LOG created using LPLOT VH Version 3.0, November 08, 2013, Copyright (C) 1999-2009 Pason Systems Corp.

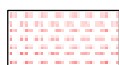|	
OPERATOR:	**NOBLE ENERGY INC.**
WELL:	**SCHAFER K16-64-1HN**
LOCATION:	**NESE SEC16 T4N R66W**
COUNTY:	**WELD**
STATE:	**COLORADO**
SPOT:	**2284' FSL, 340' FEL**
ELEVATION:	**4744' GL, 4760' KB**
FIELD:	**WATTENBERG**
SPUD DATE:	**10/30/13**
TD DATE:	**11/7/13**
DATES LOGGED:	**11/1/13 - 11/7/13**
DEPTHS LOGGED:	**595' - 11642'**
GEOLOGISTS:	**GARY MYERS, MOHAMMED ALMUBARAK**
DRILLING FLUID:	**LSND**
DRILLING RIG:	**PRECISION 828**
API:	**05-123-37807**
LOG TYPE:	**VERTICAL**
SCALE:	**1:240 (5 inches per 100 feet)**
REMARKS:	**WELLSITE GEOLOGICAL SERVICES PROVIDED BY COLUMBINE LOGGING INC.**
	LOG CONTINUES ON FILE: Schafer K16-64-1HN Horiz.lplot

LITHOLOGIES

Symbol	Description	Symbol	Description	Symbol	Description
	Sandstone		Shaly Sandstone		Shaly Siltstone
	Siltstone		Silty Shale		

ENGINEERING SYMBOLS

Symbol	Description	Symbol	Description	Symbol	Description
⎓	Connection	⊕	Connection Gas	←	Arrow
◣	Midnight Depth	→	Arrow	⊕	Trip Gas

ROP		ROTATE/SLIDE	GAMMA		INTERPRETIVE LITHOLOGY	PICTURE	DEPTH (FEET)	CUTTINGS LITHOLOGY	GAS			LITHOLOGY DESCRIPTION
									0 UNITS 100			
									C1			
									0 PPM 10000			
									C2			
									0 PPM 10000			
									C3			
									0 PPM 10000			
									C4			
0 FT/HR 1000			0 AP200				570		0 PPM 10000			

BIT #2
SMITH
SDi611, 8.75"
SER# JH4654
IN @ MD 595'

80

90

COLUMBINE LOGGING, INC.
ON LOCATION 10/31/13
MANNED 2-PERSON LOGGING
USING PASON GAS SYSTEM

DRILLED OUT OF SHOE
0410 HRS, 11/1/13

| 0 | UNITS | 100 |
| 0 | PPM | 10000 |

600

DRILLERS DEPTH
CORRECTION

10

DRILLERS DEPTH
CORRECTION
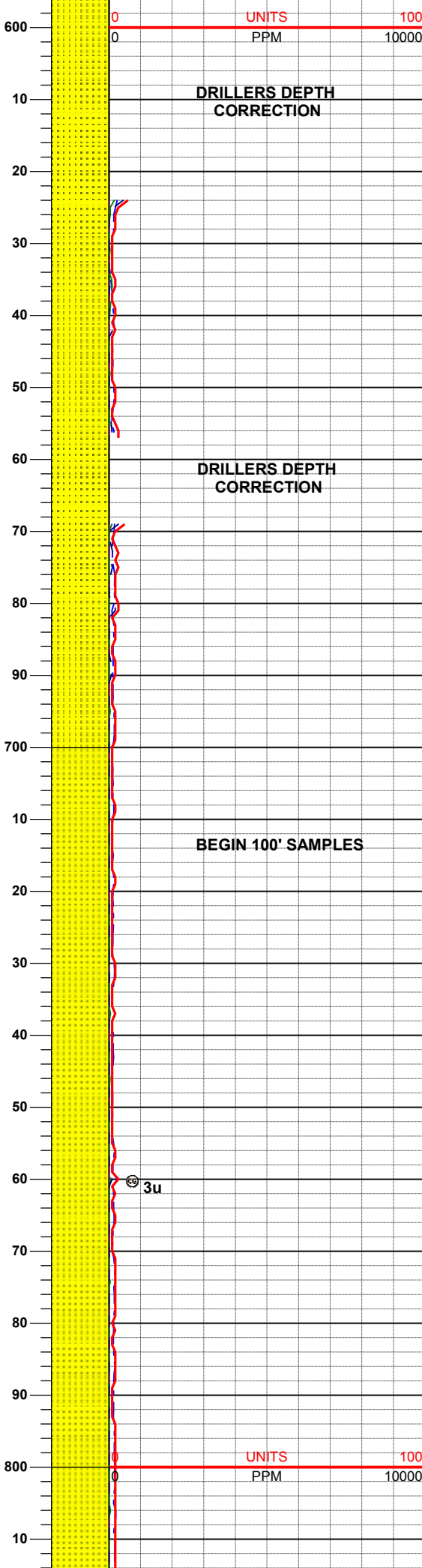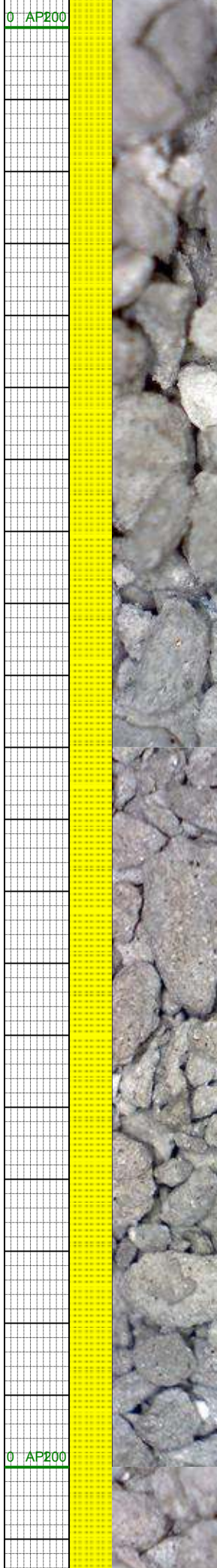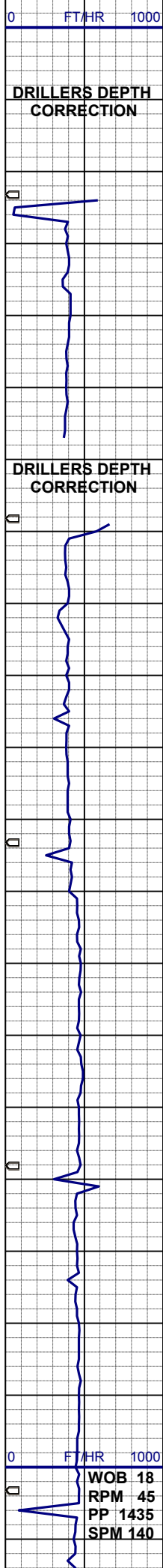
MD   613'
INC   0.3°
AZI   243.8°
TVD   613.0'

20

30

40

50
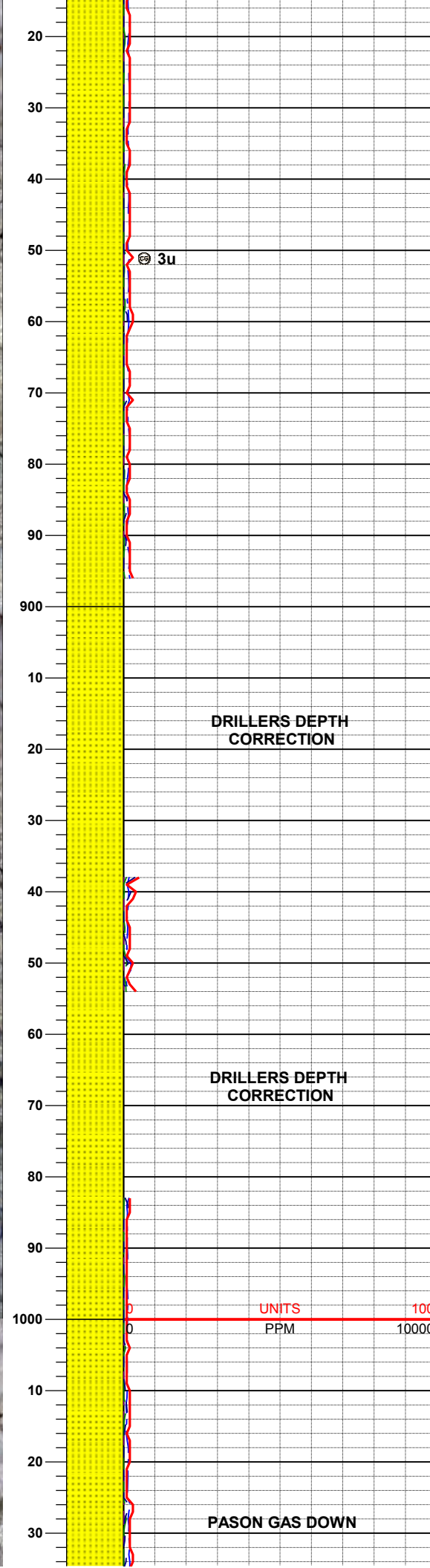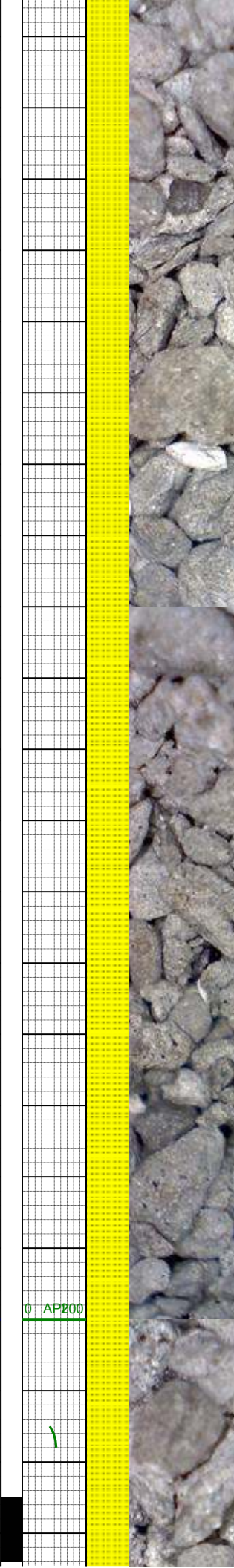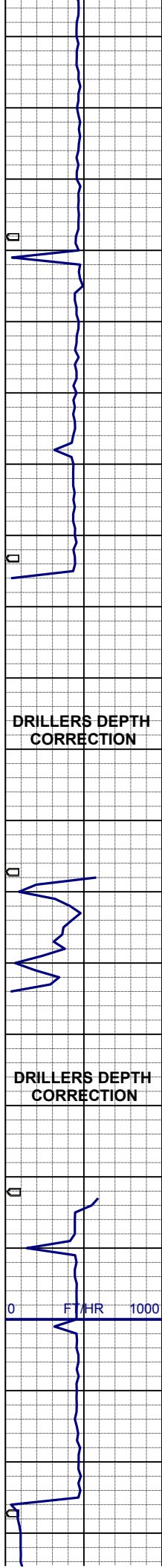
SS: lt- mgy, s&p, clr- trnsl, f- mgr, blky
- sbblky, sbrndd-sbang, mod srt, mod
sft, p- mod cmt, arg- sil mtx, sl calc, sl
mica

DRILLERS DEPTH
CORRECTION

60

DRILLERS DEPTH
CORRECTION

70

80

90

700

MD   703'
INC   0.4°
AZI   254.5°
TVD   703.0'

10

BEGIN 100' SAMPLES

20

30

40

50

SS: lt- mgy, s&p, clr- trnsl, f- mgr, blky
- sbblky, sbrndd-sbang, mod srt, mod
sft, p- mod cmt, arg- sil mtx, sl calc, sl
mica

60   3u

WT 8.5 / VIS 29

70

80

90

MD   793'
INC   0.5°
AZI   258.9°
TVD   793.0'

800

| 0 | UNITS | 100 |
| 0 | PPM | 10000 |

WOB 18
RPM 45
PP 1435
SPM 140

10

3u

SS: lt- mgy, s&p, clr- trnsl, f- mgr, blky - sbblky, sbrndd-sbang, mod srt, mod sft, p- mod cmt, arg- sil mtx, sl calc, sl mica
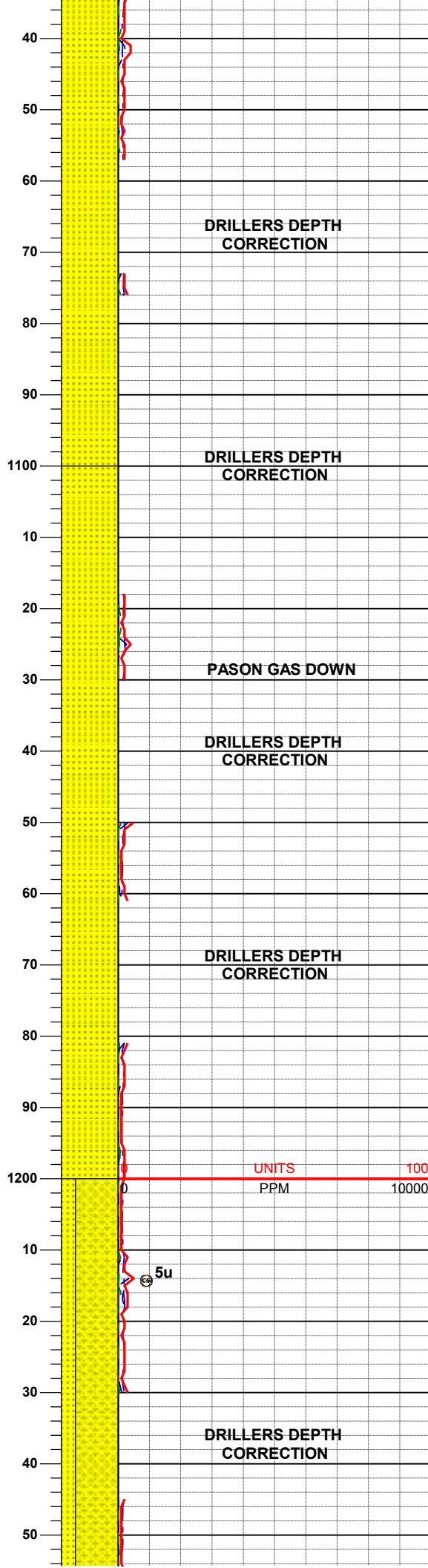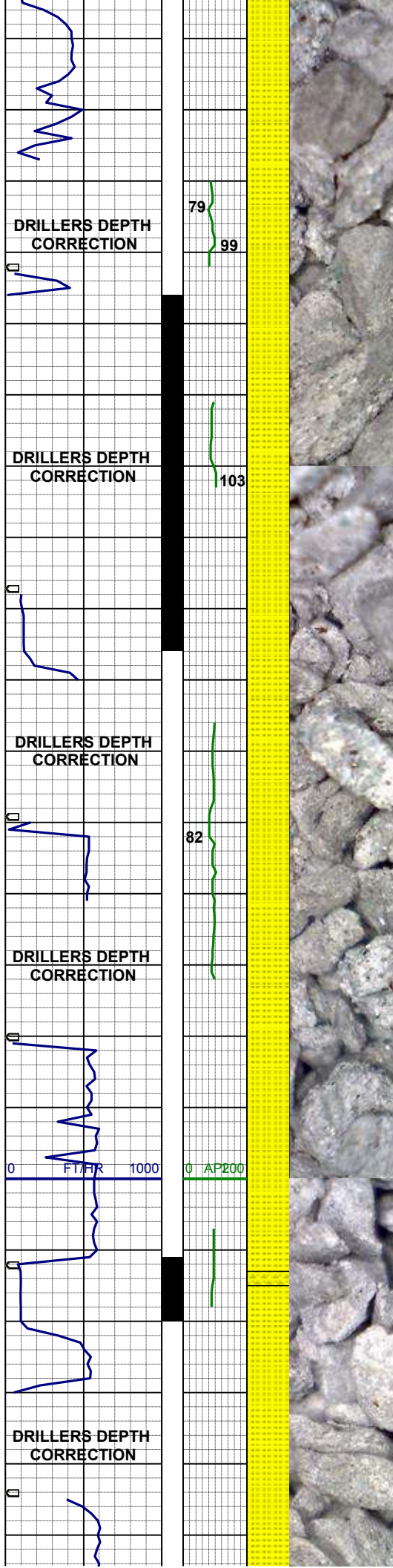
MD	**882**
INC	**0.4°**
AZI	**256.3°**
TVD	**882.0'**

DRILLERS DEPTH
CORRECTION

DRILLERS DEPTH
CORRECTION

DRILLERS DEPTH
CORRECTION

DRILLERS DEPTH
CORRECTION
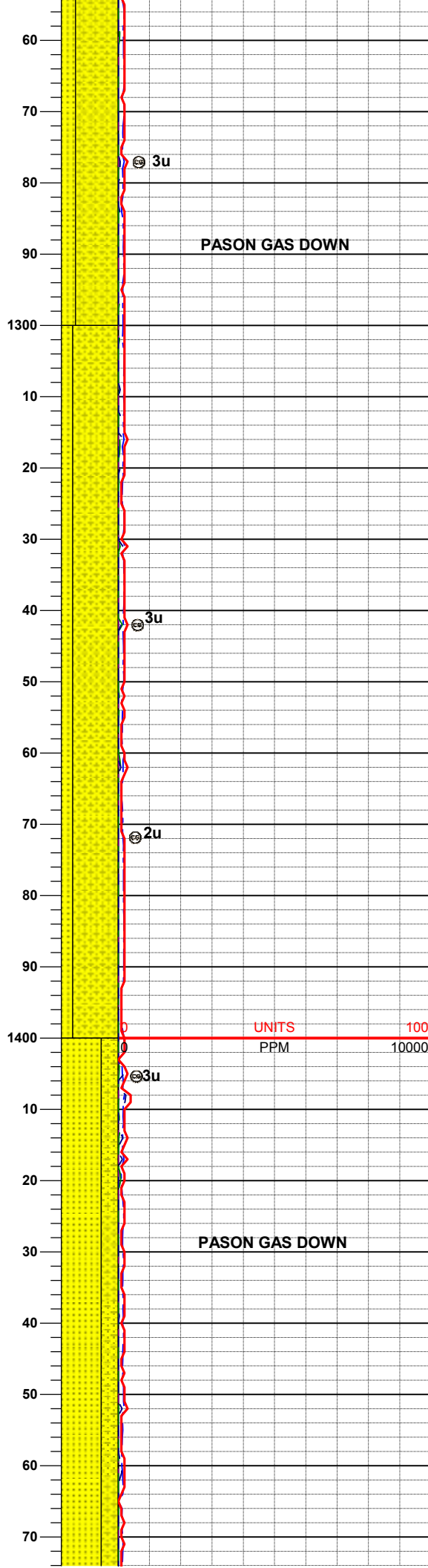
SS: lt- mgy, s&p, clr- trnsl, f- mgr, blky - sbblky, sbrndd-sbang, mod srt, mod sft, p- mod cmt, arg- sil mtx, sl calc, sl mica

MD	**972'**
INC	**9.4°**
AZI	**261.0°**
TVD	**972.0'**

0	FT/HR	1000

0 AP200

0	UNITS	100
0	PPM	10000

PASON GAS DOWN
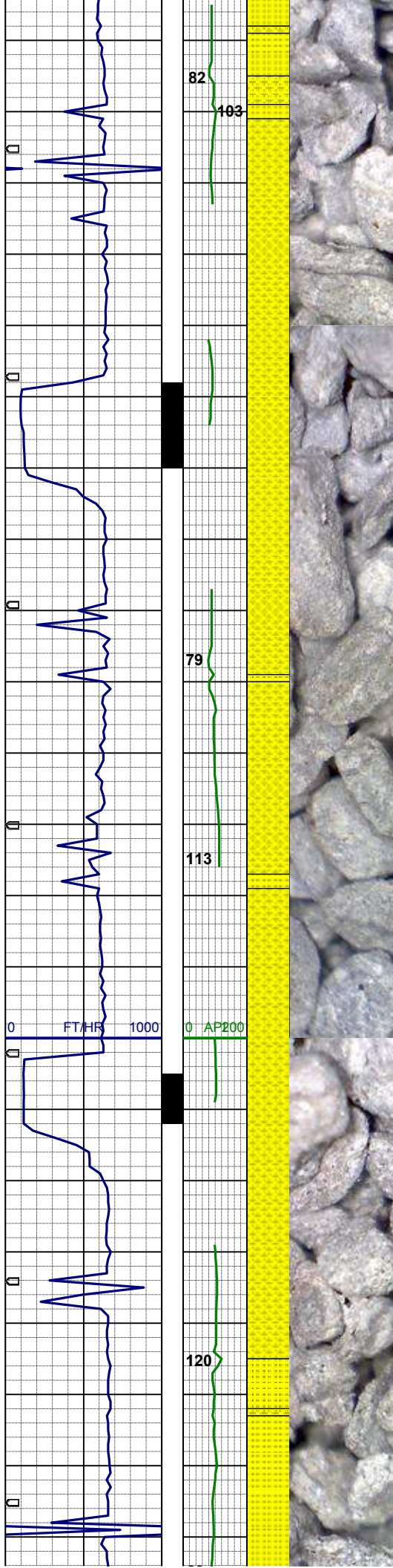
SS: lt- mgy, s&p, clr- trnsl, f- mgr, blky
- sbblky, sbrndd-sbang, mod srt, mod
sft, p- mod cmt, arg- sil mtx, sl calc, sl
mica

MD	1062'
INC	1.0°
AZI	161.7°
TVD	1062.0'

SS: lt- mgy, s&p, clr- trnsl, f- mgr, blky
- sbblky, sbrndd-sbang, mod srt, mod
sft, p- mod cmt, arg- sil mtx, sl calc, sl
mica

MD	1152'
INC	2.6°
AZI	174.6°
TVD	1156.9'

MD	1242'
INC	3.6°
AZI	160.9°
TVD	1241.8'

SHYSS: mgy, trnsl- op, vfgr, sbblky,
mod srt, sft- sl firm, mod cem, pred
arg mtx, sl calc, slty, grdg- shysltst

DRILLERS DEPTH CORRECTION

DRILLERS DEPTH CORRECTION

DRILLERS DEPTH CORRECTION

DRILLERS DEPTH CORRECTION

DRILLERS DEPTH CORRECTION

PASON GAS DOWN

DRILLERS DEPTH CORRECTION

DRILLERS DEPTH CORRECTION

DRILLERS DEPTH CORRECTION

DRILLERS DEPTH CORRECTION

79
99
103
82

0   FT/HR   1000
0   AP200

UNITS   100
PPM   10000
0   10000

5u

SS: wh- mgy, s&p ip, clr- trnsl, f- mgr,
blky- sbblky, sbrndd- sbang, p- mod
srt, mod sft, mod cmt, arg- sil mtx, sl
calc, sl mica

82

103

PASON GAS DOWN

3u

79

113

3u

2u

| | | UNITS | 100 |
| | | PPM | 10000 |

3u

PASON GAS DOWN

120

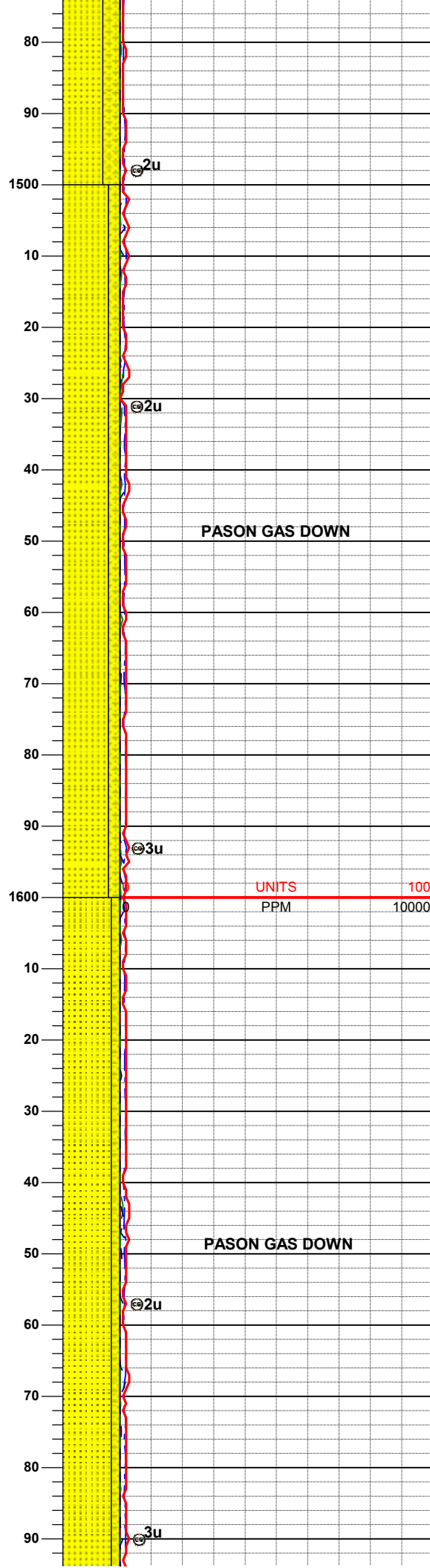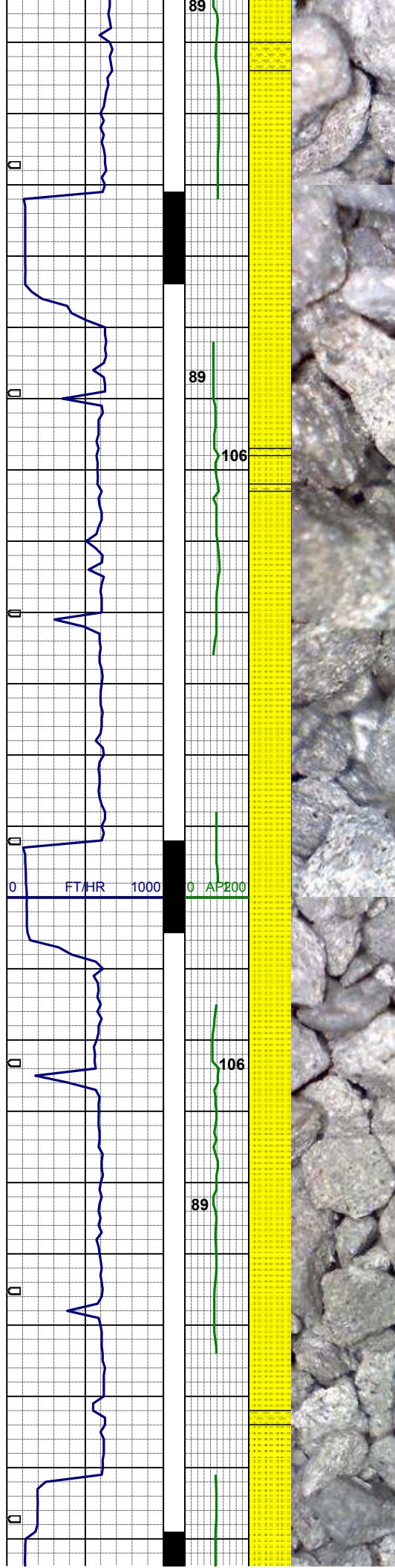| MD | 1347' |
INC	4.7°
AZI	148.9°
TVD	1346.6'

SHYSS: mgy, trnsl- op, vfgr, sbblky,
mod srt, sft- sl firm, mod cem, pred
arg mtx, sl calc, slty, grdg- shysltst
SS: wh- mgy, s&p ip, clr- trnsl, f- mgr,
blky- sbblky, sbrndd- sbang, p- mod
srt, mod sft, mod cmt, arg- sil mtx, sl
calc, sl mica

MD	1442'
INC	5.5°
AZI	142.7°
TVD	1441.2'

SS: wh- mgy, s&p ip, clr- trnsl, f- mgr,
blky- sbblky, sbrndd- sbang, p- mod
srt, mod sft, mod cmt, arg- sil mtx, sl
calc, sl mica
SHYSS: mgy, trnsl- op, vfgr, sbblky,
mod srt, sft- sl firm, mod cem, pred
arg mtx, sl calc, slty, grdg- shysltst

0   FT/HR   1000
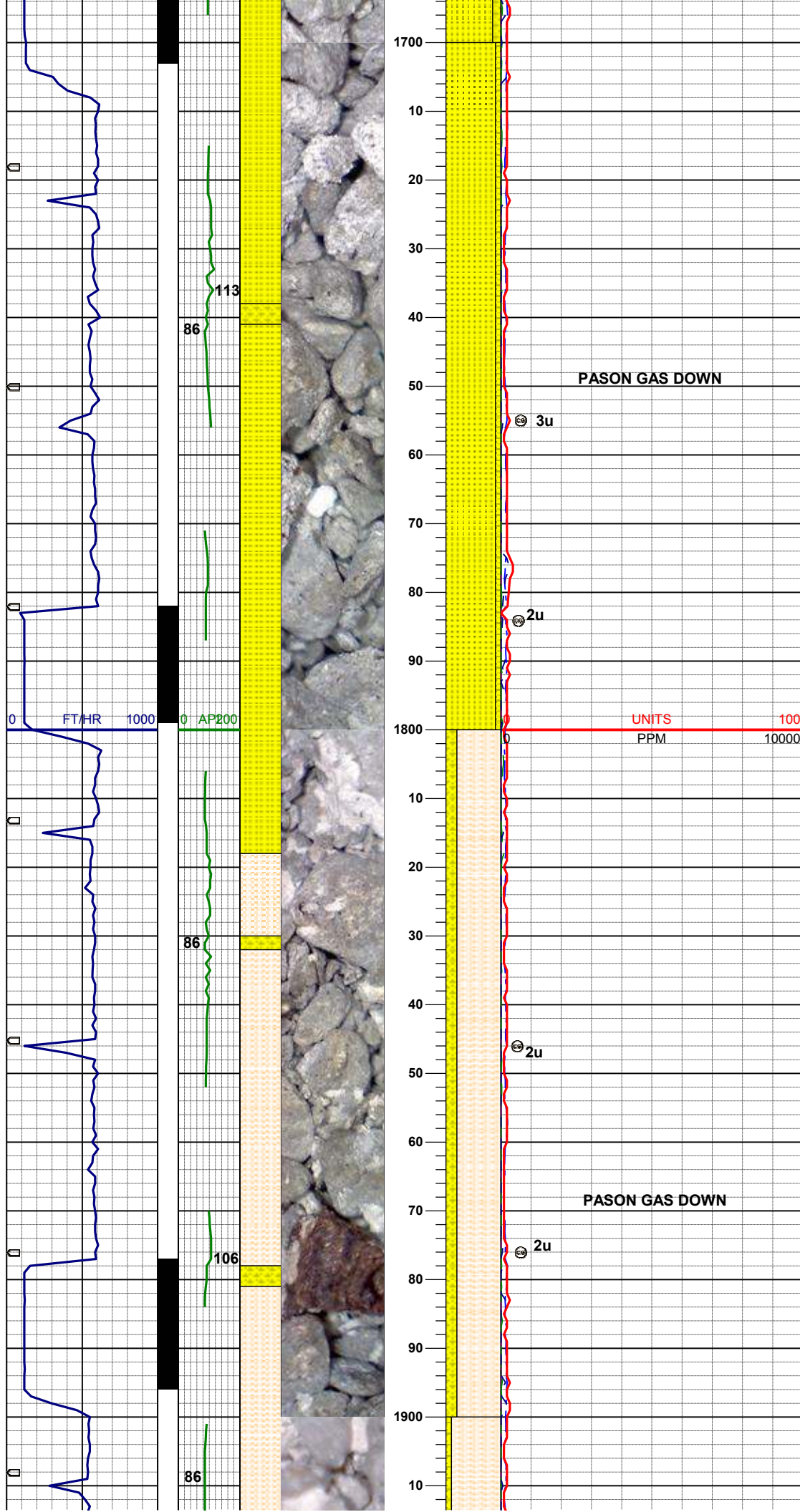0   AP200

89

89

106

0 FT/HR 1000   0 AP200

89

106

89

80
90
1500
10
20
30
40
50
60
70
80
90
1600
10
20
30
40
50
60
70
80
90

⊕2u
⊕2u
⊕3u
⊕2u
⊕3u

PASON GAS DOWN

UNITS 100
PPM 10000

PASON GAS DOWN

MD   1537'
INC   6.2°
AZI   137.5°
TVD 1535.7'

SS: wh- mgy, s&p ip, clr- trnsl, f- mgr, blky- sbblky, sbrndd- sbang, p- mod srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica
SHYSS: mgy, trnsl- op, vfgr, sbblky, mod srt, sft- sl firm, mod cem, pred arg mtx, sl calc, slty, grdg- shysltst

MD   1632'
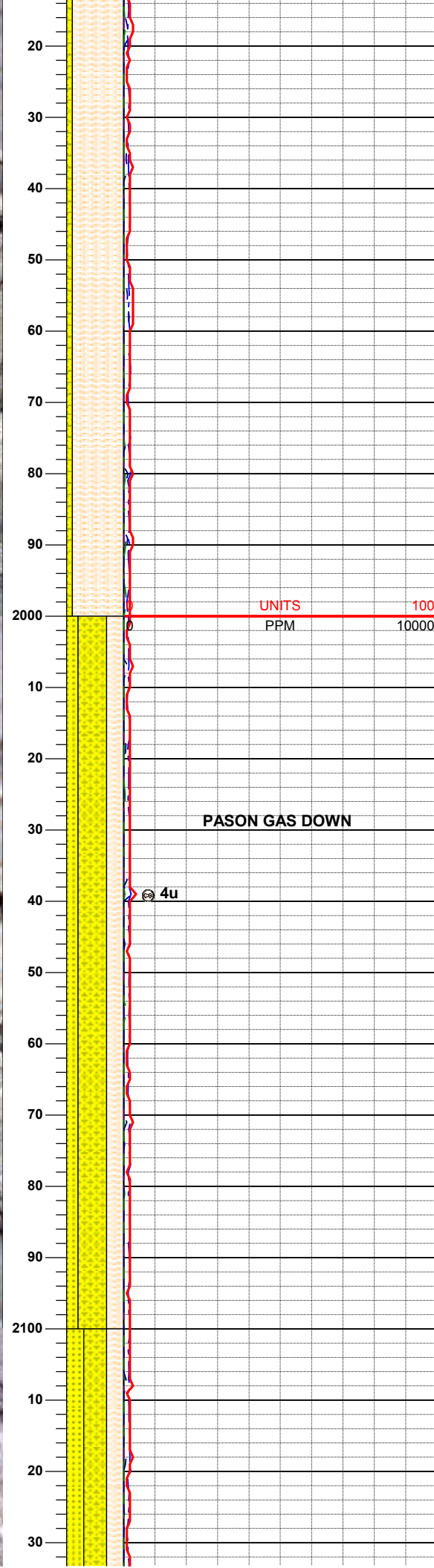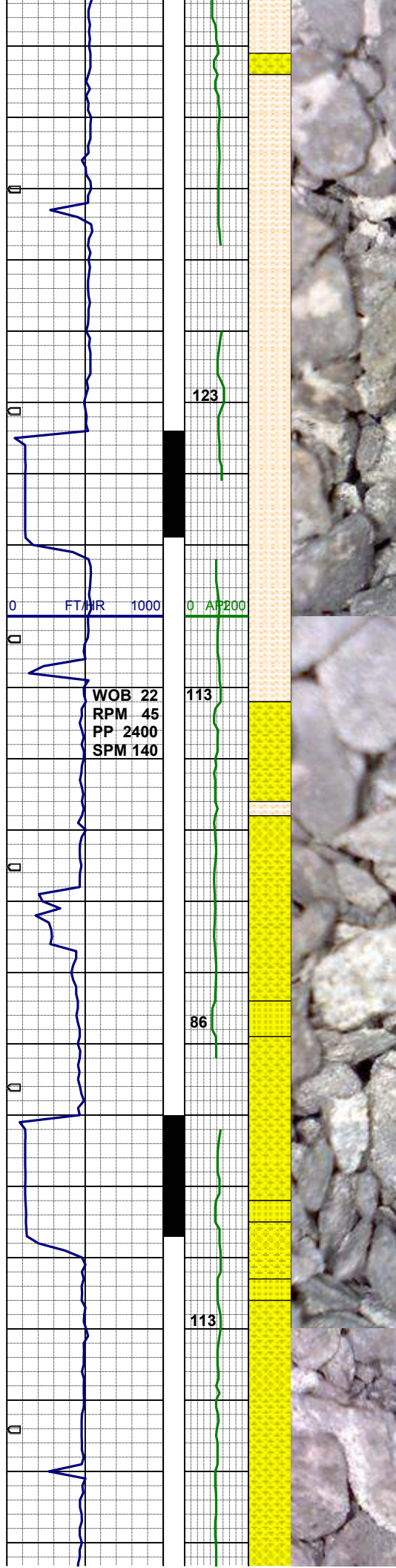**INC   7.5°**
AZI   143.6°
TVD 1630.0'

SS: wh- mgy, s&p ip, clr- trnsl, f- mgr, blky- sbblky, sbrndd- sbang, p- mod srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica, tr pyr, tr glau
SHYSS: mgy, trnsl- op, vfgr, sbblky, mod srt, sft- sl firm, mod cem, pred arg mtx, sl calc, slty, grdg- shysltst

Depth Track (left, 1700–1916)

Scale markers: 1700, 10, 20, 30, 40, 50, 60, 70, 80, 90, 1800, 10, 20, 30, 40, 50, 60, 70, 80, 90, 1900, 10

ROP / Gamma Track
- 0 **FT/HR** 1000
- 0 **AP200**
- 113
- 86
- 86
- 106
- 86

Gas / Units Track
- 0 **UNITS** 100
- **PPM** 10000
- 0 **PPM** 10000

PASON GAS DOWN

⊕ 3u

⊕ 2u

⊕ 2u

PASON GAS DOWN

⊕ 2u

Survey / Lithology Descriptions (right)

MD 1727'
INC 7.7°
AZI 142.0°
TVD 1724.2'

SS: wh- mgy, s&p ip, clr- trnsl, f- mgr, blky- sbblky, sbrndd- sbang, p- mod srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica, tr pyr, tr glau
SHYSS: mgy, trnsl- op, vfgr, sbblky, mod srt, sft- sl firm, mod cem, pred arg mtx, sl calc, slty, grdg- shysltst

MD 1821'
INC 8.4°
AZI 137.8°
TVD 1817.2'

SHYSLTST: m- dkgy, sbblky- sbplty, sft- sl firm, arg, sl calc, sdy ip, abnt wh cly, grdg- shyss

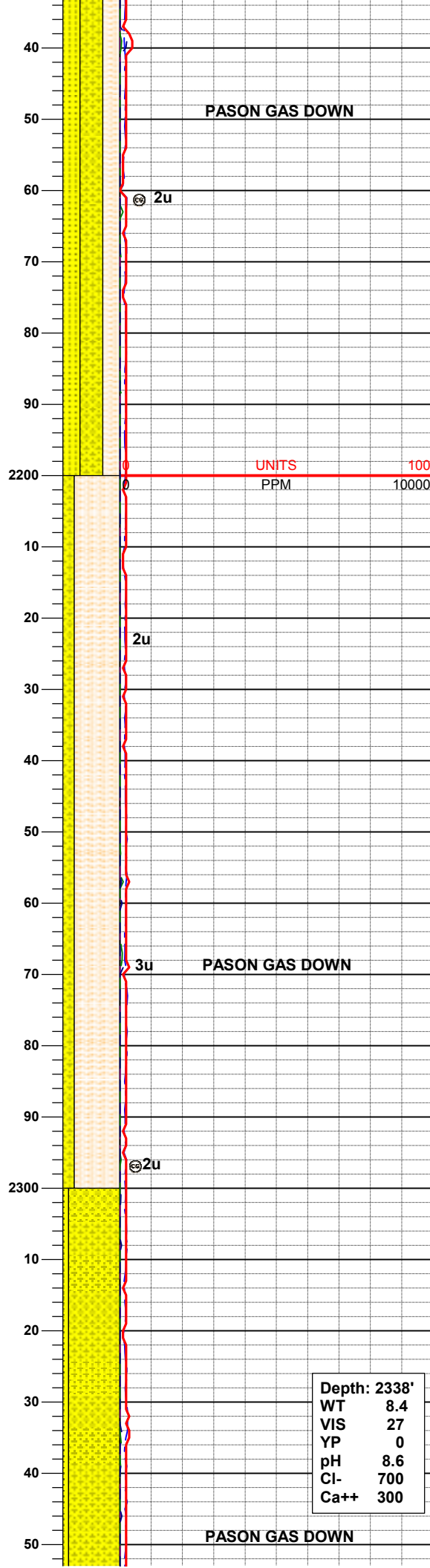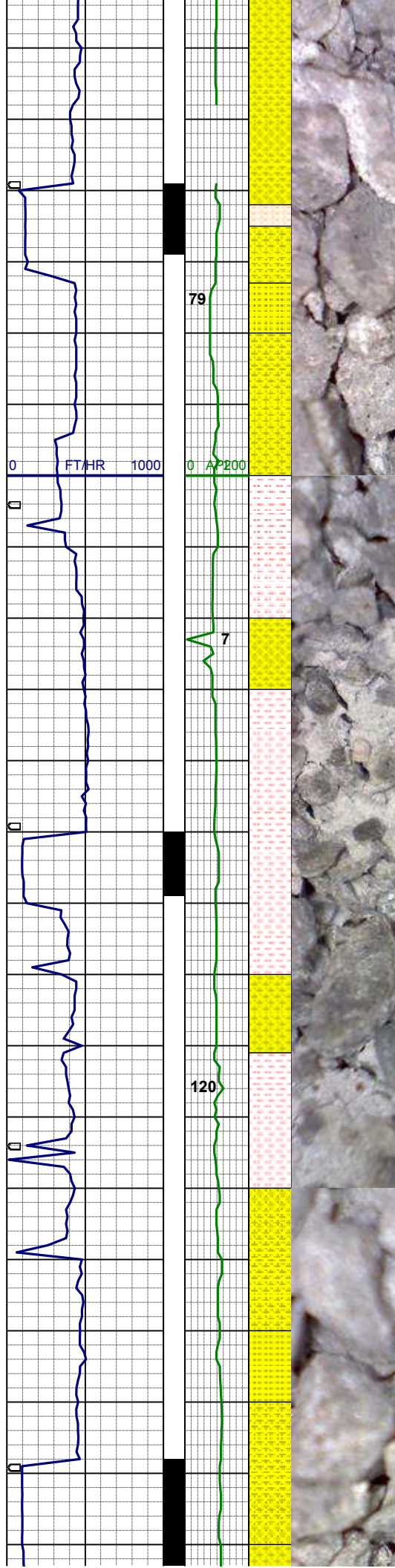**MD 1916'**

INC   9.5°
AZI   134.0°
TVD 1911.1'

20

30

40

SHYSLTST: m- dkgy, sbblky- sbplty,
sft- sl firm, arg, sl calc, sdy ip, abnt wh
cly, grdg- shyss

50

60

123

70

80

90

0   FT/HR   1000   0   API   200   UNITS   100
                              PPM   10000
2000

WOB 22   **113**   MD   2014'
RPM 45   INC   9.5°
PP 2400   AZI   137.3°
SPM 140   TVD 2007.7'

10

20

PASON GAS DOWN
30

40   ⊕ 4u

SHYSS: mgy, trnsl- op, vfgr, sbblky,
mod srt, sft- sl firm, p- mod cem, pred
arg mtx, sl calc, slty, abnt wh cly, grdg
- shysltst
SS: wh- mgy, s&p ip, clr- trnsl, f- mgr,
blky- sbblky, sbrndd- sbang, p- mod
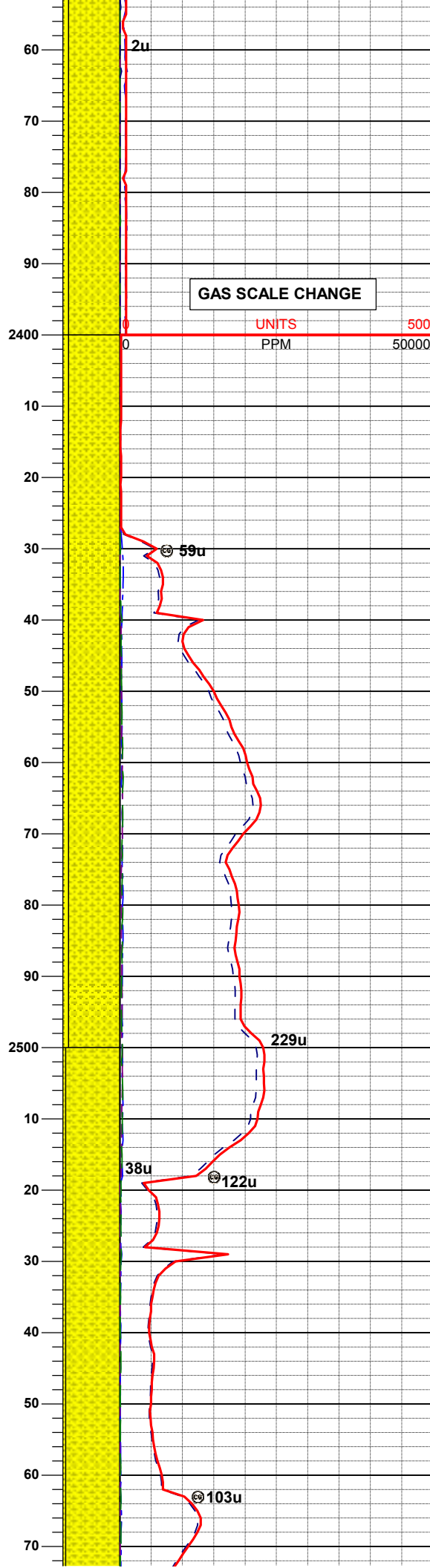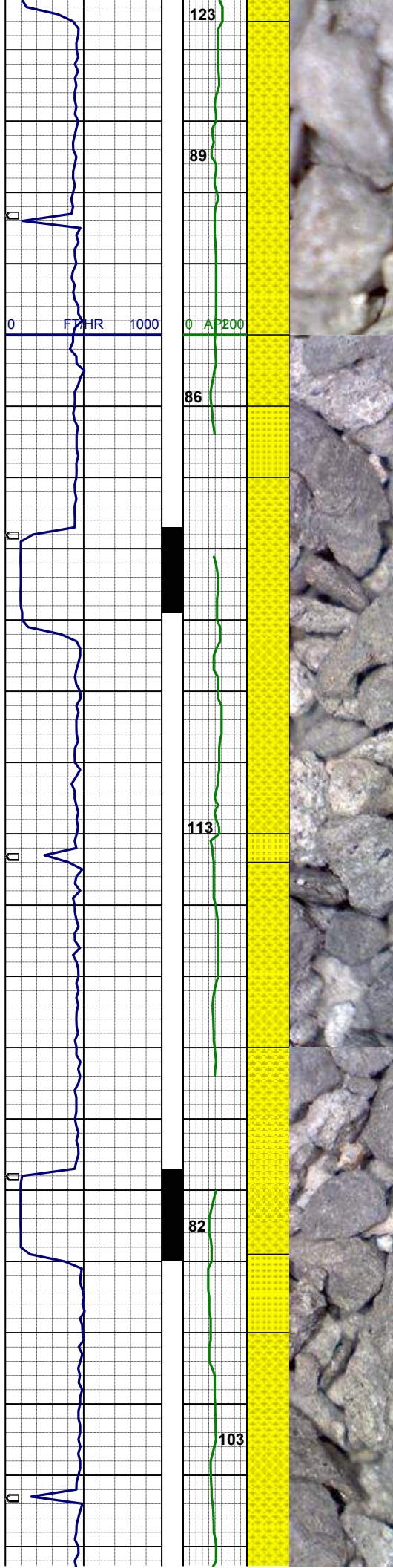srt, mod sft, mod cmt, arg- sil mtx, sl
calc, sl mica

86

50

60

70

80

90

113

MD   2104'
INC   10.5°
AZI   142.6°
TVD 2096.4'
2100

10

20

30

PASON GAS DOWN

2u

SHYSS: mgy, trnsl- op, vfgr, sbblky, mod srt, sft- sl firm, p- mod cem, pred arg mtx, sl calc, slty, abnt wh cly, grdg - shysltst

SS: wh- mgy, s&p ip, clr- trnsl, f- mgr, blky- sbblky, sbrndd- sbang, p- mod srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica

MD	2194'
INC	10.8°
AZI	140.3°
TVD	2184.8'

0   FT/HR   1000   0   AP200

0	UNITS	100
0	PPM	10000

79

7

2u

SHYSLTST: m- dkgy, sbblky- sbplty, sft- sl firm, arg, sl calc, sdy ip, abnt wh cly, grdg- shyss

3u   **PASON GAS DOWN**

MD	2284'
INC	10.3°
AZI	137.7°
TVD	2273.3'

120

2u

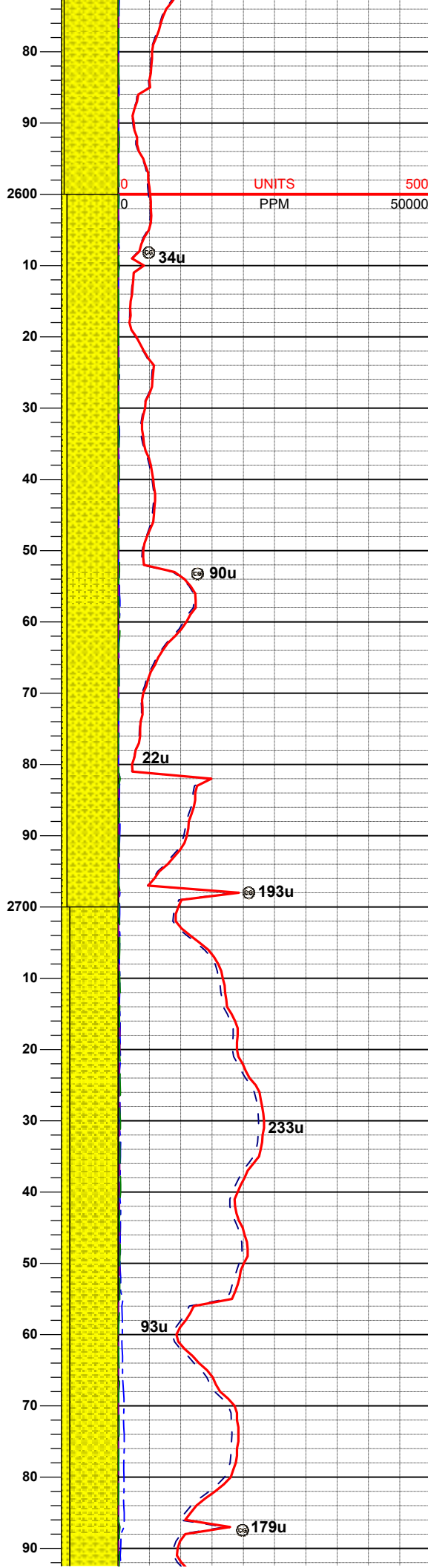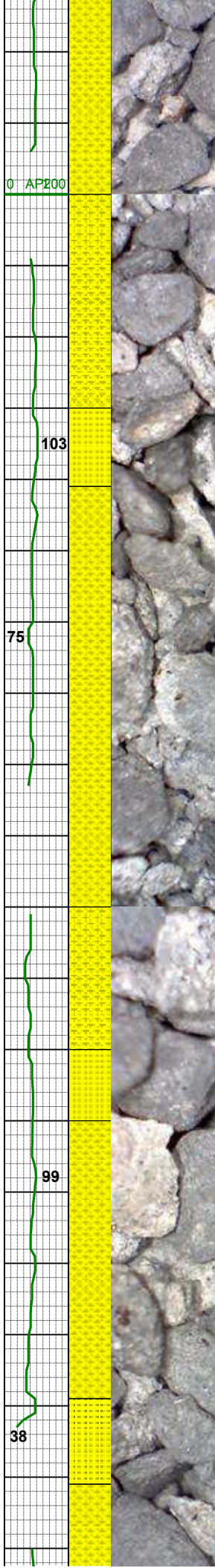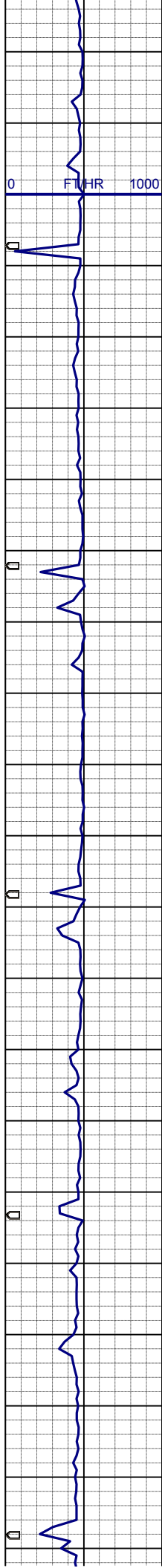| Depth: 2338'	
WT	8.4
VIS	27
YP	0
pH	8.6
Cl-	700
Ca++	300

SHYSS: m= dkgy, trnsl- op, vfgr, sbblky, mod srt, sft- sl firm, p- mod cem, pred arg mtx, sl calc, slty, grdg- shysltst

PASON GAS DOWN

Track scales:
0 FT/HR 1000
0 API 200

Gas track header:
GAS SCALE CHANGE
0 UNITS 500
0 PPM 50000

Curve/sample labels (left tracks): 123, 89, 86, 113, 82, 103

Depth markers: 60, 70, 80, 90, 2400, 10, 20, 30, 40, 50, 60, 70, 80, 90, 2500, 10, 20, 30, 40, 50, 60, 70

Gas readings: 2u, 59u, 229u, 38u, 122u, 103u

Right column descriptions:

SS: wh- mgy, s&p ip, clr- trnsl, f- mgr, blky- sbblky, sbrndd- sbang, p- mod srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica

MD	2373'
INC	10.4°
AZI	141.0°
TVD	2360.9'

SHYSS: m= dkgy, trnsl- op, vfgr, sbblky, mod srt, sft- sl firm, p- mod cem, pred arg mtx, sl calc, slty, grdg- shysltst

SS: wh- mgy, s&p ip, clr- trnsl, f- mgr, blky- sbblky, sbrndd- sbang, p- mod srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica

MD	2463'
INC	11.3°
AZI	143.8°
TVD	2449.2'

SHYSS: mgy, occ gybrn, trnsl- op, vfgr, sbblky- sbplty, mod srt, sft- sl firm, sod cmt, pred arg mtx, sl calc, slty, grdg- shysltst

SS: wh- mgy, s&p, clr- trnsl, f- mgr, blky- sbblky, sbrndd-sbang, p srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica, occ glau

MD	2553'
INC	11.6°
AZI	148.9°
TVD	2537.5'

Track headers:
- 0 FT/HR 1000
- 0 AP 200
- 0 UNITS 500
- 0 PPM 50000

Depth markers: 80, 90, 2600, 10, 20, 30, 40, 50, 60, 70, 80, 90, 2700, 10, 20, 30, 40, 50, 60, 70, 80, 90

Gamma/porosity values: 103, 75, 99, 38

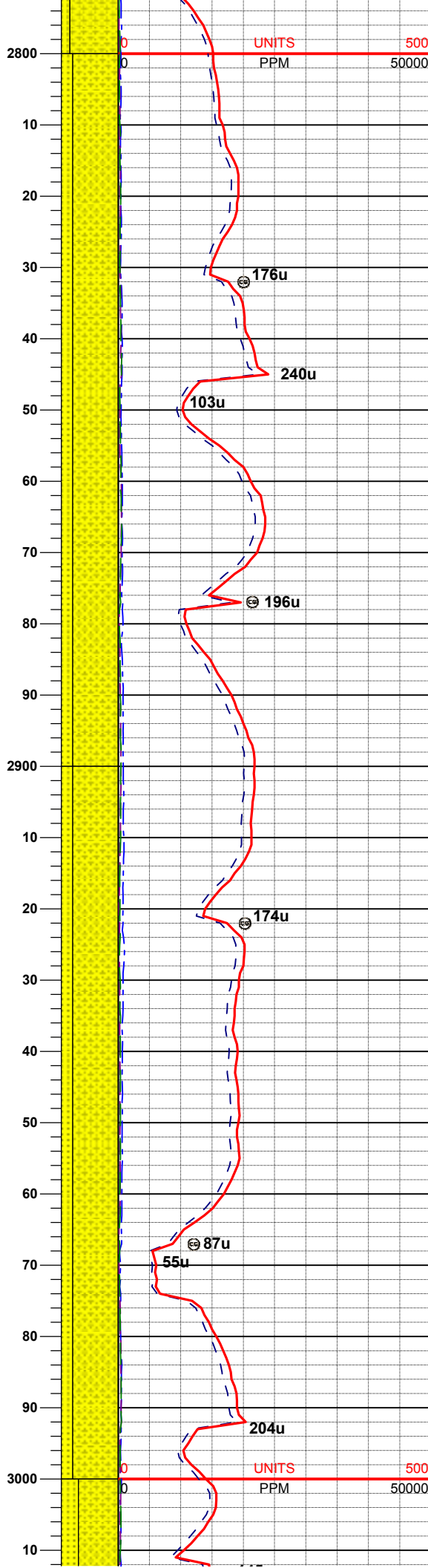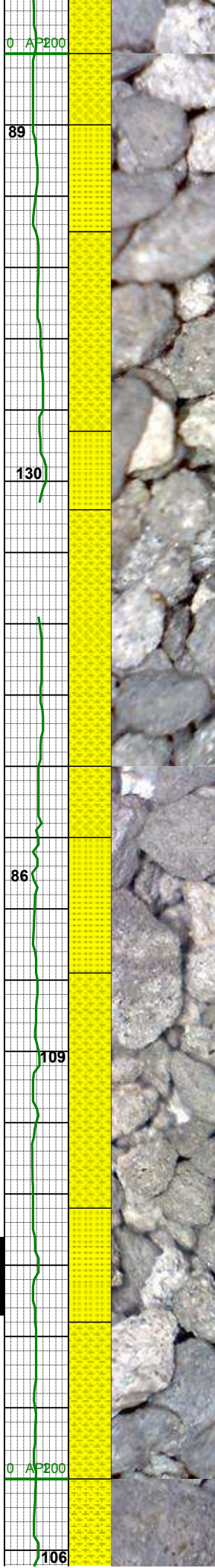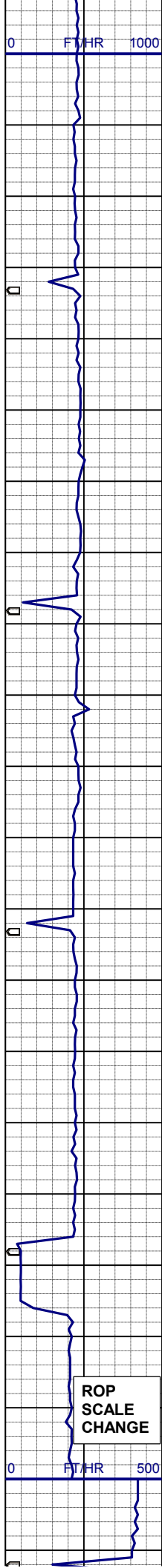Gas/show annotations: 34u, 90u, 22u, 193u, 233u, 93u, 179u

MD   2643'
INC   11.7°
AZI   147.7°
TVD   2625.6'

SHYSS: mgy, occ gybrn, trnsl- op, vfgr, sbblky- sbplty, mod srt, sft- sl firm, sod cmt, pred arg mtx, sl calc, slty, grdg- shysltst
SS: wh- mgy, s&p, clr- trnsl, f- mgr, blky- sbblky, sbrndd-sbang, p srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica, occ glau

MD   2733'
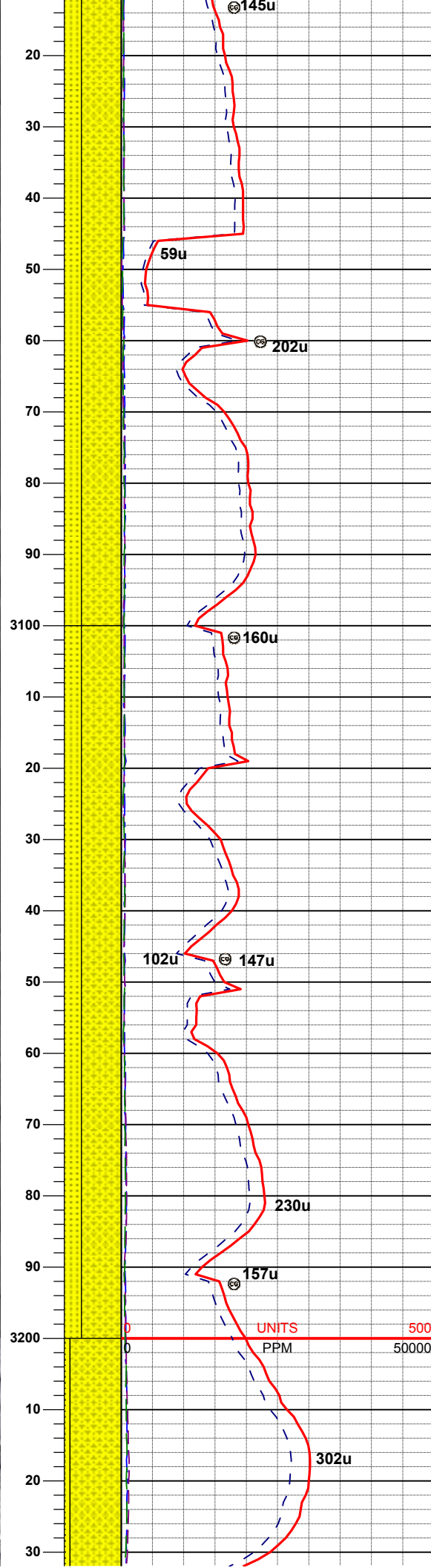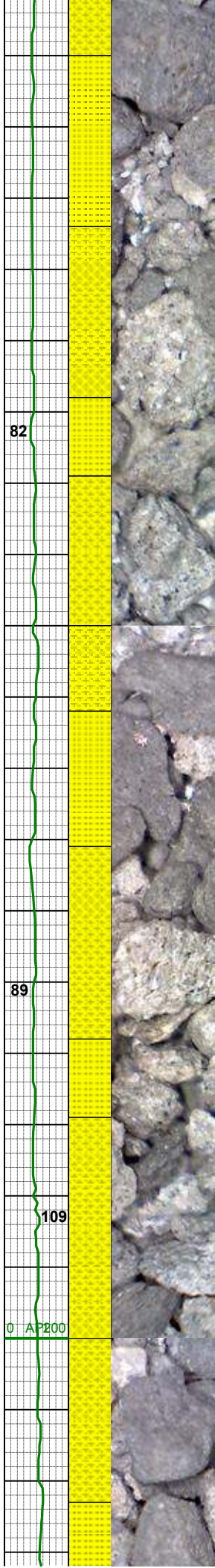INC   12.2°
AZI   148.7°
TVD   2713.7'

SHYSS: mgy, occ gybrn, trnsl- op, vfgr, sbblky- sbplty, mod srt, sft- sl firm, sod cmt, pred arg mtx, sl calc, slty, grdg- shysltst
SS: wh- mgy, s&p, clr- trnsl, f- mgr, blky- sbblky, sbrndd-sbang, p srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica, occ glau

Track 1 (ROP):
0   FT/HR   1000

ROP
SCALE
CHANGE

0   FT/HR   500

Track 2 (Gamma):
0   API   200

89

130

86

109

0   API   200

106

Depth / Gas Track:
0   UNITS   500
0   PPM   50000

2800

10

20

30   176u

40

240u

50   103u

60

70

80   196u

90

2900

10

20   174u

30

40

50

60

70   87u
55u

80

90   204u

3000

0   UNITS   500
0   PPM   50000

10

Right column annotations:

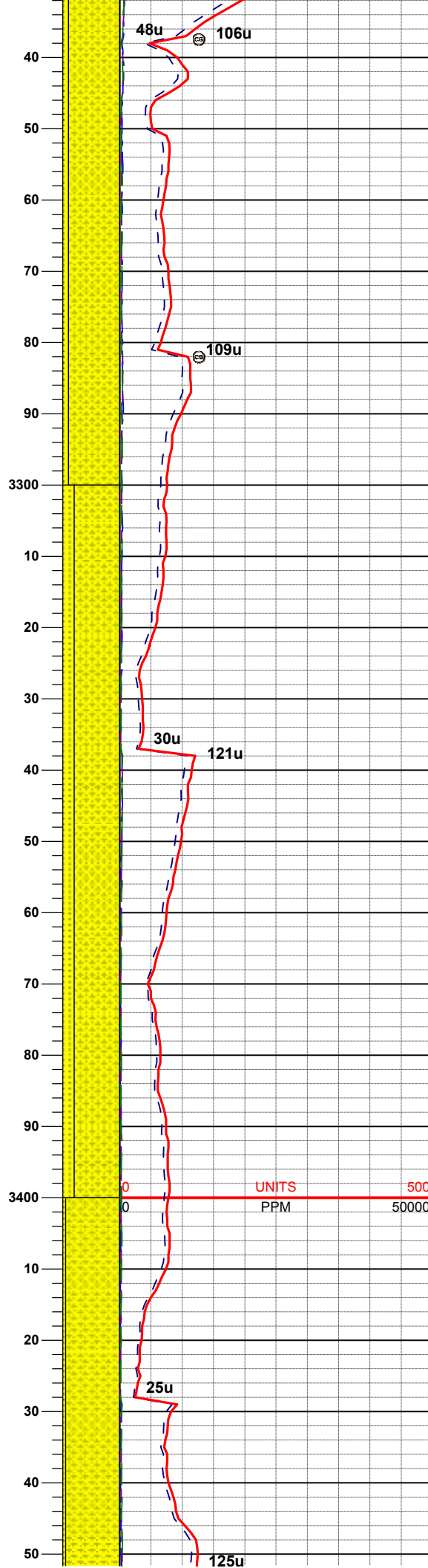MD   2823'
INC   12.2°
AZI   146.8°
TVD   2801.6'

SHYSS: mgy, occ gybrn, trnsl- op,
vfgr, sbblky- sbplty, mod srt, sft- sl
firm, sod cmt, pred arg mtx, sl calc,
slty, grdg- shysltst
SS: wh- mgy, s&p, clr- trnsl, f- mgr,
blky- sbblky, sbrndd-sbang, p srt, mod
sft, mod cmt, arg- sil mtx, sl calc, sl
mica, occ glau

MD   2913'
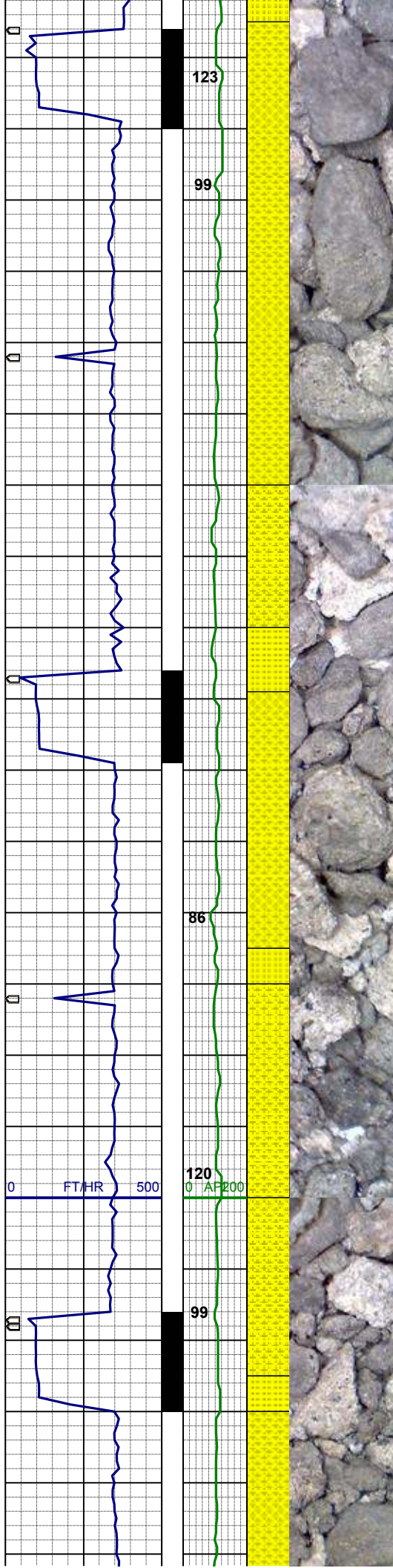INC   10.8°
AZI   143.5°
TVD   2889.8'

SHYSS: mgy, occ gybrn, trnsl- op,
vfgr, sbblky- sbplty, mod srt, sft- sl
firm, sod cmt, pred arg mtx, sl calc,
slty, grdg- shysltst
SS: wh- mgy, s&p, clr- trnsl, f- mgr,
blky- sbblky, sbrndd-sbang, p srt, mod
sft, mod cmt, arg- sil mtx, sl calc, sl
mica, occ glau

MD   3002'
INC   12.1°
AZI   145.6°
TVD   2977.0'

SHYSS: mgy, occ gybrn, trnsl- op,
vfgr, sbblky- sbplty, mod srt, sft- sl
firm, sod cmt, pred arg mtx, sl calc,
slty, grdg- shysltst
SS: wh- mgy, s&p, clr- trnsl, f- mgr,
blky- sbblky, sbrndd-sbang, p srt, mod
sft, mod cmt, arg- sil mtx, sl calc, sl
mica, occ glau

MD   3092'
INC   11.5°
AZI   144.7°
TVD   3065.1'

SHYSS: mgy, occ gybrn, trnsl- op,
vfgr, sbblky- sbplty, mod srt, sft- sl
firm, sod cmt, pred arg mtx, sl calc,
slty, grdg- shysltst
SS: wh- mgy, s&p, clr- trnsl, f- mgr,
blky- sbblky, sbrndd-sbang, p srt, mod
sft, mod cmt, arg- sil mtx, sl calc, sl
mica, occ glau

MD   3182'
INC   10.4°
AZI   142.6°
TVD   3153.5'

Track labels and gas values: 145u, 59u, 202u, 82, 160u, 89, 109, 102u, 147u, 230u, 157u, 302u

Scales:
- 0 FT/HR 500
- 0 API 200
- 0 UNITS 500
- 0 PPM 50000

Track depth labels (left gamma/rate track):
- 123
- 99
- 86
- 120
- 99

Curve scales (left track): 0 — FT/HR — 500
Middle curve scale: 0 — API — 200

Depth track (center-right): 40, 50, 60, 70, 80, 90, 3300, 10, 20, 30, 40, 50, 60, 70, 80, 90, 3400, 10, 20, 30, 40, 50

Gas curve annotations:
- 48u   106u
- 109u
- 30u   121u
- 25u
- 125u

Gas scale: 0 — UNITS — 500
0 — PPM — 50000

SHYSS: mgy, occ gybrn, trnsl- op,
vfgr, sbblky- sbplty, mod srt, sft- sl
firm, sod cmt, pred arg mtx, sl calc,
slty, grdg- shysltst
SS: wh- mgy, s&p, clr- trnsl, f- mgr,
blky- sbblky, sbrndd-sbang, p srt, mod
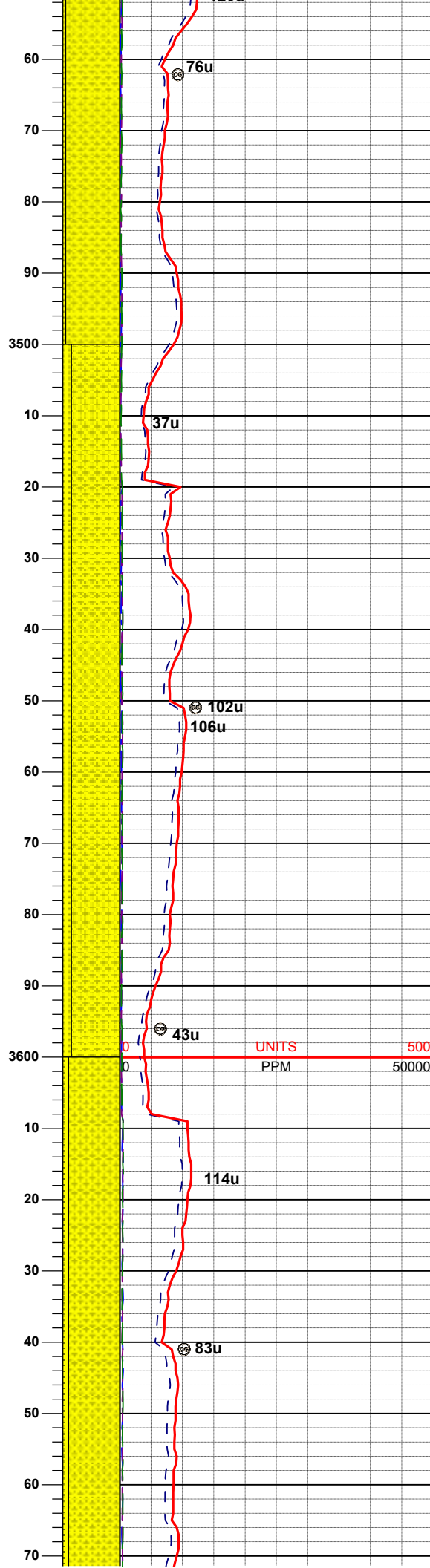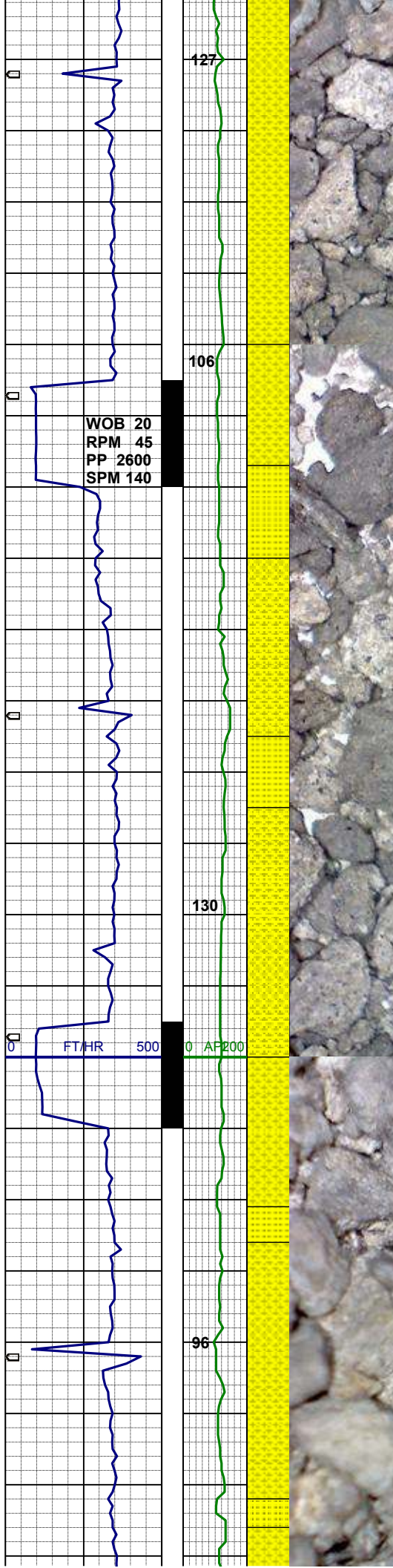sft, mod cmt, arg- sil mtx, sl calc, sl
mica, occ glau

MD   3272'
INC   10.2°
AZI   143.5°
TVD   3242.0'

SHYSS: mgy, occ gybrn, trnsl- op,
vfgr, sbblky- sbplty, mod srt, sft- sl
firm, sod cmt, pred arg mtx, sl calc,
slty, grdg- shysltst
SS: wh- mgy, s&p, clr- trnsl, f- mgr,
blky- sbblky, sbrndd-sbang, p srt, mod
sft, mod cmt, arg- sil mtx, sl calc, sl
mica, occ glau

MD   3362'
INC   10.5°
AZI   144.3°
TVD   3330.6'

WT 8.95 / VIS 30

SHYSS: mgy, occ gybrn, trnsl- op,
vfgr, sbblky- sbplty, mod srt, sft- sl
firm, sod cmt, pred arg mtx, sl calc,
slty, grdg- shysltst
SS: wh- mgy, s&p, clr- trnsl, f- mgr,
blky- sbblky, sbrndd-sbang, p srt, mod
sft, mod cmt, arg- sil mtx, sl calc, sl
mica, occ glau

MD   3452'
INC   11.0°

127

76u

60

70

80

90

3500

106

WOB 20
RPM 45
PP 2600
SPM 140

10

37u

20

30

40

50

102u
106u

60

130

70

80

90

43u

96

0 FT/HR 500   0 AP 200

3600

0   PPM   50000

UNITS
0   500

MD 3542'
INC 11.0°
AZI 144.5°
TVD 3507.3'

SHYSS: mgy, occ gybrn, trnsl- op,
vfgr, sbblky- sbplty, mod srt, sft- sl
firm, sod cmt, pred arg mtx, sl calc,
slty, grdg- shysltst
SS: wh- mgy, s&p, clr- trnsl, f- mgr,
blky- sbblky, sbrndd-sbang, p srt, mod
sft, mod cmt, arg- sil mtx, sl calc, sl
mica, occ glau

10

114u

20

30

MD 3632'
INC 11.1°
AZI 148.5°
TVD 3595.7'

40

83u

50

SHYSS: mgy, occ gybrn, trnsl- op,
vfgr, sbblky- sbplty, mod srt, sft- sl
firm, sod cmt, pred arg mtx, sl calc,
slty, grdg- shysltst
SS: wh- mgy, s&p, clr- trnsl, f- mgr,
blky- sbblky, sbrndd-sbang, p srt, mod
sft, mod cmt, arg- sil mtx, sl calc, sl
mica, occ glau

60

70
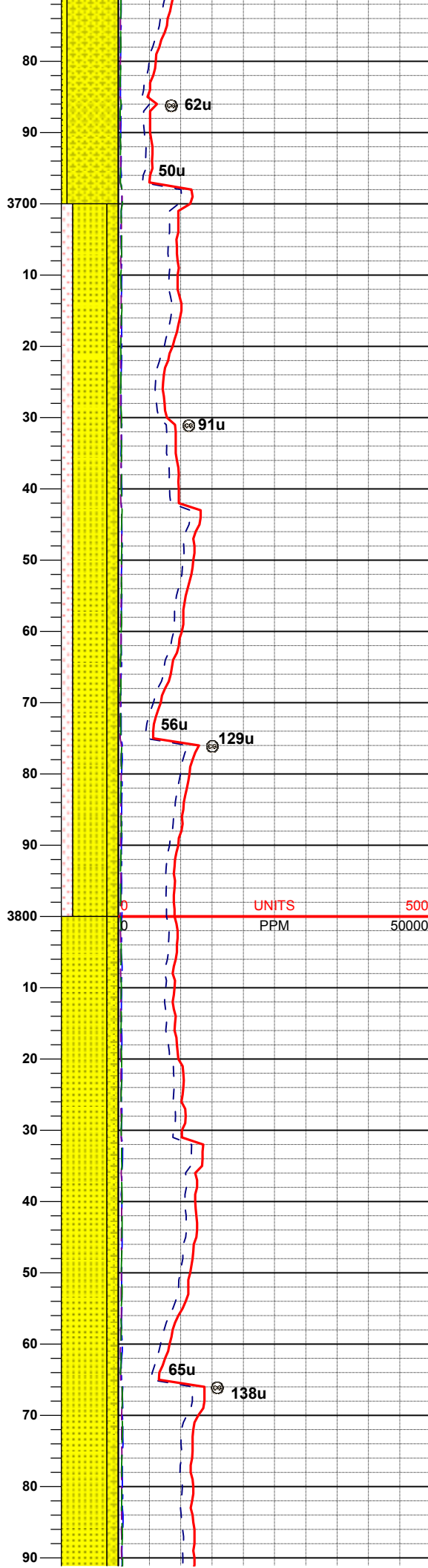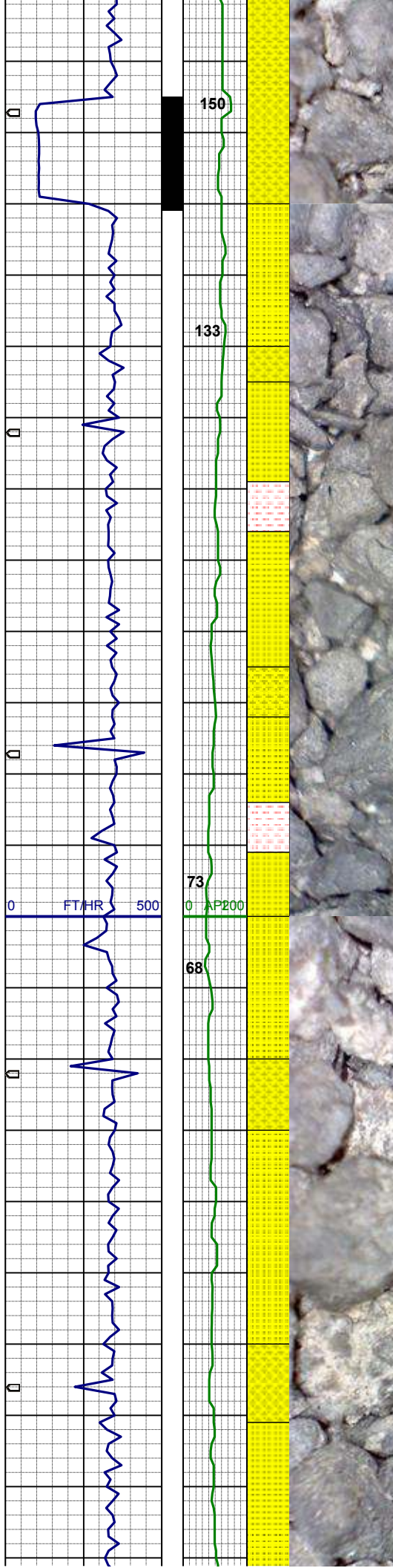
MD   3722'
INC   11.9°
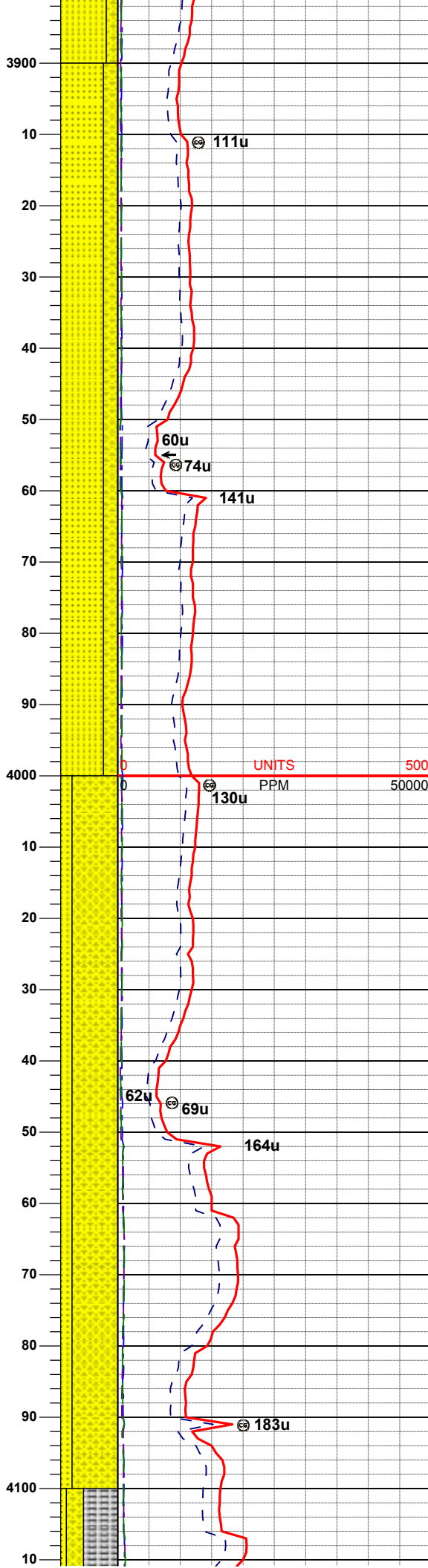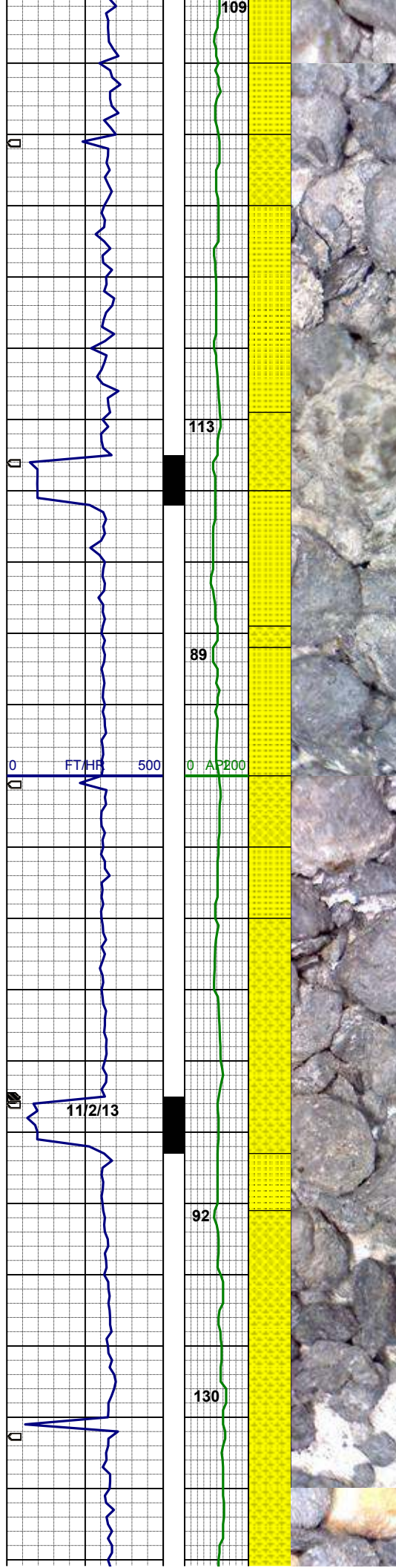AZI   151.9°
TVD 3683.9'

SS: wh, s&p, clr- trnsl, occ lt brn, f-mgr, blky- sbblky, lse, sbrndd-sbang, p srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica, occ glau
SHYSS: lt- mgy, vfgr, trnsl- op, sbrndd- sbplty, p srt, vsft- sft, pred arg mtx, mod cmt, sl calc, slty, grdg- shysltst

WT 9.20 / VIS 35

MD   3811'
INC   11.9°
AZI   150.5°
TVD 3771.0'

SS: wh, s&p, clr- trnsl, occ lt brn, f-mgr, blky- sbblky, lse, sbrndd-sbang, p srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica, occ glau
SHYSS: lt- mgy, vfgr, trnsl- op, sbrndd- sbplty, p srt, vsft- sft, pred arg mtx, mod cmt, sl calc, slty, grdg- shysltst

Track values and labels:

109

113

89

130

92

11/2/13

0 FT/HR 500

0 AP 200

Gas units track:

111u

60u

74u

141u

UNITS

0 PPM 50000 500

130u

62u 69u

164u

183u

Depth scale:

3900

10

20

30

40

50

60

70

80

90

4000

10

20

30

40

50

60

70

80

90

4100

10

Right column annotations:

MD   3901'
INC   12.0°
AZI   150.0°
TVD   3859.0'

SS: wh, s&p, clr- trnsl, occ lt brn, f- mgr, blky- sbblky, lse, sbrndd-sbang, p srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica, occ glau

SHYSS: lt- mgy, vfgr, trnsl- op, sbrndd- sbplty, p srt, vsft- sft, pred arg mtx, mod cmt, sl calc, slty, grdg- shysltst

WT 9.60 / VIS 36

MD   3991'
INC   10.9°
AZI   149.6°
TVD   3947.2'

SHYSS: mgy, occ gybrn, trnsl- op, vfgr, sbblky- sbplty, mod srt, sft- sl firm, sod cmt, pred arg mtx, sl calc, slty, grdg- shysltst

SS: wh- mgy, s&p, clr- trnsl, f- mgr, blky- sbblky, sbrndd-sbang, p srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica, occ glau

MD   4081'
INC   10.2°
AZI   145.0°
TVD   4035.7'

Track 1 (ROP / Drilling Parameters)

WOB 20
RPM 45
PP 2500
SPM 140

0   FT/HR   500

Track 2 (Gamma)

103

133

0   API   200

120

51

Depth Column

20
30
40
50
60
70
80
90
4200
10
20
30
40
50
60
70
80
90
4300
10
20
30

Gas / Chromatograph Track

78

422u

188u
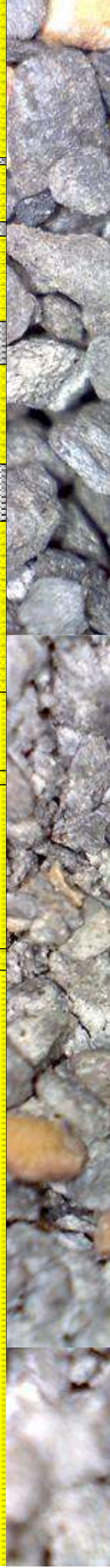
0   UNITS   500
PPM   50000

44u

97u

143u

129u

54u

Right Column (Notes)

**0100 HRS, 4135' MD
TOOH FOR MWD TOOL, TIH
RESUMED DRILLING 1130 HRS**
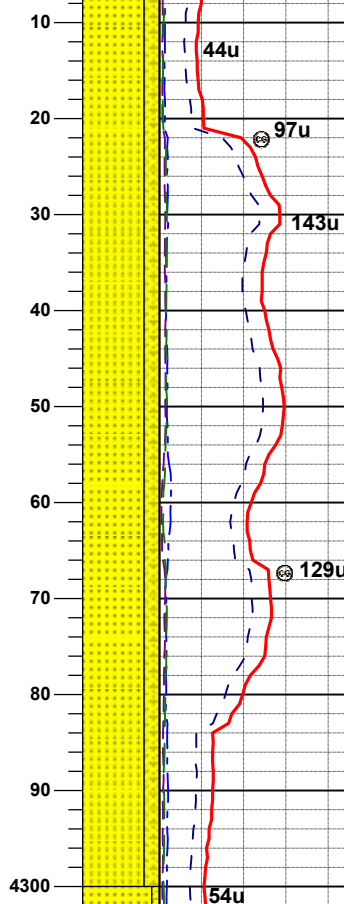
Depth: 4135'	
WT	9.2
VIS	38
YP	14
pH	8.7
Cl-	1100
Ca++	120

SLTYSH: m- dkgy, sbblky-sbplty, occ plty, sl sft- firm, sl calc, sdy ip, grdg- shyss, tr bent
SS: wh- mgy, s&p ip, clr- trnsl, occ op, f- mgr, blky- sbblky, sbang, mod srt, brit- sl firm , mod cmt, pred sil mtx, sl calc, sl mica, tr glau
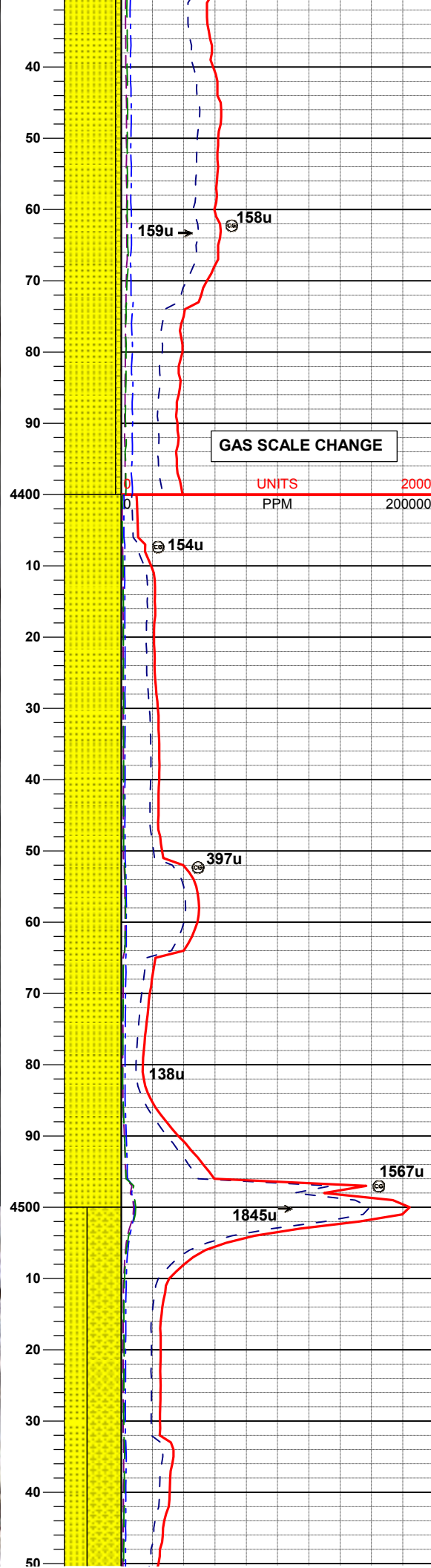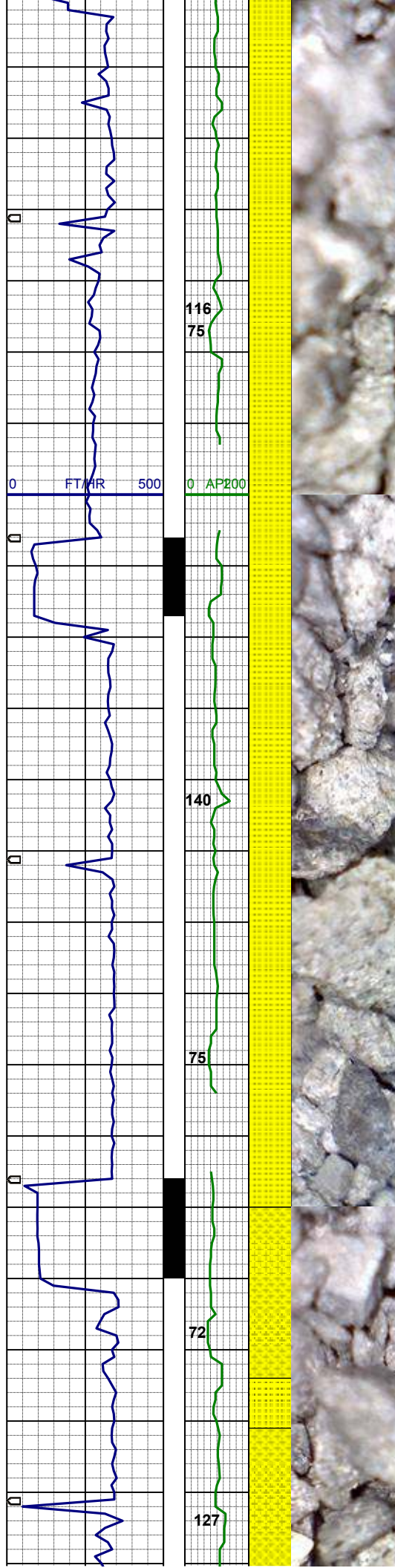
**MD   4171'
INC   9.1°
AZI   141.7°
TVD   4124.4'**

SS: wh- mgy, occ dk gy, s&p, clr- trnsl, occ op, f- mgr, blky- sbblky, pred sbang gr, mod srt, brit- sl firm, mod cmt, arg- sil mtx, sl calc, sl mica
SHYSS: m- dkgy, trnsl- op, vf- fgr, sbblky- sbplty, mod srt, sft- sl firm, pred arg mtx, mod, sl calc, slty, grdg- sltysh

**MD   4261'
INC   9.5°
AZI   140.6°
TVD   4213.2'**

SS: m- dkgy, sme wh, s&p ip, clr- trnsl, occ op, f- mgr, blky- sbblky, pred

trnsl, occ op, f- mgr, blky- sbblky, pred
sbang gr, mod srt, brit- sl firm, mod
cmt, arg- sil mtx, sl calc, sl mica

SHYSS: m- dkgy, trnsl- op, vf- fgr,
sbblky- sbplty, mod srt, sft- sl firm,
pred arg mtx, mod, sl calc, slty, grdg-
sltysh

MD   4351'
INC   9.1°
AZI   144.5°
TVD   4302.1

159u →   158u

GAS SCALE CHANGE

0	FT/HR	500
0	AP200	

0   UNITS   2000
4400   PPM
0   200000

116
75

154u

WT 9.5 / VIS 39

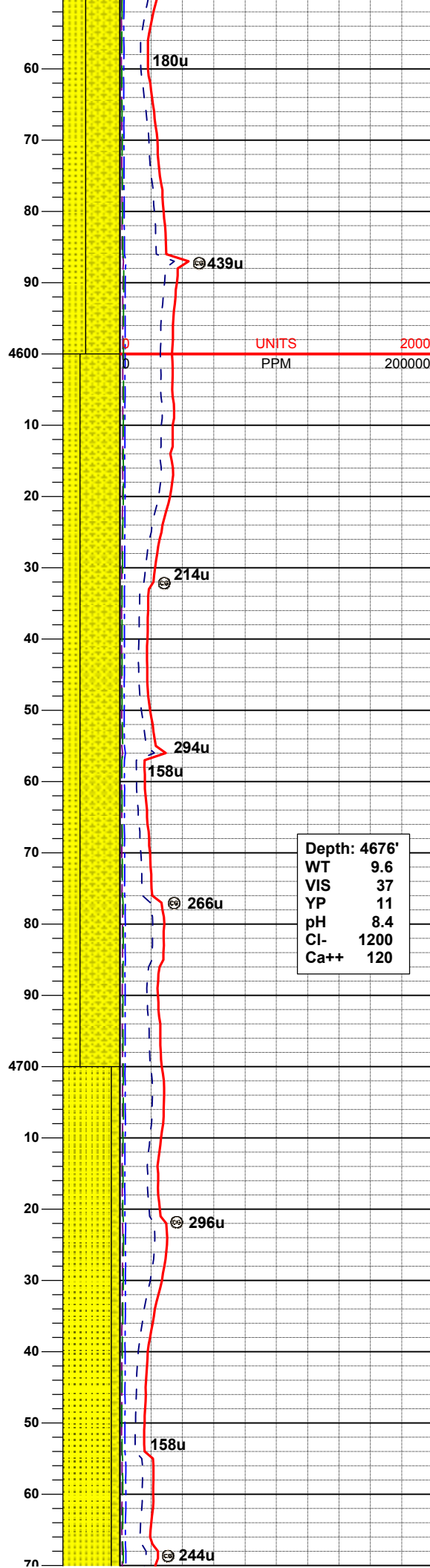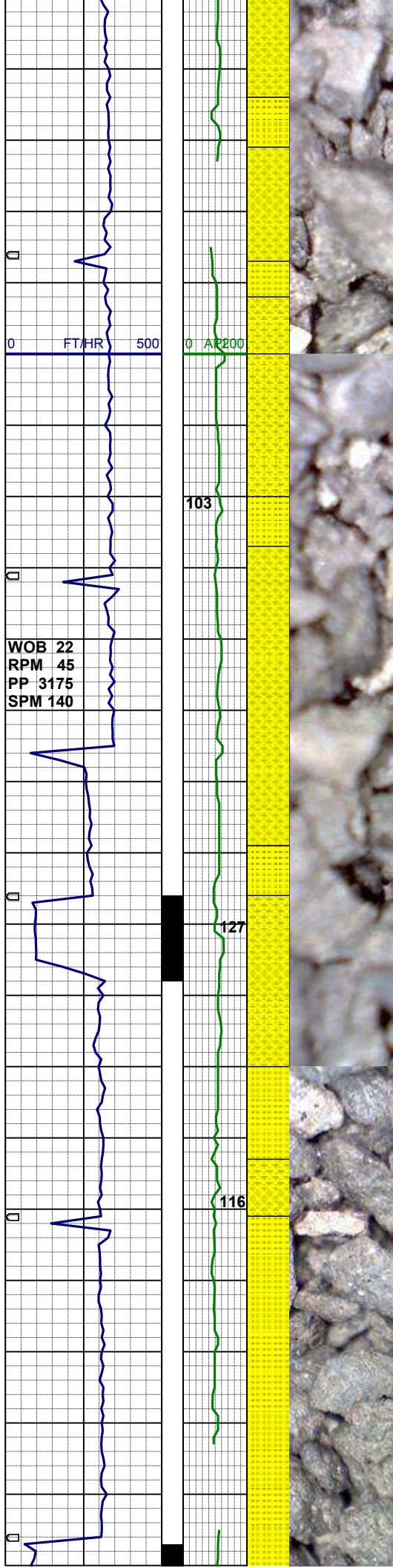**MD   4441'**
INC   9.0°
AZI   139.2°
TVD   4390.9'

SS: w- mgy, occ dkgy, s&p ip, clr-
trnsl, occ op, f- mgr, blky- sbblky, pred
sbang gr, mod srt, brit- sl firm, mod
cmt, arg- sil mtx, sl calc, sl mica, tr
glau

140

397u

75

138u

1567u

1845u →

72

MD   4531'
INC   10.3°
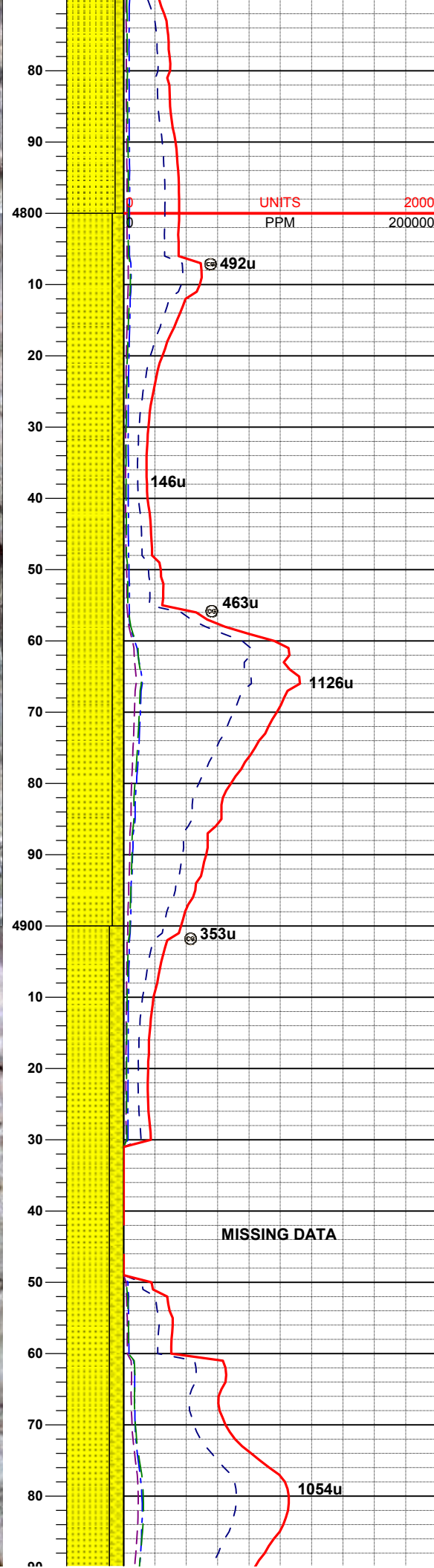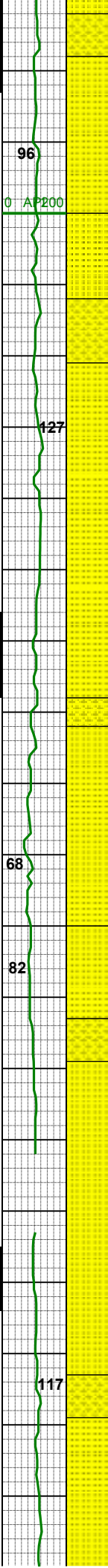**AZI   141.0°**
TVD   4479.7'

127

SHYSS: m- dkgy, trnsl- op, vf- fgr,
sbblky- sbplty, mod srt, sft- sl firm,

pred arg mtx, mod, sl calc, slty
SS: m- dkgy, sme wh, s&p ip, clr- trnsl, occ op, f- mgr, blky- sbblky, pred sbang gr, mod srt, brit- sl firm, mod cmt, arg- sil mtx, sl calc, sl mica

180u

> **439u**

0	FT/HR	500
0	API	200
0	UNITS	2000
	PPM	200000

WT 9.6 / VIS 37

103

214u

WOB 22
RPM 45
PP 3175
SPM 140

MD 4621'
INC 9.5°
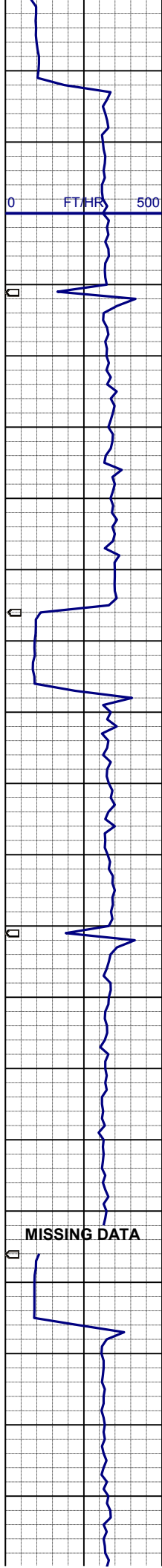**AZI 139.6°**
TVD 4568.3'

294u
158u

SHYSS: m- dkgy, trnsl- op, vf- fgr, sbblky- sbplty, mod srt, sft- sl firm, pred arg mtx, mod, sl calc, slty
SS: m- dkgy, sme wh, s&p ip, clr- trnsl, occ op, f- mgr, blky- sbblky, pred sbang gr, mod srt, brit- sl firm, mod cmt, arg- sil mtx, sl calc, sl mica

266u

127

Depth: 4676'	
WT	9.6
VIS	37
YP	11
pH	8.4
Cl-	1200
Ca++	120

MD 4711'
INC 9.0°
AZI 140.8°
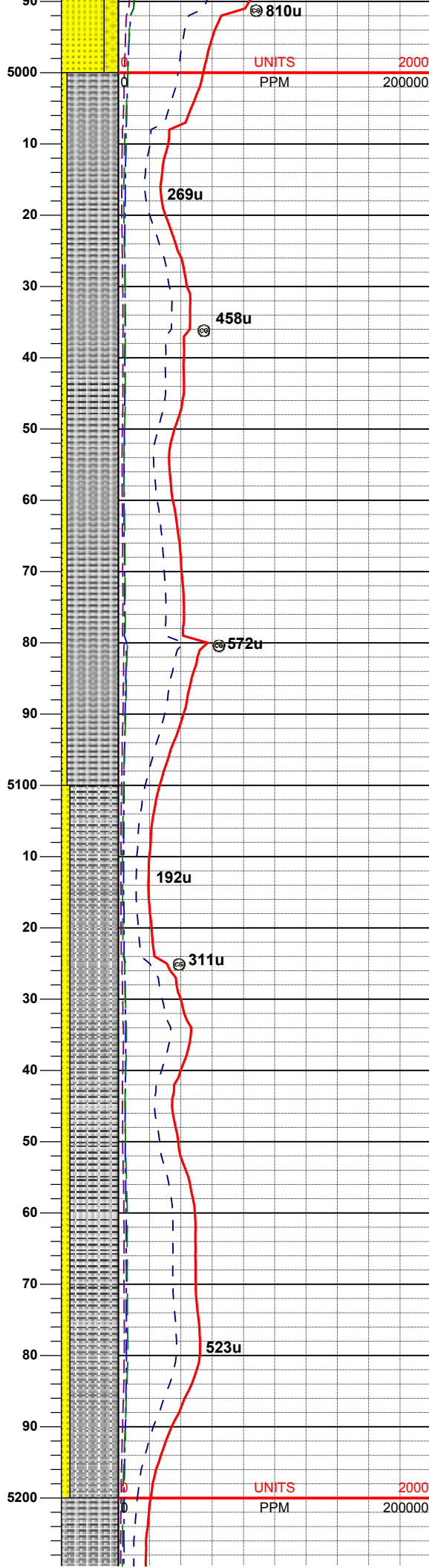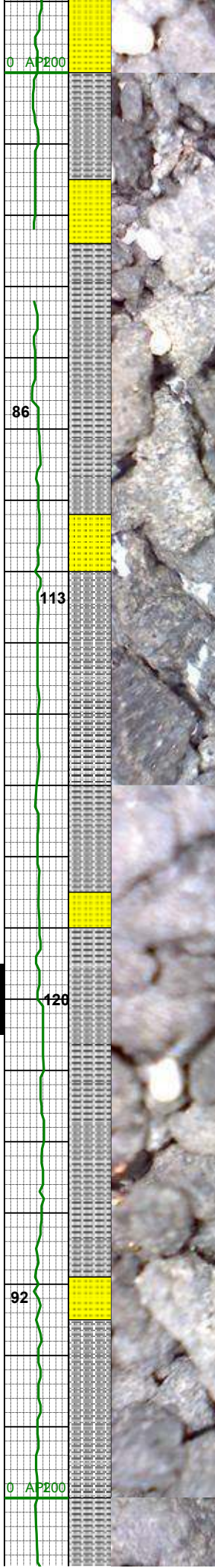**TVD 4657.1'**

116

296u

158u

SS:- SHYSS: wh- mgy, s&p ip, clr- trnsl, sme op, f- mgr, occ vfgr, blky- sbblky, sbrndd-sbang, p srt, mod sft, mod cmt, arg- sil mtx, sl calc, sl mica, tr glau, tr bent

244u

Track 1 (ROP): 0 — FT/HR — 500

Track 2 (Gamma Ray): 0 — API — 200

Gamma values: 96, 127, 68, 82, 117

MISSING DATA

Gas/Chromatograph track: 0 — UNITS — 2000 / PPM — 200000

Depth scale: 4800, 10, 20, 30, 40, 50, 60, 70, 80, 90, 4900, 10, 20, 30, 40, 50, 60, 70, 80, 90 (top 80, 90)

492u
146u
463u
1126u
353u
1054u

MISSING DATA

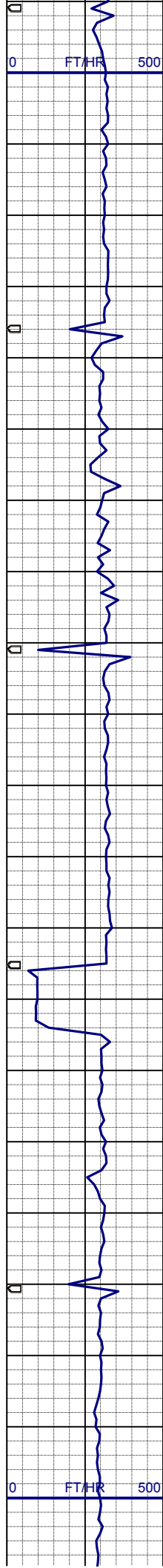MD   4801'
INC   9.3°
AZI   147.1°
TVD   4746.0'

SS:- SHYSS: wh- mgy, s&p ip, clr-
trnsl, sme op, f- mgr, occ vfgr, blky-
sbblky, sbrndd-sbang, p srt, mod sft,
mod cmt, arg- sil mtx, sl calc, sl mica,
tr glau, tr bent

MD   4891'
INC   9.8°
AZI   146.4°
TVD   4834.8'

WT 9.6 / VIS 38

SS:- SHYSS: wh- mgy, s&p ip, clr-
trnsl, sme op, f- mgr, occ vfgr, blky-
sbblky, sbrndd-sbang, p srt, mod sft,
mod cmt, arg- sil mtx, sl calc, sl mica,
tr glau, tr bent

MD   4981'
INC   9.9°
AZI   141.3°
TVD   4923.4'

Track headers:
- 0 FT/HR 500
- 0 AP1 200
- 0 UNITS 2000
- PPM
- 0 200000 (PPM)

Depth markers (right track): 5000, 10, 20, 30, 40, 50, 60, 70, 80, 90, 5100, 10, 20, 30, 40, 50, 60, 70, 80, 90, 5200

Gas/ppm annotations:
- 810u
- 269u
- 458u
- 572u
- 192u
- 311u
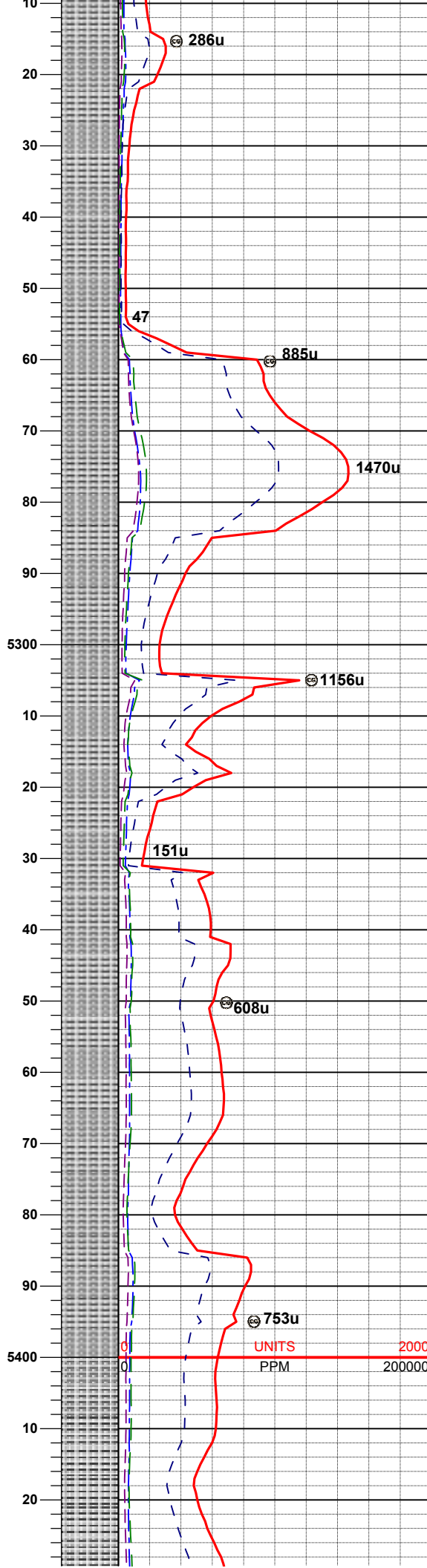- 523u

Gamma/density column numbers:
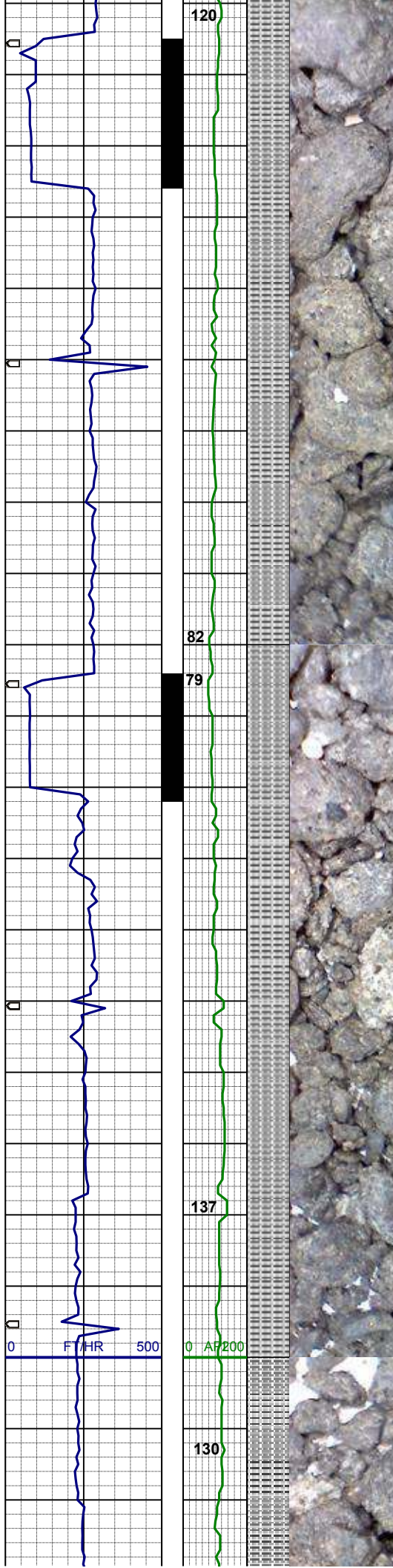- 86
- 113
- 120
- 92

SLTYSH: lt-mgy, gybrn, sbblky-sbplty, occ plty, sft-firm, arg, sl calc, pyr lam, sdy ip, grdg- shyss
SS: wh- mgy, s&p, clr- trnsl, sme op, mgr, blky- sbblky, pred sbang gr, mod srt, sl firm, m cmt, sil- arg mtx, vs calc, sl mica

MD	5071'
INC	9.0°
AZI	140.5°
TVD	5012.2'

SLTYSH: lt-mgy, gybrn, sbblky-sbplty, occ plty, sft-firm, arg, sl calc, pyr lam, sdy ip, grdg- shyss
SS: wh- mgy, s&p, clr- trnsl, sme op, mgr, blky- sbblky, pred sbang gr, mod srt, sl firm, m cmt, sil- arg mtx, vs calc, sl mica

MD	5160'
INC	8.1°
AZI	142.2°
TVD	5100.2'

120

82

79

137

130

0   FT/HR   500

0   API   200

47

82

79

137

286u

885u

1470u

1156u
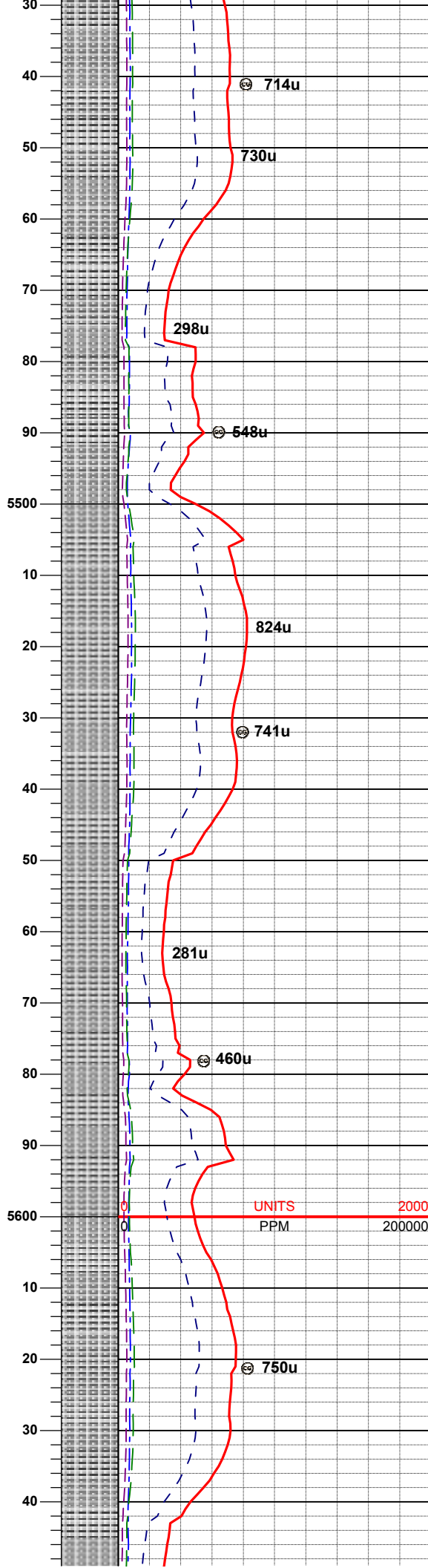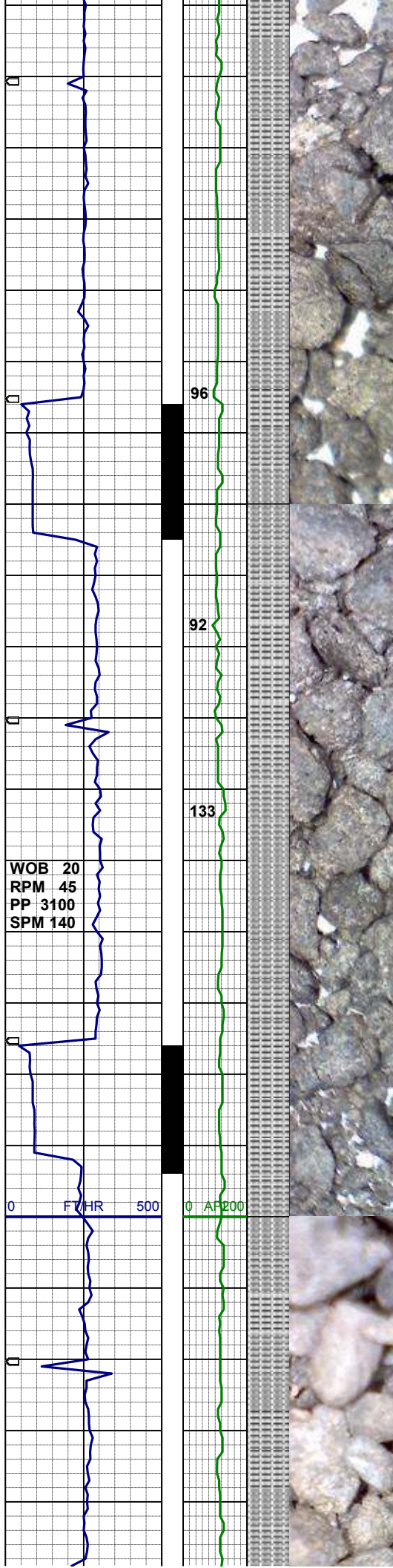
151u

608u

753u

SLTYSH: lt-mgy, gybrn, occ dkgy,
sbblky-sbplty, occ plty, sft-firm, arg, sl
calc, occ calc frag, sl sdy ip, grdg-
shyss

MD   5250'
INC   8.0°
AZI   141.3°
TVD 5189.3'

MD   5340'
INC   9.4°
AZI   141.9°
TVD 5278.3'

SLTYSH: lt-mgy, gybrn, occ dkgy,
sbblky-sbplty, occ plty, sft-firm, arg, sl
calc, occ calc frag, sl sdy ip, grdg-
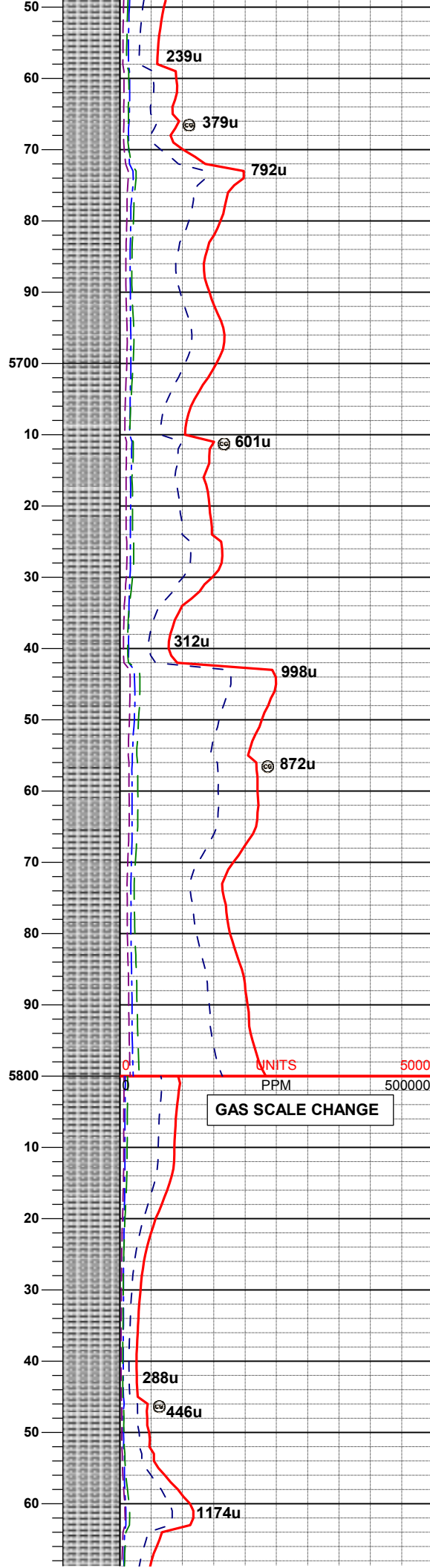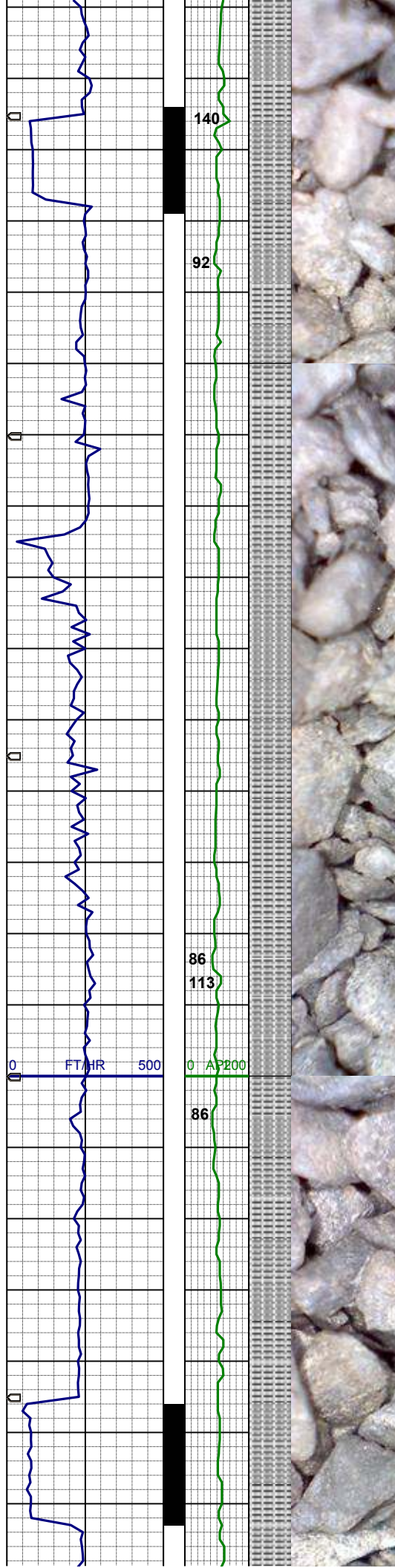shyss

MD   5430'
INC   7.7°

0   UNITS   2000
0   PPM   200000

AZI   141.0°
TVD   5367.3'

714u

730u

SLTYSH: lt-mgy, gybrn, occ dkgy,
sbblky-sbplty, occ plty, sft-firm, arg, sl
calc, occ calc frag, sl sdy ip, grdg-
shyss

298u

548u

5500

96

92

824u

741u

133

MD   5520'
INC   7.6°
AZI   144.0°
TVD   5456.5'

WT 9.7 / VIS 38

WOB   20
RPM   45
PP   3100
SPM   140

281u

SLTYSH: lt-mgy, gybrn, occ dkgy,
sbblky-sbplty, occ plty, sft-firm, arg, sl
calc, occ calc frag, sl sdy ip, grdg-
shyss

460u

0   FT/HR   500   0 AP 200

UNITS   2000

5600   PPM   200000

MD   5610'
INC   7.5°
AZI   145.6°
TVD   5545.7'

750u

SLTYSH: lt-mgy, gybrn, occ dkgy,

sbblky-sbplty, occ plty, sft-firm, arg, sl
calc, occ calc frag, sl sdy ip, grdg-
shyss

239u

379u

792u

MD   5700'
INC   7.4°
AZI   142.4°
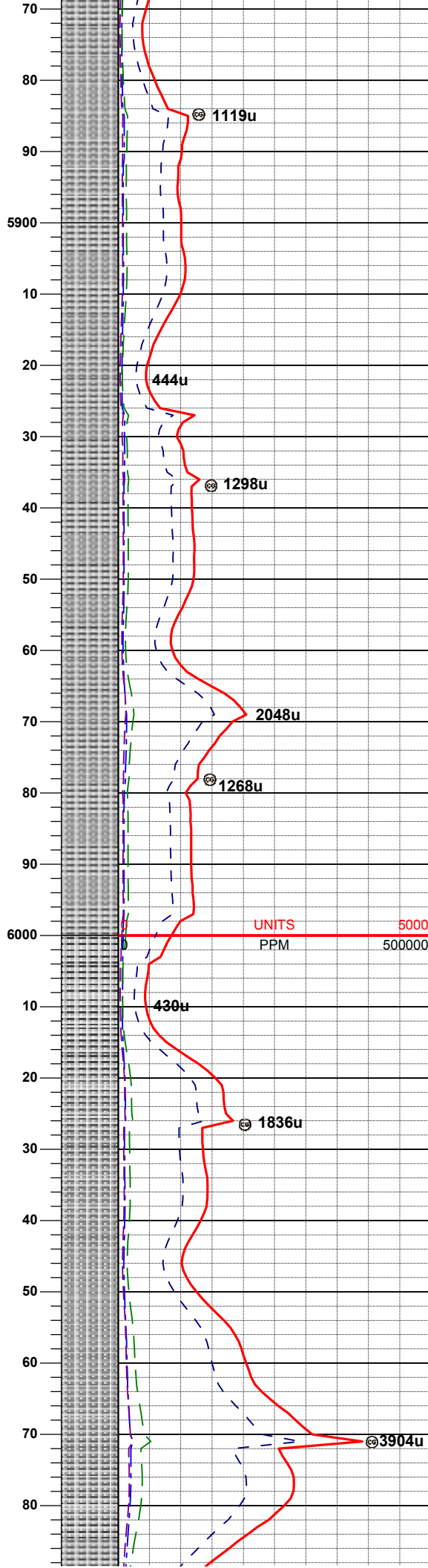**TVD   5635.0'**

601u
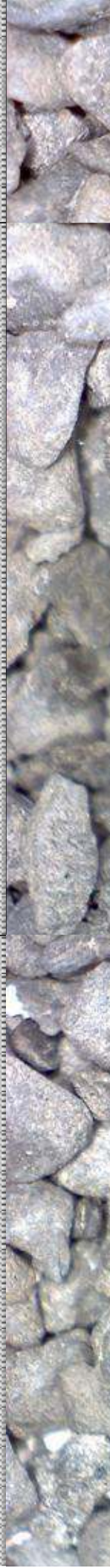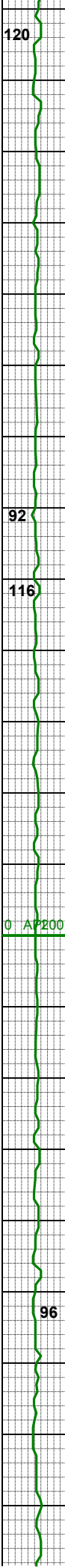
312u

998u

SLTYSH: lt-mgy, gybrn, occ dkgy,
sbblky-sbplty, occ plty, sft-firm, arg, sl
calc, occ calc frag, sl sdy ip, grdg-
shyss

872u

MD   5790'
INC   5.2°
AZI   132.4°
TVD   5724.4'

0	FT/HR	500
0	AP200	

0	UNITS	5000
	PPM	500000

GAS SCALE CHANGE

WT 9.8 / VIS 38

288u

446u

SLTYSH: lt-mgy, gybrn, occ dkgy,
sbblky-sbplty, occ plty, sft-firm, arg, sl
calc, occ calc frag, sl sdy ip, grdg-
shyss

1174u

140

92

86
113

86

11/3/13

120

92

116

96

0   FT/HR   500

0   API   200

70

80

1119u

90

5900

10

20

444u

30

1298u

40

50

60

70

2048u

80

1268u

90

6000   UNITS   5000
       PPM   500000
0

10

430u

20

30

1836u

40

50

60

70

3904u

80

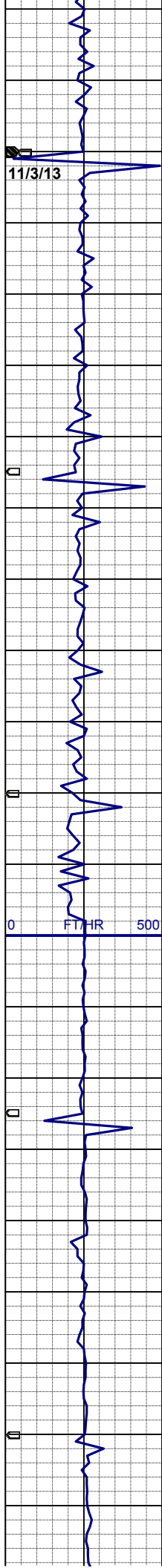MD   5880'
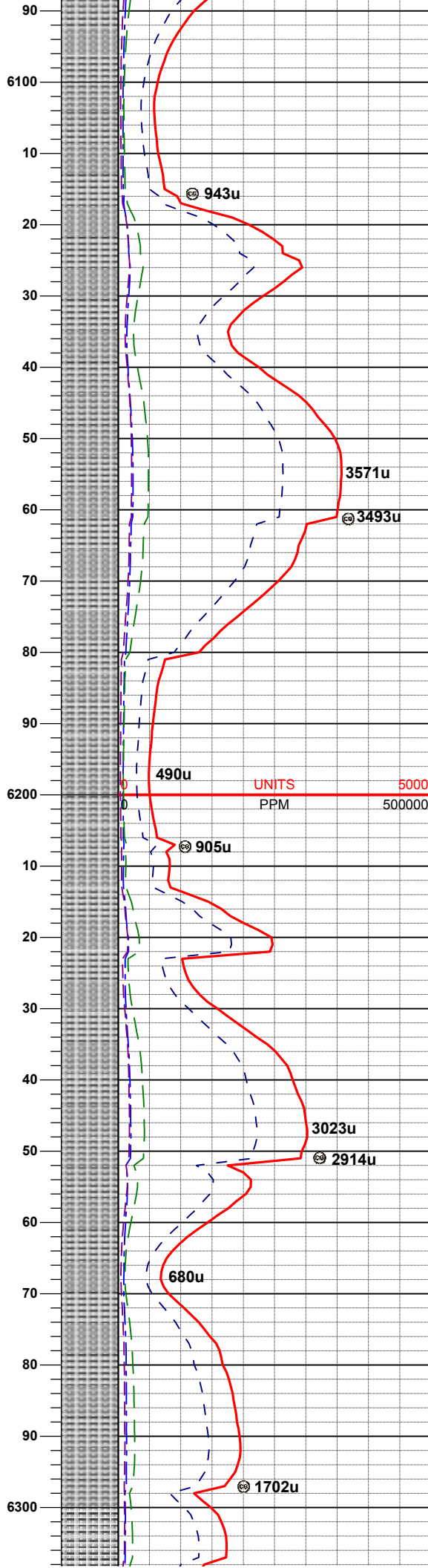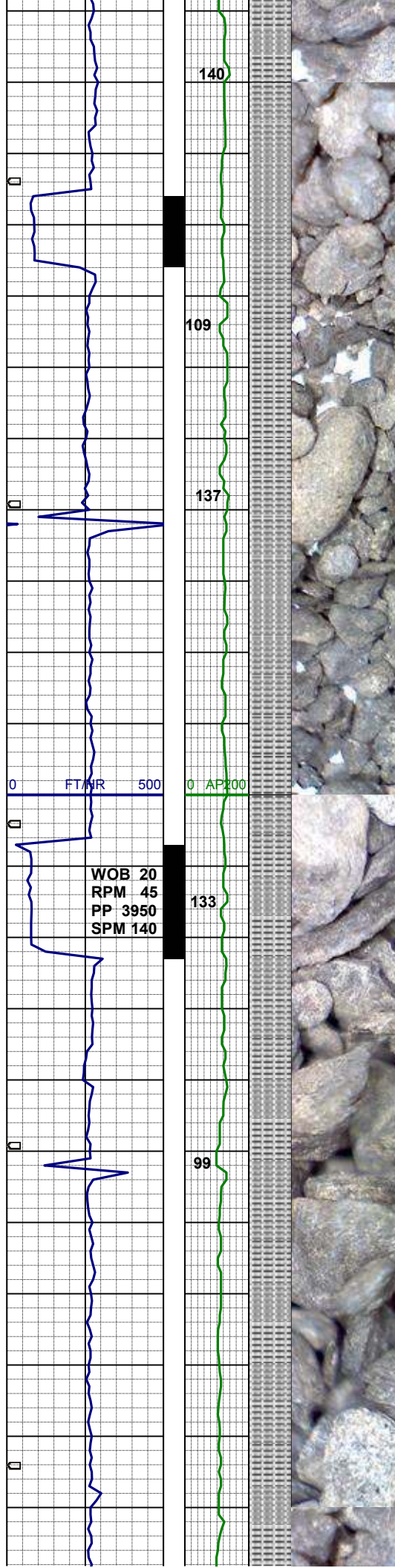INC   5.6°
AZI   139.2°
TVD   5814.0'

SLTYSH: lt-mgy, gybrn, occ dkgy, sbblky-sbplty, occ plty, sft-firm, arg, sl calc, occ calc frag, sl sdy ip, grdg-shyss

MD   5970'
INC   4.2°
AZI   140.3°
TVD   5903.7'

SLTYSH: lt-mgy, gybrn, occ dkgy, sbblky-sbplty, occ plty, sft-firm, arg, sl calc, occ calc frag, sl sdy ip, grdg-shyss

MD   6059'
INC   3.1°
AZI   139.6°
TVD   5992.5'

This is a composite well log display.

Track 1 (left): FT/HR scale 0 to 500

WOB 20
RPM 45
PP 3950
SPM 140

Track 2: API scale 0 to 200, with gamma ray values: 140, 109, 137, 133, 99

Depth track: 6100, 10, 20, 30, 40, 50, 60, 70, 80, 90, 6200, 10, 20, 30, 40, 50, 60, 70, 80, 90, 6300

Gas / PPM track:
UNITS scale 0 to 5000
PPM scale 0 to 500000

90

943u

3571u

3493u

490u

905u

3023u

2914u

680u

1702u

Survey / Description (right):

MD 6149'
INC 1.6°
AZI 175.4°
TVD 6082.4'

SLTYSH: lt-mgy, gybrn, occ dkgy, sbblky-sbplty, occ plty, sft-firm, arg, sl calc, occ calc frag, sl sdy ip, grdg-shyss

MD 6239'
INC 0.4°
AZI 269.8°
TVD 6172.4'

SLTYSH: lt-mgy, gybrn, occ dkgy, sbblky-sbplty, occ plty, sft-firm, arg, sl calc, occ calc frag, sl sdy ip, grdg-shyss
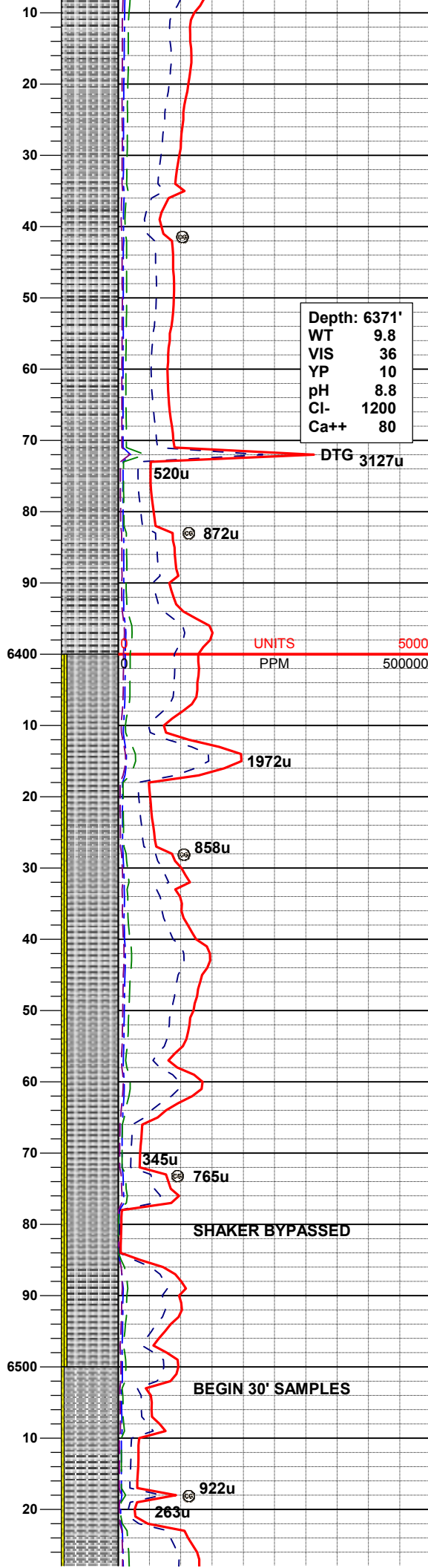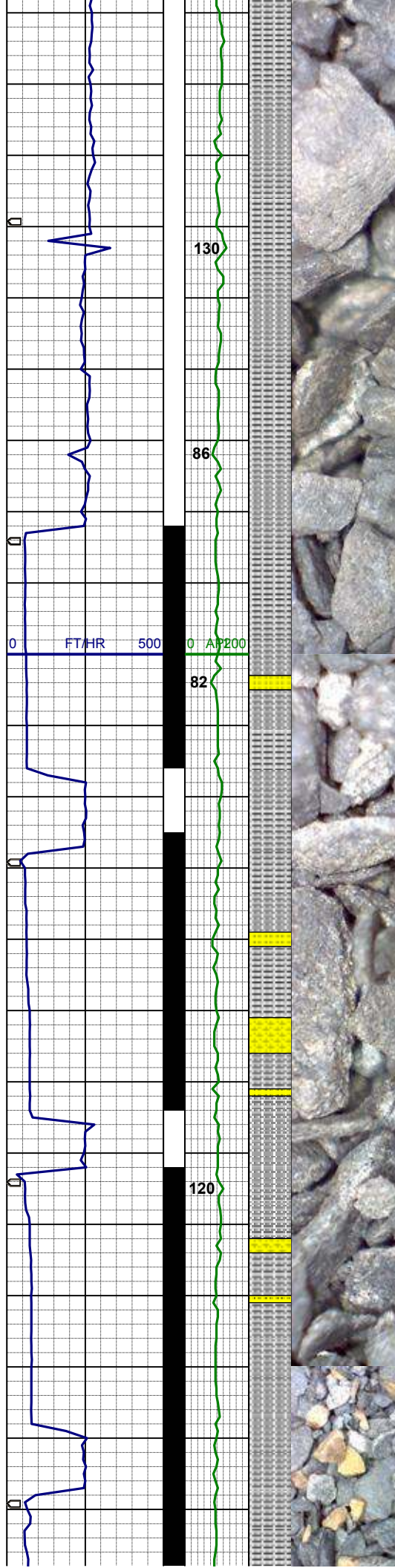
MD 6329'
INC 0.4°
AZI 229.9°
TVD 6262.4'

SLTYSH: lt-mgy, gybrn, occ dkgy, sbblky-sbplty, occ plty, sft- sl firm, sl calc, occ calc frag, sl sdy ip, grdg- shyss

Depth:	6371'
WT	9.8
VIS	36
YP	10
pH	8.8
Cl-	1200
Ca++	80

DTG 3127u

520u

872u

RIG SERVICE
X/O WASH PIPE

MD 6374'
INC 0.4°
AZI 247.5°
TVD 6307.4'

130

86

82

0 FT/HR 500   0 AP 200

UNITS 5000
PPM 500000

WT 10.35 / VIS 40

MD 6419'
INC 3.3°
AZI 269.7°
TVD 6352.4'

1972u

858u

SLTYSH: m- dkgy, gybrn, sbplty- plty, mod firm, sl calc, sdy ip, tr bent, grdg- shyss, occ f- mgr wh- m gy ss
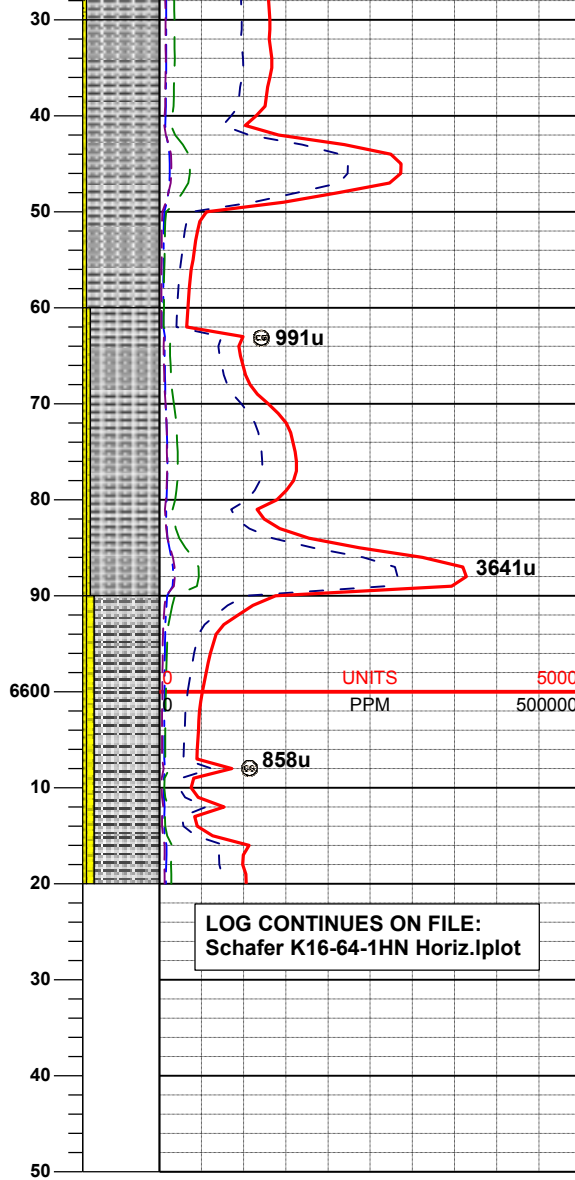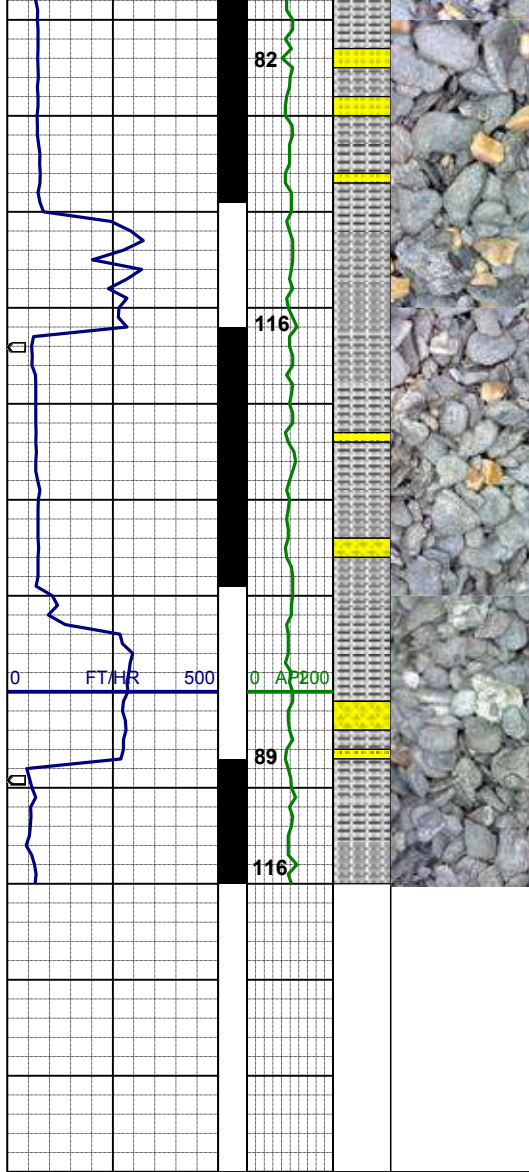
MD 6464'
INC 6.8°
AZI 272.7°
TVD 6397.2'

120

345u
765u

SHAKER BYPASSED

BEGIN 30' SAMPLES

MD 6509'
INC 10.2°
AZI 273.4°
TVD 6441.7'

WT 10.35 / VIS 39

SLTYSH: m- dkgy, gybrn, sbplty- plty, mod firm, sl calc, sdy ip, grdg- shyss

922u
263u

SLTYSH: m- dkgy, gybrn, sbplty- plty, mod firm, sl calc, sdy ip, grdg- shyss

MD   6554'
INC   12.6°
AZI   269.8°
TVD   6485.8'

⊕ 991u

SLTYSH: m- dkgy, gybrn, sbplty- plty, mod firm, sl calc, sdy ip, tr bent, grdg- shyss, occ f- mgr wh- m gy ss

3641u

MD   6599'
INC   14.6°
AZI   268.4°
TVD   6529.5'

SLTYSH: m- dkgy, gybrn, sbplty- plty, mod firm, sl calc, sdy ip, tr bent, grdg- shyss, occ f- mgr wh- m gy ss

⊕ 858u

0   FT/HR   500

0   AP200

UNITS   5000
PPM   500000

LOG CONTINUES ON FILE:
Schafer K16-64-1HN Horiz.Iplot

82

116

89

116

30
40
50
60
70
80
90
6600
10
20
30
40
50

30

THANK YOU FOR CHOOSING
COLUMBINE LOGGING, INC.