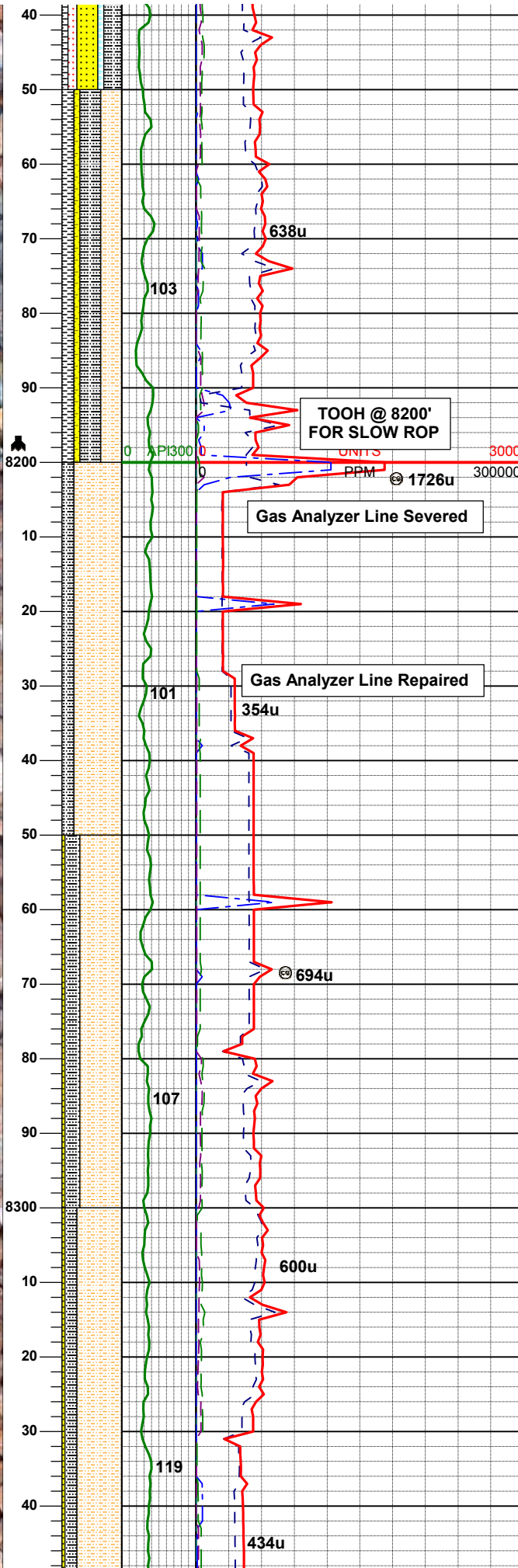
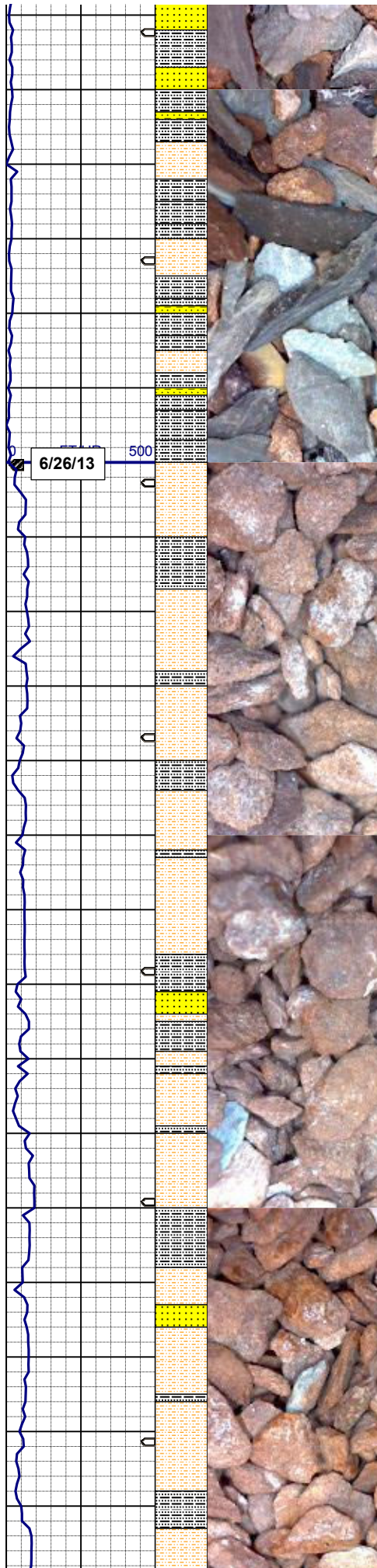
**MUD WT: 8.7 VIS: 38 IN
MUD WT: 8.7 VIS: 38 OUT**

**LOGGER'S TOP LYKINS
@ 8080' MD (PROG - 8049')**

**MUD WT: 8.6 VIS: 39 IN
MUD WT: 8.6 VIS: 39 OUT**

SS: pred pale orng, tr crm - blgy, vfgr, sbrnd-sbang, firm, brit, mod - w sort, occ slty, non calc; SLTYSH: orgrd, lt-dkgy, sbblky, sbfis - sbplty, frm hom, rthy-grty; SLTST: dk brn red-mar, sbplty, brit, sl calc; SH: mgy, sbblky, sbfis - sbplty, frm hom, rthy-grty, arg, sl-m calc; CLYST: gy, purp, plty - flky, firm, dism qtz w/ cly mtx, tr anhy, tr dul yel mnrl flr

SURVEY



SURVEY
MD 8062'
INC 0.1°
AZI 215.5°

MUD WT: 8.5+ VIS: 40 IN
MUD WT: 8.5 VIS: 39 OUT

SLTYSH: org red, lt-dkgy, sbblky, sbfis - sbplty, frm hom, rthy-grty, sl calc; SH: org rd, mgy, sbblky, sbfis - sbplty, frm hom, rthy-grty, arg, sl-m calc; SS: pred pale org, tr crm, vfgr, sbnd-sbang, frm, brit, non calc;

SURVEY
MD 8156'
INC 0.2°
AZI 40.4°

MUD WT: 8.9 VIS: 42 IN
MUD WT: 8.8+ VIS: 43 OUT

SHLYSLTST: org red, sbplty, frm, brit, vfgr, arg - cly mtx, sl calc; SLTYSH: org red, tr lt-dkgy, sbblky, sbfis - sbplty, frm hom, rthy-grty, non calc, n mnrl flr

SURVEY
MD 8251'
INC 0.2°
AZI 71.5°

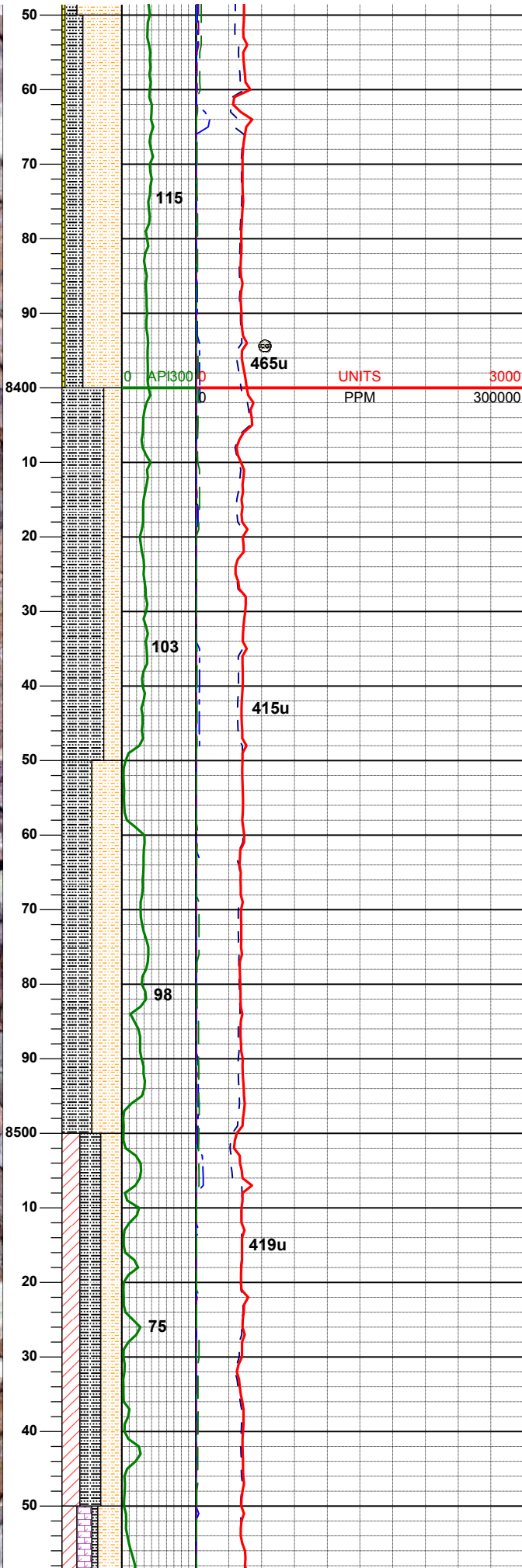
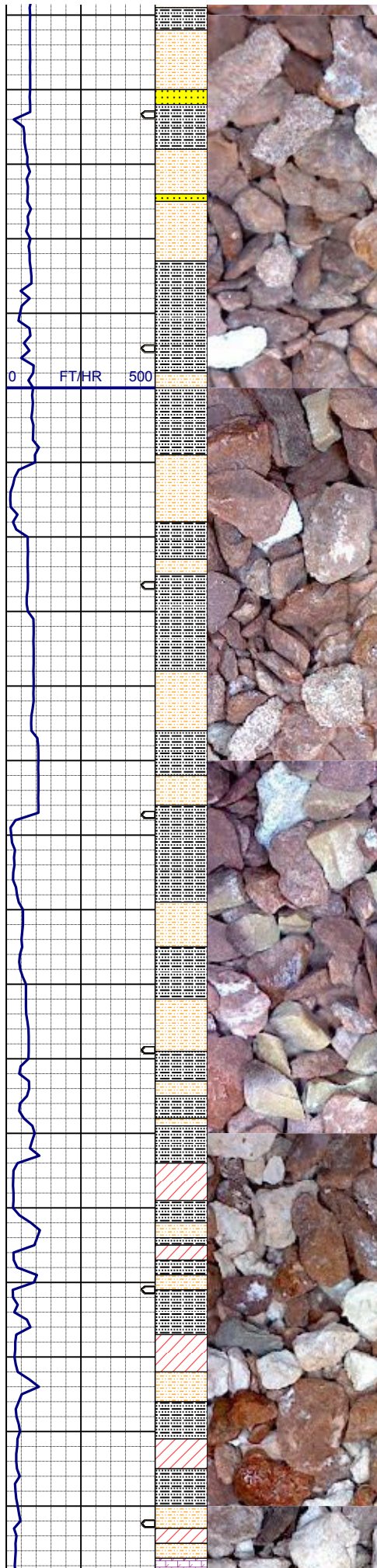
SHLYSLTST: org red, sbplty, frm, brit, vfgr, arg - cly mtx, sl calc; SLTYSH: org red, tr lt-dkgy, sbblky, sbfis - sbplty, frm hom, rthy-grty, non calc, tr wh ss, n mnrl flr

MUD WT: 8.8+ VIS: 40 IN
MUD WT: 9.0 VIS: 41 OUT

SHLYSLTST: org red, sbplty, frm, brit, vfgr, arg - cly mtx, sl calc; SLTYSH: org red, tr lt-dkgy, sbblky, sbfis - sbplty, frm hom, rthy-grty, non calc, tr ss, n mnrl flr

MUD WT: 8.8+ VIS: 39 IN
MUD WT: 8.9 VIS: 41 OUT

SURVEY
MD 8346'



INC 0.1°
AZI 142.7°

MUD WT: 8.8 VIS: 39 IN
MUD WT: 8.9 VIS: 41 OUT

SHLYSLTST: orng red, sbply, firm,
brit, vflgr, arg - cly mtx, sl calc;
SLTYSH: orng red, tr lt-dkgy, sbblky,
sbfis - sbply, firm, rthy-grty, non calc,
tr ss, n mnrl flr

MUD WT: 8.8+ VIS: 39 IN
MUD WT: 8.9 VIS: 41 OUT

SLTYSH: orng red, tr lt-dkgy, sbblky,
sbfis - sbply, firm, rthy-grty, non calc,
SHLYSLTST: orng red, sbply, firm,
brit, vflgr, arg - cly mtx, sl calc; n mnrl
flr

SLTYSH: orng red, tr lt-dkgy, sbblky,
sbfis - sbply, firm, rthy-grty, non calc,
SHLYSLTST: orng red, sbply, firm,
brit, vflgr, arg - cly mtx, sl calc; n mnrl
flr

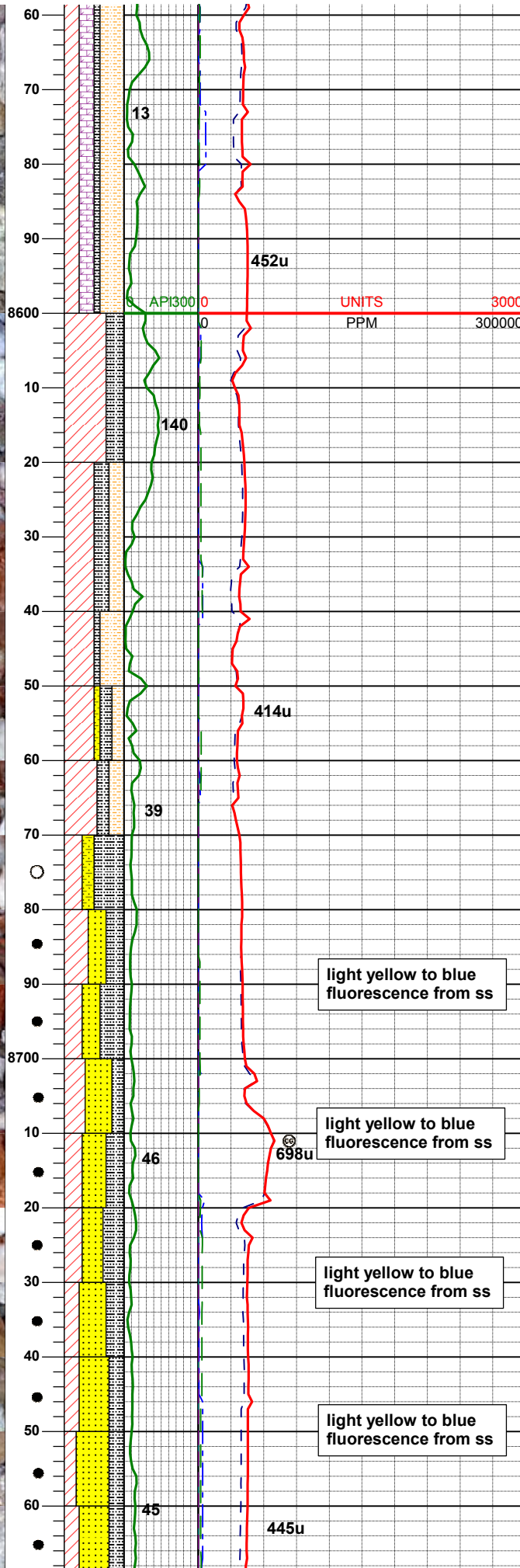
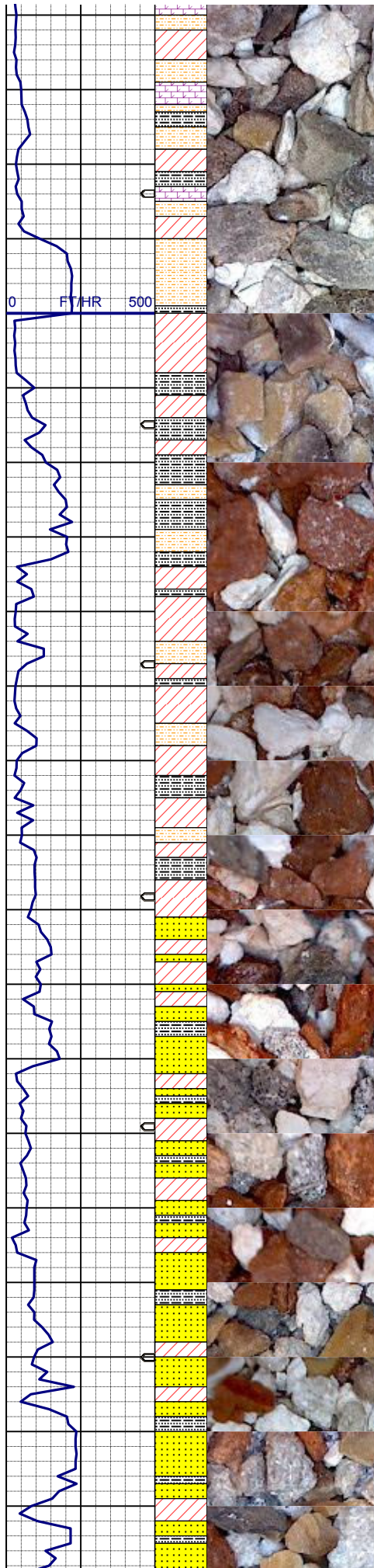
SURVEY
MD 8472'
INC 0.2°
AZI 284.6°

SLTYSH: orng red, tr lt-dkgy, sbblky,
sbfis - sbply, firm, rthy-grty, non calc,
SHLYSLTST: orng red, sbply, firm,
brit, vflgr, arg - cly mtx, sl calc, ANHY:
wh - chky wh - crm - lt gy,sbbnd, v sft-
sl firm

MUD WT: 8.6 VIS: 39 IN
MUD WT: 8.7+ VIS: 39 OUT

SURVEY
MD 8540'
INC 0.1°
AZI 340.3°

MUD WT: 8.6 VIS: 39 IN
MUD WT: 8.7+ VIS: 39 OUT



MUD WT: 8.7+ VIS: 40 OUT

SHLYSLTST: orgn red, gybrn, sbply, firm, brit, vflgr, arg - cly mtx, sl calc, DOL LS: lt gy- gybrn, offwh, sbply - irreg to sbblky, rthy-sbwxy lus mtx; ANHY: wh - chky wh - crm - lt gy, sbnd, v sft- sl firm SLTYSH: orgn red, tr lt-mgy, sbblky, sbfis - sbply, firm, rthy-grty, non calc,

MUD WT: 8.6 VIS: 38 IN
MUD WT: 8.6+ VIS: 38 OUT

ANHY: wh - chky wh - crm - lt gy, sbnd, v sft- sl firm; SLTYSH: orgn red, tr lt-dkgy, sbblky, sbfis - sbply, firm, rthy-grty, non calc, abundant LCM in sample

LOGGER'S TOP BLAINE
@ 8634' MD (PROG - 8609')

ANHY: wh - chky wh - crm - lt gy, sbnd, v sft- sl firm; SLTYSH: orgn red, tr ltgy, sbblky, sbfis - sbply, firm, rthy-grty, non calc, SHLYSLTST: orgn red, sbply, firm, brit, vflgr, arg - cly mtx, sl calc,

SURVEY
MD 8635
INC 0.2°
AZI 125.0°

ANHY: wh - chky wh - crm - lt gy, sbnd, v sft- sl firm; SLTYSH: orgn red, tr ltgy, sbblky, sbfis - sbply, firm, rthy-grty, non calc, SHLYSLTST: orgn red, sbply, firm, brit, vflgr, arg - cly mtx, sl calc,

LOGGER'S TOP LYONS SS
@ 8,682' MD (PROG - 8,647')

SS: wh, clr, trns, tr dirty org mtx, v fri - fri, vf-gr, sbnd-rnd, sme sbang, tr uncons, non-sl calc, mod blk oil stain, vis flor

SLIGHT OIL FLOWING
OVER SHAKER

SS: wh, clr, trns, tr dirty org mtx, v fri - fri, vf-gr, sbnd-rnd, sme sbang, tr uncons, non-sl calc, mod blk oil stain, vis flor

MUD WT: 8.6 VIS: 38 IN
MUD WT: 8.6+ VIS: 39 OUT

SS: wh, clr, trns, tr dirty org mtx, v fri - fri, vf-gr, sbnd-rnd, sme sbang, tr uncons, non-sl calc, mod blk oil stain, vis flor

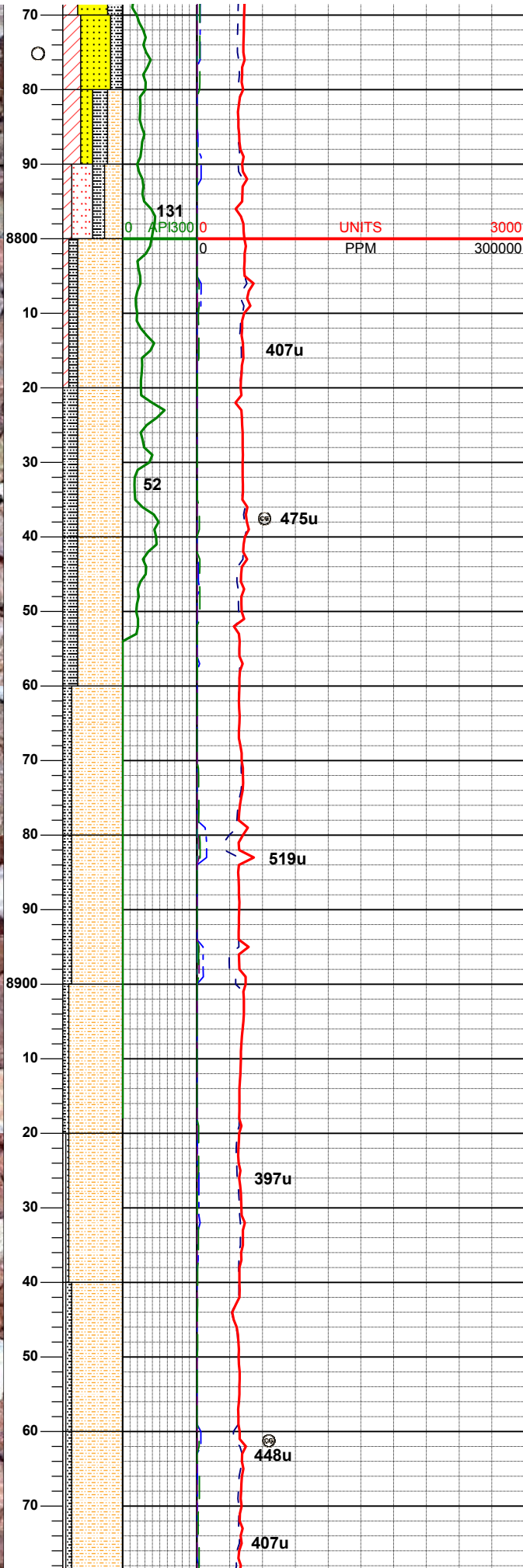
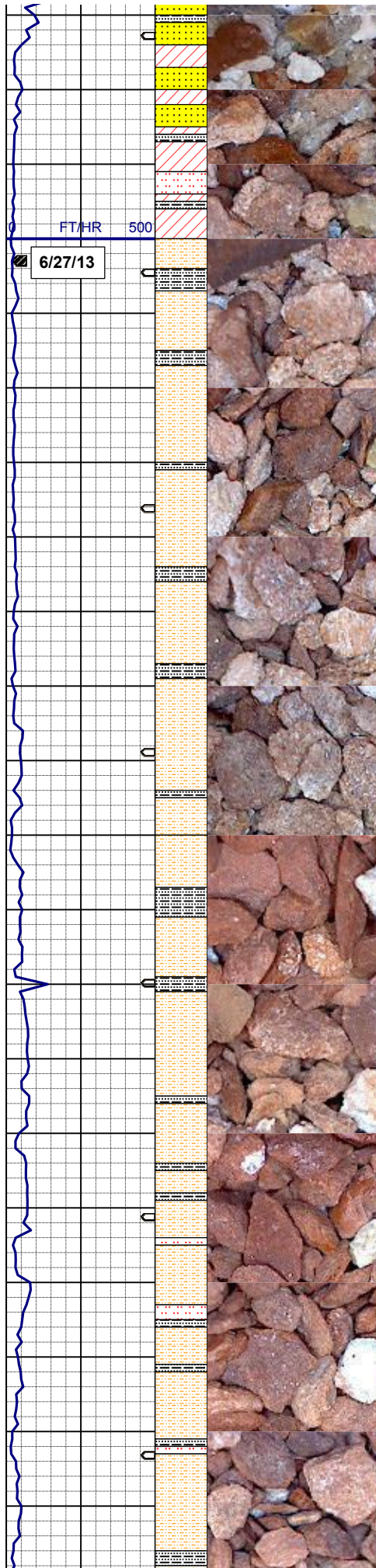
SURVEY
MD 8729
INC 0.1°
AZI 237.1°

SS: wh, clr, trns, tr dirty org mtx, v fri - fri, vf-gr, sbnd-rnd, sme sbang, tr uncons, non-sl calc, mod blk oil stain, occ tan oil stn, vis flor

SS: wh, clr, trns, v fri - fri, vf-gr, sbnd-rnd, sme sbang, occ uncons, non-sl calc, mod blk oil stain, occ tan oil stn, vis flor

TRACE OIL FLOWING
OVER SHAKER

SS: wh, clr, trns, v fri - fri, vf-gr, sbnd-rnd, sme sbang, occ uncons



SS: wh, clr, trns, v fri - fri, vf-gr,
sbrnd-rnd, sme sbang, occ uncon,
non-sl calc, tr mod blk oil stain, tr tan
oil stn

**LOGGER'S TOP SATANKA
@8780' MD (PROG - 8751')**

MUD WT: 8.6 VIS: 38 IN
MUD WT: 8.7 VIS: 39 OUT

SHLYSLTST: pale orng, sbbiky, brit,
grdg to sltst and to slty sh, non calc;
SLTY: SH: red brn, sbply, firm, non
calc

SURVEY
MD 8824
INC 0.1°
AZI 94.2°

SHLYSLTST: pale orng, sbbiky, brit,
grdg to sltst and to slty sh, non calc;
SLTY: SH: red brn, sbply, firm, non
calc

MUD WT: 8.6 VIS: 38 IN
MUD WT: 8.7 VIS: 39 OUT

SHLYSLTST: pale orng, sbbiky, brit,
grdg to sltst and to slty sh, non calc;
SLTY: SH: red brn, sbply, firm, non
calc

SHLYSLTST: pale orng, sbbiky, brit,
grdg to sltst and to slty sh, non calc;
SLTY: SH: red brn, sbply, firm, non
calc

SHLYSLTST: pale orng, sbbiky -
sbang, brit, grdg to sltst and to slty sh,
non calc; SLTY: SH: red brn, sbply,
firm, non calc

MUD WT: 8.6 VIS: 38 IN
MUD WT: 8.7 VIS: 39 OUT

SHLYSLTST: pale orng, sbbiky -
sbang, brit, grdg to sltst and to slty sh,
non calc; SLTY: SH: red brn, sbply,
firm, non calc

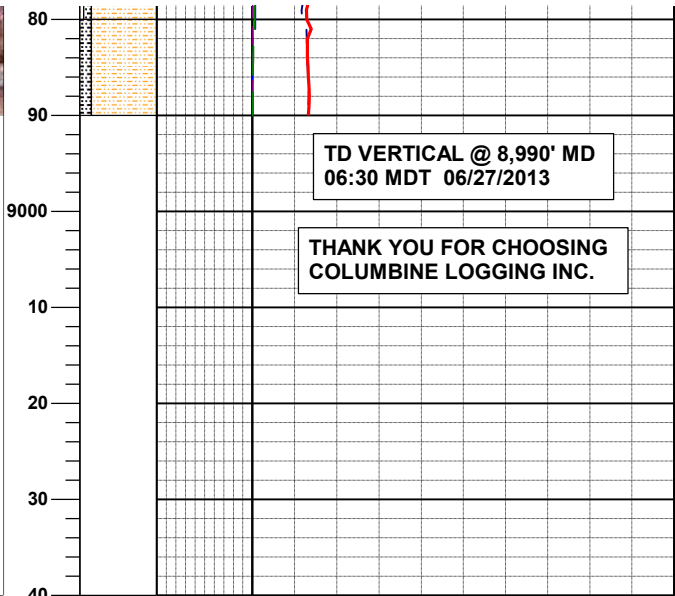
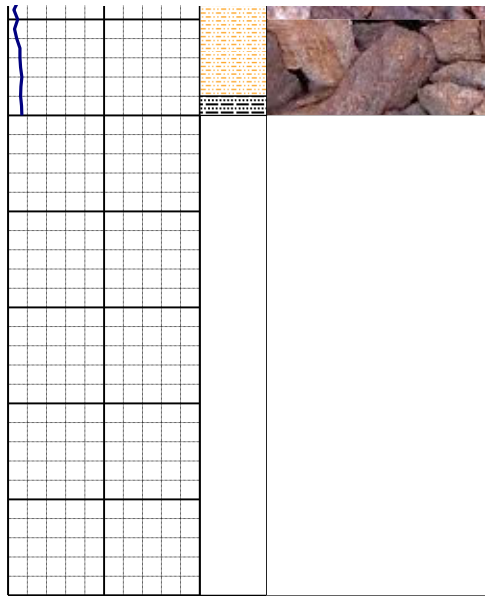
SURVEY
MD 8910
INC 0.1°
AZI 275.3°

SHLYSLTST: pale orng, sbbiky -
sbang, brit, grdg to sltst and to slty sh,
non calc; tr slty sh

MUD WT: 8.6 VIS: 38 IN
MUD WT: 8.7 VIS: 39 OUT

SHLYSLTST: pale orng, sbbiky -
sbang, brit, grdg to sltst and to slty sh,
non calc; SLTY: SH: red brn, sbply -
sbang, firm, tr sltst, non calc

SHLYSLTST: pale orng, sbbiky -
sbang, brit, grdg to sltst and to slty sh,
non calc; SLTY: SH: red brn, sbply -
sbang, firm, tr sltst, non calc



SHLYSLTST: pale orng, sbbiky - sbang, brit, grdg to sltst and to slty sh, non calc; SLTY: SH: red brn, sbply - sbang, firm, sl tr anhy, non calc

MUD WT: 8.6+ VIS: 39 IN
MUD WT: 8.7 VIS: 38 OUT