

Appendix A

Well Logs

GEOLOGIC DRILLING LOG

BORING NO. CW-1

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV.

T.O.C. ELEV. 570.88

PROJECT NAME: PROJECT NO. 86030

LOCATION

PAGE 2 OF 3

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, and-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
70	Non-weathered, medium bluish-gray and greenish-gray phyllite in equal amounts.		
80			
90	Very light gray, uniform, microcrystalline quartzitic sandstone		
100			
104-106	Medium bluish-gray and greenish-gray phyllite Drilling break at 104-106. 2 gpm @ 104-106		
110			
120	Dark bluish-gray phyllite Light gray, fine grain quartzitic sandstone Greenish-gray phyllite with minor pyrite		
130			
132-133	Light gray, fine grain quartzitic sandstone. Drilling break at 132-133. 7.5 gpm @ 132-133		
140			
143 and 148	Dark bluish-gray to black phyllite. Drilling break at 135. Possible drilling break at 143 and 148.		
150			

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, and-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
150	Greenish-gray phyllite with light gray quartzitic sandstone. Drilling break at 155 and 157. Real soft at 157-158, though no weathering in cuttings.		
160	2 gpm @ 155-158		
	Light gray quartzitic sandstone		
170	3.5 gpm @ 169 Greenish-gray phyllite. Possible drilling break at 169.		
180			

GEOLOGIC DRILLING LOG

BORING NO. CW-1A

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV.

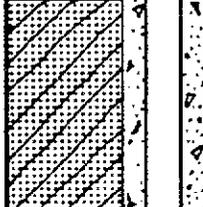
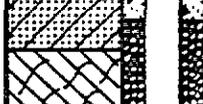
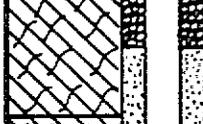
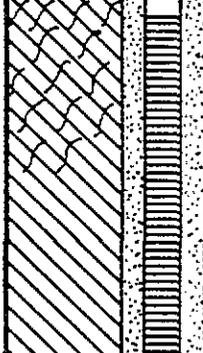
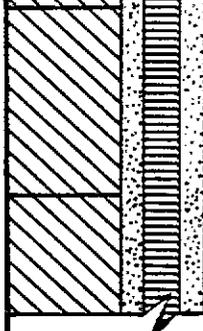
T.O.C. ELEV. 5699.3

PROJECT NAME:

PROJECT NO. 86030

LOCATION

PAGE 1 OF 2

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, And-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
0	Ground Surface		
0-2'	Orangish-brown clayey silt		+2-5': 6.25-inch Steel Protector Pipe
0-22'	Yellowish-gray sandy silt and rock fragments		0-22': Volclay Grout
0-74'	Top of highly weathered rock. Light to medium gray quartzitic sandstone with oxides. Weathered to medium reddish-brown. Quartz fragments.		0-74': 8-inch Air Rotary Drilling
22-29'	As above plus highly weathered phyllite		22-29': Bentonite Pellets
+1-34'	Predominantly phyllite. Dark bluish-gray. Moderately weathered. Some gray quartzite fragments.		+1-34': 4-inch Sch. 40 PVC Pipe
29-74'	Slightly weathered medium bluish-gray phyllite. Minor quartz.		29-74': Morie Sand
34-74'	Marked decrease in weathering. Medium bluish-gray plus greenish gray phyllite.		34-74': 4-inch Sch. 40 Wire Wrapped PVC Well Screen

DRILLER: Eichelbergers, Inc.
 LOGGED BY: P. E. Nachlas
 DRILLING STARTED: 5/10/88
 DRILLING COMPLETED: 5/10/88

WELL CONSTRUCTION Well Screen
 DRILLING METHOD Air Rotary
 STATIC WATER LEVEL 36.62
 WATER BEARING ZONES

NOTES:

GEOLOGIC DRILLING LOG

BORING NO. CW-1A

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV.

T.O.C. ELEV. 509.93

PROJECT NAME: PROJECT NO. 86030

LOCATION

PAGE 2 OF 2

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, and-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
70 80 90 100 110 120 130 140 150			

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV. _____

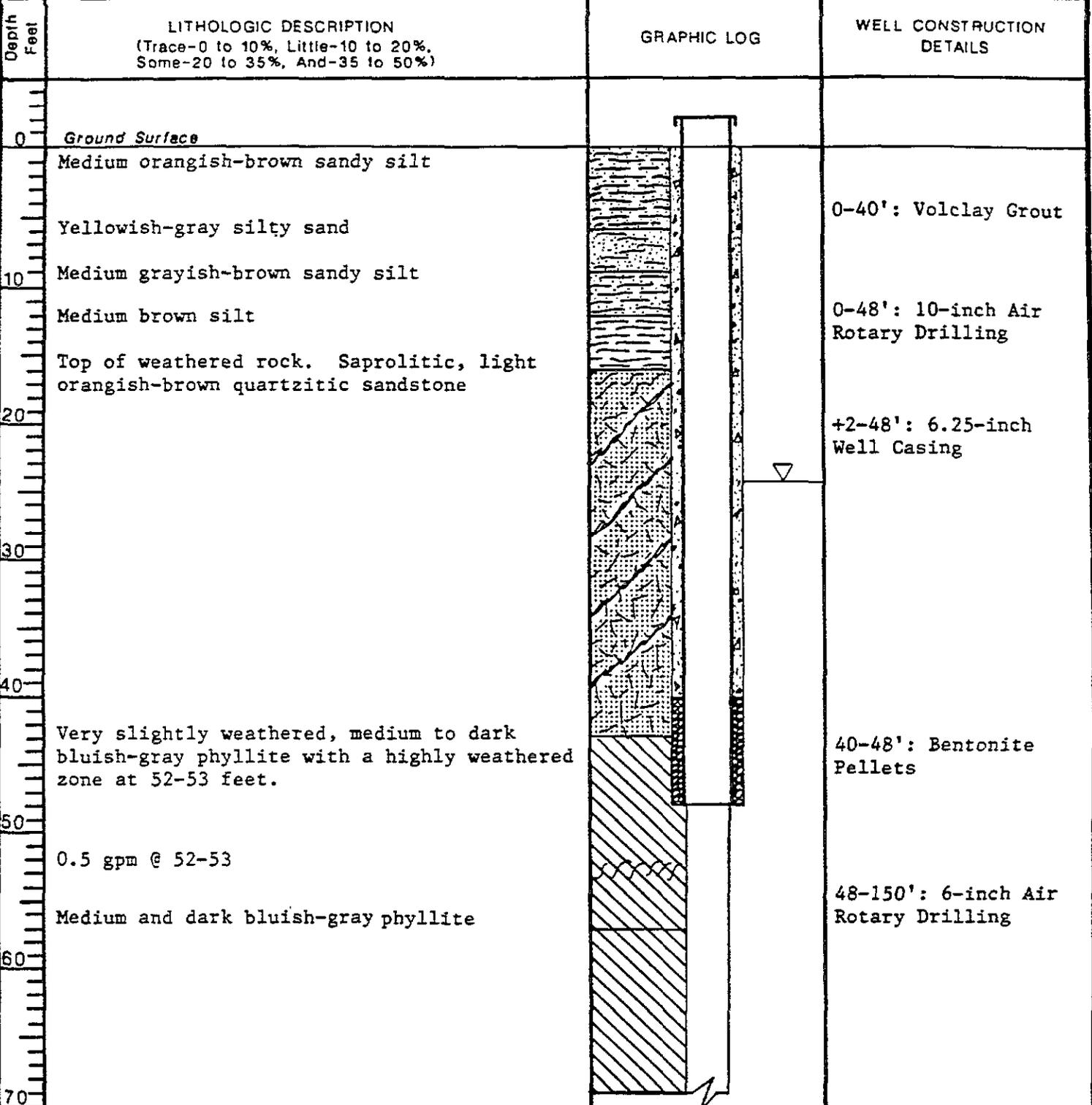
T.O.C. ELEV. 557.79

PROJECT NAME: _____

PROJECT NO. 86030

LOCATION _____

PAGE 1 OF 2



DRILLER: Eichelbergers, Inc.
 LOGGED BY: P. E. Nachlas
 DRILLING STARTED: 5/11/88
 DRILLING COMPLETED: 5/11/88

WELL CONSTRUCTION Open Rock
 DRILLING METHOD Air Rotary
 STATIC WATER LEVEL 26.40
 WATER BEARING ZONES

NOTES:

GEOLOGIC DRILLING LOG

BRINGIN. CW-2

CLIENT: Harley Davidson, Inc.

SURFACE ELEV.

T.O.C. ELEV. 557.79

PROJECT NAME: PROJECT NO. 85030

LOCATION

PAGE 2 OF 2

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, and-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
<p>70</p> <p>80</p> <p>90</p> <p>100</p> <p>110</p> <p>120</p> <p>130</p> <p>140</p> <p>150</p>	<p>Greenish-gray phyllite</p> <p>As above plus equal amounts of dark bluish-gray to black phyllite and abundant pyrite. Possible drilling break @ 103. 1.25 gpm @ 103</p> <p>Greenish-gray phyllite</p> <p>Lighter greenish-gray phyllite plus quartz fragments and pyrite.</p> <p>Medium to dark bluish and greenish-gray phyllite 5 gpm @ 123 Light gray quartzitic sandstone</p> <p>Light greenish-gray phyllite and light gray quartzitic sandstone with minor bluish-gray phyllite at 133</p> <p>Darken to greenish and bluish-gray phyllite</p>		<p>WELL CONSTRUCTION DETAILS</p>

GEOLOGIC DRILLING LOG

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV. LOCATION

T.O.C. ELEV. 519.43

PROJECT NAME:

PROJECT NO. 86030

PAGE 1 OF 3

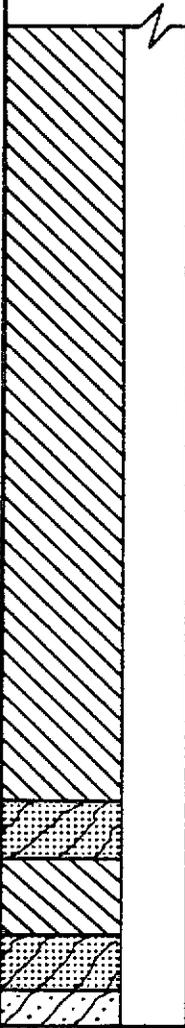
Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, And-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
0	MW-13 was deepened to 203' and retitled CW-3 <i>Ground Surface</i>		
10	Orangish-brown silty soil with weathered rock fragments with intermittent zones of light brown to orangish-brown sandy soil.		+2-20': 6 1/4-inch well casing
20	Light gray to light bluish-gray and olive-gray fine to medium grain quartzitic sandstone and moderately weathered quartz and sandstone fragments. Same as above but significant increase of milky quartz fragments.		0-20': 10-inch air-rotary drilling
30	Light bluish-gray fine to medium grain quartzitic sandstone with a slightly weathered zone at 34'.		
40	Medium bluish-gray to gray fine grain quartzitic sandstone, slightly phyllitic, and quartz and rock fragments from moderately weathered zones at 43' and 46'. 1 gpm at 43.5'.		20-203': 6-inch air-rotary drilling
50	Olive-brown fine to medium grain quartzitic sandstone and milky white medium grain quartz fragments.		
60	Bluish-gray and olive fine to medium grain quartzitic sandstone.		
70			

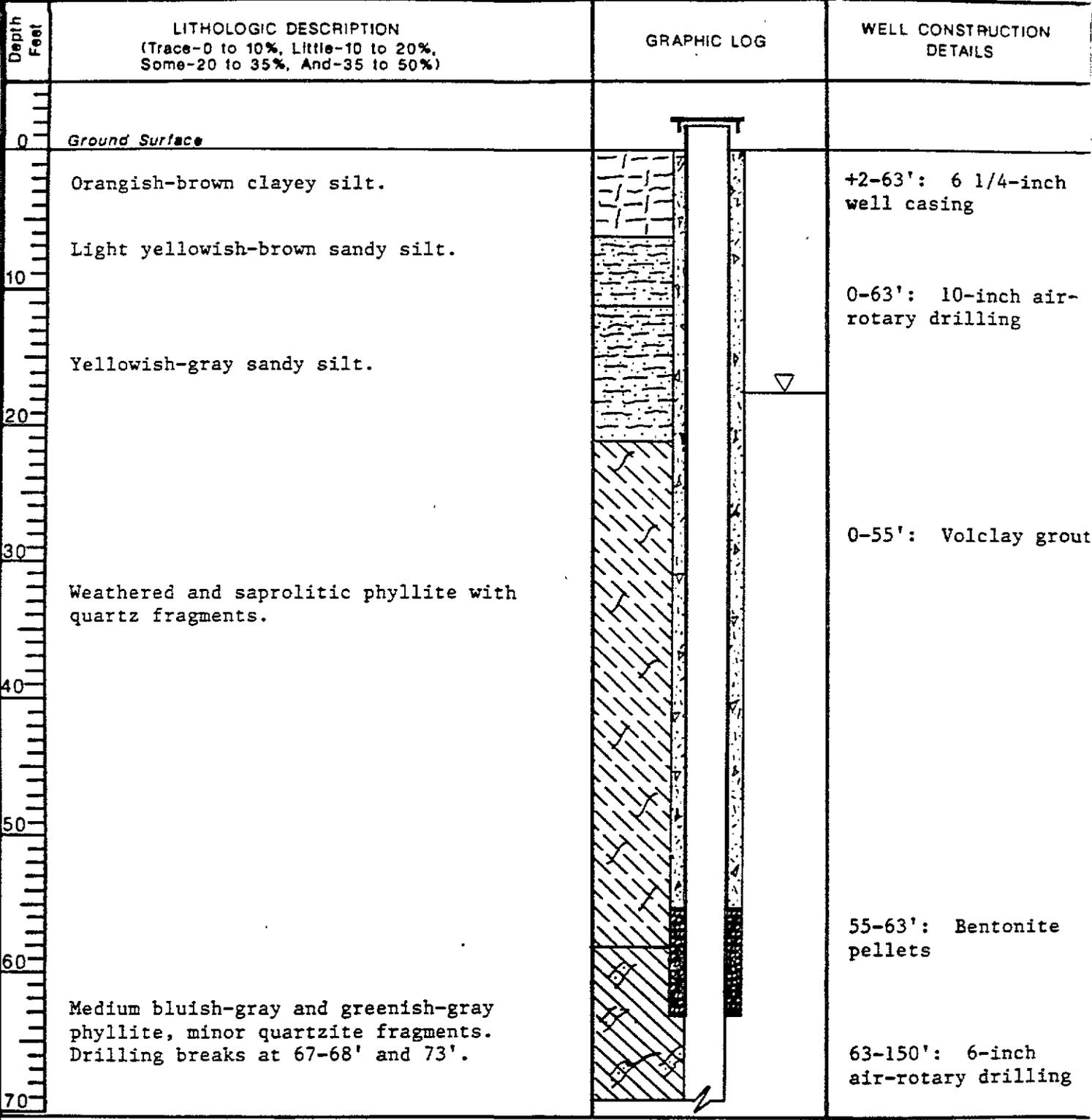
DRILLER: Eichelbergers, Inc.	WELL CONSTRUCTION Open Rock	NOTES:
LOGGED BY: P. E. Nachlas	DRILLING METHOD Air Rotary	
DRILLING STARTED: 5/11/88	STATIC WATER LEVEL 15.12'	
DRILLING COMPLETED: 5/12/88	WATER BEARING ZONES	

CLIENT Harley-Davidson, Inc.
PROJECT NAME: PROJECT NO. 86030

SURFACE ELEV.
LOCATION

BORING NO. CW-3
T.O.C. ELEV. 519.43
PAGE 3 OF 3

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, and-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
150	3 gpm at 157'.		20-203': 6-inch air-rotary drilling
160	Greenish-gray phyllite with minor dark bluish-gray phyllite. Drilling break at 108-110'.		
170			
180			
190	Light gray quartzitic sandstone.		
200	Greenish-gray phyllite as above.		
210	Light gray quartzitic sandstone. Light olive-green quartzite and light gray quartzite mixture.		



DRILLER: Eichelbergers, Inc. LOGGED BY: P. E. Nachlas DRILLING STARTED: 5/14/88 DRILLING COMPLETED: 5/14/88	WELL CONSTRUCTION Open Rock DRILLING METHOD Air Rotary STATIC WATER LEVEL 19.58' WATER BEARING ZONES	NOTES:
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GEOLOGIC DRILLING LOG

BORING NO. CW-4

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV.

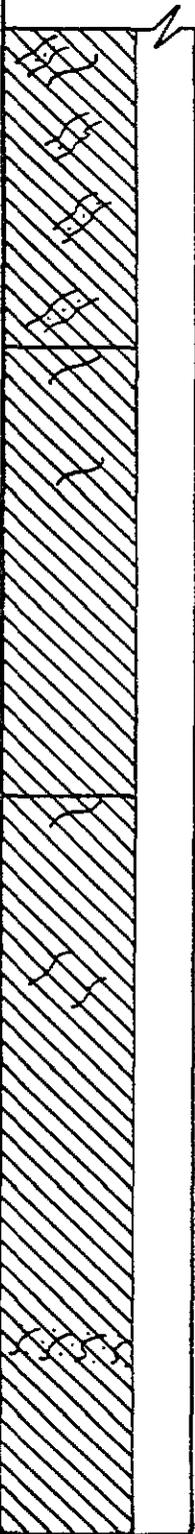
T.O.C. ELEV. 542.32

PROJECT NAME:

PROJECT NO. 86030

LOCATION

PAGE 2 OF 2

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, and-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
<div style="text-align: right; padding-right: 5px;">70</div> <div style="text-align: right; padding-right: 5px;">80</div> <div style="text-align: right; padding-right: 5px;">90</div> <div style="text-align: right; padding-right: 5px;">100</div> <div style="text-align: right; padding-right: 5px;">110</div> <div style="text-align: right; padding-right: 5px;">120</div> <div style="text-align: right; padding-right: 5px;">130</div> <div style="text-align: right; padding-right: 5px;">140</div> <div style="text-align: right; padding-right: 5px;">150</div>	<p>Medium bluish-gray and greenish-gray phyllite, minor quartzite fragments. Drilling breaks at 67-68' and 73'.</p> <p>1.5 gpm at 87-88'.</p> <p>Greenish-gray with only minor bluish-gray phyllite. Drilling breaks at 87-88' and 94'. Significant water at 94'. Minor light gray quartz at 102-104'.</p> <p>15 gpm at 94'.</p> <p>2.25 gpm at 111-112'.</p> <p>1.25 gpm at 122'.</p> <p>Medium bluish-gray and greenish-gray phyllite. Drilling break at 111-112'. Slight weathering at 122'. Quartz fragments at 129-131'. Cuttings decrease in size below 131'. Light gray quartzite with oxides at 142-143'. Quartz fragments at 148-150'.</p>		<p>63-150': 6-inch air-rotary drilling</p>

GEOLOGIC DRILLING LOG

BORING NO. CW-5

CLIENT: Harley-Davidson, Inc.
PROJECT NAME: PROJECT NO. 86030

SURFACE ELEV.
LOCATION T.O.C. ELEV. 472.06
 PAGE 1 OF 2

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, And-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
0	Ground Surface		
0-10	Orangish-brown clayey silt. Yellowish-brown sandy silt.		+3-4': 6 1/4-inch steel protector pipe
10-20	Top of weathred rock at 8'. Highly weathered and saprolitic phyllite with quartz fragments.		0-83': 8-inch air-rotary drilling 0-12': Volclay grout
20-30	Dark bluish-gray phyllite and minor quartz.		+2-23': 4-inch Sch. 40 PVC pipe
30-40	1-2 gpm at 50-52'.		12-18.5': Bentonite pellets
40-50	Medium to dark bluish-gray quartzitic sandstone. Harder and not as much phyllite, though dark bluish-gray is interbedded with the quartzitic sandstone. Drilling break and minor weathering at 50-52'.		18.5-83': Morie sand 23-83': 4-inch Sch. 40 wire-wrapped well screen
50-60			
60-70			

DRILLER: Eichelbergers, Inc.	WELL CONSTRUCTION Well Screen	NOTES:
LOGGED BY: P. E. Nachlas	DRILLING METHOD Air Rotary	
DRILLING STARTED: 5/13/88	STATIC WATER LEVEL 17.00'	
DRILLING COMPLETED: 5/13/88	WATER BEARING ZONES	

GEOLOGIC DRILLING LOG

BORING NO. CW-3

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV.

T.O.C. ELEV. 472.06

PROJECT NAME:

PROJECT NO. 86030

LOCATION

PAGE 2 OF 2

Depth
Feet

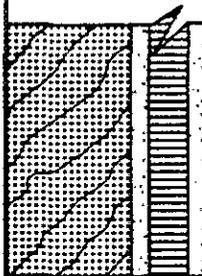
LITHOLOGIC DESCRIPTION
(Trace-0 to 10%, Little-10 to 20%,
Some-20 to 35%, and-35 to 50%)

GRAPHIC LOG

WELL CONSTRUCTION
DETAILS

70
80
90
100
110
120
130
140
150

Medium to dark bluish-gray quartzitic sandstone. Harder and not as much phyllite, though dark bluish-gray is interbedded with the quartzitic sandstone. Drilling break and minor weathering at 50-52'.



Client: Harley-Davidson

Boring No.

Piezometer No. CW-6

Location Northern Perimeter

Project No. 89254

Phase

Task

Surface Elev. 486.98 (TOC)

Page 1 of 3

Depth Feet	Blow Counts	Re-covery/ RQD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface		Soil: Dark brown, silty, clayey (ML-CL)			0	T.O.C. Elev.
10			Saprolite: Tan-brown, micaceous.			10	+2-30'=6" steel casing, volclay grout.
20			Phyllite Schist: Brown to blue-gray, with tan-brown saprolite, broken.			20	
30			Phyllite Schist: Gray, micaceous, 1/4"-1/2" rock fragments.			30	
40			As above: Gray, micaceous iron stained fractures.			40	
50			As above: Dark gray to gray, more competent, massive, angular chips.			50	
60						60	

Driller Eichelberger's Inc.
 Logged By T. O. Marrs
 Drilling Started 6/28/89
 Drilling Completed 6/28/89
 Well Construction Open rock
 Well Developed _____
 Water Bearing Zones 85', 100', 120'

Blown/Balled Yield 10 gpm
 Well Casing 6" Dia. +2 To 30
 Casing Type Steel
 Well Screen _____ Dia. _____ To _____
 Screen Type _____
 Slot Size _____
 Drilling Mud _____
 Grout Type _____

Bentonite Seal _____
 Filter Pack Qty. _____
 Filter Pack Type _____
 Static Water Level 474.83 MSL
 Date 1/26/90

Notes: _____

Client: Harley-Davidson

Boring No.

Piezometer No. CW-6

Location Northern Perimeter

Project No. 89254

Phase

Task

Surface Elev. 486.98 (TOC)

Page 2 of 3

Depth Feet	Blow Counts	Recovery/ RQD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60						60	
70						70	
80			Phyllite Schist: Blue gray to gray, micaceous, massive, angular cuttings.			80	
90			WBZ: 2-4 gpm			90	
100			WBZ: 4-6 gpm			100	
110						110	
120			Possible WBZ: 117-122			120	
130						130	
140						140	

Client: Harley-Davidson

Boring No.

Piezometer No. CW-6

Location Northern Perimeter

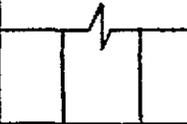
Project No. 89254

Phase

Task

Surface Elev. 486.98 (TOC)

Page 3 of 3

Depth Feet	Blow Counts	Re-covery/ RQD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
140			As above.			140	
150						150	

Client: Harley-Davidson

Project No. 89254

Phase Task

Boring No.

Piezometer No. CW-7

Location Northeast Perimeter

Surface Elev. 574.61 (TOC)

Page 1 of 3

Depth Feet	Blow Counts	Recovery/ RQD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface					0	T.O.C. Elev.
0-10			Soil: Brown to dark-brown, silty, (CL-ML). Silty sand: Tan, micaceous with rock fragments.			0-10	0-61': 10-inch roller bit.
10-20			As above; tan to dark-brown.			10-20	+1.9'-61': 6-inch steel casing.
20-30						20-30	
30-40			As above; tan to grayish brown, micaceous, soft, plastic, moist.			30-40	
40-50						40-50	
50-60						50-60	
60			Phyllite Schist: Gray, massive iron stained, angular fragments slight increase in water.			60	

Driller Eichleberger's Inc.
 Logged By T. O. Marrs
 Drilling Started 6/27/89
 Drilling Completed 6/27/89
 Well Construction Open rock
 Well Developed _____
 Water Bearing Zones _____

Blown/Bailed Yield 1.25 gpm
 Well Casing 6" Dia. 0 To 61
 Casing Type Steel
 Well Screen _____ Dia. _____ To _____
 Screen Type _____
 Slot Size _____
 Drilling Mud _____
 Grout Type _____

Bentonite Seal _____
 Filter Pack Qty. _____
 Filter Pack Type _____
 Static Water Level 535.75 MSL
 Date 1/26/90

Notes: _____

Client: Harley-Davidson

Project No. 89254

Phase Task

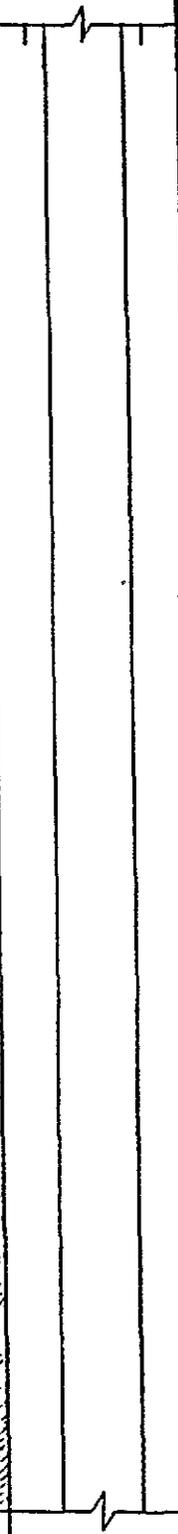
Boring No.

Piezometer No. CW-7

Location Northeast Perimeter

Surface Elev. 574.61 (TOC)

Page 2 of 3

Depth Feet	Blow Counts	Re-covery/RQD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60			Phyllite Schist: Gray, massive, iron stained, angular fragments			60	61-150': 6-inch hammer bit.
70		Phyllite Schist: Blue-gray, massive.	70				
80			80				
90				90			
100				100			
110				110			
120				120			
130			As above.	130			
140				140			

Depth Feet	Blow Counts	Re-covery/RQD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
<div style="text-align: center;">140</div>			As above.			<div style="text-align: center;">140</div> <div style="text-align: center;">150</div>	

Client: Harley-Davidson

Boring No.

Piezometer No. CW-7A

Location Northeast Perimeter

Project No. 89254

Phase Task

Surface Elev. 574.7 (TOC)

Page 1 of 2

Depth Feet	Blow Counts	Recovery/RQD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface					0	T.O.C. Elev.
0-10			Soil: Reddish-brown, silty, with rock fragments (CL-ML).			0-10	+2 - 36' = 6-inch steel casing. 0-66: 10-inch roller bit.
10-20			Sandy silt: Yellowish-brown with rock fragments.			10-20	0-32: volclay grout
20-30						20-30	
30-40			Silt: Reddish-brown with highly weathered (gray phyllite) rock fragments.			30-40	
40-50			- grayish-brown, sandy, with bluish gray rock fragments.			40-50	36-66: 6-inch stainless steel well screen (0.020 slot)
50-60						50-60	
60						60	

Driller Eichelberger, Inc.

Logged By S. A. Wendling

Drilling Started 7/10/89

Drilling Completed 7/10/89

Well Construction Well screen

Well Developed _____

Water Bearing Zones 58'

Blown/Balled Yield 1 gpm

Well Casing 6" Dia. +2 To 36

Casing Type Steel

Well Screen 6" Dia. 36 To 66

Screen Type Stainless steel

Slot Size .020

Drilling Mud _____

Grout Type _____

Bentonite Seal 32 - 34

Filter Pack Qty. 34 - 66'

Filter Pack Type Morie #1

Static Water Level 533.95 MSL

Date 1/26/90

Notes: _____

Client: Harley-Davidson

Boring No.

Piezometer No. CW-7A

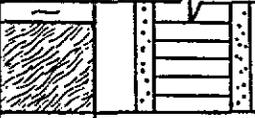
Project No. 89254

Phase Task

Location Northeast perimeter

Surface Elev. 574.71 (TOC)

Page 2 of 2

Depth Feet	Blow Counts	Recovery/ RQD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60			Phyllite schist: bluish-gray weathered.			60	
70						70	

Client: Harley-Davidson

Boring No.

Piezometer No. CW-8

Surface Elev.

(TOC) 364.78

Project No. 89254

Phase

Task

Location TCA Tank Area

Page 1 of 3

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface			0	T.O.C. Elev.
0-10	Silt: Brown to reddish-brown, clayey, some rock fragments.			0-10	+1-99: 6-inch steel casing
10-30				10-30	
30-40	Limestone: Dark gray, micro-crystalline, massive, hard.			30-40	
40-50	Limestone: Dark gray, soft, fractured, very muddy.			40-50	
50-60	Limestone: Dark gray, micro-crystalline, massive, hard.			50-60	

Driller <u>Eichelberger</u>	Blown/Bailed Yield <u>100+ gpm</u>	Bentonite Seal _____
Logged By <u>Scott A. Wendling</u>	Well Casing _____ Dia. _____ Ft.	Filter Pack Qty. _____
Drilling Started <u>10/27/89</u>	Casing Type _____	Filter Pack Type _____
Drilling Completed <u>11/01/89</u>	Well Screen _____ Dia. _____ Ft.	Static Water Level <u>346.01</u> MSL
Well Construction _____	Screen Type _____	Date <u>1/26/90</u>
Well Developed _____	Slot Size _____	Notes: <u>Hole fell in from</u>
Water Bearing Zones <u>66, 118,</u>	Drilling Mud _____	<u>146 feet to 127 feet - soft</u>
<u>135</u>	Grout Type _____ Quantity _____	<u>bottom.</u>

AIR-ROTARY DRILLING LOG

Client: Harley-Davidson

Boring No.

Piezometer No. CW-8

Surface Elev.

(TOC) 364.78

Project No. 89254

Phase

Task

Location TCA Tank Area

Page 2 of 3

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60	Limestone: Dark gray, micro-crystalline, massive, hard.			60	WBZ: ~50 gpm +1-99: 6-inch steel casing
70	Limestone: Dark gray, fractured, broken, quartz gravel.			70	
80	Limestone: Dark gray, micro-crystalline, hard.			80	
90				90	
100		100		100	
110		110		110	
120	Limestone: Dark gray, weathered, broken.			120	WBZ: ~5-8 gpm
130	Limestone: Dark gray, micro-crystalline, hard.			130	
140	Gravel: Soft, weathered, limestone, etched quartz, very muddy.			140	

AIR-ROTARY DRILLING LOG

Client: Harley-Davidson

Project No. 89254

Phase

Task

Boring No.

Surface Elev.

Location

Piezometer No. CW-8

(TOC) 364.78

TCA Tank Area

Page 3 of 3

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
140	<p><u>Gravel</u>: Soft, weathered, limestone, etched quartz, very muddy.</p> <p><u>Limestone</u>: Dark gray, hard?.</p>			140	

AIR-ROTARY DRILLING LOG

Client: HARLEY-DAVIDSON

Boring No. Piezometer No. CW-9

Location West Employee Parking Lot

Project No: 89254 Phase Task

Surface Elev. 360.79 (TOC)

Page 1 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u> Asphalt cover and gravel subbase.			0	T.O.C. Elev.
0-10	<u>SANDY SILT</u> : Brown to grayish-brown with some rock fragments.			0-10	+1-16': 10" steel casing +2-47': 6" steel casing
10-20	<u>SILTY SAND</u> : Brown to yellowish-brown, with rock fragments.			10-20	
20-23	<u>LIMESTONE</u> : Gray, soft, broken.			20-23	
23-30	<u>LIMESTONE</u> : Gray, hard, massive; WBZ at 23' (~5 gpm).			23-30	
30-41	<u>BROKEN ZONE</u> : Limestone and quartz gravel, poor circulation (27-41').			30-41	
41-50	<u>LIMESTONE</u> : Gray, hard, massive.			41-50	
50-70	<u>BROKEN ZONE</u> : Limestone and quartz gravel, sand and mud (50-70'); WBZ at 50' (~60 gpm).			50-70	Caved formation: 50-70'

Driller <u>Eichelberger, Inc.</u>	Blown/Bailed Yield <u>60 gpm</u>	Bentonite Seal _____
Logged By <u>Scott A. Wendling</u>	Well Casing <u>6" Dia. To +2-47' Ft.</u>	Filter Pack Qty. _____
Drilling Started <u>2/6/90</u>	Casing Type <u>Steel</u>	Filter Pack Type _____
Drilling Completed <u>2/15/90</u>	Well Screen _____ Dia. _____ To _____	Static Water Level <u>344.53' MSL</u>
Well Construction <u>Open Rock</u>	Screen Type _____	Date <u>3/5/90</u>
Well Developed _____	Slot Size _____	Notes: _____
Water Bearing Zones <u>23', 50'</u>	Drilling Mud _____	
	Grout Type _____ Quantity _____	

Form #WL-AR-1 (02/90)

r.e. wright associates, inc.

AIR-ROTARY DRILLING LOG

Client: HARLEY-DAVIDSON

Boring No.

Piezometer No. CW-9

Location West Employee Parking Lot

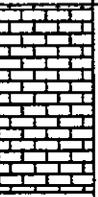
Project No: 89254

Phase

Task

Surface Elev. 360.79 (TOC)

Page 2 of 2

Depth Feet	Overburden/Lithologic Description		Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60	<p><u>LIMESTONE</u>: As above.</p>				60	
70					70	<p>Caved formation: 50-70'</p>

Client: Harley-Davidson

Boring No. Surface Elev. 417.43' (TOC)

Piezometer No. CW-10

Project No. 89254

Phase Task

Location South Perimeter

Page 1 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface			0	T.O.C. Elev.
0-10	Clayey Silt: Reddish-brown, with some rock fragments.			0-10	+2-40': 6" steel casing
10-20	Silty Sand: Light brown, unconsolidated, some rock fragments.			10-20	0-40': 10" hammer bit
20-40	Siltstone: Light brown to light bluish-brown, slightly weathered, poorly cemented.			20-40	0-40': Benseal grout
40-50	Quartzite: Bluish-gray, not weathered, hard.			40-50	40-103': 6" hammer bit
50-60	As above, except weathered and soft.			50-60	

Driller <u>Eichelberger, Inc.</u>	Blown/Balled Yield <u>1-2 gpm</u>	Bentonite Seal _____
Logged By <u>Scott A. Wendling</u>	Well Casing <u>6" Dia. +2 Ft. 40'</u>	Filter Pack Qty. _____
Drilling Started <u>3/30/90</u>	Casing Type <u>Steel</u>	Filter Pack Type _____
Drilling Completed <u>3/30/90</u>	Well Screen _____ Dia. _____ Ft. _____	Static Water Level <u>385.70'</u> MSL
Well Construction <u>Open Rock</u>	Screen Type _____	Date <u>4/10/90</u>
Well Developed _____	Slot Size _____	Notes: _____
Water Bearing Zones <u>60-65'</u>	Drilling Mud _____	
	Grout Type <u>Benseal</u> Quantity <u>0-40'</u>	

Boring No. Piezometer No. CW-10

Surface Elev. 417.43' (TOC)

Location South Perimeter

Page 2 of 2

Client: Harley-Davidson

Project No. 89254

Phase

Task

Depth Feet	Overburden/Lithologic Description		Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60 70 80 90 100 110	<p>WBZ (60-65'): 1-2 gpm.</p> <p><u>Quartzite</u>: Bluish-gray, not weathered, hard.</p> <p>Total Depth = 103'</p>				60 70 80 90 100 110	

Client: Harley-Davidson

Project No. 89254

Phase 13 Task 1

Boring No.

Piezometer No. CW-11

Surface Elev. 374.30' (TOC)

Location South Perimeter

Page 1 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u>			0	T.O.C. Elev.
0-18'	<u>Clayey Silt</u> : Reddish-brown, moist, plastic.			0-18'	10" steel casing
0-43'				0-43'	6" steel casing
0-43'				0-43'	10" hammer bit
0-43'				0-43'	Benseal grout
30-43'	<u>Void?</u> : Poor circulation, very little bit chatter.			30-43'	
43-83'	<u>Limestone</u> : Dark bluish-gray, microcrystalline, solid, reacts slightly with hydrochloric acid.			43-83'	6" hammer bit
58-61'	Broken zone (58-61), WBZ: ~ 60 gpm.			58-61'	

Driller <u>Eichelberger, Inc.</u>	Blown/Balled Yield <u>80 gpm</u>	Bentonite Seal _____
Logged By <u>Scott A. Wendling</u>	Well Casing <u>6" Dia. 0 Ft. 43'</u>	Filter Pack Qty. _____
Drilling Started <u>4/2/90</u>	Casing Type <u>Steel</u>	Filter Pack Type _____
Drilling Completed _____	Well Screen _____ Dia. _____ Ft. _____	Static Water Level <u>342.89</u> MSL
Well Construction <u>Open Rock</u>	Screen Type _____	Date <u>5/3/90</u>
Well Developed _____	Slot Size _____	Notes: <u>Caved Formation: 60-83.</u>
Water Bearing Zones <u>58, 63, 69</u>	Drilling Mud _____	
	Grout Type <u>Benseal</u> Quantity <u>0-43</u>	

Client: Harley-Davidson

Project No. 89254

Phase 13 Task 1

Boring No.

Piezometer No. CW-11

Surface Elev. 374.30' (TOC)

Location South Perimeter

Page 2 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60 65 70 75 80 85 90	<p>Limestone: Bluish-gray, solid.</p> <p>Broken Zone: WBZ: ~20 gpm.</p> <p>Limestone: Bluish-gray, solid.</p> <p>Void: No bit chatter, very rapid advancement of bit.</p>			60 65 70 75 80 85 90	<p>Caved Formation: 60-83'</p>

AIR-ROTARY DRILLING LOG

Client: **Harley Davidson**

Boring No. **CW-12**

Piezometer No.

Project No: **91328**

Phase **1**

Task **1**

Location **West Parking Lot**

Surface Elev. **FT.**

Page **1** of **3**

Depth Feet	Blow Count	Sampler Re-covery/RDD	Overburden/Lithologic Description	FID (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0			ASPHALT AND SUBBASE				0	T.O.C. Elev. 363.21
0			SILTY CLAY dark yellow, soft, moist (2'-16')				0	10" Air Rotary Borehole (0'-61')
5							5	10" Heavy Wall Casing (+2'-54')
10							10	
15							15	
20			SANDY GRAVEL 1/2"-1" pebbles with CLAYEY SILT matrix, dark yellow/brown, soft moist (16'-35')				20	
25							25	
30							30	
35			LIMESTONE Blue gray, hard, some calcite fragments (35'-40')				35	
40							40	
45			SANDY GRAVEL same as above, possible void (40'-47')				45	
50							50	
			LIMESTONE as above (47'-57')					

Continued Next Page

Driller <u>Eichelbergers, INC</u>	Blown/Bailed Yield <u>-6 gpm</u>	Bentonite Seal <u>n/a</u>
Logged By <u>D. McCarthy T. Maars</u>	Well Casing <u>10" 8" 6" Dia. +2'-54" to 61'-67'</u>	Filter Pack Qty. <u>n/a</u>
Drilling Started <u>12/11/91</u>	Casing Type <u>67'-143' Heavy Wall</u>	Filter Pack Type <u>n/a</u>
Drilling Completed <u>12/20/91</u>	Well Screen <u>n/a</u> Dia. <u>n/a</u> to <u>n/a</u>	Static Water Level _____ MSL
Construction Completed <u>12/20/91</u>	Screen Type <u>n/a</u>	Date _____
Development Completed <u>12/20/91</u>	Slot Size <u>n/a</u>	Notes: _____
Water Bearing Zones <u>119'-125'</u>	Drilling Mud <u>n/a</u>	_____
	Grout Type <u>n/a</u>	_____



Client: **Harley Davidson**

Location **West Parking Lot**

Project No: **91328**

Phase **1**

Task **1**

Surface Elev. **FT.**

Depth Feet	Blow Count	Sampler	Recovery/coverly/RQD	Overburden/Lithologic Description	FID (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
				Continued from previous page					
50								50	
55								55	
60				MUD SEAM, extremely viscous (57.5'-59')				60	
65				SANDY GRAVEL as above , but extremely hard (59'-67')				65	8" Air Rotary Borehole (61'-67')
70				WBZ Q~ 30 gpm				70	6" Air Rotary Borehole (67'-143')
75				LIMESTONE, same as above (67'-143')				75	
80								80	
85				Drill break at 82'				85	
90								90	
95								95	
100				Drill Break at 99'				100	
105								105	
110								110	
115								115	
				Continued Next Page					



AIR-ROTARY DRILLING LOG

Client: **Harley Davidson**

Boring No. **CW-12**

Piezometer No.

Location **West Parking Lot**

Project No: **91328**

Phase **1**

Task **1**

Surface Elev. **FT.**

Page **3** of **3**

Depth Feet	Blow Count	Sampler	Re-covery/RDD	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page									
120								120	
125								125	
130								130	
135								135	
140								140	
145				TD=143'				145	
150								150	
155								155	
160								160	
165								165	
170								170	
175								175	
180								180	



AIR-ROTARY DRILLING LOG

Client: **HARLEY-DAVIDSON, INC.**

Boring No. **CW-12A** Piezometer No.

Location **WEST PARKING LOT**

Project No: **91327**

Phase **1**

Task **1**

Surface Elev. **361.34 FT.**

Page **1** of **2**

Depth Feet	Blow Count	Sampler Recovery/ROD	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0			ASPHALT GRAVEL SUBBASE				0	T.O.C. Elev. 363.34
0			CLAYEY SILT: medium brown, trace of rounded fine gravel, dry.				0	10 inch air rotary borehole from 0 to 47 ft.
5							5	6 inch heavy wall casing from +2 to 47 ft.
10							10	
15			CLAYEY SILT: medium brown, little quartz fragments and rounded fine gravel.				15	
20							20	
25			SILTY CLAY: medium brown, some gravel, trace of quartz and limestone fragments.				25	
30							30	
35							35	
40							40	
45			LIMESTONE: weathered, light gray, massive, traces of iron staining.				45	

Continued Next Page

Driller <u>Eichelbergers, Inc.</u>	Blown/Bailed Yield <u>1 GPM</u>	Bentonite Seal <u>45-47 ft.</u>
Logged By <u>Tom Marrs</u>	Well Casing <u>6 inch</u> Dia. <u>+2 ft.</u> to <u>47 ft.</u>	Filter Pack Qty. <u>N/A</u>
Drilling Started <u>1/8/92</u>	Casing Type <u>Heavy wall casing</u>	Filter Pack Type <u>N/A</u>
Drilling Completed <u>1/8/92</u>	Well Screen <u>N/A</u> Dia. <u>N/A</u> to <u>N/A</u>	Static Water Level <u>344.57</u> MSL
Construction Completed <u>N/A</u>	Screen Type <u>N/A</u>	Date <u>1/27/92</u>
Development Completed <u>N/A</u>	Slot Size <u>N/A</u>	Notes: <u>NO WATER BEARING ZONE</u>
Water Bearing Zones <u>None observed</u>	Drilling Mud <u>N/A</u>	<u>OBSERVED.</u>
	Grout Type <u>N/A</u>	



r.e. wright associates, inc.

Form #wl-sc-1 (02/90)

AIR-ROTARY DRILLING LOG

Client: **HARLEY-DAVIDSON, INC.**

Boring No. **CW-12A** Piezometer No.

Location **WEST PARKING LOT**

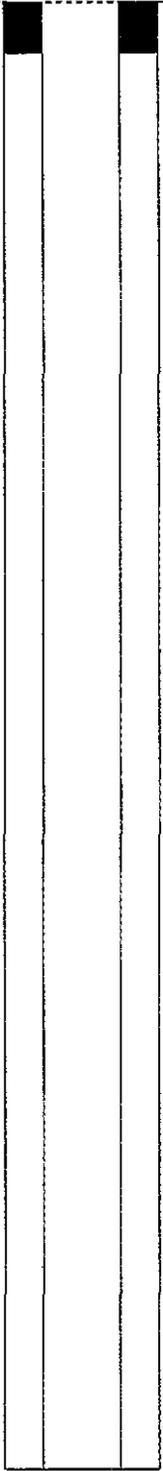
Project No: **91327**

Phase **1**

Task **1**

Surface Elev. **361.34 FT.**

Page **2** of **2**

Depth Feet	Blow Count	Sampler Recovery/RQD	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
			Continued from previous page					
45							45	6 inch air rotary borehole from 47 to 103 ft.
50			<u>LIMESTONE</u> : competent to slightly weathered, massive, traces of iron staining.				50	
55							55	
60			<u>LIMESTONE</u> : same as above.				60	
65							65	
70							70	
75							75	
80							80	
85							85	
90							90	
95							95	
100							100	
105			END OF BORING AT 103 FEET				105	



AIR-ROTARY DRILLING LOG		Boring No. CW-13	Piezometer No.			
Client: Harley-Davidson, Inc.		Location West Parking Lot				
Project No: 91327	Phase 1	Task 1-	Page 1 of 2			
Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u> Macadam (0-0.5'). Crushed stone subbase (0.5-1.0'). Silty Clay: Pale brown (5YR 5/2), moist, soft, some rock fragments (1.0-9.0').	0			0	T.O.C. Elev. <u>361.67</u> 10" Locking cap
10	Silty Clay: Dark yellowish-brown (10YR 4/2), soft, moist (9.0-14.5').	0			10	12" Air rotary borehole (roller bit) 0-60.0' 10" Light wall steel casing (+2-59.6')
20	Silty Clay: Light brown (5YR 5/6), soft, moist, lots of rounded pebbles and cobbles (14.5-36.0').	0		▽	20	
30					30	
40	Clay: Dark yellowish-brown (10YR 4/2), firm, moist, cobbles and pebbles present (36.0-39.0'). WBZ Q ~ 30 gpm. Limestone: Light gray (N7), microxline, some calcite veins (39.0-40.0').	0			40	
50	Sandy Gravel: Variable grain size, with clayey silt matrix, light brown (5YR 5/6), soft, moist (40.0-67.0').	0			50	
60	Limestone: As above (57.0-60.0').	0			60	Natural gravel pack (57-70')

Driller <u>Eichelberger (Books II)</u>	Blown/Bailed Yield <u>~100 gpm</u>	Bentonite Seal <u>N/A</u>
Logged By <u>Daniel J. McCarthy</u>	Well Casing <u>10"</u> Dia. To <u>+2 59.6 Ft.</u>	Filter Pack Qty. <u>57-70'</u>
Drilling Started <u>12/3/91</u>	Casing Type <u>Light wall steel</u>	Filter Pack Type <u>Natural gravel pack</u>
Drilling Completed <u>12/6/91</u>	Well Screen <u>N/A</u> Dia. <u>N/A</u> To <u>N/A</u>	Static Water Level <u>17.20</u> MSL
Well Construction <u>N/A</u>	Screen Type <u>N/A</u>	Date <u>12/10/91</u>
Well Developed <u>12/6-12/10/91</u>	Slot Size <u>N/A</u>	Notes: _____
Water Bearing Zones <u>36-39', 63-64'</u>	Drilling Mud <u>N/A</u>	
	Grout Type <u>N/A</u> Quantity <u>N/A</u>	

AIR-ROTARY DRILLING LOG

Client: Harley-Davidson, Inc.

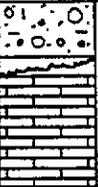
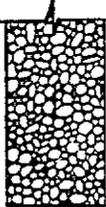
Boring No. CW-13. Piezometer No.

Location West Parking Lot

Project No: 91327 Phase 1 Task 1

Surface Elev.

Page 2 of 2

Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
<div style="text-align: center;">60</div>	<p>Sandy Gravel: As above (60-63').</p> <p>WBZ, 75 gpm (63-64').</p> <p>Limestone: As above, with quartz pebbles and clay balls (64-70').</p>	<p>0</p> <p>0</p>			<div style="text-align: center;">60</div> <div style="text-align: center;">70</div>	<p>10" Air rotary borehole (roller bit) 60-70'</p>
	<p>Total Depth = 70'.</p>					

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface	VOA (ppm)		0	T.O.C. Elev. 6" Light wall casing (+3.5-40)
0-14'	Silty Clay: Pale yellowish-brown (10YR 6/2), moist, loose (0-14').				Benseal (0-34')
14-26'	Limestone: Weathered, light gray (N8), dry, angular fragments and rock floor (14-26').				12" borehole to 50'
26-42'	Soft zone/void (26-42'). Mud slurry, Q = 25 gpm. Large cobbles, approximately 1" across.				Bentonite pellets and granular (34-36')
42-50'	Limestone: Solid rock, angular rock fragments (42-50').				#2 Morie sand (36-60')
50-51'	Fracture Q = 65-80 gpm (50-51').				6" Stainless-steel screen (40-60')
51-80'	Limestone: Solid rock (51-80').				10" borehole to 80'.

Driller <u>Eichelbergers (Books II)</u>	Blown/Bailed Yield <u>~350 gpm</u>	Bentonite Seal <u>34-36'</u>
Logged By <u>Daniel J. McCarthy</u>	Well Casing <u>6" Dia. To +3.5 40 Ft.</u>	Filter Pack Qty. <u>36-60'</u>
Drilling Started <u>9/25/91, 0815</u>	Casing Type <u>Light wall casing</u>	Filter Pack Type <u>#2 Morie</u>
Drilling Completed <u>10/8/91, 0730</u>	Well Screen <u>6" Dia. 40 To 60'</u>	Static Water Level <u>20.72 MSL</u>
Well Construction <u>10/8/91-10/9/91</u>	Screen Type <u>Stainless steel</u>	Date <u>10-8-91</u>
Well Developed <u>10/8/91</u>	Slot Size _____	Notes: <u>Yield of well increased substantially during 12" reaming of hole and development.</u>
Water Bearing Zones <u>26-42, 50-51</u>	Drilling Mud <u>N/A</u>	
	Grout Type <u>Benseal</u> Quantity <u>16 bags</u>	

AIR-ROTARY DRILLING LOG

Client: Harley Davidson

Boring No. CW-14 Piezometer No.

Location West parking lot

Project No: 91327 Phase 1 Task 1

Surface Elev. (TOC) 362.5 Page 2 of 2

Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60					60	
60	Limestone: As above.	0			60	
70					70	3/8" pea gravel (60-80')
80	TD = 80'.				80	

AIR-ROTARY DRILLING LOG

Client: **Harley Davidson**

Boring No. **CW-15**

Piezometer No. _____

Project No: **91328**

Phase **1**

Task **1**

Location **NW corner of Bldg 4**

Surface Elev. **FT.**

Page **1** of **3**

Depth Feet	Blow Count	Sampler	Recovery/cover/RD	Overburden/Lithologic Description	FID (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0	Ground Surface		FEET					0	T.O.C. Elev. 363.44
0-18'				Silty Clay light brown, 5YR5/6, soft, lots qtz fragments (0'-18')				0-18'	12" Air Rotary to 55'
18-28'				t=1 Silty Clay, dusky brown, 5YR2/2, moist, firm (18'-28')				18-28'	Assume 10" Casing grouted in place 0'-55'
28-62'				Sandy Gravel, coarse (1/2"-1") with clayey silt matrix (28'-62') WBZ @ 32' Q- 1 gpm				28-62'	
62-174'				Limestone, dark gray, n3, some calcite, microxline (62'-174')				62-174'	10" Rotary to 270'

Continued Next Page

Driller <u>Eichelberger</u>	Blown/Bailed Yield <u>--1 gpm</u>	Bentonite Seal _____
Logged By <u>D. McCarthy</u>	Well Casing _____ Dia. _____ to _____	Filter Pack Qty. _____
Drilling Started <u>10/24/91</u>	Casing Type _____	Filter Pack Type _____
Drilling Completed <u>10/28/91</u>	Well Screen _____ Dia. _____ to _____	Static Water Level _____ MSL
Construction Completed <u>10/28/91</u>	Screen Type _____	Date _____
Development Completed <u>n/a</u>	Slot Size _____	Notes: _____
Water Bearing Zones <u>32'</u>	Drilling Mud _____	_____
	Grout Type _____	_____

AIR-ROTARY DRILLING LOG

Client: **Harley Davidson**

Boring No. **CW-15**

Piezometer No.

Project No: **91328**

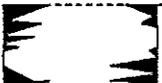
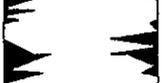
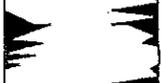
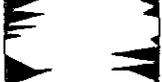
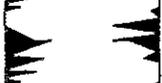
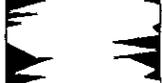
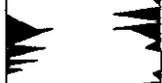
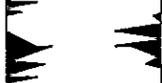
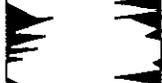
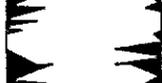
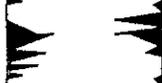
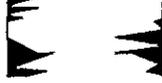
Phase **1**

Task **1**

Location **NW corner of Bldg 4**

Surface Elev. **FT.**

Page **2** of **3**

Depth Feet	Blow Count	Sampler	Recovery/ROD	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page									
80								80	
85					0			85	
90					0			90	
95					0			95	
100					0			100	
105					0			105	
110					0			110	
115					0			115	
120				Limestone as above	0			120	
125					0			125	
130					0			130	
135					0			135	
140					0			140	
145					0			145	
150					0			150	
155					0			155	
160					0			160	
165					0			165	
170					0			170	
175				Limestone, dark gray, n3, lots of calcite infilling, hard (174'-190')	0			175	
180					0			180	
185					0			185	
Continued Next Page									



Client: **Harley Davidson**

Location **NW corner of Bldg 4**

Project No: **91328**

Phase **1**

Task **1**

Surface Elev. **FT.**

Page **3** of **3**

Depth Feet	Blow Count	Sampler	Recovery/RCD	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details			
Continued from previous page												
190				Limestone, dark gray, n3, less calcite, hard (190'-240')	0			190				
195					0					195		
200					0					200		
205					0					205		
210					0					210		
215					0					215		
220					0					220		
225					0					225		
230					0					230		
235					0					235		
240				Limestone, light gray, N7, some pink and green discoloration lots of calcite, softer (240'-270')	0			240				
245					0					245		
250					0					250		
255					0					255		
260					0					260		
265					0					265		
270					0					270		
270					TD=270'						270	
275											275	
280											280	
285								285				
290								290				



AIR-ROTARY DRILLING LOG			Boring No. CW-15A	Piezometer No.		
Client: Harley Davidson			Location Adjacent to Building 4			
Project No: 91328	Phase 1	Task 1-	Surface Elev.	Page 1 of 2		
Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u>				0	T.O.C. Elev. 363.14
0-6'	<u>Silty Clay</u> : Dark brown, moist, firm (0-6').	10			0-6'	Benseal (0-9')
6-35'	<u>Sandy Gravel</u> : Loose, quartz and sandstone fragments (6-35'). 20 25-30 30-40 glorrr	200			6-12'	6" Light wall casing (+1.8-18')
35-42'	<u>Soft Zone</u> : Mud, gravel and silt (35-42'). Q = 20 gpm.	5			9-12'	Bentonite pellets (9-12')
42-45'	<u>Limestone</u> : Gray, angular, microxilline (42-45').	10			12-68.5'	#2 Morie sand (12-68.5')
45-49'	<u>Soft Zone</u> : Clay, mud, and quartz fragments. Q = approximately 30 gpm (45-49').	5			18-68.5'	6" Stainless-steel screen (18-68.5')
49-70'	<u>Limestone</u> : Gray, angular, hard (49-70').	5			60	

Driller <u>Eichelbergers (Funk)</u> Logged By <u>D. McCarthy</u> Drilling Started <u>11/4/91</u> Drilling Completed <u>11/15/91</u> Well Construction <u>11/15-11/19/91</u> Well Developed <u>11/20-11/25/91</u> Water Bearing Zones <u>35', 45-49'</u>	Blown/Bailed Yield <u>~30 gpm</u> Well Casing <u>6" Dia. To +1.8' 18' Ft.</u> Casing Type <u>Light wall casing</u> Well Screen <u>6" Dia. 18' To 68'</u> Screen Type <u>Stainless steel</u> Slot Size <u>20 slot</u> Drilling Mud <u>N/A</u> Grout Type <u>Benseal</u> Quantity <u>0-9'</u>	Bentonite Seal <u>9-12'</u> Filter Pack Qty. <u>12-68.5'</u> Filter Pack Type <u>#2 Morie</u> Static Water Level <u>20.88</u> MSL Date <u>11/20/91</u> Notes: <u>Cable tool drilling method</u>
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AIR-ROTARY DRILLING LOG

Client: Harley Davidson

Boring No. CW-15A Piezometer No.

Location Adjacent to Building 4

Project No: 91328

Phase 1

Task 1

Surface Elev.

Page 2 of 2

Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
<p>60</p> <p>70</p> <p>TD = 70'.</p>		0			<p>60</p> <p>70</p>	<p>#2 Morie sand (68.5-70')</p>

Client:

Boring No. SB-21

Piezometer No. CW-16

Project No: 92276

Phase 4

Task 1

Location Bldg. 2 TCA Degreaser Investigation

Surface Elev. 365.39 FT.

Page 1 of 2

Depth Feet	Blow Count	Sampler Re-covery/RDD	Overburden/Lithologic Description	PID (ppm)	Graphs Log	Well Construction Graphics	Depth Feet	Well Construction Details
0			Concrete				0	T.O.C. Elev. 364.32
0			Gravel Fill				0	
5			Strong Br (7.5YR 4/6) Silty CLAY (CL), with 10-15% fine to very fine sand, minor Fe/Mn staining, dry, very stiff. A/A, with few subangular to subrounded quartzose GRAVEL to 1 1/2" diameter, dry, very stiff. (CL) A/A, with minor GRAVEL, minor garnets to 1/4" diameter, slightly damp, very stiff. (CL)				5	Boled water tight metal vault cover flush with concrete floor. 2 ft.* 3 ft.* 2 ft. metal vault. 10 inch steel casing from 1.5 to 17.2 ft. bgs. 6 inch steel casing from 1.0 to 30.5 ft. bgs.
10			A/A (CL) Quartz fragments at 8.7', slightly damp.				10	10 inch conductor casing was drilled & set to 17.2 ft. with a cable tool rig. 10 inch air rotary borehole from 17.2 ft to 52.0 ft.
15			A/A Strong Mn discoloration at 10.8-10.9'. Gravel (quartzose to limestone) material from 10.8-12.6'. (GP) Strong Br (7.5YR 5/6) Clayey GRAVEL/Gravelly CLAY (GC/CL), with 30-40% coarse fragments to 1" diameter (quartz, quartzose sandstone, limestone gravels, minor Mn staining, damp, firm. Strong Br (7.5YR 5/6) Silty/Gravelly CLAY (CL). 1 1/2" diameter rounded quartz GRAVEL blocking core, moist.				15	Cement from 1.5 to 22.5 ft.
20			Light to dark gray limestone, micro-crystalline, hard. 18.0'-18.25' Small clay seam. Lt to Dk Gray LIMESTONE, micro-crystalline, primarily horizontal bedding with 1/4 to 1" thick beds and 1/2" thick beds common, slightly to moderately fractured, tight to open 1/8" apertures with calcite along fracture surfaces. Fracture orientation 5 to 25 degrees to vertical core axis, fresh to deeply weathered, moderate hardness to hard, slightly folded beds from 28-31.5', wet at 25'.				20	
25							25	Bentonite

Continued Next Page

Driller <u>Eichelberger</u>	Blown/Bailed Yield <u>>25 gpm</u>	Bentonite Seal <u>Benseal 22.5 to 25 ft.</u>
Logged By <u>PGW</u>	Well Casing <u>6in</u> Dia. <u>1.5 ft. to 30.5 ft.</u>	Filter Pack Qty. <u>32 bags 25 to 51.5' bgs</u>
Drilling Started <u>6/27/94</u>	Casing Type <u>Steel</u>	Filter Pack Type <u>#1 sand</u>
Drilling Completed <u>6/28/94</u>	Well Screen <u>6 in.</u> Dia. <u>30.5 ft. to 50.5 ft.</u>	Static Water Level _____ MSL
Construction Completed <u>6/29/94</u>	Screen Type <u>Stainless steel</u>	Date <u>6/28/94</u>
Development Completed <u>7/21/94</u>	Slot Size <u>.020 Continuous slot</u>	Notes: <u>Lithologic log from MW-54, located 9 ft. east, partially copied here.</u>
Water Bearing Zones <u>41-43 ft bgs >100 gpm; 46.5 and 48.5 ft. bgs.</u>	Drilling Mud <u>NA</u>	
	Grout Type <u>Cement 1.5 to 22.5 ft.</u>	

AIR-ROTARY DRILLING LOG

Boring No. SB-21 Piezometer No. CW-16

Client: Project No: 92276 Phase 4 Task 1

Location Bldg. 2 TCA Degreaser Investigation Surface Elev. 365.39 FT. Page 2 of 2

Depth Feet	Blow Count	Sampler Recovery/ROD	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page								
30			A/A Dark gray Limestone with minor brown weathering at fractures. Some bit channer, minor quartz, hard drilling.				30	6 inch stainless steel screen from 30.5 to 50.5 ft. bgs.
35			A/A Very little water.				35	#7 Morie sand 25 to 51.5 ft.
40			A/A Minor quartz and calcite infilling few fractures, very minor weathering.				40	
45			41 to 43 ft.-Void, clay with abundant calcite and light gray to white limestone fragments. Water bearing zone, >25 gpm. Limestone, dark gray to gray.				45	
50			46.5 ft. Small fracture, filled with calcite. 48.5 ft. Small fracture. Light gray to gray limestone.				50	
55			Boring terminated at 52.0 ft.				55	
60							60	
65							65	

Depth Feet	Blow Count	Sampler Recovery/RQD	Overburden/Lithologic Description	FID (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0							0	T.O.C. Elev.
0							0	
0			CLAYEY SILT- brown, lite clay, trace of gravel.				0	8" steel casing installed to 32'
5							5	Grouted from 4-32'
10			LIMESTONE- dark gray to black, coarse-grained, trace to little calcite. No calcite from 15-20'.				10	
15							15	
20			LIMESTONE- dark gray, weathered and fractured from 23-25', water. weathered from 25-32'.				20	Water level at 21.54'
25							25	
30			VOID- cavern with bottom sediment layer of clay, silt, and quartz gravel at approximately 61-64'.				30	Cement basket from 30-32'
35							35	

Ground Surface FEET

DN (26')

OFF (31')

PUMP INTAKE (33')

Continued Next Page

Driller <u>Eichelbergers, Inc.</u>	Blown/Bailed Yield <u>30 GPM</u>	Bentonite Seal <u>NA</u>
Logged By <u>RGR/DGW</u>	Well Casing <u>8" Dia. +3"SU to 32'</u>	Filter Pack Qty. <u>NA</u>
Drilling Started <u>6/12/95</u>	Casing Type <u>Steel</u>	Filter Pack Type <u>NA</u>
Drilling Completed <u>6/19/95</u>	Well Screen <u>NA Dia. NA to NA</u>	Static Water Level <u>MSL</u>
Construction Completed <u>6/19/95</u>	Screen Type <u>NA</u>	Date <u>6/19/95</u>
Development Completed <u>6/19/95</u>	Slot Size <u>NA</u>	Notes: <u>8" steel casing installed to 32', and</u>
Water Bearing Zones <u>23-25', 32-64'</u>	Drilling Mud <u>NA</u>	<u>a 7.07" open rock borehole drilled from</u>
	Grout Type <u>Portland</u>	<u>32-65'.</u>

Client: Harley-Davidson

Location York, PA

Project No: 95316

Phase

Task

Surface Elev. FT.

Page 2 of 2

Depth Feet	Blow Count	Sampler Re- covery/ ROD	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page								
35							35	Void/cavern from 32'-64'
40							40	
45							45	
50							50	
55							55	
60							60	
65			LIMESTONE- dark gray, trace of calcite.				65	
			Boring completed at 65 feet					
70							70	
75							75	
80							80	



SOIL BORING LOG

Client: **Harley-Davidson, Inc.**

Boring No. **CW-18**

Piezometer No.

Project No: **95395**

Phase **1**

Task **3**

Location **Building 66**

Surface Elev. **366.75 FT.**

Page **1** of **2**

Depth Feet	Blow Count	Sampler Re-covery RGD	Overburden/Lithologic Description	RID (APR)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0	Ground Surface	FEET					0	T.O.C. Elev. 365.76
0 - 10			Floor grade to 10ft., compacted crushed stone.				0 - 5	6" steel stickup in a 2'x 2'x 2' steel flushmount driveover. 0 to 8" concrete floor.
5 - 10							5 - 10	8" to 3.5" compacted backfill. 3.5" to 5.5" bgs #1 quartz sand.
10 - 15			10 - 11 ft. Silty clay, tan with approximately 50% Dolomite, calcite, and quartz weathered, coarse, gravel. 11 - 15 ft. As above with more light gray clay.				10 - 15	5.5" to 7" bgs, bentonite seal.
15 - 21			15-21 ft. Silty Clay; tan and gray, with 30 - 40% weathered, coarse gravel, dolomite, quartz, and calcite.				15 - 20	7" to 32" bgs, Portland cement grout.
21 - 26			21-26 ft. Less coarse grained material, more silty clay.				20 - 25	

Continued Next Page

Driller <u>Eichelberger's</u>	Blown/Bailed Yield <u>10 rpm</u>	Bentonite Seal <u>34.6" to 32" & 7" to 5.5"</u>
Logged By <u>DGW</u>	Well Casing <u>6 in. Dia. 37.5ft bgs - 1ft bgs</u>	Filter Pack Qty. <u>10 cubic ft.</u>
Drilling Started <u>3/18/96</u>	Casing Type <u>Steel</u>	Filter Pack Type <u>#1 quartz sand</u>
Drilling Completed <u>3/19/96</u>	Well Screen <u>6 in. Dia. 47.5ft bgs 37.5ft bgs</u>	Static Water Level <u>346.88 MSL</u>
Construction Completed <u>03/23/96</u>	Screen Type <u>Stainless steel</u>	Date <u>4/9/96</u>
Development Completed <u>04/09/96</u>	Slot Size <u>.020</u>	Notes: <u>CW-18 is inside bldg. 66. Well is</u>
Water Bearing Zones <u>45ft bgs-51ft bgs</u>	Drilling Mud <u>N.A.</u>	<u>finished with a steel locking flushmount</u>
	Grout Type <u>Portland cement type II</u>	<u>driveover in the concrete floor. 6in. steel</u>

Casing with locking and cap is shown.
Form #WI-sc-1 (02/90)



r.e. wright environmental, inc.

SOIL BORING LOG

Client: Harley-Davidson, Inc.

Boring No. CW-18

Piezometer No.

Project No: 95395

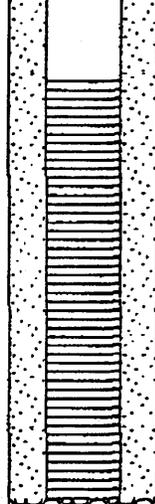
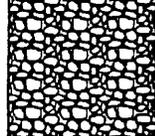
Phase 1

Task 3

Location Building 66

Surface Elev. 366.75 FT.

Page 2 of 2

Depth Feet	Blow Count	Sampler Recovery/ROD	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
			Continued from previous page					
25							25	1' to 37.5' bgs, 6" steel casing.
30			26-34ft. Fine to coarse sand and trace fine gravel, quartz, sandstone, and dolomite rock fragments in silty clay matrix.				30	32.0' to 34.6' bgs, bentonite seal.
35			34-36 ft. Silty clay, brown; balls of clay, 1 in. to 3 in. diameter with fine, weathered, quartz, dolomite, and sandstone gravel.				35	
40			36-50 ft. Dolomite, dark gray.				40	37.5' to 47.5' bgs, 6" stainless steel .020 slot screen.
45							45	34.6' to 48' bgs, #1 quartz sand pack.
50			50-51 ft. Light gray dolomite, solutioned fragments; sound 2-3 in. dolomite fragments, (no reaction to HCl); fine to coarse gravel, (sandstone, quartz) and silty clay masses as above. Suspect intact rock encountered with seams filled with gravel, sand, and clayey material. Seam at 50' to 51' that produces fines which wash into the hole. Cable tool won't advance.				50	Borehole collapsed from 47' to 51'. Total depth of hole = 51.0'
55							55	

Form #wi-ec-1 (02/90)



r.e. wright environmental, inc.

Harley-Davidson
Motor Company Operations, Inc.
York, Pa.
Project #01-1633-00-9574-100

Driller : Carey Knaub / Gary Garland
Logged By : Todd Eaby + Peter A. Enderlin
Drilling Started : 5/30/06
Drilling Completed : 7/27/06
Drilling Method : Air Rotary / Cable Tool

Boring Location : Southwest of South WPL
Well Construction : 8/28/06
Well Developed : 8/23/06

Depth in Feet	DESCRIPTION	GRAPHIC	PID (ppm)	Well: CW-20 361.49	Depth in Feet	Well Construction Information
0	yellowish brown, GRAVEL (GW) SILTY CLAY (CL) dark grey (7.5YR4/1), reddish yellow mottling (7.5YR6/6), <25% angular coarse quartz gravel		0		0	SURFACE : 2.8' stick up, 15" diameter COMPLETION : steel protector pipe
5					5	WELL CASING : 6" diameter carbon steel WELL RISER : Material : Carbon steel, Diameter : 6"
10	SILT W. TRACE OF CLAY (ML) reddish yellow (7.5YR6/6), <3% medium to fine gravel		0		10	WELL SCREEN : U - Pack Material : Type 304 Stainless Steel Diameter : 6" Slot Size : 0.040"
15	SILT W. GRAVEL (GM) strong brown (7.5YR4/6) with 50% medium to fine angular to subrounded gravel, 3% dry sand		0		15	GROUT : Portland 5-8% Bentonite total quantity :
20	WEATHERED DOLOMITIC LIMESTONE, black (2.5/N) microcrystalline. 32-33', calcite rhombohedrons		0		20	BENTONITE SEAL : Size : 3/8" Holeplug, Quantity : Bentonite
25	DOLOSTONE dark gray (7.5YR4/1), micro crystals		0		25	15" Air rotary drilling (0-26') 12" Air rotary drilling (26-120.5') 12" Mud rotary drilling (120.5-125') 19" Mud rotary drilling (0-24') 17" Casing set (0-24') 15" Mud rotary drilling (0-125') 12" Casing set (0-127')
30	DOLOMITIC LIMESTONE gray (7.5YR6/1 and 7.5YR5/1) to light gray (7.5YR7/1)		0		30	12" Mud drilling (127-153') 10" Stradex drilling/casing (153-214') Cable tool drilling (214-219') 6" Stainless 40 Slot Screen (205-215') 6" Casing set (0-205')
35	same color variation as above with 10% very pale brown (10YR8/3 to 10YR8/4), slight reaction to acid		0.3		35	Note: The well casing was cut off at 6' below ground surface (BGS) and a pitless bury unit (6" diameter) was welded onto the 6" riser. An additional section of 6" diameter riser was welded on top of the bury unit to extend abovegrade.
40					40	
45					45	
50					50	



LOG OF COLLECTION WELL CW-20

(Page 2 of 5)

Harley-Davidson
Motor Company Operations, Inc.
York, Pa.
Project #01-1633-00-9574-100

Driller : Carey Knaub / Gary Garland
Logged By : Todd Eaby + Peter A. Enderlin
Drilling Started : 5/30/06
Drilling Completed : 7/27/06
Drilling Method : Air Rotary / Cable Tool

Boring Location : Southwest of South WPL
Well Construction : 8/28/06
Well Developed : 8/23/06

Depth in Feet	DESCRIPTION	GRAPHIC	PID (ppm)	Well: CW-20 361.49	Depth in Feet	Well Construction Information
50				<p>Surface Casing</p> <p>Riser 12" Casing (0-127' bgs)</p>	50	SURFACE : 2.8' stick up, 15" diameter COMPLETION : steel protector pipe
55	WEATHERED ZONE 54-56', some iron staining, coarser gravel, WBZ 20-30 gal/min				55	WELL CASING : 6" diameter carbon steel WELL RISER Material : Carbon steel Diameter : 6" WELL SCREEN : U - Pack Material : Type 304 Stainless Diameter : 6" Slot Size : 0.040"
	POSSIBLE VOID OR FRACTURE 54-56'				60	GROUT : Portland 5-8% Bentonite total quantity : BENTONITE SEAL Size : 3/8" Holeplug Quantity :
60	DOLOSTONE light gray (7.5YR7/1) to gray (7.5YR6/1)				65	
	DOLOSTONE as above inner bedded with LIMESTONE black (2.5/N) to v. dark gray (3/N)		0		70	
65					75	15" Air rotary drilling (0-26') 12" Air rotary drilling (26-120.5') 12" Mud rotary drilling (120.5-125') 19" Mud rotary drilling (0-24') 17" Casing set (0-24') 15" Mud rotary drilling (0-125') 12" Casing set (0-127') 12" Mud drilling (127-153')
70					80	10" Stradex drilling/casing (153-214') Cable tool drilling (214-219') 6" Stainless 40 Slot Screen (205-215') 6" Casing set (0-205')
75	LIMESTONE as above with 3% calcite veins				85	Note: The well casing was cut off at 6' below ground surface (BGS) and a pitless bury unit (6" diameter) was welded onto the 6" riser. An additional section of 6" diameter riser was welded on top of the bury unit to extend abovegrade.
80	Water Bearing Zone 100 gal/min				90	
85			0		95	
90	LIMESTONE gray (6/N) to dark gray (4/N) with 3-5% weathered limey dolostone very pale yellow (10YR7/6) to dark yellowish brown (10YR3/6)			100		
95	LIMESTONE dark gray (7.5YR6/1) to gray (7.5YR4/1)		0.9			
	LIMESTONE same as 72-89'					
100						



LOG OF COLLECTION WELL CW-20

(Page 3 of 5)

Harley-Davidson
Motor Company Operations, Inc.
York, Pa.
Project #01-1633-00-9574-100

Driller : Carey Knaub / Gary Garland
Logged By : Todd Eaby + Peter A. Enderlin
Drilling Started : 5/30/06
Drilling Completed : 7/27/06
Drilling Method : Air Rotary / Cable Tool

Boring Location : Southwest of South WPL
Well Construction : 8/28/06
Well Developed : 8/23/06

Depth in Feet	DESCRIPTION	GRAPHIC	PID (ppm)	Well: CW-20 361.49	Depth in Feet	Well Construction Information
100	LIMESTONE as 94.5-97'	[Pattern]			100	SURFACE : 2.8' stick up, 15" diameter COMPLETION : steel protector pipe
105	LIMESTONE as 72-89'	[Pattern]	0.9		105	WELL CASING : 6" diameter carbon steel WELL RISER Material : Carbon steel Diameter : 6" WELL SCREEN : U - Pack Material : Type 304 Stainless Diameter : 6" Slot Size : 0.040"
110	FRACTURED ZONE, SILTY AND CLAYEY GRAVELS (GM GC) with 10% angular to subrounded gravel <2" in diameter	[Pattern]			110	GROUT : Portland 5-8% Bentonite total quantity :
115	VOID 116-120.5' lost circulation, no returns	[Pattern]	53.1		115	BENTONITE SEAL Size : 3/8" Holeplug Quantity :
120	GRAVEL FILLED VOID 120.5-125, quartz gravel and iron stained dolostone returns	[Pattern]			120	15" Air rotary drilling (0-26') 12" Air rotary drilling (26-120.5') 12" Mud rotary drilling (120.5-125') 19" Mud rotary drilling (0-24') 17" Casing set (0-24') 15" Mud rotary drilling (0-125') 12" Casing set (0-127') 12" Mud drilling (127-153') 10" Stradex drilling/casing (153-214') Cable tool drilling (214-219') 6" Stainless 40 Slot Screen (205-215') 6" Casing set (0-205')
125	FRACTURED ZONE	[Pattern]			125	Note: The well casing was cut off at 6' below ground surface (BGS) and a pitless bury unit (6" diameter) was welded onto the 6" riser. An additional section of 6" diameter riser was welded on top of the bury unit to extend abovegrade.
130	ROCK (no cuttings returned)	[Pattern]			130	
135	VOID 131-141' filled with fines, unable to sample with split spoon	[Pattern]			135	
140	VOID 141-146' filled with silt, sand, and gravels, able to split spoon sample with full (100%) recovery 141-146' bgs	[Pattern]			140	
145	VOID 146-153' filled with 50% coarse angular gravel, 30% coarse sand and 20% fine sand, split spoon 20% recovery 148-153' bgs	[Pattern]			145	
150				150		



LOG OF COLLECTION WELL CW-20

Harley-Davidson
Motor Company Operations, Inc.

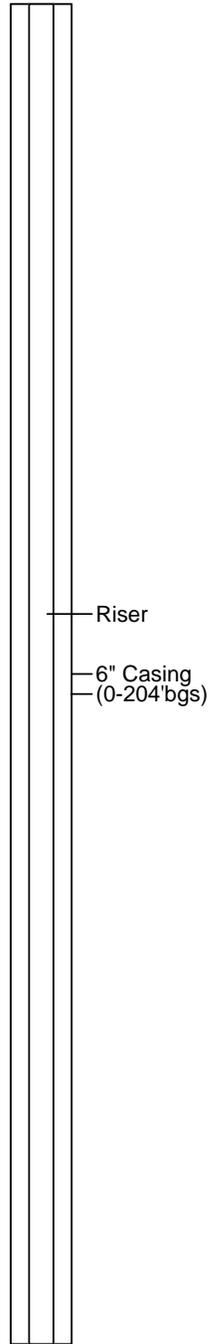
York, Pa.

Project #01-1633-00-9574-100

Driller : Carey Knaub / Gary Garland
 Logged By : Todd Eaby + Peter A. Enderlin
 Drilling Started : 5/30/06
 Drilling Completed : 7/27/06
 Drilling Method : Air Rotary / Cable Tool

Boring Location : Southwest of South WPL
 Well Construction : 8/28/06
 Well Developed : 8/23/06

Depth in Feet	DESCRIPTION	GRAPHIC	PID (ppm)	Well: CW-20 361.49	Depth in Feet	Well Construction Information
150					150	SURFACE : 2.8' stick up, 15" diameter COMPLETION : steel protector pipe
155	VOID 153-159.5' filled with COARSE to FINE GRAVEL, 50% dolostone angular dark bluish gray (3/N) to v. dark gray (SB4/1), 50% quartz coarse to fine subangular yellow (10YR8/6) to yellow brownish (10YB5/8)		156		155	WELL CASING : 6" diameter carbon steel WELL RISER Material : Carbon steel Diameter : 6" WELL SCREEN : U - Pack Material : Type 304 Stainless Steel Diameter : 6" Slot Size : 0.040"
160	LIMESTONE dark bluish gray (3/N) to v. dark gray (SB4/1) VOID filled with 70% limestone and 30% quartz as 153-159.5'				160	GROUT : Portland 5-8% Bentonite total quantity :
165	VOID or FRACTURED ZONE filled with 15% coarse quartz cobbles, 20% fine quartz gravel, 20% coarse sand, 45% fine sand moist to wet, sample spoon 30% 167-169' bgs				165	BENTONITE SEAL Size : 3/8" Holeplug Quantity :
170	VOID 169-172'				170	
175	VOID filled with poorly graded sand, sample spoon 48% recovery 172.5-177.5' bgs				175	15" Air rotary drilling (0-26') 12" Air rotary drilling (26-120.5') 12" Mud rotary drilling (120.5-125') 19" Mud rotary drilling (0-24') 17" Casing set (0-24') 15" Mud rotary drilling (0-125') 12" Casing set (0-127') 12" Mud drilling (127-153')
180	VOID filled with fine sand, 5% recovery 178-182' bgs				180	10" Stradex drilling/casing (153-214') Cable tool drilling (214-219') 6" Stainless 40 Slot Screen (205-215') 6" Casing set (0-205')
185	VOID or FRACTURED ZONE filled with 57% thick clay/silt, 24% fine sands, 19% coarse sand and rounded gravel, sample spoon 35% recovery 184-189' bgs				185	Note: The well casing was cut off at 6' below ground surface (BGS) and a pitless bury unit (6" diameter) was welded onto the 6" riser. An additional section of 6" diameter riser was welded on top of the bury unit to extend abovegrade.
190	VOID or FRACTURED ZONE filled with 50% coarse sand, 30% very coarse sand, 20% fine sand, sample spoon 8% recovery 189-190.5' bgs				190	
195	LIMESTONE black (2.5/N) to v. dark gray (3/N) with white (0/N) to light gray (7/N) calcite veins, 3% angular sandstone gravel				195	
200					200	





LOG OF COLLECTION WELL CW-20

(Page 5 of 5)

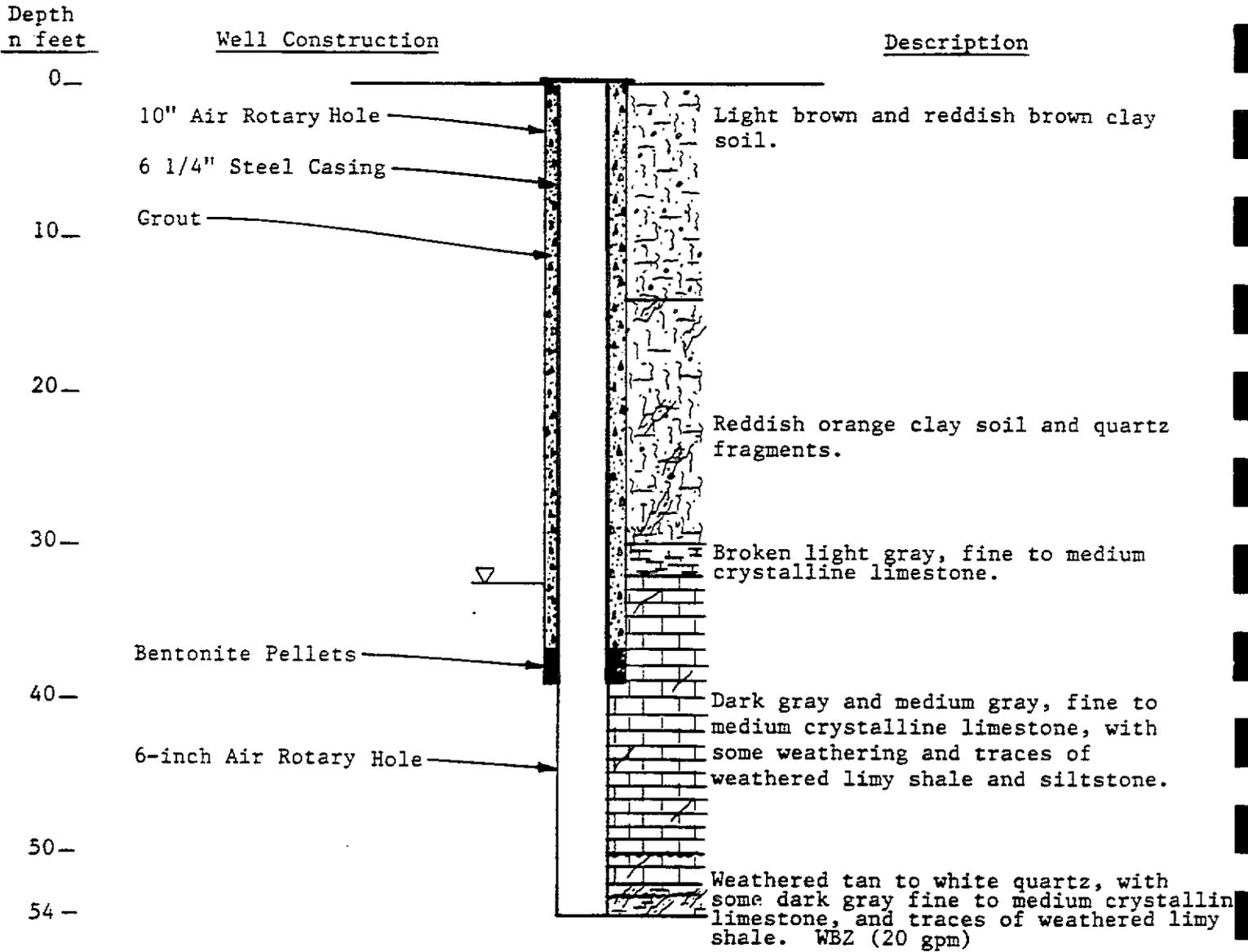
Harley-Davidson
Motor Company Operations, Inc.
York, Pa.
Project #01-1633-00-9574-100

Driller : Carey Knaub / Gary Garland
 Logged By : Todd Eaby + Peter A. Enderlin
 Drilling Started : 5/30/06
 Drilling Completed : 7/27/06
 Drilling Method : Air Rotary / Cable Tool
 Boring Location : Southwest of South WPL
 Well Construction : 8/28/06
 Well Developed : 8/23/06

Depth in Feet	DESCRIPTION	GRAPHIC	PID (ppm)	Well: CW-20 361.49	Depth in Feet	Well Construction Information
200					200	SURFACE : 2.8' stick up, 15" diameter COMPLETION : steel protector pipe WELL CASING : 6" diameter carbon steel WELL RISER Material : Carbon steel Diameter : 6" WELL SCREEN : U - Pack Material : Type 304 Stainless Steel Diameter : 6" Slot Size : 0.040" GROUT : Portland 5-8% Bentonite total quantity : BENTONITE SEAL Size : 3/8" Holeplug : Bentonite Quantity :
	LIMESTONE as above without quartz gravel				205	
205					210	
	VOID - WBZ estimated 300 gal/min				215	
215	LIMESTONE as 202-213'				220	
	VOID				225	
220	LIMESTONE as 202-213				230	15" Air rotary drilling (0-26') 12" Air rotary drilling (26-120.5') 12" Mud rotary drilling (120.5-125') 19" Mud rotary drilling (0-24') 17" Casing set (0-24') 15" Mud rotary drilling (0-125') 12" Casing set (0-127') 12" Mud drilling (127-153') 10" Stradex drilling/casing (153-214') Cable tool drilling (214-219') 6" Stainless 40 Slot Screen (205-215') 6" Casing set (0-205')
220	TD -219 FEET				235	Note: The well casing was cut off at 6' below ground surface (BGS) and a pitless bury unit (6" diameter) was welded onto the 6" riser. An additional section of 6" diameter riser was welded on top of the bury unit to extend abovegrade.
235					240	
240					245	
245				250		
250						

Geologic and Well Construction Log

Harley Davidson
Well MW1



Vertical Scale
1" = 10'

Geologic and Well Construction Log

Harley Davidson
Well MW2

Depth
in feet

Well Construction

Description

0 —

Light and dark brown soil.

10 —

Dark yellowish orange, moderate yellowish brown, and moderate olive brown, very weathered, fine to medium grained sandstone

20 —

10" Air Rotary Hole

6 1/4" Steel Casing

30 —

Grout

40 —

Bentonite Pellets

WBZ (1 gpm)

50 —

Light olive brown weathered fine to medium grained quartzitic sandstone.

60 —

6-inch Air Rotary Hole

Moderate olive brown, weathered fine to medium grained sandstone.

Vertical Scale
1" = 10'

Geologic and Well Construction Log

Harley Davidson
Well MW2 Cont'd.

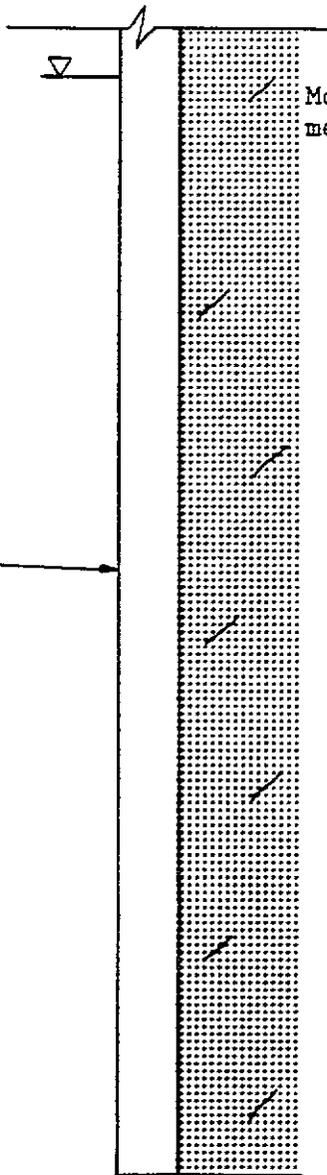
Depth
in feet

Well Construction

Description

60—
70—
80—
90—
100—
110—
120—
121—

6-inch Air Rotary Hole



Moderate olive brown, weathered fine to medium grained sandstone.

Vertical Scale
1" = 10'

Geologic and Well Construction Log

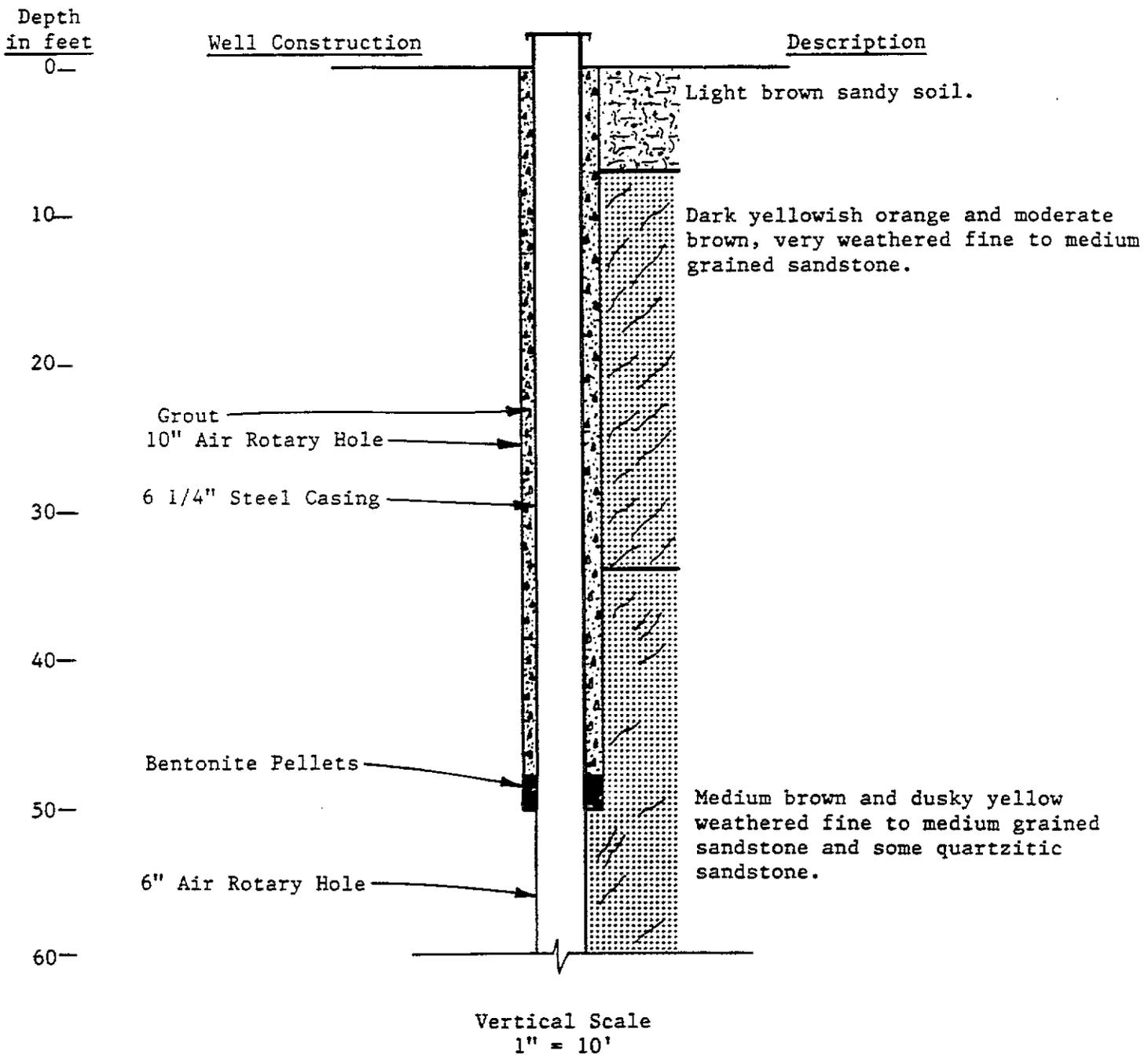
Harley Davidson
Well MW2 Cont'd.

Drilling Began: 4/7/86
Drilling Complete: 4/8/86
Drilling Contractor: Eichelberger
Drilling Method: Air Rotary
Site Geologist: R. A. Hoover
Casing Interval: +2 - 46' BGS
Open Rock Hole Interval: 46 - 121' BGL
Water Bearing Zones: 45' BGS (1 gpm)
SWL Elevation (Date): 447.56' (5/12/86)

Total Depth: 121' BGS
Total Yield: 1 GPM
Elevation: 509.4 TOC
508.50' GS

Geologic and Well Construction Log

Harley Davidson
Well MW3



Geologic and Well Construction Log

Harley Davidson
Well MW3 Cont'd.

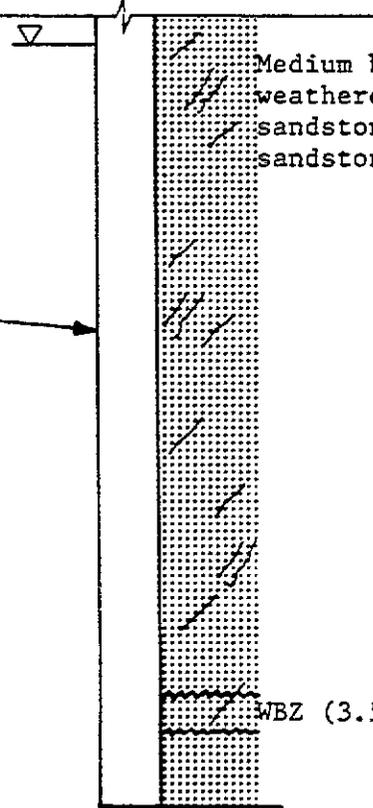
Depth
in feet

Well Construction

Description

60—
70—
80—
90—
100—
102—

6-inch Air Rotary Hole



Medium brown and dusky yellow weathered fine to medium grained sandstone and some quartzitic sandstone.

Vertical Scale
1" = 10'

r.e. wright associates, inc.

Geologic and Well Construction Log

Harley Davidson
Well MW3 Cont'd.

Drilling Began: 4/8/86	Total Depth: 102' BGS
Drilling Complete: 4/8/86	Total Yield: 3.5 GPM
Drilling Contractor: Eichelberger	Elevation: 542.11 TOC
Drilling Method: Air Rotary	540.25 GS
Site Geologist: R. A. Hoover	Open Rock Hole Elevation Interval:
Casing Interval: +2 - 50' BGS	438.3 - 490.3'
Open Rock Hole Interval: 50 - 102' BGS	
Water Bearing Zones: 96 - 98' BGS (3.5 gpm)	
SWL Elevation (Date): 480.73 (5/12/86)	

Geologic and Well Construction Log

Harley Davidson
Well MW4

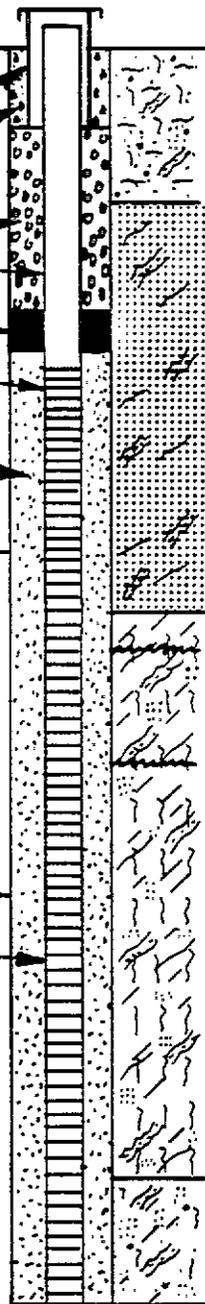
Depth
in feet

Well Construction

Description

0
10
20
30
40
50
60
67

6" Steel Protector Pipe
Grout
Gravel
4" Schedule 40 Pipe
Bentonite Pellets
1" Sch. 40 PVC Pipe
Morie #1 Sand
10" Air Rotary Hole
4" Sch. 40 PVC Screen



Dark yellowish orange sandy soil and medium grained quartzitic sandstone fragments.
Grayish orange and very pale orange, slightly weathered, quartzitic medium and coarse grained sandstone, with some quartz
WBZ (20 gpm)
Dark yellowish orange clay and pale yellowish brown clayey sand saprolite, with some sandstone fragments.
Rounded quartz pebbles, dark yellowish orange weathered sandstone fragments, and clayey sand saprolite

Vertical Scale
1" = 10'

r.e. wright associates, inc.

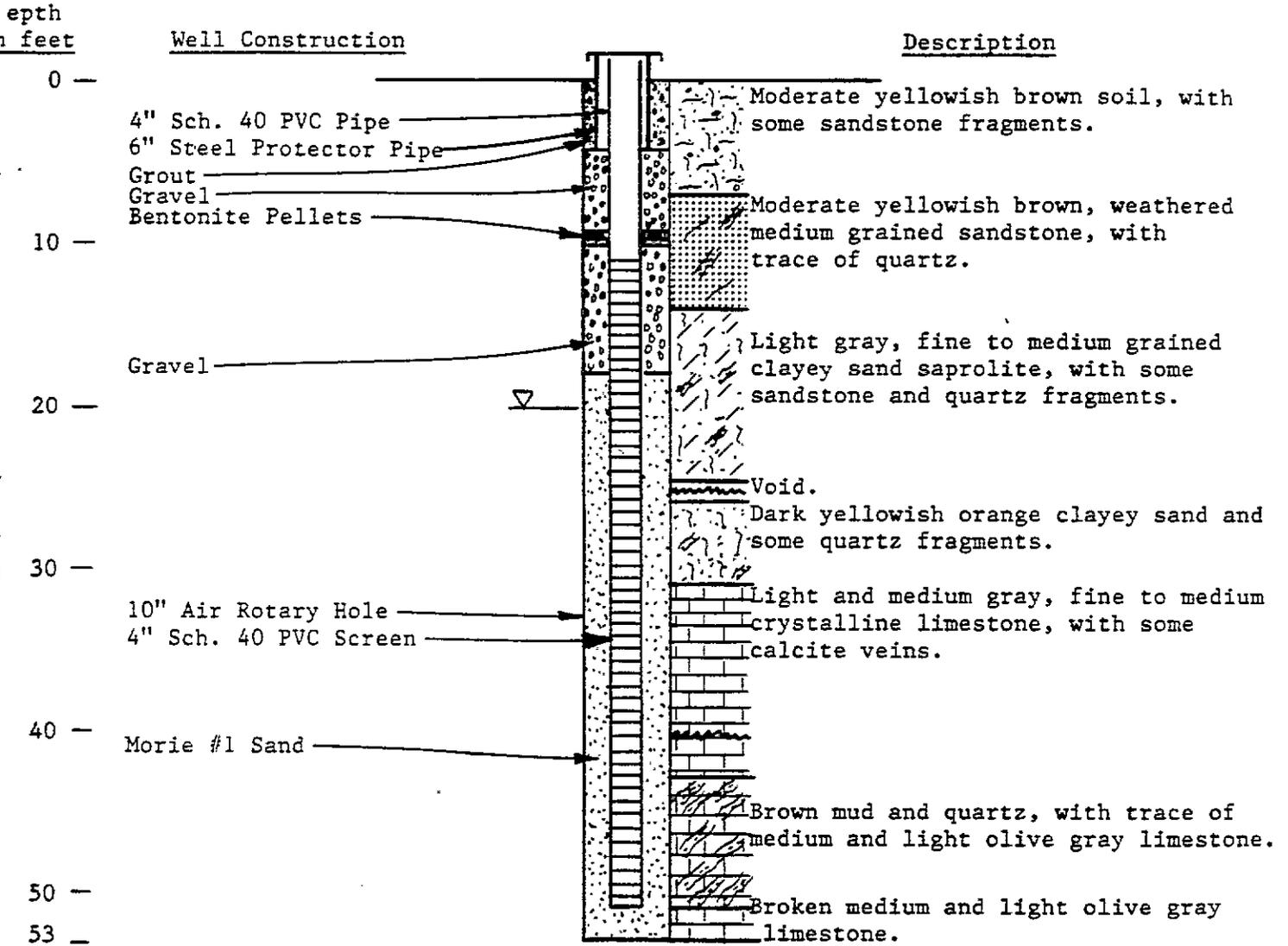
Geologic and Well Construction Log

Harley Davidson
Well MW4 Cont'd.

Drilling Began: 4/9/86	Total Depth: 67' BGS
Drilling Complete: 4/14/86	Total Yield: 20 GPM
Drilling Contractor: Eichelberger	Elevation: 397.82' TOC
Drilling Method: Air Rotary	395.78' GS
Site Geologist: R. A. Hoover	Screen Elevation Interval: 328.8 - 378.8'
Casing Interval: +1.5 - 17' BGS	
Screen Interval: 17 - 67' BGS	
Water Bearing Zones: 32 - 38' BGS (20 gpm)	
SWL Elevation (Date): 370.42 (5/12/86)	

Geologic and Well Construction Log

Harley Davidson
Well MW5



Vertical Scale
1" = 10'

Geologic and Well Construction Log

Harley Davidson
Well MW5 Cont'd.

Drilling Began: 4/9/86	Total Depth: 53' BGS
Drilling Complete: 4/11/86	Total Yield: 40 GPM
Drilling Contractor: Eichelberger	Elevation: 370.80' TOC
Drilling Method: Air Rotary	369.38' GS
Site Geologist: R. A. Hoover	Screen Elevation Interval: 318.4 - 358.4'
Casing Interval: +1.5 - 11' BGS	
Screen Interval: 11 - 51' BGS	
Water Bearing Zones: 25' (30 gpm), 40' (10 gpm)	
SWL Elevation (Date): 350.67 (5/12/86)	

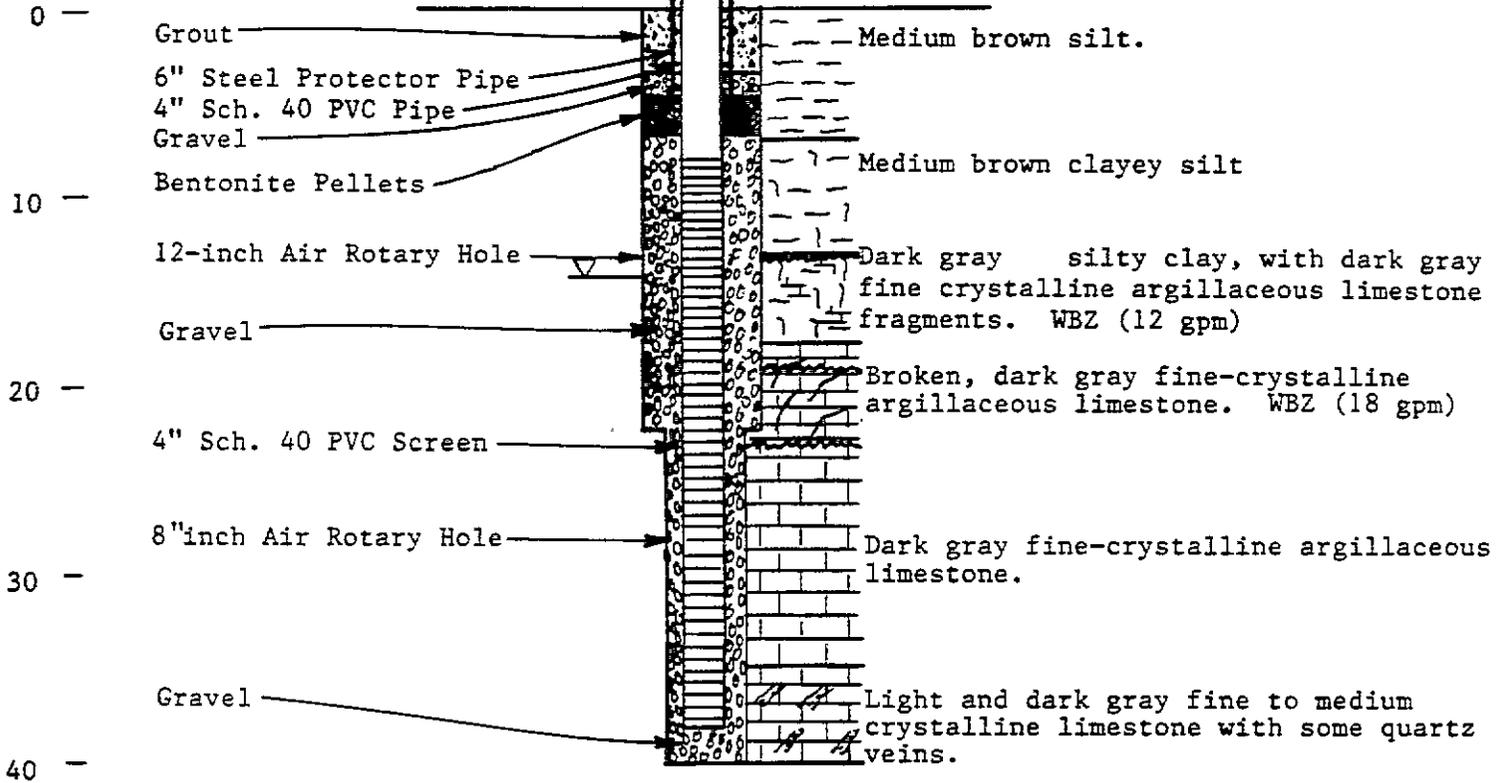
Geologic and Well Construction Log

Harley Davidson
Well MW6

Depth
in feet

Well Construction

Description



Vertical Scale
1" = 10'

Geologic and Well Construction Log

Harley Davidson
Well MW6 Cont'd.

Drilling Began: 5/5/86	Total Depth: 40' BGS
Drilling Complete: 5/6/86	Total Yield: 30+ GPM
Drilling Contractor: Eichelberger	Elevation: 360.98' TOC
Drilling Method: Air Rotary	358.38' GS
Site Geologist: R. A. Hoover	Screen Elevation Interval: 320.4-350.4'
Casing Interval: +2.5 - 8' BGS	
Screen Interval: 8-38' BGS	
Water Bearing Zones: 13' (12 gpm), 19-23 (18 GPM)	
SWL Elevation (Date): 346.73' (5/12/86)	

Geologic and Well Construction Log

Harley Davidson
Well MW6A

Depth
in feet

Well Construction

Description

0—

Moderate yellowish brown clayey soil.

10—

10-inch Air Rotary Hole
8" Casing
6 1/4" Steel Casing

20—

Grout

Moderate yellowish brown clayey soil
with some quartz and dark gray limestone
fragments.

30—

8-inch Air Rotary Hole
6 1/4" Steel Casing

Dark gray, fine to medium crystalline
limestone and argillaceous limestone.

Bentonite Pellets

40—

Grout

Medium to dark gray, fine to medium
crystalline limestone.

50—

6-inch Air Rotary Hole

60—

65—

Vertical Scale
1" = 10'

r.e. wright associates, inc.

Geologic and Well Construction Log

Harley Davidson
Well MW6A Cont'd.

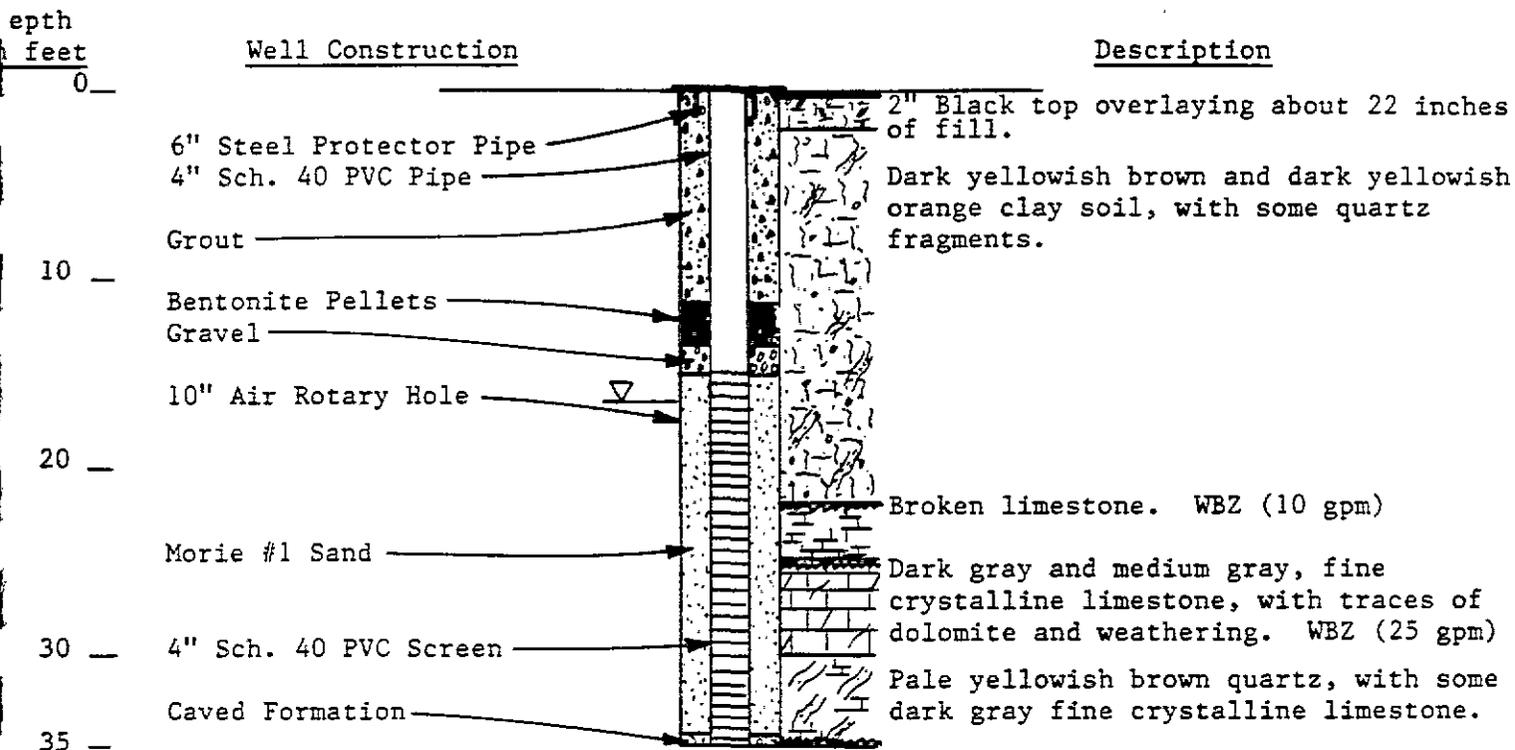
Drilling Began: 4/16/86
Drilling Complete: 4/17/86
Drilling Contractor: Eichelberger
Drilling Method: Air Rotary
Site Geologist: R. A. Hoover
Casing: 6"(8")
Casing Interval: 0(0) - 35'(25') BGS
Open Rock Hole Interval: 35 - 65' BGS
Water Bearing Zones: 46' BGS (0.5 gpm)
SWL Elevation (Date): 351.34 (4/21/86)

Total Depth: 65' BGS
Total Yield: 1/2 GPM
Elevation: 361.40' TOC
359.07' GS
Open Rock Hole Elevation Interval:
294.1 - 324.1'

NOTE: Boring was abandoned and
filled with cement grout.

Geologic and Well Construction Log

Harley Davidson
Well MW7



Vertical Scale
1" = 10'

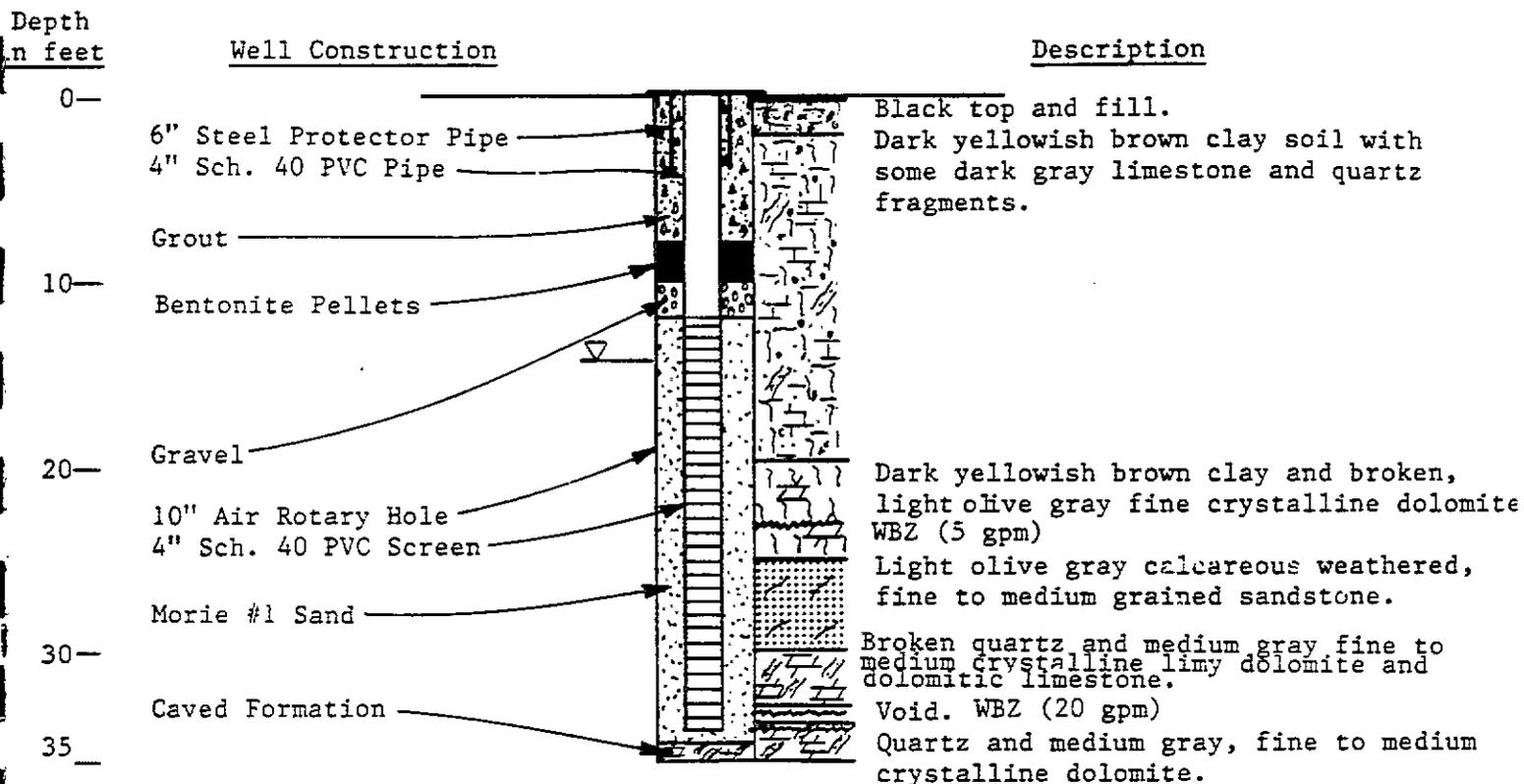
Geologic and Well Construction Log

Harley Davidson
Well MW7 Cont'd.

Drilling Began: 4/14/86	Total Depth: 35' BGS
Drilling Complete: 4/14/86	Total Yield: 35 GPM
Drilling Contractor: Eichelberger	Elevation: 362.18' TOC
Drilling Method: Air Rotary	360.77' GS
Site Geologist: R. A. Hoover	Screen Elevation Interval: 325.8 - 345.8
Casing Interval: 0 - 15' BGS	
Screen Interval: 15 - 35' BGS	
Water Bearing Zones: 22' (10 gpm), 25 - 35' (25 gpm)	
SWL Elevation (Date): 344.29 (5/12/86)	

Geologic and Well Construction Log

Harley Davidson
Well MW8



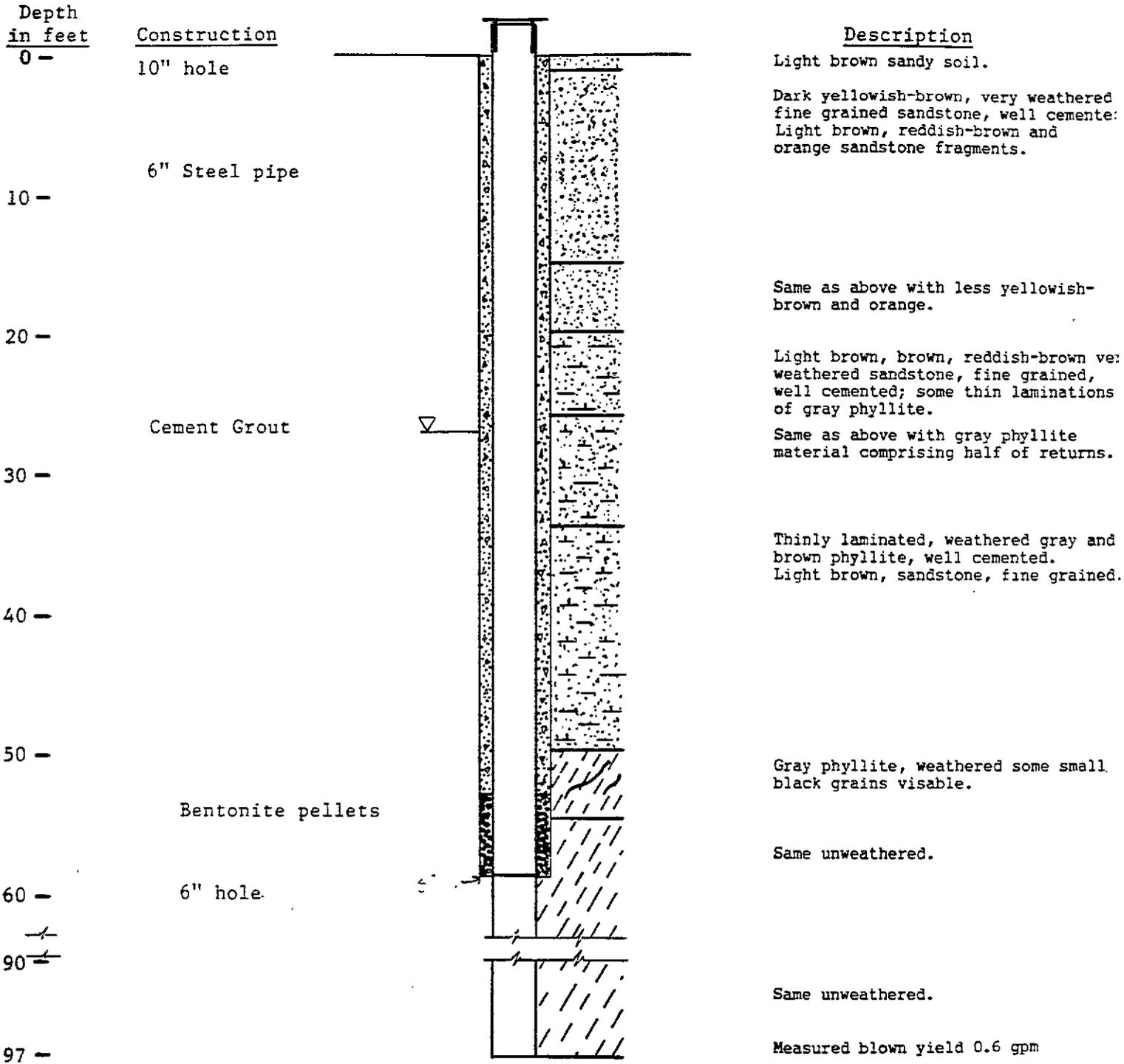
Vertical Scale
1" = 10'

Geologic and Well Construction Log

Harley Davidson
Well MW8 Cont'd.

Drilling Began: 4/15/86	Total Depth: 36' BLS
Drilling Complete: 4/15/86	Total Yield: 25 GPM
Drilling Contractor: Eichelberger	Elevation: 360.55 ' TOC
Drilling Method: Air Rotary	359.44' GS
Site Geologist: R. A. Hoover	Screen Elevation Interval: 325.4 - 347.4
Casing Interval: 0 - 12' BLS	
Screen Interval: 12 - 34' BLS	
Water Bearing Zones: 23' (5gpm), 33 - 34' (20 gpm)	
SWL Elevation (Date): 345.00 (5/12/86)	

Geologic and Well Construction Log
MW-9



Vertical Scale 1" = 10'

Drilling Began: 11/25/86
 Drilling Completed: 11/25/86
 Drilling Contractor: Eichelberger
 Drilling Method: Air Rotary

Total Depth: 97'
 Total Yield: 0.6 gpm
 Elevation, TOC: 559.76'

Geologic and Well Construction Log

MW-10

Depth
in feet

Construction

Description

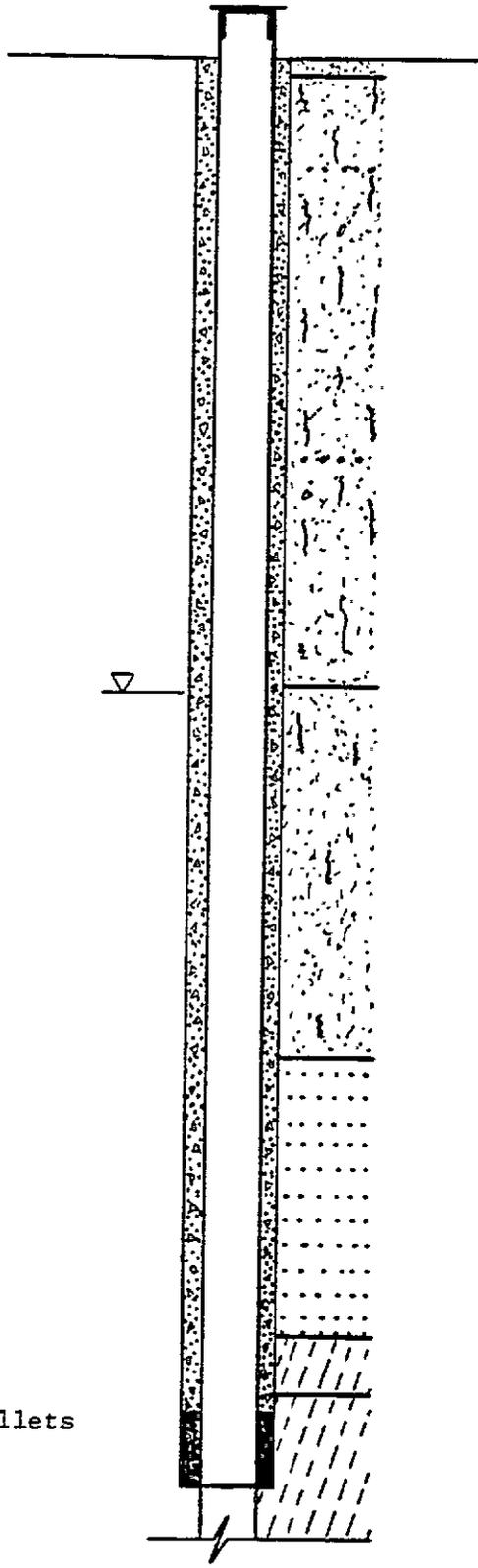
0-
10-
20-
30-
40-
50-
60-
70-
80-

10" hole
6" Steel pipe

Cement Grout

Bentonite pellets

6" hole



Light brown sandy soil.
Orange-brown clayey sandy soil with weathered sandstone fragments. Fragments are gray, brown, blue-gray, very fine grained, soft, and very well cemented. Some coarse fragments (phyllite?)

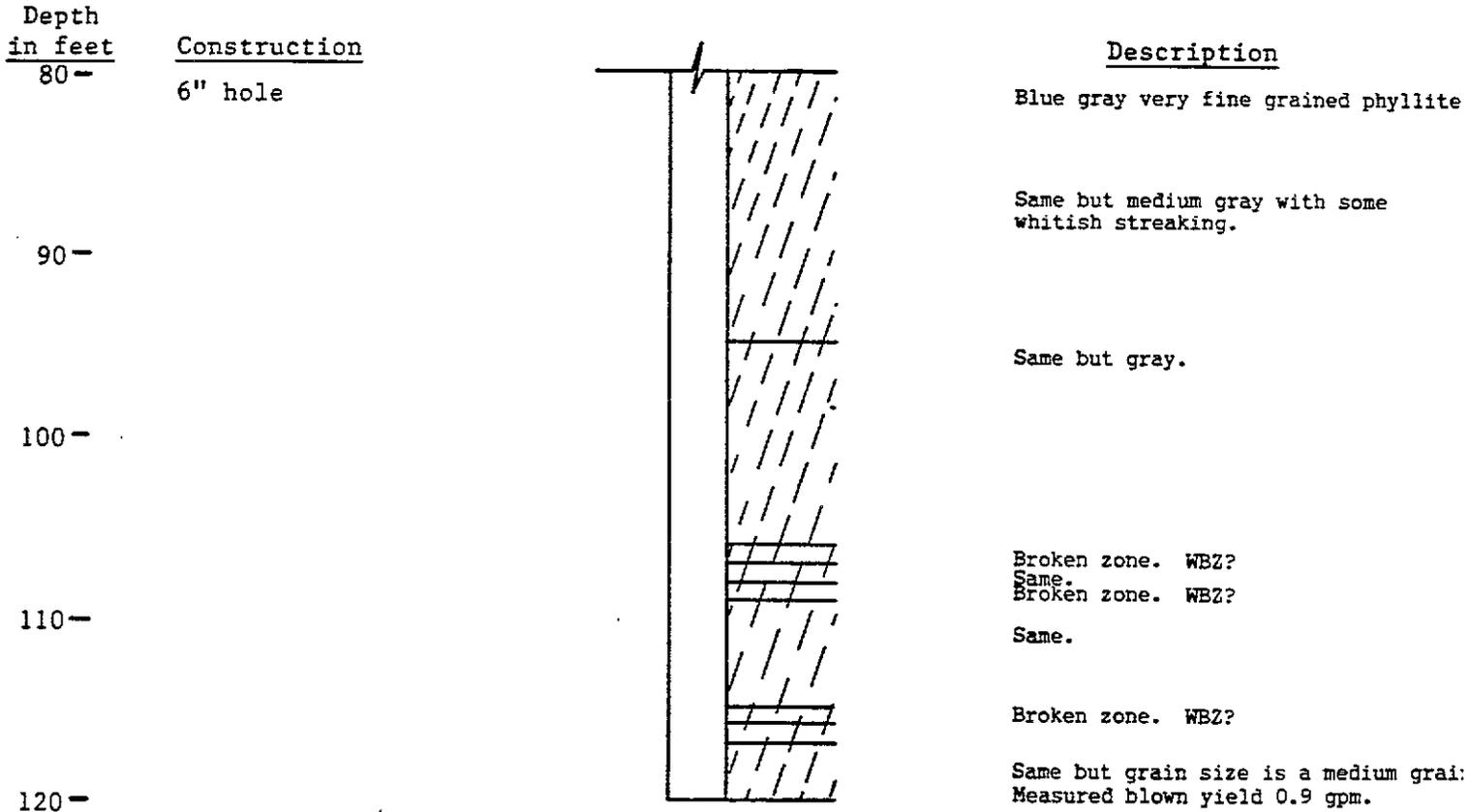
Same as above plus fragment colors of brown, reddish-brown.

Very fine grained fragments of well cemented sandstone, blue gray to green gray.

Weathered zone, larger fragments of brown, fine to medium grained phyllite, some small white quartz veins. Blue gray very fine grained phyllite

Vertical Scale 1" = 10'

HARLEY-DAVIDSON YORK, INC.
 Geologic and Well Construction Log
 MW-10 Cont'd.

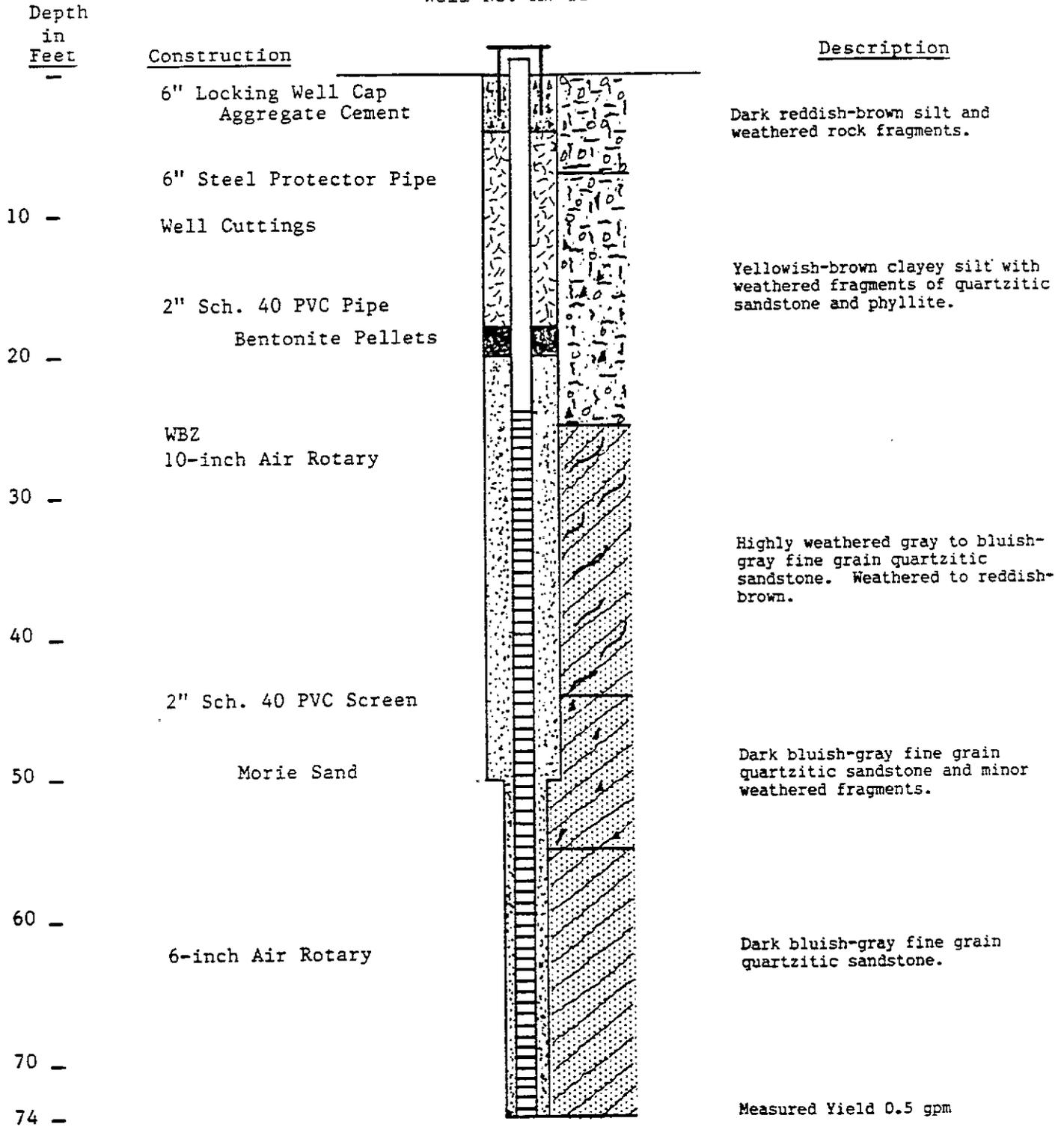


Vertical Scale 1" = 10'

Drilling Began: 11/24/86
 Drilling Completed: 11/24/86
 Drilling Contractor: Eichelberger
 Drilling Method: Air Rotary

Total Depth: 120'
 Total Yield: 0.9 gpm
 Elevation, TOC: 568.75'

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-11



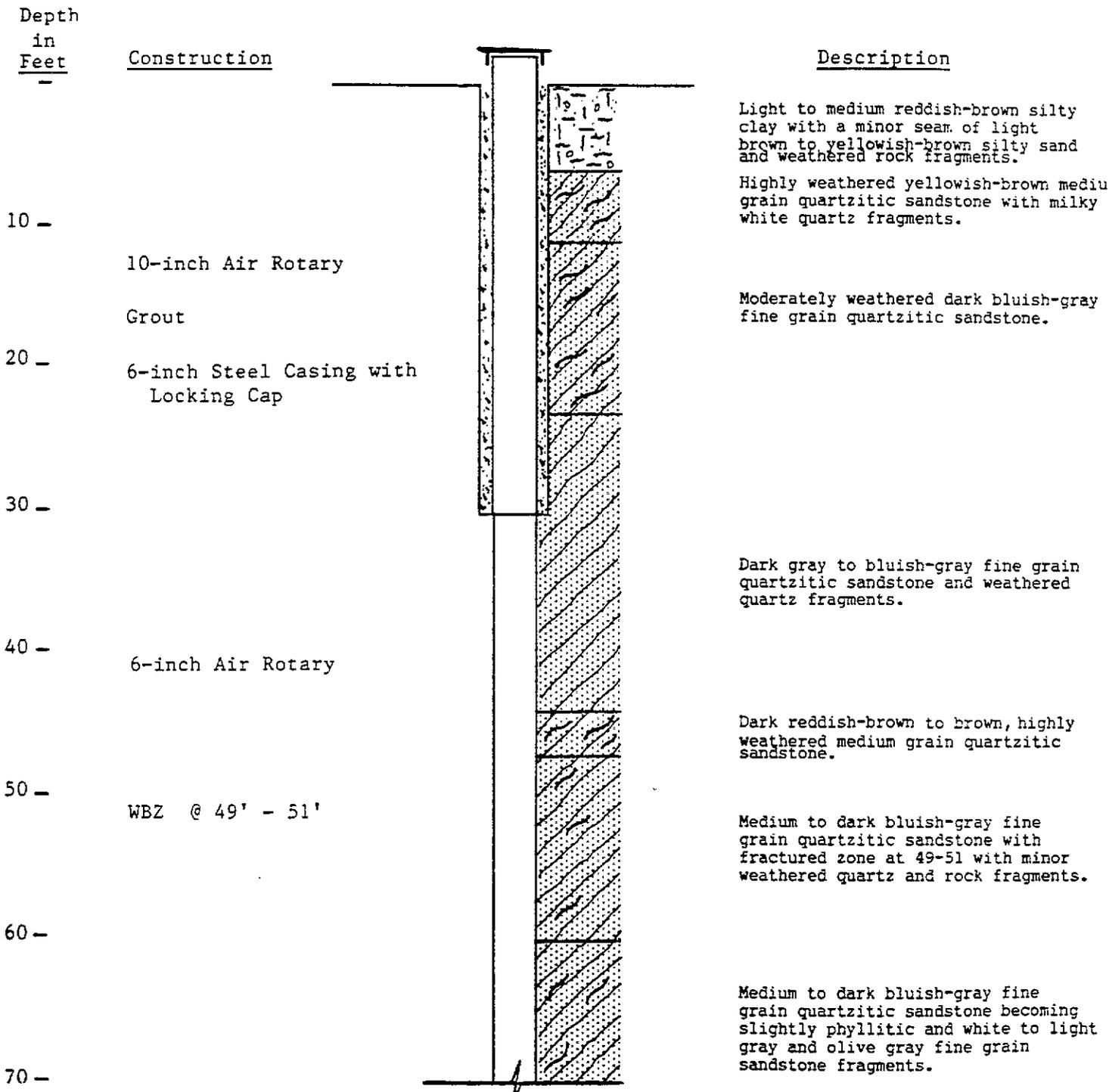
Vertical Scale 1" = 10'

Harley - Davidson York, Inc.
Geologic and Well Construction Log
Well No. MW-11
(Continued)

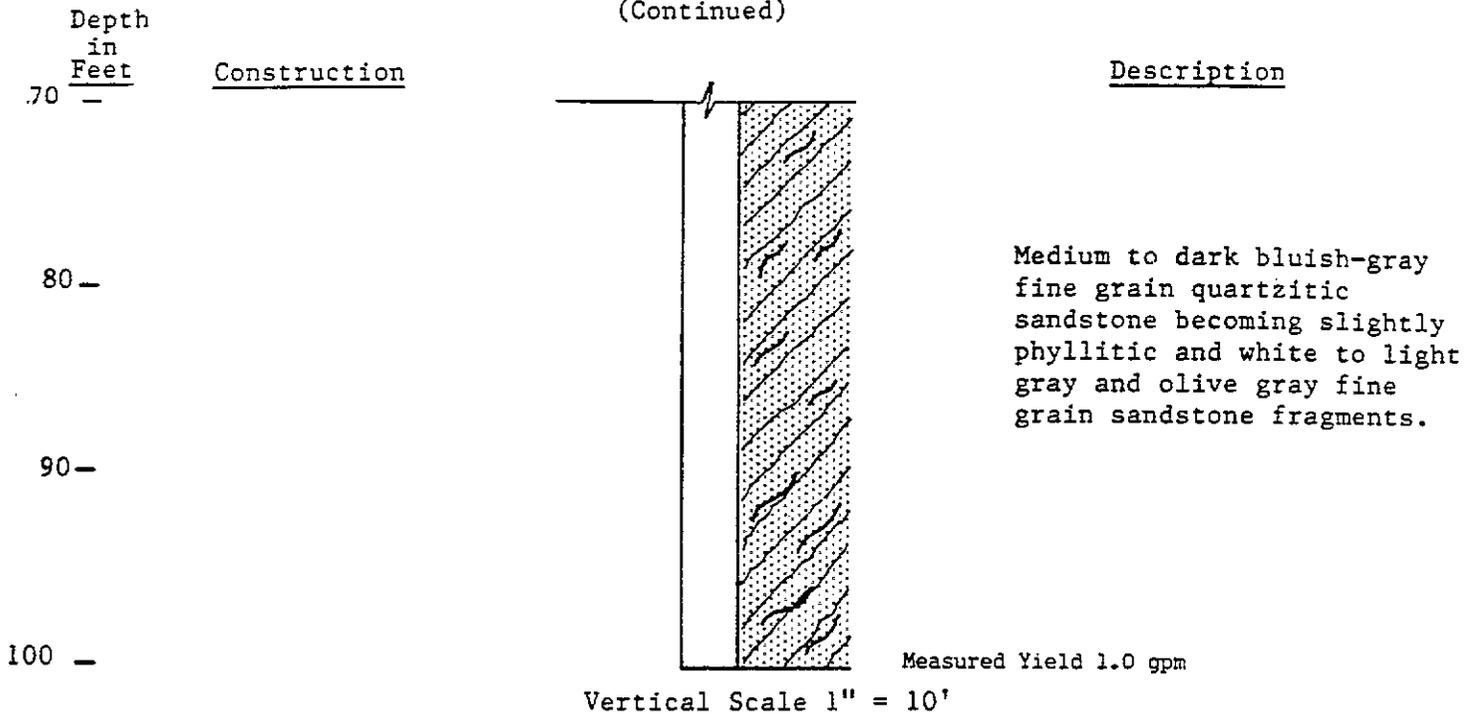
Total Depth: 74'
Depth to Competent Bedrock: 44
SWL (Date): 42.28 (5/13/87)
Screened Interval: 74-24
Hole Diameter: 10" to 50'; 6" to 74'
Monitoring Tube: 24 - +1
Elev., Ground Surface: 563.65

Well No.: MW-11
Driller: Eichelberger
Logged by: P.E. Nachlas
Drilling Began: 5/12/87
Drilling Completed: 5/12/87
Well Const. Completed: 5/13/87
Development Completed: 5/12/87
Elev., T.O.C.: 565.11 (PVC)

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-12



Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-12
 (Continued)



Total Depth: 100
 Depth to Competent Bedrock: 23
 SWL (Date): 26.25 (5/14/87)
 Screened Interval: Open Rock
 Hole Diameter: 10" to 30'; 6' to 100'
 Monitoring Tube: 6" csg @ 30'
 Elev., Ground Surface: 536.66

Well No.: MW-12
 Driller: Eichelberger
 Logged by: P.E. Nachlas
 Drilling Began: 5/13/87
 Drilling Completed: 5/13/87
 Well Const. Completed: 5/13/87
 Development Completed: 5/13/87
 Elev., T.O.C.: 536.69

Harley- Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-13

Depth
in
Feet

Construction

Description

10 -

Grout
10-inch Air Rotary
6-inch steel Casing with
Locking Cap

Orangish-brown silty soil with weathered rock fragments with intermittent zones of light brown to orangish-brown sandy soil.

20 -

Light gray to light bluish-gray and olive gray fine to medium grain quartzitic sandstone and moderately weathered quartz and sandstone fragments.
Same as above but significant increase of milky quartz fragments.

30 -

Light bluish-gray fine to medium grain quartzitic sandstone with a slightly weathered zone at 34'.

40 -

WBZ @ 43.5'

Medium bluish-gray to gray fine grain quartzitic sandstone, slightly phyllitic, and quartz and rock fragments from moderately weathered zones at 43 and 46'.

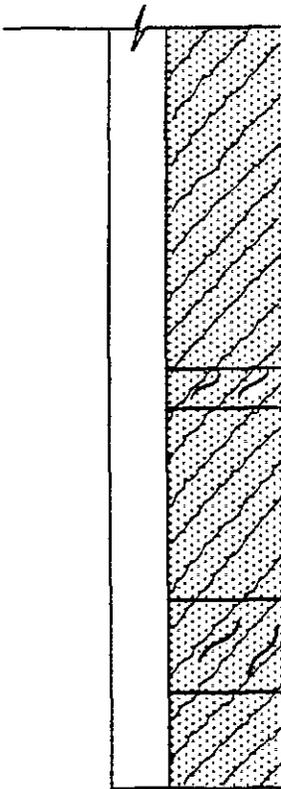
50 -

6-inch Air Rotary

Olive brown fine to medium grain quartzitic sandstone and milky white medium grain quartz fragments.

60 -

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-13
 (Continued)

Depth in Feet	Construction		Description
70-	6-inch Air Rotary		Bluish gray and olive fine to medium grain quartzitic sandstone.
80-			Olive green schisty quartzitic sandstone and quartz and weathered quartz fragments with minor euhedral pyrite.
90-			Bluish gray and olive brown fine to medium grain quartzitic sandstone with minor pyrite and quartz fragments.
100-			Dark bluish gray fine to medium grain quartzitic sandstone and quartz fragments with minor olive green quartzitic sandstone.
			Dark bluish gray and olive brown quartzitic sandstone and minor pyrite.
			Measured Yield 1.0 gpm

Vertical Scale 1" = 10'

Total Depth: 100'
 Depth to Competent Bedrock: 15.5'
 SWL (Date): 20.61 (5/14/87)
 Screened Interval: Open Rock
 Hole Diameter: 10" to 20'; 6" to 100'
 Monitoring Tube: 6" csg @ 20'
 Elev., Ground Surface: 517.56

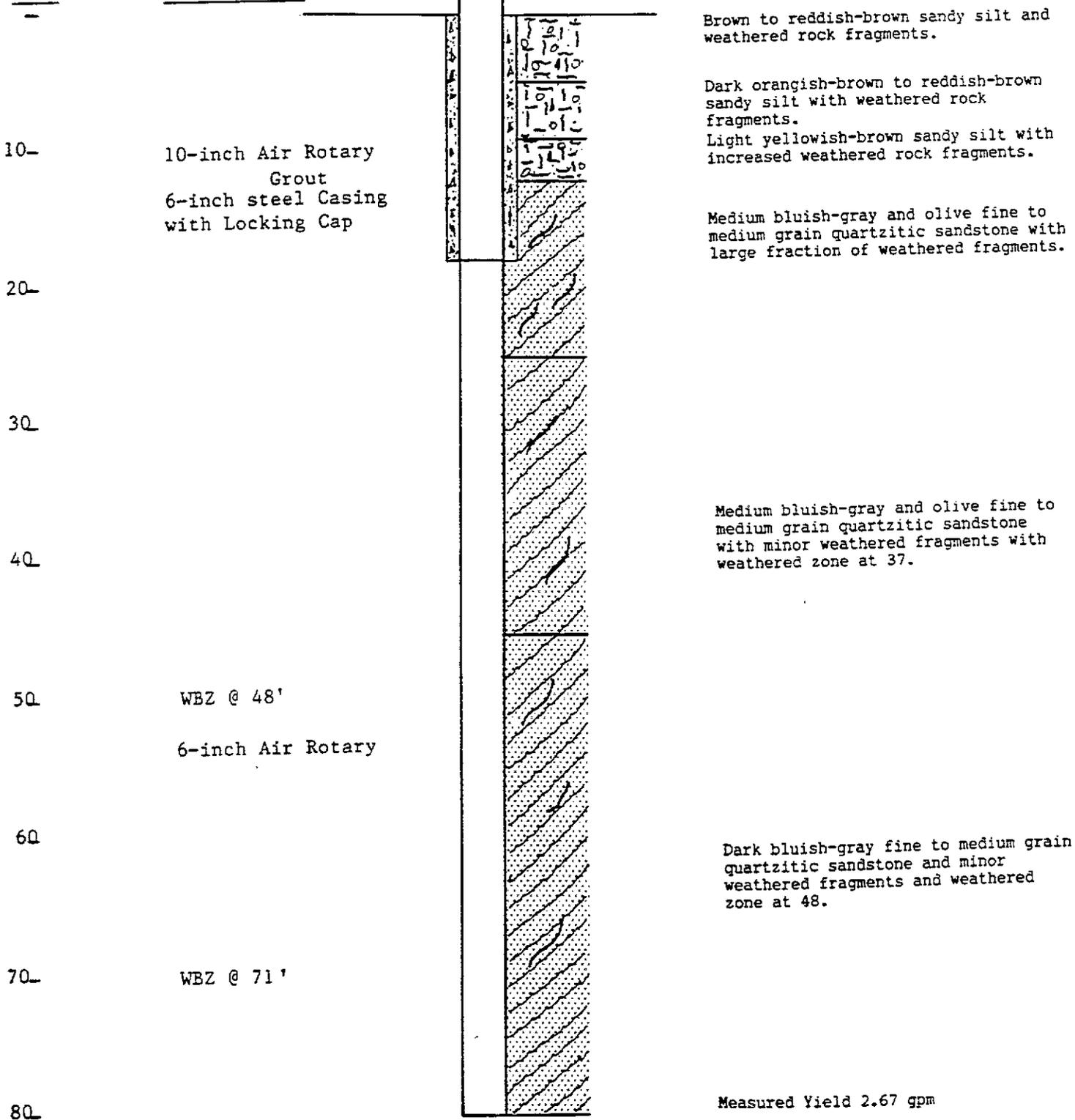
Well No.: MW-13
 Driller: Eichelberger
 Logged by: P.E. Nachlas
 Drilling Began: 5/13/87
 Drilling Completed: 5/13/87
 Well Const. Completed: 5/13/87
 Development Completed: 5/13/87
 Elev., T.O.C.: 519.23

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-14

Depth
in
Feet

Construction

Description



Measured Yield 2.67 gpm

Vertical Scale 1" = 10'

r.e. wright associates, inc.

Harley - Davidson York, Inc.
Geologic and Well Construction Log

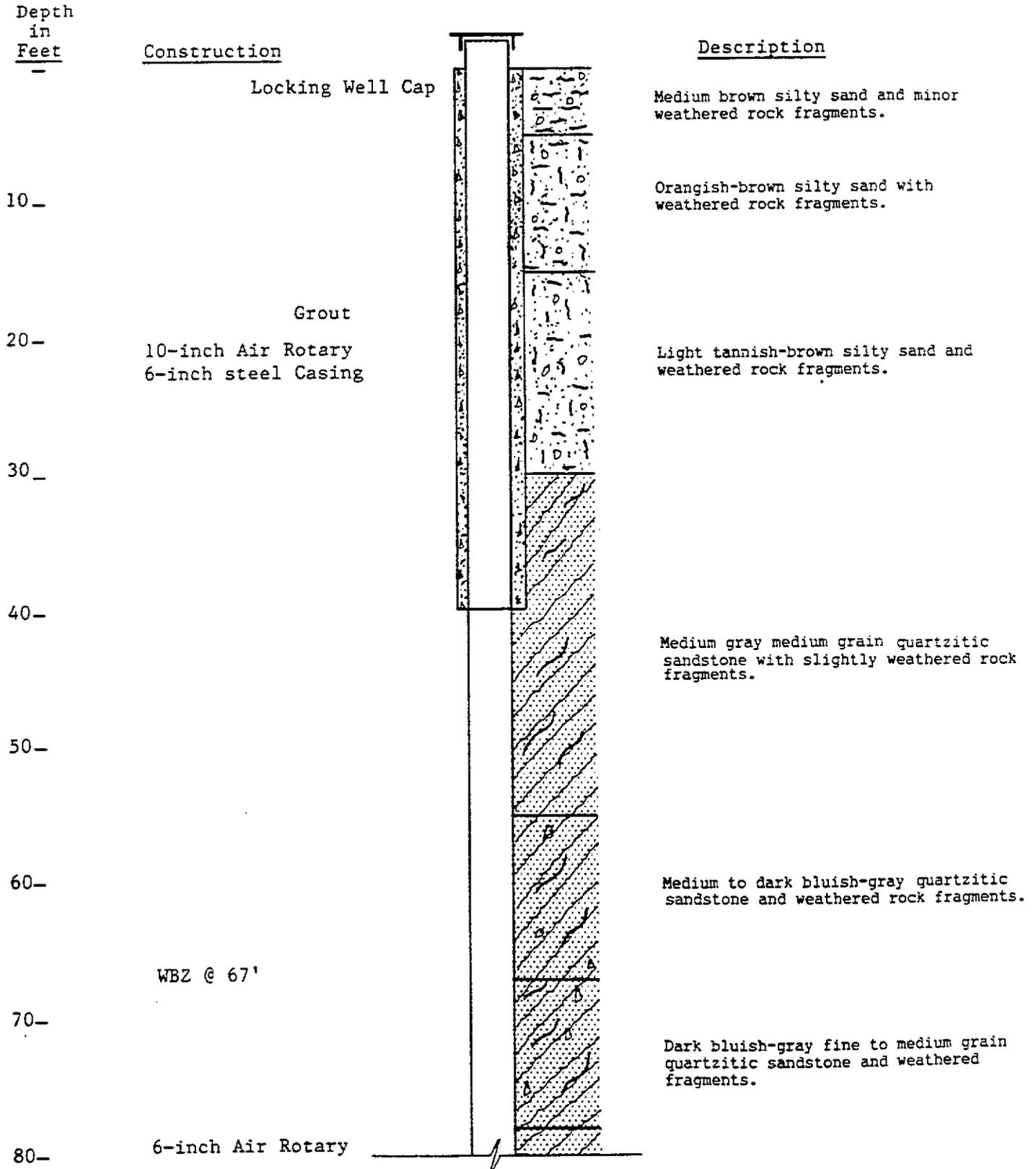
Well No. MW-14

(Continued)

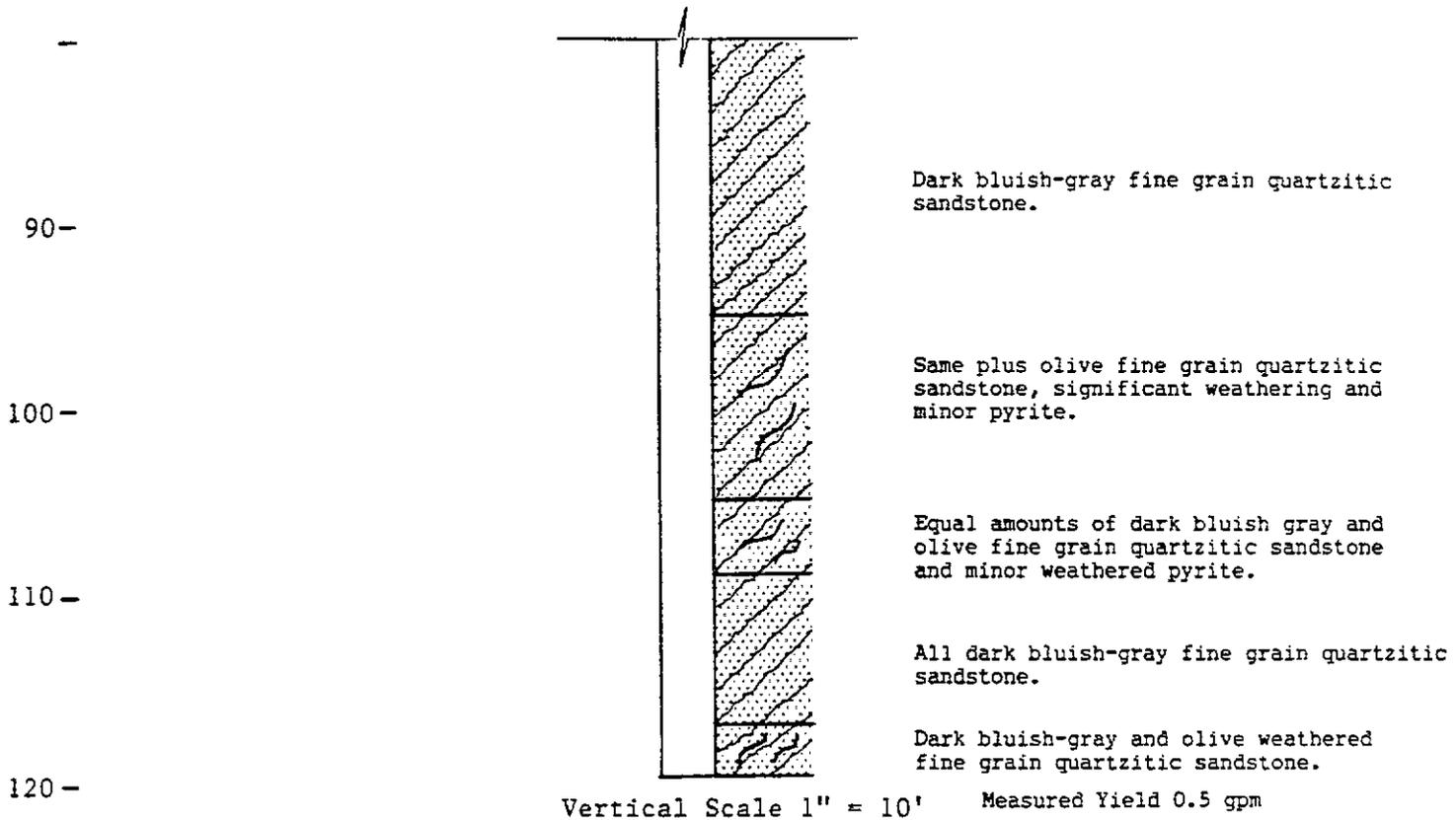
Total Depth: 80'
Depth to Competent Bedrock: 12'
SWL (Date): 27.43 (5/15/87)
Screened Interval: Open Rock
Hole Diameter: 10" to 18'; 6" to 80'
Monitoring Tube: 6" to 18'
Elev., Ground Surface: 520.38

Well No.: MW-14
Driller: Eichelberger
Logged by: P.E. Nachlas
Drilling Began: 5/14/87
Drilling Completed: 5/14/87
Well Const. Completed: 5/14/87
Development Completed: 5/14/87
Elev., T.O.C.: 520.39

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-15



Harley - Davidson York, Inc.
Geologic and Well Construction Log
Well No. MW-15
(Continued)



Total Depth: 120'
Depth to Competent Bedrock: 35'
SWL (Date): 61.50 (5/15/87)
Screened Interval: Open Rock
Hole Diameter: 10" to 40'; 6" to 120'
Monitoring Tube: 6" to 40'
Elev., Ground Surface: 522.26

Well No.: MW-15
Driller: Eichelberger
Logged by: P.E. Nachlas
Drilling Began: 5/14/87
Drilling Completed: 5/14/87
Well Const. Completed: 5/14/87
Development Completed: 5/14/87
Elev., T.O.C.: 524.90

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV.

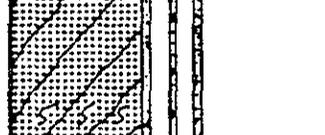
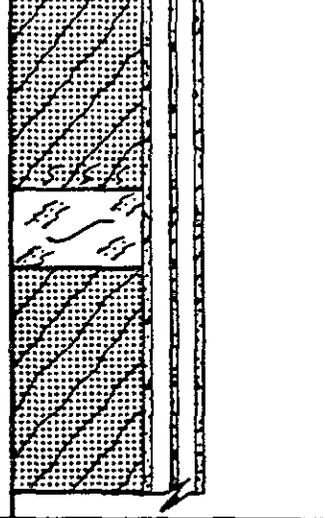
T.O.C. ELEV. 517.50

PROJECT NAME:

PROJECT NO. 86030

LOCATION

PAGE 1 OF 3

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, And-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
0	Ground Surface	+7.34	
10	Orangish-brown silt with rock fragments. Light orangish-brown silty sand. Dry and granular with rock fragments.		+2.5-23': 6 1/4-inch well casing
20	Light yellowish-gray silty sand and rock fragments. Light orangish-brown silty sand and rock fragments. Highly weathered bluish-gray crystalline quartzitic sandstone.		0-23': 10-inch air-rotary drilling
30	Decreased weathering of quartzitic sandstone, cuttings are larger in size and with less weathered surfaces.		0-98': Volclay grout
40	Very slight weathering of bluish-gray quartzitic sandstone with weathered zones at 32', 42', and 53'.		23-201': 6-inch air-rotary drilling
50	Drilling break through milky quartz fragments.		+2-103': 2-inch Sch. 40 PVC pipe
60	Bluish-gray interbedded phyllite and quartzitic sandstone.		+2-193': 2-inch Sch. 40 PVC pipe
70			

DRILLER: Eichelbergers, Inc.	WELL CONSTRUCTION Multilevel Piezometer	NOTES: MW-16D is a flowing well which is capped to prevent discharge.
LOGGED BY: P. E. Nachlas	DRILLING METHOD Air Rotary	
DRILLING STARTED: 3/17/88	STATIC WATER LEVEL (S) 14.80'	
DRILLING COMPLETED: 3/18/88	WATER BEARING ZONES (D) 7.34' above casing	

GEOLOGIC DRILLING LOG

BORING NO. MW-16 (S.D.)

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV.

T.O.C. ELEV. 517.50

PROJECT NAME: PROJECT NO. 86030

LOCATION

PAGE 2 OF 3

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, and-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
70			
	Bluish-gray interbedded phyllite and quartzitic sandstone.		
	Greenish-gray phyllite.		
80	Light bluish-gray quartzitic sandstone, quartz and weathered rock fragments.		
	Bluish-gray phyllite, drilling break at 86'.		
90	Darkened to medium bluish-gray phyllite, quartz fragments at 93'.		
	Dark gray quartzitic sandstone.		98-110': Morie sand
100	Light gray quartzitic sandstone, drilling break at 104-105'.		103-108': 2-inch Sch. 40 wire-wrapped PVC well screen
110	Dark gray quartzitic sandstone.		110-135': Bentonite pellets
	Cuttings lighter and reduced to coarse sand size.		
	Dark gray quartzitic sandstone and interbedded phyllite.		
120	Dark gray quartzitic sandstone and interbedded phyllite.		
	Dark gray quartzitic sandstone and interbedded phyllite.		
130	Dark gray quartzitic sandstone and interbedded phyllite.		
	Dark gray quartzitic sandstone and interbedded phyllite.		
140	Medium gray to bluish-gray phyllite.		135-150': Morie sand
	Medium gray to bluish-gray phyllite.		
150			

GEOLOGIC DRILLING LOG

CLIENT: Harley-Davidson, Inc.

PROJECT NAME:

PROJECT NO. 86030

SURFACE ELEV.

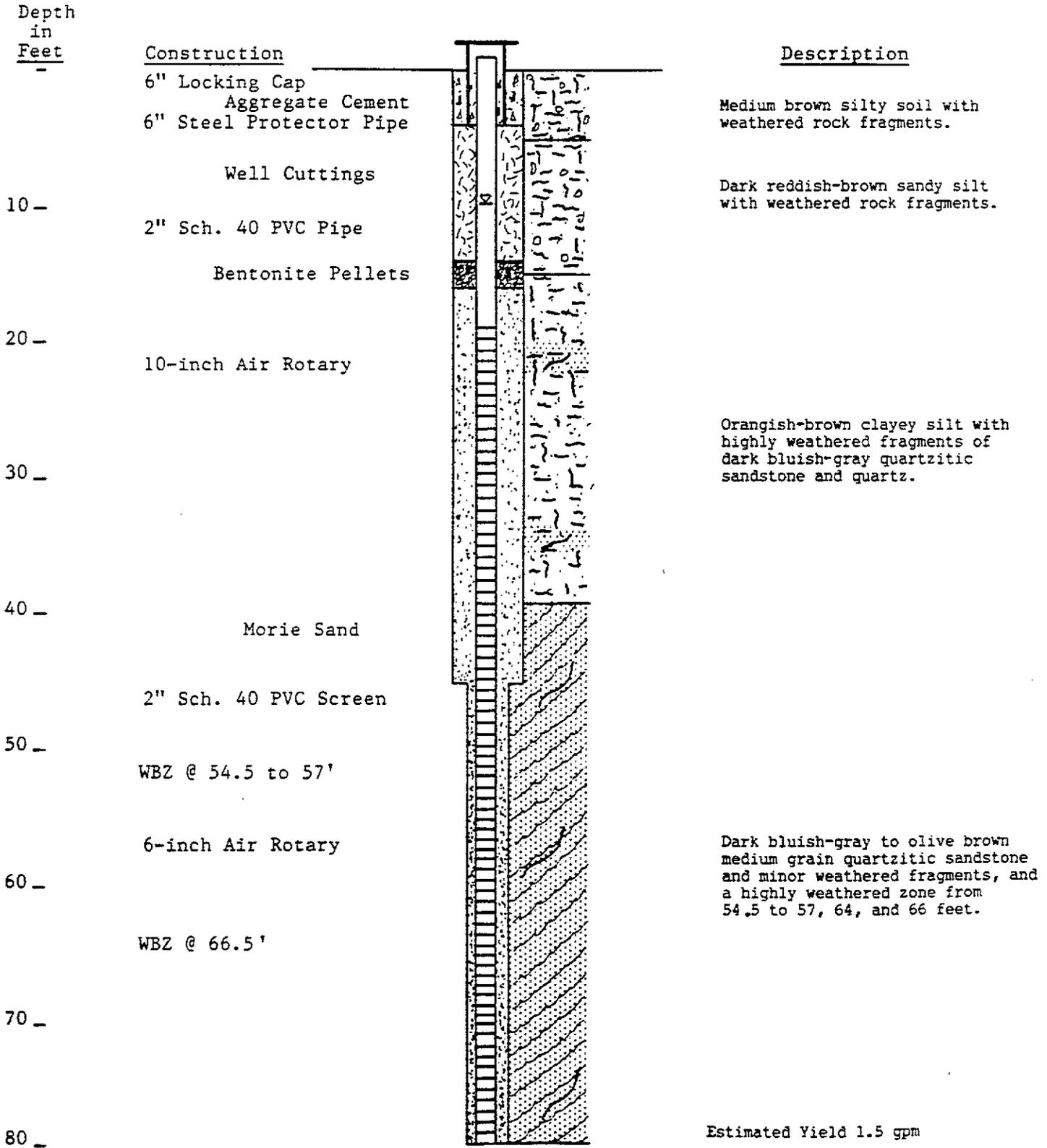
LOCATION

T.O.C. ELEV. 517.50

PAGE 3 OF 3

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, and-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
150	Medium gray to bluish-gray phyllite.		
160	Dark gray quartzitic sandstone and interbedded phyllite, reduced size of cuttings, drilling break at 156'.		150-190': Bentonite pellets
170	Increased size of cuttings of above lithology, drilling break at 171'.		
180	Same lithology, reduced cutting size.		
190	Same lithology with large fraction of quartz fragments, minor greenish-gray phyllite, drilling break at 196'.		190-201': Morie sand
200			193-198': 2-inch Sch. 40 wire-wrapped PVC well screen
210			

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-17



Estimated Yield 1.5 gpm

Vertical Scale 1" = 10'

r.e. wright associates, inc.

Harley - Davidson York, Inc.
Geologic and Well Construction Log

Well No. MW-17

(Continued)

Total Depth: 79 '
Depth to Competent Bedrock: 39 '
SWL (Date): 9.86 (5/20/87)
Screened Interval: 79-19
Hole Diameter: 10" to 45'; 6" to 79'
Monitoring Tube: 19 - +1
Elev., Ground Surface: 456.70

Well No.: MW-17
Driller: Eichelberger
Logged by: P.E. Nachlas
Drilling Began: 5/18/87
Drilling Completed: 5/19/87
Well Const. Completed: 5/19/87
Development Completed: 5/19/87
Elev., T.O.C.: 458.03 (PVC)

GEOLOGIC DRILLING LOG

BORING NO. MW-18 (S.D)

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV.

T.O.C. ELEV. 465.37

PROJECT NAME:

PROJECT NO. 86030

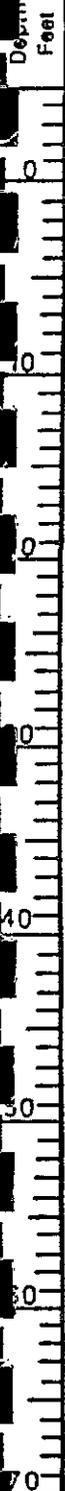
LOCATION

PAGE 1 OF 3

LITHOLOGIC DESCRIPTION
(Trace-0 to 10%, Little-10 to 20%,
Some-20 to 35%, And-35 to 50%)

GRAPHIC LOG

**WELL CONSTRUCTION
DETAILS**



Ground Surface

Orangish-brown silty clay with rock fragments, weathered.

Light brown silt with minor rock fragments.

Medium brown silt with minor rock fragments.

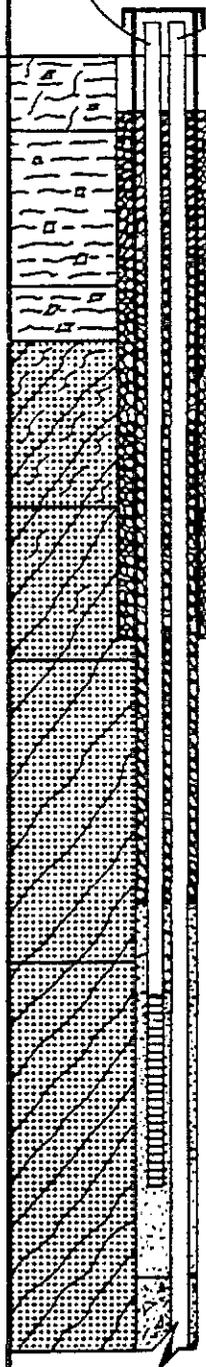
Highly weathered, medium bluish-gray quartzitic sandstone and highly weathered quartz fragments.

Only slightly weathered medium bluish-gray quartzitic sandstone.

Unweathered medium bluish-gray quartzitic sandstone.

Olive-gray to medium gray quartzitic sandstone with slaty texture, harder to coarse sand size reduced cuttings.

+3.67 ∇ ∇ +7.09



+3-31': 6.25-inch well casing

0-31': 10-inch air-rotary drilling

3-45': Bentonite pellets

+2-50': 2-inch Sch. 40 PVC pipe

31-161': 6-inch air-rotary drilling

45-65': Morie sand

50-60': 2-inch Sch. 40 wire-wrapped PVC well screen

65-125': Volclay grout

DRILLER: Eichelbergers, Inc.

WELL CONSTRUCTION Multilevel Piezometer
DRILLING METHOD Air Rotary

NOTES: Both piezometers are flowing wells and were capped to prevent discharge.

LOGGED BY: P. E. Nachlas

STATIC WATER LEVEL (S) 3.67' above casing

DRILLING STARTED: 3/18/88

WATER BEARING ZONES (D) 7.09' above casing

DRILLING COMPLETED: 3/25/88

GEOLOGIC DRILLING LOG

BORING NO. MW-18 (S.D)

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV.

T.O.C. ELEV. 465.37

PROJECT NAME: PROJECT NO. 86030

LOCATION

PAGE 2 OF 3

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, and-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
70	As above, but with quartz and slightly more (greater fraction) of olive-gray larger cutting size.		
80	Light olive-gray and bluish-gray with minor quartz fragments and reduced cutting size.		+2-133': 2-inch Sch. 40 PVC pipe
90	Light olive-gray and bluish-gray, but with larger cuttings, again with slaty texture.		
	Reduced olive-gray to mostly bluish-gray larger cuttings with slaty texture.		
100	Olive-gray and bluish-gray quartzitic sandstone again, and cuttings reduced to coarse sand size.		
110	Coarse sand size cuttings of olive-gray quartzitics only, blue is absent.		
120			
130	Same olive-gray, cuttings are enlarged.		
140			
150	Olive-gray and medium blue quartzitic sandstone again, coarse sand size cuttings.		
		133-138': 2-inch Sch. 40 wire-wrapped PVC well screen	
		140-161': Bentonite pellets	

GEOLOGIC DRILLING LOG

BORING NO. MW-18 (S.D)

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV.

T.O.C. ELEV. 465'37

PROJECT NAME:

PROJECT NO. 86030

LOCATION

PAGE 3 OF 3

Depth
Feet

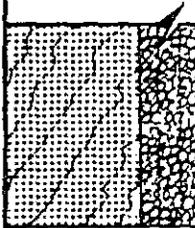
LITHOLOGIC DESCRIPTION
(Trace-0 to 10%, Little-10 to 20%,
Some-20 to 35%, and-35 to 50%)

GRAPHIC LOG

**WELL CONSTRUCTION
DETAILS**

150

Olive-gray and medium blue quartzitic sandstone again, coarse sand size cuttings.



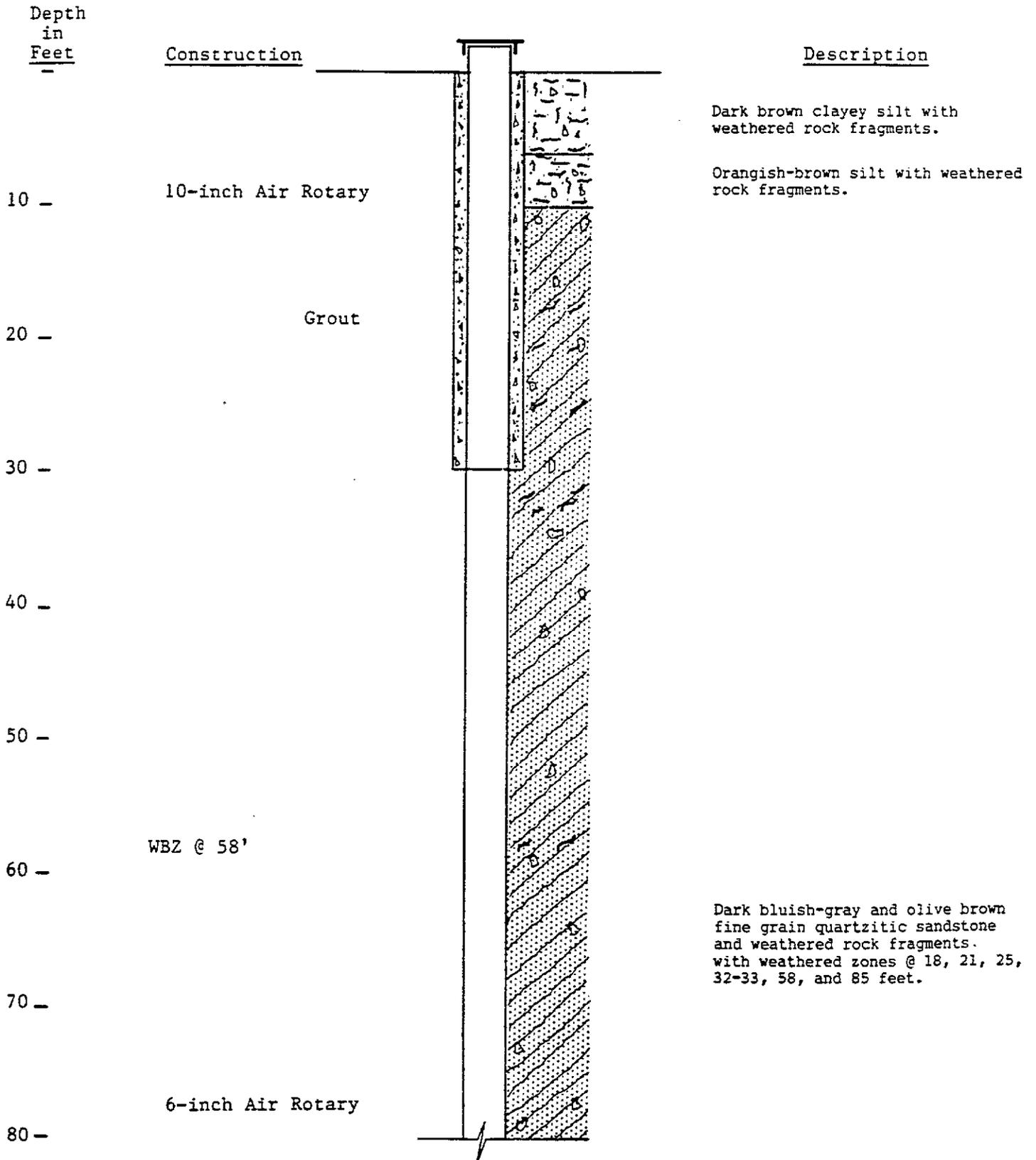
140-161': Bentonite pellets

160

170

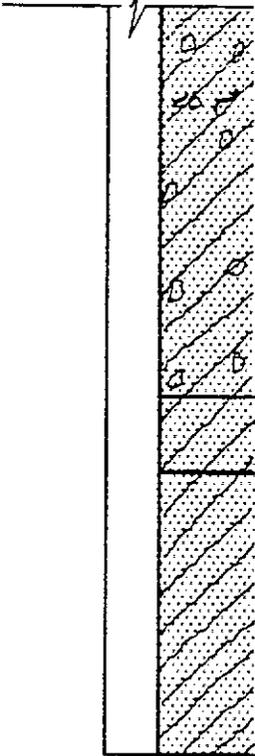
180

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-19



Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-19

(Continued)

Depth in Feet	Construction		Description
90-			
100-			Dark bluish-gray fine grain quartzitic sandstone.
110-	WBZ @ 111'		Dark bluish-gray and olive brown fine grain quartzitic sandstone.
120-			Measured Yield 1.0 gpm

Vertical Scale 1" = 10'

Total Depth: 120'
 Depth to Competent Bedrock: 10'
 SWL (Date): 21.29 (5/21/87)
 Screened Interval: Open Rock
 Hole Diameter: 10" to 15'; 6" to 120'
 Monitoring Tube: 6" to 15'
 Elev., Ground Surface: 426.48

Well No.: MW-19
 Driller: Eichelberger
 Logged by: P.E. Nachlas
 Drilling Began: 5/19/87
 Drilling Completed: 5/20/87
 Well Const. Completed: 5/20/87
 Development Completed: 5/20/87
 Elev. T.O.C.: 428.20

GEOLOGIC DRILLING LOG

BORING NO. MW-20 (S)

CLIENT: Harley-Davidson, Inc.

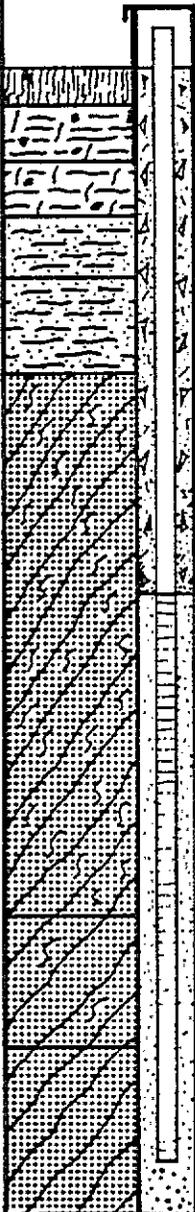
SURFACE ELEV. LOCATION

T.O.C. ELEV. 575.34

PROJECT NAME:

PROJECT NO. 86030

PAGE 1 OF 1

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, And-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
0	Ground Surface		
0-61'	Dark brown to black sandy topsoil Orangish-red silt-clay with minor rock fragments		0-61': 6-inch Air Rotary Drilling
+3-5'	Light orangish-brown silty-clay with red clay chunks		+3-5': 6-inch Steel Protector Pipe
10	Light yellowish-brown sandy-silt Medium Yellowish-brown sandy-silt		+2-28': 2-inch Sch 40 PVC Pipe
0	Highly weathered medium bluish-gray quartzitic sandstone-slight darkening at 39'		0-28': Volclay Grout
0			28-58': 2-inch Sch 40 Wire Wrapped PVC Screen
40	As above, but less severely		28-61': Morrie Sand
50	Almost exclusively medium bluish-gray weathered severely again-saprolitic		
0	Light gray quartzitic sandstone, unweathered		
70			

DRILLER: Eichelbergers, Inc.

WELL CONSTRUCTION Well Screen

NOTES:

LOGGED BY: P. E. Nachlas

DRILLING METHOD Air Rotary

DRILLING STARTED: 3/21/88

STATIC WATER LEVEL 39.04

DRILLING COMPLETED: 3/21/88

WATER BEARING ZONES

GEOLOGIC DRILLING LOG

BORING NO. MW-20 (M, D)

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV.

T.O.C. ELEV. 575.21

PROJECT NAME:

PROJECT NO. 86030

LOCATION

PAGE 1 OF 3

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, And-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS	
0	<i>Ground Surface</i>			
0-10	Dark brown to black sandy topsoil Orangish-red silt-clay with minor rock fragments Light orangish-brown silty-clay with red clay chunks		+2-50': 10-inch Air Rotary Drilling +2-50': 6-inch Well Casing	
10-20	Light yellowish-brown sandy-silt Medium Yellowish-brown sandy-silt		+1.5-163': 2-inch Sch 40 PVC Pipe +1.5-83': 2-inch Sch 40 PVC Pipe	
20-30	Highly weathered medium bluish-gray quartzitic sandstone-slight darkening at 39'			
30-40			35-65': Volclay Grout 35-72': Bentonite Pellets	
40-50	As above, but less severely			
50-60	Almost exclusively medium bluish-gray weathered severely again-saprolitic			50-165': 6-inch Air Rotary Drilling
60-70	Light gray quartzitic sandstone, unweathered			

DRILLER: Eichelbergers, Inc. LOGGED BY: P. E. Nachlas DRILLING STARTED: 3/21/88 DRILLING COMPLETED: 3/21/88	WELL CONSTRUCTION Multi-Level Piezometer DRILLING METHOD Air Rotary STATIC WATER LEVEL (M) 39.05 WATER BEARING ZONES (D) 28.02	NOTES:
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GEOLOGIC DRILLING LOG

BORING NO. MW-20 (M, D)

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV.

T.O.C. ELEV. 575.21

PROJECT NAME:

PROJECT NO. 86030

LOCATION

PAGE 2 OF 3

Depth Feet	LITHOLOGIC DESCRIPTION (Trace-0 to 10%, Little-10 to 20%, Some-20 to 35%, and-35 to 50%)	GRAPHIC LOG	WELL CONSTRUCTION DETAILS
<div style="text-align: center;">70</div> <div style="text-align: center;">80</div> <div style="text-align: center;">90</div> <div style="text-align: center;">100</div> <div style="text-align: center;">110</div> <div style="text-align: center;">120</div> <div style="text-align: center;">130</div> <div style="text-align: center;">140</div> <div style="text-align: center;">150</div>	<p>Weathered zone in above rock</p> <p>Weathered zone in above rock</p> <p>Darker, medium gray and bluish-gray Larger cuttings</p> <p>Highly weathered zone followed by changed back to medium bluish-gray. Weather quartz present</p> <p>Almost exclusively medium bluish-gray quartzitic sandstone</p> <p>Mixed medium bluish-gray and light gray No weathering</p> <p>Increased weathering in same as above, but with decrease in frequency of bluish-gray</p>		<p>72-75': Morrie Sand</p> <p>78-83': 2-inch Sch 40 Wire Wrapped PVC Screen</p> <p>85-150': Bentonite Slurry</p>

GEOLOGIC DRILLING LOG

BORING NO. MW-20 (M, D)

CLIENT: Harley-Davidson, Inc.

SURFACE ELEV.

T.O.C. ELEV. 575.21

PROJECT NAME:

PROJECT NO. 86030

LOCATION

PAGE 3 **OF** 3

Depth
Feet

LITHOLOGIC DESCRIPTION
(Trace-0 to 10%, Lills-10 to 20%,
Some-20 to 35%, and-35 to 50%)

GRAPHIC LOG

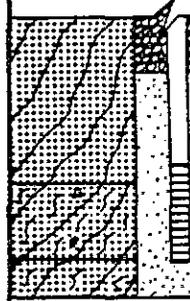
**WELL CONSTRUCTION
DETAILS**

150

160

170

180

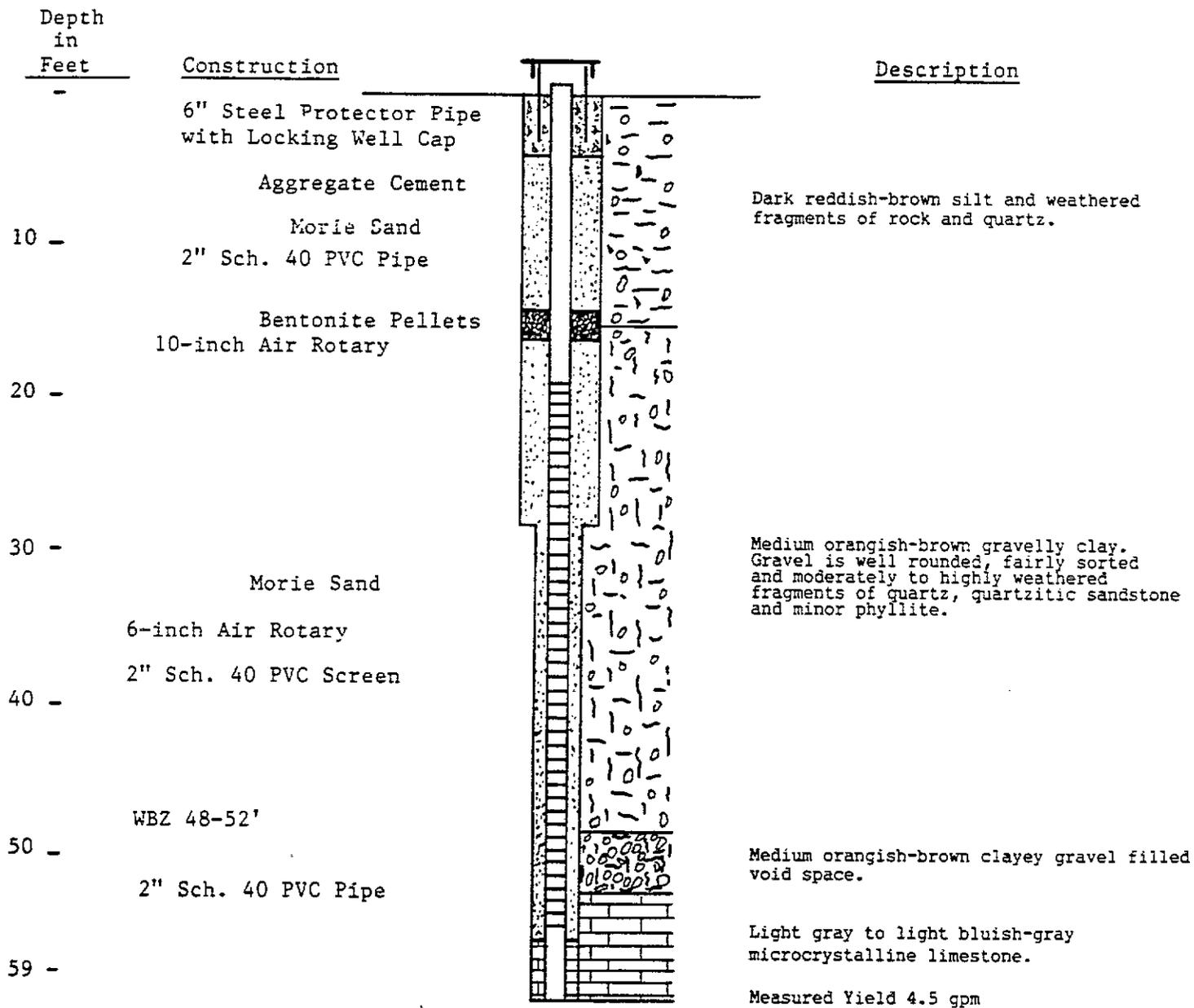


150-153': Bentonite
Pellets

153-165': Morrie Sand

158-163': 2-inch Sch
40 Wire Wrapped
PVC Screen

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-21



Vertical Scale 1" = 10'

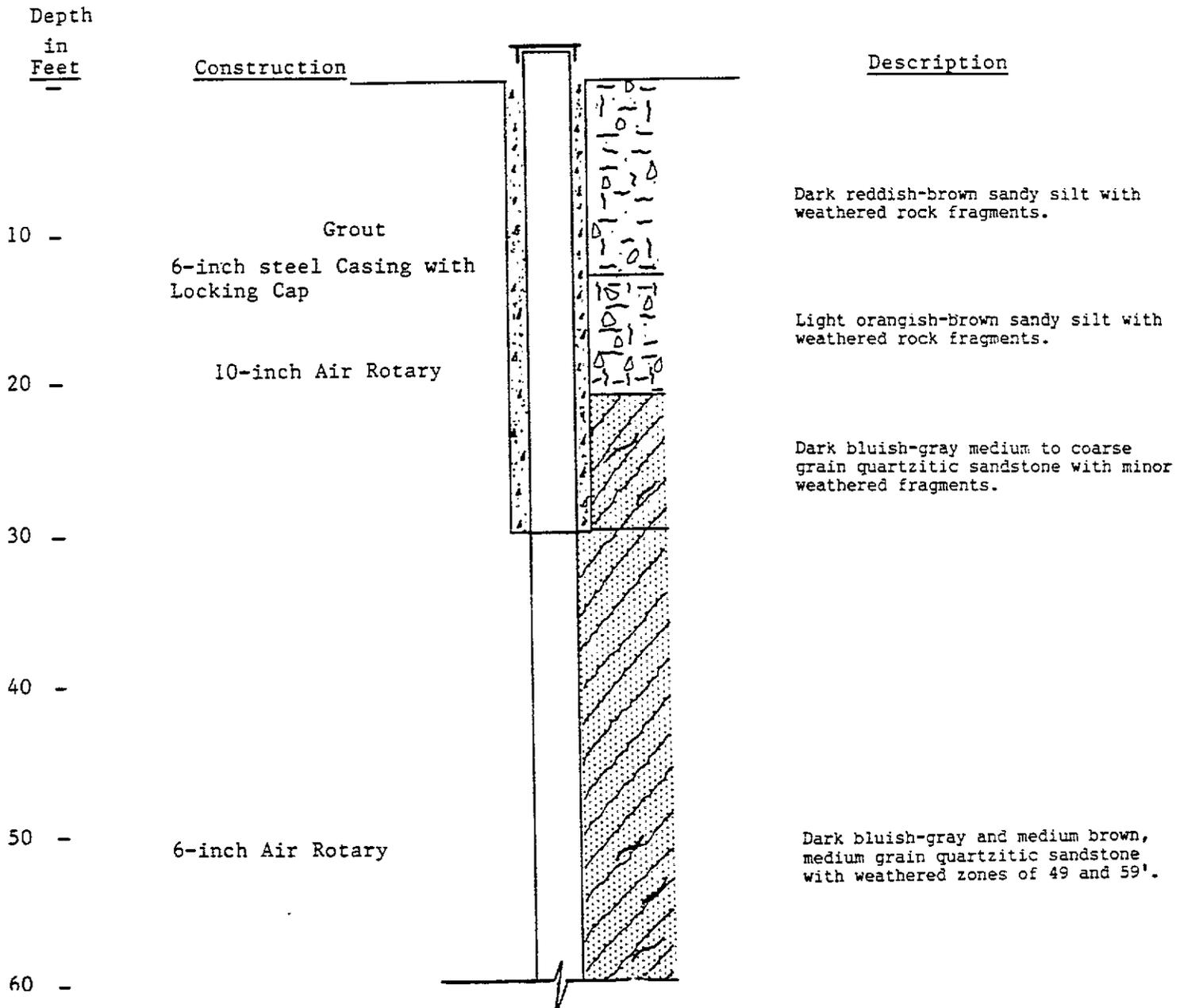
Measured Yield 4.5 gpm

Harley - Davidson York, Inc.
Geologic and Well Construction Log
Well No. MW-21
(Continued)

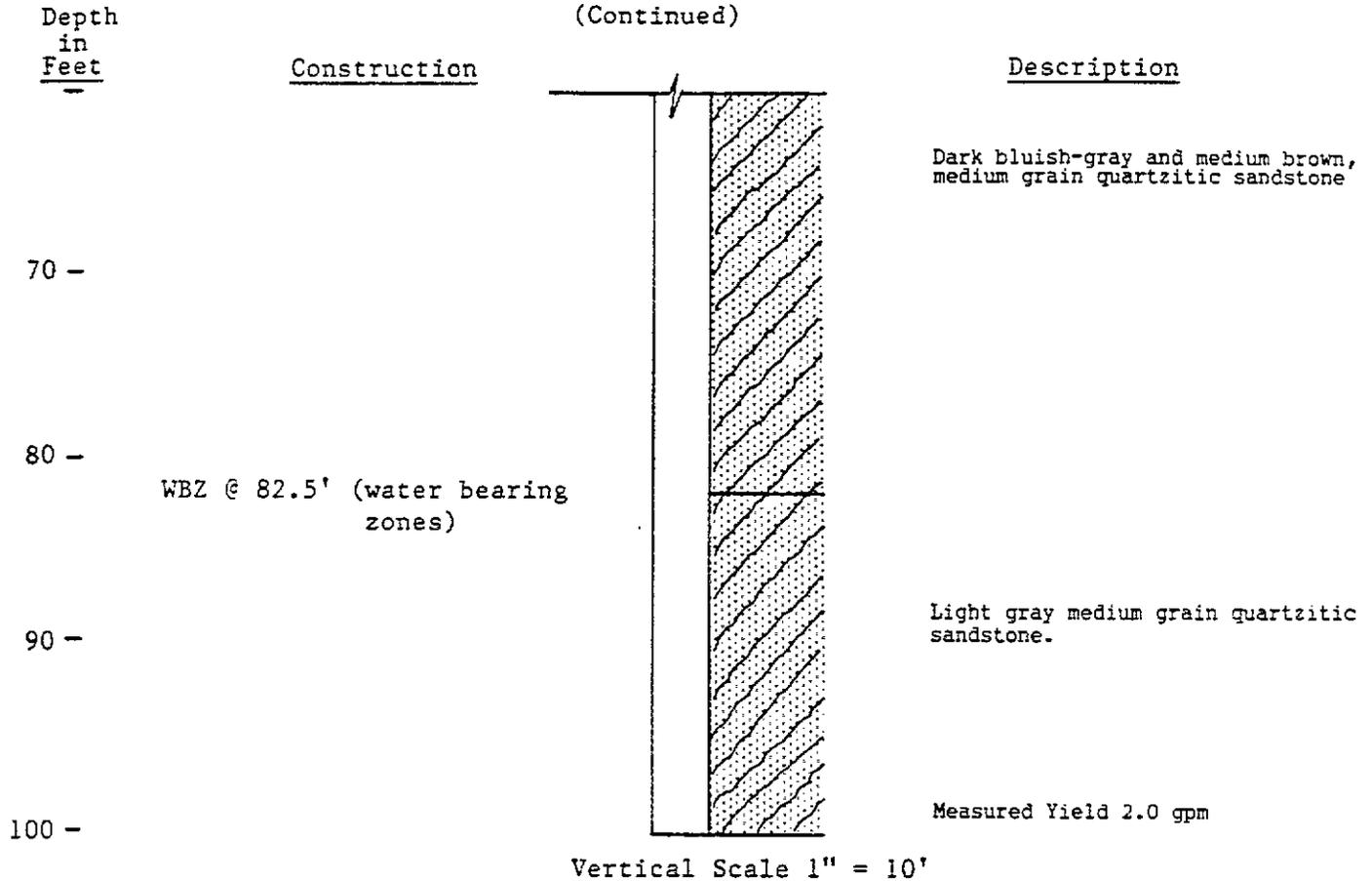
Total Depth: 59'
Depth to Competent Bedrock: 52'
SWL (Date): 26.43 (5/20/87)
Screened Interval: 54 to 19'
Hole Diameter: 10" to 28; 8" to 54
Monitoring Tube: 19 - +1
Elev., Ground Surface: 435.77

Well No.: MW-21
Driller: Eichelberger
Logged by: P.E. Nachlas
Drilling Began: 5/15/87
Drilling Completed: 5/18/87
Well Const. Completed: 5/18/87
Development Completed: 5/18/87
Elev., T.O.C.: 426.76 (PVC)

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-22



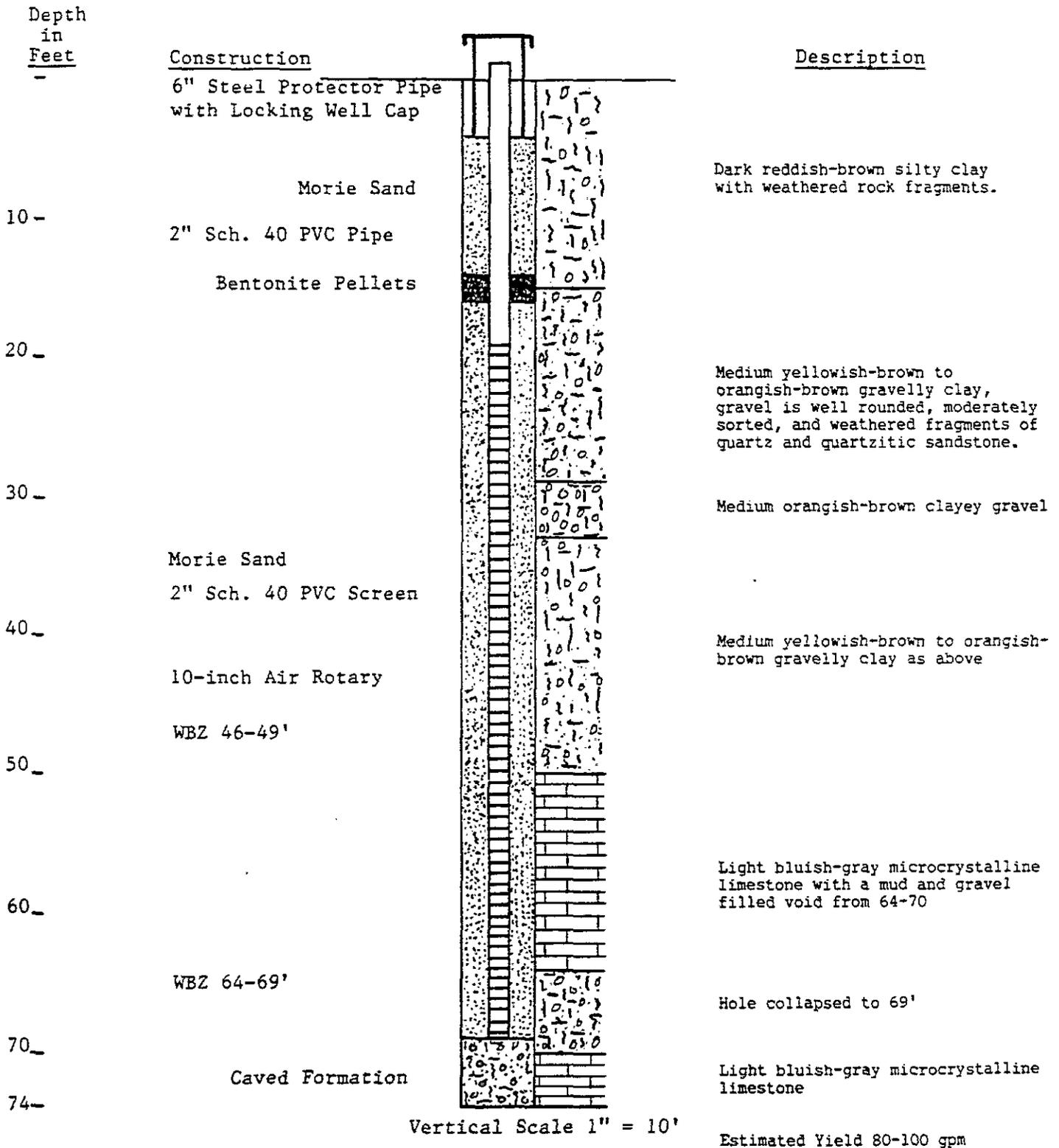
Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-22
 (Continued)



Total Depth: 100'
 Depth to Competent Bedrock: 21'
 SWL (Date): 55.74 (5/18/87)
 Screened Interval: Open Rock
 Hole Diameter: 10" to 30; 6" to 100'
 Monitoring Tube: 6" csg to 30'
 Elev., Ground Surface: 463.94

Well No.: MW-22
 Driller: Eichelberger
 Logged by: P.E. Nachlas
 Drilling Began: 5/14/87
 Drilling Completed: 5/15/87
 Well Const. Completed: 5/15/87
 Development Completed: 5/15/87
 Elev., T.O.C.: 448.57

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-23



Vertical Scale 1" = 10'

Estimated Yield 80-100 gpm

Harley - Davidson York, Inc.
Geologic and Well Construction Log

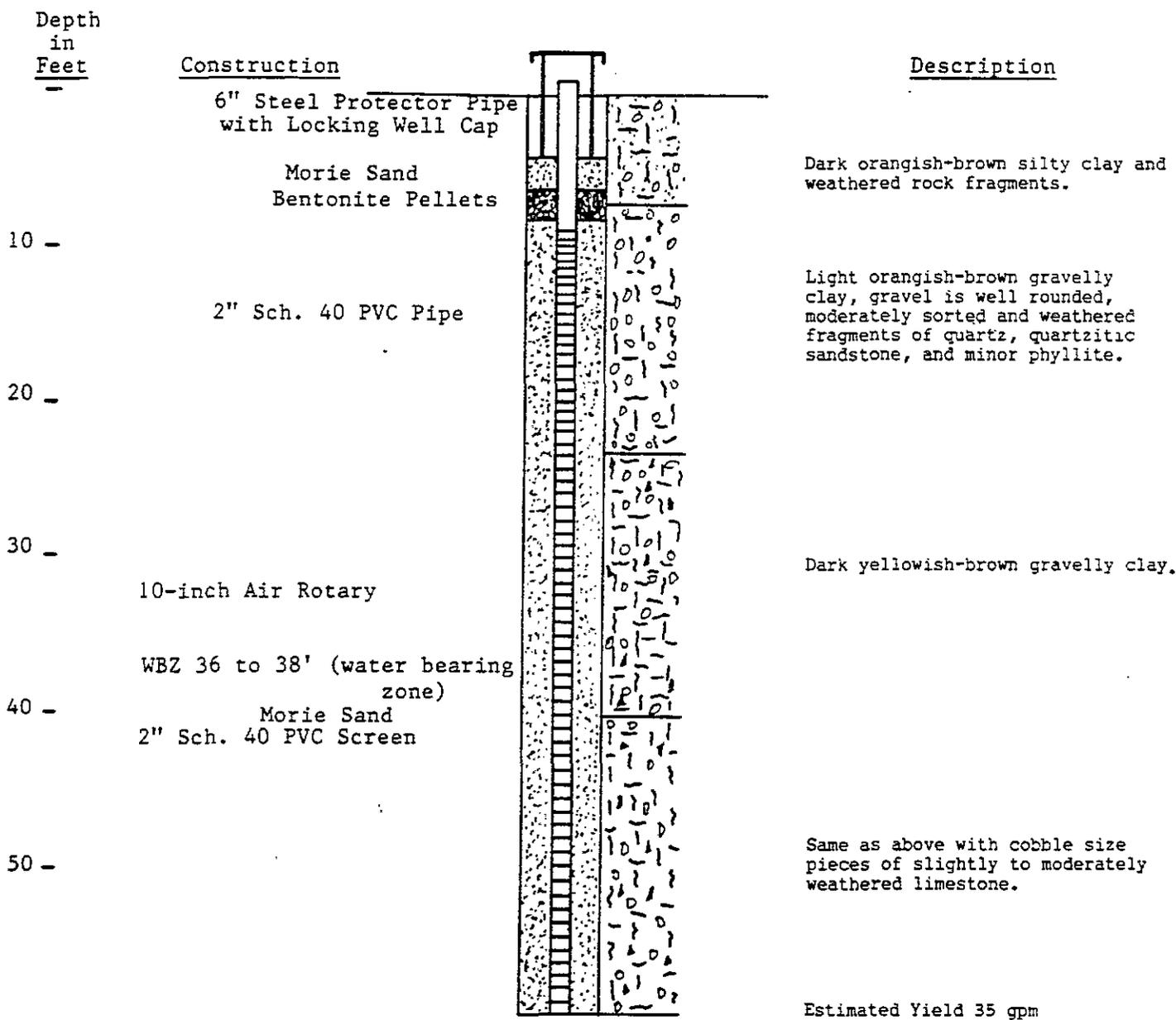
Well No. MW-23

(Continued)

Total Depth: 74'
Depth to Competent Bedrock: 50'
SWL (Date): 29.36 (5/28/87)
Screened Interval: 69-19
Hole Diameter: 10" to 74'
Monitoring Tube: 19 - +1
Elev., Ground Surface: 373.17

Well No.: MW-23
Driller: Eichelberger
Logged by: P.E. Nachlas
Drilling Began: 5/26/87
Drilling Completed: 5/27/87
Well Const. Completed: 5/27/87
Development Completed: 5/27/87
Elev., T.O.C.: 374.07 (PVC)

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-24



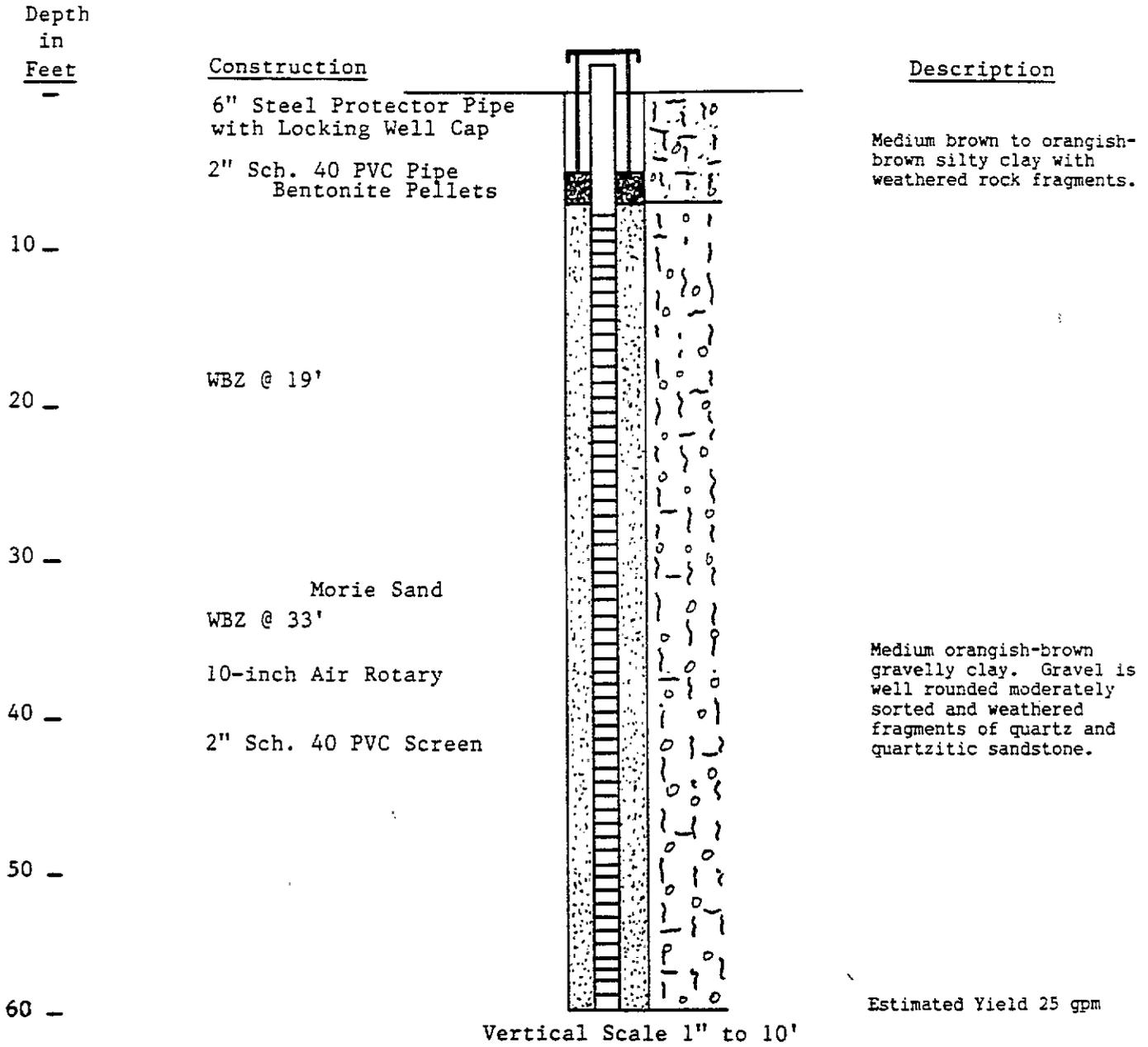
Estimated Yield 35 gpm

Vertical Scale 1" to 10'

Total Depth: 59'
 Depth to Competent Bedrock: 58'
 SWL (Date): 28.13 (5/28/87)
 Screened Interval: 59-9
 Hole Diameter: 10" to 59
 Monitoring Tube: 9-G.S.
 Elev., Ground Surface: 374.95

Well No.: MW-24
 Driller: Eichelberger
 Logged by: P. E. Nachlas
 Drilling Began: 5/26/87
 Drilling Completed: 5/26/87
 Well Const. Completed: 5/26/87
 Development Completed: 5/26/87
 Elev., T.O.C.: 375.21 (PVC)

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-25

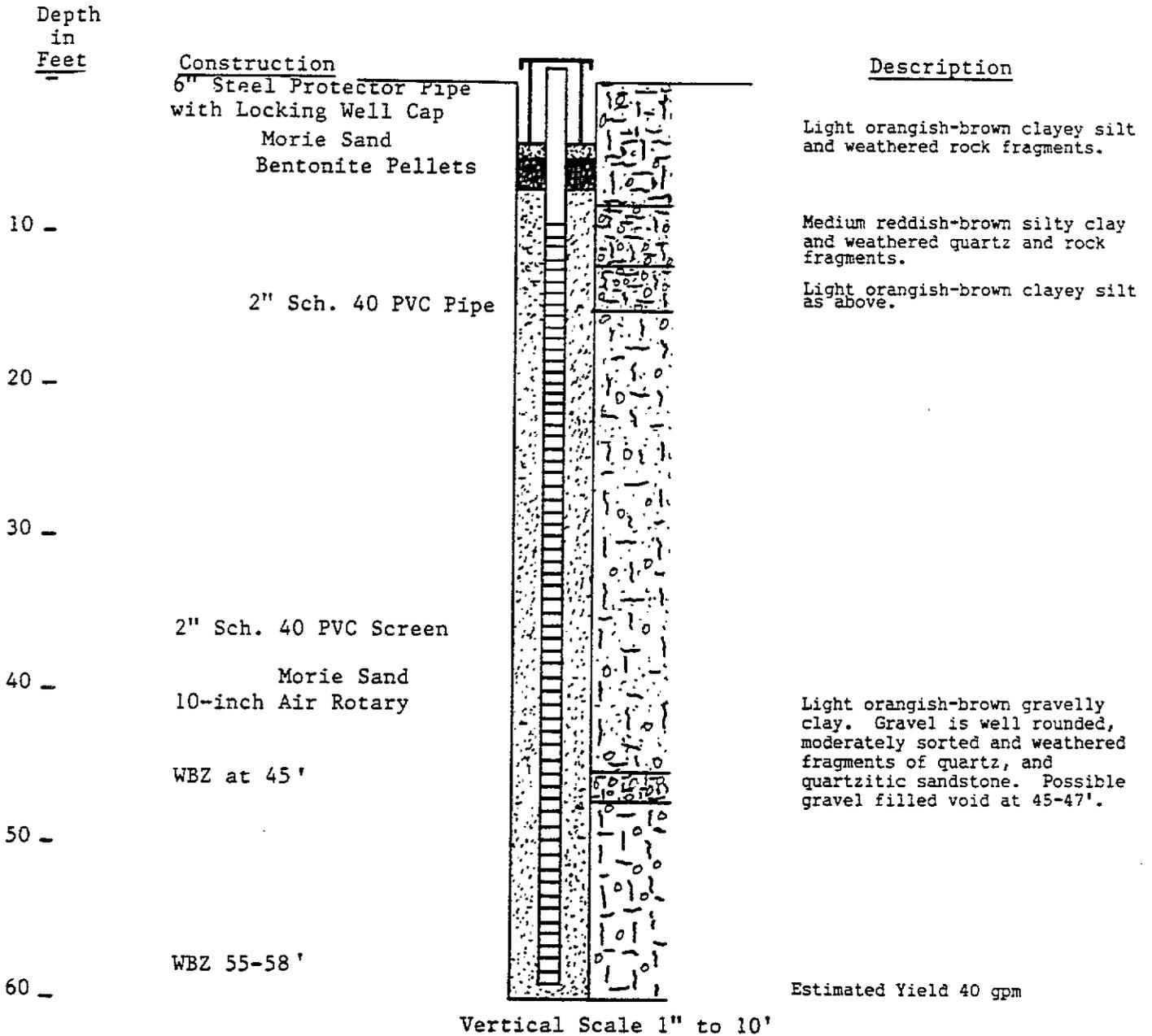


Vertical Scale 1" to 10'

Total Depth: 58'
 Depth to Competent Bedrock: ND
 SWL (Date): 5.47 (5/22/87)
 Screened Interval: 58 to 8
 Hole Diameter: 10" to 58"
 Monitoring Tube: 8 to G.S.
 Elev., Ground Surface: 381.28

Well No.: MW-25
 Driller: Eichelberger
 Logged by: P.E. Nachlas
 Drilling Began: 5/20/87
 Drilling Completed: 5/21/87
 Well Const. Completed: 5/21/87
 Development Completed: 5/21/87
 Elev., T.O.C.: 381.73 (PVC)

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-26



Estimated Yield 40 gpm

Vertical Scale 1" to 10'

Harley - Davidson York, Inc.

Geologic and Well Construction Log (Continued)

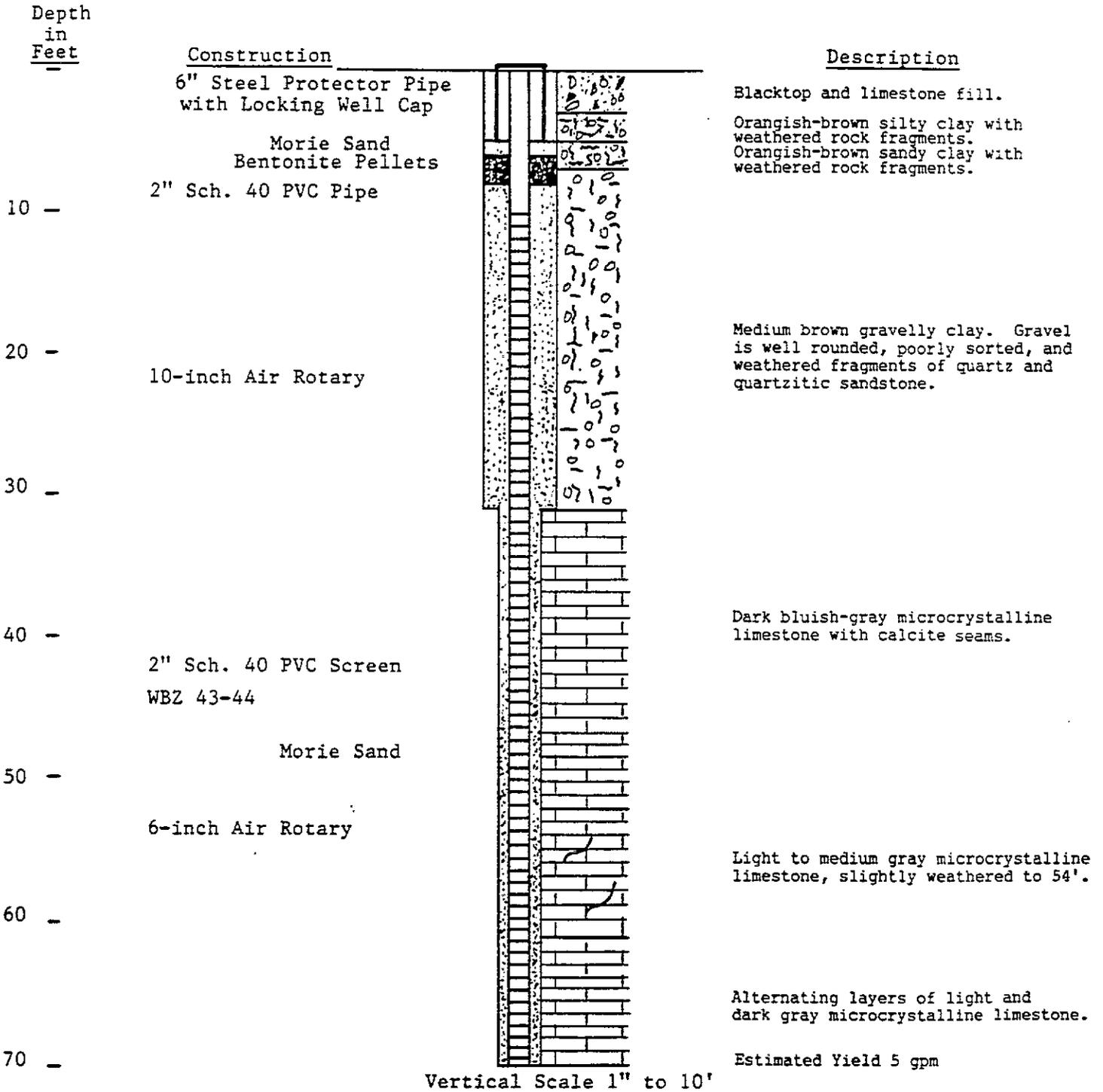
Well No. MW-26

Vertical Scale 1" to 10'

Total Depth: 60'
Depth to Competent Bedrock: ND
SWL (Date): 15.99 (5/21/87)
Screened Interval: 59-9
Hole Diameter: 10" to 60'
Monitoring Tube: 9 - +1
Elev., Ground Surface: 377.16

Well No.: MW-26
Driller: Eichelberger
Logged by: P. E. Nachlas
Drilling Began: 5/20/87
Drilling Completed: 5/20/87
Well Const. Completed: 5/20/87
Development Completed: 5/20/87
Elev., T. O. C.: 377.52 (PVC)

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-27



Harley - Davidson York, Inc.

Geologic and Well Construction Log (Continued)

Well No. MW-27

Total Depth: 70'
Depth to Competent Bedrock: 30.5'
SWL (Date): 13.08 (5/29/87)
Screened Interval: 70-10
Hole Diameter: 10" to 31'; 6" to 70'
Monitoring Tube: 10 - G.S.
Elev., Ground Surface: 362.34

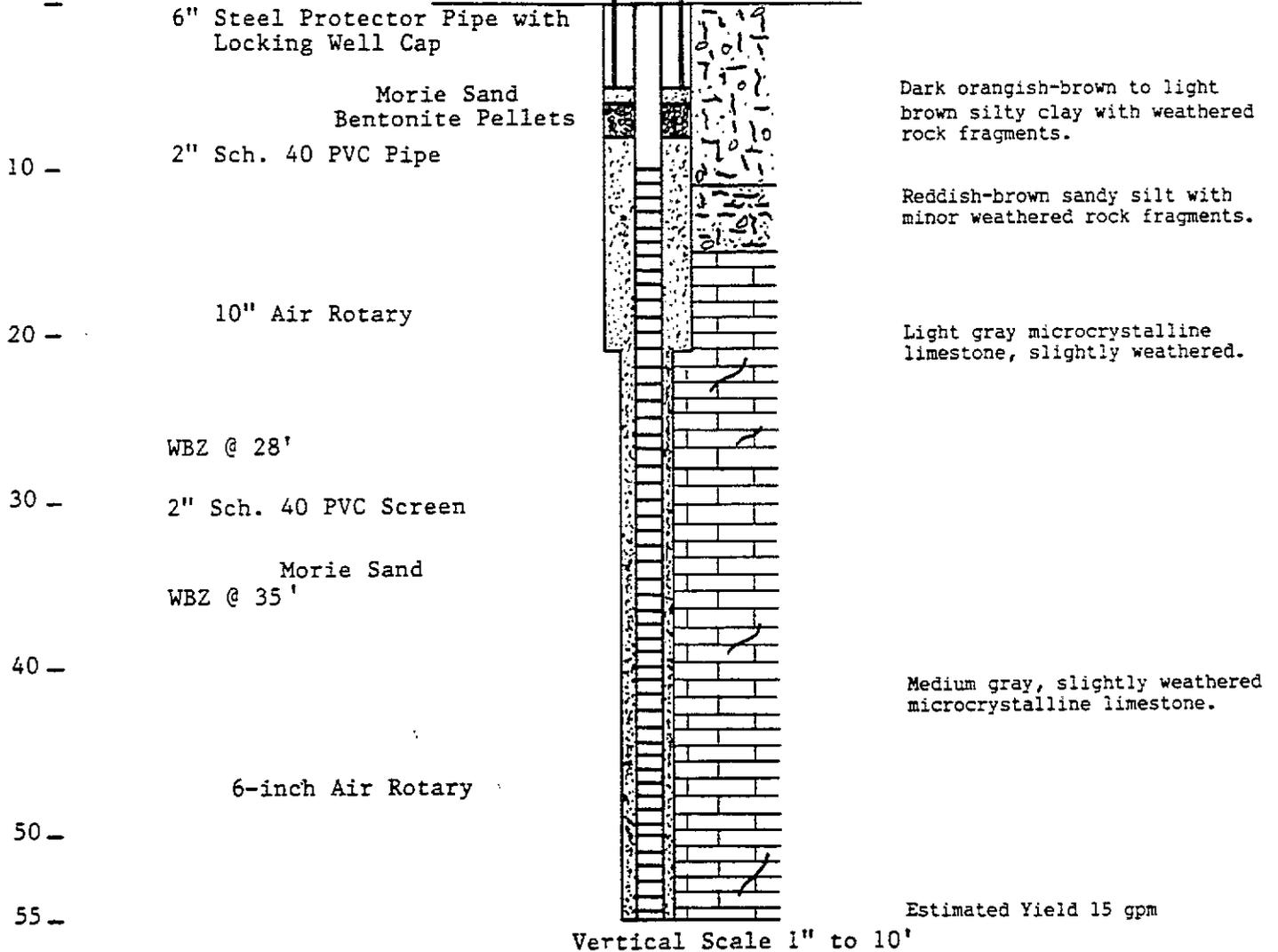
Well No.: MW-27
Driller: Eichelberger
Logged by: P. E. Nachlas
Drilling Began: 5/28/87
Drilling Completed: 5/28/87
Well Const. Completed: 5/28/87
Development Completed: 5/28/87
Elev., T.O.C.: 362.26 (PVC)

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-28

Depth
in
Feet

Construction

Description



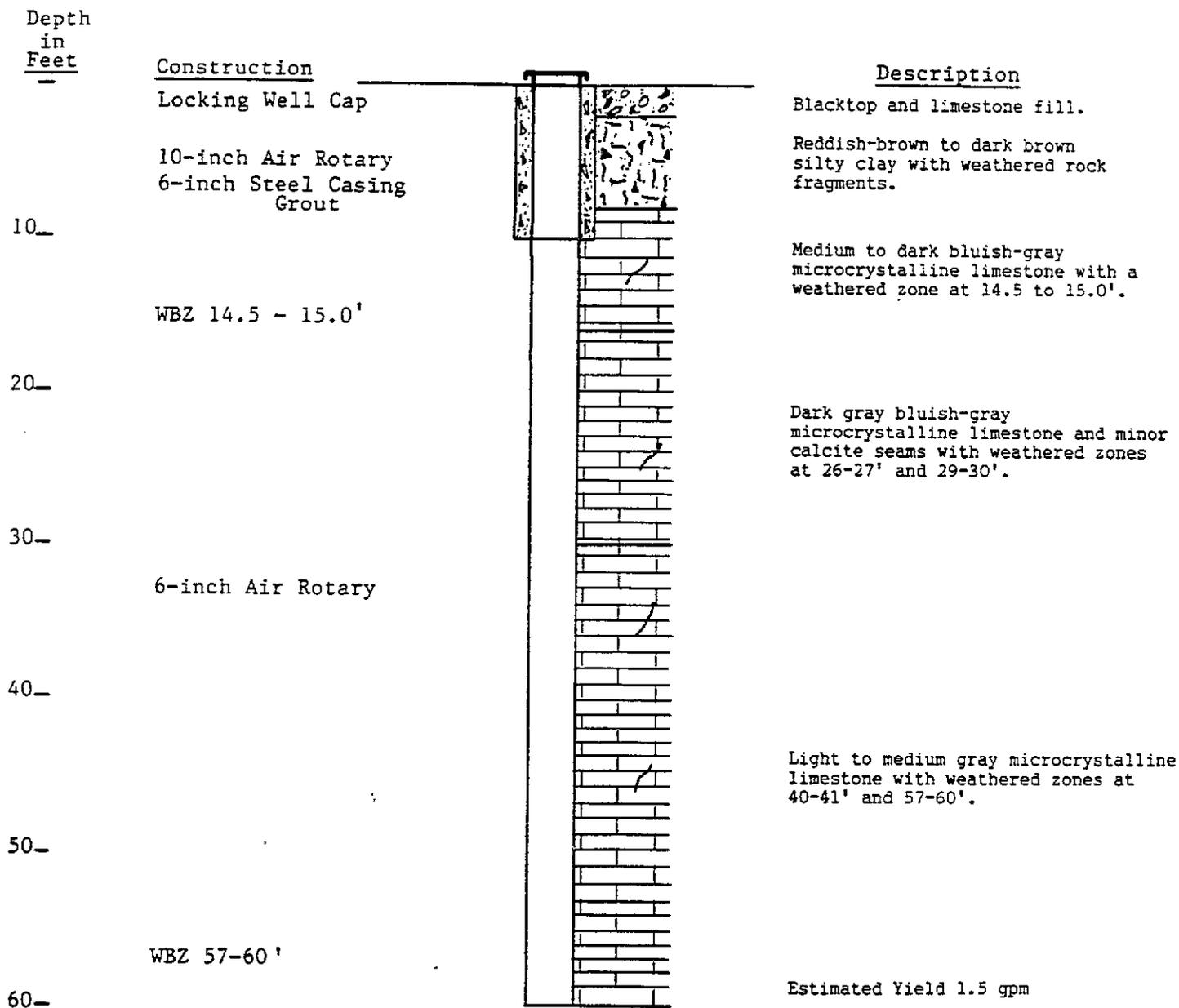
Vertical Scale 1" to 10'

Harley - Davidson York, Inc.
Geologic and Well Construction Log (Continued)
Well No. MW-28

Total Depth: 55'
Depth to Competent Bedrock: 16'
SWL (Date): 17.05 (5/29/87)
Screened Interval: 55-10
Hole Diameter: 10" to 21"
Monitoring Tube: 10 - G.S.
Elev., Ground Surface: 364.11

Well No.: MW-28
Driller: Eichelberger
Logged by: P. E. Nachlas
Drilling Began: 5/29/87
Drilling Completed:
Well Const. Completed:
Development Completed: 5/29/87
Elev., T.O.C.: 363.96 (PVC)

Harley - Davidson York, Inc.
 Geologic and Well Construction Log
 Well No. MW-29



Estimated Yield 1.5 gpm

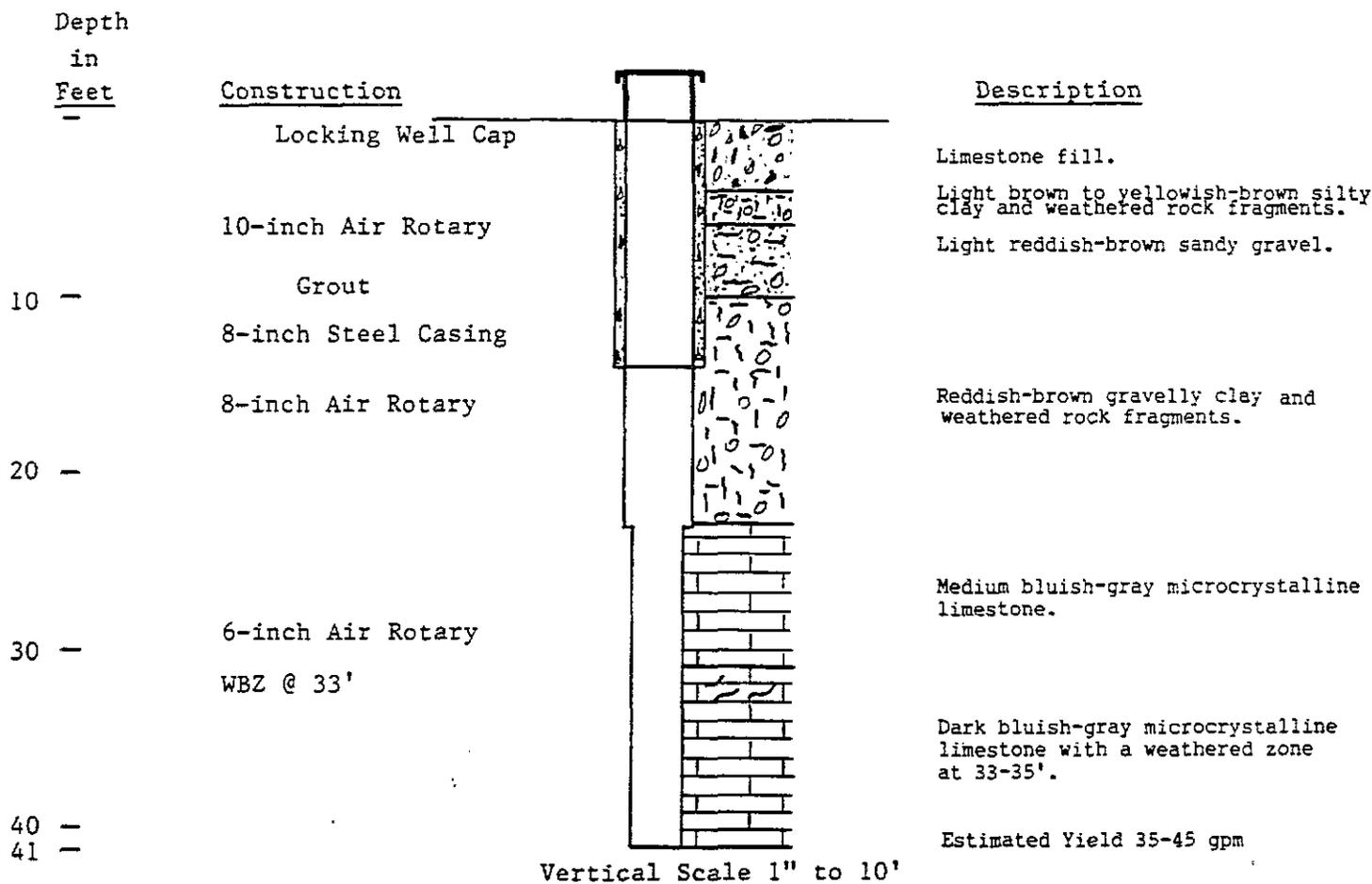
Vertical Scale 1" to 10'

Total Depth: 60'
 Depth to Competent Bedrock: 8'
 SWL (Date): 19.96 (5/29/87)
 Screened Interval: Open Rock
 Hole Diameter: 10" to 10'; 6" to 60'
 Monitoring Tube: 6' csg to 10'
 Elev., Ground Surface: 366.96

Well No.: MW-29
 Driller: Eichelberger
 Logged by: P.E. Nachlas
 Drilling Began: 5/29/87
 Drilling Completed: 5/29/87
 Well Const. Completed: 5/29/87
 Development Completed: 5/29/87
 Elev., T.O.C.:

365.63

Harley - Davidson York, Inc.
Geologic and Well Construction Log
Well No. MW-30



Total Depth: 41'
Depth to Competent Bedrock: 12.5'
SWL (Date): 13.86 (5/29/87)
Screened Interval: Open Rock
Hole Diameter: 10" to 14"; 8" to 23; 6" to 41'
Monitoring Tube: 8" csg to 23'
Elev., Ground Surface: 363.48

Well No.: MW-30
Driller: Eichelberger
Logged by: P. E. Nachlas
Drilling Began: 5/27/87
Drilling Completed: 5/28/87
Well Const. Completed: 5/28/87
Development Completed: 5/28/87
Elev., T.O.C.: 364.99

Client: Harley-Davidson
 Project No. 89254 Phase Task
 Boring No. Plezometer No. MW-31S, D
 Location Containment Area
 Surface Elev. TOC 36.8 31 Page 1 of 2

Depth Feet	Blow Counts	Recovery/RQD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface					0	T.O.C. Elev. Flush mount surface completion.
0-10			Asphalt top and gravel subbase. Silt: Brown, sandy, some rounded gravel.			0-10	0-43: 8-inch air rotary drilling.
10-23			Silt: As above, poor circulation (9'-23').			10-23	0-43: 6-inch steel casing - perforated from 14' to 42'
23-41			23-41: No circulation, rapid drill advancement.			23-41	14-34: 2-inch Sched. 40, .020 slot PVC screen
41-46			Limestone: Dark gray, massive			41-46	
46-55			Limestone: Gray, broken, WBZ: 46-55', ~ 20 gpm.			46-55	43-85: 6-inch air rotary drilling.
55-61			WBZ: 55'-61', ~ 10 gpm			55-61	36-65: Bentonite hole plug.

Driller <u>Eichelberger's Inc.</u>	Blown/Balled Yield <u>30 gpm</u>	Bentonite Seal <u>8-12, 65-66</u>
Logged By <u>T. O. Marrs</u>	Well Casing <u> </u> Dia. <u> </u> To <u> </u>	Filter Pack Qty. <u>12-36, 66-81</u>
Drilling Started <u>9/28/89</u>	Casing Type <u> </u>	Filter Pack Type <u>Morie #1</u>
Drilling Completed <u>1/5/90</u>	Well Screen <u> </u> Dia. <u> </u> To <u> </u>	Static Water Level <u> </u> MSL
Well Construction <u>Well screen</u>	Screen Type <u> </u>	Date <u> </u>
Well Developed <u> </u>	Slot Size <u> </u>	Notes: <u>Hole fell in to 46' and was then cleaned out and completed with a cable tool rig.</u>
Water Bearing Zones <u>46'-55', 55'-61'</u>	Drilling Mud <u> </u>	
	Grout Type <u> </u>	

Client: Harley-Davidson
 Project No. 89254
 Phase Task
 Boring No. Plezometer No. MW-31S, D
 Location Containment Area
 Surface Elev. TOC 362.31 Page 2 of 2

Depth Feet	Blow Counts	Re-covery/ RQD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60			61-69: No returns (void?)			60	
70			Limestone: gray, massive, etched quartz fragments, rounded gravel.			70	
80			Caved formation: 81-85'			80	70-80: 2-inch Sched. 40, .020 slot PVC screen
90						90	

Client: Harley-Davidson

Project No. 89254

Phase Task

Boring No.

Piezometer No. MW-32S, D

Location TCA Tank Area

Surface Elev. 363.46 (TOC)

Page 1 of 3

Depth Feet	Blow Counts	Recovery/RGD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface					0	T.O.C. Elev. Flush mount surface completion
0-10			Silt: Brown to reddish-brown clayey.			0-103	10" steel casing.
10-20			Limestone: Gray to brown, massive, hard.			0-103	6" steel casing.
20-30			Limestone: Gray, broken. WBZ, muddy at 22'.				
30-40			Lost circulation: 22-45'				
40-50							
50-60			Limestone: Gray, broken, quartz calcite and schist gravel fragments.				

325"
TD = 142.75

Driller Eichelberger's Inc.

Logged By Tom Marrs

Drilling Started 7/5/89

Drilling Completed 9/28/89

Well Construction Well Screen

Well Developed

Water Bearing Zones 22;

58 - 68 ; 143'

Blown/Balled Yield

Well Casing 6" Dia. 0 To 103'

Casing Type Steel

Well Screen Dia. To

Screen Type

Slot Size

Drilling Mud

Grout Type

Bentonite Seal 131-133, 191-196

Filter Pack Qty. 133-148, 196-220

Filter Pack Type Morie #2

(S)=345.99

Static Water Level (D)=345.57 MSL

Date 1/26/90

Notes: Recompleted as

multi-piezometer well.

Client: Harley-Davidson

Project No. 89254

Phase Task

Boring No.

Piezometer No. MW-325, D

Location TCA Tank Area

Surface Elev. 363.46 (TOC)

Page 2 of 3

Depth Feet	Blow Counts	Recovery/ROD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60			Limestone: Gray, hard, massive microcrystalline.			60	
70						70	
80						80	
90						90	
100						100	
110						110	
120						120	
130						130	
140						140	

Client: Harley-Davidson

Boring No.

Piezometer No. MW-32S, D

Location TCA Tank Area

Project No. 89254

Phase Task

Surface Elev. 363.46 (TOC)

Page 3 of 3

Depth Feet	Blow Counts	Recovery/RQD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
140 150 160 170 180 190 200 210 220			As above; <u>Limestone:</u> Gray, hard, massive, microcrystalline.			140 150 160 170 180 190 200 210 220	210-220: 2" PVC screen (.020 slot)

Client: Harley-Davidson

Boring No.

Piezometer No. MW-33

Location TCA Tank Area

Surface Elev. 365.07 (TOC)

Page 1 of 1

Project No. 89254

Phase

Task

Depth Feet	Blow Counts	Recovery/RGD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface					0	T.O.C. Elev. Flush mount surface completion.
0-5			Silt: Brown to dark brown, sandy, clayey.			0-17	6" steel casing.
5-21			5-21': Lost circulation			0-23	2" Sched. 40 PVC riser.
0-19						0-19	Volclay grout
23-43			Silt: Brown to dark brown, plastic, limestone rock fragments (ML-CL)			23-43	2" Sched. 40 .020 slot PVC screen
30			Limestone: Gray, massive				
			Muddy seam				

Driller Eichelberger's Inc.
 Logged By Tom Marrs
 Drilling Started 6/30/89
 Drilling Completed 6/30/89
 Well Construction Well screen
 Well Developed _____
 Water Bearing Zones _____

Blown/Balled Yield _____
 Well Casing 2" Dia. 0 To 23
 Casing Type PVC
 Well Screen 2" Dia. 23 To 43
 Screen Type PVC
 Slot Size .020
 Drilling Mud _____
 Grout Type _____

Bentonite Seal 17 - 19
 Filter Pack Qty. 19 - 43
 Filter Pack Type Morie #1
 Static Water Level 346.30 MSL
 Date 1/26/90

Notes: _____

Client: Harley-Davidson

Boring No.

Piezometer No. / MW-34S

Location Courtyard area

Project No. 89254

Phase Task

Surface Elev. 362.12

Page 1 of 1

Depth Feet	Blow Counts	Recovery/RQD	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface					0	T.O.C. Elev. Flush mount surface completion
0-10			Soil: Brown to reddish-brown (ML) Limestone: Bluish-gray, microcrystalline, solid			0-10	0-24': 6-inch steel well casing
10-20			Limestone: Light brown, sandy, soft. Limestone: Bluish-gray, hard, microcrystalline.			10-20	0-37': 8-inch air rotary drilling
20-30			Lost circulation: 14-23'			20-30	0-17: 2-inch, Sched 40, PVC Riser
30-40			Limestone: Brownish-gray, (dolomitized?) Lost circulation: 28-37' bit still striking (weathered zone?)			30-40	17-37': 2-inch, Sched. 40, .020 slot PVC well screen
40			Note: This well was originally drilled to 125'. The well was plugged back to 37' with bentonite hole plug when the 6" steel casing broke at a weld. 40 feet of 6" steel casing was left in the hole.			40	

Driller Eichelberger, Inc.
 Logged By S. A. Wendling
 Drilling Started 7/11/89
 Drilling Completed 7/12/89
 Well Construction Well screen
 Well Developed _____
 Water Bearing Zones _____

Blown/Balled Yield _____
 Well Casing 6" Dia. 0 To 24'
 Casing Type Steel
 Well Screen 2" Dia. 17 To 37
 Screen Type PVC-Sched. 40
 Slot Size .020
 Drilling Mud _____
 Grout Type _____

Bentonite Seal _____
 Filter Pack Qty. _____
 Filter Pack Type _____
 Static Water Level 345.99 MSL
 Date 1/26/90

Notes: _____

Client: Harley-Davidson

Boring No.

Piezometer No. MW-34D

Location Courtyard Area

Project No. 89254

Phase Task

Surface Elev. 362.12 (TOC)

Page 1 of 2

Depth Feet	Blow Counts	Recovery/RQD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface					0	T.O.C. Elev. Flush mount surface completion
0-13			Silt: Brown to reddish-brown, weathered rock fragments.			0-10	0-82: 6" steel casing
13-17			Limestone: Bluish-gray, soft			10	0-82: 8" Air rotary drilling
17-25			13-17: Lost circulation, no bit chatter.	v.s.		20	
25-30			17-25: Lost circulation, bit now striking.	sed.		20	0-115: 2" Sched. 40 PVC Riser
30-52			Limestone: Bluish-gray, hard			30	
52-56			52-56: Void			50	
56-58			Limestone?: Hard rock, no circulation			60	
58-63			58-63: Void			60	

Driller Eichelberger's Inc.
 Logged By S. A. Wendling
 Drilling Started 7/12/89
 Drilling Completed 7/13/89
 Well Construction Well screen
 Well Developed _____
 Water Bearing Zones 121'

Blown/Balled Yield 50 gpm
 Well Casing 2" Dia. 0 To 115
 Casing Type PVC
 Well Screen 2" Dia. 115 To 125
 Screen Type PVC
 Slot Size .020
 Drilling Mud _____
 Grout Type _____

Bentonite Seal 80 - 91
 Filter Pack Qty. 91 - 125
 Filter Pack Type Morie #1
 Static Water Level 346.07 MSL
 Date 1/26/90

Notes: _____

Client: Harley-Davidson

Project No. 89254

Phase Task

Boring No.

Piezometer No. MW-34D

Location Courtyard Area

Surface Elev. 362.12 (TOC)

Page 2 of 2

Depth Feet	Blow Counts	Recovery/RQD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60			Limestone?: Hard rock, no circulation			60	
70			69-72: Void			70	
80			Limestone: Bluish-gray, microcrystalline			80	82-125: 6" Air rotary drilling.
90						90	
100						100	
110			Same as above			110	
120			WBZ @ 121'			120	115-125: 2" Sched. 40 .020 slot PVC screen
130						130	

Client: Harley-Davidson

Boring No.

Piezometer No. MW-355

Location Courtyard Area

Project No. 89254

Phase Task

Surface Elev. 361.58 (TOC)

Page 1 of 1

Depth Feet	Blow Counts	Recovery/RQD	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface					0	T.O.C. Elev.
0-10			Concrete drive, gravel sub-base			0-10	0-23: 6-inch air rotary drilling.
10-17			Silt: Brown to reddish-brown very poor circulation from 2' to 17'.			10-17	
17-19						17-19	9-19: 2" Sched. 40 .020 slot PVC screen
19-23						19-23	
23-30			Limestone: Gray, weathered, some quartz gravel.			23-30	

Driller <u>Eichelberger's Inc.</u>	Blown/Balled Yield _____	Bentonite Seal <u>4 - 7</u>
Logged By <u>Tom Marrs</u>	Well Casing <u>2" Dia. 0 To 9</u>	Filter Pack Qty. <u>7 - 19</u>
Drilling Started <u>7/7/89</u>	Casing Type <u>Sched. 40, PVC</u>	Filter Pack Type <u>Morie #1</u>
Drilling Completed <u>7/7/89</u>	Well Screen <u>2" Dia. 9 To 19</u>	Static Water Level <u>346.00</u> MSL
Well Construction <u>Well screen</u>	Screen Type <u>Schedule 40, PVC</u>	Date <u>1/26/90</u>
Well Developed _____	Slot Size <u>.020</u>	Notes: <u>Original TD was 23', formation caved to 19'.</u>
Water Bearing Zones _____	Drilling Mud _____	
	Grout Type _____	

Client: Harley-Davidson

Boring No.

Piezometer No. MW-35D

Project No. 89254

Phase Task

Location Courtyard area

Surface Elev. 361.59

Page 1 of 2

Depth Feet	Blow Counts	Recovery/ROD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0			Concrete, gravel			0	T.O.C. Elev. Flush mount surface completion.
0	Ground Surface		Silt: tan to brown, clayey (CL, ML)			0	0-104: 6-inch steel casing.
10						10	0-104: 8-inch air rotary drilling
20			Limestone: gray, massive.			20	0-114: 2-inch sched. 40 PVC riser
30			Mud filled void = 24 - 96, no circulation.			30	
40						40	
50						50	
60			As above, no circulation.			60	

Driller Eichelberger's Inc.

Logged By Tom Marrs

Drilling Started 7/6/89

Drilling Completed 7/7/89

Well Construction Well Screen

Well Developed

Water Bearing Zones

Blown/Balled Yield

Well Casing 2" Dia. 0 To 114

Casing Type PVC, Sched. 40

Well Screen 2" Dia. 114 To 124

Screen Type PVC - Sched. 40

Slot Size .020

Drilling Mud

Grout Type

Bentonite Seal 102 - 106

Filter Pack Qty. 106 - 124

Filter Pack Type Morie #1

Static Water Level 346.04 MSL

Date 1/26/90

Notes:

Client: Harley-Davidson

Location Cortyard area

Project No. 89254

Phase Task

Surface Elev. 361.57

Depth Feet	Blow Counts	Recovery/Recovery/Recovery	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60			As above, no circulation.	Void w. sed.		60	
70						70	
80						80	
90						90	
100			Limestone gravel? No circulation			100	
			Limestone: Gray, hard				104 - 124: 6-inch air rotary drilling
110						110	
120						120	114-124: 2-inch Sched. 40, .020 slot PVC well screen.
130						130	

Client: Harley-Davidson

Project No. 89254

Phase Task

Boring No.

Piezometer No. MW-36S, D

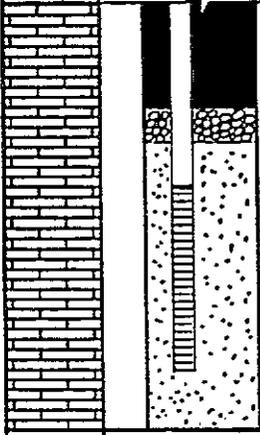
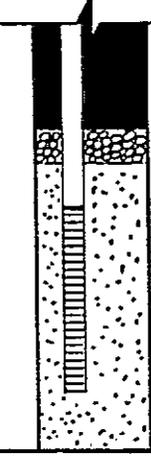
Location Containment Area

Surface Elev. 372.15(TOC)

Page 1 of 2

Depth Feet	Blow Counts	Recovery/ROD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface					0	T.O.C. Elev.
0-10			Silt: Brown to red-brown, gravel.			0-10	+1.5-43: 6" steel casing, perforated from 20-41'.
10-20			Silt: Red brown, sandy, some rounded gravel.			10-20	0-43': 8-inch air rotary drilling.
20-30			As above, no gravel.			20-30	
30-40			24-39: No circulation, no bit chatter.			30-40	20-40: 2-inch, Sched. 40, .020 slot PVC screen
40-50			Top of rock at 39'			40-50	
50-60			39-43: No circulation.			50-60	41-66: Bentonite hole plug.
60			Limestone: Gray to dark gray, hard, massive.			60	

Driller <u>Eichelberger's Inc.</u>	Blown/Balled Yield <u>5 cpm</u>	Bentonite Seal <u>16-18, 66-68</u>
Logged By <u>T. O. Marrs</u>	Well Casing <u>6"</u> Dia. <u>+1.5</u> To <u>43</u>	Filter Pack Qty. <u>18-41, 68-83</u>
Drilling Started <u>9/29/89</u>	Casing Type <u>Steel-perforated:20-41'</u>	Filter Pack Type <u>Morie #1</u>
Drilling Completed <u>1/4/90</u>	Well Screen <u>_____</u> Dia. <u>_____</u> To <u>_____</u>	Static Water Level <u>_____</u> MSL
Well Construction <u>Well screen</u>	Screen Type <u>_____</u>	Date <u>_____</u>
Well Developed <u>_____</u>	Slot Size <u>_____</u>	Notes: <u>Hole fell in to 67'; cleaned</u>
Water Bearing Zones <u>64'-74'</u>	Drilling Mud <u>IA</u>	<u>out and completed with cable tool</u>
	Grout Type <u>_____</u>	<u>rig</u>

Client: Harley-Davidson				Boring No.		Piezometer No. MW-36S, D	
Project No. 89254				Location Containment Area		Surface Elev. 372.15 (TOC)	
Phase				Task			
Depth Feet	Blow Counts	Recovery/ RGD.	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60			WBZ: 64-74, ~ 5 gpm			60	
70			74-83: As above, poor circulation.			70	
80						80	
90						90	

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface			0	T.O.C. Elev.
0-23'	Asphalt cover with gravel subbase.			0-23'	8" hammer bit
2-17'	SILT-SANDY SILT: Brown to yellowish-brown, some etched quartz fragments (2-17').			8-11'	Bentonite pellets
17-45'	LIMESTONE: Gray to light gray, massive, micro-crystalline (17-45').			11-33'	Morie #1 sand
				12-32'	2", 0.020 slot PVC screen
				23-143'	6" hammer bit
				33-119'	Bentonite hole plug
	As above, more bluish-gray.				

Driller <u>Eichelberger, Inc.</u>	Blown/Bailed Yield <u>50 gpm</u>	Bentonite Seal _____
Logged By <u>Scott A. Wendling</u>	Well Casing _____ Dia. To _____ Ft.	Filter Pack Qty. _____
Drilling Started <u>1/22/90</u>	Casing Type _____	Filter Pack Type _____
Drilling Completed <u>1/23/90</u>	Well Screen _____ Dia. To _____	Static Water Level <u>345.0'</u> MSL
Well Construction <u>Well Screen</u>	Screen Type _____	Date <u>1/26/90</u>
Well Developed _____	Slot Size _____	Notes: _____
Water Bearing Zones <u>137'</u>	Drilling Mud _____	
	Grout Type _____ Quantity _____	

r.e. wright associates, inc.

AIR-ROTARY DRILLING LOG

Client: Harley-Davidson

Boring No. Piezometer No. MW-37S, MW-37D

Location West Parking Lot

Project No: 89254

Phase

Task

Surface Elev. 360.80 (TOC)

Page 2 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60 70 80 90 100 110	<p>LIMESTONE: As above.</p>			60 70 80 90 100 110	
120	<p>Possible WBZ at 117'; ~ 0.5 gpm.</p>			120	<p>119-125': Bentonite pellets</p>
130				130	<p>125-141': Morie #1 sand</p>
140	<p>WBZ at 137'; ~ 50 gpm; etched quartz gravel, muddy limestone, as above.</p>			140	<p>131-141': 0.020 slot, Schedule 40, 2" PVC well screen</p>

*SS Filled
Void*

AIR-ROTARY DRILLING LOG

Boring No. MW-38A Piezometer No. MW-38S

Client: HARLEY-DAVIDSON

Location West Parking

Project No: 89254 Phase Task

Lot Surface Elev. 359.47 (TOC)

Page 1 of 1

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u>			0	T.O.C. Elev.
0-5'	<u>CLAYEY SILT</u> : Brown, minor rock fragments.			0-5'	6" steel casing
5-35'	<u>SILTY CLAY</u> : Brown to yellowish-brown, with rock fragments.			0-35'	8" hammer bit
35-38'	<u>SILTY SAND</u> : Brown to yellowish-brown, some gravel.			6-8'	Bentonite pellets
38-30'	<u>LIMESTONE</u> : Gray, solid, poor circulation.			8-30'	Morie #1 sand
30-35'	Caved formation: 30-35'.			10-30'	2", 0.020 slot PVC well screen

Driller <u>Eichelberger, Inc.</u>	Blown/Bailed Yield _____	Bentonite Seal <u>6-8'</u>
Logged By <u>Scott A. Wendling</u>	Well Casing <u>6" Dia. To +2-5'</u> Ft.	Filter Pack Qty. <u>8-30'</u>
Drilling Started <u>2/6/90</u>	Casing Type <u>Steel</u>	Filter Pack Type <u>Morie #1</u>
Drilling Completed <u>2/6/90</u>	Well Screen <u>2" Dia 10' To 30'</u>	Static Water Level <u>345.07'</u> MSL
Well Construction <u>PVC Well Screen</u>	Screen Type <u>PVC</u>	Date <u>2/26/90</u>
Well Developed _____	Slot Size <u>0.020"</u>	Notes: _____
Water Bearing Zones _____	Drilling Mud _____	
	Grout Type <u>Quantity</u>	

r.e. wright associates, inc.

AIR-ROTARY DRILLING LOG

Client: HARLEY-DAVIDSON

Boring No. MW-38 Piezometer No. MW-38

Location West Parking

Lot Surface Elev. 359.48

Project No: 89254 Phase Task

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u>			0	T.O.C. Elev.
0-39'	Asphalt cover and gravel subbase.			0-39'	8" hammer bit
0-1.5'	<u>SILTY SAND</u> : Brown to yellowish-brown, some rock fragments, damp.			+1.5-39'	6" steel casing
0-20'	<u>LIMESTONE</u> : Gray, microcrystalline, solid; WBZ: 10 gpm.			20	
0-30'	<u>LIMESTONE</u> : Gray, broken, poor circulation.			30	
0-40'	<u>LIMESTONE</u> : Blue-gray, microcrystalline, massive.			40	39-103': 6" hammer bit
0-50'	WBZ: ~ 40 gpm			50	39-75': Cuttings/bentonite hole plug backfill
0-60'	<u>LIMESTONE</u> : Gray, microcrystalline, massive.			60	

Driller <u>Eichelberger, Inc.</u>	Blown/Bailed Yield <u>20 gpm (91')</u>	Bentonite Seal <u>75-80'</u>
Logged By <u>Scott A. Wendling</u>	Well Casing <u>6" Dia. To +1.5-39' Ft.</u>	Filter Pack Qty. <u>80-95'</u>
Drilling Started <u>1/23/90</u>	Casing Type <u>Steel</u>	Filter Pack Type <u>Morie #1</u>
Drilling Completed <u>1/24/90</u>	Well Screen <u>2" Dia. 85-95'</u>	Static Water Level <u>344.94' MSL</u>
Well Construction <u>PVC Well Screen</u>	Screen Type <u>PVC</u>	Date <u>1/26/90</u>
Well Developed _____	Slot Size <u>0.020"</u>	Notes: _____
Water Bearing Zones <u>21', 50', 91'</u>	Drilling Mud _____	_____
	Grout Type _____ Quantity _____	

r.e. wright associates, inc.

AIR-ROTARY DRILLING LOG

Client: HARLEY-DAVIDSON

Boring No. MW-38 Piezometer No. MW-38 b

Location West Parking Lot

Project No: 89254 Phase Task

Surface Elev. 359.46

Page 2 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60				60	
	LIMESTONE: As above.				39-75': Cuttings/bentonite hole plug backfill
70				70	
					
80				80	75-80': Bentonite pellets
					80-95': Morie #1 sand
90	WBZ: ~ 20 gpm; etched quartz gravel, clayey mud.			90	85-95': 2" PVC 0.020 slot well screen
	LIMESTONE: As above.				
100				100	95-103': Caved formation

Project No: 89254 Phase _____ Task _____

Surface Elev. 361.56 (TOC) Page 1 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u>			0	T.O.C. Elev.
0-10	<u>SILT</u> : Brown to yellowish-brown, some rock fragments. <u>LIMESTONE LENS</u> : Gray, weathered, perched WBZ, <1 gpm.			0-10	+2-3': 6" steel casing 0-100': 8" hammer bit
10-20	<u>SILTY CLAY</u> : Brown, quartz and limestone fragments. WBZ at 15' (3-5 gpm).			10-20	0-3': Bentonite pellets 3-30': Morie #1 sand
20-30	<u>LIMESTONE GRAVEL</u> : Gray, muddy. <u>LIMESTONE</u> : Gray, hard.			20-30	4-24': 2", Schedule 40, 0.020" slot PVC screen
30-40	<u>LIMESTONE GRAVEL</u> : Sand, mud.			30-40	30-51': Bentonite hole plug and cuttings
40-50		Sed. fill. VOID		40-50	
50-60	WBZ at 58' (~5 gpm).			50-60	51-53': Bentonite pellets 53-67': Morie #1 sand 55-65': 2", Schedule 40, 0.020" slot PVC screen

Driller <u>Eichelberger, Inc.</u>	Blown/Bailed Yield <u>5-10 gpm</u>	Bentonite Seal _____
Logged By <u>Scott A. Wendling</u>	Well Casing _____ Dia. To _____ Ft.	Filter Pack Qty. _____
Drilling Started <u>1/29/90</u>	Casing Type _____	Filter Pack Type _____
Drilling Completed <u>1/30/90</u>	Well Screen _____ Dia. _____	Static Water Level <u>S - 342.08'</u> <u>D - 342.29' MSL</u>
Well Construction <u>PVC Well Screen</u>	Screen Type _____	Date <u>3/5/90</u>
Well Developed _____	Slot Size _____	Notes: _____
Water Bearing Zones <u>15', 58'</u>	Drilling Mud _____	
	Grout Type _____ Quantity _____	

AIR-ROTARY DRILLING LOG

Client: HARLEY-DAVIDSON

Boring No.

Piezometer No. MW-39S, MW-39D

Location West Perimeter Area

Project No: 89254 Phase Task

Surface Elev. 361.56 (TOC)

Page 2 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60	No circulation, VOID? <u>QUARTZ AND LIMESTONE GRAVEL</u> : Muddy, sandy.			60	67-100': Caved formation
70	<u>LIMESTONE</u> : Gray, hard. <u>LIMESTONE GRAVEL</u> : Muddy, sandy. <u>LIMESTONE</u> : Gray, massive.			Void Sed.	
80				80	
90				90	
100				100	

Form #WL-AR-1 (02/90)

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AIR-ROTARY DRILLING LOG

Client: HARLEY-DAVIDSON

Boring No. Piezometer No. MW-40S, MW-40D

Location South Perimeter

Project No: 89254 Phase Task

Surface Elev. 375.83 (TOC)

Page 1 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u>			0	T.O.C. Elev.
0-10	<u>CLAYEY SILT</u> : Brown to reddish-brown, some rock fragments, moist, plastic.	[Pattern]	[Diagram]	0-10	+1.5-26': 6" steel casing
10-20	<u>CLAYEY SILT</u> : As above, poor circulation.	[Pattern]	[Diagram]	10-20	
20-30		[Pattern]	[Diagram]	20-30	
30-40	<u>LIMESTONE</u> : Gray to bluish-gray, microcrystalline.	[Pattern]	[Diagram]	30-40	27-47': 2", 0.020" slot PVC well screen
40-50	Mud-filled VOID?; poor to no circulation, no bit chatter.	[Pattern]	[Diagram]	40-50	
50-60	<u>LIMESTONE</u> : Gray to bluish-gray, solid.	[Pattern]	[Diagram]	50-60	44-47': Gravel pack
60-65	WBZ: 10-15 gpm, muddy, etched quartz gravel.	[Pattern]	[Diagram]	60-65	
65-70	<u>LIMESTONE</u> : As above.	[Pattern]	[Diagram]	65-70	

Driller <u>Eichelberger, Inc.</u>	Blown/Bailed Yield <u>15 gpm (61')</u>	Bentonite Seal _____
Logged By <u>Scott A. Wendling</u>	Well Casing _____ Dia. To _____ Ft.	Filter Pack Qty. _____
Drilling Started <u>1/30/90</u>	Casing Type _____	Filter Pack Type _____
Drilling Completed <u>2/1/90</u>	Well Screen _____ Dia. _____	Static Water Level <u>S - 343.13'</u> <u>D - 343.13'</u> MSL
Well Construction _____	Screen Type _____	Date <u>3/5/90</u>
Well Developed _____	Slot Size _____	Notes: <u>Unable to pack sand/gravel</u>
Water Bearing Zones <u>53', 61'</u>	Drilling Mud _____	<u>around screen (27-44'); unable</u>
	Grout Type _____ Quantity _____	<u>to fill void.</u>

Form #WL-AR-1 (02/90)

r.e. wright associates, inc.

AIR-ROTARY DRILLING LOG

Client: HARLEY-DAVIDSON

Boring No.

Piezometer No. MW-40S, MW-40D

Location South Perimeter

Project No: 89254

Phase

Task

Surface Elev. 375.83 (TOC)

Page 2 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60	WBZ: ~15 gpm, more gravel.			60	65-68': Bentonite pellets
70	LIMESTONE: As above.			70	68-75': Caved formation
80	LIMESTONE: Broken, weathered, several mud-filled voids, poor circulation.			80	75-78': Bentonite pellets
90	Caved formation: 92-103'.			82	78-92': Morie #1 sand
100				92	82-92': 2", 0.020" slot PVC well screen

Several Voids w. Sol.

Client: Harley-Davidson

Boring No.

Piezometer No. MW-41S, D

Surface Elev.

(TOC) 426.08

Project No. 89254

Phase

Task

Location South Perimeter

Page 1 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface			0	T.O.C. Elev. Locking cap
0-5'	Variegated dark reddish-brown (5YR 3/2) silty clay with 1-inch siltstone fragments, moist, plastic.				
5'-20'	Reddish-yellow (7.5YR 6/6) sandy silt/saprolite with some siltstone fragments to 1/2-inch, dry.				
20'-25'	Dark brown (7.5YR 3/4) clayey silt with 1/2-inch siltstone fragments, moist.				
25'-32'	Reddish-yellow (7.5YR 6/6) saprolite/sandy silt with more siltstone fragments.				
32'-50'	Competent dark bluish-gray siltstone, fine-grained, well cemented, slightly weathered, with some quartz fragments.				30'-33': Bentonite pellets 33'-66': Sand
50'-65'	Same as above, except less weathered and almost no quartz.				

Driller <u>Eichelberger</u>	Blown/Balled Yield <u>1/4 gpm</u>	Bentonite Seal <u>Pellets</u>
Logged By <u>Stephen M. Knight</u>	Well Casing <u>2" Dia.</u> <u> </u> Ft. <u> </u>	Filter Pack Qty. <u> </u>
Drilling Started <u>2/1/90</u>	Casing Type <u>PVC</u>	Filter Pack Type <u>Morie Sand</u>
Drilling Completed <u>2/1/90</u>	Well Screen <u>2" Dia.</u> <u> </u> Ft. <u> </u>	Static Water Level <u> </u> MSL
Well Construction <u>PVC</u>	Screen Type <u>PVC</u>	Date <u> </u>
Well Developed <u>No</u>	Slot Size <u>0.02</u>	Notes: <u>Shallow well; SWL = 42.6'</u>
Water Bearing Zones <u>None Detected</u>	Drilling Mud <u>None</u>	<u>from TOC. Deep well; SWL = 48.5'</u>
	Grout Type <u> </u> Quantity <u> </u>	<u>from TOC. Date: 2/2/90</u>

Boring No. Plezometer No. MW-41S, D

Surface Elev. (TOC) 426.08

Client: Harley-Davidson

Project No. 89254

Phase

Task

Location South Perimeter

Page 2 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60				60	
70				70	66'-110': Hole plug bentonite
80	65'-126': As above, except some quartz present.			80	
90				90	
100	Blown yield \approx 1/4 gpm.			100	
110				110	110'-113': Bentonite pellets
120				120	113'-126': Sand
					Total Depth = 125'
	Blown yield \approx 1/4 gpm; waited 1/2 hour, then blown yield \approx 1/4-1/2 gpm. About 3 gallons present in hole.				

Client: Harley-Davidson

Boring No. Surface Elev.

Piezometer No. 42S, M, D
Piezometer No.

Project No. 89254

Phase Task

Location (TOC) 411.3A

Page 1 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface			0	T.O.C. Elev. Locking Well Cap
0-5'	Variegated dark reddish-brown (5YR 3/2) silty clay with 1-inch siltstone fragments, moist plastic.			0-8'	Cuttings
5-20'	Reddish-yellow (7.5 YR 6/6) sandy silt saprolite with 1/2-inch siltstone fragments. Dry.			8-13'	Bentonite pellets
20-29'	Dark yellowish-brown (10 YR 3/4) clayey silt with 1/2-inch siltstone fragments.			13-36'	Sand
29-44'	Dark bluish-gray siltstone, fine-grained, well cemented, moderately weathered. No quartz fragments. Fractured.			36-43'	Cuttings
44-45'	Brown siltstone, soft.			43-51'	Bentonite pellets
45-50'	As above, with some quartz fragments. Blown yield \approx 1/4 gpm.			51-75'	Sand.
50-75'	As above, except not fractured, no quartz fragments, and only slightly weathered.				

Driller <u>Eichelberger</u>	Blown/Balled Yield <u>3/4 gpm</u>	Bentonite Seal <u>Pellets</u>
Logged By <u>Stephen M. Knight</u>	Well Casing <u>2</u> Dia. <u> </u> Ft. <u> </u>	Filter Pack Qty. <u> </u>
Drilling Started <u>2/2/90</u>	Casing Type <u>PVC</u>	Filter Pack Type <u>Morie Sand</u>
Drilling Completed <u>2/2/90</u>	Well Screen <u>2</u> Dia. <u> </u> Ft. <u> </u>	Static Water Level <u>402.70'(S)</u> MSL
Well Construction <u>PVC</u>	Screen Type <u>PVC</u>	Date <u>3/5/90</u>
Well Developed <u>No</u>	Slot Size <u>0.02</u>	Notes: <u>Water rose to 47' from TOC</u>
Water Bearing Zones <u>Between 50 and 75'</u>	Drilling Mud <u>None</u>	<u>in 1/2 hr. Yield approx. 3.8 gpm</u>
	Grout Type <u>None</u> Quantity <u> </u>	

Client: Harley-Davidson

Project No. 89254

Phase

Task

Boring No.

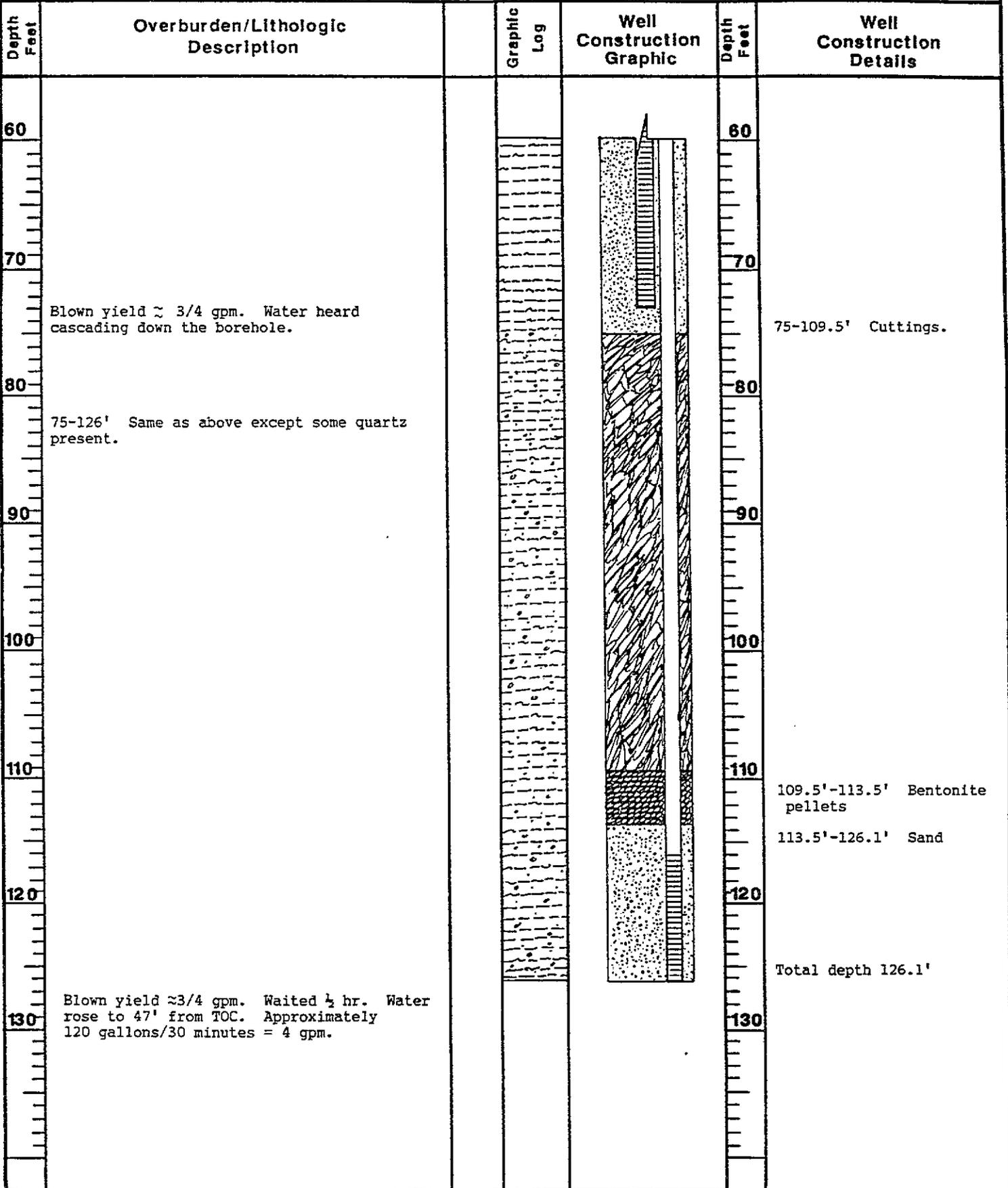
Surface Elev.

Location 411.39 (TOC)

Piezometer No. 42S, M, D

Piezometer No.

Page 2 of 2



AIR-ROTARY DRILLING LOG

Client: HARLEY-DAVIDSON

Boring No. _____ Piezometer No. MW-43D

Location South Perimeter

Project No: 89254 Phase _____ Task _____

Surface Elev. 383.31 (TOC)

Page 1 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u>			0	T.O.C. Elev.
0	<u>SILT</u> : Brown to reddish-brown, clayey, moist, plastic, with some rock fragments.			10	+2-10': 6" steel casing 8-10': Bentonite pellets
30	<u>SILT</u> : Dark brown, moist, more rock fragments/gravel.			20	10-26': Gravel and bentonite hole plug
30				30	26-30': Bentonite hole plug
40				40	30-56': Caved formation
50				50	
50	<u>LIMESTONE</u> : Dark gray to bluish-gray, soft, weathered.			60	56-58': Bentonite pellets
50	<u>LIMESTONE</u> : Gray, solid.				58-75': Bentonite hole plug
50	<u>LOST CIRCULATION</u> : 57-77'.				

Driller <u>Eichelberger, Inc.</u>	Blown/Bailed Yield _____	Bentonite Seal _____
Logged By <u>Scott A. Wendling</u>	Well Casing _____ Dia. To _____ Ft.	Filter Pack Qty. _____
Drilling Started <u>2/9/90</u>	Casing Type _____	Filter Pack Type _____
Drilling Completed <u>2/12/90</u>	Well Screen _____ Dia. To _____	Static Water Level <u>350.54'</u> MSL
Well Construction _____	Screen Type _____	Date <u>3/5/90</u>
Well Developed _____	Slot Size _____	Notes: _____
Water Bearing Zones _____	Drilling Mud _____	
	Grout Type _____ Quantity _____	

Form #WL-AR-1 (02/90)

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AIR-ROTARY DRILLING LOG

Client: HARLEY-DAVIDSON

Boring No. Piezometer No. MW-43 D

Location South Perimeter

Project No: 89254 Phase Task

Surface Elev. 383.31 (TOC)

Page 2 of 2

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60	<u>LOST CIRCULATION</u> : 57-77'.			60	58-75': Bentonite hole plug
70	<u>LIMESTONE</u> : Gray, fractured, poor circulation.			70	75-79': Bentonite pellets
80	<u>LIMESTONE</u> : Gray, massive, poor circulation.			80	79-92': Morie #1 sand
90		90	82-92': 2", Schedule 40, 0.020" slot PVC screen		

Form #WL-AR-1 (02/90)

r.e. wright associates, inc.

Client: Harley-Davidson

Boring No.

Piezometer No. MW-44

Surface Elev. 417.37' (TOC)

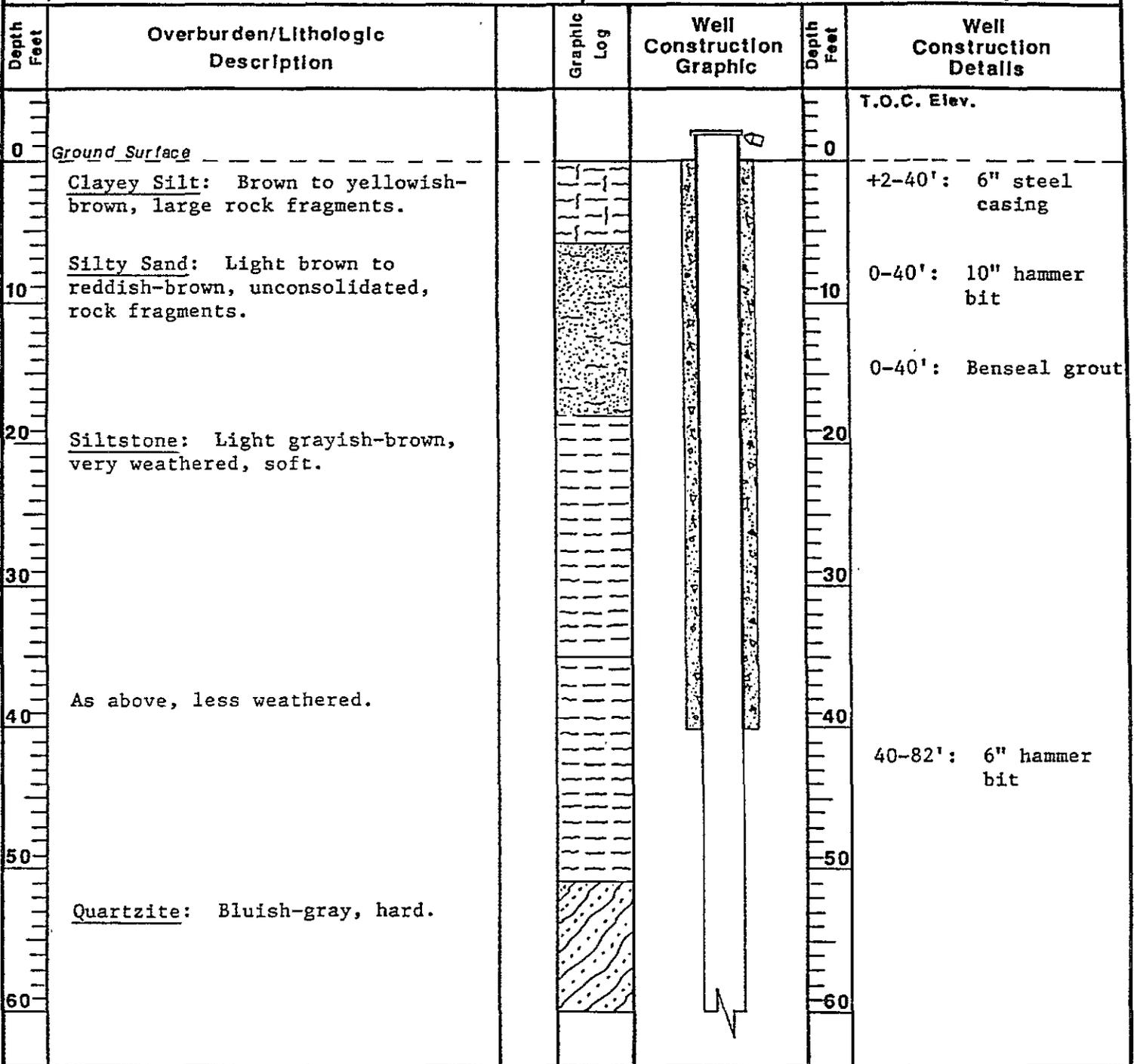
Project No. 89254

Phase

Task

Location South Perimeter

Page 1 of 2



Driller <u>Eichelberger, Inc.</u>	Blown/Balled Yield <u>~0.7 gpm</u>	Bentonite Seal _____
Logged By <u>Scott A. Wendling</u>	Well Casing _____ Dia. _____ Ft. _____	Filter Pack Qty. _____
Drilling Started <u>4/2/90</u>	Casing Type _____	Filter Pack Type _____
Drilling Completed <u>4/2/90</u>	Well Screen _____ Dia. _____ Ft. _____	Static Water Level <u>387.38'</u> MSL
Well Construction <u>Open Rock</u>	Screen Type _____	Date <u>4/10/90</u>
Well Developed _____	Slot Size _____	Notes: _____
Water Bearing Zones _____	Drilling Mud _____	
	Grout Type <u>Benseal</u> Quantity <u>0-40'</u>	

Client: Harley-Davidson

Project No. 89254

Phase

Task

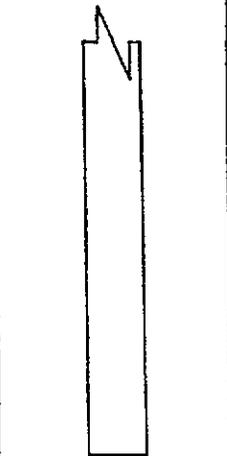
Boring No.

Piezometer No. MW-44

Surface Elev. 417.37' (TOC)

Location South Perimeter

Page 2 of 2

Depth Feet	Overburden/Lithologic Description		Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60 70 80 90	<p>Quartzite: As above.</p> <p>Total Depth = 82'</p>				60 70 80 90	

AIR-ROTARY DRILLING LOG

Client: Harley-Davidson, Inc.

Boring No. _____ Piezometer No. MW-45

Location Building 4 Area

Surface Elev. 361.72' (Top of Drive-over) Page 1 of 1

Project No: 89254

Phase _____

Task _____

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u>		Flush-mount Drive-over	0	T.O.C. Elev.
10	<u>Clayey Silt</u> : Brown, plastic with a few rock fragments.	[Pattern]	[Pattern]	10	0-27': 8" hammer bit 5-6': Bentonite pellets
20	<u>Sandy Silt</u> : Yellowish-brown to reddish-brown, moist, with some rock fragments.	[Pattern]	[Pattern]	20	6-38': Morie #1 sand
30	<u>Limestone</u> : Bluish-gray, microcrystalline, reacts with hydrochloric acid, slight broken zone at 28-30'.	[Pattern]	[Pattern]	30	8-38': 2" PVC 20-slot well screen
40	WBZ at 34-36' (~20 gpm).	[Pattern]	[Pattern]	40	27-38': 6" hammer bit
50	Total Depth = 38'	[Pattern]	[Pattern]	50	
60		[Pattern]	[Pattern]	60	

Driller <u>Eichelberger, Inc.</u>	Blown/Bailed Yield <u>20 gpm</u>	Bentonite Seal <u>5-6'</u>
Logged By <u>Scott A. Wendling</u>	Well Casing <u>6"</u> Dia. To <u>0-5</u> Ft.	Filter Pack Qty. <u>6-38'</u>
Drilling Started <u>5/14/90</u>	Casing Type <u>Steel</u>	Filter Pack Type <u>Morie #1</u>
Drilling Completed <u>5/14/90</u>	Well Screen <u>2"</u> Dia. <u>8</u> To <u>38'</u>	Static Water Level <u>15.74'</u> (grd.) MSL
Well Construction <u>PVC Well Screen</u>	Screen Type <u>PVC</u>	Date <u>5/17/90</u>
Well Developed _____	Slot Size <u>20 Slot</u>	Notes: _____
Water Bearing Zones <u>34-36'</u>	Drilling Mud _____	
	Grout Type <u>Quantity</u>	

Form #WL-AR-1 (02/90)

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AIR-ROTARY DRILLING LOG
 Client: Harley-Davidson, Inc.

Project No: 89254 Phase Task

Boring No. Piezometer No. MW-46
 Location Building 4 Area
 Surface Elev. 360.25 (Top of Drive-over) Page 1 of 1

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u>		Flush-mount Drive-over	0	T.O.C. Elev.
0-10	<u>Clayey Silt</u> : Brown, moist, rock fragments.			0-10	0-27': 8" hammer bit 4-5.5': Bentonite pellets
10-20	<u>Sandy Silt</u> : Reddish-brown, moist, rock fragments.			10-20	5.5-38': Morie #1 sand 8-38': 2" PVC 20-slot well screen
20-30	<u>Limestone</u> : Gray, broken, WBZ (~8 gpm). <u>Limestone</u> : Gray to bluish-gray, solid.			20-30	
30-40	<u>Limestone</u> : Gray, soft, broken. <u>Limestone</u> : Gray, solid.			30-40	27-39': 6" hammer bit
40	Total Depth = 39'			40	
50				50	
60				60	

Driller <u>Eichelberger, Inc.</u>	Blown/Bailed Yield <u>8 gpm</u>	Bentonite Seal <u>4-5.5'</u>
Logged By <u>Scott A. Wendling</u>	Well Casing <u>6"</u> Dia. To <u>0-3</u> Ft.	Filter Pack Qty. <u>5.5-38'</u>
Drilling Started <u>5/14/90</u>	Casing Type <u>Steel</u>	Filter Pack Type <u>Morie #1</u>
Drilling Completed <u>5/15/90</u>	Well Screen <u>2"</u> Dia. <u>8</u> To <u>38'</u>	Static Water Level <u>15.30'</u> (grd.) MSL
Well Construction <u>PVC Well Screen</u>	Screen Type <u>PVC</u>	Date <u>5/17/90</u>
Well Developed _____	Slot Size <u>20 Slot</u>	Notes: _____
Water Bearing Zones <u>24-26'</u>	Drilling Mud _____	
	Grout Type <u>Quantity</u>	

Form #WL-AR-1 (02/90)

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AIR-ROTARY DRILLING LOG

Client: Harley-Davidson, Inc.

Boring No. _____ Piezometer No. MW-47

Location Building 4 Area

Project No: 89254 Phase _____ Task _____

Surface Elev. 361.74' (Top of Drive-over) Page 1 of 1

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u>		Flush-mount Drive-over	0	T.O.C. Elev.
0-5'	<u>Clayey Silt</u> : Brown, some rock fragments.			0-5'	8" hammer bit
5-10'	<u>Sandy Silt</u> : Yellowish-brown to reddish-brown, etched quartz fragments.			5-10'	Backfilled with cuttings
10-12'	<u>Silty Sand</u> : As above, more rock fragments.			10-12'	Bentonite pellets
12-35'	<u>Sandy Silt</u> : Yellowish-brown to reddish-brown, rock fragments.			12-35'	Morie #1 sand
15-35'				15-35'	2" PVC 20-slot well screen
33-56'	Silt/mud-filled voids, some gravel, poor circulation.			35-56'	Caved formation
33-35'	WBZ at 33-35' (~5 gpm).				
	Total Depth = 56'				

Driller <u>Eichelberger, Inc.</u>	Blown/Bailed Yield <u>5 gpm</u>	Bentonite Seal <u>10-12'</u>
Logged By <u>Scott A. Wendling</u>	Well Casing <u>6" Dia.</u> To <u>0-3</u> Ft.	Filter Pack Qty. <u>12-35'</u>
Drilling Started <u>5/15/90</u>	Casing Type <u>Steel</u>	Filter Pack Type <u>Morie #1</u>
Drilling Completed <u>5/15/90</u>	Well Screen <u>2" Dia.</u> <u>15</u> To <u>35'</u>	Static Water Level <u>15.99'</u> (grd. MSL)
Well Construction <u>PVC Well Screen</u>	Screen Type <u>PVC</u>	Date <u>5/17/90</u>
Well Developed _____	Slot Size <u>20 Slot</u>	Notes: _____
Water Bearing Zones <u>33-35'</u>	Drilling Mud _____	
	Grout Type _____ Quantity _____	

Depth Feet	Overburden/Lithologic Description	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u>		Flush-mount Drive-over	0	T.O.C. Elev.
0-10	<u>Sandy Silt</u> : Reddish-brown, abundant quartz gravel and large rock fragments.			0-40'	8" hammer bit
10-20	Moist returns at 18'. WBZ at 20' (~5 gpm).			1-2'	Bentonite pellets
20-30	25-39': Silt/mud-filled voids, some gravel, poor circulation.			2-23'	Morie #1 sand
30-40	<u>Limestone</u> : Gray, solid?. Total Depth = 40'			2-22'	2" PVC 20-slot well screen
40-60				25-40'	Caved formation

Driller <u>Eichelberger, Inc.</u>	Blown/Bailed Yield <u>5 gpm</u>	Bentonite Seal <u>1-2'</u>
Logged By <u>Scott A. Wendling</u>	Well Casing <u>6"</u> Dia. To <u>0-4</u> Ft.	Filter Pack Qty. <u>2-23'</u>
Drilling Started <u>5/15/90</u>	Casing Type <u>Steel</u>	Filter Pack Type <u>Morie #1</u>
Drilling Completed <u>5/16/90</u>	Well Screen <u>2"</u> Dia. <u>2</u> To <u>22'</u>	Static Water Level <u>13.90'</u> (grd.) MSL
Well Construction <u>PVC Well Screen</u>	Screen Type <u>PVC</u>	Date <u>5/17/90</u>
Well Developed _____	Slot Size <u>20 Slot</u>	Notes: _____
Water Bearing Zones <u>20'</u>	Drilling Mud _____	
	Grout Type _____ Quantity _____	

r.e. wright associates, inc.

AIR-ROTARY DRILLING LOG			Boring No.	Piezometer No. MW-49SD		
Client: Harley Davidson			Location Adjacent to Building 4			
Project No: 91328		Phase 1	Task 1-	Surface Elev.	Page 1 of 3	
Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface				0	T.O.C. Elev. 363.56
0-12	Silty Clay: Orangish-brown, moist, soft, lots of quartz fragments (0-12').	0	7-1 7-7 7-7 7-7 7-7 7-7		0-10	6" ODEX casing +2-61'
12-29	Sandy Gravel: Loose, wet, lots of quartz and sandstone pebbles and cobbles (12-29').	0			20	
27-35	Weathered Limestone: Gray, angular, some chunks of mud (27-35').	113			30	
35-38	Limestone: Gray, angular, some quartz fragments (35-38').	60			40	
38-48	Soft Zone: Clay, gravel, and angular limestone cobbles (38-48').	22			50	
52-53	Fracture, Q = 30 gpm (52-53').	40			60	
48-61	Limestone: Gray, angular, some calcite fragments (48-61').	12				

Driller Eichelbergers (Books II)
 Logged By D. McCarthy/T. Marrs
 Drilling Started 10/15/91
 Drilling Completed 10/21/91
 Well Construction 10/21/91
 Well Developed N/A
 Water Bearing Zones 52-53, 73.5-75, 198-202

Blown/Bailed Yield ~35 gpm
 Well Casing 2" Dia. To +2-135' Ft.
 Casing Type PVC flush mount
 Well Screen 2" Dia. 135-155' To 202-212'
 Screen Type PVC flush mount
 Slot Size 20 slot
 Drilling Mud N/A
 Grout Type Benseal Quantity 61-133'

Bentonite Seal 155-158, 178-200.5
 Filter Pack Qty. 134.5-155, 200.5-212
 Filter Pack Type #1 Morie sand
 Static Water Level _____ MSL

Date _____
 Notes: _____

AIR-ROTARY DRILLING LOG

Client: Harley Davidson

Boring No.

Piezometer No. MW-49SD

Location Adjacent to Building 4

Project No: 91328

Phase 1

Task 1

Surface Elev.

Page 2 of 3

Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60	Limestone: Gray, fine grained, massive (61-73.5').	10	[Graphic Log]	[Well Construction Graphic]	60	
70		60			70	
80	Limestone with weathered brown fragments and abundant calcite (73.5-75').	0	[Graphic Log]	[Well Construction Graphic]	80	
90		0			90	
100	Limestone: Gray, fine grained, massive (75-127').	0	[Graphic Log]	[Well Construction Graphic]	100	Benseal (61-133')
110		0			110	
120	Limestone: Abundant calcite vein filling (127-140').	0	[Graphic Log]	[Well Construction Graphic]	120	
130		0			130	
140		0	[Graphic Log]	[Well Construction Graphic]	140	

AIR-ROTARY DRILLING LOG

Client: Harley Davidson

Boring No.

Piezometer No. MW-49SD

Location Adjacent to Building 4

Project No: 91328

Phase 1

Task 1

Surface Elev.

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Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
140		0	0		140	
150		0	0		150	#1 Morie sand (134.5-155')
160	Limestone: Hard, gray, massive (140-198').	0	0		160	Bentonite pellets (155-158')
170		0	0		170	3/8" Pea Gravel (158-178')
180		0	0		180	
190		0	0		190	Bentonite pellets (178-200.5')
200	Limestone: Soft zone, Q = approximately 5 gpm (198-202').	0	0		200	
210	Limestone: Hard, gray, massive (202-220').	0	0		210	#1 Morie sand (200.5-212') 2" PVC FJ screen 20 slot (202-212')
220	TD = 220'.	0	0		220	3/8" Pea gravel (211-221')

AIR-ROTARY DRILLING LOG			Boring No.	Piezometer No. MW-50SD		
Client: Harley Davidson			Location West parking lot			
Project No: 91328	Phase 1	Task 1	Surface Elev.	Page 1 of 3		
Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface				0	T.O.C. Elev. 361.6 6" Protective Casing
0-27	Silty Clay: Reddish-brown, moist, loose, some rock fragments (0-27').	5 7	[Symbolic Log]	[Well Construction]	0-27	Benseal (2-42')
27-34	Void (27-34'). Water at 30'.	15	[Symbolic Log]	[Well Construction]	27-34	2" PVC riser pipe (+2-110', +2-160')
34-57	Sandy Gravel: Rounded (34-57').	22	[Symbolic Log]	[Well Construction]	34-57	Hole plug, #2 Morie sand, 3/8" Pea gravel (42-44')
57-66	Limestone: Solid (57-66').	5 3 4	[Symbolic Log]	[Well Construction]	57-66	Collapsed hole (44-102')

Driller <u>Eichelbergers (Books II)</u>	Blown/Bailed Yield <u>3 gpm</u>	Bentonite Seal <u>102-104', 153-157'</u>
Logged By <u>D. McCarthy</u>	Well Casing <u>2" Dia. To +2-110' Ft. +2-160'</u>	Filter Pack Qty. <u>104-120', 157-170'</u>
Drilling Started <u>9/18/91, 0915</u>	Casing Type <u>PVC</u>	Filter Pack Type <u>#2 Morie sand</u>
Drilling Completed <u>9/23/91, 1100</u>	Well Screen <u>2" Dia. 110-170' To 160-170'</u>	Static Water Level <u>S = 18.5' MSL D = 19.1'</u>
Well Construction <u>9/24/91</u>	Screen Type <u>PVC</u>	Date <u>9/24/91</u>
Well Developed <u>N/A</u>	Slot Size <u>20 slot</u>	Notes: _____
Water Bearing Zones <u>117'</u>	Drilling Mud <u>N/A</u>	
	Grout Type <u>Benseal</u> Quantity <u>2-42</u> (32 bags)	

AIR-ROTARY DRILLING LOG
 Client: Harley Davidson
 Project No: 91328 Phase 1 Task 1

Boring No. Piezometer No. MW-50SD
 Location West parking lot
 Surface Elev. Page 2 of 3

Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60	Soft zone (66-67').	0	[Pattern]	[Pattern]	60	
70		0	[Pattern]	[Pattern]	70	
80	Solid limestone (67-117').	0	[Pattern]	[Pattern]	80	
90		0	[Pattern]	[Pattern]	90	
100		0	[Pattern]	[Pattern]	100	
110		0	[Pattern]	[Pattern]	110	Bentonite Pellets (102-104')
120	WBZ, Q = 2.5-3 gpm (117-118').	0	[Pattern]	[Pattern]	120	#2 Morie sand (104-120') 2" PVC 20-slot well screen (110-120')
130	Limestone: As above (118-170').	0	[Pattern]	[Pattern]	130	#2 Morie sand. (120-125') Hole plug (125-129')
140		0	[Pattern]	[Pattern]	140	Hole cuttings and 3/8" pea gravel (129-157')

AIR-ROTARY DRILLING LOG

Client: Harley Davidson

Boring No. Piezometer No. MW-50SD

Location West parking lot

Project No: 91328 Phase 1 Task 1

Surface Elev. Page 3 of 3

Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
140			[Hatched Pattern]	[Dotted Pattern]	140	
150		0	[Hatched Pattern]	[Dotted Pattern]	150	
160		0	[Hatched Pattern]	[Dotted Pattern]	160	Bentonite Pellets (153-157')
170			[Hatched Pattern]	[Dotted Pattern]	170	3/8" Pea gravel (157-170') 2" Pre-packed screen (160-170')
	TD = 170'.					

AIR-ROTARY DRILLING LOG		Boring No. MW-51S	Piezometer No.			
Client: Harley Davidson		Location Western parking lot				
Project No: 91328	Phase 1	Task 1	Surface Elev. 364.19 [TOC]			
Page 1 of 1						
Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	Ground Surface				0	T.O.C. Elev. 6" Protector Pipe (+2.5-17')
0-10.5'	Silty Clay: Brown, moist (0-10.5').	0	[Symbol]	[Symbol]	0-10	Benseal (0-23')
10.5-18'	Weathered limestone bedrock (10.5-18').	0	[Symbol]	[Symbol]	10-20	
17.0'	Set temporary 6" casing at 17.0'.				20	
18-38'	Limestone: Solid, gray, angular fragments, microxline (18-38').	0	[Symbol]	[Symbol]	20-30	Bentonite Pellets (23-28')
23-28'					30	Centralizer/bentonite bridge
34-44'					40	2" Pre-packed screen (34-44')
38-51'	Void 38-51'. Mud filled. Some gravel and angular limestone flakes, mostly water.	55	[Symbol]	[Symbol]	40-50	
51'	TD = 51'.				50	
60					60	

Driller <u>Eichelbergers (Books II)</u>	Blown/Bailed Yield <u>~ 5 gpm</u>	Bentonite Seal <u>23-28' pellets</u>
Logged By <u>D. McCarthy</u>	Well Casing <u>2" Dia. To +4' 33 Ft.</u>	Filter Pack Qty. <u>N/A</u>
Drilling Started <u>10/1/91</u>	Casing Type <u>PVC flush mount</u>	Filter Pack Type <u>N/A</u>
Drilling Completed <u>10/2/91</u>	Well Screen <u>2" Dia. 33' To 43'</u>	Static Water Level <u>MSL</u>
Well Construction <u>10/14/91</u>	Screen Type <u>PVC pre-pack</u>	Date _____
Well Developed <u>N/A</u>	Slot Size <u>20</u>	Notes: <u>Hole collapsed to 44', while drilling MW-51D.</u>
Water Bearing Zones <u>38-51</u>	Drilling Mud <u>N/A</u>	
	Grout Type <u>Benseal</u> Quantity <u>0.23'</u>	

AIR-ROTARY DRILLING LOG

Client: Harley Davidson

Boring No. MW-51D Piezometer No.

Location West parking lot

Project No: 91328

Phase 1

Task 1 -

Surface Elev.

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Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u>				0	T.O.C. Elev. 364.42
0-10'	<u>Silty Clay</u> : Light brown, moist, some rounded quartz fragments (0-10').	0/106			0-10	Concrete percolation collar (0-1')
11-12'	<u>Silty Clay</u> : Dark brown, some limestone fragments (11-12').	0/0			10-12	
12-37'	<u>Limestone</u> : Gray, some calcite fragments (12-37').	0/0			12-37	Benseal (1-47.5')
37-44'	<u>Soft zone/limestone fragments, quartz fragments.</u> Q = 15 gpm (37-44').	0/0			37-44	
44-62'	<u>Limestone</u> : Same as above (44-62').	0/0			44-62	Hole plug (47.5-55')

Driller <u>Eichelbergers (Books II)</u>	Blown/Bailed Yield <u>~1 gpm</u>	<u>Pellets and Bentonite Seal Hole plug (75-88')</u>
Logged By <u>D. McCarthy</u>	Well Casing <u>2"</u> Dia. To <u>+3'</u> 110 Ft.	Filter Pack Qty. <u>88-120'</u> (2 bags)
Drilling Started <u>10/10/91, 0900</u>	Casing Type <u>PVC</u>	Filter Pack Type <u>3/8" Pea gravel</u>
Drilling Completed <u>10/11/91, 1345</u>	Well Screen <u>2" Dia 110'</u> To <u>120'</u>	Static Water Level <u>21.84</u> MSL
Well Construction <u>10/14/91, 1400-1600</u>	Screen Type <u>Pre-pack</u>	Date <u>10/28/91</u>
Well Developed <u>N/A</u>	Slot Size <u>20 slot</u>	Notes: <u>ODEX used from 0-60'.</u>
Water Bearing Zones <u>37-44', 72'</u>	Drilling Mud <u>N/A</u>	
	Grout Type <u>Benseal</u> Quantity <u>27-47.5'</u>	

AIR-ROTARY DRILLING LOG

Client: Harley Davidson

Boring No. MW-51D

Piezometer No.

Location West parking lot

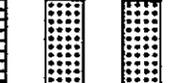
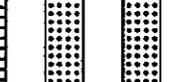
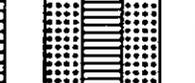
Project No: 91328

Phase 1

Task 1

Surface Elev.

Page 2 of 2

Depth Feet	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
60	6" casing set at 62.5'	0/0			60	Collapsed formation (55-75')
70	WBZ at 72', approximately 1 gpm.	0/0			70	Hole plug (75-80')
80	Limestone: As above (62-100').				80	Bentonite pellets (80-88')
90					90	
100					100	3/8" Pea gravel (88-120')
110	Limestone: As above (100-120').				110	2" PVC riser pipe (+4-110')
120	TD = 120'.				120	2" PVC pre-packed screen (110-120')

AIR-ROTARY DRILLING LOG

Client: Harley-Davidson, Inc.

Boring No. MW-52

Piezometer No.

Location Drum Storage Area

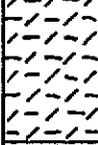
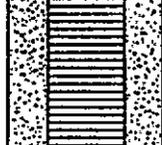
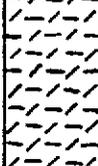
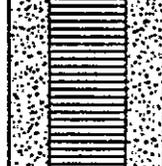
Project No: 91330

Phase 1

Task 1

Surface Elev.

Page 1 of 1

Depth Feet	Overburden/Lithologic Description	VOA	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0	<u>Ground Surface</u>				0	T.O.C. Elev. 368.55
0-1.5'	MACADAM (0-1.5').					
1.5-2.0'	CRUSHED STONE (1.5-2.0').					
2.0-14.0'	SILTY CLAY, yellowish-brown, moist, firm (2.0-14.0').	5-6				4" PVC riser pipe (+1-6.0') Bentonite pellets (3.0-4.0')
14.0-29.0'	SILTY CLAY, brown to grayish-brown (14.0-29.0').					#0 Morie sand (4.0-36.0')
29.0-32.0'	WEATHERED LIMESTONE (29.0-32.0').					4" PVC flush-joint 20-slot screen (6.0-36.0')
32.0-46.0'	CLAYEY SILT, brown (32.0-46.0'). Lots of limestone and rock fragments.					4" PVC bottom plug
36.0-46.0'						Screen reset to 36.0' after sand bridge elevated pipe 8.0'
	Total Depth: 46.0' (11/25/91)					#0 Morie sand (36.0-46.0')

Driller <u>Eichelberger (Books II)</u>	Blown/Bailed Yield <u>~ 2 gpm</u>	Bentonite Seal <u>3.0-4.0'</u>
Logged By <u>PMD/DJM</u>	Well Casing <u>4" Dia. To 6.0 Ft.</u>	Filter Pack Qty. <u>4.0-46.0'</u>
Drilling Started <u>11/22/91</u>	Casing Type <u>PVC Flush-joint Riser Pipe</u>	Filter Pack Type <u>#0 Morie Sand</u>
Drilling Completed <u>11/25/91</u>	Well Screen <u>4" Dia. 6.0' To 36.0'</u>	Static Water Level <u>7.22' MSL</u>
Well Construction <u>11/25/91</u>	Screen Type <u>PVC Flush-joint</u>	Date <u>11/25/91</u>
Well Developed <u>N/A</u>	Slot Size <u>20-slot</u>	Notes: _____
Water Bearing Zones <u>14.0', 43.0'</u>	Drilling Mud <u>N/A</u>	
	Grout Type <u>Quantity</u>	

SOIL BORING LOG

Client: HARLEY-DAVIDSON

Boring No. MW-53

Piezometer No.

Location DRUM STORAGE AREA

Project No: 91330

Phase

Task

Surface Elev.

Page 1 of 1

Depth Feet	Blow Counts	Recovery/RQD.	Overburden/Lithologic Description	VOA (ppm)	Graphic Log	Well Construction Graphic	Depth Feet	Well Construction Details
0			Ground Surface				0	T.O.C. Elev. Flushmount 308.2 Driveover
0-2'			ASPHALT AND GRAVEL SUBBASE (0-2').					10" hollow-stem auger borehole (0-30').
2-26'			SILTY CLAY: orange-brown soft, with some rounded quartz fragments (2-26').	< 1			10	4" PVC riser pipe (0.5-8').
26-30'			SILTY CLAY: Orange-brown with rounded quartz gravels (26-30').	< 1			20	#1 Morie sand (5-30').
30'			SILTY CLAY: Orange-brown with rounded quartz gravels (26-30').	< 1			30	Bentonite Pellets (4-5').
			LIMESTONE (30').	< 1				Concrete (0-4').
			TOTAL DEPTH = 30'					4" PVC screen 20-slot (8-28').

Driller <u>Eichelbergers</u>	Blown/Bailed Yield <u>~ 1.1 gpm</u>	Bentonite Seal <u>Bentonite Pellets (4-5')</u>
Logged By <u>Tom Marrs</u>	Well Casing <u>4"</u> Dia. To <u>8</u> Ft.	Filter Pack Qty. <u>5-30'</u>
Drilling Started <u>11/26/91</u>	Casing Type <u>PVC Riser Pipe</u>	Filter Pack Type <u>#1 Morie Sand</u>
Drilling Completed <u>11/26/91</u>	Well Screen <u>4"</u> Dia. <u>8'</u> To <u>28'</u>	Static Water Level <u>7.78'</u> MSL
Construction Completed <u>11/26/91</u>	Screen Type <u>PVC Flushmount</u>	Date <u>1/2/92</u>
Development Completed <u>N/A</u>	Slot Size <u>20 Slot</u>	Notes: _____
Water Bearing Zones <u>N/A</u>	Drilling Mud <u>N/A</u>	_____
	Grout Type <u>Concrete (0-4')</u>	_____

SOIL BORING LOG

Boring No. **SB-12** Piezometer No. **MW-54**

Client: **Harley-Davidson, Inc.**

Location **Bldg #2 TCA Degreaser Investigation**

Project No: **92276** Phase **5** Task **1**

Surface Elev. **365.08 FT.** Page **1** of **3**

Depth Feet	Blow Count	Sampler Re-covery/ ROD	Overburden/Lithologic Description	PID (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0	Ground Surface	FEET	Concrete				0	T.O.C. Elev.
			Gravel Fill					Metal cover flush with ground surface. 0.3-20.5' 2" Sch 40 PVC FT casing. 4.25 inch borehole from 1.0-17.2'. 3.25 inch core hole from 17.2-30.7'. Slotted interval 20.5-30.3'. 2.0-17.0' Bentonite
	3-7-10-11	1.1	Strong Br (7.5YR 4/6) Silty CLAY (CL), with 10-15% fine to very fine sand, minor Fe/Mn staining, dry, very stiff.	9				
	6-9-11-9	1.9	A/A, with few subangular to subrounded quartzose GRAVEL to 1 1/2" diameter, dry, very stiff. (CL)	7				
5	5-6-10-11	0.9	A/A, with minor GRAVEL, minor garnets to 1/4" diameter, slightly damp, very stiff. (CL)	11			5	Borehole sampled from 1.0-17.2' (refusal with 2" Split Spoon sampler-4 1/2" DD threaded casing driven to 17.2') cased boring. Reamed to 3/4" with Tri-Core roller bit to 17.5'. Cored with Nx core bit from 17.5-30.7'.
	7-10-10-9	1.1	A/A (CL)	6				
	6-7-10-10	1.5	Quartz fragments at 8.7', slightly damp.	8				
10			A/A				10	
	9-11-7-8	2.0	Strong Mn discoloration at 10.8-10.9'. Gravel (quartzose to limestone) material from 10.8-12.6'. (GP)	6				

Continued Next Page

Driller BS & T	Blown/Bailed Yield N/A	Bentonite Seal N/A
Logged By PGW	Well Casing 2" Dia. 0.3' to 20.5'	Filter Pack Qty. ~10 quart jars
Drilling Started 7/7/93	Casing Type Sch 40 PVC	Filter Pack Type #00 morie sand
Drilling Completed 7/7/93	Well Screen 2" Dia. 20.5' to 30.5'	Static Water Level 341.73 MSL
Construction Completed 7/7/93	Screen Type .010" machine	Date 7/29/93
Development Completed 7/29/93	Slot Size .010"	Notes: _____
Water Bearing Zones WBZ at 25.5-27.5'	Drilling Mud N/A	
	Grout Type pellets/granular	



SOIL BORING LOG

Client: Harley-Davidson, Inc.

Boring No. SB-12

Piezometer No. MW-54

Location Bldg #2 TCA Degreaser Investigation

Project No: 92276

Phase 5

Task 1

Surface Elev. 365.08 FT.

Page 2 of 3

Depth Feet	Blow Count	Sampler Recovery/RQD	Overburden/Lithologic Description	PID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page								
	7-7-6-9	0.1	Strong Br (7.5YR 5/6) Clayey GRAVEL/Gravelly CLAY (GC/CL), with 30-40% coarse fragments to 1" diameter (quartz, quartzose sandstone, limestone gravels, minor Mn staining, damp, firm.				15	
15	11-5-6-6	0.2	Strong Br (7.5YR 5/6) Silty/Gravelly CLAY (CL). 1 1/2" diameter rounded quartz GRAVEL blocking core, moist.				15	
		7.5	17.0'-17.2' Med to Dk Br (10YR 4/3) CLAY, < 10% coarse fragments, fine to medium sand, moist, stiff. (CL)				20	
20			Lt to Dk Gray LIMESTONE, micro-crystalline, primarily horizontal bedding with 1/4 to 1" thick beds and 1/2" thick beds common, slightly to moderately fractured, tight to open 1/8" apertures with calcite along fracture surfaces. Fracture orientation 5 to 25 degrees to vertical core axis, fresh to deeply weathered, moderate hardness to hard, slightly folded beds from 28-31.5', wet at 25'.				20	
25		5.7					25	

Continued Next Page



SOIL BORING LOG

Client: **Harley-Davidson, Inc.**

Boring No. **SB-12**

Piezometer No. **MW-54**

Project No: **92276**

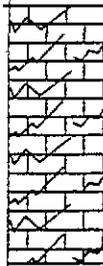
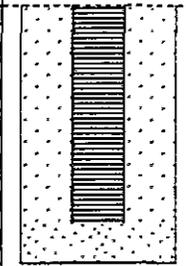
Phase **5**

Task **1**

Location **Bldg #2 TCA Degreaser Investigation**

Surface Elev. **365.08 FT.**

Page **3** of **3**

Depth Feet	Blow Count	Sampler Re- covery/ ROD	Overburden/Lithologic Description	PID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page								
30			BORING TERMINATED at 30.7 ft bgs.				30	Cap 30.3-30.7'
35							35	
40							40	



SOIL BORING LOG

Client: Harley-Davidson, Inc.

Boring No. SB-13

Piezometer No. MW-55

Project No: 92276

Phase 5

Task 1

Location Bldg #2 TCA Degreaser Investigation

Surface Elev. 365.06 FT.

Page 1 of 3

Depth Feet	Blow Count	SAMPLER Re-covery/ ROD	Overburden/Lithologic Description	RID (ft)	GRAPHIC LOG	Well Construction Graphics	Depth Feet	Well Construction Details
0	Ground Surface	FEET	Concrete				0	T.O.C. Elev. Metal cover flush with ground surface.
6-6-6-7		1.9	Gravel (Fill) Strong Br (7.5YR 4/6) Silty CLAY (CL) with Gravel, 20-30% quartzose gravel subrounded to 3/4" diameter, common Fe/Mn staining, dry, stiff.	95				0.25-21.05' 2" SCH 40 PVC flush threaded casing. 21.05-30.9' 0.010" slotted casing 2.0-18.5' Bentonite 18.5-31.0' #00 Morie DTW BTOC 24.67' on 7/9/93 Cap 30.9'-31.2'
6-5-7-6		1.8	A/A, Silty CLAY (CL) without gravel, with color change at 3.4' to Dk Yellowish Br (10YR 3/4), common Mn staining, dry, stiff.	114				
6-6-12-10		2.0	A/A (CL) with color change at 4.8' to Yellowish Br (10 YR 5/4) with minor rounded quartzose gravel to 3/4" diameter, increasing clay percentage, 5-10% silt, minor Mn staining, damp, very stiff.	69				
16-26-20-20		2.0	GRAVEL from 6.2-6.8' in CLAY (GC), rapid gradational contact from subrounded to subangular gravels to 1 1/4" diameter to fine to coarse sand + fine to coarse gravel, mainly quartzitic gravel (metaquartzite), common Fe staining, rare garnets, dry, hard.	30				
14-3-11-13		1.0	A/A (GC), through 9' broken/crushed gravel + subrounded to rounded gravels up to greater than 1" diameter, dry, loose.	230				
			Clayey GRAVEL (GC) at 9.3-10', slightly damp, very stiff.					
			Decreasing Gravel.					
4-5-8-9		2.2	Yellowish Br (10YR 5/4) Silty CLAY with GRAVEL (CL), damp, very stiff.	120			10	2" continuous Split Spoon sampling from 1.0-22.3'. 4.25" threaded casing driven to 22.3'+. Reamed with 3.25" Tri-Core roller bit. Rock core taken from 22.5-31.5' with Nx core

Continued Next Page

Driller <u>BS & T</u>	Blown/Bailed Yield <u>N/A</u>	Bentonite Seal <u>pellets/granular</u>
Logged By <u>PGW</u>	Well Casing <u>2"</u> Dia. <u>-0.2' to 20.85'</u>	Filter Pack Qty. <u>N/A</u>
Drilling Started <u>7/8/93</u>	Casing Type <u>PVC</u>	Filter Pack Type <u>#00 Morie sand</u>
Drilling Completed <u>7/8/93</u>	Well Screen <u>2"</u> Dia. <u>-20.85 to 30.6'</u>	Static Water Level <u>341.64</u> MSL
Construction Completed <u>7/8/93</u>	Screen Type <u>PVC</u>	Date <u>7/29/93</u>
Development Completed <u>7/29/93</u>	Slot Size <u>.010"</u>	Notes:
Water Bearing Zones <u>WBZ at 25-31'</u>	Drilling Mud <u>N/A</u>	
	Grout Type <u>N/A</u>	

SOIL BORING LOG

Client: Harley-Davidson, Inc.

Project No: 92276

Phase 5

Task 1

Boring No. SB-13

Piezometer No. MW-55

Location Bldg #2 TCA Degreaser Investigation

Surface Elev. 365.06 FT.

Page 2 of 3

Depth Feet	Blow Count	Sampler Re-covery/ ROD	Overburden/Lithologic Description	PID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page								
	4-5-8-11	2.1	Minor rounded to subrounded GRAVEL up to 3/8" diamter. Minor Fe staining, no Mn staining. Minor Mn staining at 13'.	127				bit.
15	9-11-10-12	2.2	GRAVEL up to greater than 1" diameter at 14'. Yellowish Br (10YR 5/4) Silty CLAY (CL), rare gravel, <5% fine-coarse sand, abundant Mn staining slightly damp, very stiff.	280			15	
	9-11-10-12	2.0	Gradational contact at 17.5', increasing gravel, 5-15% coarse fragments, gravel up to 1/2" diameter. Minor mottles from 18.5-19.0'.	233				
20	5-7-7-7	2.0	A/A, with common Mn staining, damp, stiff. Moist to wet at 20.7'.	158			20	
	4-5-50/0.3'	1.5	Dk Yellow (10YR 3/4) SILT (ML), 5-10% clay, moist, firm.	271				
		3.0	Med to Dk Gray LIMESTONE, micro-crystalline, horizontal bedding, with 1/4 to 1" thick beds, 1/2" thick beds common, slight to moderate fracturing and locally intense with tight 1/16" to open unknown apperatures. Fracture orientation 20-70 degrees to vertical core axis with common calcite along fracture surfaces, none to common bioturbation, moderate hardness to hard, fresh to deeply weathered along fractures, wet at 25'.					Auger refusal at 22.3'.
25		3.0	28-31' Clayey Silt-filled void, wet.				25	
Continued Next Page								



SOIL BORING LOG

Client: Harley-Davidson, Inc.

Boring No. SB-13

Piezometer No. MW-55

Project No: 92276

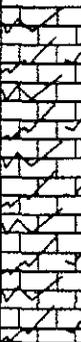
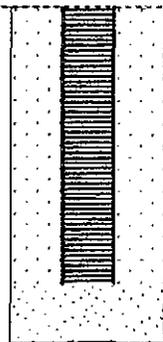
Phase 5

Task 1

Location Bldg #2 TCA Degreaser Investigation

Surface Elev. 365.06 FT.

Page 3 of 3

Depth Feet	Blow Count	Sampler Re-covery/ RQD	Overburden/Lithologic Description	PID (PPR)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page								
30		0.35 NR	Clay seam. BORING TERMINATED at 31.5 ft bgs.				30	
35							35	
40							40	



SOIL BORING LOG

Client: **Harley-Davidson**

Project No: **93386**

Phase **1**

Task **3**

Boring No. **SB-7**

Piezometer No. **MW-56**

Location **East of Bldg #46**

Surface Elev. **372.57 FT.**

Page **1** of **3**

Depth Feet	Blow Count	Sampler Re-covery/RQD	Overburden/Lithologic Description	PID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0	Ground Surface	FEET	Asphalt				0	T.O.C. Elev.
			Gravel Fill to 3-inch diameter, wet beneath asphalt.					Metal well cover flush with ground surface. Locking compression cap.
	3-5-20-18 3"SS	1.8	Lt Br/Tan Silty SAND (SC), with Gravels, minor to common Fe staining, stiff, dry.	22				3.25 inch ID H.S.A. drilling to 26.5' bgs with 2- & 3-inch Split Spoon driven with a 140-lb drive hammer using a 30-inch drop.
	5-4-4	1.2	Lt Gray Clayey GRAVEL (GC), with greater than 50% coarse fragments to greater than 1-inch diameter, firm, damp.	28				0.5-3' Concrete
5	4-3-4	1.5	Lt Br to Gray Clayey GRAVEL (GC), with greater than 60% coarse fragments, crushed quartz (rounded to subrounded) to greater than 1-inch diameter, common Fe staining, firm, dry to damp.	25			5	3-20' Bentonite
	2-4-4	1.2						
	3-2-2	1.2	Lt Reddish Br Clayey GRAVEL (GC), with greater than 75% gravels (quartz), limestone fragments, phyllite, mica, fine to coarse sand, Fe staining on quartz, damp.	40				
			As above (GC), Lt Reddish Br, with common Fe staining, damp.	28				
	1-2-2	1.4						
10			Reddish Br Gravelly CLAY (CL), with greater than 20% coarse fragments (locally greater than 40%), gravels to greater than 1 1/2-inch diameter, common to heavy Fe staining, damp.	23			10	

Continued Next Page

Driller Echelberger
 Logged By Paul Werner
 Drilling Started 11/16/93
 Drilling Completed 11/16/93
 Construction Completed 11/17/93
 Development Completed 11/18/93
 Water Bearing Zones WBZ at ~25 ft.

Blown/Bailed Yield N/A
 Well Casing 2" Dia. 0.35 to 27"
 Casing Type N/A
 Well Screen 2" Dia. 27" to 37"
 Screen Type pre-packed PVC
 Slot Size 0.010"
 Drilling Mud N/A
 Grout Type bentonite

Bentonite Seal granular
 Filter Pack Qty. 4 bags
 Filter Pack Type #00 Mnie sand
 Static Water Level 350.55 MSL
 Date 11/30/93

Notes: Soil boring SB-7 was drilled with H.S.A. on 9/17/93. Air Rotary borehole was drilled on 11/16/93 at location SB-7.



r.e. wright associates, inc.

SOIL BORING LOG

Client: Harley-Davidson

Boring No. SB-7

Piezometer No. MW-56

Project No: 93386

Phase 1

Task 3

Location East of Bldg #46

Surface Elev. 372.57 FT.

Page 2 of 3

Depth Feet	Blow Count	Sampler Re-covery/RGD	Overburden/Lithologic Description	PID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page								
15	3-2-4	1.3	As above (CL), with up to 20% coarse fragments, gravels to 3/4-inch diameter, common Mn staining, firm, dry to damp.	9			15	
20	wt of hammer	1.1	Reddish Br Sandy CLAY (CL), with rare gravels, fine to coarse sand, common Fe staining, soft, moist.	15			20	20-37' #00 Morie sand
25	wt of hammer	1.7	Reddish Br Gravelly CLAY (CL), with Dk Brownish Gray Clay, gravels to 1/2-inch diameter, fine to coarse sand, common Fe staining, soft, wet.	8			25	Static water level @ 23.5' bgs on 9/17/93. Water first encountered @ 24.6' bgs on 9/17/93.
			Med Br Silty CLAY (CL), wet.					27-37' pre-packed PVC screen 8 inch ID Air rotary drilling on 11/16/93.
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SOIL BORING LOG

Client: Harley-Davidson

Boring No. SB-7

Piezometer No. MW-58

Project No: 93386

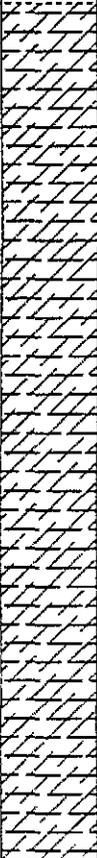
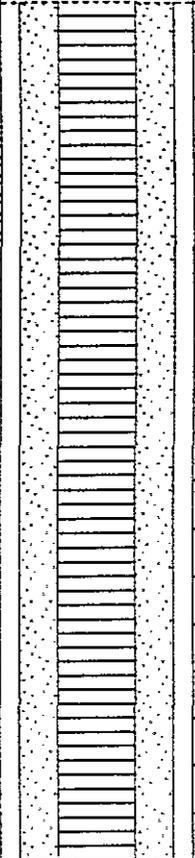
Phase 1

Task 3

Location East of Bldg #46

Surface Elev. 372.57 FT.

Page 3 of 3

Depth Feet	Blow Count	Sampler Re-covery/ ROD	Overburden/Lithologic Description	PID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page								
30			As above (CL).				30	
35			As above (CL), wet.				35	
40			BORING TERMINATED at 37 ft.				40	



SOIL BORING LOG

Client: **Harley-Davidson**

Boring No. **SB-16**

Piezometer No. **MW-57**

Project No: **93386**

Phase **1**

Task **3**

Location **South of Bldg #66**

Surface Elev. **364.31 FT.**

Page **1** of **3**

Depth Feet	Blow Count	Sampler Re-covery/ ROD	Overburden/Lithologic Description	PTD (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0	Ground Surface	FEET	Ashpalt				0	T.O.C. Elev.
			Gravel Fill					Metal well cover flush with ground surface. Locking compression cap.
	9-12-9-8 3"SS	2.0	Med to Dk Br Silty CLAY (CL), with little gravel (quartz) to 1-inch diameter, abundant Fe & Mn staining, very stiff, damp.	1				4.25 inch ID H.S.A. drilling to 26.5' bgs with 2- & 3-inch Split Spoon samplers driven with a 140-lb drive hammer using a 30 inch drop.
	8-12-21	1.5	As above (CL), with little gravel (quartz) to 1-inch diameter, minor Fe & Mn staining, hard, damp.	1				0.4-3' Concrete
5	6-15-24	1.5	As above (CL), with little gravel (quartz) to 1 1/2-inch diameter, abundant Fe & Mn staining, hard, damp.	1			5	3-23' Bentonite
	16-21-15	1.5	As above (CL), with some gravel (quartz) to 2-inch diameter, abundant Fe & Mn staining, hard, damp.	2				
	6-9-11	1.5	As above (CL), with trace gravel (quartz) to 1 1/2-inch diameter, abundant Fe & Mn staining, very stiff, damp.	2				
10	3-3-6	1.5	As above (CL), with trace gravel (quartz) to 1/8-inch diameter, minor Fe & Mn staining, stiff, damp.	2			10	

Continued Next Page

Driller <u>Eichelberger</u>	Blown/Bailed Yield <u>N/A</u>	Bentonite Seal <u>granular</u>
Logged By <u>Paul Dial</u>	Well Casing <u>2"</u> Dia. <u>0.35</u> to <u>25'</u>	Filter Pack Qty. <u>3 bags</u>
Drilling Started <u>11/17/93</u>	Casing Type <u>N/A</u>	Filter Pack Type <u>#00 Mordie sand</u>
Drilling Completed <u>11/17/93</u>	Well Screen <u>2"</u> Dia. <u>25</u> to <u>35'</u>	Static Water Level <u>345.11</u> MSL
Construction Completed <u>11/18/93</u>	Screen Type <u>pre-packed PVC</u>	Date <u>11/30/93</u>
Development Completed <u>11/19/93</u>	Slot Size <u>0.010"</u>	Notes: <u>Soil boring SB-16 was drilled with</u>
Water Bearing Zones <u>WBZ at ~23 ft.</u>	Drilling Mud <u>N/A</u>	<u>H.S.A. on 9/28/93. Air rotary borehole was</u>
	Grout Type <u>bentonite</u>	<u>drilled on 11/17/93 at location SB-16.</u>

SOIL BORING LOG

Boring No. SB-16

Piezometer No.

MW-57

Client: Harley-Davidson

Location South of Bldg #66

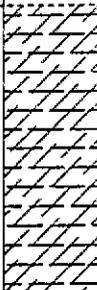
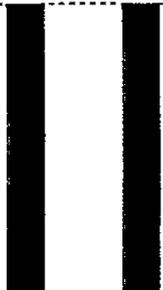
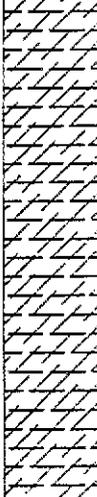
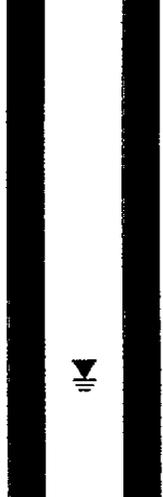
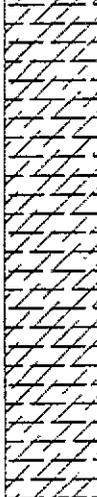
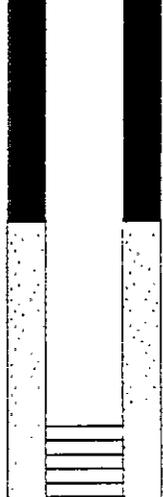
Project No: 93386

Phase 1

Task 3

Surface Elev. 364.31 FT.

Page 2 of 3

Depth Feet	Blow Count	Sampler Re-covery/ ROD	Overburden/Lithologic Description	PTD (PPR)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page								
15	3-4-6	1.5	Lt to Med Br Silty CLAY (CL), with few Gray areas, trace gravel (quartz) to 1/8-inch diameter, trace sand, abundant Fe & Mn staining, stiff, moist.	1			15	
20	3-4-4	1.5	As above (CL), with trace gravel (quartz) to 1/4-inch diameter, abundant Fe & Mn staining, firm, moist.	2			20	
25	3-6-13	1.5	As above (CL), with little sand, abundant Fe & Mn staining, very stiff, wet.	1			25	Water first encountered @ 23' bgs on 9/28/93. 23-35' #00 Marie sand
			As above (CL), wet.					Static water level @ 24.5' bgs on 9/28/93. 25-35' 0.010" slot pre-packed PVC screen
Continued Next Page								

Water first encountered @ 23' bgs on 9/28/93. 23-35' #00 Marie sand

Static water level @ 24.5' bgs on 9/28/93. 25-35' 0.010" slot pre-packed PVC screen

8 inch ID Air rotary drilling on 11/17/93.



SOIL BORING LOG

Client: **Harley-Davidson**

Boring No. **SB-16**

Piezometer No. **MW-57**

Project No: **93386**

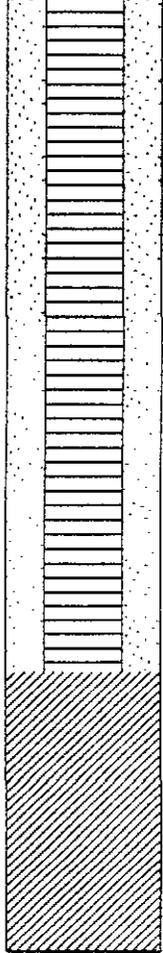
Phase **1**

Task **3**

Location **South of Bldg #66**

Surface Elev. **364.31 FT.**

Page **3** of **3**

Depth Feet	Blow Count	Sampler Re- covery/ RQD	Overburden/Lithologic Description	PTD (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
			Continued from previous page					
30			As above (CL), wet.				30	
35			As above (CL), wet.				35	35-38' Slough
			BORING TERMINATED at 38 ft.					
40							40	



SOIL BORING LOG

Client: **Harley-Davidson**

Project No: **93386**

Phase **1**

Task **3**

Boring No. **SB-20**

Piezometer No. **MW-58**

Location **In road between Bldgs #2 & #46**

Surface Elev. **365.28 FT.**

Page **1** of **3**

Depth Feet	Blow Count	Sampler Re-covery/RCD	Overburden/Lithologic Description	PID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0	Ground Surface	FEET					0	T.O.C. Elev.
			Asphalt					Metal well cover flush with ground surface. Locking compression cap.
			Gravel Fill					8 inch ID Air rotary drilling on 11/18/93.
			Med Br Silty CLAY (CL), with minor Fe staining, damp.					0.5-2' Concrete
5			Med Br Silty CLAY (CL), with abundant Fe staining, damp.				5	2-8' Bentonite
10			Dk Br Silty CLAY (CL), with abundant Fe staining, damp.				10	8-25' Slough

Continued Next Page

Driller <u>Echelberger</u>	Blown/Bailed Yield <u>N/A</u>	Bentonite Seal <u>granular</u>
Logged By <u>Paul Dial</u>	Well Casing <u>2"</u> Dia. <u>0.35</u> to <u>25'</u>	Filter Pack Qty. <u>1 bag</u>
Drilling Started <u>11/18/93</u>	Casing Type <u>N/A</u>	Filter Pack Type <u>#00 Morie sand</u>
Drilling Completed <u>11/18/93</u>	Well Screen <u>2"</u> Dia. <u>25'</u> to <u>35'</u>	Static Water Level <u>346.37</u> MSL
Construction Completed <u>11/18/93</u>	Screen Type <u>pre-packed PVC</u>	Date <u>11/30/93</u>
Development Completed <u>11/24/93</u>	Slot Size <u>0.010"</u>	Notes: _____
Water Bearing Zones <u>WBZ at ~28 ft.</u>	Drilling Mud <u>N/A</u>	_____
	Grout Type <u>bentonite</u>	_____



SOIL BORING LOG

Client: **Harley-Davidson**

Boring No. **SB-20**

Piezometer No. **MW-58**

Project No: **93386**

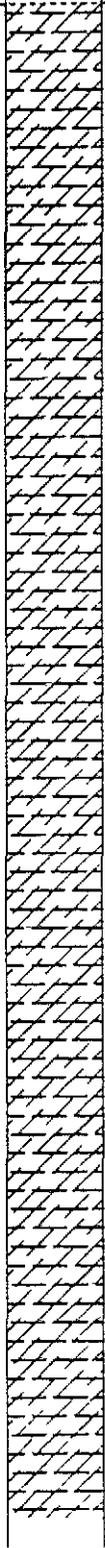
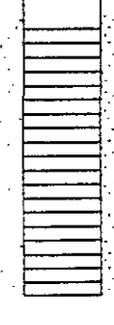
Phase **1**

Task **3**

Location **In road between Bldgs #2 & #46**

Surface Elev. **365.28 FT.**

Page **2** of **3**

Depth Feet	Blow Count	Sampler Re- covery/ ROD	Overburden/Lithologic Description	PID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
			Continued from previous page					
15			As above (CL).				15	
20			As above (CL).				20	Static water level @ 22.42' bgs on 11/18/93.
25			As above (CL).					25
			Continued Next Page					



SOIL BORING LOG

Client: Harley-Davidson

Project No: 93386

Phase 1

Task 3

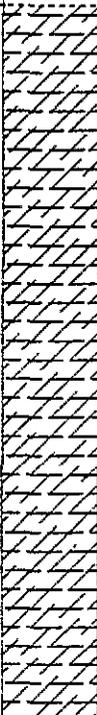
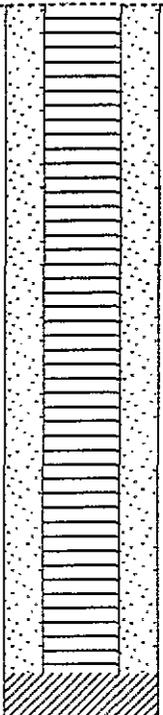
Boring No. SB-20

Piezometer No. MW-58

Location In road between Bldgs #2 & #46

Surface Elev. 365.28 FT.

Page 3 of 3

Depth Feet	Blow Count	Sampler Recovery/ROD	Overburden/Lithologic Description	FID (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
			Continued from previous page					
			As above (CL), wet.					Water first encountered @ -28' bgs on 11/18/93.
30							30	
			As above (CL).					
35			BORING TERMINATED on probable limestone bedrock or boulder @ 35.5 ft.				35	35-35.5' Slough
40							40	



AIR-ROTARY DRILLING LOG

Client: HARLEY DAVIDSON

Project No: 94461

Phase

Task

Boring No. MW-59

Piezometer No.

MW-59

Location Old Waste Containment Area

Surface Elev. 369.72 FT.

Page 1 of 2

Depth Feet	Blow Count	Sampler Recovery/RQD	Overburden/Lithologic Description	FID (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0	Ground Surface	FEET					0	T.O.C. Elev. 373.05
0-2.7			SANDY, CLAYEY, SILT Brown, some gravel.				0-3.3	6 in. steel protective casing set from 2.7 ft bgs to 3.3 ft. ags.
2.7-2.88			Weathered quartz gravel or cobble.				2.88-13	2 in. PVC riser from 13 ft. bgs to 2.88 ft. above ground surface.
11-13							11-13	Bentonite seal from 11 ft. bgs to ground surface.
11-46			SILTY, SANDY, CLAY Brown, weathered limestone gravel.				11-46	#1 Silica sand from 11 ft. bgs to 46 ft. bgs.
13-43							13-43	2 in. PVC slotted screen from 13 ft. bgs to 43 ft. bgs.

Continued Next Page

Driller Eichelberger's
 Logged By RAH/DGW
 Drilling Started 5/10/95
 Drilling Completed 5/10/95
 Construction Completed 5/10/95
 Development Completed 5/11/95
 Water Bearing Zones Approximately 24 ft. below ground surface.

Blown/Bailed Yield _____
 Well Casing 2" Dia. 13' bgs to 2' abs
 Casing Type PVC
 Well Screen 2" Dia. 43' bgs to 13' bgs
 Screen Type Slotted
 Slot Size .020
 Drilling Mud N.A.
 Grout Type _____

Bentonite Seal 0-11' bgs 3 bags
 Filter Pack Qty. 21 bags
 Filter Pack Type #1 silica sand
 Static Water Level 343.20 MSL
 Date 5/26/95
 Notes: TOC elevation and static water level measured on 5/26/95



r.e. wright environmental, inc.

Abandoned 4/11/01

AIR-ROTARY DRILLING LOG

Client: HARLEY DAVIDSON

Boring No. MW-59

Piezometer No. MW-59

Project No: 94461

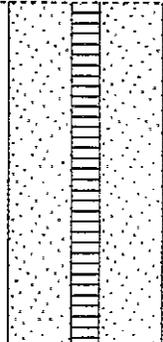
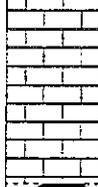
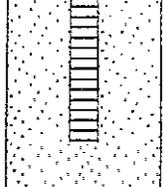
Phase

Task

Location Old Waste Containment Area

Surface Elev. 369.72 FT.

Page 2 of 2

Depth Feet	Blow Count	Sampler	Recovery/RQD	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
				Continued from previous page					
30				SILTY CLAY Brown, some quartz and limestone gravel.				30	
35								35	
40				LIMESTONE Gray, massive, hard.				40	
45				VOID filled with silt.				45	
				TD=46 feet.					Total depth of hole is 46 ft.
50								50	
55								55	
60								60	
65								65	



AIR-ROTARY DRILLING LOG

Client: HARLEY DAVIDSON

Project No: 94461

Phase

Task

Boring No. MW-60

Piezometer No.

MW-60

Location Old Waste Containment Area

Surface Elev. FT.

Page 1 of 2

Depth Feet	Blow Count	Sampler Re-covery/ ROD	Overburden/Lithologic Description	FID (PPM)	GRAPHIC LOG	Well Construction Graphics	Depth Feet	Well Construction Details
0			Ground Surface				0	T.O.C. Elev. 369.02
0-3.2			Fill Angular limestone cobbles and gravel mixed with sandy silt and clay.				0-3.2	6 in. steel protective casing set from 3.2 ft. bgs to 2.8 ft. ags
3.2-8			Clayey Silt Brown, some quartz gravel.				3.2-8	2 in. PVC riser set from 8 ft. bgs to 2 ft. ags.
8-10							8-10	Bentonite seal from 1.5 ft. bgs to 7 ft. bgs.
10-38							10-38	2 in. PVC slotted screen from 8 ft. bgs to 38 ft. bgs.
38-41							38-41	#1 Silica sand from 7 ft. bgs to 41 ft. bgs.

Continued Next Page

Driller <u>Eichelberger's</u>	Blown/Bailed Yield _____	Bentonite Seal <u>0-8 ft bgs 2 bags</u>
Logged By <u>RAH/DGW</u>	Well Casing <u>2" Dia. 8 ft bgs to 2 ft ags</u>	Filter Pack Qty. <u>15.5 bags</u>
Drilling Started <u>5/10/95</u>	Casing Type <u>PVC</u>	Filter Pack Type <u>#1 silica sand</u>
Drilling Completed <u>5/10/95</u>	Well Screen <u>2" Dia. 38 ft bgs 8 ft bgs</u>	Static Water Level _____ MSL
Construction Completed <u>5/10/95</u>	Screen Type <u>Slotted</u>	Date <u>5/26/95</u>
Development Completed <u>5/11/95</u>	Slot Size <u>.020</u>	Notes: <u>TOC elevation and static water level measured on 5/26/95.</u>
Water Bearing Zones _____	Drilling Mud <u>N.A.</u>	
	Grout Type _____	

Form #wl-sc-1 (02/90)



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Abandoned 4/11/01

AIR-ROTARY DRILLING LOG

Client: **Harley - Davidson Motor Company**

Boring No. **MW-61**

Piezometer No. **MW-61**

Project No: **95503**

Phase **1**

Task **3**

Location **Southern Property Boundary Area**

Surface Elev. **374.17 FT.**

Page **1** of **3**

Depth Feet	Blow Count	Sampler Re-covery/ROD	Overburden/Lithologic Description	FID (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0	Ground Surface	FEET					0	T.O.C. Elev. 373.87
0-5			SILT (ML)- Moderate yellowish brown clayey silt with some quartz gravel and medium-grained sand. Slightly moist, stiff, low plasticity.				0-5	0-100' 8-inch well with dual-level piezometers 0-3.0' Flushmount drive-over with concrete collar
5-25	Run #1 16'-25'	8.7'/100%	16.0' LIMESTONE- Light medium gray with wavy bedding and few white calcite veins filling high-angle fractures. 17.0'- Small, silt-filled open fracture, 5 degree dip 18.0'- Small, silt-filled open fracture, 5 degree dip 19.2'- Small, silt-filled open fracture, 10 degrees. Medium dark gray sandy limestone with little or no wavy bedding visible. 19.8'- Small, silt-filled open fracture, 5 degree dip				5-25	3.0-45.0' Cement Grout: Portland Type II/Benseal mix
25-30	Run #2 25'-35'	9.9'/100%	20.0'- Low-angle, irregular fracture with some hematite staining. 20.4'- Low angle (5 deg. dip), irregular fracture with some hematite staining. 21.5'- Low-angle, irregular fracture. 22.2'- Open dissolution fracture, 20 degree dip.				25-30	

Continued Next Page

Driller D.E. Nelson Drilling	Blown/Bailed Yield 5 gpm	Bentonite Seal Medium Bentonite Chips
Logged By Samuel P. Watts	Well Casing 2 inches Dia. 0-52' to 0-80'	Filter Pack Qty. 14 bags
Drilling Started 9/25/95	Casing Type Sch 40 PVC	Filter Pack Type Morie #1 sand
Drilling Completed 9/26/95	Well Screen 2 inches Dia. 52-58' to 80-85'	Static Water Level MSL
Construction Completed 10/12/95	Screen Type Sch 40 PVC	Date 11/14/95
Development Completed 9/26/95	Slot Size 0.020 inch	Notes: T.O.C. Elev. is top of PVC
Water Bearing Zones 55.0' and 83.0'	Drilling Mud N/A	61S=373.87 ft 61D=373.87 ft AMSL
	Grout Type Portland Type II	



AIR-ROTARY DRILLING LOG

Client: **Harley - Davidson Motor Company**

Project No: **95503** Phase **1** Task **3**

Boring No. **MW-61** Piezometer No. **MW-61**

Location **Southern Property Boundary Area**

Surface Elev. **374.17 FT.** Page **2** of **3**

Depth Feet	Blow Count	Sampler Recovery/ ROD	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page								
30			23.1'- Open fracture, 45 degree dip. Light gray to very light gray limestone with some wavy beds. Very light gray limestone with some wavy bedding. Same wavy bedding- some of the siltier beds have an orangish color.				30	
35	Run #3 35'-45'	10.3/100%	High angle fracture broke along a healed fracture while coring, 75 degree dip. No more orange silty layers.				35	
40			Rock core broke at high angle along healed fracture, 70 degree dip.				40	
45	Run #4 45'-55'	10.4/100%	43.0'- Small, low-angle open fracture, 2 degree dip. 43.5'- Open dissolution fracture with some silt, 8 degree dip.				45	
50			52.3'- Open fracture with some silt and orange staining, 20 degree dip.				50	46-49' Medium bentonite chips
55	Run #5 55'-65'	10.4/100%	53.6'- Open fracture with some silt and orange staining, 2 degree dip. Numerous healed, solution-filled fractures. 54.2'- Open fracture with some silt, 5 degree dip. Numerous healed, solution-filled fractures.				55	0-52' Sch. 40 threaded PVC riser 52-58' 20-slot PVC screen
60			Rock core broke along three healed fractures: 80, 75, and 70 degree fractures Open fracture with orange-stained calcium crystals and fine-grained sand particles, 70 degree dip. Open fracture with orange-stained calcium crystals and fine-grained sand particles, 70 degree dip.				60	49-59' Morie #1 sand-pack
65	Run #6 65'-75'	9.9/100%	Medium light gray silty limestone with medium dark gray wavy beds. Rock contains near-vertical, calcite-cemented fractures. 65-66.3'- very thin bedding, uniform in color; medium light gray. 66.3'-75' Light gray fragments in dark gray matrix. Either conglomeratic or leopard rock" (Reef origin).				65	59-77.3' Medium bentonite chips

Continued Next Page

Client: **Harley - Davidson Motor Company**

Project No: **95503**

Phase **1**

Task **3**

Boring No. **MVY-01**

Piezometer No. **MW-61**

Location **Southern Property Boundary Area**

Surface Elev. **374.17 FT.**

Page **3** of **3**

Depth Feet	Blow Count	Sampler Re-covery/ROD	Overburden/Lithologic Description	FID (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
			Continued from previous page					
70							70	
75	Run #7 75'-85'	10.2/100%	Rock core broken at 70 degrees along a healed fracture. Fracture cemented with calcite, slickensides visible along solution plane. Dark gray conglomeratic? limestone with numerous calcite filled high angle fractures.				75	0-79.5' Sch. 40 threaded PVC riser
80							80	79.5-84.5' 20-slot PVC screen
85	Run #8 85'-95'	10.0/100%	81.7'- Open fracture containing small calcite crystals, 70 degree dip. Light gray matrix has a greenish tint. 82.4'- Open fracture with some greenish silt, 70 degree dip. 84.2'- Open low-angle fracture containing dark gray silt. 84-86'- Numerous high-angle fractures. Cement within fractures is mostly calcite. Limestone becomes fairly massive. Rock still has a greenish tint.				85	77.3'-86.0' Morie #1 sand-pack
90							90	86-100' 8-inch boring back-filled with medium bentonite chips
95	Run #9 95'-100'	5.0/100%	Rock core broken at 45 degrees along a healed fracture containing calcite. Slickensides visible along solution plane. Limestone becomes more conglomeratic? with light gray fragments and dark matrix. Medium light gray with very thin medium gray, wavy beds.				95	
100			Boring terminated at 100.0 ft. b.g.s.				100	
105							105	
110							110	

Form #wl-sc-1 (02/90)



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AIR-ROTARY DRILLING LOG

Client: **Harley - Davidson Motor Company**

Boring No. **MW-62**

Piezometer No. **MW-62**

Project No: **95503**

Phase **1**

Task **3**

Location **Southern Property Boundary Area**

Surface Elev. **371.73 FT.**

Page **1** of **3**

Depth Feet	Blow Count	Sampler	Recovery	ROD	Overburden/Lithologic Description	FID (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0									0	T.O.C. Elev. 371.28
0									0	0-100' 8-inch well with dual-level piezometers
					CLAYEY SILT (ML)- Light brown to moderate brown clayey silt loam with some quartz gravel and fine sand.					0-3.0' Flushmount drive-over with concrete collar
5									5	3.0-36.0' Cement Grout: Portland Type II/Benseal mix
10									10	
15									15	
20									20	
25									25	
30					LIMESTONE- Medium dark gray, highly weathered limestone with some thin, medium light gray beds				30	

Continued Next Page

Driller <u>Eichelberger's, Inc.</u>	Blown/Bailed Yield <u>5 gpm</u>	Bentonite Seal <u>Medium Bentonite Chips</u>
Logged By <u>Samuel P. Watts</u>	Well Casing <u>2 inches</u> Dia. <u>0-40'</u> to <u>0-84'</u>	Filter Pack Qty. <u>14 bars</u>
Drilling Started <u>10/5/95</u>	Casing Type <u>Sch 40 PVC</u>	Filter Pack Type <u>Moric #1 sand</u>
Drilling Completed <u>10/6/95</u>	Well Screen <u>2 inches</u> Dia. <u>40-45'</u> to <u>84-94'</u>	Static Water Level _____ MSL
Construction Completed <u>10/9/95</u>	Screen Type <u>Sch 40 PVC</u>	Date <u>11/14/95</u>
Development Completed <u>10/6/95</u>	Slot Size <u>0.020 inch</u>	Notes: <u>T.O.C. Elev. is top of PVC</u>
Water Bearing Zones <u>43.0' and 90.0'</u>	Drilling Mud <u>N/A</u>	<u>62S=371.28 ft 62D=371.27 ft AMSL</u>
	Grout Type <u>Portland Type II</u>	

AIR-ROTARY DRILLING LOG

Client: Harley - Davidson Motor Company

Boring No. MW-62

Piezometer No. MW-62

Project No: 95503

Phase 1

Task 3

Location Southern Property Boundary Area

Surface Elev. 371.73 FT.

Page 2 of 3

Depth Feet	Blow Count	Sampler	Re-cover/ROD	Overburden/Lithologic Description	FIID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
				Continued from previous page					
30				31.0-34.0' Mud filled void				30	
35				LIMESTONE- Medium dark gray, weathered limestone with some thin, medium gray beds				35	36-38' Medium bentonite chips
40								40	0-40' Sch. 40 threaded PVC riser
45				43.0' Small, water-bearing seam.				45	40-45' 20-slot PVC screen
50								50	38-46' Moric #1 sand-pack
55								55	46-63' Medium bentonite chips
60								60	
65								65	63-81' Benseal w/ "clear mud" flocculant
				68.0-75.0' Mud-filled void					
				Continued Next Page					



AIR-ROTARY DRILLING LOG

Client: Harley - Davidson Motor Company

Project No: 95503

Phase 1

Task 3

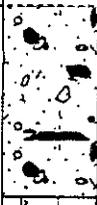
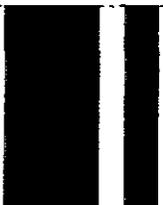
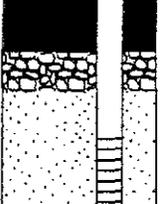
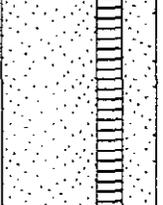
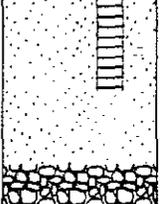
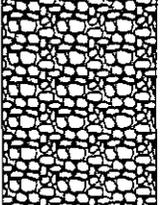
Boring No. MW-62

Piezometer No. MW-62

Location Southern Property Boundary Area

Surface Elev. 371.73 FT.

Page 3 of 3

Depth Feet	Blow Count	Sampler Re-covery/RDD	Overburden/Lithologic Description	FID (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
70			Continued from previous page				70	
75			LIMESTONE- Dark gray limestone, probably conglomeratic? (see MW-61); calcite filled veins.				75	
80							80	0-84' Sch. 40 threaded PVC riser
85							85	81-82' Mud & cuttings mixture
90			89.5'- Dark gray limestone, contains many calcite filled veins.				90	82-83' Medium bentonite chips
95							95	84-94' 20-slot PVC screen
100							100	83-96' Morie #1 sand-pack
105			Boring terminated at 103.0 ft. b.g.s.				105	96-103' 8-inch boring back-filled with medium bentonite chips & cuttings
110							110	

AIR-ROTARY DRILLING LOG

Client: **Harley - Davidson Motor Company**

Project No: **95503**

Phase **1**

Task **3**

Boring No. **MW-63**

Piezometer No. **MW-63**

Location **Southern Property Boundary Area**

Surface Elev. **375.62 FT.**

Page **1** of **3**

Depth Feet	Blow Count	Sampler Re-covery/ROD	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0	Ground Surface	FEET					0	T.O.C. Elev. 374.95
0-5			SILT (ML)- Light brown sandy, clayey silt with some subrounded quartz gravel. slightly moist, low plasticity.				0-5	0-100' 8-inch well with dual-level piezometers 0-3.0' Flushmount drive-over with concrete collar
5-28							5-28	3.0-33.0' Cement Grout: Portland Type II/Benseal mix
28-30			CLAY (ML)- moderate yellowish brown silty clay. trace of gravel, moist medium plasticity. 28-33' LIMESTONE- Light gray, highly weathered, broken limestone fragments				28-30	

Continued Next Page

Driller <u>Eichelberger's, Inc.</u>	Blown/Bailed Yield <u>1 gpm</u>	Bentonite Seal <u>Medium Bentonite Chips</u>
Logged By <u>Samuel P. Watts</u>	Well Casing <u>2 inches Dia. 0-40' to 0-87'</u>	Filter Pack Qty. <u>30 bags- Morie #1 sand</u>
Drilling Started <u>10/6/95</u>	Casing Type <u>Sch 40 PVC</u>	Filter Pack Type <u>-3 tons- #4 & #2 gravel</u>
Drilling Completed <u>10/6/95</u>	Well Screen <u>2 inches Dia. 40-50' to 87-97'</u>	Static Water Level _____ MSL
Construction Completed <u>10/9/95</u>	Screen Type <u>Sch 40 PVC</u>	Date <u>11/14/95</u>
Development Completed <u>10/6/95</u>	Slot Size <u>0.020 inch</u>	Notes: <u>T.O.C. Elev. is top of PVC</u>
Water Bearing Zones <u>37.0' and 93.0'</u>	Drilling Mud <u>N/A</u>	<u>63S=374.95 ft 63D=374.96 ft AMSL</u>
	Grout Type <u>Portland Type II</u>	

AIR-ROTARY DRILLING LOG

Client: Harley - Davidson Motor Company

Project No: 95503

Phase 1

Task 3

Boring No. MW-63

Piezometer No.

MW-63

Location Southern Property Boundary Area

Surface Elev. 375.62 FT.

Page 2 of 3

Depth Feet	Blow Count	Sampler Re-coveru/RDD	Overburden/Lithologic Description	FID (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
			Continued from previous page					
30							30	
35			LIMESTONE- medium gray limestone bedrock containing a few thin, light gray beds and some fractures.				35	33-35' Medium bentonite chips
40							40	0-37' Sch. 40 threaded PVC riser
45			37-51'- Water and silt filled void				45	33-38' #2 clean gravel- 2.5 tons 38-39.5' #4 well gravel- 21 bags (100lb.)
50							50	37-47' Pre-packed, 20-slot PVC screen containing Morie #1 sand
55			LIMESTONE- Dark gray conglomeratic? limestone with a few calcite filled veins. (see MW-61)				55	39.5-48' Morie #1 sand- 30 bags (50lb.)
60							60	48-85' Medium bentonite chips
65							65	

Continued Next Page

Client: Harley - Davidson Motor Company
 Project No: 95503 Phase 1 Task 3

Depth Feet	Blow Count	Sampler Re-covery/RQD	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page								
70							70	
75							75	
80							80	
83			83'- Dark gray limestone contains many calcite filled veins				85	0-84' Sch. 40 threaded PVC riser
86			86'- Dark gray limestone becomes massive with no calcite veins.				90	84-94' 20-slot PVC screen
93			93'- Dark gray limestone, contains many calcite veins.				95	85-98' Morie #1 sand-pack
98			98'- Dark gray limestone, with no calcite veins.				100	98-100' Medium bentonite chips
			Boring terminated at 100.0 ft. b.g.s.				105	
							110	

AIR-ROTARY DRILLING LOG

Client: **Harley - Davidson Motor Company**

Project No: **95503**

Phase **1**

Task **3**

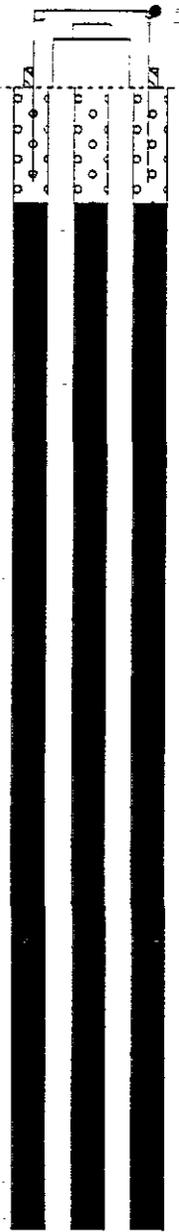
Boring No. **MW-64**

Piezometer No. **MW-64**

Location **Southern Property Boundary Area**

Surface Elev. **415.52 FT.**

Page **1** of **3**

Depth Feet	Blow Count	Sampler Recovery/ROD	Overburden/Lithologic Description	FID (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0	Ground Surface	FEET					0	T.O.C. Elev. 417.26
0-20	Tri-cone bit	0-20 ft.	CLAYEY SILT (ML)- Light brown to moderate brown clayey silt loam with some quartz gravel and fine sand.				0-5	0-82' 8-inch well with dual-level piezometers Protective steel casing with concrete collar and locking cap
20-40	Advanced casing	0-40 ft.					5-20	3-30' Cement Grout: Portland Type II/Benseal mix
20-40.0							20-40.0	0'-40.0' Six-inch casing advanced. No rock encountered.

Continued Next Page

Driller <u>D.E. Nelson Drilling</u>	Blown/Bailed Yield <u>10 gpm</u>	Bentonite Seal <u>Medium Bentonite Chios</u>
Logged By <u>Samuel P. Watts</u>	Well Casing <u>2 inch Dia. 0-35' to 0-70'</u>	Filter Pack Qty. <u>12 bags</u>
Drilling Started <u>9/26/95</u>	Casing Type <u>PVC</u>	Filter Pack Type <u>Moric #1 sand</u>
Drilling Completed <u>9/27/95</u>	Well Screen <u>2 inch Dia. 35-40' to 70-75'</u>	Static Water Level <u>MSL</u>
Construction Completed <u>10/03/95</u>	Screen Type <u>PVC</u>	Date <u>10/03/95</u>
Development Completed <u>10.03/95</u>	Slot Size <u>0.20 inch</u>	Notes: <u>T.O.C. Elev. is top of PVC</u>
Water Bearing Zones <u>30.0' and 70.0'</u>	Drilling Mud <u>N/A</u>	<u>64S=417.26 ft 64D=417.27 ft AMSL</u>
	Grout Type <u>Bentonite cement</u>	

AIR-ROTARY DRILLING LOG

Client: **Harley - Davidson Motor Company**

Boring No. **MW-64** Piezometer No. **MW-64**

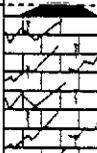
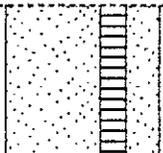
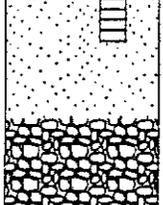
Location **Southern Property Boundary Area**

Project No: **95503** Phase **1** Task **3**

Surface Elev. **415.52 FT.** Page **2** of **3**

Depth Feet	Blow Count	Sampler	Recovery/coverly/ROD	Overburden/Lithologic Description	FID (ppm)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
				Continued from previous page					
30				SILTY SAND (SM)- Light brown silty sand with rounded to subangular sand grains, coarse to fine				30	0-35' Sch. 40 threaded PVC riser
35				Rising piezometric head observed in well.				35	30-33' Medium bentonite chips 35-40' 20-slot PVC screen
40	Run #1 55'-65'		0.7' / 0%	40'- Began advancing core-barrel through soil without casing. No noticeable resistance until 55' b.g.s.				40	33-42' Morie #1 sand-pack
45								45	
50								50	
55								55	
60				GRAVEL- Rounded quartz gravel, clear to milky pale yellowish orange.				60	42-68' Medium bentonite chips
				SANDSTONE- highly weathered sandstone, dusky red to black					
65	Run #2 65'-68'		0.8' / 0%	LIMESTONE- light bluish gray limestone with very light gray to white calcite layers and some hematite staining. Highly weathered with dissolution pits and high angle fractures.				65	
	Run #3 68'-74'		0.9' / 0%	CLAY- Moderate brown silty clay with rounded quartz, sandstone, and limestone gravel. Contains trace of fine sand, stiff, medium plasticity. Medium light gray to light bluish gray					0-70' Sch. 40 threaded
				Continued Next Page					



Depth Feet	Blow Count	Sampler Re- cover/ ROD	Overburden/Lithologic Description	FLD (PPM)	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page								
70			limestone weathered and highly fractured. Large dissolution features and some orange staining. 70.0' - No longer a rising piezometric head in well. Driller could not get drill water to return to surface.				70	PVC riser 70-75' 20-slot PVC screen
75	Run #4 74'-84'	5.5' / 55%	Limestone becomes much less weathered. Medium gray with wavy bedding or conglomeratic? structure (see MW-61). Contains numerous re-healed, high-angle fractures, cement material is white calcite. Low angle dissolution fracture with silt. High angle dissolution fracture. Void				75	68-77' Morie #1 sand-pack
80			Moderate brown silty clay with rounded quartz, sandstone, and limestone gravel and a little fine sand. Stiff, medium plasticity.				80	78'-82.0' Drill bit descended quickly.
85	Run #5 84'-85'	1.1' / 100%	LIMESTONE- medium gray with wavy bedding. Similar to above limestone unit with re-healed high-angle fractures.				85	
	Run #6 85'-89.5'	2.6' / 13%	Large calcite vein highly dissolved and partially filled with mud. CLAY- moderate yellowish brown silty clay containing rounded gravel and some sand.					
90	Run #7 89.5-91'	0.6' / 0%	Medium gray limestone.				90	
	Run #8 91'-92'	0.7' / 0%						
95			Boring terminated at 92.0 ft. b.g.s.				95	
100							100	
105							105	
110							110	



WELL CONSTRUCTION SUMMARY

Well No. 65S

PROJECT Harley Davidson	PROJECT NO. 1406701
LOCATION York, PA	ELEVATION AND DATUM
DRILLING AGENCY Eichelberger's	DATE STARTED 6/10/1998 DATE FINISHED 6/11/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary	DRILLER Carey Knaub
SIZE AND TYPE OF BIT 7 7/8" Hammer Bit	INSPECTOR Dave Wilson

METHOD OF INSTALLATION
Well was advanced by air rotary hammer bit to a total depth of 103 ft. The screen and riser were inserted down the borehole. Sand, bentonite, and Benseal grout were added to finish the well to the surface. Note; MW-65S is a multilevel piezometer in same borehole as MW65D.

METHOD OF WELL DEVELOPMENT
The well was developed on 7/13/98 using airlift method at a rate of approximately 0.25 gallons per minute until the discharge was clear.

TYPE OF CASING Schedule 40 PVC	DIAMETER 2 inch	TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout
TYPE OF SCREEN Schedule 40 PVC	DIAMETER 2 inch	TYPE OF SEAL MATERIAL Bentonite Chips
BOREHOLE DIAMETER 8 inches		TYPE OF FILTER MATERIAL # 1 Morie Sand

TOP OF CASING	ELEVATION	DEPTH	WELL DETAILS	SOIL CLASSIFICATION	DEPTH (FT)	
Above ground			Steel Protective Cover			
TOP OF SEAL		66.3 ft.		Brown SILT, tr Clay, with m-Quartzite gravel.	2.0	
TOP OF FILTER		71.3 ft.		5.0		
TOP OF SCREEN		75 ft.		Portland Cement Grout	Green/gray Quartzite, fine grained, weath-ered, from 5 to 85 ft.	
BOTTOM OF BORING		103 ft.			Dark gray, unweath-ered, Quartzite from 85 to 103 ft.	
SCREEN LENGTH		10 ft.				
		75 ft. to 85 ft. bgs				
		0.010 inch				
GROUNDWATER ELEVATIONS						
ELEVATION		DATE				
ELEVATION		DATE			66.3	
ELEVATION		DATE			71.3	
ELEVATION		DATE			75.0	
ELEVATION		DATE				
ELEVATION		DATE			86.0	

WELL CONSTRUCTION SUMMARY

Well No. 65D

PROJECT Harley Davidson	PROJECT NO. 1406701
LOCATION York, PA	ELEVATION AND DATUM
DRILLING AGENCY Eichelberger's	DATE STARTED 6/10/1998
	DATE FINISHED 6/11/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary	DRILLER Carey Knaub
SIZE AND TYPE OF BIT 7 7/8" Hammer Bit	INSPECTOR Dave Wilson

METHOD OF INSTALLATION
Well was advanced by air rotary hammer bit to a total depth of 103 ft. The screen and riser were inserted down the borehole. Sand, bentonite, and Benseal grout were added to finish the well to the surface.

METHOD OF WELL DEVELOPMENT
The well was developed on 7/13/98 using airlift method at a rate of approximately 1.0 gallons per minute until the well went dry. After recovery, the well was developed at the rate of ~ 0.25 gpm until clear.

TYPE OF CASING Schedule 40 PVC	DIAMETER 2 inch	TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout
TYPE OF SCREEN Schedule 40 PVC	DIAMETER 2 inch	TYPE OF SEAL MATERIAL Bentonite Chips
BOREHOLE DIAMETER 8 inches		TYPE OF FILTER MATERIAL # 1 Morie Sand

TOP OF CASING	ELEVATION	DEPTH	WELL DETAILS	SOIL CLASSIFICATION	DEPTH (FT)
Above ground			Steel Protective Cover		
TOP OF SEAL		86 ft.		Brown SILT, tr Clay, with m-Quartzite gravel.	2.0
TOP OF FILTER		89 ft.		Portland Cement Grout	5.0
TOP OF SCREEN		92.25 ft.		Green/gray Quartzite, fine grained, weathered, from 5 to 85 ft.	
BOTTOM OF BORING		103 ft.		Dark gray, unweathered, Quartzite from 85 to 103 ft.	
SCREEN LENGTH		10 ft.			66.3
SLOT SIZE	0.010 inch				
GROUNDWATER ELEVATIONS					
ELEVATION	DATE				71.3
ELEVATION	DATE				86.0
ELEVATION	DATE				89.0
ELEVATION	DATE				92.3
ELEVATION	DATE		PVC Screen	Sand Filter	
ELEVATION	DATE				
ELEVATION	DATE				103.0

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York, PA		Elevation and Datum			
Drilling Company		Eichelberger's		Date Started		Date Finished	
Drilling Equipment		Ingersoll Rand T4W Air Rotary		6/10/98		6/11/1998	
Size and Type of Bit		7 7/8" Hammer Bit		Completion Depth		Rock Depth	
Casing		---		103 ft.		5 ft.	
Casing Hammer	Weight	---		Drop	---		Water Level
Sampler		2" OD Split Spoon		Driller		Carey Knaub	
Sampler Hammer Weight		NA		Drop		NA	
				Inspector		Dave Wilson	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1	S1	S-S	1.0	NA	Brown SILT, tr CLAY, little Quartzite fragments.	
2						
3						
4						
5						
6	S2	SS	0.3	NA	Green gray Quartzite, competent rock.	Split spoon refusal. Bit chatter.
7						
8					Weathered Quartzite, Fe stained.	Dust from cuttings is brown.
9						
10						
11	S3	Cuttings			Coarse fragments of weathered gray Quartzite.	
12						
13						
14						
15						
16	S4	Cuttings			Gray/green Quartzite, fine grained, weathered/Fe stained	Steady bit chatter, hard drilling.
17						
18						
19						
20						
21						

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		6/10/1998	
Drilling Company		Eichelberger's			Date Finished		6/11/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22					Gray/green Quartzite, fine grained, weathered.			
23	S5	Cuttings						
24								
25								
26								
27								
28								
29	S6	Cuttings						
30								
31						14:50		
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		6/10/1998	
Drilling Company		Eichelberger's			Date Finished		6/11/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
43					Gray/green Quartzite, fine grained, weathered.			
44	S7	Cuttings						
45								
46								
47								
48								
49								
50	S8	Cuttings			Green/gray Quartzite, fine grained, weathered.			
51								
52								
53								
54								
55								
56								
57								
58								
59								
60								
61	S9	Cuttings			Green/gray Quartzite, fine grained, weathered.			
62								
63								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		6/10/1998	
Drilling Company		Eichelberger's			Date Finished		6/11/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS		
64								
65								
66								
67	S10	Cuttings			Less weathered, some dark gray Quartzite fragments.	15:08		
68								
69								
70								
71	S11	Cuttings			Dark gray Quartzite, fine grained, weathered.		Hard Drilling	
72								
73								
74								
75								
76								
77	S12	Cuttings			Weathered, dark gray, fine grained, Quartzite.	15:10		
78								
79								
80								
81								
82								
83								
84	S13	Cuttings			Gray Quartzite, weathered.			

*Standard Penetration Test N-Value

Project Name					Harley Davidson		Project No.		1406701	
Boring Location					York PA		Date Started		6/10/1998	
Drilling Company					Eichelberger's		Date Finished		6/11/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS				
85					Dark gray, unweathered, Quartzite, fine grained.	15:45 Dust changed color from brown to light gray. Hard rock				
86	S14	Cuttings								
87										
88										
89										
90										
91										
92										
93										
94										
95					15:53 Slightly weathered @ 95 ft.					
96	S15	Cuttings		Fracture or weathered zone. Dark gray unweathered Quartzite with some weathered material.						
97										
98										
99										
100					16:00 Total depth of borehole = 103 ft.					
101	S16	Cuttings		Fracture or weathered zone. Dark gray unweathered Quartzite with some weathered material.						
102										
103										
104										
105										

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. 66D

PROJECT Harley Davidson	PROJECT NO. 1406701
LOCATION York, PA	ELEVATION AND DATUM
DRILLING AGENCY Eichelberger's	DATE STARTED 6/5/1998
	DATE FINISHED 6/26/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary	DRILLER Carey Knaub
SIZE AND TYPE OF BIT 7 7/8" Hammer Bit	INSPECTOR Dave Wilson

METHOD OF INSTALLATION
Well was advanced by air rotary hammer bit to a total depth of 100 ft. The screen and riser were inserted down the borehole. Sand, bentonite, and Benseal grout were added to finish the well to the surface. Note; MW-66D is a multilevel piezometer in same borehole as MW66S.

METHOD OF WELL DEVELOPMENT
The well was developed on 7/14/98 using airlift method at a rate of approximately 1.5 gallons per minute for 1.5 hrs until discharge was clear.

TYPE OF CASING Schedule 40 PVC	DIAMETER 2 inch	TYPE OF BACKFILL MATERIAL Benseal Grout (Portland cement/Bentonite)
TYPE OF SCREEN Schedule 40 PVC	DIAMETER 2 inch	TYPE OF SEAL MATERIAL Bentonite Chips
BOREHOLE DIAMETER 8 inches		TYPE OF FILTER MATERIAL # 1 Morie Sand

TOP OF CASING	ELEVATION	DEPTH	WELL DETAILS	SOIL CLASSIFICATION	DEPTH (FT)	
Above ground			Steel Protective Cover			
TOP OF SEAL		61.6 ft.		Gravel, sand, silt, and miscellaneous fill.		
TOP OF FILTER		81.3 ft.				
TOP OF SCREEN		84.5 ft.			Portland Cement Grout	20.0
BOTTOM OF BORING		100 ft.			Top of rock, Quartzite	
SCREEN LENGTH		15 ft.				44.6
SLOT SIZE	0.010 inch				Sand Filter	47.2
GROUNDWATER ELEVATIONS						61.6
ELEVATION	DATE				Bentonite	
ELEVATION	DATE					
ELEVATION	DATE					81.4
ELEVATION	DATE				84.5	
ELEVATION	DATE					
ELEVATION	DATE				100.0	

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York, PA		Elevation and Datum			
Drilling Company		Eichelberger's		Date Started		Date Finished	
Drilling Equipment		Ingersoll Rand T4W Air Rotary		6/5/1998		6/26/1998	
Size and Type of Bit		6 and 8 inch Hammer Bit.		Completion Depth		Rock Depth	
Casing		---		100 ft.		20 ft.	
Casing Hammer		Weight ---		Drop ---		Water Level 53 ft.bgs 6/22/98	
Sampler		2" OD Split Spoon		Driller		Carey Knaub	
Sampler Hammer Weight		NA		Drop NA		Inspector Dave Wilson	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1	S1	S-S	0.5	NA	Gray/black GRAVEL and SAND, tr SILT. Wood.	Start 10:00 6/5/98 PID = 3 ppm
2					Moist	
3						
4						
5						
6	S2	SS	0.3	NA	Black clayey SILT; tr wood. (soft)	PID = 6 ppm odor of petroleum?
7					moist	
8						
9						
10						
11	S3	SS	0.3	NA	Black clayey SILT; tr wood.	PID = 10.1 ppm 8.7 ppm odor of petroleum?
12					moist	
13						
14						
15						
16	S4	SS	1.1	NA	Black clayey SILT; 2inch piece of wood Light brown SILT, some clay, tr fine to medium SAND.	PID = 1 to 5 ppm. Spoon is wet.
17					Wet/moist	
18						
19						
20						
21	S5	SS	1.0	NA	Top of weathered rock. Light brown fine to medium SAND, some coarse GRAVEL, tr SILT.	

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		6/5/1998	
Drilling Company		Eichelberger's			Date Finished		6/26/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS		
22	S5	SS		NA	Weathered Quartzite.			Split spoon refusal.
23					22 to 29 ft. Dry, weathered, rock. Cuttings light brown, fine to medium SAND, some SILT, some fine to coarse GRAVEL.			Set 4 inch PVC to 29 ft. to keep hole open for coring.
24								
25								
26								
27								
28								
29								
30								08:00 6/9/98 Start coring.
31								PID = 1 to 3 ppm from borehole.
32								Cored through metal. 2 inch piece in barrel. Burned up bit, pulled rods, will ream hole and drive 8 inch casing further down to seal overburden completely.
33	Run	Core Type	% Recovery	RQD		Drilling Rate		
34	1	NQ	100	79	Gray Quartzite fractured 33.5 ft. to 34.5ft.	5:14		08:45 -10:15 completed demobe.
35						7:45		Drilled to 33 feet. Set additional 8 inch steel casing to 30 ft. Drilled out 4inch piece of gray metal. (see daily log)
36					Gray/brown Quartzite. Fracture at 35.5, 36, 36.5, and 37 ft. Fracture zone 38.5 to 40.	2:04		
37						4:53		
38	2	NQ	98	70			7:22	
39							9:31	@ 34 ft., increased to 600 psi and 2200-2500 rpm.
40						12:00	PID =0ppm, 33 to 35 ft.	
41	3	NQ	89	14	Brown/gray Quartzite, highly fractured /weathered; iron staining.	2:20		Wash changed from gray to brown at 36 ft. At 36.5 ft., back to a gray wash.
42						5:00		

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		6/5/1998	
Drilling Company		Eichelberger's			Date Finished		6/26/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS		
43	3	NQ	89	14				Run 3, blocked off at 43 ft.
44	4	NQ	116	68	Brown/gray Quartzite, highly fractured /weathered; iron staining.		7:35	
45								
46	5	NQ		48	Brown/gray Quartzite, fractured/ weathered, iron staining. Fractures at 46, 47, and 48 ft.			
47								
48								
49								
50					43 to 50 ft. Fracture zone.		9:38	
51	6	NQ	100	70	Gray Quartzite, iron staining on fracture surfaces. Fractures at 51, 51.5, 52, 52.5 ft. Fracture zones from 53 to 53.5 ft. and 54.5 to 55 ft.		2:44	No PID from 50 to 100 ft. due to heavy rain showers.
52								
53								
54								
55								
56	7	NQ	100	18	Gray Quartzite, moderately to severely fractured. Iron staining on fractures.		6:00	
57								
58								
59								
60							12:10	
61	8	NQ	100	77	Gray Quartzite. Fractures at 60.25, 61.5, 62, 63, 64, and 64.5 ft.		15:10	
62								
63								
							2:23	
							5:21	

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		6/5/1998	
Drilling Company		Eichelberger's			Date Finished		6/26/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
64	8	NQ	100	77		10:11		
65						12:35		
66	9	NQ	100	53	Gray QUARTZITE. Fracture zone at 66 to 66.75 ft.	2:20		
67						4:19		
68						6:52		
69						9:04		
70						10:50		
71	10	NQ	100	65	Gray QUARTZITE. Iron staining on fractures. 45-60 degrees.	2:04		
72						5:07		
73								
74								
75						10:47		
76	11	NQ	100	52	Gray QUARTZITE, iron staining on fractures.	2:32		
77						4:59		
78						7:06		
79						8:51		
80						11:00		
81	12	NQ	100	42	Gray QUARTZITE	2:25		
82								
83						0:00	Dense gray clay 2 to 3 inches.	
84						2:01	Clay,(chlorite) in fractures.	

Note: Inner barrel blocked off/ jammed. Pulled rods. Clogged with clay.

*Standard Penetration Test N-Value

Project Name					Harley Davidson		Project No.		1406701		
Boring Location					York PA		Date Started		6/5/1998		
Drilling Company					Eichelberger's		Date Finished		6/26/1998		
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS					
85	12					3:16					
86	13	NQ	100	73	Gray QUARTZITE, iron staining on fractures. Chlorite on fractures.	5:19					
87						5:19					
88						9:16					
89						9:16					
90						11:27					
91	14	NQ	100	57	Gray QUARTZITE, iron staining. slight clay on fractures.	2:00					
92						4:05					
93						6:15					
94						7:46					
95						9:20					
96						1:20					
97	15	NQ	100	72	Gray QUARTZITE, slight iron staining.	2:36					
98						4:20					
99						5:45					
100						7:20					
101											
102											
103											
104											
105											

Void
↓

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. 67S

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM	
DRILLING AGENCY Eichelberger's		DATE STARTED 5/20/1998	DATE FINISHED 5/22/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Carey Knaub	
SIZE AND TYPE OF BIT 7 7/8" Hammer Bit to 38 ft. 7 7/8" Roller Bit to 71 ft.		INSPECTOR Dave Wilson	
METHOD OF INSTALLATION Well was advanced by air rotary hammer bit to 38 ft. A roller bit was used to finish the hole to a total depth of 71 ft. PVC screen and riser were inserted down hole. Sand, bentonite, and grout completed the well to the surface. Note; MW-67S is a multilevel piezometer in same borehole as MW67D.			
METHOD OF WELL DEVELOPMENT The well was developed on 7/15/98 using airlift method at a rate of 0.5 gallons/minute for 1.5 hours. The discharge did not completely clear. Remained a light brown after pumping a total of 45 gallons.			
TYPE OF CASING	DIAMETER	TYPE OF BACKFILL MATERIAL	
Schedule 40 PVC	2 inch	Benseal Grout 3 94# bags	
TYPE OF SCREEN		TYPE OF SEAL MATERIAL	
Schedule 40 PVC	2 inch	Bentonite Chips 1 50# bag	
BOREHOLE DIAMETER 8 inches		TYPE OF FILTER MATERIAL #1 Morie Sand. 16 50# bags	
TOP OF CASING	ELEVATION	DEPTH	
Above ground		+ 2 ft.	
TOP OF SEAL	ELEVATION	DEPTH	
		10.8 ft.	
TOP OF FILTER	ELEVATION	DEPTH	
		12.8 ft.	
TOP OF SCREEN	ELEVATION	DEPTH	
		15 ft.	
BOTTOM OF BORING	ELEVATION	DEPTH	
		31 ft.	
SCREEN LENGTH		DEPTH	
15 ft.		15 to 30 ft. bgs	
SLOT SIZE 0.010 inch			
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
3.25ft. Toc PVC	5/22/1998		
ELEVATION	DATE		
ELEVATION	DATE		
ELEVATION	DATE		
ELEVATION	DATE		
ELEVATION	DATE		

WELL DETAILS		SOIL CLASSIFICATION	DEPTH (FT)
Steel Protective Cover			
PVC Riser		SILTS and CLAY	
Portland Cement Grout			10.8
Bentonite			12.8
PVC Screen			15.0
Sand Filler			31.0

WELL CONSTRUCTION SUMMARY

Well No. 67D

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM	
DRILLING AGENCY Eichelberger's		DATE STARTED 5/20/1998	DATE FINISHED 5/22/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Carey Knaub	
SIZE AND TYPE OF BIT 7 7/8" Roller Bit to 71 ft. 7 7/8" Hammer Bit		INSPECTOR Dave Wilson	
METHOD OF INSTALLATION Well was advanced by air rotary hammer bit to 38 ft. A roller bit was used to finish the hole to a total depth of 71 ft. PVC screen and riser were inserted down hole. Sand, bentonite, and grout completed the well to the surface. Note; MW-67D is a multilevel piezometer in same borehole as MW67S.			
METHOD OF WELL DEVELOPMENT The well was developed on 7/15/98 using airlift method at a rate of 2.0 gallons/minute for 1.0 hours. Discharge was clear after pumping a total of 120 gallons			
TYPE OF CASING	DIAMETER	TYPE OF BACKFILL MATERIAL	
Schedule 40 PVC	2 inch	Portland Cement/Granular Bentonite grout	
TYPE OF SCREEN	DIAMETER	TYPE OF SEAL MATERIAL	
Schedule 40 PVC	2 inch	Bentonite Chips	
BOREHOLE DIAMETER 8 inches		TYPE OF FILTER MATERIAL # 1 Morie Sand	
TOP OF CASING	ELEVATION	DEPTH	
Above ground		+2.0 ft.	
TOP OF SEAL	ELEVATION	DEPTH	SOIL CLASSIFICATION
		31 ft.	
TOP OF FILTER	ELEVATION	DEPTH	12.8
		58 ft.	
TOP OF SCREEN	ELEVATION	DEPTH	31.0
		60 ft.	
BOTTOM OF BORING	ELEVATION	DEPTH	
		71 ft.	
SCREEN LENGTH 10 ft.			
SLOT SIZE 0.010 inch			
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
+ 2 ft. or more/Artesian			
ELEVATION	DATE		

WELL DETAILS

Steel Protective Cover

PVC Riser

PVC Screen

Bentonite

Bentonite

Sand Filter

Sand Filter

Portland Cement

Grout

Sand

Filler

Shallow

SILT and CLAY to 31 ft. bgs

Dark gray Quartzite, weathered, from -31 to 43 ft. Unweathered from 43 to 71 ft. Water bearing zone at -65 ft.

DEPTH (FT)

12.8

31.0

58.0

60.0

71.0

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York, PA		Elevation and Datum			
Drilling Company		Eichelberger's		Date Started		Date Finished	
Drilling Equipment		Ingersoll Rand T4W Air Rotary		5/20/98		5/22/1998	
Size and Type of Bit		7 7/8" Hammer Bit		Completion Depth		Rock Depth	
Casing		---		71 ft.		31ft.	
Casing Hammer		Weight ---		Drop ---		Water Level	
Sampler		2" OD Split Spoon		Driller		Carey Knaub	
Sampler Hammer Weight		NA		Drop NA		Inspector	
						Dave Wilson	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1	S1	S-S	0.8	NA	SILT, brown, firm, little CLAY	Low plasticity, 3/16 inch thread. PID = 0 ppm.
2						
3						
4						
5						
6	S2	SS	0.9	NA	SILT, brown, damp, stiff, little CLAY laminated, maybe saprolitic.	15:53 PID = 0 ppm. Low plasticity, 1/4 inch thread.
7						
8						
9						
10						
11	S3	SS	2.0	NA	SILT, brown, damp, medium stiff; little CLAY, saprolitic, some black mottling, organics?	16:04 PID = 0 ppm. 1/4 inch thread.
12						
13						
14						
15						
16	S4	SS	0.4	NA	SILT, brown, soft, some CLAY, tr GRAVEL, subangular, weathered.	9:40 PID = 0 ppm 1/4 inch thread
17						
18						
19						
20						
21	S-5	SS	2.0	NA	CLAY, brown, soft, little SILT, moist.	PID = 0 ppm. 1/16 inch thread.

Project Name					Harley Davidson	Project No.		1406701
Boring Location					York PA	Date Started		Date Finished
Drilling Company					Eichelberger's	5/20/1998		
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22	S5				CLAY, brown, soft; little SILT; yellow mottling, moist. tr GRAVEL, subangular, weathered.	10:03	PID = 0 ppm <1/16 inch thread.	
23								
24								
25								
26	S6	SS	2	NA				
27					CLAY, brown, soft, little SILT. Quartzite, weathered, fine grained.	10:28	Top of weathered rock, split spoon refusal at 31 ft. very dry. Drilled to 35 ft. in rock. No returns, clay sealing off borehole. Blowing out hole at 11:02.	
28								
29								
30								
31	S7a	SS	0.6	NA				
32	S7b				Quartzite, fine grained, gray, weathered brown.	11:01	13:00 5/21/98 Set temporary 8 inch steel casing to 32 bgs.	
33								
34								
35	S8	cuttings						
36								
37					11:24			
38								
39								
40								
41								
42								

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		5/20/1998	
Drilling Company		Eichelberger's			Date Finished		5/22/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
43	S9	Cuttings			Gray, fine grained Quartzite, approximately 50% brown, weathered material.	PID = 0 ppm. Note:S9 was 42 to 43 ft. bgs.		
44								
45	S10	Cuttings			Gray, fine grained, Quartzite. No weathered material.	Dry, dusty, driller added small amount of water to dampen dust.		
46								
47								
48								
49								
50	S11	Cuttings			Dark gray, fine grained, Quartzite No weathered material.	15:00 Dry, dusty returns. 15:00 to 15:40- Hammer bit not operating properly, change over to a roller bit.		
51								
52								
53								
54								
55	S12	Cuttings			Hard, dark gray, fine grained Quartzite. Some brown, weathered, fragments.	15:45		
56								
57								
58								
59								
60	S13	Cuttings			Hard, dark gray with light gray Quartzite. No weathered material.	16:00 Dry, dusty. PID = 0 ppm.		
61								
62	S14	Cuttings			Hard, dark gray Quartzite.	16:03 Dry		
63								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701				
Boring Location		York PA			Date Started		5/20/1998				
Drilling Company		Eichelberger's			Date Finished		5/22/1998				
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS					
64					Hard, dark gray, Quartzite.	9:15	Water bearing zone				
65											
66	S15	Cuttings									
67											
68											
69											
70											
71									Total Depth = 71 ft.		
72											
73											
74											
75											
76											
77											
78											
79											
80											
81											
82											
83											
84											

*Standard Penetration Test N-Value

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York, PA		Elevation and Datum			
Drilling Company		Eichelberger's		Date Started		Date Finished	
Drilling Equipment		Ingersoll Rand T4W Air Rotary		5/19/1998		6/3/1998	
Size and Type of Bit				Completion Depth		Rock Depth	
Casing		6 Inch Steel from 80 ft. to + 3 ---		105 ft.		46.5 ft.	
Casing Hammer		Weight ---		Drop ---		Water Level 14.0 ft 08:00 5/26/98	
Sampler		2" OD Split Spoon		Driller		Carey Knaub/Bob Austin	
Sampler Hammer Weight		NA		Drop NA		Inspector Dave Wilson/Lou Russo	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1						11:30 (military time)
2						
3						
4						
5						
6	S1	SS	2.0	NA	Brown, firm, CLAY and SILT, tr SAND.	12:46 PID = 0 ppm.
7						
8						
9						
10						
11	S-2	SS	1.0	NA	Brown with gray mottling, SILT, with some CLAY. (also dark brown with black mottling, organic materials?)	Smooth smear, 1/4 inch thread; (SILT and CLAY)
12						
13						~13:30 Broken hydraulic line, rig down. Restart at 15:34
14						
15						
16	S-3	SS	1.0	NA	Brown, wet, medium hard CLAY and SILT. (Resists molding and rolling.)	Outside of split spoon is wet. PID = 0ppm
17						
18						
19						
20						
21	S-4	SS	1.8	NA	Brown, stiff, moist CLAY; tr rounded and subangular medium to fine GRAVEL, stained orange/red.	16:15 1/32 inch thread. PID = 0 ppm.

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finished	
Drilling Company		Eichelberger's			5/19/1998			
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22	S-4	SS			Brown, firm, moist, SILT and CLAY 1/8 inch thread, plastic.	PID = 0ppm. 5/19/1998 4:43:00 PM At ~ 27 ft. water was observed being pushed out the top of the adjacent MW-17 stickup. Stopped drilling to determine how to proceed. 5/20/98 09:05 restart with low air.	9:33	10:06
23								
24								
25								
26	S-5	SS	2	NA				
27					Brown, soft, mottled, moist, CLAY, some SILT. 1/16 inch thread.	10:25	10:45	
28								
29								
30								
31	S-6	SS	2	NA	Brown, with light yellow mottling, soft, SILT; some CLAY.	10:36	10:45	
32								
33					Brown, with light yellow mottling, soft, SILT; some CLAY; some fine GRAVEL; tr SAND.	10:36	10:45	
34								
35					Brown, with light yellow mottling, soft, SILT; some CLAY.	10:36	10:45	
36	S-7A	SS		NA				
37	S7B							
38					Brown, weathered, QUARTZITE. Top of weathered rock at 38 ft.			
39								
40								
41								
42								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finished	
Drilling Company		Eichelberger's			5/19/1998			
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
43								
44								
45								
46					Dark gray QUARTZITE	11:20	Top of competent rock at 46.5 ft. Drilled to 49 ft.	
47						11:40	#####	
48							Set 4 inch PVC casing to 48 ft. to keep hole open for coring. Loose material sloughed in 48 to 49 ft.	
49	Run	Core Type	% Recovery	RQD				
50					Gray QUARTZITE	0	07:00 to 08:30 set up. Begin coring 500 psi 1200-1500 rpm.	
51	1	NQ	87	87		3:19		
52						7:45	Increase to 2200-2500 rpm. PID = 1 to 1.5 ppm	
53						12:05		
54						15:00	4 ft. run, 52 inch total	
55	2	NQ	100	70	Gray QUARTZITE, broken, weathered from 53 ft. to 55 ft. 1 inch.	2:04	Circulation blocked off.	
56						4:51	400 psi, 2200-2500 rpm.	
57						7:00	PID = 1.0 to 1.5 ppm on weathered zone, 53 to 55 ft.	
58					Fracture at 57 ft. 4 inch.	8:46		
59						10:30		
60	3	NQ2	100	98	Gray QUARTZITE Fracture at 59 ft.	1:14	500 psi 2200 to 2500 rpm.	
61						3:20	5 ft. run.	
62						5:20		
63					From 62.5 to 63.5 ft. Moderately weathered, Fe staining on all fractures.	7:18		
						8:26		

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finished	
Drilling Company		Eichelberger's			5/19/1998			
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS		
64	3	NQ				5 inch/minute		
65	4	NQ2	100.0	97	Gray QUARTZITE Weathered fractures, Fe staining 63.5 to 66.5 ft.	1:42	500 psi 2200 to 2500 rpm	
66						3:14		
67						4:40		
68						8:10	Harder rock, 2 inch/minute	
69						12:15		
70	5	NQ2	100	97	Gray QUARTZITE Weathered zone from 70 to 71 ft. Fractures at 70 to 71 ft.	16:30	2 inch/min 500 psi 2200 to 2500 rpm At 15:00, increase to 700 psi. Bit is advancing very slowly. Had to stop to repair leak in containment.	
71						0	Restart, increase to 1000 psi.	
72								
73						3:45		
74						5:40		
75	6	NQ2	100	100	Gray QUARTZITE Fracture, Fe staining.	2:40	600 psi 2200 to 2500 rpm	
76						5:54	PID = 0 ppm.	
77						8:43		
78						11:10		
79						14:05		
80	7	NQ2	100	90	Gray QUARTZITE 80 to ~80.75 ft. fracture zone/weathered, (Fe staining).	2:30	600 psi 2200 to 2500 rpm. PID = 0 ppm	
81						4:18	Note: bottom of 6 inch steel casing set at 80 ft. 6 inch open rock hole from 80 to 105 ft.	
82						7:36		
83								
84								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701		
Boring Location		York PA			Date Started		Date Finished		
Drilling Company		Eichelberger's			5/19/1998				
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS			
85	8	NQ2	95	68	Gray QUARTZITE Fracture at 84.5 ft. Void 87.5 to '88 ft.	3:08	600 psi 2200 to 2500 rpm		
86									
87									
88									
89									
90	9	NQ	100	100	Gray QUARTZITE	3:30			
91									
92									
93									
94									
95	10	NQ	100	87	Gray QUARTZITE Highly weathered zone/Fe staining 96.5 to 97.5 ft.	7:33			
96									
97									
98									
99									
100	11	NQ	100*	50*	1 ft. Gray QUARTZITE (slight Fe stain) 1 ft. Highly weathered/fractured QUARTZITE with Fe staining. Total depth =105		Core barrel blocked off at 98.5 ft. Stopped coring 5/26/98. * Based on 24 inch run. Bottom of boring.		
101									
102									
103									
104									
105									

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. **MW-69**

PROJECT		PROJECT NO.	
Harley Davidson		1406701	
LOCATION		ELEVATION AND DATUM	
York, PA			
DRILLING AGENCY		DATE STARTED	DATE FINISHED
Eichelberger's		6/25/1998	6/29/1998
DRILLING EQUIPMENT		DRILLER	
Ingersoll Rand T4W Air Rotary		Carey Knaub	
SIZE AND TYPE OF BIT		INSPECTOR	
6 inch Hammer Bit /10 inch Roller Bit		Dave Wilson	
METHOD OF INSTALLATION			
Well was advanced to 74 ft. (top of rock) with 6 inch hammer bit. Borehole was then reamed with 10 inch roller bit to 77 ft. bgs. Temporary 8 inch casing was set to 77 ft. Hole was advanced to 126 ft. bgs. 6 inch steel casing was set to ? Bgs. A 2 ft. bentonite seal was put in place at the bottom of the 6 inch casing. Benseal grout completed the well to the surface.			
METHOD OF WELL DEVELOPMENT			
The well was developed with a submersible pump at 0.25 gpm for a total of 1 hr. 51 min. on 7/15/98. (pumped dry, left to recover overnight.) Well was pumped for 11 min. at 0.50 gpm on 7/16/98 until discharge was clear.			
TYPE OF CASING	DIAMETER	TYPE OF BACKFILL MATERIAL	
Steel	6 inch	Portland Cement/Granular Bentonite grout	
TYPE OF SCREEN		TYPE OF SEAL MATERIAL	
NA		Pelletized Bentonite	
BOREHOLE DIAMETER		TYPE OF FILTER MATERIAL	
		NA	
TOP OF CASING	ELEVATION	DEPTH	WELL DETAILS
Above ground		+3 ft.	
TOP OF SEAL	ELEVATION	DEPTH	SOIL CLASSIFICATION
TOP OF FILTER	ELEVATION	DEPTH	SILT and CLAY, trace SAND and GRAVEL
NA			
TOP OF SCREEN	ELEVATION	DEPTH	Portland Cement Grout
		6 inch Steel Casing	
BOTTOM OF BORING	ELEVATION	DEPTH	74.0
		8 inch open rock ? to 126 ft.	
SCREEN LENGTH		NA	LIMESTONE
SLOT SIZE		NA	
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		Bentonite
		7/15/98 DTW = 69.21 ft.	
ELEVATION	DATE		Open Rock Hole in Limestone
ELEVATION	DATE		?
ELEVATION	DATE		126.0
ELEVATION	DATE		
ELEVATION	DATE		

Project Name Harley Davidson					Project No. 1406701	
Boring Location York, PA					Elevation and Datum	
Drilling Company Eichelberger's					Date Started	Date Finished
Drilling Equipment Ingersoll Rand T4W Air Rotary					6/25/1998	
Size and Type of Bit 6 Inch Hammer Bit					Completion Depth	Rock Depth
Casing ---					126 ft. 74 ft.	
Casing Hammer		Weight ---	Drop ---		Water Level	
Sampler 2" OD Split Spoon					Driller Carey Knaub	
Sampler Hammer Weight NA			Drop NA		Inspector Dave Wilson	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1	S1	S-S	0.5	NA	Brown SILT; sandstone cobble.	PID = 0 ppm Drove a cobble, poor recovery.
2						
3						
4						
5						
6	S2	SS	1.3	NA	Brown SILT and CLAY; tr SAND; some coarse GRAVEL, weathered sandstone, and green phyllite.	PID = 0 ppm
7						
8						
9						
10						
11	S3	SS	0.8	NA	Tan and gray mottled CLAY; some SILT; coarse, weathered, sandstone GRAVEL.	PID = 0 ppm
12						
13						
14						
15						Water above 15 ft. bgs. Maybe perched water table. PID = 0 ppm
16	S4a	SS	1.3	NA	Saturated, very loose, brown, SILT; tr SAND and GRAVEL.	
17	S4b				Stiff, tan and gray mottled CLAY.	
18						
19						
20						
21	S-5	SS	1.7	NA	Soft, brown, CLAY and SILT; tr SAND; some coarse, sandstone and phyllite GRAVEL.	PID = 0 ppm

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finished	
Drilling Company		Eichelberger's						
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22	S5				See above	PID = 0 ppm		
23								
24								
25								
26	S6	SS	1.7	NA	Brown, mottled red, stiff CLAY; some SILT; tr coarse GRAVEL.	PID = 0 ppm		
27								
28								
29								
30						PID = 0 ppm		
31	S7	SS	0.8	NA	Very stiff, red/brown CLAY; tr sub angular, quartz, GRAVEL.			
32								
33								
34						PID = 0 ppm		
35								
36	S8	SS	0.8	NA	Very stiff, red/brown CLAY; mottled with black, tr GRAVEL.			
37								
38						Not sure this is representative of the 40 - 42 ft. interval. Material slumping into hole at approximately 15 ft. bgs. 11:09		
39								
40								
41	S9	SS	0.7	NA	Tan and gray mottled, saturated, SILT; with CLAY.			
42								

*Standard Penetration Test N-Value

Project Name Harley Davidson		Project No. 1406701	
Boring Location York PA		Date Started 6/25/1998	Date Finished
Drilling Company Eichelberger's			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
43					Saturated, loose, brown, SILT; SAND; fine to coarse, angular, and sub-rounded sandstone and quartz GRAVEL; from ~42 to 74 ft. (top of rock)	6/25/1998 14:00 Reamed 10 inch hole to 75 ft. bgs Top of rock at 74 ft. Set temporary 8 inch steel casing to 77 ft. NO split spoons collected from 42 to 74 ft. due to saturated, loose, material which would not stay in the spoon. Hole collapsing. Formation sampled from drill cuttings.
44						
45						
46						
47						
48						
49						
50						
51						
52						
53						
54						
55						
56						
57						
58						
59						
60						
61						
62						
63						

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York PA		Date Started		Date Finished	
Drilling Company		Eichelberger's		6/25/1998			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
64						
65						
66						
67						
68						
69						
70						
71						
72						
73						
74						
75					LIMESTONE	Top of rock. 8 inch steel, temporary casing set to 77 ft. bgs on 6/26/98.
76						
77						
78						Start on 6/29/98.
79						
80	S10	cuttings			Dark gray, massive, LIMESTONE; slightly weathered, Fe stained.	
81						WBZ at 81 ft.
82						
83						
84						

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finished	
Drilling Company		Eichelberger's			6/25/1998			
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
85	S11	cuttings			Dark to light gray, crystalline, LIME-STONE.	Cuttings/dust become lighter gray.		
86								
87								
88								
89								
90								
91	S12	cuttings			Dark gray, mottled light gray, LIME-STONE, crystalline.	PID = 0 ppm		
92								
93								
94								
95	S13	cuttings			Light gray, crystalline LIMESTONE.	PID = 0 ppm		
96						6 inch steel casing set to ?		
97								
98								
99								
100						Dry, dusty returns.		
101								
102	S14	cuttings			Light gray, crystalline, LIMESTONE.	PID = 0 ppm.		
103						102.5 ft. at 13:55 on 6/29/98.		
104								
105								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701					
Boring Location		York PA			Date Started		6/25/1998					
Drilling Company		Eichelberger's			Date Finished							
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS						
106					Light gray, crystalline, LIMESTONE.	Very dry and dusty returns, light gray.						
107	S15	cuttings										
108												
109												
110												
111												
113												
114	S16	cuttings							Light gray, weathered, (Fe stained) LIMESTONE.	Lighter color. Weathered zone. Less dust. Maybe WBZ. ??		
115												
116												
117												
118	S17	cuttings										
119									Light gray LIMESTONE.			
120												
121												
122												
123												
124												
125	S18	cuttings			Light gray, LIMESTONE.							
126												
127												
						Total depth = 126 ft. bgs on 6/30/98.						

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. 70D

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM	
DRILLING AGENCY Eichelberger's		DATE STARTED 7/1/1998	DATE FINISHED 7/6/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Kevin Huffman	
SIZE AND TYPE OF BIT 7 7/8" Hammer Bit		INSPECTOR Dave Wilson	
METHOD OF INSTALLATION Well was advanced by air rotary hammer bit to a total depth of 85 ft. The screen and riser were inserted down the borehole. Sand, bentonite, and Benseal grout were added to finish the well to the surface.			
METHOD OF WELL DEVELOPMENT The well was developed on 7/16/98 using airlift method at a rate of approximately 1.5 gallons per minute for 2 hrs. 45 min. The discharge was hazy and dirty, but cleared up after being surged several times.			
TYPE OF CASING	DIAMETER	TYPE OF BACKFILL MATERIAL	
Schedule 40 PVC	2 inch	Portland Cement/Granular Bentonite grout	
TYPE OF SCREEN		TYPE OF SEAL MATERIAL	
Schedule 40 PVC	2 inch	Bentonite Chips	
BOREHOLE DIAMETER 8 inches		TYPE OF FILTER MATERIAL # 1 Morie Sand	
TOP OF CASING	ELEVATION	DEPTH	DEPTH (FT)
Flush Mount			
TOP OF SEAL	ELEVATION	DEPTH	
		35 ft.	
TOP OF FILTER	ELEVATION	DEPTH	
		67.5 ft.	
TOP OF SCREEN	ELEVATION	DEPTH	
		68 ft.	
BOTTOM OF BORING	ELEVATION	DEPTH	
		85 ft.	
SCREEN LENGTH		10 ft.	
SLOT SIZE	0.010 inch		
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
DTW= 19.97 ft. TOC PVC	7/6/1998		
ELEVATION	DATE		
DTW= 19.6 ft. TOC PVC	7/16/1998		
ELEVATION	DATE		
ELEVATION	DATE		
ELEVATION	DATE		
ELEVATION	DATE		

WELL DETAILS

Steel Protective Cover

PVC Riser

Portland Cement Grout

Upper sand pack

Bentonite

PVC Screen

Sand Filter

SOIL CLASSIFICATION

SILT, tr Clay, SAND and GRAVEL to 52 ft.

12.0

15.6

35.0

Green/gray Phyllite, fine grained, weath-ered, from 52 to 68 ft. Fractured, 68 to 71 ft. More competent, 71 to 76 ft. Fractured below 76 ft.

67.5

68.0

85.0

Project Name		Harley Davidson		Project No.		1406701			
Boring Location		York, PA		Elevation and Datum					
Drilling Company		Eichelberger's		Date Started		Date Finished			
Drilling Equipment		Ingersoll Rand T4W Air Rotary		7/1/1998		7/6/1998			
Size and Type of Bit		7 7/8" Hammer Bit		Completion Depth		Rock Depth			
Casing		---		85 ft.		52 ft.			
Casing Hammer Weight		---		Drop		---			
Sampler		2" OD Split Spoon		Water Level					
Sampler Hammer Weight		NA		Drop		NA			
				Driller				Kevin Huffman	
				Inspector				Dave Wilson	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION		REMARKS
1	S1	S-S	0.5	NA	Brown SILT and GRAVEL, sandstone, limestone, and quartz, med to coarse. (fill).	8:28	PID = 0 ppm.
2							
3							
4							
5							
6	S2	SS	2.0	NA	Brown SILT; tr CLAY; tr angular, coarse, GRAVEL; soft, damp.	9:04	PID = 0.8 ppm.
7							
8							
9							
10							
11	S3	SS	2.0	NA	Brown, medium stiff, CLAYEY SILT; little coarse, weathered, GRAVEL; sandstone and quartz. Fe stained.	9:16	PID = 0 ppm.
12							
13							
14							
15							
16	S4a	SS	2.0	NA	Yellow/brown SILT; tr CLAY; soft, damp. Brown, SILT; little SAND, and coarse quartz GRAVEL; moist.	9:35	PID = 0 ppm.
17	S4b						
18							
19							
20							
21	S-5	SS	1.5	NA	Yellow/brown SANDY SILT; coarse, weathered, quartz GRAVEL. Green/gray PHYLLITE fragments in shoe.		PID = 0 ppm.

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York PA		Date Started		Date Finished	
Drilling Company		Eichelberger's		7/1/1998		7/6/1998	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
22	S5					
23						Slight bit chatter @ 23 and 25 ft.
24						
25						
26	S6	SS		NA	Coarse, medium, and fine, weathered, quartz GRAVEL; with fine SAND; tr SILT. Wet.	9:55 Outside of split spoon and rods are wet. 11:00 A.M. water in hole at 22 ft. bgs.
27						10:35 Bit chatter from 27 to 29 ft.
28						
29						
30						
31						
32						
33	S7	SS	0.8	NA	Brown, saturated, angular, weathered, quartz GRAVEL; and SILT; little SAND.	PID = 0 ppm.
34						8 inch steel temporary casing set to 40.5 ft. bgs, to keep hole open.
35						
36						
37						
38						
39						
40						
41	S8	SS	2	NA	Brown, saprolitic, thinly laminated, CLAY; little SILT. Wet.	15:10 PID = 0 ppm.
42						

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/1/1998	
Drilling Company		Eichelberger's			Date Finished		7/6/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
43						PID = 0 ppm.		
44								
45						15:35		
46	S9	Cuttings		NA	Highly weathered, green/gray, PHYLLITE, sandstone, and quartz. Medium sand to coarse gravel size. (1 mm to 30 mm).	PID = 0 ppm.		
47						16:00 Split spoon refusal at 45 ft. bgs.		
48						Bit chatter from 45 to 45.5 ft.		
49								
50								
51	S10	Cuttings		NA	Highly weathered, PHYLLITE and QUARTZ. Medium sand to coarse gravel size fragments.	PID = 0 ppm.		
52								
53					Highly weathered, green/gray PHYLLITE and QUARTZ.	Start: 7/2/98		
54						Steady bit chatter.		
55						Very weathered from 54 to 63 ft. bgs.		
56								
57								
58								
59								
60								
61								
62								
63								

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/1/1998	
Drilling Company		Eichelberger's			Date Finished		7/6/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
64					Green/gray PHYLLITE and QUARTZ. Weathered, but more competent than above.	Increased bit chatter, more competent rock from 63 to 68 ft.		
65								
66								
67								
68								
69					Fractured, weathered, from 68 to 71 ft.	Increased water. Water bearing zone.		
70								
71								
72					More competent rock from 71 to 76 ft.	More competent, increased resistance to drilling.		
73								
74								
75								
76								
77					Badly broken, and fractured. Larger fragments 3 to 5 cm in size.	9:00 AM 2 ft. cave in. Measured well depth at approximately 76 ft.		
78								
79								
80								
81								
82								
83								
84								
						Hole collapsed from 80 to 85 ft.		

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/1/1998	
Drilling Company		Eichelberger's			Date Finished		7/6/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
85					TD of borehole = 85 ft	7/2/98 approximately 9:30 AM.		
86								
87								
88								
89								
90								
91								
92								
93								
94								
95								
96								
97								
98								
99								
100								
101								
102								
103								
104								
105								

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. 71S

PROJECT Harley Davidson	PROJECT NO 1406701
LOCATION York, PA	ELEVATION AND DATUM
DRILLING AGENCY Eichelberger's	DATE STARTED 5/27/1998 DATE FINISHED 6/8/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary	DRILLER Carey Knaub
SIZE AND TYPE OF BIT 7 7/8" Hammer Bit	INSPECTOR Dave Wilson

METHOD OF INSTALLATION
 (See MW 71D wc.xls) The upper screen was installed from 45 to 30 ft. bgs. The sand pack was brought to 28 ft. Chipped Bentonite was added to 26 ft. Benseal grout was pumped through a tremie pipe until the grout reached the surface.

METHOD OF WELL DEVELOPMENT
 The well was developed on 7/16/98 using a whale??? pump and surging at a rate of 0.25 gpm for 1 hr. 30 min. until discharge was clear.

TYPE OF CASING Schedule 40 PVC	DIAMETER 2 inch	TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout
TYPE OF SCREEN Schedule 40 PVC	DIAMETER 2 inch	TYPE OF SEAL MATERIAL Bentonite Chips
BOREHOLE DIAMETER 8 inches		TYPE OF FILTER MATERIAL # 1 Morie Sand

TOP OF CASING	ELEVATION	DEPTH	WELL DETAILS		DEPTH (FT)
Flush Mount			Steel Protective Cover	SOIL CLASSIFICATION	
TOP OF SEAL		26 ft.		Silts, clays, saprolite and coarse gravel.	
TOP OF FILTER		28 ft.			
TOP OF SCREEN		30 ft.			
BOTTOM OF BORING		46.8 ft.			
SCREEN LENGTH	15 ft.				
SLOT SIZE	0.010 inch				
GROUNDWATER ELEVATIONS					
ELEVATION		DATE			
DTW = 34.55		7/16/1998			
ELEVATION		DATE			26.0
ELEVATION		DATE			28.0
ELEVATION		DATE			30.0
ELEVATION		DATE	PVC Screen	Sand Filter	
ELEVATION		DATE			46.8

WELL CONSTRUCTION SUMMARY

Well No. 71D

PROJECT Harley Davidson	PROJECT NO. 1406701	
LOCATION York, PA	ELEVATION AND DATUM	
DRILLING AGENCY Eichelberger's	DATE STARTED 5/27/1998	DATE FINISHED 6/8/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary	DRILLER Carey Knaub	
SIZE AND TYPE OF BIT 7 7/8" Hammer Bit	INSPECTOR Dave Wilson	

METHOD OF INSTALLATION
 The well was advanced to 84 ft. using an 8 inch hammer bit and 10 inch roller bit. The bedrock was cored from 84 to 101 ft. The deep well screen was set from 101 to 91 ft. Top of the sandpack was set at 88.5 ft. Chipped bentonite was brought up to 83 ft. Benseal grout was brought up to 55 ft. Due to loss of grout, a mixture of bentonite and gravel was brought up to 46.8 ft. (See MW71S wc.xls)

METHOD OF WELL DEVELOPMENT
 The well was developed on 7/16/98 using airlift method at a rate of 0.5 gpm for 1 hr. 20 min. until the discharge was clear.

TYPE OF CASING Schedule 40 PVC	DIAMETER 2 inch	TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout
TYPE OF SCREEN Schedule 40 PVC	DIAMETER 2 inch	TYPE OF SEAL MATERIAL Bentonite Chips
BOREHOLE DIAMETER 8 inches		TYPE OF FILTER MATERIAL # 1 Morie Sand

P. OF CASING	ELEVATION	DEPTH	WELL DETAILS	SOIL CLASSIFICATION	DEPTH (FT)
Above ground			Steel Protective Cover		
TOP OF SEAL		DEPTH 46.8 ft.			
TOP OF FILTER		DEPTH 88.5 ft.		Portland Cement Grout	
TOP OF SCREEN		DEPTH 91 ft.		Upper Sand Pack	
BOTTOM OF BORING		DEPTH 101 ft.		Bentonite and Gravel	
SCREEN LENGTH	10 ft.				46.8
SLOT SIZE	0.010 inch				55.0
GROUNDWATER ELEVATIONS					
ELEVATION	DTW = 35.9 ft.	DATE 7/16/1998			
ELEVATION		DATE	Portland Cement Grout	Quartzite	80.0
ELEVATION		DATE			83.0
ELEVATION		DATE	Bentonite		88.5
ELEVATION		DATE	PVC Screen	Sand Filter	91.0
ELEVATION		DATE			101.0

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York, PA		Elevation and Datum			
Drilling Company		Eichelberger's		Date Started		5/27/1998	
Drilling Equipment		Ingersoll Rand T4W Air Rotary				6/8/1998	
Size and Type of Bit		8 inch Hammer Bit.		Completion Depth		Rock Depth	
Casing		---		101 ft.		80 ft.	
Casing Hammer		Weight		Drop		Water Level	
		---		---			
Sampler				2" OD Split Spoon			
Sampler Hammer Weight				NA		Drop	
				NA		Inspector	
						Dave Wilson	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1	S1	S-S	1.0	NA	Dark brown, dry, SILT; some coarse to medium Quartzite GRAVEL; tr SAND.	16:16 PID =0 ppm
2						
3						
4						
5						
6	S2	SS	1.9	NA	Tan, soft, SILT; tr CLAY. Quartzite cobble in shoe.	16:26 crumbles, no thread. PID = 0 ppm
7						
8						
9						
10						16:31 Bit chatter, 8 to 10 ft.
11	S3	SS	1.7	NA	Brown SILT; tr CLAY; little Sand; some coarse, weathered, quartzite GRAVEL.	
12						
13						
14						
15						
16	S4	SS	2.0	NA	Brown, soft, SILT; tr CLAY.	16:42 ##### 8:26
17						
18						
19						
20						8:33 PID = 0ppm crumbles, no thread.
21	S5	SS	1.7	NA	Brown, with gray mottling, soft, SILT. tr CLAY.	8:44 0 ppm 2 ppm 1-2 ppm

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		5/27/1998	
Drilling Company		Eichelberger's			Date Finished		6/8/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22	S5	SS		NA	Brown, soft, SILT; tr CLAY.	#####		
23								
24								
25							9:07	PID = 0 ppm
26	S6	SS	1.2	NA				Top of borehole, HNU = 14 ppm
27								
28								
29								
30							9:15	0 ppm
31	S7			NA		Brown, soft, moist, SAND; little SILT; tr CLAY.		0.5 ppm Black stained patch
32							9:31	0 ppm
33							9:56	Bit Chatter
34								10:05 to 11:54 Hole has collapsed at 25 ft. Can't get split spoon down to 35 ft. Set temporary 8 inch casing
35							9:58	to 35 ft. Clean out casing, drive split spoon at 35 to 37 ft. interval.
36	S8	SS	2.0	NA	Brown, saprolitic, moist, SILT; tr CLAY little angular, coarse, GRAVEL.	11:54		
37							12:10	PID = 0 ppm
38								
39								
40								
41	S9	SS	2.0	NA	Brown, mottled with black, saprolitic, SILT and CLAY; tr SAND. Wet	13:10	PID = 0 ppm	
42							13:35	13:42 Water at approximately 35 ft, bgs.

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		5/27/1998	
Drilling Company		Eichelberger's			Date Finished		6/8/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
43								
44								
45								
46	S10	SS		NA	SILT and CLAY; Brown, mottled with black at 46 and 47 ft. tr SAND. Wet.			PID = 0 ppm = 2 ppm = 1 ppm Slight odor noted while drilling to 50 ft.
47								
48								
49								
50								
51	S11	SS	2.0	NA				
52					CLAY, little SILT, tr SAND, and GRAVEL. Wet, brown, soft, laminated, saprolitic.	14:26		PID = 0 ppm = 2 ppm = 0.5 ppm Making water. 
53								
54								
55								
56	S12	SS	2.0	NA				
57								
58					CLAY, little SILT, tr coarse to fine GRAVEL. Brown, soft, wet. Friable rock fragments in tip of spoon.	15:29		PID = 0 ppm
59								
60								
61	S13	SS	2.0	NA	SAPROLITE/SCHIST; micaceous, laminated, light tan, soft, friable, wet.	15:55		PID = 0 ppm
62								
63								
						16:15		Not competent.

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		5/27/1998	
Drilling Company		Eichelberger's			Date Finished		6/8/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
64					SAPROLITE, laminated, wet, friable, soft, dark brown, gray, light tan.	16:24		
65						16:40	PID = 0 ppm. Start split spoon at 16:40, open split spoon at 16:49.	
66	S14	SS	2.0	NA				
67								
68							Start at 68 ft. 08:30 5/29/98 Blowing water and silt out of the hole.	
69								
70					SILT, tr CLAY, SAND, GRAVEL; brown, saturated, very soft. (Note: could be material sloughed into the hole.)	8:45		
71	S15	SS	1.0	NA		9:27	PID = 0 ppm Drove split spoon to 72 ft. at 09:28 Opened split spoon at 09:38.	
72						9:28		
73					Brown SILT; some subangular, weathered, GRAVEL, sandstone and quartz.			
74								
75					S17 cuttings: Angular, fine chips of gray QUARTZITE.	9:45	Drilling very easy, mostly silt being washed away with returns.	
76	S16	cuttings		NA		10:35	Note: odor detected as hole being blown out. HNU jumped to 6 ppm in the breathing zone, then decreased to 1 ppm.	
77								
78							Top of weathered rock. Bit chatter, reasonably competent rock.	
79								
80							11:30 to 13:15 Set 8 inch steel casing to 79 ft. bgs to keep hole open for coring.	
81								
82								
83	Run	Core Type	% Recovery	RQD				
84								

*Standard Penetration Test N-Value

LOG OF BORING NO: MW-71

Sheet 5 of 5

Project Name		Harley Davidson			Project No.		1406701		
Boring Location		York PA			Date Started		5/27/1998		
Drilling Company		Eichelberger's			Date Finished		6/8/1998		
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS			
85	1	NQ	95.0	64	Gray Quartzite, weathered.		Start 6/8/98 08:30 at 84 ft.		
86					Fracture Fe stained.				
87	2	NQ	98.0	94	Gray QUARTZITE	3:39	400 psi down pressure 2200- 2500 rpm. PID = 0ppm		
88					Fracture zone, 87.5 to 88 ft. Fe stained.	7:41			
89						10:58			
90						13:05			
91					Fracture at 90.5 ft. Fe stained.	15:35/0			
92	3	NQ	102.0	98	Gray QUARTZITE	2:56	500 psi down pressure 2200-2500 rpm PID*= 0ppm		
93					Fracture Fe stained	5:25			
94					Fracture Fe stained	8:19			
95					Fracture Fe stained	11:16			
96					Fracture	13:47			
97	4	NQ	98.0	65	Gray QUARTZITE	6:40	500 psi 2200-2500 rpm		
98					Fracture Fe stained	8:50			
99						11:21			
100					Fracture zone 99 to 100 ft.	13:35			
101					Fracture at 100.5 ft.	15:25			
102						Completed coring, 13:30 6/8/98			
103									
104									
105									

*Standard Penetration Test N-Value

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York, PA		Elevation and Datum			
Drilling Company		Eichelberger's		Date Started		Date Finished	
Drilling Equipment		Ingersoll Rand T4W Air Rotary		6/17/1998		6/24/1998	
Size and Type of Bit		6 Inch Hammer Bit		Completion Depth		Rock Depth	
Casing		---		101 ft.		48 ft.	
Casing Hammer		Weight		Drop		Water Level	
		---		---			
Sampler				2" OD Split Spoon			
Sampler Hammer Weight				NA		Drop	
						NA	
				Inspector			
				Dave Wilson			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1	S1	S-S	1.0	NA	Brown Silt, with weathered Quartz and sandstone Gravel, tr Sand.	13:24 (military time) PID = 0 ppm
2						
3						
4						
5						
6	S2	SS	1.2	NA	Brown, firm, SILT; tr CLAY; tr GRAVEL orange mottling.	13:31 PID = 0 ppm
7						
8						
9						
10						
11	S3	SS	1.2	NA	Brown, SILT; with SAND; some sandstone GRAVEL, iron stained.	13:34 PID = 0 ppm
12						
13						
14						
15						
16	S4	SS	1.3	NA	SILT; tan with gray mottling, little CLAY.	13:52 PID = 0 ppm
17						
18						
19						
20						
21	S-5	SS	2.0	NA	SILT; tan with gray mottling, little CLAY.	PID = 0 ppm

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		6/17/1998	
Drilling Company		Eichelberger's			Date Finished		6/24/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22	S5					14:15	PID = 0 ppm	
23								
24								
25								
26	S6	SS	1.7	NA				
27						14:35	PID = 0 ppm	
28								
29								
30								
31	S7	SS	1.5	NA	CLAY; brown with gray mottling. Some SILT; little coarse to fine GRAVEL, quartz and weathered sandstone.			
32						15:00	PID = 0 ppm	
33								
34								
35								
36	S8	SS	1.7	NA	Brown, moist, CLAY; tr SAND; tr GRAVEL; iron stained, weathered sandstone.			
37						16:15	PID = 0 ppm	
38								
39								
40								
41	S9	SS	0.7	NA	Brown, saturated, very soft CLAY; tr GRAVEL; tr SAND.			
42					Note: Black, very soft CLAY in drive shoe. No response on HNU	Split spoon refusal at 42 ft.		

*Standard Penetration Test N-Value

Project Name					Harley Davidson		Project No.		1406701						
Boring Location					York PA		Date Started		6/17/1998						
Drilling Company					Eichelberger's		Date Finished		6/24/1998						
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS									
43						Bit chatter at 42 ft, for short time, then no chatter, no resistance from 43 to 48 ft. Possible void.									
44															
45															
46															
47															
48															
49					Weathered rock?						Bit chatter, no returns.				
50															
51															
52															
53															
54															
54					Increased bit chatter, probably more competent rock.	No returns.									
55															
56															
57															
58															
59															
59											16:31 Stop on 6/17/98.				
60											6/18/1998 9:25:00 AM Reamed 10 inch hole to 59 ft. Set 8 inch casing to 59 ft. Will drill out hole with 6 inch hammer bit.				
61	S10	cuttings			Dark gray mottled with light gray LIMESTONE. Weathered, (iron stained) quartz fragments.										
62															
63															

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		6/17/1998	
Drilling Company		Eichelberger's			Date Finished		6/24/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
64								
65								
66								
67								
68								
69								
70	S11	cuttings			Dark gray, mottled light gray, LIMESTONE.			PID = 0 ppm. Very dry and dusty.
71								
72								
73								
74								
75	S12	cuttings			Dark gray, mottled light gray, LIMESTONE.	13:04		PID = 0 ppm
76								
77								
78								
79								
80	S13	cuttings			Dark gray, mottled light gray, LIMESTONE. Slightly weathered.			PID = 0 ppm
81								
82								
83								
84								

*Standard Penetration Test N-Value

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York PA		Date Started		Date Finished	
Drilling Company		Eichelberger's		6/17/1998		6/24/1998	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
85						
86						
87						
88						
89						
90	S14	cuttings			Dark gray LIMESTONE.	13:12 PID = 0 ppm Very dry and dusty, no water.
91						
92						
93						
94						
95						
96						
97						
98						
99	S15	cuttings			Dark gray, mottled light gray, LIMESTONE.	PID = 0 ppm
100						
101					Total depth =101	13:16 6/18/98
102						
103						
104						
105						

*Standard Penetration Test N-Value

LANGAN Engineering and Environmental Services, Inc.

River Drive Center 1, Elmwood Park, NJ 07407

WELL CONSTRUCTION SUMMARY

Well No. MW-73

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM	
DRILLING AGENCY Eichelberger's		DATE STARTED	DATE FINISHED
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Carey Knaub	
SIZE AND TYPE OF BIT		INSPECTOR Dave Wilson	
METHOD OF INSTALLATION Borehole was advanced with 6 inch hammer bit, then reamed with 10 inch roller bit to 81 ft. NQ sized rock core was collected from 81 ft. to 101 ft. Borehole was reamed 6 inch to 101 ft. 6 inch steel casing was set to 80 ft. and grouted in place. Well was completed as an open rock hole from 80 to 101 ft.			
METHOD OF WELL DEVELOPMENT MW- 73 was developed on 7/20/98 by pumping with a submersible pump at a rate of 1.0 gpm until dry. Well was pumped again on 7/21/98 until dry. Discharge was clear.			
TYPE OF CASING Steel	DIAMETER 6 inch	TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout	
TYPE OF SCREEN NA	TYPE OF SEAL MATERIAL Pelletized Bentonite		
BOREHOLE DIAMETER 10 inch to 80 ft. 6 inch to 101 ft.		TYPE OF FILTER MATERIAL NA	
TOP OF CASING	ELEVATION	DEPTH	<div style="text-align: center;">WELL DETAILS</div>
Flush Mount.			
TOP OF SEAL	ELEVATION	DEPTH	
TOP OF FILTER	ELEVATION	DEPTH	
TOP OF SCREEN	ELEVATION	DEPTH	
6 inch open rock hole. 75 to 101 ft.			
BOTTOM OF BORING	ELEVATION	DEPTH	
101 ft.			
SCREEN LENGTH	NA		
SLOT SIZE	NA		
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
7/20/98 DTW = 48.65 ft.			
ELEVATION	DATE		
7/21/98 DTW = 75.32 ft.			
ELEVATION	DATE		
			DEPTH (FT)
			SOIL CLASSIFICATION
			59.0
			75.0
			76.0
			101.0

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York, PA		Elevation and Datum			
Drilling Company		Eichelberger's		Date Started		Date Finished	
Drilling Equipment		Ingersoll Rand T4W Air Rotary		6/8/1998			
Size and Type of Bit				Completion Depth		Rock Depth	
Casing		---		101 ft.		76 ft	
Casing Hammer		Weight		Drop		Water Level	
		---		---			
Sampler		2" OD Split Spoon		Driller		Carey Knaub/Bob Austin	
Sampler Hammer Weight		NA		Drop		Inspector	
				NA		Dave Wilson/Lou Russo	

Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS
1	S1	S-S	1.0	NA	Red/brown, soft, SILT; tr CLAY; tr subangular GRAVEL.	10:48 (military time) PID = 0 ppm
2						
3						
4						
5						
6	S2	SS	2.0	NA	Brown, soft, SILT; tr CLAY; tr subangular quartz GRAVEL.	PID = 0 ppm
7						
8						
9						
10						11:03
11	S3	SS	1.5	NA	Red/brown, mottled with tan, SILT; tr GRAVEL; tr CLAY.	PID = 0 ppm
12						
13						
14						
15						
16	S4	SS	1.7	NA	Red/brown soft SILT; some subangular quartz GRAVEL; some CLAY.	11:29 PID = 0 ppm
17						
18						
19						
20						
21	S-5	SS	1.7	NA	Tan SILT; some subangular, and rounded quartz GRAVEL; some CLAY.	PID = 0 ppm Note: Black mottling in bottom 6 in. of spoon. PID = 0 ppm.

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		6/8/1998	
Drilling Company		Eichelberger's			Date Finished			
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22	S5					11:41		
23								
24								
25						11:48		
26	S6	SS	1.5	NA	Tan,soft, CLAY and SILT; some sub-angular quartz GRAVEL.		12:45 to 13:15 Set 6 inch steel casing to 19 ft. to keep hole open. Clean out /drill to 25 ft. Set up split spoon at 25 to 27 ft.	
27								
28								
29								
30								
31	S7	SS	2	NA	Tan, firm, CLAY and SILT; some sub-angular, quartz GRAVEL.		PID = 0ppm Black staining at 31 ft. PID = 0 ppm.	
32								
33								
34								
35						13:42		
36	S8	SS	2	NA	Tan, firm, CLAY and SILT; some sub-angular quartz GRAVEL.		PID = 0 ppm Black stained material at 36 ft. PID = 0 ppm	
37						13:51		
38								
39								
40						14:00		
41	S9	SS	0.3	NA	Tan, saturated, CLAY with coarse GRAVEL.		PID = 0 ppm Outside of split spoon is wet.	
42						14:15	14:20 Added second length of 6 in. steel casing to 39 ft.	

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finished	
Drilling Company		Eichelberger's			6/8/1998			
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
43					Brown, wet, soft, CLAY and SILT; some subangular, coarse, quartz GRAVEL.			
44								
45							14:49	PID = 0 ppm
46	S10	SS	2.0	NA				
47						15:15		
48							15:25	Water blowing out of borehole.
49								
50						15:40		Making Water.
51	S11	SS	0.7	NA	Brown, saturated, very soft, fine to medium SAND; fine GRAVEL; some SILT.			
52								
53								
54								
55								
56	S12	SS	2	NA	Gray, laminated, saprolitic, CLAY above gray, fine grained DOLOMITE	16:15		PID = 0 ppm
57						16:40		Maybe top of weathered rock.
58								
59							6/9/98 08:08	Bit chatter, top of bedrock?
60								Note: rock is not very competent, seems to be alternating layers of rock and sediment.
61	S13	cuttings			~ 50% weathered Dolomite rock/gravel, iron stained, mixed with SILT, CLAY, little SAND. Very thick, saturated, poor returns.			6/9/98 11:20
62								Reaming hole with 10 in. roller bit drill stem is bouncing. Indicates alternating layers of rock/sediment.
63								Bit chatter at 62 ft.

*Standard Penetration Test N-Value

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York PA		Date Started		Date Finished	
Drilling Company		Eichelberger's		6/8/1998			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS	
64	S13	cuttings			Mixture of SILT, CLAY, GRAVEL, little SAND. Saturated	PID = 0 ppm.	
65							
66							
67	S14	cuttings					
68							
69							
70							
71	S15	cuttings					AS Above.
72							
73							
74							
75							
76					Dark gray DOLOMITE.	Bit chatter. 6/9/1998 11:25:00 AM Reamed hole with 10 inch roller bit Top of competent rock at 76 ft.	
77	S16	cuttings				Hard, slow drilling. At 79 ft., 20000# of pulldown pressure, rock still very resistant.	
78							
79							
80							
81						11:31 6/11/98 09:30 Start coring. 400 psi, 2000 to 2500 rpm. 500psi, 2200 to 2500 rpm. Purple water, 83.5 to 85.5 ft.	
82					Dark gray/purple argillaceous DOLOMITE.		
83	1	NQ	80	37	Highly fractured.		
84							

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finished	
Drilling Company		Eichelberger's			6/8/1998			
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS		
85	1	cont.						
86								
87					Fracture at 86.5 ft. and 87 ft. Grades into white MARBLE, with greenish and purple veins. (quartz?) also.	2:09	500 psi 2200 to 2500 rpm.	
88	2	NQ	125.0	97		4:26	Chatter at 87.5 to 88 ft.	
89						6:42	Color change to white. Blocked off at 90 ft.	
90					Fracture at 89.5 ft.	9:20	Run 2 = 4 ft. run. (recovered 5 ft.)	
91								
92					White MARBLE, greenish and purple veins. (quartz?)			
93	3	NQ	102	100			Color change to white. PID = 0	
94					Fracture at 92 and 93 ft.	9:25		
95								
96								
97						0 2:06	White water at 97.5 ft.	
98	4	NQ	100.0	100	White MARBLE, greenish and purple veins. (quartz?)			
99						8:00	PID = 0 ppm	
100					Fracture at 99.5 ft.	10:31		
101					Total depth = 101	14:29	White water at 100.5 ft.	
102							Stop 11:20 AM #####	
103							Set 6 inch casing to 80 ft. and grouted in place.	
104								
105								

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. 74D

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM TOC PVC = 360.70 ft. AMSL	
DRILLING AGENCY Eichelberger's		DATE STARTED	DATE FINISHED 8/11/1999
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Kevin Weigle	
SIZE AND TYPE OF BIT 7 7/8" Hammer Bit		INSPECTOR Ed Zofchak	
METHOD OF INSTALLATION The well was advanced by air rotary hammer bit to a total depth of			
METHOD OF WELL DEVELOPMENT The well was developed on 8/13/99 air lift and surge method. The well was developed for 78 minutes at 1.5 gpm. The discharge was silty at the beginning and clear at the end. A total of 117 gallons was removed from the well.			
TYPE OF CASING	DIAMETER	TYPE OF BACKFILL MATERIAL	
Schedule 40 PVC	2 inch	Portland Cement/Granular Bentonite grout	
TYPE OF SCREEN		TYPE OF SEAL MATERIAL	
Schedule 40 PVC	2 inch	Bentonite Chips	
BOREHOLE DIAMETER 8 inches		TYPE OF FILTER MATERIAL # 1 Morie Sand	
TOP OF CASING	ELEVATION	DEPTH	
Flush Mount			
TOP OF SEAL	ELEVATION	DEPTH 201 ft.	
TOP OF FILTER	ELEVATION	DEPTH 220 ft.	
TOP OF SCREEN	ELEVATION	DEPTH 225 ft.	
BOTTOM OF BORING	ELEVATION	DEPTH 250 ft.	
SCREEN LENGTH		225 to 250 ft.	
SLOT SIZE	0.010 inch		
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
338.65	8/11/1999		
ELEVATION	DATE		
340.65	10/1/1999		
ELEVATION	DATE		
ELEVATION	DATE		
ELEVATION	DATE		

WELL DETAILS		SOIL CLASSIFICATION	DEPTH (FT)
Material / Component	Approx. Depth Range (ft)		
Steel Protective Cover	0 - 201		
PVC Riser	0 - 220		
Portland Cement Grout	201 - 220		172.5
Bentonite	220 - 225		175.0
Upper sand pack	225 - 250		201.0
Sand Filter	225 - 250		220.0
PVC Screen	225 - 250		250.0



Engineering and Environmental Services, Inc.

LOG OF BORING MW-745/D SHEET 1 OF

PROJECT HARLEY DAVIDSON CORP. RI/RS		PROJECT NO. 1406701	
LOCATION YORK, PENNSYLVANIA		ELEVATION AND DATUM	
DRILLING AGENCY EICHELBERGERS, INC.		DATE STARTED 21 JULY 1999	DATE FINISHED 11 AUGUST 1999
DRILLING EQUIPMENT INGERSOLL RAND T-4 AIR ROTARY RIG		COMPLETION DEPTH MW-745-201	ROCK DEPTH 33 1/2 FT.
SIZE AND TYPE OF BIT 1 1/8, 1 1/8 BUTTND BITS		NO. SAMPLES	DIST. UNDIST. CORE
CASING 12 IN & 10 IN CASING		WATER LEVEL	FIRST COMPL. 24 HR.
CASING HAMMER	WEIGHT N/A	DROP N/A	FOREMAN KEVIN WEIGLE
SAMPLER	N/A		
SAMPLER HAMMER	WEIGHT N/A	DROP N/A	INSPECTOR ED ZOFCHAK

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)	
			NO. LOG.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.		
12 IN STEEL 10 IN STEEL 8 IN STEEL	Medium Brown SILT, some fine to coarse sand, trace of gravel (dry)	1					PID Background = 0.1-0.7 ppm ^{START 13:00}	
	CONCRETE SLAB	2						
	Orange Brown CLAY, trace to some silt and fine sand (moist)	3					PID READING AT DRILLER'S CONTROL STATION BEARING ZONE (B.Z) = 0.4-0.6 ppm	
		4						
		5						
			6					PID = 0.4-0.6 ppm at 5 ft depth
			7					
			8					PID = 0.4-0.5 ppm at 12 ft
			9					
			10					
		Tom Brown CLAY, trace to some silt and fine sand (moist)	11					
		Orange Brown CLAY becoming	12					
		Orange Brown SILT and fine to medium GRAVEL (moist)	13					
			14					



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Engineering and Environmental Services, Inc.

JOB NO. 1406701

LOG OF BORING NO. MW-745/D

DATE _____

SHEET 2 OF _____

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	
12 IN. STEEL	Brown SILT and fine to medium Limestone GRAVEL (dry to moist)	16					
		17					
10 IN. STEEL		18					
		19					
		20					
		21					BZ = 0.4 - 0.6 ppm at 20 ft
		22					
		23					
		24					BZ = 0.5 ppm at 24 ft.
		25					
		26					
		27					
		28					MODERATE TO HEAVY CHATTER AT 27 1/2 FT DEPTH 14:08 BZ = 0.5 - 0.7 ppm at 28 ft.
		29					
		30					DRILLING STOPS AT 14:10. DRILLER REPORTS GRAVELLY MATERIAL GETTING WET & STICKY. WILL NOT BLOW OUT OF BORE HOLE. NEED TO ADD WATER. CONSTRUCT CUTTING CONTAINMENT AREA.
		31					DRILLING RESUMES AT 14:22
		32					

JOB NO. 1406701

DATE 21 JULY 1999

LOG OF BORING NO. MW-745/D

SHEET 3 OF

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOG.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	
12 IN. STEEL	TOP OF BEDROCK						DRILL PIPE AND BIT BOUNCING WITH HEAVY CHATTER AS TOP OF BEDROCK ENCOUNTERED AT 33 1/2 FT. 14:38 P10 BZ = 0.6-0.7 ppm AT 34 FT. DRILLING BECOMES SMOOTH AND STEADY IN ROCK DRILLING STOPS AT 39 FT DEPTH AT 15:30, DRILLER'S SET 12 IN. STEEL CASING DRILLING STOPS 7/21 AT 16:45 DRILLING RESUMES 7/22 AT 10:10
	Dark to Medium Gray Limestone	34				2:00	
		35				7:57	
		36				8:53	
		37				9:30	
		38				13:15	
		39				10:42	
		40				4:08	
		41				—	
		42				—	
10 IN. STEEL	OPEN VOID	41					DRILLING PIPE PINKS RAPIDLY THROUGH 40 TO 45 FT INTERVAL AT APPROX. 15 TO 20 SEC / FT. DRILLER REPORTS OPEN VOID BETWEEN 40 AND 42 FT DEPTH LOSS OF CIRCULATION BEGINNING AT ~40 FT. DEPTH HEAVY CHATTER/GRINDING
		43					
	SEDIMENT-FILLED VOID SPACES / BROKEN ROCK	44					
		45					10:30
		46				4:48	
	LIMESTONE BEDROCK	47				4:16	P10 BZ = 0.5-0.6 ppm AT 46 FT P10 RO = 0.6-0.8 ppm
		48				2:45	DRILL PIPE BOUNCING / WITH OCC. BINDING AT 47 1/2 TO SURF IN FRACTURED BROKEN ROCK ZONE
	FRACTURED / BROKEN LIMESTONE	49				4:22	P10 BZ = 0.4-0.6 ppm AT 48 FT P10 RO = 0.4-0.7 ppm
	50				4:36	DRILLER REPORTS FRACTURED BEDROCK ZONE BETWEEN 49 AND 50 FT DEPTH.	
					7:27		
	Dark to Medium Gray LIMESTONE						



Engineering and Environmental Services, Inc.

JOB NO. 1406701

LOG OF BORING NO. MW-745/D

DATE 21-22 JULY 1999

SHEET 4 OF

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES			REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOC.	TYPE	RECOV. FT. PENETR. RESIST. BL/6 IN.	
10 INCH CASING	Dark to Medium Gray Limestone	52			7:27	NO RETURN WATER MODERATE TO HEAVY CHATTER
		53			4:12	
	OPEN VOID	54			1:25	BZ P.D = 0.1 to 0.4 gpm POLLUPR P.D = 0.2 to 0.5 11:00
		55			1:20	
	BROKEN LIMESTONE	56			1:00	
	SEAM	57			1:20	
	BROWN LIMESTONE	58			4:25	
	CLAY FILLED SEAM	59			1:11	
		60			1:03	DRILLING PIPE MOVES QUICKLY DOWN
		61			1:10	11:00
	SOFT, CLAY AND BRKED FRACTURED ROCK ZONE DOWN TO 75 FT	62			1:53	SHORT, STOP DRILLING NO WATER RETURN
		63			1:14	
		64			1:24	
		65			1:35	
		66			1:17	
		67			1:24	
		68			—	
					1:19	



Engineering and Environmental Services, Inc.

JOB NO. 1406701

DATE 22 July 1999

LOG OF BORING NO. MW-745/D

SHEET 5 OF

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BL/S IN.	
10 WCA CASING	CLAY FILLED ZONE W/ BROKEN ROCK	70					
		71					
		72					
		73					
		HARD ROCK STRAT/LAY	74				
		BROKEN FRACTURED LIMESTONE	75				
	76						
	77						
		HARD ROCK STRAT/LAY	78			2:50	
		Gray LIMESTONE	79			3:45	
	80				3:03		
	81				4:45		
	82				6:31		
	83				7:15		
	84				4:14		
	85				4:34		
86				4:42			
						OCCASIONAL HEAVY CHATTER ~ 86 FT ASPEN	



Engineering and Environmental Services, Inc.

JOB NO. 1406701

LOG OF BORING NO. MW-74 S/P

DATE 22 JULY 1999

SHEET 6 OF

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	
10 INCH CASING	HARD, COMPACT LIMESTONE BEDROCK	88			4:23		13:30 Breathing zone 0.9 m 1.3 gpm
		89			4:38		Roll off - 0.5 to 0.6 gpm
		90			4:06		CONTINUED MODERATE TO OCCASIONALLY HEAVY CHATTER
		91			4:41		-VOLT LITTLE WARM RETURN
		92			5:12		
		93			4:07		
		94			3:48		14:00 B.Z - 0.4 - 0.6 Roll off 0.3 - 0.6 gpm
		95			4:05		CONTINUED POOR, MUDDY WATER RETURN
		96			4:05		OCCASIONAL HEAVY CHATTER
		97			3:40		STEADY DRILLING
		98			3:46		
		99			3:25		
		100			4:18		14:15 100 FT BZ - 0.5 to 0.6 gpm
		101			3:47		Roll off 0.2 to 2.0 gpm
		102			3:46		
		103			4:36		
104			5:45				
			6:02		14:40 BZ - 0.04 - 0.5 Roll off 0.4 - 0.6		



JOB NO. 1406701

LOG OF BORING NO. MW-74510

DATE 22-28 July 1999

SHEET 7 OF

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)	
			NO. LOG.	TYPE	RECOV. FT.	PENETR. RESIST BLUG IN.		
20 1/2" CASING	Dark to Medium Grey Limestone - hard with occ seams	106	7103				CONTINUED STEADY DRILLING WITH OCC BINDING / CHATTER	
		107	651					
		108	548					
		109	556					
		110	7015					BINDING / CHATTER AT ~109 1/2 FT DEPTH; BOAST HOLE CASING ON PIPE
		111	742					RESUME STEADY DRILLING
		112	512					110 FT BZ = 0.4 TO 0.6 ppm RETURN 0.5 TO 0.8 ppm
		113	553					STEADY DRILLING WITH STOPS FOR DAM 7/22/99 AT 112 FT RETURN 0.2 / 0.3 TO 0.5 ppm
		114	519					START 7/28/99 @ 15:30
		115	525					MUDDY RETURN 15:45 STEADY DRILLING BZ - 1-14 RETURN 1.2-3
		116	433					
		117	439					STEADY DRILLING W/ LITTLE WATER / MUDDY RETURN 15:55 @ 116 FT BZ / 20 - 3 TO 14
		118	507					
		119	531					OCC. LIGHT CHATTER 118 FT 3/4"
		120	620					16:15 PID BZ = 0.1 TO 0.3 ppm CONTINUED 0.3 TO 0.4
		121	521					CONTINUED STEADY DRILLING WITH OCC LIGHT CHATTER
		122	538					16:30
			556					BZ - 0.1 to .4 ppm RETURN 0.2 TO 0.4 ppm



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Engineering and Environmental Services, Inc.

JOB NO. 1406701

DATE 28 July 1999

LOG OF BORING NO. MW-74510

SHEET 8 OF

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES					REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BLU/IN.		
10 INCH CASING	HARD COMPACT LIMONITE BED ROCK	124				584	1840 BZ 0.2-0.4 RETURN 0.3-0.4	
		125				628	- STOPPED DRILLING W/ ACC. LIGHT TO MUD CITATION	
		126				632		
		127				625	- VERT LITTLE HARDEN RETURN 16:55	
		128				646	BZ 0.2-0.4 RETURN 0.3-0.5	
		129				601		
		130				622	17:05 BZ-0.3-0.6 SPILLCS 2.1ppm	
		131				650		
		132				600	17:20 BZ-0.4-.6 RETURN 0.6-0.7	
		133				534	17:35 BZ-0.3-0.4	
		134				541		
		135				620		
		136				584		
		137				602		
		138				-	STOP 18:00 @ 137 FT RESUME 7/29/99 @ 8:00	
		139				-		
		140				551		
						450		



Engineering and Environmental Services, Inc.

JOB NO. _____

DATE 7/29/89

LOG OF BORING NO. MW-21510

SHEET 9 OF _____

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES			REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOG.	TYPE	RECOV. FT. PENETR. RESIST. BL/6 IN.	
10" W STEEL CASING	HARD COMPACT LIMESTONE BED ROCK	142			4.21	
		143			5.32	
		144			6.01	
		145			5.43	
		146			5.26	
		147			4.47	
		148			4.52	
		149			5.03	
		150			4.58	
			Dark Gray LIMESTONE	151		
152				214		
153				216		
154				157		
155				148		
156				143		
157				158		
158				205		
159				221		
	4-6" - <u>SEAM</u>	159				OCC LIGHT TO MUDSTONE CHATTER AT 158 1/2 FT



JOB NO. _____
DATE 9/29/01

LOG OF BORING NO. MW-74 S/D

SHEET 10 OF _____

SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	
Medium to Dark Gray LIMESTONE - hard, competent - No water	161				210	STORMY EVEN DRILLING STORMY DRILLING
	162				212	
	163				215	
	164				118	
	165				158	
	166				191	
	167				202	
	168				126	
	169				136	
	170				230	
- FRACTURED / NEARLY FRACTURED SEAM	171				200	G.C. MUDSTONE CHERT CONTINUED STORMY DRILLING - OCCASIONAL CHERT GRINDING - GREASY WATER
	172				157	
	173				205	
	174				240	
	175				233	
	176				253	
	177				207	
Medium LIMESTONE	178				143	15:15

JOB NO. _____ LOG OF BORING NO. MW-745/0

DATE 7/30-8/5/99 SHEET 11 OF _____

DEPTH SCALE	SAMPLE DESCRIPTION	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)		
		NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.			
179	Medium to Dark Gray Limestone				243	CONTINUED STERILE VOID DRILLING - OCC. CAVITATION 15:26 GROUNDWATER - LITTLE WATER		
180					309			
181					327			
182					207			
183					202			
184					137			
185					254			
186					202			
187		Broken fractured limestone					222	- MINOR CAVITATION - BROWN OILY WATER
188							1:30	
189					4:26	STOP PER DAY AT 188 FT @ 16:00 RESUME WORK 8/2/99 BZ=0ppm MINOR CAVITATION 190 1/2 TO 191 FT - LOSS OF CIRCULATION 191 1/2 FT - DURING CASING IN FROM 186 TO 188 FT 2ND STERILE VOID DRILLING - 5:00 OPM 188-188 FT STOP @ 194 FT @ 18:00 8/3/99 - SET ON CASING TO 194 FT (NOT GROUND) BZ=10-11.2ppm START 8/5/99 12:20		
190					4:48			
191					5:01			
192					4:52			
193					5:00			
194					4:49			
195		Light to medium Gray Limestone - CONTINUE STERILE DRILLING					2:13	
							2:25	





JOB NO. _____
DATE 8/5/99

LOG OF BORING NO. MW-74S/D

SHEET 12 OF _____

SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		NO. LOG.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	
Light Medium Gray LIMESTONE	197				2:26	CONTINUOUS STROKING DRILLING - LITTLE WATER (gray)
	198				2:41	
	199				3:12	
	200				2:48	
	201				2:33	
	202				3:08	
	203				3:20	
	204				3:01	
	205				2:49	
	Medium to Dark Gray LIMESTONE	205				
206					2:22	
207					2:15	
208					2:18	
209					2:25	
210					2:07	
211					2:13	
212					2:31	
213					2:38	
214						



JOB NO. _____
DATE 8/3/99

LOG OF BORING NO. MW-74510

SHEET 13 OF _____

SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES			REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		NO. LOC.	TYPE	RECOV. FT. PENETR. RESIST. BL/6 IN.	
Medium to Dark Gray Limestones	215			2:27	CONTINUED STEADY EVEN DRILLING - NO / LITTLE WATER 13:35 P10 B2 - 0.570 0.6 ppm PERC UP - 0.970 0.570 - OCCASIONAL LIGHT CRACKS; STEADY EVEN DRILLING - NO WATER
	216			2:29	
	217			2:19	
	218			2:25	
	219			2:23	
	220			2:36	
	221			2:20	
	222			2:22	
	223			2:18	
	224			1:59	
Medium to Dark Gray Limestones	225			1:48	- CONTINUED STEADY EVEN DRILLING - NO ODORS P10 = 0 14:00
	226			1:25	
	227			1:31	
	228			1:29	
	229			1:43	
	230			1:45	
	231			1:39	
				1:57	



JOB NO. _____

DATE 8/5/09

LOG OF BORING NO. MW-745/D

SHEET 14 OF _____

SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	
Grey LIMONSTONE	233				—	STEADY END DRILLING NO DISCRETE WATER BORING ZONES ENCOUNTERED
	234				—	
	235				1:35	
	236				2:11	
	237				2:15	
	238				2:01	
	239				14:30	
	240				1:45	CONTINUED STEADY END DRILLING P1050 ppm
	241				2:07	-NO WATER
	242				1:59	
	243				1:41	
	244				1:39	
	245				1:22	
	246				1:16	STEADY END DRILLING P1050 ppm NO WATER
	247				1:27	
	248				1:31	
	249				1:20	
	250				1:57	
	251				1:43	STOP 14:50 @

WELL CONSTRUCTION SUMMARY

Well No. MW-75D

PROJECT HARLEY DAVIDSON RI/FS		PROJECT NO. 1406701							
LOCATION YORK, PENNSYLVANIA		ELEVATION AND DATUM 361.80 FT							
DRILLING AGENCY EICHELBERGERS		DATE STARTED 8 JULY 1999	DATE FINISHED 19 JULY 1999						
DRILLING EQUIPMENT INGERSOLL RAND		DRILLER KEN WEIGLE							
SIZE AND TYPE OF BIT 5 7/8		INSPECTOR ED ZOFCHAK							
METHOD OF INSTALLATION WELL WAS ADVANCED BY AIR RETURN WAGON BIT TO 217 FT									
METHOD OF WELL DEVELOPMENT WELL DEVELOPED ON 8/13/99 USING AIR LIFT AT RATE OF 2 TO 2.5 GPM FOR 1 HR. DISCHARGE VISIBLY CLEAR UP AT END OF HOUR. APPROX 130 GAL REMOVED									
TYPE OF CASING PVC	DIAMETER 2 INCH	TYPE OF BACKFILL MATERIAL CEMENT GROUT							
TYPE OF SCREEN PVC	DIAMETER 2 INCH	TYPE OF SEAL MATERIAL BENTONITE CHIPS							
BOREHOLE DIAMETER 6 INCHES		TYPE OF FILTER MATERIAL #1 MORTAR SAND							
TOP OF CASING	ELEVATION	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">WELL DETAILS</th> <th style="width: 25%;">SOIL CLASSIFICATION</th> <th style="width: 25%;">DEPTH</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"> </td> <td></td> <td></td> </tr> </tbody> </table>		WELL DETAILS	SOIL CLASSIFICATION	DEPTH			
WELL DETAILS	SOIL CLASSIFICATION			DEPTH					
TOP OF SEAL	ELEVATION								
TOP OF FILTER	ELEVATION								
TOP OF SCREEN	ELEVATION								
BOTTOM OF BORING	ELEVATION								
SCREEN LENGTH	13 FT SCREEN								
SLOT SIZE	.010 IN.								
GROUNDWATER ELEVATIONS									
ELEVATION	DATE								
ELEVATION	DATE								
ELEVATION	DATE								
ELEVATION	DATE								
ELEVATION	DATE								
ELEVATION	DATE								

Project Name Harley Davidson		Project No. 1406701	
Boring Location York, PA		Elevation and Datum 360.48	
Drilling Company Eichelberger's		Date Started 7/6/1998	Date Finis 7/30/
Drilling Equipment Ingersoll Rand T4W Air Rotary		Completion Depth 173 ft.	Rock Dept 17
Size and Type of Bit 8 Inch Hammer Bit			
Casing ---		Water Level 20.1 ft. bgs 7/30/98	
Casing Hammer Weight ---		Drop ---	
Sampler 2" OD Split Spoon		Driller Carey Knaub	
Sampler Hammer Weight NA		Inspector Dave Wilson	
Drop NA			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION		REMARKS
1					Asphalt and clean fill. Limestone crusher waste to 10 ft. bgs.	11:21	
2							
3							
4							
5							
6							
7							
8							
9							
10							
11	S-1	cuttings	NA	NA	Brown, sandy, silt.	11:46	PID = 0 ppm.
12							
13							
14					Weathered, coarse, quartz, gravel and dolomite fragments. Quartz and dolomite are slightly weathered.	11:46	Note: Gray rock chips react with Hcl acid when crushed. PID = 0 ppm. Water on top of bedrock at approximately 16 ft. bgs. 11:30 to 14:32 Set 8 inch x18 ft. steel casing t ft. bgs. Attempted to drill ahead 8 inch x 24 ft. stabilizer bit . Bit ing up on casing. Pull 8 inch ca Reamed hole 10 inch to 22 ft. t Reset 8 inch casing. Drilled to with 8 inch stabilizer.
16	S-2	SS	0.7				
17					Top of rock at approximately 17 ft. bgs.	11:46	14:32 to 15:26 Meeting re: MW
18							
19							
20							
21							

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York PA		Date Started		Date Finis	
Drilling Company		Eichelberger's		7/6/1998			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
22					LIMESTONE and DOLOMITE, light gray mottled. Apprx. 30 to 40 % Fe stained/ weathered.	Some rock chips react strongly with Hcl acid, others react only when crushed.
23						
24						
25	S-3	cuttings	NA	NA		
26						
27						
28						
29						
30						
31	S-4	cuttings	NA	NA		
32					Light and dark gray DOLOMITE. Approximately 15 to 20 % weathered, Fe stained.	14:03 Weak reaction with HCl when powdered.
33						
34						
35						
36	S-5	cuttings	NA	NA		
37					Light gray DOLOMITE, fine grained. Approximately 15 to 20 % Fe stained.	14:05 Weak reaction with HCl when powdered.
38						
39						
40						
41	S-6	cuttings	NA	NA		
42						

*Standard Penetration Test N-Value

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York PA		Date Started		Date Finis	
Drilling Company		Eichelberger's		7/6/1998			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
43						
44						
45						
46	S-7	cuttings	NA	NA	Light gray DOLOMITE, with thin,(1 mm) Calcite veins. Apprx. 20% Fe stained.	14:11 Weak reaction with HCl when powdered. Some white (calcite fragments react strongly with ε
47						
48						
49						14:13
50						
51						
52						
53						
54						14:16
55						
56	S-9	cuttings	NA	NA	Light and dark gray mottled DOLOMITE and LIMESTONE, with thin (1mm) Calcite veins. Apprx. 15 to 20 % Fe stained.	14:19 More reaction with acid but still mostly dolomite.
57						
58						
59						
60						Slight amount of water at 58 or
61	S-10	cuttings	NA	NA	Limestone; dark gray,hard, massive, unweathered. Graphite.	Color change. Darker limestone. Strong reaction with HCl.
62						
63						

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finis	
Drilling Company		Eichelberger's			7/6/1998			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
64						14:24
65						
66						
67	S-11	cuttings	NA	NA	Dark gray LIMESTONE with thin Calcite veins (1mm). No weathered material, no Fe stains.	Strong reaction with HCl acid.
68						14:27
69						14:30 to 15:26 Break for meeti
70	S-12	cuttings	NA	NA	Dark gray LIMESTONE with thin Calcite veins. No weathered material.	14:30 15:27 Water has accumulated borehole, approx. 7 ft.
71						
72						
73						
74						
75						
76						
77						
78						15:35
79						
80	S-13	cuttings	NA	NA	Dark gray LIMESTONE, Calcite, Graphite. Little or no Fe stains.	
81						
82						
83						15:39 Loss of bit chatter at 83 ft. Voic
84					Void?	

*Standard Penetration Test N-Value

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York PA		Date Started		Date Finis	
Drilling Company		Eichelberger's		7/6/1998			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
85						
86						
87						15:41
88						15:43
89						
90	S-14	cuttings	NA	NA	Dark gray, hard, massive, LIMESTONE No Fe stains.	Strong reaction with HCl.
91						15:45 Less bit chatter from 90 to 92 f
92						
93						
94						
95						15:48
96						15:49
97						
98						
99						15:53
100	S-15	cuttings	NA	NA	Dark gray, hard, massive, LIMESTONE Graphite, Calcite veins, 1 to 3 mm thick.	Strong reaction with HCl.
101						
102						
103						
104						15:57
105						

*Standard Penetration Test N-Value

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York PA		Date Started		Date Finis	
Drilling Company		Eichelberger's		7/6/1998			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
106						15:59
107						
108						
109						
110	S-16	cuttings	NA	NA	Dark gray massive LIMESTONE. Graphite, Calcite.	16:01 Dry, dusty. Strong reaction with HCl.
111						
112						16:04
113						
114						16:06
115						
116						
117						
118						16:08
119						
120	S-17	cuttings	NA	NA	Dark gray, massive, LIMESTONE. Little or no weathering. Calcite, Graphite.	
121						
122						
123						
124						16:14
125						
126						

*Standard Penetration Test N-Value

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York PA		Date Started		Date Finis	
Drilling Company		Eichelberger's		7/6/1998			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
127						16:17
128						
129						16:18
130	S-18	cuttings	NA	NA	Dark gray, massive, LIMESTONE. Graphite, Calcite. No Fe stains.	Strong reaction with HCl.
131						
132						
133						
134						16:23
135						
136						
137						16:25
138						
139						
140	S-19	cuttings	NA	NA	Dark gray, massive LIMESTONE, with Calcite veins.	16:27
141					VOID	Water bearing zone. PID = 90 ppm headspace.
142					Coarse to fine, weathered, quartz gravel; medium to fine sand and silt.	
143						
144						Stop 7/6/98 7/7/98 08:54 Start DTW = 21 ft. bgs.
145						9:10
146					Rock ? At 146 ft.	9:21 Bit hanging up and bouncing. No returns.
147						9:26

*Standard Penetration Test N-Value

Project Name	Harley Davidson	Project No.	1406701
Boring Location	York PA	Date Started	7/6/1998
Drilling Company	Eichelberger's	Date Finis	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
148						9:36 7/7/1998
149						9:48 149 ft. bit running smoother. Maybe through void. PID = 0 to 13 ppm.
150						10:02 150.5 ft.
151					Broken rock, bit bouncing. No returns.	10:04 151 ft. Bit locked up. Low down sure on bit.
152					Bit locked up. Weathered, broken, rock?	10:09 152 ft. Bit bouncing, no returns
153						10:12 Bit locked up at 153 ft.
154						
155					VOID at 154 ft. Saturated SAND, SILT, and GRAVEL. Weathered, subangular, quartz gravel, fine to coarse. Brown, fine to coarse sand and silt.	Tools dropping. VOID
156						
157						
158						
159						
160						
161						
162						
163						
164						
165						
166						
167						10:30
168						

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/6/1998	
Drilling Company		Eichelberger's			Date Finis			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
169					VOID Drill stem dropping under weight of tools.	
170						
171						
172						
173						
174						
175						
176						10:33
177						
178						
179						10:35
180						
181						
182						
183						
184						
185						10:37
186						
187						
188						
189					10:38	
					Bit bouncing at 188.5 ft.	
					Total depth = 190 ft.	

PID maxed out on 200 scale at ft. Strong solvent odors, much stronger than before.

Dropping under weight of tools
No pulldown pressure.

Dropping faster.

PID = 350 ppm at top of borehole
10:45 increased pulldown from 5000 # to 10000#. Bit not advancing
Pulled tools, found 8 inch bit broken off. Will attempt to retrieve it with cable tool rig.

*Standard Penetration Test N-Value



Engineering and Environmental Services, Inc.

LOG OF BORING

MW-75D

SHEET 1 OF

13

PROJECT HARLEY DAVIDSON RE/FS		PROJECT NO. 1460701	
LOCATION YORK, PENNSYLVANIA		ELEVATION AND DATUM	
DRILLING AGENCY EICHEL BERGERS		DATE STARTED 8 JULY 1999	DATE FINISHED 19 JULY 1999
DRILLING EQUIPMENT INGERSOLL RAND T-900 AIR ROTARY		COMPLETION DEPTH 217 FT	ROCK DEPTH 18 FT
SIZE AND TYPE OF BIT 97/8, 77/8 IN. 614 IN. TRICONE ROLLER BIT	NO. SAMPLES	DIST. -	UNDIST. -
CASING 10.12 / 8 IN. / 6 IN. (NOMINAL)	WATER LEVEL	FIRST	COMPL. 24 HR.
CASING HAMMER	WEIGHT AIR HAMMER	DROP N/A	FOREMAN KEN WEIGLE
SAMPLER N/A	INSPECTOR ED ZOFCIAK		
SAMPLER HAMMER	WEIGHT N/A	DROP N/A	

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES					REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOC.	TYPE	REC. FT.	PENETR. RESIST. BL/6 IN.		
	NOTE: THIS LOG IS A CONTINUATION OF A BORING FOR DEEP BIOLOGIC MONITORING WELL MW-75, BEGUN ON 30 JULY 1998.	1						
		2						
	LOW STEEL CASING SET INTO AT 26 FT IN BEDROCK.	3						
	6 IN BILLET BORING TERMINATED AT 111 FT DEPTH	4						
	DRILLING WORK STOPS 7/31/98	5						
	RESUMES 7/8/99.	6						
10 IN. STEEL		7						
8 IN. STEEL		8						
6 IN. STEEL		9						
		10						
	Brown firm SAND, some silt, trace gravel	11						
		12						
		13						
		14						



Engineering and Environmental Services, Inc.

JOB NO. 1406701

LOG OF BORING NO. MW-75D

DATE 8 TO 19 JULY 1989

SHEET 2 OF 13

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	
	OVERBURDEN SOIL Brown fine sand, sm silt, m gravel	16					
		17					
	PROBABLE TOP OF BEDROCK	18					
	Dark Gray Limestone Bedrock	19					
		20					
		21					
		22					
		23					
		24					
		25					
		26					
		27					
		28					
		29					
		30					
		31					
		32					





Engineering and Environmental Services, Inc.

JOB NO. 1406701

LOG OF BORING NO. MW-750

DATE 8 08 19 JULY 1997

SHEET 3 OF 13

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	
8 IN. STEEL 6 IN. STEEL	Dark Gray Limestone Bedrock	34					
		35					
		36					
		37					
		38					
		39					
		40					
		41					
		42					
		43					
		44					
		45					
		46					
		47					
		48					
		49					
		50					



Engineering and Environmental Services, Inc.

JOB NO. 1406701

LOG OF BORING NO. MW-75D

DATE 8 19 JULY 1999

SHEET 4 OF 13

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOG.	TYPE	RECOV. FT.	PENETR. RESIST. BLG IN.	
8 IN. STEEL 6 IN. STEEL	Gray Limestone Bedrock	52					
		53					
		54					
		55					
		56					
		57					
		58					7/8/99 RESUME DRILLING OPERATIONS P10 Background = 0.2-0.4 ppm
		59					15:00 - BLOW OUT STOPPING WATER IN BORE HOLE
		60				1:30	DRILLER'S SAMPLE BZ. 0.25 ppm PULL-UP 10-15 ppm
		61				1:35	
		62				1:20	
		63				1:17	BZ = 0.2 ppm PULL-UP 5-6 ppm
		64				1:20	DRILLER REPORTS SPREADY DRILLING; ROCK FEELS SOMEWHAT SOFT, SLIGHTLY WEATHERED
		65				1:15	(i.e., REMAINING OUT 6 IN BORE HOLE)
		66				1:15	
67				1:16			
68				1:10	Slight Chalk at ~67 1/2 ft		
				1:15			



Engineering and Environmental Services, Inc.

JOB NO. 1706701

LOG OF BORING NO. MW-75D

DATE 8 TO 19 JULY 1999

SHEET 5 OF 13

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)	
			NO. LOG.	TYPE	RECOV. FT.	PENETR. RESIST. BLG IN.		
8 IN. STEEL 6 IN. STEEL	Gray Limestone Bedrock	70				1:36	ADD 25 FT DRILL PIPE AT 69 FT PID BZ = 0.1 ppm 15:30	
		71				1:18		
		72				1:29		
		73				1:14	PID FULL ORR = 2.6 TO 3.0 ppm	
		74				1:07		
		75				1:14		
		76				1:27	Occasional chatter steady drilling PID BZ = 0 TO 0.1 ppm PID FULL-ORR = 2.9 TO 3 ppm	
		77				1:19		
		78				1:22		
		79				1:17		
		80				0:57		
		81				1:20		
		82	PROBABLE VOID/SEAM				1:05	DRILLER RESPONSE SOFT WORKER ZONE BETWEEN 81-82 FT. INCREASE IN HEAVY CHATTER DOWN 10 IN. EXTENSION CASING GRAY TO GREEN COLOR CHANGE
		83				1:00		
		84				1:05		
		85				1:02	Occasional heavy chatter 16:00	
		86				1:06	86 TO 88 TO 88 10"	
							1:13	



JOB NO. 1706701

DATE 8 TO 19 JULY 1999

LOG OF BORING NO. MW-750

SHEET 6 OF 13

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOG.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	
8 IN STEEL 6 IN STEEL	Gray Limestone Bedrock	88				1:20	
		89				1:10	
		90				1:05	
		91				1:05	
	Brown water cascading around 10 inch casing	92				3:17	DRILLING STOPS 16:05 7/8/99 AT 9 1/2 FT.
		93				2:20	REEL OFF FULL UP WARM. LEAKAGE FROM CURNER. DRILLER'S TRANSFER LIQUID TO WARM PUMP/TURN TO BACKER TANK
		94				2:30	DRILLING RESUMES 7/9/99 8:35 P10 Background 0 to .2 ppm Occasional strong, sweet chemical odor between 92 and 97 ft.
	SLOW RETURN OF DRILL PIPE	95				4:23	P10 BZ - 2 to 4 ppm, Spiking up to 25 ppm P10 PULVER - 10 to 15 ppm
		96				3:40	8:50 - ADD 25 FT DRILL PIPE
		97				2:20	9:00 P10 BZ = 1.2 to 3.7 ppm @ 95 ft HEAVY CHATTER; DRILL PIPE BOUNCED 96 TO 98 FT.
		98				1:40	P10 BZ = 0.9 to 2.4 ppm at 98 ft
		99				3:00	
		100				1:54	
		101				1:15	NO WARM RETURN
		102				~1:05	DRILL PIPE ADVANCES RAPIDLY
		103				~1:05	
		104				~1:10	
						~1:15	

LARGE VOID 101 TO 106 FT

9:35



Engineering and Environmental Services, Inc.

JOB NO. 1406701
 DATE 8 10 JULY 1999

LOG OF BORING NO. MW-750

SHEET 7 OF 13

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	
	LARGE VOID 101 TO 106 FT	106					
	Limestone Bedrock	107					RESUME STEADY DRILLING @ 106 TO 107 FT DEPTH DECREASE IN RETURN WATER FLOW
		108					0935 OCCASIONAL CHATTER 108'2" TO 108'6" P10 BZ 0.2-1.3 ppm CONTINUED
		109					
		110					
		111					CONT'D OCCASIONAL LIGHT/NOO. CHATTER OCCASIONAL SURGES OR GRAY WATER 111-112 FT
		112					
		113					
		114					
		115					
		116					CONTINUED STEADY DRILLING
		117					
		118					P10 BZ 0.9-2.7 ppm
		119					OCCASIONAL HEAVY CHATTER 118- 119 FT; NO WATER RETURN DRILLER ATTEMPTS TO CLEAN 10'35 OUT BORING TO 119 FT. THROUGH 25 FT SECTION OF PILING, LOSING AIR CIRCULATION AT 101-106 FT. BURIED PIPING W/ STRENGTH TO ~104 FT. NEED TO SET CASING SET CASING TO 119 FT. RESUME DRILLING 7/12/99 P10 BZ 0.1 TO 1.3 ppm AT 16:05
		120					
		121					
		122					

Occasional moderate chatter,
 grinding
 Gray water discharge.

8 IN STEEL
 6 IN STEEL



Engineering and Environmental Services, Inc.

JOB NO. 1400701

LOG OF BORING NO. MW-750

DATE 8 TO 19 JULY 1999

SHEET 8 OF 13

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)	
			NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.		
6 IN. STEEL	Continued steady drilling. Light to moderate grinding / chatter. Gray return water	124				2:37		
		125				2:28		
		126				2:52		
		127				2:09	16:20 P10 BZ = 0 ppm	
		128				2:25		
		129				2:47		
		130				2:12		
		131				2:10	16:30	
		132	Slight binding of drill bit at 131 1/2 ft.				2:01	
		133					2:12	
	134					2:18		
	135	Moderate chatter at 135 1/2 ft.				2:00		
	136					1:44		
	137					1:44		
	138					1:52		
	139	Occasional chatter				1:48		
	140					1:37		
						2:45	DRILLING STOPS 41 FT. AT 17:00 ASSUMES 8:25 7/13/99 BZ P10 = 0 TO 0.3 ppm	



Engineering and Environmental Services, Inc.

JOB NO. 1406701

DATE 8 to 19 JULY 1999

LOG OF BORING NO. MW-750

SHEET 9 OF 13

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BL/A IN.	
6 IN STEEL	Gray water, good return occasional chatter, steady drilling	142				2:27	RESUME DRILLING 7/13/99
		143				2:24	P10 POLLUTE 0.001.3 ppm
		144				2:06	
		145				2:24	
		146				1:37	
		147				3:54	08:25 P10 BZ 0-0.3 ppm
	Discharge water changes color from gray to brown. Heavy grinding; drill stem bouncing Fractured Rock Zone Producing large volumes of water	148				4:40	
		149				4:54	SPIND ~ 6 IN W HANDLE NARROW CONCENTRATED FROM BONE/TULE
		150				4:38	10:15 STOP AT 150 FT
		151				5:45	P10 BZ 0.2 TO 3.3 ppm
		152				6:08	
		153				7:03	POLLUTE AT STOP 10:30 7/13/99 CAPACITY. AT 152 FT 0.001 RESUME DRILLING 7/15/99 AT 8:00
	Gray limestone bedrock - moderate chatter, brown water discharge	154				3:10	
		155				3:16	BZ - 1.1 TO 1.3 POLLUTE 7:00 TO 9:00 ppm SPILL 13:00 TO 15:00 ppm 9:15 P10 BZ - 0.3 TO 0.4
		156				3:09	
		157				5:47	
		158				5:11	9:25 P10 BZ - 0.000.1 ppm
		158				5:43	
Weathered Broken / Fractured Bedrock - Boring producing water - occasional heavy chatter/ bouncing at 156 ft - increasing water flow at 157 1/2 ft							

JOB NO. 1406701

LOG OF BORING NO. MW-75

DATE 8 to 19 JULY 1999

SHEET 10 OF 13

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BLG IN.	
	Weathered fractured limestone - occ mod chatter; increase water flow	160				10:45	occ. mod to strong odor
	Gray limestone bedrock - poor water return	161				8:27	BZ spikes 43-70 ppm; 30-70 ppm 9:35
		162				4:40	
	- No water	163				4:05	9:50 BZ = 0 ppm
		164				4:00	
	- Occ chatter - sporadic brown water ↓ increasing water return	165				4:22	10:20
		166				4:01	
		167				4:23	
	- occ. grinding / chatter 167 1/2 ft - Brown sporadic water	168				4:22	STOP 11:00 @ 167ft 10:30 Resume 14:20 ↓ BZ - 1.3 to 1.5 ppm BZ 1.2-1.8 Follow up 200 ppm Note off 150-160 ppm
		169				5:15	
		170				3:00	15:10
		171				-	Rods drop
	Void - possible minor sediment	172				-	
		173				-	Rapid descent of drilling rods
		174				-	
		175				-	
		176				-	

6 1/2" STAIN

JOB NO. 1406701
 DATE 8 TO 19 JULY 1989

LOG OF BORING NO. MW-75

SHEET 11 OF 13

CASING	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOG.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	
	VOID SPACE	178				—	
		179				—	
		180				—	
	Broken / Fractured Scam	181					P10 BZ = 0.25005 ppm BZ = 0.640 0.8 ppm
	Sediment filled void	182					
	Broken / Fractured bedrock with occasional open voids / Scams	183				40	
		184				—	
		185				36	
		186				31	
	- occ. chatter	187				53	Slower drilling at 188 ft
		188				100	
		189				126	- moderate grinding / burning - little reaction water
	Gray limestone bedrock	190				3:40	P10 BZ = 0.21006 ppm BZ = 0.640 0.8 ppm
	<u>SEAM</u>	191				15:11	
		192				18:00	STOP FOR DAY @ 17:20 7/15/89 @ 192 ft
		193				302	RESUME 7/14/89; DRILLING 196 FT DEPTH
	- occ light chatter - gray water	194				301	
						8:06	6 INCH STEEL CASING SET TO 192 FT DEPTH & CROWN



Engineering and Environmental Services, Inc.

JOB NO. 1406701

LOG OF BORING NO. MW-75

DATE 8 TO 19 JULY 1999

SHEET 12 OF 13

SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	
Gray Limestone Bedrock. Steady drilling; gray return water Occasional binding; driller increases rotation	196				10:25	LUDO SQUEEZING AS BORING APPROX. CAS; DRILLER RESISTS BT TO TURN OUT STOP 7/18 @ 14:30 P10 BZ = 0.8 ppm RESUME DRILLING 7/19 @ 13:50 P10 Background = .5 to .7 ppm
	197				2:07	
	198				2:50	
	199				1:53	
	200				1:51	
	201				2:00	
	202				1:30	
	203				1:40	
	204				1:48	
	205				1:54	
Continued steady drilling Dark gray chips of limestone with gray return water	206				1:55	P10 BZ = 0.3 to 0.5 ppm P10 ALL UR = 0.6 to 0.8
	207				3:10	
	208				1:37	
	209				1:48	
	210				2:28	
VOID SPACE	211				2:29	P10 BZ = 0.3 to 0.4 ppm P10 ALL UR = 0.5 to 0.9 ppm
	212				3:07	
Gray Limestone						DRILL PIPE DRIPS; CHANGE IN DISCHARGE WATER FROM GRAY TO BROWN. SIGNIFICANT INCREASE IN VOLUME OF WATER BEHIND CUT OR BULK. GRAVEL AND SAND CUTTINGS



Engineering and Environmental Services, Inc.

JOB NO. 1406701

LOG OF BORING NO. MW-75

DATE 8 TO 19 JULY 1999

SHEET 13 OF 13

SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BL/6 IN.	
Gray Limestone	214				2:33	P10 B2 = 0.4 - 0.6 ppm P10 ROLL OFF = 0.9 - 0.8
	215				1:23	P10 B2 0.9 - 1.4 ppm
	216				2:20	Moderate chatter Driller estimates approximately 200 gpm being produced
	217				1:53	P10 B2 = 0.6 - 1.0 ppm P10 ROLL OFF = 0.3 - 0.9
BOTTOM OF BORING 217 FT	217					SDP 17:45

Project Name					Harley Davidson					Project No.					1406701																			
Boring Location					York, PA					Elevation and Datum																								
Drilling Company					Eichelberger's					Date Started					Date Finished																			
Drilling Equipment					Ingersoll Rand T4W Air Rotary					7/20/1998					7/22/1998																			
Size and Type of Bit					7 7/8" Hammer Bit					Completion Depth					Rock Depth																			
Casing					---					85 ft.					43 ft.																			
Casing Hammer					Weight					---					Drop					---					Water Level									
Sampler					2" OD Split Spoon					Driller					Carey Knaub																			
Sampler Hammer Weight					NA					Drop					NA					Inspector					Dave Wilson									
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION										REMARKS																			
1	S1	S-S	2.0	NA	Dry, hard, brown SILT; tr CLAY; tr fine SAND; tr coarse quartz and sandstone GRAVEL.										15:10 PID = 0 ppm.																			
2																																		
3																																		
4																																		
5																																		
6	S2	SS	2.0	NA	Brown, firm, SILT; tr CLAY; tr sub-rounded GRAVEL.										15:28 PID = 0 ppm.																			
7																																		
8																																		
9																																		
10					Reddish brown SILT; some SAND; some subrounded, weathered, quartz and sandstone GRAVEL.										PID = 0 ppm.																			
11																																		
12																																		
13																																		
14																																		
15					Brown, medium to coarse, SAND; and fine to coarse, angular quartz GRAVEL.										PID = 0 ppm.																			
16																																		
17																																		
18																																		
19					Brown, moist, SILT; some SAND; tr medium quartz GRAVEL.										PID = 0 ppm. Outside of split spoon is wet.																			
20																																		
21																																		
S-5					SS					0.3					NA																			

*Standard Penetration Test N-Value

Project Name					Harley Davidson		Project No.		1406701	
Boring Location					York PA		Date Started		7/20/1998	
Drilling Company					Eichelberger's		Date Finished		7/22/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS				
22	S5				see above					
23										
24										
25										
26	S6	SS	1	NA	Tan/gray mottled SILT; some CLAY; tr SAND and fine GRAVEL. Limestone fragment in nose of shoe.					
27						PID = 0 ppm.				
28						Stop 7/20/98 at 16:00.				
29										
30										
31	S7	SS	1.9	NA	Brown CLAY; some SILT, tr coarse SAND. Dark gray fragments of LIMESTONE.	7/21/98 at 08:30 Hole collapsing at 30 ft. Set temporary 6 inch casing to 30 ft. to keep hole open to drive next split spoon. (at 10:00)				
32						10:20	Note: diameter of split spoon is not full, possibly on a pinnacle. Attempted second split spoon at 30 to 32 ft., no recovery. Intermittent bit chatter.			
33										
34										
35										
36	S8	cuttings			Quartz GRAVEL with a few LIME STONE fragments. Making a lot of water.	10:45	Steady bit chatter at 35 ft. bgs. Intermittent bit chatter below 35 ft. Probably unconsolidated material. Bit vibrating, driller thinks it is going crooked. Tried to pull tools, drill-stem is hanging up on 6 inch casing. Casing may be crooked or bent. Needed pull down pressure to get bit to hammer, but bit wouldn't free fall.			
37										
38										
39										
40										
41										
42										

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701		
Boring Location		York PA			Date Started		7/20/1998		
Drilling Company		Eichelberger's			Date Finished		7/22/1998		
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS			
43						11:25	Steady bit chatter.		
44	S10	cuttings			Very weathered, quartz, angular, GRAVEL. Unweathered, dark gray, angular LIMESTONE fragments.	7/21/98 14:33 to 16:30	Hole reamed to 38 ft. with 10 inch stabilizer. No problem. Set temporary 10 inch casing to 34 ft.		
45									
46									
47							8:10	7/22/98 08:30 to 15:22	
48	S11	cuttings			Angular, fresh, dark gray LIMESTONE fragments. Some weathered Quartz.		Reamed hole from 38 ft. to 46.5 ft. Set temporary 8 inch casing to 46.5'		
49							Drill with 6 inch hammer bit inside 8 inch steel casing from 46.5 ft.		
50									
51							PID = 0 ppm.		
52									
53	S12	cuttings			Dark gray, angular, LIMESTONE cuttings. Some quartz or calcite.		Dry, light gray dust.		
54									
55									
56									
57									
58									
59									
60									
61									
62						15:41			
63									

*Standard Penetration Test N-Value

Project Name Harley Davidson		Project No. 1406701	
Boring Location York PA		Date Started 7/20/1998	Date Finished 7/22/1998
Drilling Company Eichelberger's			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
64						
65						
66						
67						
68						
69	S13	cuttings			Hard, dark gray, massive, LIME STONE with graphite. Fresh, unweathered.	
70						
71						
72						
73						
74						
75						
76						15:49
77						
78	S14	cuttings			77 to 81 ft. Mud filled fracture/void. Weathered quartz GRAVEL.	PID = 0.7 ppm. Water bearing zone.
79						
80						
81						
82	S15	cuttings			LIMESTONE	Strong bit chatter.
83						16:00
84						

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/20/1998	
Drilling Company		Eichelberger's			Date Finished		7/22/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
85					TD of borehole = 85 ft	7/22/1998 4:02:00 PM		
86								
87								
88								
89								
90								
91								
92								
93								
94								
95								
96								
97								
98								
99								
100								
101								
102								
103								
104								
105								

*Standard Penetration Test N-Value

Project Name Harley Davidson		Project No. 1406701	
Boring Location York, PA		Elevation and Datum	
Drilling Company Eichelberger's		Date Started 6/9/1998	Date Finished 6/10/98
Drilling Equipment CME-85		Completion Depth 67 ft.	
Size and Type of Bit 4-1/4" ID Hollow Stem Auger		Rock Depth Not Encountered	
Casing 2 Inch PVC ---		Water Level 19.0 ft. at completion	
Casing Hammer Weight ---	Drop ---	Driller Bob Austin	
Sampler 2" OD Split Spoon		Inspector Lou Russo	
Sampler Hammer Weight 140 lb	Drop 30"		

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1	S1	SS	NA	NA	Grass/ topsoil Brown, fine to medium SILTY SAND; tr fine GRAVEL. Dry, medium dense.	13:00
2						
3						
4						
5						
6	S2	SS	0.9	6	Brown SILT; tr fine to medium SAND; tr fine GRAVEL; (quartz). Dry, medium dense.	Odor present. PID = 0.5 - 0.6 ppm background 1 -2 ppm at borehole.
7				10		
8				11		
9						
10						
11	S3	SS	0.5	6	Brown, SILT; tr fine to medium SAND; tr fine sub angular, GRAVEL. Dry, medium dense.	
12				6		
13				7		
14				8		
15						
16	S4	SS	1.8	4	Light brown, CLAYEY SILT; tr fine to coarse SAND. (dry/moist)	5 ppm
17				4		
18				5		
19				7		3 ppm
20						4 ppm
21	S5	SS	2.0	4	Light brown, mottled orange, CLAYEY SILT; tr fine to coarse SAND; tr fine GRAVEL, subangular, limestone.	7 ppm Borehole = 15 - 20 ppm 10 ppm 50 ppm
				4		
				6		

*Standard Penetration Test N-Value

Project Name					Harley Davidson		Project No.		1406701	
Boring Location					York, PA		Date Started		6/9/1998	
Drilling Company					Eichelberger's		Date Finished		6/10/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS				
22	S5			6	(moist/dry)					
23										
24										
25										
26	S6	SS	2	6	Brown, CLAYEY SILT; tr to some fine to coarse SAND; tr fine GRAVEL, angular quartz.	2 ppm	Borehole = 20 ppm	10 ppm	Gravelly zone = 25.5 to 26	5 ppm
27				7						
28				8						
29				9						
30										
31	S7	SS	0.5	6	Light brown/gray SILT; some CLAY; some fine to coarse SAND; tr fine subangular GRAVEL. Loose to dense, moist.	0.8 ppm		Spoon wet.	Top of bentonite at 31 ft.	
32				8						
33				10						
34				12						
35										
36	S8	SS	2	7	Light brown CLAYEY SILT; tr to some fine to coarse SAND; tr fine, quartz, angular to subangular, GRAVEL. Dense, moist.	3 ppm			Top of sand pack at 35 ft.	
37				8						
38				9						
39				11						
40										
41	S9	SS	1.1	5	Brown, CLAYEY SILT; tr fine SAND. moist	Top of screen.		0.5 ppm	background	
42				6						
				5						
				6						

*Standard Penetration Test N-Value

Project Name					Harley Davidson		Project No.		1406701	
Boring Location					York, PA		Date Started		6/9/1998	
Drilling Company					Eichelberger's		Date Finished		6/10/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS				
43										
44										
45										
46	S10	SS	0.8	1	Light brown, CLAYEY SILT; tr fine to medium SAND; fine GRAVEL.	2-4 ppm				
47				2						
48					Wet.	Quartz in nose piece.				
49										
50										
51	S11	SS	2	3	Brown/gray CLAYEY SILT; tr fine to coarse SAND; tr fine GRAVEL.	Very soft 50 to 51 ft.				
52				5						
53					Wet	Dense 51 to 52 ft.				
54						0.5 ppm				
55										
56	S12	SS	1.3	3	Brown, CLAYEY SILT; tr to some fine to coarse SAND and fine GRAVEL.	1-5 ppm				
57				6						
58					Wet	Pieces red gravel				
59	S13	SS	0.3	3	Brown, CLAYEY SILT; some fine to coarse SAND and fine GRAVEL.	STOP 16:00 6/9/98				
60				4						
61						Water started coming into hole very rapidly. Suspect that 55 - 57 ft sample released containing pressure to a higher "k" unit.				
62	S14	SS	1	3	Brown, CLAYEY SILT; some fine to coarse SAND and fine GRAVEL. quartz, rounded to subrounded.	@ 16:00 dtw=34 ft bgs				
63				5		@ 16:30 dtw= 24 ft. bgs				
						@ 18:00 dtw = 21 ft. bgs				
						Seemed stable				
						Start 08:00 6/10/98				
						PID = 8-10 from borehole.				
						S13, S14, S15, background PID readings = 0.5 ppm.				

*Standard Penetration Test N-Value

Project Name Harley Davidson		Project No. 1406701	
Boring Location York, PA		Date Started 6/9/1998	Date Finished 6/10/1998
Drilling Company Eichelberger's			

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
64						Bottom of screen at 65 ft. 10 slot.
65						
66	S15	SS	1.3	5	TD = 67 ft.	
				5		
67				5		
				5		
68						
69						
70						

Project Name Harley Davidson		Project No. 1406701	
Boring Location York, PA		Elevation and Datum	
Drilling Company Eichelberger's		Date Started 6/19/1998	Date Finished 6/22/98
Drilling Equipment CME-85		Completion Depth 39 ft.	Rock Depth Not Encountered
Size and Type of Bit 4-1/4" ID Hollow Stem Auger			
Casing 2 Inch PVC ---		Water Level 12 ft. On 6/22/98	
Casing Hammer Weight ---		Drop ---	
Sampler 2" OD Split Spoon		Driller Bob Austin	
Sampler Hammer Weight 140 lb		Drop 30"	
		Inspector Lou Russo/Dave Wilson	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1					Asphalt and gravel fill.	
2						
3						
4						
5						
6	S1	SS	0.5	5	FILL Dark brown gravel and cinders.	PID = 0 ppm
7				7		
7				5		
8					Tan SILT; tr CLAY; tr SAND; orange mottling, Some quartz fragments	PID = 0 ppm 6/22/98 DTW = 12 ft. bgs.
9						
10						
11	S2	SS	2.0	5		
12				7 12 16		
13					Quartz GRAVEL with SAND.	PID = 0 ppm
14						
15						
16	S3	SS	1.8	10	Brown CLAY with subrounded GRAVEL.	13:36
17				16 21 12		
18		cuttings			Brown CLAY with subrounded GRAVEL.	
19						
20						
21	S4	SS	1.0	5	Brown SILT; little CLAY; little quartz subangular GRAVEL. moist	PID = 0 ppm

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York, PA			Date Started		6/19/98	
Drilling Company		Eichelberger's			Date Finished		6/22/98	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22	S4			10				
23				10				
24								
25								
26	S5	SS	2	4	Brown f-SAND; quartz, rounded, GRAVEL; tr CLAY saturated	PID = 0 ppm		
27			8			saturated		
28				14		14:15 water at ~ 26 ft. bgs.		
29				18				
30								
31	S6	SS	0	6	No Recovery	PID = 0 ppm		
32				6		No Recovery, split spoon is wet.		
33				6				
34				6				
35								
36	S7a	SS	1.5	4	Brown, loose, f-SAND; some f-GRAVEL, angular.	PID = 0 ppm		
37	S7b			5		Brown, stiff, CLAY; little subrounded, GRAVEL.	saturated.	
38	S8	SS	1.5	8	Brown, stiff CLAY. TD = 39 ft.		Auger to 37 ft. Drove another split spoon to verify clay layer underlying upper water zone.	
39								
40								
41								
42								

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. 79

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM	
DRILLING AGENCY Eichelberger's		DATE STARTED 6/17/1998	DATE FINISHED 6/17/1998
DRILLING EQUIPMENT CME-85		DRILLER Bob Austin	
SIZE AND TYPE OF BIT 4.25 inch Hollow Stem Auger		INSPECTOR Lou Russo	
METHOD OF INSTALLATION Well was advanced by hollow stem auger method to 42 feet. The screen and riser were inserted down the auger stem. Sand and then bentonite were added as the augers were removed. Benseal grout and a flush mount assembly completed the well to the surface..			
METHOD OF WELL DEVELOPMENT The well was pumped with a centrifugal pump on 7/17/98 at a rate of approximately 0.25 gallons per minute for a total of 3 hours and 20 minutes. The well was also surged several times but did not clear up.			
TYPE OF CASING PVC		DIAMETER 2 Inch	
TYPE OF SCREEN PVC		DIAMETER 2 Inch	
BOREHOLE DIAMETER		TYPE OF BACKFILL MATERIAL Portland Cement	
		TYPE OF SEAL MATERIAL Bentonite Pellets/Cement Bentonite Mix	
		TYPE OF FILTER MATERIAL # 1 Morie Sand	
TOP OF CASING	ELEVATION	DEPTH	<div style="text-align: center;">WELL DETAILS</div>
Flush Mount			
TOP OF SEAL	ELEVATION	DEPTH 0 ft.	
TOP OF FILTER	ELEVATION	DEPTH 17 ft.	
TOP OF SCREEN	ELEVATION	DEPTH 20 ft.	
BOTTOM OF BORING	ELEVATION	DEPTH 42 ft.	
SCREEN LENGTH 20 ft.			
SLOT SIZE .010 inch			
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
DTW = 19.5 ft. on 6/17/98			
ELEVATION	DATE		

Project Name Harley Davidson		Project No. 1406701	
Boring Location York, PA		Elevation and Datum	
Drilling Company Eichelberger's		Date Started 6/17/98	Date Finished 6/17/98
Drilling Equipment CME-85		Completion Depth 42 ft.	Rock Depth Not Encountered
Size and Type of Bit 4-1/4" ID Hollow Stem Auger			
Casing 2 Inch PVC ---		Water Level 19.5 ft. at completion	
Casing Hammer Weight ---		Drop ---	
Sampler 2" OD Split Spoon		Driller Bob Austin	
Sampler Hammer Weight 140 lb		Drop 30"	
		Inspector Lou Russo	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1					Asphalt and gravel fill.	Start at 07:30 6/17/98
2						
3						
4						
5						
6	S1	SS	0.9	9 23	Brown f-m SILTY SAND tr f-c GRAVEL (quartz) moist	PID = 0.5 ppm background
7				19 5		
8					White f SAND; tr -some SILT; tr f GRAVEL wet	Perched ? Water PID = 0.5 ppm background
9						
10						
11	S2	SS	1.5	4 4		
12				5 6		
13					Gray clayey SILT; tr-some f-c SAND moist	PID = 0.5 ppm background
14						
15						
16	S3	SS	0.8	3 4		
17				5 5		
18					Brown, clayey SILT; tr f-c SAND; f-GRAVEL.	PID = 0.5 ppm background
19						
20						
21	S4a	SS	0.9	3 6		

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York, PA			Date Started		6/17/1998	
Drilling Company		Eichelberger's			Date Finished		6/17/98	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22	S4b			7 10	Gray silty f-SAND; tr CLAY; moist			
23								
24								
25								
26	S5	SS	1.5	4 6 7 10				
27								
28								
29								
30								
31	S6	SS	0.1	6 6 6 7	Gray CLAY.	PID = 0.5 ppm background Pushing a stone?		
32								
33								
34								
35								
36	S7	SS	0.7	? 5 5 5	Gray clayey SILT; some f-SAND; tr f GRAVEL; (limestone pieces) wet	PID = 0.5 ppm background Bouncing/spoon stuck in hole. Grinding-35 to 40 ft.		
37								
38								
39								
40								
41	S8	SS	0.8	12 13	Gray clayey SILT; some f-SAND tr f- GRAVEL.	PID = 0.5 ppm background Refusal, spoon rods bending.		
42								
					TD = 42 ft.			

*Standard Penetration Test N-Value

Project Name Harley Davidson		Project No. 1406701	
Boring Location York, PA		Elevation and Datum	
Drilling Company Eichelberger's		Date Started 7/30/99	Date Finished 7/30/99
Drilling Equipment CME-85			
Size and Type of Bit 4-1/4" ID Hollow Stem Auger		Completion Depth 41 ft.	Rock Depth Not Encountered
Casing 2 Inch PVC ---			
Casing Hammer Weight ---	Drop ---	Water Level 32.3 ft. at completion	
Sampler 2" OD Split Spoon		Driller Bob Austin	
Sampler Hammer Weight 140 lb	Drop 30"	Inspector Dave Wilson	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1					Asphalt and gravel fill. limestone cobbles CLAY & SILT; dark brown, & gray	Start at 09:30 7/30/99 PLAN: Auger to 25 ft. bgs. Split spoon every five feet from 25 to 35 feet bgs. To look for water.
2						
3						
4						
5						
6					CLAY & SILT; (color change to lighter brown); tr Sand, tr angular Gravel.	9:36
7						
8						
9						
10						
11					CLAY & SILT; brown, tr Sand, tr angular Gravel.	9:38
12						
13						
14						
15						
16					CLAY & SILT; brown, tr Sand, tr angular Gravel.	9:41 Dry, no water.
17						
18						
19						
20						
21					CLAY & SILT; brown, tr Sand, tr angular Gravel.	9:46

*Standard Penetration Test N-Value

Project Name					Harley Davidson		Project No.		1406701	
Boring Location					York, PA		Date Started		7/30/1999	
Drilling Company					Eichelberger's		Date Finished		7/30/99	
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS				
22					More Clay, moist.	Softer at 22 ft. bgs.				
23										
24										
25						9:50				
26	S-1	SS	0.6	4	CLAY & SILT; mottled brown and gray, tr angular Gravel, moist.	1/16 inch thread, poor recovery, pushed a rock fragment.				
27				4						
28										
29										
30										
31	S-2	SS	0	3	No Recovery.	No recovery at 30 to 32 ft. No indication of water, split spoon is dry.				
32				4						
33										
34										
35						10:11				
36	S-3	SS	2	3	CLAY & SILT; brown, fm angular Gravel; tr f Sand; firm, wet. @ 36 ft. 2 inch layer fm gravel. @ 37 ft. f sand w/ f angular gravel.	Outside of split spoon is wet. indent 1/4 inch with thumb 10:46 DTW = 32.3 ft. bgs.				
37				2						
38										
39										
40						10:29				
41					Wet, large clumps of clay & silt. TD = 41 ft.	Auger refusal at 41 ft.				
42										

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. 81S

PROJECT Harley Davidson		PROJECT NO. 14067																																																																																																	
LOCATION York, PA		ELEVATION AND DATUM TOC PVC = 360.97																																																																																																	
DRILLING AGENCY Eichelberger's		DATE STARTED 8/7/1999	DATE FINISHED 8/7/1999																																																																																																
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Kevin Weigle																																																																																																	
SIZE AND TYPE OF BIT 9-7/8 in. Roller Bit		INSPECTOR Ed Zofchak																																																																																																	
METHOD OF INSTALLATION Borehole was completed to 66 ft. bgs. MW81 D screen set at 56 to 66 ft. bgs. MW81S screen set at 31 to 41 ft. bgs. Sand pack was installed to 28 ft. bgs., chipped bentonite to 25 ft. bgs. Cement/bentonite grout to surface. The well was completed at the surface with a flush mount cover.																																																																																																			
METHOD OF WELL DEVELOPMENT The well was developed by air lift method on 8/12/99 by airlift and surging. The well was pumped for 52 minutes at 1.5 gpm. A total of 78 gallons was removed from the well. The discharge was dirty to begin with and clear at the end.																																																																																																			
TYPE OF CASING PVC DIAMETER 2 inches		TYPE OF BACKFILL MATERIAL Portland Cement																																																																																																	
TYPE OF SCREEN PVC DIAMETER 2 inches		TYPE OF SEAL MATERIAL Chipped Bentonite																																																																																																	
BOREHOLE DIAMETER 10 inches		TYPE OF FILTER MATERIAL # 1 Morie Sand																																																																																																	
TOP OF CASING	ELEVATION	DEPTH	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">WELL DETAILS</th> <th rowspan="2" style="text-align: center;">SOIL CLASSIFICATION</th> <th rowspan="2" style="text-align: center;">DEPTH (FT)</th> </tr> <tr> <td colspan="2" style="text-align: center;">Steel Protective Cover</td> <td></td> <td></td> </tr> <tr> <td colspan="2" style="text-align: center;">Flush Mount at s</td> <td></td> <td></td> </tr> <tr> <td>TOP OF SEAL</td> <td>ELEVATION</td> <td>DEPTH</td> <td></td> </tr> <tr> <td></td> <td></td> <td>25 ft.</td> <td></td> </tr> <tr> <td>TOP OF FILTER</td> <td>ELEVATION</td> <td>DEPTH</td> <td></td> </tr> <tr> <td></td> <td></td> <td>28.20 ft.</td> <td>7 ft.</td> </tr> <tr> <td>TOP OF SCREEN</td> <td>ELEVATION</td> <td>DEPTH</td> <td></td> </tr> <tr> <td></td> <td></td> <td>30.92 ft.</td> <td></td> </tr> <tr> <td>BOTTOM OF BORING</td> <td>ELEVATION</td> <td>DEPTH</td> <td></td> </tr> <tr> <td></td> <td></td> <td>66 ft.</td> <td>16 ft.</td> </tr> <tr> <td>SCREEN LENGTH</td> <td></td> <td>10 ft.</td> <td></td> </tr> <tr> <td>SLOT SIZE</td> <td colspan="2">0.01 inch</td> <td></td> </tr> <tr> <td colspan="3" style="text-align: center;">GROUNDWATER ELEVATIONS</td> <td></td> </tr> <tr> <td>ELEVATION</td> <td>DATE</td> <td></td> <td></td> </tr> <tr> <td>DTW = 22.10 ft.</td> <td>8/12/99</td> <td></td> <td></td> </tr> <tr> <td>ELEVATION</td> <td>DATE</td> <td></td> <td></td> </tr> <tr> <td>DTW = 22.09 ft.</td> <td>8/13/99</td> <td></td> <td>25 ft.</td> </tr> <tr> <td>ELEVATION</td> <td>DATE</td> <td></td> <td></td> </tr> <tr> <td>342.41</td> <td>10/1/1999</td> <td></td> <td>28 ft.</td> </tr> <tr> <td>ELEVATION</td> <td>DATE</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>31 ft.</td> </tr> <tr> <td>ELEVATION</td> <td>DATE</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>43 ft.</td> </tr> </table>	WELL DETAILS		SOIL CLASSIFICATION	DEPTH (FT)	Steel Protective Cover				Flush Mount at s				TOP OF SEAL	ELEVATION	DEPTH				25 ft.		TOP OF FILTER	ELEVATION	DEPTH				28.20 ft.	7 ft.	TOP OF SCREEN	ELEVATION	DEPTH				30.92 ft.		BOTTOM OF BORING	ELEVATION	DEPTH				66 ft.	16 ft.	SCREEN LENGTH		10 ft.		SLOT SIZE	0.01 inch			GROUNDWATER ELEVATIONS				ELEVATION	DATE			DTW = 22.10 ft.	8/12/99			ELEVATION	DATE			DTW = 22.09 ft.	8/13/99		25 ft.	ELEVATION	DATE			342.41	10/1/1999		28 ft.	ELEVATION	DATE						31 ft.	ELEVATION	DATE						43 ft.
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WELL CONSTRUCTION SUMMARY

Well No. 81D

PROJECT Harley Davidson		PROJECT NO. 14067	
LOCATION York, PA		ELEVATION AND DATUM TOC PVC = 360.75	
DRILLING AGENCY Eichelberger's		DATE STARTED 8/7/1999	DATE FINISHED 8/7/1999
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Kevin Weigle	
SIZE AND TYPE OF BIT 9-7/8 in. Roller Bit		INSPECTOR Ed Zofchak	
METHOD OF INSTALLATION Borehole was completed to 66 ft. bgs. MW81 D screen set at 56 to 66 ft. bgs. Sand pack was installed to 52 ft. bgs., chipped bentonite to 43 ft. bgs. MW 81 S screen set at 41 to 31 ft bgs. Cement/bentonite grout to surface. The well was completed at the surface with a flush mount cover..			
METHOD OF WELL DEVELOPMENT The well was developed by air lift method on 8/12/99 by airlift and surging. The well was pumped for 45 minutes at 2.0 gpm. A total of 90 gallons was removed from the well. The discharge was dirty to begin with and clear at the end.			
TYPE OF CASING	DIAMETER	TYPE OF BACKFILL MATERIAL	
PVC	2 inches	Portland Cement	
TYPE OF SCREEN	DIAMETER	TYPE OF SEAL MATERIAL	
PVC	2 inches	Chipped Bentonite	
BOREHOLE DIAMETER 10 inches		TYPE OF FILTER MATERIAL # 1 Morie Sand	
TOP OF CASING	ELEVATION	DEPTH	
Flush Mount at s			
TOP OF SEAL	ELEVATION	DEPTH	
		43 ft.	
TOP OF FILTER	ELEVATION	DEPTH	
		52 ft.	
TOP OF SCREEN	ELEVATION	DEPTH	
		56 ft.	
BOTTOM OF BORING	ELEVATION	DEPTH	
		66 ft.	
SCREEN LENGTH		10 ft.	
SLOT SIZE	0.01 inch		
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
DTW = 21.53 ft.	8/13/1999		
ELEVATION	DATE		
342.63	10/1/1999		
ELEVATION	DATE		

WELL DETAILS		SOIL CLASSIFICATION	DEPTH (FT)
Steel Protective Cover			
PVC Riser	Portland Cement Bentonite Seal	Asphalt and limestone cobbles, Fill	
	Upper Sand Filter	Broken limestone and sediment.	43 ft.
	Bentonite Seal		52.0
PVC Screen	Sand Filter		56.0
	Limestone		66 ft.

Project Name Harley Davidson					Project No. 1406701	
Boring Location York, PA					Elevation and Datum	
Drilling Company Eichelberger's					Date Started	
Drilling Equipment Ingersoll Rand T4W Air Rotary					8/7/99	
Size and Type of Bit 9 7/8 inch Roller Bit					Completion Depth	
Casing 12 inch Steel					66 ft.	
Casing Hammer Weight ---					Drop ---	
Water Level 22 ft.						
Sampler 2" OD Split Spoon					Driller Kevin Weigle	
Sampler Hammer Weight NA					Drop NA	
					Inspector Ed Zofchak	
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS
1					Asphalt Pavement	4 inch thick paved surface 8/5/99 Test pit excavated to 11 ft. bgs in Bldg 2/4 corridor for underground utilities. No utilities were encountered. Old building or light footer encountered in east wall of excavation.
2					Support base: Limestone cobbles and fm gravel.	
3					Round cast iron footer.	
4					Fill: dry to moist	
5					Brown Clayey Silt; some fm gravel, mixed with cobble size rock fragments and chunks of concrete.	
6						
7						
8					Natural soil ; dry to moist.	
9					Orange brown Clayey Silt; tr to some mc gravel.	
10						
11						
12						
13					Orange brown Clayey cf Sand; trace f gravel, (moist).	
14	SS1	SS	2.0	N/A	Orange brown Clay; trace to some Silt with occ. Pockets of cm Sand. (moist)	
15						
16						
17					6 to 8 inches weathered Limestone.	
18						
19						
20	SS2	SS	1.8	N/A	Orange brown Clay; tr to some fm Sand (moist)	
21						
						PID = 0 ppm

*Standard Penetration Test N-Value

LOG OF BORING NO: MW81

Sheet 2 of 5

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		8/7/99	
Drilling Company		Eichelberger's			Date Finished		8/7/99	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22						Slow drilling beginning at 22 ft., slight bouncing. Driller reports broken Limestone and Clay between 22 and 24 ft.		
23					Broken, weathered Limestone.			
24						PID = 0 ppm. Refusal at 26 ft. 3 inches.		
25								
26						Occasional moderate chatter as drill assembly advanced.		
27	SS3	SS	0.3	N/A	Orange brown Clay; some of Sand; tr f Gravel. (moist)			
28						PID = 0 ppm		
29					Weathered Limestone			
30						PID = 0 ppm		
31					Orange brown Clay mixed with bits of brown and gray weathered Limestone.			
32						Note; No indication of groundwater observed while drilling through overburden. Borehole advanced to 42 ft bgs into possible bedrock. Brown water blown out of borehole as driller cleans out to 42 ft. Initial water at 31 ft., rising to 27 ft. after apprx. 10 minutes.		
33					Orange brown Clay mixed with quartz and gray/brown limestone gravel/ fragments. (moist)			
34						1:54		
35					Limestone			
36						2:01		
37					Fractured, broken Limestone with frequent clay seams/lenses.			
38								
39					Weathered, broken Limestone			
40								
41								
42					Medium gray Limestone.			

*Standard Penetration Test N-Value

LOG OF BORING NO: MW-81

Sheet 3 of 5

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		8/7/99	
Drilling Company		Eichelberger's			Date Finished		8/7/99	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
43					as above; Medium gray Limestone.	43 ft. at 16:45		
44						2:01		
45						1:59		
46					Fractured, broken Limestone with ledges and voids.	Drill pipe breaks through Limestone at 45 ft. bgs. Drill pipe and bit descend rapidly from 45 to 65 ft. depth. Occasional moderate chatter/grinding through 6 to 12 inch thick limestone ledges. Driller reports occasional voids up to 2 ft. thick.		
47								
48								
49								
50								
51								
52								
53								
54								
55								
56					Fractured, broken Limestone with ledges and voids.	Occasional moderate chatter/grinding through limestone ledges. Drill pipe moves rapidly through void spaces without resistance.		
57						PID = 0 ppm. No odors noted.		
58						Driller estimates 50 gpm yield from fractured limestone zone 45-65 ft.		
59								
60								
61								
62								
63								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		8/7/99	
Drilling Company		Eichelberger's			Date Finished		8/7/99	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
64						Probable top of bedrock.		
65								
66					Gray limestone			
67					Bottom of Boring at 66 ft.			
68								
69								
70								
71								
72								
73								
74								
75								
76								
77								
78								
79								
80								
81								
82								
83								
84								

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. 82

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM	
DRILLING AGENCY Eichelberger's		DATE STARTED 7/24/1998	DATE FINISHED 7/27/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Carey Knaub	
SIZE AND TYPE OF BIT 6 inch Hammer Bit /10 inch Roller Bit		INSPECTOR Dave Wilson/Lou Russo	
METHOD OF INSTALLATION Drilled with 6 inch hammer bit to 51 ft. Hole reamed 10 inch to 51.5 ft. Temporary 8 inch steel casing set to 51 ft. 6 inch hole advanced to 76 ft. Hole reamed 8 inch to 53.5 ft. Permanent 6 inch steel casing set to 53.5 ft. Pelletized Bentonite from 53.5 to ? Ft. Benseal grout to surface. ~3 ft. stickup at surface.			
METHOD OF WELL DEVELOPMENT As of 10/2/98 the well has not been developed.			
TYPE OF CASING Steel		TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout	
DIAMETER 6 inch		TYPE OF SEAL MATERIAL Pelletized Bentonite	
TYPE OF SCREEN NA		TYPE OF FILTER MATERIAL NA	
BOREHOLE DIAMETER 10 inch to 51.5 ft. 8 inch to 53.5 ft. 6 inch to 76 ft.			
TOP OF CASING	ELEVATION	DEPTH	<div style="text-align: center;">WELL DETAILS</div>
Above ground			
TOP OF SEAL	ELEVATION	DEPTH	
TOP OF FILTER	ELEVATION	DEPTH	
NA			
TOP OF SCREEN	ELEVATION	DEPTH	
6 inch open rock hole. 53.5 to 76 ft.			
BOTTOM OF BORING	ELEVATION	DEPTH	
76 ft.			
SCREEN LENGTH	6 inch open rock hole. 53.5 to 76 ft.		
SLOT SIZE	NA		
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
7/27/98 DTW = 37.5 ft bgs			
ELEVATION	DATE		

Project Name		Harley Davidson		Project No.		1406701			
Boring Location		York, PA		Elevation and Datum					
Drilling Company		Eichelberger's		Date Started		Date Finished			
Drilling Equipment		Ingersoll Rand T4W Air Rotary		7/24/1998		7/27/1998			
Size and Type of Bit		8 Inch Hammer Bit/ 10 Inch Roller Bit		Completion Depth		Rock Depth			
Casing		6 Inch Steel		76 ft.		48 ft.			
Casing Hammer Weight		---		Drop		---			
Sampler		Cuttings		Water Level		38 ft. bgs			
Sampler Hammer Weight		NA		Drop		NA			
				Driller		Carey Knaub			
				Inspector				Dave Wilson/ Lou Russo	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1	S1	Cuttings	NA	NA	Light brown, SANDY SILT; some sub-rounded, fine to coarse, GRAVEL; weathered sandstone.	10:45 PID = 0 ppm
2						
3						
4						
5						
6	S2	cuttings	NA	NA	Light brown, SANDY SILT; some sub-rounded, fine to coarse, GRAVEL; weathered sandstone.	PID = 1.0 ppm
7						
8						
9						
10	S3	cuttings	NA	NA	Light brown, SANDY SILT; tr rounded fine GRAVEL.	PID = 0 ppm
11						
12						
13						
14						
15	S4	cuttings	NA	NA	Brown SILT; tr SAND; little CLAY; tr fine quartz and sandstone GRAVEL	PID = 0 ppm
16						
17						
18						
19						
20						
21						

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/24/1998	
Drilling Company		Eichelberger's			Date Finished		7/27/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22	S5	cuttings	NA	NA	Brown SILT, and subrounded quartz and sandstone GRAVEL, (~50%). tr CLAY; tr SAND.			PID = 0 ppm At 13:00 water in hole at 21 ft. bgs.
23								
24								
25								
26								
27					No Sample			
28								
29								
30								
31	S6	cuttings	NA	NA	Brown, moist, CLAY, and subrounded, quartz and sandstone GRAVEL; some SILT.			PID = 0 ppm
32								
33								
34								
35								
36					No returns from 35 to 48 ft.			
37								
38								
39								
40								
41								
42								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/24/1998	
Drilling Company		Eichelberger's			Date Finished		7/27/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
43								
44								
45								
46								
47						Bit chatter.		
48								
49					Top of rock at 48 ft.	Top of rock, solid bit chatter. Drilled 3 ft. into rock, 48 to 51 ft.		
50								
51						13:00 to 14:19 reamed hole with 10 inch roller bit to 51.5 ft. Rock is very hard, slow drilling.		
52					LIMESTONE; light gray, hard, massive, fresh, unweathered. 51 to 70 ft.	11:10 14:20 to 15:05 set temporary, 8 inch steel casing to 51 ft. bgs. 15:20 Start drilling rock with 6 inch hammer bit.		
53								
54								
55								
56								
57								
58								
59								
60								
61								
62								
63								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/24/1998	
Drilling Company		Eichelberger's			Date Finished		7/27/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS		
64								
65								
66								
67								
68								
69								
70								
71					Weathered zone at 70 ft. LIMESTONE, Fe stained.		15:30	Loss of bit chatter. Water bearing zone, making approximately 3 to 5 gpm.
72								
73								
74								7/27/98 09:00
75								DTW = 38 ft. bgs. Reamed 8 inch hole to 53.5 ft. Set 6 inch permanent casing to 53.5 ft. Grouted in place.
76							15:36	Developed well with air and water for 10 to 15 min. DTW = 37.5 ft. at 14:00
77					TD = 76 ft.			
78								
79								
80								
81								
82								
83								
84								

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. **MW-83**

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM Flushmount = 364.82	
DRILLING AGENCY Eichelberger's		DATE STARTED 7/9/1998	DATE FINISHED 7/10/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Carey Knaub	
SIZE AND TYPE OF BIT 6 & 8 inch Hammer Bit /10 inch Roller Bit		INSPECTOR Dave Wilson	
METHOD OF INSTALLATION Drilled with 8 inch hammer bit to 35 ft. Hole reamed 10 inch to 35 ft. Temporary 8 inch steel casing set to 35 ft. 6 inch hole advanced to 76 ft. Hole reamed 8 inch to 51 ft. Permanent 6 inch steel casing set to 51 ft. Pelletized Bentonite from 51 to 53 ft. Benseal grout to surface. Flushmount at surface.			
METHOD OF WELL DEVELOPMENT The well was developed for 30 minutes on 7/13/98 at 2.25 gpm till dry. A total of 68 gallons was removed by submersible pump. The well was developed again on 7/14/98 for 62 minutes at 0.25 gpm till dry. A total of 15.5 gallons was removed. Discharge was clear at the end.			
TYPE OF CASING Steel	DIAMETER 6 inch	TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout	
TYPE OF SCREEN Open rock hole.		TYPE OF SEAL MATERIAL Pelletized Bentonite/ Drive shoe.	
BOREHOLE DIAMETER 10 inch to 35 ft. 8 inch to 51 ft. 6 inch to 76 ft.		TYPE OF FILTER MATERIAL NA	
TOP OF CASING	ELEVATION	DEPTH	<div style="text-align: center;">WELL DETAILS</div>
Flushmount	364.82		
TOP OF SEAL	ELEVATION	DEPTH	
NA			
TOP OF FILTER	ELEVATION	DEPTH	
NA			
TOP OF SCREEN	ELEVATION	DEPTH	
6 inch open rock hole 51 to 76 ft.			
BOTTOM OF BORING	ELEVATION	DEPTH	
		76 ft.	
SCREEN LENGTH NA			SOIL CLASSIFICATION
SLOT SIZE NA			
GROUNDWATER ELEVATIONS			SILT, CLAY, and GRAVEL, tr SAND. LIMESTONE
ELEVATION	DATE		
	7/13/98 DTW= 47.65 ft.bgs		
ELEVATION	DATE		
347.03	10/1/1999		
ELEVATION	DATE		
ELEVATION	DATE		
ELEVATION	DATE		33 ft.
ELEVATION	DATE		51 ft.
ELEVATION	DATE		76.0

Project Name Harley Davidson					Project No. 1406701	
Boring Location York, PA					Elevation and Datum	
Drilling Company Eichelberger's					Date Started	Date Finished
Drilling Equipment Ingersoll Rand T4W Air Rotary					7/9/1998	7/10/1998
Size and Type of Bit 6 and 8 Inch Hammer Bit, 10 inch Roller Bit.					Completion Depth	Rock Depth
Casing 6 inch steel ---					76 ft.	33 ft.
Casing Hammer			Weight ---	Drop ---	Water Level	
Sampler 2 inch Split Spoon and Cuttings					Driller Carey Knaub	
Sampler Hammer Weight			NA	Drop NA	Inspector Dave Wilson	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1		Cuttings	NA	NA	Blacktop, coarse limestone gravel, FILL.	8:31 PID = 0 ppm
2						
3						
4						
5						
6	S1	SS	0.8	NA	CLAY and SILT; brown, firm; little medium, subangular, quartz GRAVEL.	8:49 PID = 0 ppm
7						
8						
9						
10						
11	S-2	SS	2.0	NA	CLAY and SILT, brown, firm; trace fine GRAVEL	8:49 PID = 0 ppm
12						
13						
14						
15						
16	S-3	SS	2.0	NA	CLAY and SILT; Dark gray/black, soft, moist; trace fine GRAVEL.	9:16 PID = 0 ppm Start of water?
17						
18						
19						
20						
21	S-4	SS	2.0	NA	CLAY; Gray to black, wet, medium stiff; tr SILT; tr black angular GRAVEL.	9:16 Outside of split spoon is wet.

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/9/1998	
Drilling Company		Eichelberger's			Date Finished		7/10/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22	S-4	SS	2	NA		PID = 0 ppm Bit chatter at 23 ft. bgs.		
23								
24								
25								
26	S-5	SS	0.54	NA				
27					CLAY; Gray/black, wet, soft,; tr SILT; little angular black GRAVEL.	PID = 0 ppm		
28								
29								
30								
31	S-6	SS		NA				
32					CLAY and SILT; tr fine SAND; some coarse GRAVEL; saturated, very soft.	Outside of split spoon is wet.		
33								
34								
35								
36								
37	S-7	cuttings	NA	NA	LIMESTONE; with calcite, dark gray, to light gray, hard, crystalline.	Strong bit chatter at 33 ft. bgs. Hard. 10:05 Temporary 8 inch steel casing set to 35 ft. bgs.		
38								
39								
40								
41								
42								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/9/1998	
Drilling Company		Eichelberger's			Date Finished		7/10/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS		
43	S-8	cuttings	NA	NA	LIMESTONE; light gray, crystalline, massive.	Weathered zone. Loss of bit chatter, dust changed from light gray to tan.		
44								
45								
46								
47								
48					Weathered zone, Fe stains on cuttings.			
49								
50								
51								
52								
53								
54								
55	S-10	cuttings	NA	NA	LIMESTONE; dark gray, massive, calcite, graphite, slight weathering.	Water bearing zone at 54 ft. bgs. ~3 to 5 gpm.		
56								
57								
58								
59								
60	S-11	cuttings	NA	NA	LIMESTONE; hard dark gray, slight weathering, graphite.			
61								
62								
63								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/9/1998	
Drilling Company		Eichelberger's			Date Finished		7/10/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
64								
65								
66								
67							13:38	
68								
69								
70								
71								
72	S-12	cuttings	NA	NA	LIMESTONE; dark gray to light gray massive, calcite, graphite, slight weathering.			
73								
74								
75								
76								
77					TD = 76 ft.			
78								
79								
80								
81								
82								
83								
84								

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. 84

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM TOC PVC = 368.79	
DRILLING AGENCY Eichelberger's		DATE STARTED 7/16/1998	DATE FINISHED 7/20/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Carey Knaub	
SIZE AND TYPE OF BIT 8 inch hammer bit. 6 inch & 10 inch roller bit.		INSPECTOR Lou Russo	
METHOD OF INSTALLATION The well was advanced to 63 ft. with 6" H.B. 8" H.B. to 78 ft.bgs. .			
METHOD OF WELL DEVELOPMENT			
TYPE OF CASING Schedule 40 PVC	DIAMETER 2 inch	TYPE OF BACKFILL MATERIAL 24 bags cement, 26 bags bentonite	
TYPE OF SCREEN Schedule 40 PVC	DIAMETER 2 inch	TYPE OF SEAL MATERIAL Bentonite Pellets	
BOREHOLE DIAMETER 10 inch and 6 inch.		TYPE OF FILTER MATERIAL #1 Morie Sand 44 50# bags, Gravel 2 100# bags	
TOP OF CASING	ELEVATION	DEPTH	<div style="text-align: center;">WELL DETAILS</div>
Flush Mount			
TOP OF SEAL	ELEVATION	DEPTH 58 ft.	
TOP OF FILTER	ELEVATION	DEPTH 67 ft.	
TOP OF SCREEN	ELEVATION	DEPTH 75 ft.	
BOTTOM OF BORING	ELEVATION	98 ft.	
SCREEN LENGTH		20 ft.	
SLOT SIZE	0.010 inch		
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
349.63	10/1/1999		
ELEVATION	DATE		
ELEVATION	DATE		
ELEVATION	DATE		
ELEVATION	DATE		

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York, PA		Elevation and Datum			
Drilling Company		Eichelberger's		Date Started		Date Finished	
Drilling Equipment		Ingersoll Rand T4W Air Rotary		7/16/1998		7/17/1998	
Size and Type of Bit		7 7/8" Hammer Bit		Completion Depth		Rock Depth	
Casing		---		80 ft.		63 ft.	
Casing Hammer		Weight ---		Drop ---		Water Level	
Sampler		2" OD Split Spoon		Driller		Carey Knaub	
Sampler Hammer Weight		NA		Drop NA		Inspector	
						Lou Russo	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1					Asphalt and gravel 1 ft.	Start 10:15 7/16/98 PID = 0.5 ppm background from borehole
2					See MW - 78 Log. 	
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/16/1998	
Drilling Company		Eichelberger's			Date Finished		7/17/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22					See MW - 78 Log. 	moist		
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/16/1998	
Drilling Company		Eichelberger's			Date Finished		7/17/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
43						Note: After drilling to 80 ft. with 6 inch bit, hole was reamed out with 10 inch roller bit to 80 ft.bgs.		
44								
45								
46					Light brown SILT; some f-c Sand and Gravel. Tr-some Clay.			
47						PID = 0.5 ppm background from borehole		
48								
49								
50								
51								
52								
53								
54								
55								
56								
57		cuttings			Light brown silty SAND & GRAVEL, rounded and subrounded quartz & limestone; tr-some Clay. Wet	pulled rods, switch to 6 inch roller bit with stabilizer to drill bedrock. Water level rose to ground surface & bubbling. (artesian?).		
58								
59								
60								
61								
62								
63					Top of bedrock.	Drill chatter.		

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/16/1998	
Drilling Company		Eichelberger's			Date Finished		7/17/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
64					Possible boulder 63 to 66.5 ft. No limestone cuttings.	Chatter, fractured rock.		
65								
66					Void 66.5 to 71 ft.			
67								
68								
69								
70								
71								
72					Limestone 71 to 74 ft.			
73								
74								
75					Void- 74 - 77 ft.			
76								
77								
78					Limestone 77-80.			
79								
80								
81					TD = 80 ft.			
82								
83								
84								

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. 85

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM	
DRILLING AGENCY Eichelberger's		DATE STARTED 2/10/2000	DATE FINISHED 2/15/2000
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Carey Knaub	
SIZE AND TYPE OF BIT 10 inch and 6 inch Hammer Bit.		INSPECTOR Dave Wilson	
METHOD OF INSTALLATION Hole reamed 10 inch to 25 ft. Temporary 10 inch steel casing set to 19.5 ft. 6 inch temporary casing set to 25 ft. 6 inch borehole advanced to 150 ft. Hole reamed 10 inch to 120 ft. Permanent 6 inch casing set to 120 ft. Chipped bentonite from 118 to 120 ft. bgs. Benseal grout to surface. Flushmount at surface.			
METHOD OF WELL DEVELOPMENT The well was developed for 120 minutes on 3/02/00 at 3.0 gpm till dry. A total of 360 gallons was removed by submersible pump. The discharge was very muddy at the start but cleared after approximately 30 minutes.			
TYPE OF CASING Steel		DIAMETER 6 inch	
		TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout	
TYPE OF SCREEN Open rock hole. 120 to 150 ft. bgs.		TYPE OF SEAL MATERIAL Chipped Bentonite/ Drive shoe.	
BOREHOLE DIAMETER 10 inch to 120 ft. 6 inch from 120 to 150 ft.		TYPE OF FILTER MATERIAL NA	
TOP OF CASING	ELEVATION	DEPTH	<div style="text-align: center;">WELL DETAILS</div>
Flushmount			
TOP OF SEAL	ELEVATION	DEPTH	
NA			
TOP OF FILTER	ELEVATION	DEPTH	
6 inch open rock hole 120 to 150 ft.			
TOP OF SCREEN	ELEVATION	DEPTH	
150 ft.			
SCREEN LENGTH NA			
SLOT SIZE NA			
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
2/15/00 DTW= 31 ft.bgs			
ELEVATION	DATE		
3/02/00 DTW = 28.25 ft.bgs.			
ELEVATION	DATE		

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York, PA		Elevation and Datum			
Drilling Company		Eichelberger's		Date Started		Date Finished	
Drilling Equipment		Ingersoll Rand T4W Air Rotary		2/10/2000		2/15/2000	
Size and Type of Bit		12 and 10 Inch Hammer Bit.		Completion Depth		Rock Depth	
Casing		6 inch steel - - -		150 ft.		19 ft.	
Casing Hammer		Weight - - -		Drop - - -		Water Level 31 ft. bgs 2/15/00	
Sampler		Cuttings		Driller		Carey Knaub	
Sampler Hammer Weight		NA		Drop NA		Inspector Dave Wilson	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1					CLAYEY SILT; dark brown, with rounded quartz cobbles.	14:24 2/10/2000 Note: Test pit was dug from 0 to 6 ft. bgs to clear utilities. 12 inch temporary casing set to 8 ft. bgs. 10 inch temporary casing set to 19.5 ft. bgs.
2					CLAY with SILT; Color change to red brown. Rootlets visible, maybe original surface.	
3					CLAY and SILT; fine to medium GRAVEL with angular quartz cobbles at 5 ft.	
4						
5						
6						
7	S-1	cuttings			Dark gray SILTY CLAY; tr fm rounded quartz gravel.	14:42
8						
9						
10						
11	S-2	cuttings			Brown CLAYEY SANDY SILT; tr fm gravel, quartz.	
12						
13						
14						
15						
16						
17						
18						14:48
19	S-3	cuttings			Brown, soft, moist CLAY; tr SILT.	Top of rock at 19 ft. bgs.
20					LIMESTONE; dark/ light gray mottled.	
21	S-4	cuttings			LIMESTONE, dark gray, with minor calcite. Competent.	

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		2/10/2000	
Drilling Company		Eichelberger's			Date Finished		2/15/2000	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22	S-4	cuttings			LIMESTONE; dark gray, with minor calcite. Competent.			10 inch temporary casing set to 19.5 ft. bgs. 10 inch borehole 19 to 25 ft.
23								
24								
25	S-5	cuttings			LIMESTONE; dark/light gray mottled. Minor weathering, < 10% of cuttings are Fe stained.		15:35	2/10/00 STOP
26								2/11/00 START
27								6 inch steel casing set to 25 ft. bgs.
28								2/14/00 Reamed 10 inch borehole to 120 ft. bgs. Set 6 inch permanent steel casing to 120 ft. bgs. Clean out with 6 inch bit to 150 ft. bgs.
29	S-6	cuttings			LIMESTONE; hard, dark gray. No weathered material, no calcite.		10:40	
30								
31								
32								
33								
34	S-7	cuttings			LIMESTONE; hard, competent, dark gray with some light gray material. No weathering.		10:46	Hard, solid bit chatter, dry, dusty.
35								
36								
37								
38	S-7	cuttings			LIMESTONE; hard, competent, dark gray with some light gray material. No weathering.		10:48	
39								
40								
41								
42								

*Standard Penetration Test N-Value

Project Name		Harley Davidson		Project No.		1406701	
Boring Location				York PA		Date Started	
Drilling Company				Eichelberger's		2/10/2000	Date Finished
							2/15/2000

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
43	S-7					
44						
45						
46	S-8	cuttings			LIMESTONE; dark gray, with slight amount (<10%) of weathered material.	47 to 48 ft. cuttings darker, slight weathered zone.
47						
48						
49						
50						
51						
52						
53	S-9	cuttings			LIMESTONE; dark/light gray mottled. No weathered material.	Solid bit chatter, hard, dry, dusty. No odors.
54						
55						
56						
57						10:58
58						10:59
59						
60						
61	S-10	cuttings			LIMESTONE; very dark gray, with minor amounts of light gray mottling. No weathered material.	11:02
62						
63						

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		2/10/2000	
Drilling Company		Eichelberger's			Date Finished		2/15/2000	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION		REMARKS	
64								
65	S-10	cuttings				11:05		
66								
67								
68						11:08		
69								
70					LIMESTONE; very dark gray. Minor amounts of light gray mottled material. Unweathered.			
71	S-11	cuttings				11:09		
72								
73						11:11		
74								
75						11:12		
76								
77					LIMESTONE; very dark gray with minor amounts of light gray material. No weathering.			
78	S-12	cuttings						
79								
80								
81								
82								
83								
84								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		2/10/2000	
Drilling Company		Eichelberger's			Date Finished		2/15/2000	
Depth (ft)					DESCRIPTION		REMARKS	
85					LIMESTONE; hard, very dark gray, competent. No weathered material.	11:21		
86	S-13	cuttings				11:23		
87								
88								
89								
90								
91					LIMESTONE; hard, dark gray, with some lighter gray material (apprx. 20%) Minor calcite. Unweathered.			
92	S-14	cuttings						
93								
94								
95								
96								
97					LIMESTONE; hard, dark gray. Apprx. 10% weathered material, slight Fe stains.			
98	S-15	cuttings				11:34		
99								
100								
101								
102								
103						2/11/00 Stop temporarily. Called PJR. Decide to drill to 150 ft.		
104								
105								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		2/10/2000	
Drilling Company		Eichelberger's			Date Finished		2/15/2000	
Depth (ft)					DESCRIPTION		REMARKS	
106	S-15				LIMESTONE; very dark gray, hard, competent. Slight amount of calcite, (<10%).	13:52	Solid bit chatter.	
107								
108	S-16	cuttings						
109								
110								
111					LIMESTONE; very dark gray, hard, competent. A few minor calcite veins, 1mm thick. No weathered material.	13:52		
112	S-17	cuttings						
113								
114								
115								
116					LIMESTONE; hard, dark gray, unweathered. No calcite observed.	13:52		
117	S-18	cuttings						
118								
119								
120								
121					LIMESTONE; very dark gray. Slight amount, <5%, of weathered material. Slight calcite.	14:01	WBZ ? 125 to 126 ft.	
122								
123	S-19	cuttings						
124								
125								
126								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		2/10/2000	
Drilling Company		Eichelberger's			Date Finished		2/15/2000	
Depth (ft)					DESCRIPTION		REMARKS	
127	S-19				LIMESTONE; hard, dark gray, competent. No weathered material. No calcite observed.		2/11/00 14:10 Stop at 130 ft. bgs. 14:09 Wash water downhole, blow it out. 14:30 Wait to see if any water comes in. Small amount of water (apprx 1 ft.)	
128	S-20	cuttings						
129								
130								
131								
132					LIMESTONE; hard, dark gray, competent. No weathering. Slight amount of calcite observed. (<5%).		Making a small amount of water, approximately 1 to 2 gpm. 14:34	
133	S-21	cuttings						
134								
135								
136								
137					LIMESTONE; hard, very dark gray. No weathered material. No calcite observed.		Making 1 to 2 gpm. 14:38	
138								
139								
140								
141								
142	S-22	cuttings						
143								
144								
145								
146								
147								

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. **MW-86S**

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM TOC PVC = 407.42 ft. AMSL	
DRILLING AGENCY Eichelberger's		DATE STARTED 5/26/1998	DATE FINISHED 6/4/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Carey Knaub/Bob Austin	
SIZE AND TYPE OF BIT 8 inch Hammer Bit / 8 inch Roller Bit		INSPECTOR Lou Russo/Dave Wilson	
METHOD OF INSTALLATION Drilled with 8 inch hammer bit to 30 ft. Set temporary 8 inch steel casing to 29 ft bgs. Drilled 8 inch roller bit to 59 ft. bgs. Rock cored from 59 ft. to 98.5 ft. Hole backfilled with Bentonite to 83 ft. Sand from 83 to 80 ft. Upper 2 inch PVC screen set from 27 to 12 ft. Sandpack to 10 ft. Grout to surface. 6 inch steel protective stickup at surface.			
METHOD OF WELL DEVELOPMENT The well was developed on 7/15/98 for 3 hours 10 minutes at a rate of 0.25 gpm. The discharge was very dirty. The well was surged several times. The discharge was light brown at the end.			
TYPE OF CASING PVC	DIAMETER 2 Inch	TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout	
TYPE OF SCREEN PVC Slot	TYPE OF SEAL MATERIAL Pelletized Bentonite		
BOREHOLE DIAMETER 8 Inch	TYPE OF FILTER MATERIAL #1 Quartz Sand		
TOP OF CASING	ELEVATION	DEPTH	<div style="text-align: center;">WELL DETAILS</div>
Above ground	407.42 PVC		
TOP OF SEAL	ELEVATION	DEPTH	
		Ground Surface	
TOP OF FILTER	ELEVATION	DEPTH	
		10 ft.	
TOP OF SCREEN	ELEVATION	DEPTH	
		12 ft.	
BOTTOM OF BORING	ELEVATION	DEPTH	
		105 ft.	
SCREEN LENGTH	15 ft.	12 to 27 ft.	
SLOT SIZE	0.01		
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
392.82	10/1/1999		
ELEVATION	DATE		
			27.0
			32.5

WELL CONSTRUCTION SUMMARY

Well No. MW-86D

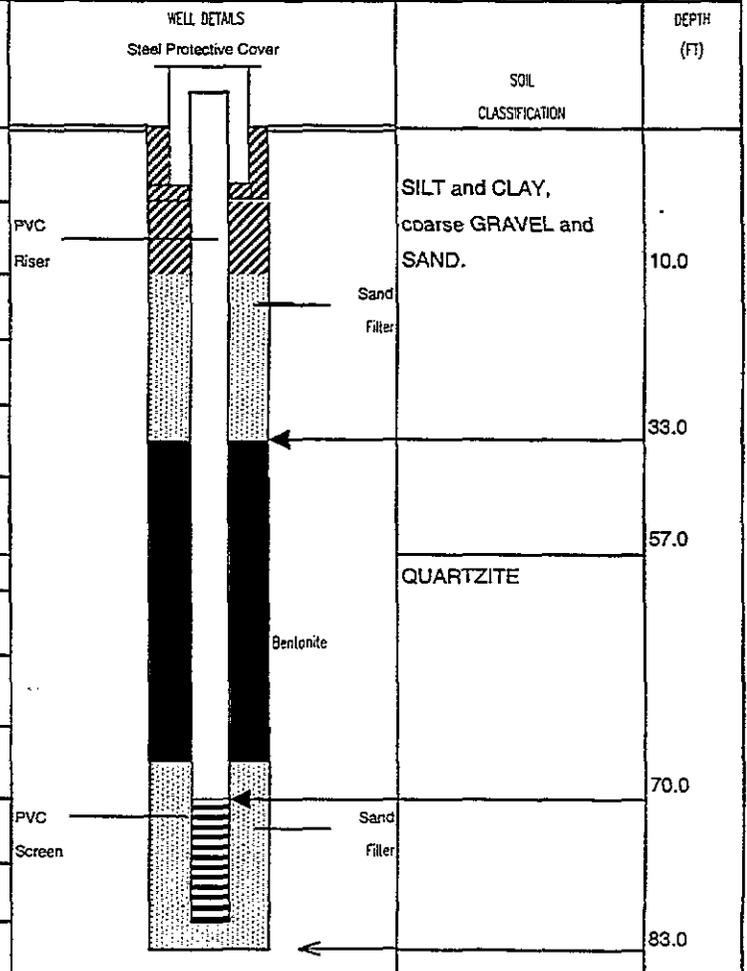
PROJECT Harley Davidson	PROJECT NO. 1406701
LOCATION York, PA	ELEVATION AND DATUM TOC PVC = 407.48 ft. amsl
DRILLING AGENCY Eichelberger's	DATE STARTED 5/26/1998
	DATE FINISHED 6/4/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary/Coring Rig	DRILLER Carey Knaub/Bob Austin
SIZE AND TYPE OF BIT 8 inch Hammer Bit / 8 inch Roller Bit	INSPECTOR Lou Russo/Dave Wilson

METHOD OF INSTALLATION
 Drilled with 8 inch hammer bit to 30 ft. Set temporary 8 inch steel casing to 29 ft bgs. Drilled 8 inch roller bit to 59 ft. bgs. Rock cored from 59 ft. to 98.5 ft. Hole backfilled with Bentonite to 83 ft. Sand from 83 to 80 ft. 2 inch PVC screen set from 70 to 80 ft. Sandpack to 67.5 ft. Bentonite to 33 ft. Sandpack from 33 to 10 ft Grout to surface. 6inch steel protective stickup at surface.

METHOD OF WELL DEVELOPMENT
 The well was developed on 7/15/98 using the airlift method at a rate of 1.25 gallons per minute for 1 hour and 25 minutes. Discharge started cloudy but turned clear. Approximately 106 gallons were removed.

TYPE OF CASING PVC	DIAMETER 2 Inch	TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout
TYPE OF SCREEN PVC Slot		TYPE OF SEAL MATERIAL Pelletized Bentonite
BOREHOLE DIAMETER 8 inch		TYPE OF FILTER MATERIAL #1 Quartz Sand.

TOP OF CASING	ELEVATION	DEPTH	WELL DETAILS	SOIL CLASSIFICATION	DEPTH (FT)
Above ground	407.48 PVC		Steel Protective Cover		
TOP OF SEAL		33		SILT and CLAY, coarse GRAVEL and SAND.	10.0
TOP OF FILTER		67	PVC Riser		
TOP OF SCREEN		70			
BOTTOM OF BORING		83			
SCREEN LENGTH	10 ft				33.0
SLOT SIZE	0.01				57.0
GROUNDWATER ELEVATIONS				QUARTZITE	70.0
ELEVATION	DATE				
397.65	10/1/1999				
ELEVATION	DATE				83.0
ELEVATION	DATE				
ELEVATION	DATE				



Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York, PA		Elevation and Datum			
Drilling Company		Eichelberger's		Date Started		Date Finished	
Drilling Equipment		Ingersoll Rand T4W Air Rotary		5/26/1998		6/4/1998	
Size and Type of Bit		8 Inch Hammer Bit and 8 Inch Roller Bit.		Completion Depth		Rock Depth	
Casing		2 Inch PVC		98.5 ft.		57 ft.	
Casing Hammer		Weight		Drop		Water Level	
		---		---			
Sampler		2" OD Split Spoon		Driller		Carey Knaub/Bob Austin	
Sampler Hammer Weight		NA		Drop		NA	
						Inspector	
						Dave Wilson/Lou Russo	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1	S-1	SS	1.7	NA	SILT; tr CLAY; tr SAND; tr GRAVEL; soft, dry.	15:00 Note: HNU is not working. No PID readings.
2						
3						
4						
5						15:08
6	S-2	SS	2.0	NA	Brown SILT, some coarse GRAVEL, Fe stained, weathered; tr CLAY.	
7						
8						
9						
10						
11	S-3	SS	1.8	NA	Brown SILT; some coarse GRAVEL, subangular, weathered, tr SAND.	
12						15:20
13						
14						
15						15:26
16	S-4	SS	1.5	NA	Brown, soft, SILT and CLAY; some GRAVEL, weathered, subangular.	1/8 inch thread. Outside of split spoon is wet.
17						15:41
18						16:00
19						
20						
21	S-5	SS	0.3	NA	GRAVEL; some SILT and SAND; saturated, very loose.	16:05 Very poor split spoon recovery. Material runs out of split spoon, or could be very coarse gravel which won't enter the spoon.

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finished	
Drilling Company		Eichelberger's			5/26/1998			
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22	S-5	SS			GRAVEL, SILT, SAND; brown, saturated, very loose material.			
23								Making water.
24								
25							16:20	Very poor split spoon recovery. Material runs out of split spoon.
26	S-6	SS	0,25	NA				
27							16:30	Stop, 5/26/98 Start, 5/27/98 Hole collapsed to 27 ft. bgs. Will forego split spoon, and set casing.
28								Set 8 inch temporary steel casing to 29 ft. 4 inch bgs.
29								
30							8:40	
31								
32					Coarse GRAVEL and SILT, brown. Very fluid.			
33								Making water.
34								
35							12:50	
36								
37								
38								
39								
40								
41							12:55	Bit chatter.
42								

*Standard Penetration Test N-Value

Project Name					Harley Davidson		Project No.		1406701	
Boring Location					York PA			Date Started		Date Finished
Drilling Company					Eichelberger's			5/26/1998		
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS				
43										
44										
45						Color change				
46	S-7	cuttings	NA	NA	GRAVEL, mc, weathered, angular, and subangular; with SILT; tr CLAY. Dark brown, saturated, thicker than above, but still very fluid.					
47										
48										
49										
50										
51	S-8	cuttings	NA	NA	GRAVEL, mc, weathered, angular, and subangular; with SILT; little CLAY. Grave consists of weathered, rust, colored, quartzite and quartz chips.	Making water.				
52										
53										
54										
55							12:57			
56										
57						13:08 Strong bit chatter. Top of rock at 57 ft. bgs.				
58		Core Type	% Recovery	RQD	QUARTZITE					
59	Run					13:20 Stop, 5/27/98				
60	1	NQ	100	100	Gray Quartzite, iron staining fracture	11:30 Start, 5/28/98				
61					fracture	5:51 DTW in PVC = 15 ft. bgs. 450 psi, 2000 - 2200 rpm.				
62					fracture	8:44 60 to 61 ft. switched to 500 psi, 2200 - 2500 rpm.				
63					fracture	11:53				
						14:53 Run 1 = 4 ft. 59 to 63.3				

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finished	
Drilling Company		Eichelberger's			5/26/1998			
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
64					Gray Quartzite	2:30		
65	2	NQ	100	87	Fractured from 63 to 65.5 ft.	5:00		
66						8:15		
67					fracture	10:37		
68					fracture	14:51	Changed color to dark brown.	
69					Gray QUARTZITE	3:08		
70	3	NQ	88	33	fractured		Rod dropped 6 inches, 70 to 70.5 ft.	
71								
72					Highly fractured and weathered, iron staining.	5:26		
73						6:24		
74					Gray QUARTZITE			
75	4	NQ	100	6	Highly fractured and weathered, iron staining.			
76								
77								
78								
79					QUARTZITE; highly weathered and fractured with iron staining to 81 ft.	1:15		
80	5	NQ	100	27		2:44		
81								
82					less weathered and fractured.		Blocked off, no circulation.	
83	6	NQ	100.0	42	QUARTZITE; highly weathered and fractured with iron staining.	1:30		
84								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		5/26/1998	
Drilling Company		Eichelberger's			Date Finished			
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
85	6	NQ			less weathered.			
86								
87								
88	7	NQ	100	22	fracture Gray QUARTZITE fracture fracture 89 to 89.5 highly fractured, mildly weathered.	13:10	500 psi 2200 - 2500 rpm.	Blocked off, stop coring.
89						2:30		
90						4:39		
91	8	NQ	100	42	Gray QUARTZITE; highly fractured, slightly weathered, slight iron staining.			
92								
93								
94	9	NQ	80	80	fracture Gray QUARTZITE; fracture fracture fracture fracture	5:39	500 psi 2200 - 2500 rpm.	Stop 5/26/98 6/4/1998 9:00:00 AM Abandon hole with bentonite to 80 ft.
95						10:01		
96						12:10		
97								
98								
99								
100								
101								
102								
103								
104								
105								

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. 87

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM TOC PVC = 371.56	
DRILLING AGENCY Eichelberger's		DATE STARTED 7/10/1998	DATE FINISHED 7/15/1998
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Carey Knaub	
SIZE AND TYPE OF BIT 8 inch/6 inch hammer bit.		INSPECTOR Dave Wilson	
METHOD OF INSTALLATION The well was advanced to 43 ft. with 6" H.B. 8" H.B. to 78 ft.bgs. Set temporary 6" steel casing to 78 ft. Drilled with 6" H.B. to 91 ft. Advanced 6" steel casing to 92.5 ft., drilled to 98 ft.bgs total depth. Competent limestone at 95 ft.			
METHOD OF WELL DEVELOPMENT As of 9/19/98 the well had not been developed.			
TYPE OF CASING Schedule 40 PVC	DIAMETER 2 inch	TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout 24 bags cement, 25 bags bentonite	
TYPE OF SCREEN Schedule 40 PVC	DIAMETER 2 inch	TYPE OF SEAL MATERIAL Bentonite Pellets	
BOREHOLE DIAMETER 10 inch and 6 inch.		TYPE OF FILTER MATERIAL #1 Morie Sand 44 50# bags, Gravel 2 100# bags	
TOP OF CASING	ELEVATION	DEPTH	<div style="text-align: center;">WELL DETAILS</div>
Flush Mount			
TOP OF SEAL	ELEVATION	DEPTH 58 ft.	
TOP OF FILTER	ELEVATION	DEPTH 67 ft.	
TOP OF SCREEN	ELEVATION	DEPTH 75 ft.	
BOTTOM OF BORING	ELEVATION	98 ft.	
SCREEN LENGTH		20 ft.	
SLOT SIZE	0.010 inch		
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
345.36	10/1/1999		
ELEVATION	DATE		67.0
ELEVATION	DATE		75.0
ELEVATION	DATE		95.0
ELEVATION	DATE		98.0
			Limestone

SOIL CLASSIFICATION

Silts, Clay, and Gravel
Wet, thick, mud and weathered gravel below 30 ft. bgs.

Portland Cement Grout & Bentonite

Bentonite

Portland Cement Grout & Bentonite

Bentonite

Sand Filler

Limestone

Project Name Harley Davidson		Project No. 1406701	
Boring Location York, PA		Elevation and Datum	
Drilling Company Eichelberger's		Date Started 7/10/1998	Date Finished 7/15/1999
Drilling Equipment Ingersoll Rand T4W Air Rotary		Completion Depth 98 ft.	Rock Depth
Size and Type of Bit		Water Level	
Casing 2 inch PVC	Weight ---	Drop ---	
Sampler 2" OD Split Spoon		Driller Carey Knaub	
Sampler Hammer Weight NA	Drop NA	Inspector Dave Wilson	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1						12:59 7/10/1998
2						
3						
4						
5						
6	S1	SS	1.8	NA	Brown SILT; some CLAY; little GRAVEL angular.	PID = 0 ppm.
7						
8						
9						
10						
11	S-2	SS	1.0	NA	SILT; some CLAY; red/brown mottled with tan.	PID = 0 ppm.
12						
13						
14						
15						
16	S-3	SS	1.0	NA	Brown SILT; little CLAY; little angular quartz GRAVEL.	PID = 0 ppm.
17						
18						
19						
20						
21	S-4	SS	2.0	NA	Tan SILT; little CLAY; tr angular quartz GRAVEL. Medium stiff.	PID = 0 ppm.

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/10/1998	
Drilling Company		Eichelberger's			Date Finished		7/15/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS		
22	S-4	SS			Tan SILT; little CLAY; some c-m angular quartz GRAVEL.	PID = 0 ppm.		
23								
24								
25								
26	S-5	SS	1.0	NA				
27					SAND, loose, f-m, saturated, brown; grading to dark gray, SANDY CLAY.	Wet, saturated. PID = 0 ppm.		
28								
29								
30								
31	S-6	SS	0.8	NA				
32					Wet, saturated. PID = 0 ppm.			
33								
34								
35								
36	S-7	SS	0.7	NA				
37								
38								
39								
40								
41								
42								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/10/1998	
Drilling Company		Eichelberger's			Date Finished		7/15/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
43					SILT and CLAY, saturated, thick, viscous mud; with weathered quartz and sandstone GRAVEL, f-c.	7/13/98 Start drilling at 43 ft. bgs. Bit chatter at 43 ft. bgs.		
44	S-9	cuttings				14:40 7/12/1998 S-8 split spoon collected on 7/12 poor recovery; hole collapsed to 43 ft.		
45								
46	S-8	SS	0.3	NA				
47								
48								
49								
50								
51								
52								
53								
54					43 to 60 ft. weathered rock or alternating voids and ledges.			
55								
56	S-10	cuttings		NA		Very thick, viscous, mixture of SILT, CLAY, and f-c weathered, subangular, quartz, sandstone, and limestone GRAVEL.		
57								
58								
59								
60								
61								
62								
63								
					Intermittent bit chatter. Can't hear the rig due to air filtration machinery nearby.			
					Bit chatter 60 to 61 ft.			

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/10/1998	
Drilling Company		Eichelberger's			Date Finished		7/15/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
64					GRAVEL, c-m weathered, subangular quartz, sandstone, dark gray limestone in a matrix of very thick, viscous, mud.			
65								
66	S-11	cuttings						
67								
68								
69					As above: GRAVEL, c-m weathered, subangular quartz, sandstone, dark gray limestone in a matrix of very thick, viscous, mud.			
70								
71								
72	S-12	cuttings						
73								
74					As above: GRAVEL, c-m weathered, subangular quartz, sandstone, dark gray limestone in a matrix of very thick, viscous, mud.	11:20		Set temporary 6 inch casing to 78 ft. bgs. Drilled ahead to 91 ft. bgs.
75								
76								
77								
78								
79					As above: GRAVEL, c-m weathered, subangular quartz, sandstone, dark gray limestone in a matrix of very thick, viscous, mud.			
80	S-13	cuttings						
81								
82								
83								
84								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		7/10/1998	
Drilling Company		Eichelberger's			Date Finished		7/15/1998	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
85						7/14/1998 9:15:00 AM 6inch temporary steel casing set to 92.5 ft. bgs. Will attempt to drill ahead of casing to 100 ft. bgs. To find bedrock.		
86								
87								
88								
89								
90								
91								
92	S-14	cuttings			Very weathered, subangular, quartz and sandstone GRAVEL; with very soft, plastic, balls of clay.	15:40 7/13/1998		
93								
94								
95								
96	S-15	cuttings			Limestone; dark gray, angular, fine fragments.			
97						Steady bit chatter, top of competent rock at 95 ft. bgs.		
98					TD = 98 ft.			
99								
100								
101								
102								
103								
104								
105								

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. MW-88

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM	
DRILLING AGENCY Eichelberger's		DATE STARTED 2/23/2000	DATE FINISHED 2/25/2000
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Carey Knaub	
SIZE AND TYPE OF BIT 6 & 8 inch Hammer Bit /10 inch Roller Bit		INSPECTOR Dave Wilson	
METHOD OF INSTALLATION 12 inch borehole was advanced to 25 ft. bgs. 10 inch temporary casing set to 25 ft. 10 inch borehole from 25 to 30 ft. 6 inch permanent casing set to 30 ft. bgs. 6 inch borehole from 30 to 50 ft. Chipped bentonite from 28 to 30 ft. Benseal grout to surface. 8 inch flushmount at surface.			
METHOD OF WELL DEVELOPMENT The well was developed on 3/02/00 for 120 minutes at 2.5 gpm. 300 gallons was removed by submersible pump. The discharge was muddy at the start, but gradually cleared .			
TYPE OF CASING Steel	DIAMETER 6 inch	TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout	
TYPE OF SCREEN Open rock hole. 30 to 50 ft. bgs.		TYPE OF SEAL MATERIAL Chipped Bentonite/ Drive shoe.	
BOREHOLE DIAMETER 12 inch to 25 ft. 10 inch 25 to 30 ft. 6 inch 30 to 50 ft.		TYPE OF FILTER MATERIAL NA	
TOP OF CASING	ELEVATION	DEPTH	<div style="text-align: center;">WELL DETAILS</div>
Flushmount			
TOP OF SEAL	ELEVATION	DEPTH	
TOP OF FILTER	ELEVATION	DEPTH	
TOP OF SCREEN	ELEVATION	DEPTH	
6 inch open rock hole 30 to 50 ft.			
BOTTOM OF BORING	ELEVATION	DEPTH	
50 ft.			
SCREEN LENGTH	NA		
SLOT SIZE	NA		
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
2/25/00 DTW= 24.7 ft.bgs			
ELEVATION	DATE		
3/02/00 DTW = 24.61 ft bgs.			
ELEVATION	DATE		

Project Name Harley Davidson		Project No. 1406701	
Boring Location York, PA		Elevation and Datum	
Drilling Company Eichelberger's		Date Started	Date Finished
Drilling Equipment Ingersoll Rand T4W Air Rotary		2/23/2000	2/25/2000
Size and Type of Bit 12 inch, 10 inch, and 6 inch Hammer Bit		Completion Depth	Rock Depth
Casing ---		50 ft.	24 ft.
Casing Hammer	Weight ---	Drop ---	Water Level 25 ft. bgs
Sampler	Cuttings	Driller Carey Knaub	
Sampler Hammer Weight	NA	Drop NA	Inspector Dave Wilson

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1						11:20 2/23/2000 Start. Set 12inch x 8 ft, temporary steel casing to approximately 6 ft. bgs. Drill 12 inch borehole to 25 ft. bgs.
2						
3						
4						
5						
6						
7	S-1	cuttings			SILT and CLAY; Dark brown, soft; some quartz GRAVEL; aprx. 5-10%.	11:26 PID = 0 ppm. 1/8 inch thread.
8						
9						No returns from 9 to 15 ft.
10						
11						
12						
13						
14						
15						
16	S-2	cuttings			SILT and CLAY; brown, soft, moist; tr fine angular GRAVEL.	11:30 PID = 0 ppm. Color change; lighter brown. 1/8 inch thread. Increased bit chatter.
17						
18						
19						
20						
21						

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finished	
Drilling Company		Eichelberger's						
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22	S-3	cuttings			SILT and CLAY; brown, soft, moist. Change to Limestone at 24 ft.	Easy penetration. PID = 0.5 ppm. 2/23/00 17:00 STOP Top of rock. Increased bit chatter, gray cuttings/rock chips at 24 ft. Delay due to rig breakdown. Set 10 inch casing to 25 ft. bgs. PID = 0 ppm. 2/24/00 Start at 25 ft. bgs. Reamed 10 inch hole 25 to 30 ft. bgs. Set permanent 6 inch steel casing to 30 ft. bgs. Add 2 bags chipped bentonite for seal.		
23								
24								
25								
26	S-4	cuttings			LIMESTONE; light and dark gray, apprx. 25% Fe stained, apprx. 5% quartz	10:30 2/24/00 restart, water in hole. PID = 0 ppm.		
27								
28								
29								
30								
31	S-5	cuttings			LIMESTONE; dark/light gray, apprx. 10 to 15 % Fe stained material.	PID = 0 ppm.		
32								
33								
34								
35								
36	S-6	cuttings			LIMESTONE; dark gray, with a few calcite veins, 1 to 2 mm thick. Apprx. 5% Fe stained material.	PID = 0 ppm.		
37								
38								
39								
40								
41	S-7	cuttings			LIMESTONE; dark and light gray. Apprx. 5% Fe stained.	Less bit chatter at 41 ft. bgs. Fracture zone? 41 to 42 ft. bgs. PID = 0 ppm.		
42								
41	S-7	cuttings			LIMESTONE; Very dark gray. Some calcite veins. Apprx. 5% Fe stained/ weathered material.	Less bit chatter at 41 ft. bgs. Fracture zone? 41 to 42 ft. bgs. PID = 0 ppm.		
42								

*Standard Penetration Test N-Value

Project Name					Harley Davidson		Project No.		1406701	
Boring Location					York PA		Date Started		2/23/2000	
Drilling Company					Eichelberger's		Date Finished		2/25/2000	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS				
43	S-7	cuttings								
44										
45										
46	S-8	cuttings			LIMESTONE; very dark gray with some light gray mottling. Little or no weathering.					Additional water coming in hole at 47 to 48 ft. apprx. 6 to 8 gpm. PID = 0 ppm. 10:56 2/24/00 DTW = 26 ft. bgs.
47										
48										
49										
50										
51					TD = 50 ft.					
52										
53										
54										
55										
56										
57										
58										
59										
60										
61										
62										
63										

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. 89

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM TOC PVC =	
DRILLING AGENCY Eichelberger's		DATE STARTED 2/8/2000	DATE FINISHED 2/9/2000
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Carey Knaub	
SIZE AND TYPE OF BIT 12, 10 and 6 inch Hammer Bit.		INSPECTOR Dave Wilson	
METHOD OF INSTALLATION Drill with 10 inch hammer bit to 41.5ft. Ream hole 12inch to 34 ft. bgs. Set temporary 10 inch casing to 34 ft. Set 6 inch steel casing to 40 ft. 4.5 in. bgs Drill with 6 inch hammer bit to 76 ft. bgs. Void at 72 to 73 ft. Drill to 82 ft. Set 2 in. PVC screen from 78 to 68 ft. Sandpack to 65 ft. Bentonite to 60 ft. Benseal grout to surface. Flushmount at surface.			
METHOD OF WELL DEVELOPMENT The well was developed on 3/3/00 using the airlift method for 105 minutes at arate of 1.5 gpm. The well was surged several times. The discharge at the start was muddy, but clear at the end.			
TYPE OF CASING Schedule 40 PVC	DIAMETER 2 inch	TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout	
TYPE OF SCREEN Schedule 40 PVC	DIAMETER 2 inch	TYPE OF SEAL MATERIAL Bentonite Pellets	
BOREHOLE DIAMETER 10 inch and 6 inch.		TYPE OF FILTER MATERIAL #1 Quartz Sand	
TOP OF CASING	ELEVATION	DEPTH	<div style="text-align: center;">WELL DETAILS</div>
Flush Mount			
TOP OF SEAL	ELEVATION	DEPTH 60 ft.	
TOP OF FILTER	ELEVATION	DEPTH 65 ft.	
TOP OF SCREEN	ELEVATION	DEPTH 68 ft.	
BOTTOM OF BORING	ELEVATION	DEPTH 82 ft.	
SCREEN LENGTH	10 ft. 78 to 68 ft.		
SLOT SIZE	0.010 inch		
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
			SOIL CLASSIFICATION
			Silt, Clay, Gravel.
			Limestone and Dolomite
			60.0
			65.0
			68.0
			82.0

Project Name Harley Davidson					Project No. 1406701	
Boring Location York, PA					Elevation and Datum	
Drilling Company Eichelberger's					Date Started	Date Finished
Drilling Equipment Ingersoll Rand T4W Air Rotary					2/8/2000	2/9/2000
Size and Type of Bit 12, 10, and 6 inch hammer bit.					Completion Depth	Rock Depth
Casing ---					82 ft.	32 ft.
Casing Hammer		Weight ---	Drop ---		Water Level	
Sampler cuttings					Driller Carey Knaub	
Sampler Hammer Weight		NA		Drop NA	Inspector Dave Wilson	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1	S-1	cuttings			SILT, tr CLAY; brown, soft; tr fine SAND tr coarse angular GRAVEL.	10:15 2/8/2000 PID not responding. No odors or staining.
2						
3						
4						
5	S-2	cuttings			SILT, tr CLAY; dark brown, soft. Fine to medium subrounded, GRAVEL	2/8/00 10:15 to 10:50 Drill with 10 inch hammer bit to 41.5 ft. Ream hole 12inch to 34 ft. bgs. Set temporary 10 inch casing to 34 ft.
6						
7						
8						
9	S-3	cuttings			SILT and CLAY; tr fine GRAVEL. Soft, dark brown.	No odors or staining. 1/8 inch thread.
10						
11						
12						
13	S-4	cuttings			SILT and CLAY; tr fine to coarse rounded GRAVEL. Soft, moist, dark brown.	1/8 inch thread. No odors or staining.
14						
15						
16						
17						
18						
19						
20						
21						10:30

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		2/8/2000	
Drilling Company		Eichelberger's			Date Finished		2/9/2000	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
22						No returns from 21 to 34 ft. bgs.		
23								
24								
25								
26								
27								
28						Bit chatter.		
29								
30						Increased Bit chatter.		
31								
32						Top of rock at approximately 32 ft.		
33								
34								
35	S-5	cuttings			LIMESTONE; dark and light gray mottled, slightly weathered(Fe stained) appr. 15 to 20 % white calcite fragments.	10:37	Reacts with HCl acid.	
36							Change in color of cuttings from dark brown to light brown.	
37								
38	S-6	cuttings			LIMESTONE; darker gray, little or no weathering, less white calcite, appr. 10%.		No odors.	
39								
40	S-7	cuttings			LIMESTONE and DOLOMITE; light gray, slight amount of calcite. Apprx. 20% weathered, Fe stained fragments.		Dolomite observed, weak reaction with HCl acid when pulverized.	
41								
42	S-8					10:49	10 inch borehole to 41.5 ft.	
						15:35	11:00 to 12:00 Reamed 12 inch hole to 34 ft. bgs.Set 10 inch casing to	

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		2/8/2000	
Drilling Company		Eichelberger's			Date Finished		2/9/2000	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
43	S-8	cuttings			LIMESTONE; dark and light gray, apprx. 15% weathered, Fe stained material.	33ft. 9 in. bgs. Clean out inside 10 inch casing to 41.5 ft. No evidence of water observed. Set 6 inch steel casing to 40 ft. 4.5 in. bgs. 15:35 to 16:00 Drill 6 inch hammer bit to 76 ft bgs. Dust changes color from light gray to brown. Weathered zone, maybe a trace of water.		
44								
45								
46								
47	S-9	cuttings			LIMESTONE; dark and light gray mottled, some white calcite, apprx. 10% Fe stained fragments.	Light gray dust. Steady bit chatter. Strong reaction with acid, no dolomite observed.		
48								
49								
50								
51								
52	S-10	cuttings			LIMESTONE; dark gray, little or no weathering, slight amount of calcite.	15:49		
53								
54								
55								
56								
57								
58								
59								
60								
61								
62								
63	S-11							

*Standard Penetration Test N-Value

Project Name					Harley Davidson		Project No.		1406701						
Boring Location					York PA		Date Started		Date Finished						
Drilling Company					Eichelberger's										
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS									
64	S-11	cuttings			LIMESTONE and DOLOMITE; dark gray.	Light gray dust, steady bit chatter. Note: Some dark fragments react strongly with HCl. Some react weakly when pulverized.									
65															
66															
67															
68															
69															
70															
71															
72															
73															
73					VOID; weathered, coarse, angular, quartz gravel with brown clay.	72 to 73 ft. Void, loss of bit chatter, muddy water. Blowing air downhole, returning very fine sediment. Apprx. 8 gpm.									
74						16:00 STOP 2/8/00 9:30 START 2/9/00 Run water downhole to open up void. Solid bit chatter from 76 to 81 ft. 10:11 Sound hole, open to 82 ft. bgs. Strong reaction with acid. A few dark gray fragments that may be Dolomite, weak reaction with acid.									
75															
76															
77	S-12	cuttings			LIMESTONE: dark gray, Maybe DOLOMITE.										
78															
79															
80															
81															
82															
83					TD = 82 ft. bgs.										
84															

*Standard Penetration Test N-Value

Project Name Harley Davidson		Project No. 1406701	
Boring Location York, PA		Elevation and Datum	
Drilling Company Eichelberger's		Date Started 1/27/2000	Date Finished 2/4/2000
Drilling Equipment Ingersoll Rand T4W Air Rotary		Completion Depth 77 ft.	Rock Depth 53 ft.
Size and Type of Bit 12, 10, and 6 inch hammer bit.			
Casing ---		Water Level	
Casing Hammer	Weight ---	Drop ---	
Sampler cuttings		Driller Carey Knaub	
Sampler Hammer Weight	NA	Drop NA	Inspector Dave Wilson

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1	S-1	cuttings			CLAY and SILT; brown, tr fmc quartz GRAVEL.	14:23 Start 1/27/00 with 10 inch hammer bit.
2						1/8 inch thread.
3						1/28/00 09:30 to 10:10.
4						Ream hole 12 inch to 55 ft. bgs.
5						Water at apprx. 40 ft. bgs.
6						
7						
8	S-2	cuttings			Brown/red SILT and CLAY; tr f quartz GRAVEL	Color change from dark brown to more brick red.
9						1/8 inch thread.
10						No odors or staining.
11						
12						
13						
14						
15	S-3	cuttings			SILTY, fm SAND, and fc GRAVEL. angular to subrounded quartz and sandstone, dry.	14:36 Increased Bit chatter. Quartz and sandstone rock chips.
16						
17						
18						
19						
20	S-4	cuttings			SILTY, fm SAND, and fc GRAVEL, subangular quartz and sandstone.	14:38 No reaction to HCl More sandy, dry grittier.
21						

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finished	
Drilling Company		Eichelberger's			1/27/2000		2/4/2000	
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS		
22								
23								
24								
25								
26	S-5	cuttings			SILT and CLAY;brown, soft, moist. fc GRAVEL, sandstone and quartz, weathered, subangular, dark color.			No odors or staining. No reaction to HCl. Largest sandstone fragments measure 20 mm.
27								
28								
29								No returns 28 to 40 ft. bgs..
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40						14:52	#####	
41								1/28/2000 10:01:00 AM Water in hole.
42								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701				
Boring Location		York PA			Date Started		1/27/2000				
Drilling Company		Eichelberger's			Date Finished		2/4/2000				
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS					
43					SILT and CLAY, brown, soft, moist; tr f quartz GRAVEL.	14:57	1/8 inch thread. More clay, less gravel.				
44											
45	S-6	cuttings									
46											
47											
48											
49											
50											
51											
52											
53					15:06	1/27/00 Bit chatter, no returns.					
54					LIMESTONE	15:08	1/27 and 1/28/00 Steady bit chatter. Top of competent rock. No returns, 53 to 58 ft.				
55											
56											
57											
58					15:16	1/27/00 Stop drilling due to sub zero wind chill. Pull tools, sound hole, open to 41 ft. bgs.					
59	S-7	cuttings			LIMESTONE, dark and light gray mottled(reacts with HCl) and quartz fragments(no reaction with HCl). Apprx. 30% Fe stained, weathered, material.	1/28/00 Reamed hole 12 inch to 55 ft. bgs. Water and thick mud in hole at apprx.40 ft. Set 10 inch temporary casing to 55 ft. Clean out with 10 in. H.B. to 60 ft. bgs.					
60											
61	S-8	cuttings			LIMESTONE, light gray, apprx. 20 to 30% weathered, Fe stained.	14:50 to 15:40 Set 6 inch steel casing to 59.5 ft. bgs. STOP 1/28/00					
62											
63											

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701		
Boring Location		York PA			Date Started		1/27/2000		
Drilling Company		Eichelberger's			Date Finished		2/4/2000		
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS			
64	S-8					1/31/2000 1:30:00 PM Start at 60.5 ft. bgs. With 6 inch hammer bit inside 6 inch casing. DTW = 43.2 ft. bgs.			
65									
66	S-9	cuttings			LIMESTONE, light gray, apprx. 20 to 30 % weathered.				
67									
68									
69									
70	S-10	cuttings			VOID 69 to 72 ft.	Tools dropping, no bit chatter Water changed color from gray to brown, lost circulation, then water discharge increased. 14:50 1/31/00 STOP at 72 ft. 11:50 2/3/00 Start drilling at 72 ft. Loss of bit chatter at 74 to 75 ft.			
71									
72									
73	S-11	cuttings			LIMESTONE, broken, weathered, apprx. 80% weathered material.				
74									
75									
76	S-12	cuttings			Weathered LIMESTONE	Solid bit chatter again at 76 to 77 ft.			
77					LIMESTONE, light gray, less weathered.				
78					TD = 77 ft.	NOTE; Delay between 1/31/00 and 2/3/00 was due to waiting on Harley Davidson personnel to do snow removal and to a frozen valve on the drill rig.			
79									
80									
81									
82									
83									
84									

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. MW-91

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM	
DRILLING AGENCY Eichelberger's		DATE STARTED 2/16/2000	DATE FINISHED 2/17/2000
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Carey Knaub	
SIZE AND TYPE OF BIT 12 Inch, 10 Inch, 6 Inch Hammer bits		INSPECTOR Dave Wilson	
METHOD OF INSTALLATION 12 inch borehole was advanced to 15 ft. bgs. 10 inch temporary casing set to 14 ft. 10 inch borehole from 14 to 19 ft. 6 inch temporary casing set to 19 ft. bgs. Drill 6 inch to 75 ft. Ream 10 inch hole to 50 ft. 6 inch permanent casing set to 50 ft. bgs. Complete as 6 inch open rock hole from 50 to 75 ft. Benseal grout to surface. Stickup at surface.			
METHOD OF WELL DEVELOPMENT The well was developed on 3/01/00 for 150 minutes at 0.75 gpm. 112 gallons were removed by submersible pump. The discharge was hazy at the start, but cleared quickly.			
TYPE OF CASING Steel	DIAMETER 6 inch	TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout	
TYPE OF SCREEN Open rock hole. 50 to 75 ft. bgs.		TYPE OF SEAL MATERIAL Chipped Bentonite/ Drive shoe.	
BOREHOLE DIAMETER 12 inch to 15 ft. 10 inch 15 to 50 ft. 6 inch 50 to 75 ft.		TYPE OF FILTER MATERIAL NA	
TOP OF CASING	ELEVATION	DEPTH	<div style="text-align: center;">WELL DETAILS</div>
6 Inch Steel		Stickup	
TOP OF SEAL	ELEVATION	DEPTH	
TOP OF FILTER	ELEVATION	DEPTH	
NA			
TOP OF SCREEN	ELEVATION	DEPTH	
6 inch open rock hole 50 to 75 ft.			
BOTTOM OF BORING	ELEVATION	DEPTH	
		75 ft.	
SCREEN LENGTH	NA		
SLOT SIZE	NA		
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
DTW = 49.92 ft.	2/24/2000		
ELEVATION	DATE		
DTW = 49.68 ft	3/1/2000		
ELEVATION	DATE		

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York, PA		Elevation and Datum			
Drilling Company		Eichelberger's		Date Started		Date Finished	
Drilling Equipment		Ingersoll Rand T4W Air Rotary		2/16/2000		2/17/2000	
Size and Type of Bit		12, 10, and 6 inch hammer bit.		Completion Depth		Rock Depth	
Casing		---		75 ft.		9 ft.	
Casing Hammer		Weight ---		Drop ---		Water Level 2/24/00 DTW = 49.92 ft.	
Sampler cuttings				Driller Carey Knaub			
Sampler Hammer		Weight NA		Drop NA		Inspector Dave Wilson	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1	S-1	cuttings			Brown, SANDY SILT, with CLAY, and GRAVEL; brown, light gray to green, angular, weathered, fine grained, Quartzite.	13:15 2/16/00 Start Drill with 12 inch hammer bit to 15 ft. bgs. PID = 0.0 ppm
2						
3						
4						
5						
6						
7						
8						
9						
10	S-2	cuttings			QUARTZITE, dark gray to light gray, Fe stained. Apprx 30 to 40 % weathered material.	PID = 0.0ppm Cuttings are almost completely coarse, angular, quartzite. Boulder? or top of very weathered rock.
11						
12						
13	S-3	cuttings			QUARTZITE, weathered, fractured, dark gray to light gray, apprx. 50 % weathered, Fe stained material.	PID = 0.0 ppm Weathered rock
14						
15	S-4	cuttings			QUARTZITE, weathered, fractured, dark gray with blue tint on unweathered surfaces. Fine grained. Apprx. 70 to 80 % Fe stained weathered, brown, material.	13:30 A large quantity of brown, fine, rock dust is coming up with the cuttings. The rock appears to be very friable and disintegrates to dust as it is drilled. PID = 0.0 ppm 10 inch temporary steel casing set to 14 ft. bgs. Drill with 10 inch H.B. to 19 ft. bgs. Set 6 inch steel casing to 19 ft. bgs.
16						
17						
18						
19						
20						
21	S-5	cuttings				14:35 Reamed hole 10 inch to 50 ft. bgs. Set permanent 6 inch steel casing to 50 ft. bgs. 6 inch open rock hole from 50 to 75 ft.

Project Name		Harley Davidson			Project No.		1406701		
Boring Location		York PA			Date Started		Date Finished		
Drilling Company		Eichelberger's			2/16/2000		2/17/2000		
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS			
22	S-5	cuttings			QUARTZITE, fine grained, dark bluish gray. 70 to 80% Fe stained, weathered material.	14:48	No reaction with Hcl. PID = 0.0 ppm. Drilling very easy. Cuttings are light brown, dusty, sandy.		
23									
24									
25									
26	S-6	cuttings			QUARTZITE, weathered, dark blue-gray, fine grained. Fe stained.	PID = 0.0 ppm			
27									
28									
29	S-7	cuttings			QUARTZITE, dark blue gray, fine grained, friable. Apprx. 60 -70% weathered material.	Lighter gray dust. PID = 0.0 ppm Brown dust, very dry. Apprx. 1 ft. of steady bit chatter.			
30									
31									
32									
33									
34						Drilling pretty easy, rock is not very competent.			
35									
36									
37									
38									
39									
40									
41									
42	S-8	cuttings							

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finished	
Drilling Company		Eichelberger's						
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
43	S-8	cuttings			QUARTZITE, weathered, dark blue/gray to green/gray. Apprx.70 to 80% Fe stained material.			
44								
45								
46								
47								
48								
49								
50	S-9	cuttings			QUARTZITE, dark gray with light green/gray tint. Friable, highly weathered, 80 to 90% Fe stained.			
51								
52								
53								
54								
55								
56								
57	S-10	cuttings			QUARTZITE, dark gray with light green/gray tint. Friable, highly weathered, 80 to 90% Fe stained. Some very weathered.			
58								
59								
60								
61	S-11	cuttings			QUARTZITE, light gray/ green, 80 to 90 % Fe stained, very weathered.			
62								
63								

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		Date Finished	
Drilling Company		Eichelberger's						
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
64	S-11	cuttings			QUARTZITE, light gray/ green, 80 to 90 % Fe stained, very weathered. Some white quartz chips.	15:45	Light gray/brown dust.	
65							Steady bit chatter at 66 ft. Quartz vein?	
66	S-12	cuttings					PID = 0.0 ppm.	
67								
68						15:47		
69								
70					QUARTZITE, light gray/ green, 80 to 90 % Fe stained, very weathered.		PID = 0.0 ppm.	
71	S-13	cuttings					72 to 73 ft. Weathered zone, brown dust. Dust settled. WBZ.	
72							15:52 slight amount of water in hole.	
73							15:57 Running a steady stream of water out of 6 inch casing.	
74							Apprx. 1 gpm.	
75						15:49		
76					TD = 75 ft. bgs.			
77								
78								
79								
80								
81								
82								
83								
84								

*Standard Penetration Test N-Value

WELL CONSTRUCTION SUMMARY

Well No. MW-92

PROJECT Harley Davidson		PROJECT NO. 1406701	
LOCATION York, PA		ELEVATION AND DATUM	
DRILLING AGENCY Eichelberger's		DATE STARTED 2/21/2000	DATE FINISHED 2/23/2000
DRILLING EQUIPMENT Ingersoll Rand T4W Air Rotary		DRILLER Carey Knaub	
SIZE AND TYPE OF BIT 6 Inch Hammer bit, 10 inch reamer.		INSPECTOR Dave Wilson	
METHOD OF INSTALLATION Drilled 6 inch borehole to 100.5 ft. bgs. Little or no water in borehole. Let it set overnight, water came in slowly overnight. Reamed 10 inch hole to 50 ft. with 10 inch reamer attachment, 6 inch permanent casing set to 50 ft. bgs. Complete as 6 inch open rock hole from 50 to 100.5 ft. Benseal grout to surface. Stickup at surface.			
METHOD OF WELL DEVELOPMENT The well was developed on 3/01/00 for 73 minutes at 1.0 to 0.5 gpm until dry. 40 gallons were removed by submersible pump. The well was pumped on 3/02/00 for 65 minutes at 0.5 gpm until dry. 32.5 gallons were removed. The discharge was hazy at the start, but cleared quickly.			
TYPE OF CASING Steel	DIAMETER 6 inch	TYPE OF BACKFILL MATERIAL Portland Cement/Granular Bentonite grout	
TYPE OF SCREEN Open rock hole. 50 to 100.5 ft. bgs.		TYPE OF SEAL MATERIAL Chipped Bentonite/ Drive shoe.	
BOREHOLE DIAMETER 10 inch to 50 ft. 6 inch 50 to 100.5 ft.		TYPE OF FILTER MATERIAL NA	
TOP OF CASING	ELEVATION	DEPTH	<div style="text-align: center;">WELL DETAILS</div>
6 Inch Steel		Stickup	
TOP OF SEAL	ELEVATION	DEPTH	
TOP OF FILTER	ELEVATION	DEPTH	
NA			
TOP OF SCREEN	ELEVATION	DEPTH	
		6 inch open rock hole 50 to 100.5 ft.	
BOTTOM OF BORING	ELEVATION	DEPTH	
		100.5 ft.	
SCREEN LENGTH	NA		
SLOT SIZE	NA		
GROUNDWATER ELEVATIONS			
ELEVATION	DATE		
DTW = 84.63 ft.	2/24/2000		
ELEVATION	DATE		
DTW = 77.28 ft	3/1/2000		
ELEVATION	DATE		
DTW = 77.14 ft.	3/2/2000		
ELEVATION	DATE		
ELEVATION	DATE		
ELEVATION	DATE		

Project Name		Harley Davidson		Project No.		1406701	
Boring Location		York, PA		Elevation and Datum			
Drilling Company		Eichelberger's		Date Started		Date Finished	
Drilling Equipment		Ingersoll Rand T4W Air Rotary		2/21/2000		2/23/2000	
Size and Type of Bit		6 Inch and 10 Inch Hammer Bit.		Completion Depth		Rock Depth	
Casing		---		100.5 ft.		13 ft.	
Casing Hammer		Weight		Drop		Water Level	
		---		---		2/24/00 DTW = 84.63 ft.	
Sampler				Driller		Carey Knaub	
cuttings							
Sampler Hammer Weight		NA		Drop		NA	
						Inspector	
						Dave Wilson	

Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS
1	S-1	cuttings			Dark brown, moist SILT and CLAY; with cmf, dark gray weathered, sub-angular, quartzite GRAVEL, fine grained.	11:00 2/21/00 Start Drill with 6 Inch hammer bit. Then will ream hole out to 10 Inch in order to set 6 inch casing. No returns 2 to 8 ft. 08:26 DTW = 94.56 Temp. TOC 08:31 DTW = 94.53 Temp. TOC 08:34 DTW = 94.50 Temp. TOC Water has come in overnight and is rising slowly. Reamed hole 10 inch from 0 to 50 ft. bgs. Set 6 inch permanent steel casing to 50 ft. bgs. Ben seal grout to surface. Complete as 6 inch open rock hole from 50 to 100 ft. PID = 0.0ppm
2						
3						
4						
5						
6						
7						
8						
9	S-2	cuttings			Dark brown, soft, SILT and CLAY; tr fine SAND and cmf dark gray, weathered quartzite GRAVEL.	PID = 0.0ppm
10						
11						
12	S-3	cuttings			QUARTZITE, very weathered (rust brown color). Fe stained. Fine grained.	PID = 0.0 ppm Weathered rock at 13 ft.
13						
14						
15	S-4	cuttings			QUARTZITE, very weathered, Fe stained, rusty brown color. Fine grained on fresh surfaces.	PID = 0.0 ppm
16						
17						
18						
19						
20						
21						

*Standard Penetration Test N-Value

Project Name					Harley Davidson		Project No.		1406701	
Boring Location					York PA		Date Started		2/21/2000	
Drilling Company					Eichelberger's		Date Finished		2/23/2000	
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS				
22					QUARTZITE .dark gray, fine grained. Most material is Fe stained and weathered. >50%.	PID = 0.0 ppm.				
23	S-5	cuttings								
24										
25					QUARTZITE, gray to light gray/green. >50% is Fe stained, weathered.	PID = 0.0 ppm.				
26	S-6	cuttings								
27										
28										
29										
30					QUARTZITE, light gray to light tan and gray/green, fine grained. >50% weathered and Fe stained.	PID = 0.0 ppm				
31	S-7	cuttings								
32										
33										
34					QUARTZITE, light gray to light tan and gray/green, fine grained. >50% weathered and Fe stained. Very weathered.	PID 0.0 ppm 38 to 40 ft. Color change to red brown dust.				
35	S-8	cuttings								
36										
37										
38										
39										
40										
41										
42										

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701		
Boring Location		York PA			Date Started		2/21/2000		
Drilling Company		Eichelberger's			Date Finished		2/23/2000		
Depth (ft)	S	Type	Recov. (ft)	SPT* b/6"	DESCRIPTION	REMARKS			
43	S-9	cuttings			QUARTZITE, gray to gray/green, fine grained, weathered. > 50% Fe stained, rusty brown color.	11:16	Friable, breaks easily with finger pressure.		
44									
45									
46									
47									
48	S-10	cuttings			QUARTZITE, light gray/green, fine grained, weathered. >50 % Fe stained rusty brown color, friable.	11:18	PID = 0.3 ppm. Apprx. 12:30 After lunch, blew out hole to see if any water came in. No water in hole.		
49									
50									
51									
52	S-11	cuttings			QUARTZITE, gray to light gray/green. Fine grained. > 50% weathered, Fe stained, rust brown color.		PID = 0.0 ppm. Weathered zone? 53 to 54 ft. Reddish dust. Brief loss of bit chatter at 55 ft.		
53									
54									
55									
56									
57									
58	S-12	cuttings			QUARTZITE, gray to light gray/green. Fine grained. Less weathered, apprx. 30 to 40 % Fe stained.		PID = 0.2 ppm Grayish dust 59 to 60 ft.		
59									
60									
61									
62	S-13	cuttings			QUARTZITE, dark gray to light gray, fine grained. Apprx. 30 % weathered Fe stained.		Light gray dust. PID = 0.3 ppm.		
63									
							63 ft. Harder, increased bit chatter.		

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701	
Boring Location		York PA			Date Started		2/21/2000	
Drilling Company		Eichelberger's			Date Finished		2/23/2000	
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS		
64	S-13							
65								
66								
67	S-14	cuttings			QUARTZITE, dark gray to light gray, fine grained. Apprx. 30 % weathered Fe stained.	13:06	67 ft. brown dust, slight weathered zone.	
68							PID = 0.1 ppm.	
69							light brown dust.	
70								
71	S-15	cuttings			QUARTZITE, dark gray to light gray, fine grained. Apprx. 30 % weathered Fe stained.	13:09	PID = 0.1 ppm	
72								
73								
74							Slight weathered zone, reddish dust.	
75							Stopped drilling to see if any water collects in the borehole.	
76	S-16	cuttings			QUARTZITE, gray to light gray. More weathered, >50 % Fe stained.	14:15	13:50 Blew air downhole, no water. Washed water downhole and blew air downhole till dry. Waited again, but no water came in.	
77							14:15 Start drilling again at 75 ft.	
78							75 to 80 ft. light brown dust.	
79							PID = 0.0 ppm.	
80								
81	S-17	cuttings			QUARTZITE, dark gray to light gray. Weathered, >50 % Fe stained.	14:17	PID = 0.0 ppm.	
82								
83								
84								

*Standard Penetration Test N-Value

Project Name		Harley Davidson			Project No.		1406701			
Boring Location		York PA			Date Started		2/21/2000			
Drilling Company		Eichelberger's			Date Finished		2/23/2000			
Depth (ft)	S	Type	Recov. (ft)	SPT* bl/6"	DESCRIPTION	REMARKS				
85	S-17							Lighter gray dust.		
86	S-18	cuttings			QUARTZITE, dark gray to light gray. Weathered, >50 % Fe stained. . Fine grained.			PID = 0.0 ppm.		
87										
88										88 to 89 ft. red dust, weathered.
89										
90										14:20
91	S-19	cuttings			QUARTZITE, dark gray to light gray. Less weathered, apprx 30 % Fe stained.			Lighter gray, increased bit chatter.		
92										PID = 0.6 ppm.
93										
94										
95										14:22
96	S-20	cuttings			QUARTZITE, fine grained, less weathered, apprx. 30 % Fe stained.			Less bit chatter.		
97										PID = 0.6 ppm.
98										98 ft. reddish dust.
99										
100										
101					TD = 100.5 ft.			Light brown dust.		
102								14:24 to 14:26 Washed water down-hole. 14: 26 shut rig off.		
103								14:36 Blew air downhole. No indication of water.		
104								15:55 Blew air downhole. Slight amount of water in hole. Will let it set overnight to see if any water comes in.		
105										

*Standard Penetration Test N-Value



LOG OF MONITORING WELL MW-93S

(Page 1 of 1)

Harley-Davidson Motor Company Operations, Inc.	Driller : Carey Knaub	Boring Location : West Parking Lot
York, Pa.	Logged By : Todd Eaby	Well Construction : 4/8/04
Project #01-1633-00-5524-707	Drilling Started : 4/8/04	Well Developed : 4/12/04
	Drilling Completed : 4/8/04	
	Drilling Method : Air Rotary	

Depth in Feet	DESCRIPTION	GRAPHIC	PID (ppm)	Well: MW-93S Elev 362.47': 3' Stickup	Depth in Feet	Well Construction Information
0	GRAVEL at surface - railroad ballast black fines - very little returns				0	SURFACE COMPLETION : 3' stick up, 6" steel protection pipe
5	SILT - brownish yellow (10YR 16/8)		0		5	WELL RISER Diameter : Schedule 40 PVC : 4"
10				Grout (0-17')	10	WELL SCREEN Type : U - Pack Material : Schedule 40 PVC Diameter : 4" Slot Size : .010"
15	color change to olive brown (2.5Y 4/4)		0	Riser	15	GROUT Quantity : Portland 5-8% Bentonite : 32 - 94 lb. bags
20	LIMESTONE, gray (5N), micro xtl, weathered chip faces			Bent. seal (17'-20')	20	BENTONITE SEAL Size : 3/8" Holeplug Bentonite Quantity : 200 lbs - 4-50 lbs. bags
25	steady, smooth drilling, possibly rock based on drill penetration rate and pull down pressure, very little drill cuttings to surface.		0		25	FILTER PACK Size U - Pack Borehole : 1.5 50 lb. bag #1 Morie : 36 50 lbs. bags 3/8 : gravel
30	faster drill penetration - no circulation to surface at 28' - circulation back at 29'			Screen (26.2 - 41.2)	30	Roller Bit and 20' long stabilizer w/low to no air and ~25 gpm water
35	lost circulation, rougher drilling possible void, broken rock 30-30.5'		0	3/8 Pea Gravel	35	12" diameter borehole (0-45') bgl 4" U-pack screen (26.2-41.2) 1.5 - 50 lb. bags #1 Morie in U-pack 4" PVC Riser (0-26.2) 3/8 Pea gravel (24-41.2) 36 - 50 lb. bags Hole plug Bentonite (21-24') 4 - 50 lb. bags Grout (0-17') (20-21') Hole Plug (17-20') 7 - 50 lb. bags
40	34.5' broken up				40	Borehole Collapse (41.5-45')
45	38' rougher drilling, faster penetration 39' steady drilling 39.5' broken up, rough drilling, fast advance, possible void 39.5-40' 41' steady drilling and borehole advance		0	Borehole Collapse	45	6" diameter steel protector pipe (0-5') 3' stickup
45	TD - 45 FEET				50	

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LOG OF MONITORING WELL MW-93D

(Page 1 of 1)

Harley-Davidson Motor Company Operations, Inc.	Driller : Carey Knaub	Boring Location : West of South WPL
York, Pa.	Logged By : Todd Eaby	Well Construction : 4/6/04
Project #01-1633-00-5524-707	Drilling Started : 3/31/04	Well Developed : 4/12/04
	Drilling Completed : 4/5/04	
	Drilling Method : Air Rotary	

Depth in Feet	DESCRIPTION	GRAPHIC	PID (ppm)	Well: MW-93D Elev. 361.86': 3' Stickup	Depth in Feet	Well Construction Information
0	GRAVEL (aggregate) railroad ballast black fines - very little returns				0	SURFACE COMPLETION : 3" stick up, 6" diameter, steel protector pipe
5	CLAYEY SILT (ML) -yellowish brown (10YR5/6), trace fine to coarse sand <5% angular to sub-rounded gravel		0		10	WELL CASING : 10.6" diameter steel
10	SILTY SANDY GRAVEL (GM)-70% gravel sub-angular to sub- rounded, quartz, l.s. and quartzite, not consistent returns.		0		15	WELL RISER : Schedule 40 PVC
15	LIMESTONE (broken) and SILTY GRAVEL, gray (5/N) & black (2.5/N) microcrystalline, weathered stained chip faces, gravel as above.		0		20	Material Diameter : 4"
20	DOLOMITIC LIMESTONE, black (2.5/N) microcrystalline. 32-33'		0		25	WELL SCREEN : U - Pack
25	LIMESTONE and SILTY GRAVEL: same as 24-32' interval		0		25	Material Diameter : Schedule 40 PVC
30	DOLOMITIC LIMESTONE, black (2.5/N) microcrystalline, white veining.		0		30	Material Diameter : 4"
35	VOID: 48-54.5'		0		30	Slot Size : 0.010"
40	DOLOMITIC LIMESTONE, black (2.5/N) white veining, microcrystalline, grading to dolostone with depth.		0		35	GROUT total quantity : Portland 5-8% Bentonite : 64-94 lbs. bags
45	possible fracture @ 77' bgl		0		45	BENTONITE SEAL
50	possible fracture @ 81' bgl		0		45	Size : 3/8" Holeplug Bentonite
55	soft zone or fracture @ 89.5'		0		50	Quantity : 75 lbs. - 1.5 50 lb. bags
60	DOLOMITIC LIMESTONE: gray (5/N) to dark gray (4/N) w/ minor black (2.5/N) dolostone interbeds, microcrystalline, white calcite veining, possible stylolites decreasing amounts of gray and dark gray below 101' bgl.		0		60	12" diameter drilling (0-58')
65	DOLOMITIC LIMESTONE: black (2.5/N) v. minor dark gray (4/N) interbeds, microcrystalline soft zone or possible fracture @ 110' < 1/4 gpm.		0		65	10" diameter drilling (19-85')
70			0		70	10" diameter casing (0-56')
75			0		70	6" diameter casing (0-85')
80			0		75	6" diameter drilling (85-142')
85			0		75	VOID (142-160')
90			0		80	2" diameter schedule 40 PVC (0-134.7) riser
95			0		85	2" ID U-Pack PVC screen (134.7-144.7)
100			0		90	Shale Catcher @ 132.3'
105			0		90	Bentonite Seal (125.7-132.3')
110			0		95	Annulus between 12" diameter borehole and 10" diameter casing:
115			0		100	GROUT (0-85') 31 - 94lbs. bags Portland + 5-8% Bentonite
120			0		105	6.5 - 50lb bags 3/8" Bentonite Chips
125			0		110	Annulus between 10" diameter casing and 6" diameter casing:
130			0		115	GROUT (0-85') 18 - 94lb. bags Portland + 5-8% Bentonite
135			0		120	2-50lb. bags of 3/8" Bentonite Chips
140			0		125	Annulus between 6" diameter casing/6" diameter borehole and 2" PVC Riser:
145			0		130	GROUT (0-125.7') 15 - 94lb. bags Portland + 5-8% Bentonite
150			0		135	
155			0		140	
160			0		145	
165	TD - 160 FEET		0		150	
					155	
					160	
					165	

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 9-11-07

Drilling Completed : 9-11-07
 Well Construction : 9-11-07
 Well Development : 10-19-07
 Water Elev./Date : 14.91' bgs / 10-19-07

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC
0			Utility Clearance from 0.0'-5.0' with air-knife and hand tools on 9/7/08. 0.0'-3.0' yellowish brown (10YR 5/8) silt with sub-angular to sub-rounded gravel and from 3.0'-5.0' strong brown (7.5YR 5/8) moist, silt with clay and gravel.	ML	0	
2.0	2.0/2.0	2	SILT: strong brown (7.5YR 5/8), with clay and gravel, moist.	ML	NM	
3.0		3				
3.0		3				
5.0		5	AS ABOVE.	ML		
7.0	0.4/2.0	7	Accumulated Lost Core.		NM	
9.0		9				
11.0		11				
12.0	0.1/2.0	7	SILT: strong brown (7.5YR 5/8), with clay and sub-angular gravel, moist.	ML	NM	
11.0		11	Accumulated Lost Core.			
18.0		18				
7.0	0.3/2.0	7	AS ABOVE: saturated.	ML		
6.0		6	Accumulated Lost Core.		NM	
7.0		7				
9.0		9				
3.0	0.7/2.0	3	AS ABOVE: quartzite fragments.	ML		
3.0		3	Accumulated Lost Core.		NM	
5.0		5				
7.0		7				
7.0	2.0/2.0	7	CLAY: yellowish brown (10YR 5/6), high plasticity, trace silt and quartzite fragments, saturated.	CL	NM	
5.0		5				
8.0		8				
9.0		9				
			END of BORING.			

Well Construction Information

WELL CONSTRUCTION
 Date Completed : 9-11-07
 Auger I.D. : 4 1/4"
 Drilling Method : Hollow Stem Auger
 Driller : Nate Moyer

WELL CASING :
 Material : Sch 40 PVC
 Diameter : 2"
 From : 0.0' to 12' BGL
 Joints : Flush Threaded

WELL SCREEN :
 Material : Sch 40 PVC
 Diameter : 2"
 From : 12' to 17' BGL
 Joints : Flush Threaded
 Opening : 0.010 slot

ADDITIONAL CONSTRUCTION DETAILS

#1 Morie Sand, 4-50 lb. bags

Bentonite Seal (7' - 10' bgs)
 1, 50 lb bag

Type II Portland Cement with 5% bentonite crumbles, 1-94 lb. bag

Sakrete Surface Completion, 2-80 lb. bags

No PID screening during drilling due to rain and humidity affecting instrument.

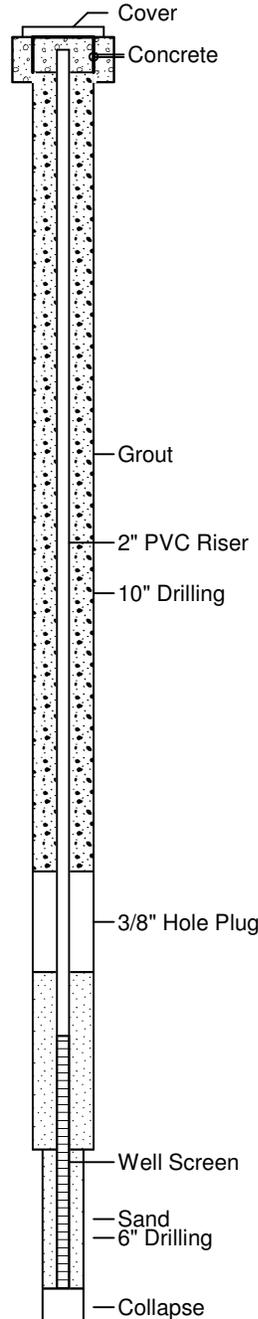
Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 51' bgs

Drilling Bit Diameter : 10" to 44'bgs, 6" to 49'bgs
 Final completion : 09/27/07-10/1/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 10/19/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	Gravel (Road base)				0	WELL CONSTRUCTION Date Compl. : 10/1/07 Hole Diameter : 10", 6" Total Depth of Well: 49.5' bgs
5	ML, clayey silt, 10YR 5/6 yellowish brown, moist, soft, low plasticity			0.0	5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-39.5' bgs WELL Screen Material : Sch. 40 Well Screen Slot Size : 0.010 Diameter : 2" From : 39.5-49.5' bgs SAND Type : #1 Morie Sand Amount : 11, 50 lb bags BENTONITE Type : 3/8" Hole Plug Amount : 4, 50 lb bags GROUT Type : Bentonite/ Portland Cement Amount : 7, 50 lb bags 37, 94 lb bags WELL COVER Type : Flush Mount
15	CL, sandy clay, 10YR 5/6 yellowish brown, slightly moist, non plastic, <5% gravel			0.0	15	Static water level @ 20.93' BGS on 10/1/07. Notes: 10" Drilling (0 - 44' bgs) 6" Drilling (44 - 51' bgs) Bentonite Seal (33' - 37' bgs) 4, 50 lb bags
20	CL, clayey silt, 2.5 Y 4/3 to 4/2, olive brown to dark grayish brown, moist, soft, high plasticity, <5% gravel			58 216	20	
25	CL, sandy clay with gravel, 2.5Y 4/1 to 4/2 dark gray to dark grayish brown, wet, soft, high plasticity, 40% gravel 1 cm to 1 inch			0.0	25	
30	ML, clayey silt with limestone fragments, 2.5Y 4/2 dark grayish brown, wet, medium plasticity		31	0.0	30	
35	Weathered Limestone fragments with clayey silt, Gley 1 3/N dark greenish gray				35	
40	Weathered Limestone, increased water yield				40	
45	Competent Limestone Bedrock				45	
50	Fractured Limestone		47-51		50	
50	Collapse				50	
50	END BORING @ 51FEET BGS				50	

Well: MW-95
 Elev. 358.72:





Log of Monitoring Well MW-96 D

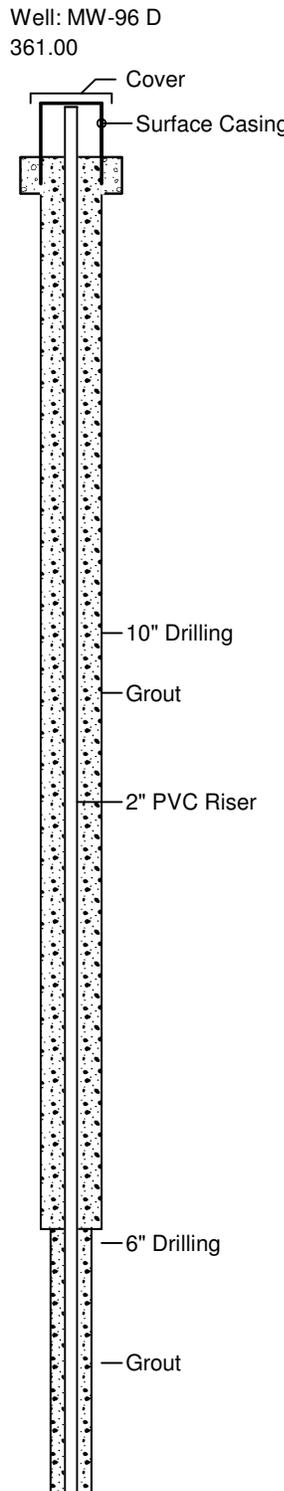
(Page 1 of 2)

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 90' bgs

Drilling Bit Diameter : 10" to 40' and 6" to 90'
 Final completion : 10/1/07-10/4/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 1/9/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	ML, clayey silt, 7.5YR 4/4 brown, low plasticity, <5% sub angular gravel, dry			0.0	0	WELL CONSTRUCTION Date Compl. : 10/4/07 Hole Diameter : 10", 6" Total Depth of Well: 87.5' bgs
5	ML, clayey silt, 7.5YR 2.5/1 black, dry, very low plasticity			182	5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2'-77.5' bgs Shale Trap Depth : 75.5' bgs
10	ML, silt, very low clay, <5% fine to medium sand, 10YR 6/6 brownish yellow, no plasticity, damp, citrus like odor			28.6	10	WELL Screen Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 77.5-87.5' bgs
15	ML, silt, <5% fine to medium sand, 10YR 5/6 yellowish brown, dry, citrus odor, no plasticity			61.0	15	SAND Type : #1 Morie Sand Amount : 1 bag
20	ML, silt, <7% sub rounded gravel, 10YR 5/4 yellowish brown, dry, citrus like odor			41.5	20	BENTONITE Type : 3/8" Hole Plug Amount : 34 bags
25	ML, silt, <7% sub rounded gravel, 10YR 5/4 yellowish brown, dry, citrus like odor, <5% angular quartzite fragments			3.2	25	GROUT Type : Benseal/ Portland Cement Amount : 5 bags/64 bags
30	GC, gravelly clay with angular quartzite and limestone fragments, 10YR 4/4 dark yellowish brown, moist			0.1	30	WELL COVER Type : Stick Up
35	Weathered Limestone, Gley 1 4/N dark gray, sub rounded fragments			0.0	30	Static water level @ 22.53' BGS on 10/5/07.
40	Competent Limestone, Gley 2 3/10B very dark bluish gray, saturated			33-34	30	10" Diameter Drilling (0 -40' bgs) 6" Diameter Drilling (40' - 90' bgs)
45					35	Bentonite Seal (67' - 75' bgs) 4, 50lb bags
50					40	
					45	
					50	





Log of Monitoring Well MW-96 D

(Page 2 of 2)

Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
Drilled By : Carey Knaub
Logged By : Emily Wade
Drilling Method : Air Rotary
Total Depth of Boring : 90' bgs

Drilling Bit Diameter : 10" to 40" and 6" to 90"
Final completion : 10/1/07-10/4/07
Well Construction : 2" Schedule 40 PVC
Well Development : 1/9/08

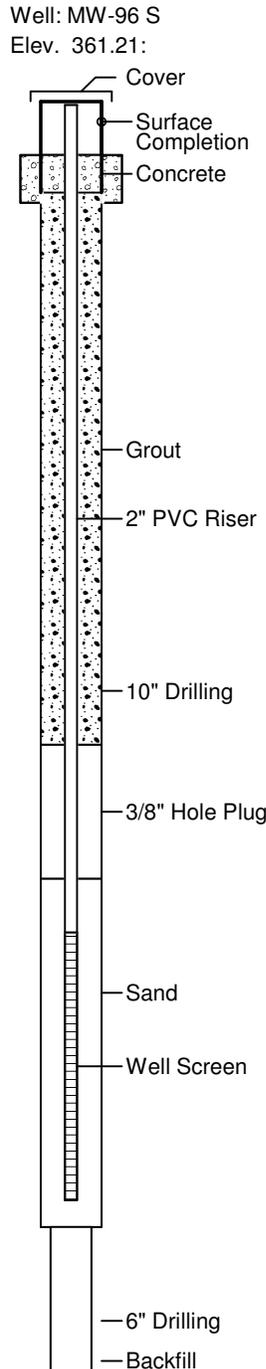
Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-96 D 361.00	Depth in Feet	Well Construction Information
50	Competent Limestone Bedrock, Gley 2 3/10B very dark bluish gray, saturated				50		50	WELL CONSTRUCTION Date Compl. : 10/4/07 Hole Diameter : 10", 6" Total Depth of Well: 87.5' bgs
55				55	63.5		55	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2'-77.5' bgs Shale Trap Depth : 75.5' bgs
60				60			60	WELL Screen Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 77.5-87.5' bgs
65				65			65	SAND Type : #1 Morie Sand Amount : 1 bag BENTONITE Type : 3/8" Hole Plug Amount : 34 bags
70	VOID			70			70	GROUT Type : Benseal/ Portland Cement Amount : 5 bags/64 bags
75	Competent Limestone Bedrock, Gley 2 3/10B				75		75	WELL COVER Type : Stick Up
80	VOID			80			80	Static water level @ 22.53' BGS on 10/5/07. 10" Diameter Drilling (0 -40' bgs) 6" Diameter Drilling (40' - 90' bgs) Bentonite Seal (67' - 75' bgs) 4, 50lb bags
85				85			85	
90	END BORING @ 90 FEET BGS--Bottom of void			90			90	
95				95			95	
100				100		100		

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 70.5' bgs

Drilling Bit Diameter : 10" to 40' and 6" to 70.5'
 Final completion : 10/4/07-10/5/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 10/18/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	ML, clayey silt, 7.5YR 4/4 brown, low plasticity, <5% sub angular gravel, dry			0.0	0	WELL CONSTRUCTION Date Compl. : 10/5/07 Hole Diameter : 10", 6" Total Depth of Well: 39' bgs
5	ML, clayey silt, 7.5YR 2.5/1 black, dry, very low plasticity			19.8	5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5'-29' bgs
10	ML, silt, very low clay, <5% fine to medium sand, 10YR 6/6 brownish yellow, no plasticity, damp, slight citrus like odor				10	WELL Screen Material : Sch. 40 Well Screen Slot Size : 0.010 Diameter : 2" From : 29-39' bgs
15	ML, silt, <5% sub rounded gravel, 10YR 5/6 yellowish brown, dry, slight citrus like odor			16.0	15	SAND Type : #1 Morie Sand Amount : 12 bags
20	GM, silty gravel, sub rounded gravel, 10YR 5/4 yellowish brown, moist			6.8	20	BENTONITE Type : 3/8" Hole Plug Amount : 8 bags
25	Weathered limestone bedrock, Gley 2 3/10B very dark bluish gray, calcite, sub rounded fragments, 10YR 5/4 yellowish brown gravelly silt			3.5	20	GROUT Type : Benseal/ Portland Cement Amount : 3 bags/32 bags
30	Limestone Bedrock, Gley 2 3/10B very dark bluish gray, <3% sub rounded quartzite			0.0	25	WELL COVER Type : Stick Up
35	VOID				25	Static water level @ 22.37' BGS on 10/5/07.
40	Cuttings were saturated at 26' bgs				30	Backfilled 6" open rock with 3/8" Hole Plug from 70.5' bgs to 40' bgs.
45	Limestone Bedrock, Gley 2 3/10B very dark bluish gray				35	10" Diameter Drilling (0 - 40' bgs) 6" Diameter Drilling (40' - 70.5' bgs)
50					40	Bentonite Seal (22' - 27' bgs) 2, 50 lb bags





Log of Monitoring Well MW-96S

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 70.5' bgs

Drilling Bit Diameter : 10" to 40' and 6" to 70.5'
 Final completion : 10/4/07-10/5/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 10/18/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-96 S Elev. 361.21:	Depth in Feet	Well Construction Information
50	Same As Above: Limestone				50	— 6" Drilling — Backfill	50	WELL CONSTRUCTION Date Compl. : 10/5/07 Hole Diameter : 10", 6" Total Depth of Well: 39' bgs
55			55	55	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5'-29' bgs			
60			60	60	WELL Screen Material : Sch. 40 Well Screen Slot Size : 0.010 Diameter : 2" From : 29-39' bgs			
65			65	65	SAND Type : #1 Morie Sand Amount : 12 bags			
70	END BORING @ 70.5 FEET BGS Top of void, stopped drilling		70	70	BENTONITE Type : 3/8" Hole Plug Amount : 8 bags GROUT Type : Benseal/ : Portland Cement Amount : 3 bags/32 bags			
75		75	75	WELL COVER Type : Stick Up				
80		80	80	Static water level @ 22.37' BGS on 10/5/07. Backfilled 6" open rock with 3/8" Hole Plug from 70.5' bgs to 40' bgs. 10" Diameter Drilling (0 - 40' bgs) 6" Diameter Drilling (40' - 70.5' bgs)				
85		85	85	Bentonite Seal (22' - 27' bgs) 2, 50 lb bags				
90		90	90					
95		95	95					
100		100	100					



Log of Monitoring Well MW-97

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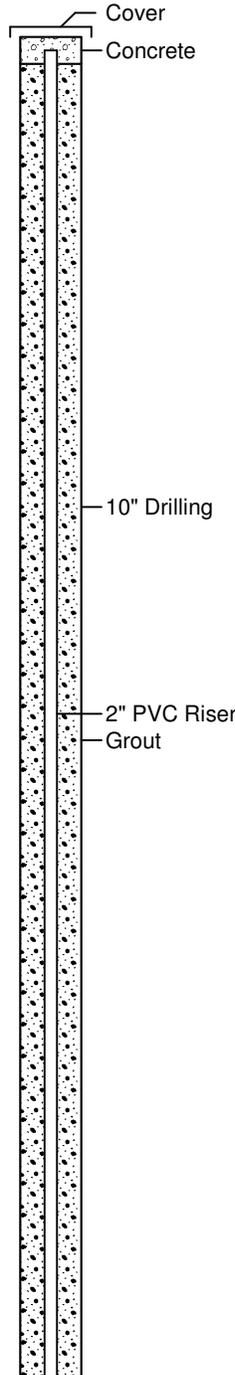
Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 80' bgs

Drilling Bit Diameter : 10" to 79 bgs'
 Final completion : 10/15/07-10/16/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 1/9/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	Asphalt and Limestone Gravel Road Base				0	WELL CONSTRUCTION
5	CL, medium plasticity clay, 10YR 2/1 black, <5% angular gravel			0.0	5	Date Compl. : 10/16/07 Hole Diameter : 10" Total Depth of Well: 80' bgs
10	ML, clayey silt, <7% fine sand, moist, low to medium plasticity			0.0	10	WELL CASING
15	ML, silt, 10YR 5/6 yellowish brown, <3% angular to sub angular gravel, moist, very low plasticity			0.0	15	Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5'-70' bgs
20	ML, silt, 10 YR 4/6 dark yellowish brown, <5% angular to sub angular quartzite fragments, moist, no plasticity			0.0	20	Shale Trap Depth : 68' bgs
25	ML, silt, 10YR 5/6 yellowish brown, <5% angular to sub angular quartzite fragments, moist, no plasticity			0.1	25	WELL Screen
30	Weathered Limestone, Gley 2 2.5/10B bluish black, silty matrix			0.0	30	Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 70-80' bgs
35	Limestone, Gley 1 4/N dark gray, sub rounded quartzite fragments			0.0	35	SAND
40	ML, clayey silt, 10YR 4/6 dark yellowish brown, <5% sub rounded quartzite and fine sand, moist			0.0	40	Type : #1 Morie Sand Amount : 1 bag
45	GC, gravelly clay, 10YR 5/6 yellowish brown, sub angular to sub rounded quartzite			0.1	45	BENTONITE
50	GC, gravelly clay, 10YR 5/6 yellowish brown, sub angular to sub rounded quartzite, medium plasticity, <5% fine sand			0.0	50	Type : 3/8" Hole Plug Amount : 19 bag
	GC, gravelly clay, 10YR 5/6 yellowish brown, saturated, sub angular to sub rounded quartzite			0.0		GROUT
	Competent Limestone, Gley 2 2.5/10B bluish black			0.0		Type : Benseal/ Portland Cement Amount : 3 bags/ 23 bags
	VOID					WELL COVER
						Type : Flush Mount
						Static water level @ 22.46' BGS on 10/16/07.
						10" Diameter Drilling (0' - 80' bgs)
						Bentonite Seal (62' - 66' bgs) 1, 50 lb bag

Well: MW-97
 Elev. 357.39:





Log of Monitoring Well MW-97

(Page 2 of 2)

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 80' bgs

Drilling Bit Diameter : 10" to 79 bgs'
 Final completion : 10/15/07-10/16/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 1/9/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-97 Elev. 357.39:	Depth in Feet	Well Construction Information
50	Same As Above: VOID				50		50	WELL CONSTRUCTION Date Compl. : 10/16/07 Hole Diameter : 10" Total Depth of Well: 80' bgs WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5'-70' bgs Shale Trap Depth : 68' bgs WELL Screen Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 70-80' bgs SAND Type : #1 Morie Sand Amount : 1 bag BENTONITE Type : 3/8" Hole Plug Amount : 19 bag GROUT Type : Benseal/ : Portland Cement Amount : 3 bags/ 23 bags WELL COVER Type : Flush Mount
55	Limestone, Gley 2 2.5/10B				55		55	Static water level @ 22.46' BGS on 10/16/07. 10" Diameter Drilling (0' - 80' bgs) Bentonite Seal (62' - 66' bgs) 1, 50 lb bag
60	Weathered Limestone, Gley 2 2.5/10B				60		60	
65	VOID				65		65	
70					70		70	
75					75		75	
80					80		80	
85					85		85	
90	Not Bottom of Void END BORING @ 80 FEET BGS				90		90	
95					95		95	
100					100	100		



Log of Monitoring Well MW-98D

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Andy Sallaway, Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 172' bgs

Drilling Bit Diameter : Various - See Below
 Drilling Started : 4/2/08
 Final Completion : 4/7/08
 Well Construction : 2" Schedule 40 PVC
 Well Development : 4/23/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	ML, clayey silt, 10YR 4/3 brown, soft, moist			0.0	0	WELL CONSTRUCTION Date Compl. : 4/7/08 Total Depth of Well : 171' bgs WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5' -131' bgs WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 131' - 171' bgs SAND Type : #1 Morie Sand Amount : 25, 50 lb bags BENTONITE Type : 3/8" Hole Plug Amount : 79, 50 lb bags GROUT Type : Benseal/ Portland Cement Amount : 5, 50 lb bags/ 50, 94 lb bags WELL COVER Type : Locking Stick-up
5	GC, clayey gravels, 10YR 4/6 dark yellowish brown, slightly moist			0.0	5	
10	GC, clayey gravels, 10YR 4/1 dark gray, dry, hydrocarbon-like odor			7.9	10	12" Drilling Grout
10	GM, silty gravel, 10YR 4/1 dark gray, borehole PID measurement 1.2 ppm			44.1	10	
15	ML, clayey silt 10YR 4/1 dark gray, <3% gravels, medium, plasticity, slightly moist, soft			10.1	15	2" PVC Riser
15	ML, clayey silt 10YR 4/1 dark gray, <3% gravels, medium to low plasticity, soft, moist			0.8	15	
20	CG, clayey gravels, 10YR 4/3 brown, quartzite gravel, moist, soft, low plasticity			0.0	20	10" Drilling Grout
25	CL, clay with gravels, <3% gravels, 10YR 4/6 dark yellowish brown, soft, medium plasticity			0.0	25	
30	GM, silty gravel and sand, free water			0.0	30	Notes: 12" Drilling (0 - 17' bgs) 10" Drilling (17' - 91.5' bgs) 8" Drilling (91.5' - 172' bgs) Bentonite Seal (123' - 128' bgs) 2, 50 lb bags Bentonite used during grouting 77, 50 lb bags Static water level 19.50' below top of inside casing on 4/23/08.
30	Weathered Limestone, Gley 2 5/5PB bluish gray			0.0	30	
35	VOID, clay with sand and gravel filled			0.0	35	40
35	Weathered Limestone - Color as above			0.0	35	
40	VOID, tools dropped			0.0	40	40
40	Weathered Limestone - Color as above			0.0	40	
40	Competent Limestone - Color as above			0.0	40	40
40	VOID, tools dropped			0.0	40	
40	Weathered Limestone - Color as above			0.0	40	40
40	Competent Limestone, Gley 2 2.5/5B bluish black			0.0	40	
40	Weathered Limestone - Color as above			0.0	40	40
40	Competent Limestone, Gley 2 2.5/5B bluish black			0.0	40	
40	Weathered Limestone - Color as above			0.0	40	40
40	Competent Limestone, Gley 2 2.5/5B bluish black			0.0	40	
40	Weathered Limestone - Color as above			0.0	40	40
40	Competent Limestone, Gley 2 2.5/5B bluish black			0.0	40	

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Log of Monitoring Well MW-98D

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
Drilled By : Carey Knaub
Logged By : Andy Sallaway, Emily Wade
Drilling Method : Air Rotary
Total Depth of Boring : 172' bgs

Drilling Bit Diameter : Various - See Below
Drilling Started : 4/2/08
Final Completion : 4/7/08
Well Construction : 2" Schedule 40 PVC
Well Development : 4/23/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-98D Elev. 361.41:	Depth in Feet	Well Construction Information
44	VOID, tools dropped				44		44	WELL CONSTRUCTION Date Compl. : 4/7/08 Total Depth of Well: 171' bgs
	Competent Limestone - Color as above							WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5' -131' bgs
	VOID, clay and gravel filled, 15% quartzite gravel							WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 131' - 171' bgs
49	Weathered Limestone - Color as above				49		49	SAND Type : #1 Morie Sand Amount : 25, 50 lb bags
	Competent Limestone - Color as above							59 BENTONITE Type : 3/8" Hole Plug Amount : 79, 50 lb bags
54					54		54	GROUT Type : Benseal/ Portland Cement Amount : 5, 50 lb bags/ 50, 94 lb bags
59					59		59	WELL COVER Type : Locking Stick-up
64	VOID, tools dropped				64		64	Notes: 12" Drilling (0 - 17' bgs) 10" Drilling (17' - 91.5' bgs) 8" Drilling (91.5' - 172' bgs)
	Weathered Limestone - Color as above							74 Bentonite Seal (123' - 128' bgs) 2, 50 lb bags
	VOID, tools dropped							Bentonite used during grouting 77, 50 lb bags
69	Weathered Limestone - Color as above				69		69	79 Static water level 19.50' below top of inside casing on 4/23/08.
	VOID, tools dropped							
74	Competent Limestone - Color as above				74		74	
	VOID, tools dropped							
79					79		79	
84					84		84	

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Log of Monitoring Well MW-98D

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Andy Salloway, Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 172' bgs

Drilling Bit Diameter : Various - See Below
 Drilling Started : 4/2/08
 Final Completion : 4/7/08
 Well Construction : 2" Schedule 40 PVC
 Well Development : 4/23/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-98D Elev. 361.41:	Depth in Feet	Well Construction Information
88	Competent Limestone - Color as above				88	10" Drilling Grout	88	WELL CONSTRUCTION Date Compl. : 4/7/08 Total Depth of Well: 171' bgs WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5' -131' bgs WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 131' - 171' bgs SAND Type : #1 Morie Sand Amount : 25, 50 lb bags BENTONITE Type : 3/8" Hole Plug Amount : 79, 50 lb bags GROUT Type : Benseal/ : Portland Cement Amount : 5, 50 lb bags/ : 50, 94 lb bags WELL COVER Type : Locking Stick-up
93					93		93	
98					98	8" Drilling	98	
103					103		103	
108					108	Grout	108	
113					113		113	Notes: 12" Drilling (0 - 17' bgs) 10" Drilling (17' - 91.5' bgs) 8" Drilling (91.5' - 172' bgs)
118	Phyllite, Gley 2 4/5PB dark bluish gray				118		118	Bentonite Seal (123' - 128' bgs) 2, 50 lb bags Bentonite used during grouting 77, 50 lb bags
123					123		123	Static water level 19.50' below top of inside casing on 4/23/08.
128					128	3/8" Hole Plug Sand 2" PVC Screen	128	

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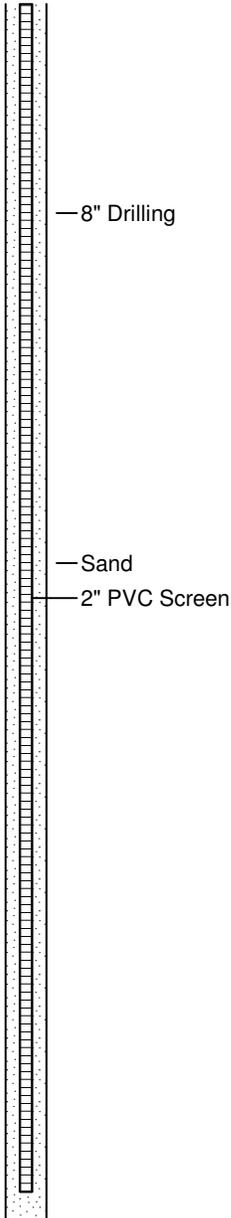
Log of Monitoring Well MW-98D

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
Drilled By : Carey Knaub
Logged By : Andy Sallaway, Emily Wade
Drilling Method : Air Rotary
Total Depth of Boring : 172' bgs

Drilling Bit Diameter : Various - See Below
Drilling Started : 4/2/08
Final Completion : 4/7/08
Well Construction : 2" Schedule 40 PVC
Well Development : 4/23/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-98D Elev. 361.41:	Depth in Feet	Well Construction Information
132	Same As Above, Phyllite				132	 <p>— 8" Drilling</p> <p>— Sand</p> <p>— 2" PVC Screen</p>	132	WELL CONSTRUCTION Date Compl. : 4/7/08 Total Depth of Well: 171' bgs WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5' -131' bgs WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 131' - 171' bgs SAND Type : #1 Morie Sand Amount : 25, 50 lb bags BENTONITE Type : 3/8" Hole Plug Amount : 79, 50 lb bags GROUT Type : Benseal/ : Portland Cement Amount : 5, 50 lb bags/ : 50, 94 lb bags WELL COVER Type : Locking Stick-up
137					137		137	
142					142		142	
147					147		147	
152					152		152	
157					157		157	Notes: 12" Drilling (0 - 17' bgs) 10" Drilling (17' - 91.5' bgs) 8" Drilling (91.5' - 172' bgs)
162					162		162	Bentonite Seal (123' - 128' bgs) 2, 50 lb bags Bentonite used during grouting 77, 50 lb bags
167					167		167	Static water level 19.50' below top of inside casing on 4/23/08.
172	END OF BORING @ 172'				172		172	

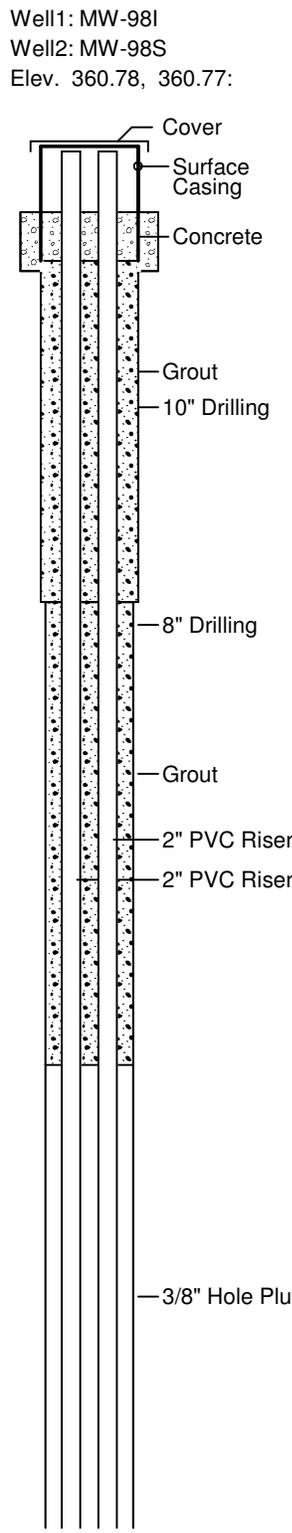
Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 109' bgs

Drilling Bit Diameter : Various - See Below
 Drilling Started : 4/8/08
 Final Completion : 4/11/08
 Well Construction : 2" Schedule 40 PVC
 Well Development : 4/24/08

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Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	CL, silty clay, 10YR 4/3 brown, moist, semi dense, <3% sub rounded to rounded quartzite fragments, organics (roots, grass)			0.0	0	WELL CONSTRUCTION Date Compl. : 4/11/08 Total Depth of Well: 105' bgs : 68' bgs
5	ML, clayey silt, 10YR 3/4 dark yellowish brown, medium plasticity, moist, semi dense, <3% sub rounded quartzite fragments			0.0	5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5' - 100' bgs From : +2' - 61' bgs
10	GC, clayey gravels, 10YR 4/4 dark yellowish brown, <30% angular quartzite fragments in clay matrix, low plasticity, semi dense			0.0	10	WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 100' - 105' bgs From : 61' - 68' bgs
15	ML, silt, 10 YR 3/2 very dark grayish brown, moist, low plasticity, semi dense, <5% sub rounded quartzite, <5% angular limestone fragments			0.0	15	SAND Type : #1 Morie Sand Amount : 59, 50 lb bags
20	GM, 10YR 3/2 very dark grayish brown, dry, angular quartzite and limestone fragments in silt matrix				20	BENTONITE Type : 3/8" Hole Plug Amount : 37, 50 lb bags
25	CL, clay, 2.5Y 4/1 dark gray, moist, medium plasticity, "balled" cuttings, <5% sub angular quartzite				25	GROUT Type : Benseal/ : Portland Cement Amount : 3, 50 lb bags/ : 30, 94 lb bags
30	GC, clayey gravel, 10YR 5/6 yellowish brown, sub rounded quartzite in saturated clay matrix		28		30	WELL COVER Type : Locking Stick-up
35	Weathered Limestone, Gley 2 2.5/10B bluish black, approx. 10 gpm				35	Notes: 10" Drilling (0 - 17' bgs) 8" Drilling (17' - 94' bgs) 6" Drilling (94' - 109' bgs)
40	Competent Limestone, no cuttings returned to surface				40	Bentonite Seal (93.4' - 98' bgs) 1, 50 lb bag, (36' - 58' bgs) 1, 50 lb bag
45	VOID, mud filled, tools dropped				45	Borehole collapsed (69.5' - 82.3' bgs) when installing bentonite seal, 1, 50 lb bag
50	Weathered Limestone, no cuttings returned to surface				50	Bentonite used during grouting 35, 50 lb bags
55	VOID, mud filled, tools dropped				55	MW-98I static water level 20.53' below top of inside casing on 4/24/08. MW-98S static water level 20.38' below top of inside casing on 4/24/08.





Log of Monitoring Well MW-98I & MW-98S

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
Drilled By : Carey Knaub
Logged By : Emily Wade
Drilling Method : Air Rotary
Total Depth of Boring : 109' bgs

Drilling Bit Diameter : Various - See Below
Drilling Started : 4/8/08
Final Completion : 4/11/08
Well Construction : 2" Schedule 40 PVC
Well Development : 4/24/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
55	Same As Above, VOID				55	WELL CONSTRUCTION Date Compl. : 4/11/08 Total Depth of Well : 105' bgs : 68' bgs
60	Weathered Limestone, no cuttings returned to surface VOID, mud filled, tools dropped				60	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5' - 100' bgs From : +2' - 61' bgs
65	Competent Limestone, no cuttings returned to surface, slow and smooth drilling VOID, tools dropped				65	WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 100' - 105' bgs From : 61' - 68' bgs
70	Competent Limestone, no cuttings returned to surface, slow smooth drilling				70	SAND Type : #1 Morie Sand Amount : 59, 50 lb bags
75	VOID, tools dropped				75	BENTONITE Type : 3/8" Hole Plug Amount : 37, 50 lb bags
80	Competent Limestone, no cuttings returned to surface, slow, smooth drilling				80	GROUT Type : Benseal/ Portland Cement Amount : 3, 50 lb bags/ 30, 94 lb bags
85	VOID, tools dropped				85	WELL COVER Type : Locking Stick-up
90	Weathered Limestone, no cuttings returned to surface, drill tools jumpy VOID, tools dropped				90	Notes: 10" Drilling (0 - 17' bgs) 8" Drilling (17' - 94' bgs) 6" Drilling (94' - 109' bgs)
95	Competent Limestone, no cuttings returned to surface, smooth drilling				95	Bentonite Seal (93.4' - 98' bgs) 1, 50 lb bag, (36' - 58' bgs) 1, 50 lb bag
100	Weathered Limestone, no cuttings returned to surface, rough, drill tools jumpy Competent Limestone, no cuttings returned to surface, smooth drilling		101		100	Borehole collapsed (69.5' - 82.3' bgs) when installing bentonite seal, 1, 50 lb bag Bentonite used during grouting 35, 50 lb bags
105	Fracture, approx. 20 gpm blown yield Phyllite, Gley 2 6/10B bluish gray				105	MW-98I static water level 20.53' below top of inside casing on 4/24/08. MW-98S static water level 20.38' below top of inside casing on 4/24/08.
110	END OF BORING @ 109' BGS				110	

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Log of Monitoring Well MW-99D

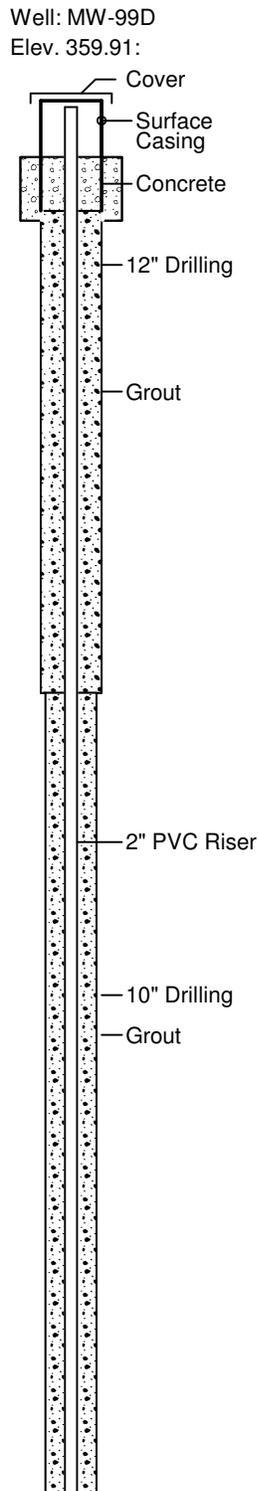
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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Mike Toath
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 150' bgs

Drilling Bit Diameter : Various - See Below
 Drilling Started : 3/18/08
 Final Completion : 3/26/08
 Well Construction : 2" Schedule 40 PVC
 Well Development : 4/30/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	ML, clayey silt, 10YR 4/4 dark yellowish brown, low plasticity, semi-dense, damp, <5% sub-rounded quartzite fragments			0.0	0	WELL CONSTRUCTION Date Compl. : 3/26/08 Total Depth of Well: 142' bgs
5	ML, silt with very little clay, 10YR 3/3 dark brown, low plasticity, semi-dense, damp, <5% sub-rounded to sub-angular quartzite fragments			0.0	5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5' -132' bgs
10	ML, silt, 10YR 3/2 very dark grayish brown, low plasticity, damp, semi-dense, <6% sub-rounded quartzite fragments, <3% coarse to fine sand			0.0	10	WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 132' -142' bgs
15	CL, clay, 2.5Y 4/1 dark gray, medium plasticity, semi-dense, damp, <3% fine to coarse sand			0.0	15	SAND Type : #1 Morie Sand Amount : 25, 50 lb bags
20	GP, poorly graded gravel, 10YR 5/3 brown, sub-rounded quartzite fragments			0.0	20	BENTONITE Type : 3/8" Hole Plug Amount : 79, 50 lb bags
25	Limestone fragments, angular. Gley 2 5/5PB bluish black in 10YR 5/3 yellowish brown mud, 22-23 gpm blown yield VOID, tools dropped		23	0.0	25	GROUT Type : Benseal/ Portland Cement Amount : 5, 50 lb bags/ 50, 94 lb bags
30	Competent Limestone, no cuttings returned to surface, smooth, steady drilling				30	WELL COVER Type : Locking Stick-up
35	VOID, tools dropped Weathered Limestone, no cuttings returned to surface, drill tools jumpy Competent Limestone, no cuttings returned to surface				35	Notes: 12" Drilling (0 - 20' bgs) 10" Drilling (20' - 65' bgs) 8" Drilling (65' - 118' bgs) 6" Drilling (118' - 150' bgs)
40	VOID, tools dropped Weathered Limestone bedrock, no cuttings returned to surface Competent Limestone, no cuttings returned to surface				40	Bentonite Seal (119.5' - 125.5' bgs) 3, 50 lb bags Bentonite used during grouting 114, 50 lb bags
45	VOID- possibly filled with gravel, some rotation required for tools to fall				45	Boring abandoned with #1 Morie Sand (142.2' - 150' bgs) 2, 50 lb bags Static Water Level 18.12' below top of inside casing on 4/30/08
50					50	





Log of Monitoring Well MW-99D

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Mike Toath
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 150' bgs

Drilling Bit Diameter : Various - See Below
 Drilling Started : 3/18/08
 Final Completion : 3/26/08
 Well Construction : 2" Schedule 40 PVC
 Well Development : 4/30/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-99D Elev. 359.91:	Depth in Feet	Well Construction Information	
50	Same As Above, VOID				50		50	WELL CONSTRUCTION Date Compl. : 3/26/08 Total Depth of Well : 142' bgs	
	Competent Limestone, no cuttings returned to surface								
55	VOID- tools dropped				55	10" Drilling	55	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5' -132' bgs	
	Weathered Limestone, no cuttings returned to surface					Grout			
60	Competent Limestone, no cuttings returned to surface				60		60	WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 132' -142' bgs	
65					65		65	SAND Type : #1 Morie Sand Amount : 25, 50 lb bags	
70	VOID- possibly filled with gravel or weathered/broken limestone. Drilling without air- no cuttings returned to surface. Blown Yield: 40-50 GPM				70		70	BENTONITE Type : 3/8" Hole Plug Amount : 79, 50 lb bags	
75					75	8" Drilling	75	GROUT Type : Benseal/ Portland Cement Amount : 5, 50 lb bags/ 50, 94 lb bags	
						2" PVC Riser		WELL COVER Type : Locking Stick-up	
80					80		80	Notes: 12" Drilling (0 - 20' bgs) 10" Drilling (20' - 65' bgs) 8" Drilling (65' - 118' bgs) 6" Drilling (118' - 150' bgs)	
	Competent Limestone, no cuttings returned to surface					Grout		85	Bentonite Seal (119.5' - 125.5' bgs) 3, 50 lb bags Bentonite used during grouting 114, 50 lb bags
90					90		90	90	Boring abandoned with #1 Morie Sand (142.2' - 150' bgs) 2, 50 lb bags
	VOID- possibly sand and gravel filled								Static Water Level 18.12' below top of inside casing on 4/30/08
95					95		95		
	Weathered Limestone, no cuttings returned to surface								
100	VOID- tools dropped				100		100		



Log of Monitoring Well MW-99D

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Mike Toath
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 150' bgs

Drilling Bit Diameter : Various - See Below
 Drilling Started : 3/18/08
 Final Completion : 3/26/08
 Well Construction : 2" Schedule 40 PVC
 Well Development : 4/30/08

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Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-99D Elev. 359.91:	Depth in Feet	Well Construction Information
100	Weathered Limestone, no cuttings returned to surface	[Graphic]			100	8" Drilling	100	WELL CONSTRUCTION Date Compl. : 3/26/08 Total Depth of Well: 142' bgs
105	Competent Limestone, no cuttings returned to surface	[Graphic]			105	Grout	105	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5' -132' bgs
110		[Graphic]			110		110	WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 132' -142' bgs
115	VOID- possibly sand and gravel filled	[Graphic]			115		115	SAND Type : #1 Morie Sand Amount : 25, 50 lb bags
120	Weathered Limestone, no cuttings returned to surface	[Graphic]			120	2" PVC Riser Grout	120	BENTONITE Type : 3/8" Hole Plug Amount : 79, 50 lb bags
125	Competent Limestone, no cuttings returned to surface	[Graphic]			125	3/8" Hole Plug 6" Drilling	125	GROUT Type : Benseal/ Portland Cement Amount : 5, 50 lb bags/ 50, 94 lb bags
130	Weathered Limestone, no cuttings returned to surface	[Graphic]			130	Sand and gravel Shale Trap	130	WELL COVER Type : Locking Stick-up
135	Competent Limestone, no cuttings returned to surface	[Graphic]			135		135	Notes: 12" Drilling (0 - 20' bgs) 10" Drilling (20' - 65' bgs) 8" Drilling (65' - 118' bgs) 6" Drilling (118' - 150' bgs)
140	VOID- tools dropprd Weathered Limestone, no cuttings returned to surface VOID- tools dropped	[Graphic]			140		140	Bentonite Seal (119.5' - 125.5' bgs) 3, 50 lb bags Bentonite used during grouting 114, 50 lb bags
145	Water Bearing Zone, gpm unknown, drilling without air, water came to surface as tools were falling Weathered Limestone, no cuttings returned to surface Competent Limestone, no cuttings returned to surface VOID- tools dropped	[Graphic]			145	2" PVC Screen	145	Boring abandoned with #1 Morie Sand (142.2' - 150' bgs) 2, 50 lb bags Static Water Level 18.12' below top of inside casing on 4/30/08
150	Competent Limestone, no cuttings returned to surface END OF BORING @150' BGS	[Graphic]			150	Sand	150	



Log of Monitoring Well MW-99S

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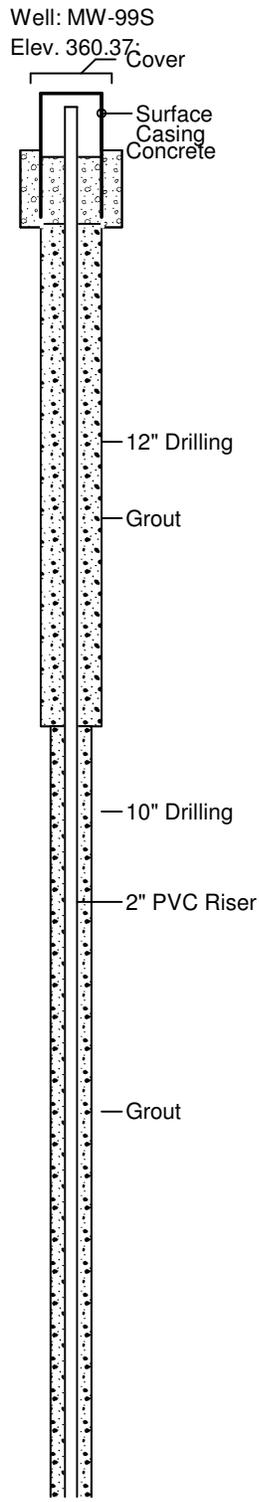
Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 75' bgs

Drilling Bit Diameter : Various - See Below
 Drilling Started : 3/26/08
 Final completion : 3/28/08
 Well Construction : 2" Schedule 40 PVC
 Well Development : 4/25/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	ML, clayey silt, 10YR 3/2 very dark grayish brown, low plasticity, low density, moist, <3% sub-rounded quartzite fragments			0.0	0	WELL CONSTRUCTION Date Compl. : 3/28/08 Total Depth of Well : 74' bgs
5	CL, silty clay, 10YR 4/3 brown, medium plasticity, semi-dense, saturated, <5% sub-rounded to sub-angular quartzite fragments, <3% fine to coarse sand			0.0	5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5' -64.3
10	GM, silty gravel, 10YR 4/4 dark yellowish brown, moist, no plasticity, low density, <20% sub-rounded gravel, <10% fine to coarse sand			0.0	10	WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 64.3' - 74.3' bgs
15	GC, clayey gravel, 2.5Y 4/2 dark grayish brown, moist, low plasticity, semi-dense, <25% sub-rounded to sub-angular quartzite fragments, <10% fine to coarse sand			0.0	15	SAND Type : #1 Morie Sand Amount : 3, 50 lb bags
20	GP, poorly graded gravel, 10YR 4/6 dark yellowish brown, quartzite, coarse gravel to fine sand			0.0	20	BENTONITE Type : 3/8" Hole Plug Amount : 48, 50 lb bags
25	Weathered Limestone, Gley 2 5/5PB bluish gray, 5-10 gpm blown yield		23	0.0	25	GROUT Type : Benseal/ Portland Cement Amount : 2, 50 lb bags/ 20, 94 lb bags
30	Competent Limestone, Gley 2 2.5/5PB bluish black, no cuttings returned to surface				30	WELL COVER Type : Locking Stick-up
35	Weathered Limestone, no cuttings returned to surface VOID- tools dropped				35	Notes: 12" Drilling (0 - 17' bgs) 10" Drilling (17' - 75' bgs) Bentonite Seal (48' - 57.8' bgs) 17, 50 lb bags Bentonite used during grouting 31, 50 lb bags Static Water Level 19.11' below top of inside casing on 4/25/08
40	Competent Limestone, no cuttings returned to surface				40	

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Log of Monitoring Well MW-99S

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 75' bgs

Drilling Bit Diameter : Various - See Below
 Drilling Started : 3/26/08
 Final completion : 3/28/08
 Well Construction : 2" Schedule 40 PVC
 Well Development : 4/25/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-99S Elev. 360.37:	Depth in Feet	Well Construction Information
40	Same As Above, Competent Limestone VOID- tools dropped	[Graphic: Limestone pattern]			40	10" Drilling	40	WELL CONSTRUCTION Date Compl. : 3/28/08 Total Depth of Well : 74' bgs
45	Competent Limestone, no cuttings returned to surface	[Graphic: Limestone pattern]			45	Grout	45	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5' -64.3
50	VOID, tools dropped	[Graphic: Blank]			50		50	WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 64.3' - 74.3' bgs
55	Weathered/Broken Limestone - uneven drilling, no cuttings returned to surface	[Graphic: Broken limestone pattern]			55	3/8" Hole Plug	55	SAND Type : #1 Morie Sand Amount : 3, 50 lb bags
55	Competent Limestone, no cuttings returned to surface	[Graphic: Limestone pattern]			55	2" PVC Riser	55	BENTONITE Type : 3/8" Hole Plug Amount : 48, 50 lb bags
60	VOID, tools dropped	[Graphic: Blank]			60		60	GROUT Type : Benseal/ Portland Cement Amount : 2, 50 lb bags/ 20, 94 lb bags
60	Weathered/Broken Limestone - uneven drilling, no cuttings returned to surface	[Graphic: Broken limestone pattern]			60	Sand	60	WELL COVER Type : Locking Stick-up
60	Competent Limestone, no cuttings returned to surface	[Graphic: Limestone pattern]			60	Shale Trap	60	
65	Weathered Limestone, no cuttings returned to surface	[Graphic: Broken limestone pattern]			65		65	Notes: 12" Drilling (0 - 17' bgs) 10" Drilling (17' - 75' bgs)
70	VOID- tools dropped	[Graphic: Blank]			70		70	Bentonite Seal (48' - 57.8' bgs) 17, 50 lb bags
70					70	2" PVC Screen	70	Bentonite used during grouting 31, 50 lb bags
75	Competent Limestone, no cuttings returned to surface END OF BORING @ 75 BGS	[Graphic: Limestone pattern]			75		75	Static Water Level 19.11' below top of inside casing on 4/25/08
80					80		80	



Log of Monitoring Well MW-100D

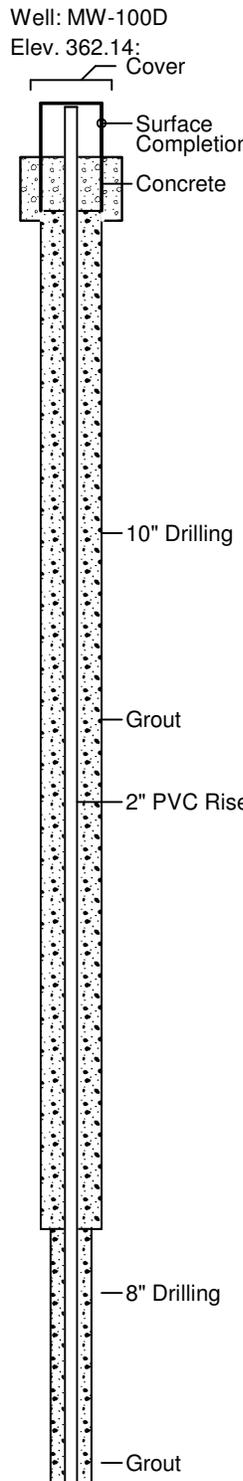
(Page 1 of 3)

Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
Drilled By : Carey Knaub
Logged By : Emily Wade, Andy Sallaway
Drilling Method : Air Rotary
Total Depth of Boring : 121' bgs

Drilling Bit Diameter : Various - See Below
Drilling Started : 2/27/08
Final Completion : 3/10/08
Well Construction : 2" Schedule 40 PVC
Well Development : 4/30/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	CL, silty clay, 10YR 4/3 brown, saturated, soft, medium plasticity, organics, <3% fine sand			0.0	0	WELL CONSTRUCTION Date Compl. : 3/10/08 Total Depth of Well: 114' bgs
5	GC, clayey gravel, sub rounded to rounded quartzite, clay 10YR 3/4 dark yellowish brown			0.0	5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2' - 114' bgs
10	GC, clayey gravel, sub angular to sub rounded quartzite, moist			0.0	10	WELL Screen Material : U-Pack Slot Size : 0.010" Diameter : 2" From : 104' - 114' bgs
15	GC, clayey gravel, 10YR 5/6 yellowish brown, moist, low plasticity			0.0	15	SAND Type : #1 Morie Sand Amount : 10, 50 lb bags
20	ML, silt, 10YR 6/6 brownish yellow, dry, no plasticity, low density, <5% sub angular quartzite fragments			0.0	20	BENTONITE Type : 3/8" Hole Plug Amount : 214, 50 lb bags
25					25	GROUT Type : Benseal/ Portland Cement Amount : 5, 50 lb bags/ 40, 94 lb bags
30	CL, clay, 5YR 5/6 yellowish red, moist, dense, medium plasticity, sub rounded to rounded gravel and cobbles			0.0	30	WELL COVER Type : Locking Stick-up
35	Weathered rock- no cuttings, slower drill tool penetration and rough drilling				35	Notes: 10" Drilling (0 - 40' bgs) 8" Drilling (40' - 121' bgs) Bentonite Seal (87' - 93' bgs) 1.5, 50 lb bags
40	CG, gravelly clay, 10YR 5/6 yellowish brown, moist, subangular to subrounded quartzite fragments in clay matrix, <3% coarse to fine sand,			0.0	40	Bentonite used during grouting 212.5, 50 lb bags
45	CL, clay, saturated, 10YR 5/6 yellowish brown			0.0	45	Drilling undercut drill rig at approximately 5' - 15' bgs. 212.5, 50 lb bags of 3/8" Bentonite Hole Plug were used to fill void.
50	Weathered Limestone, Gley 2 4/5PB dark bluish gray				50	Static Water Level 20.07' below top of inside casing on 4/30/08



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Log of Monitoring Well MW-100D

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
Drilled By : Carey Knaub
Logged By : Emily Wade, Andy Sallaway
Drilling Method : Air Rotary
Total Depth of Boring : 121' bgs

Drilling Bit Diameter : Various - See Below
Drilling Started : 2/27/08
Final Completion : 3/10/08
Well Construction : 2" Schedule 40 PVC
Well Development : 4/30/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-100D Elev. 362.14:	Depth in Feet	Well Construction Information
50	Same As Above, Limestone Broken Limestone cuttings, air began blowing out around 10" temporary casing				50		50	WELL CONSTRUCTION Date Compl. : 3/10/08 Total Depth of Well: 114' bgs
55	Weathered Limestone, color as above, in saturated clay, 10YR 5/6 yellowish brown, matrix		54		55		55	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2' - 114' bgs
60	Weathered Limestone- drill tools jumpy 10,000 lbs force downward, no cuttings returned to surface		60		60		60	WELL Screen Material : U-Pack Slot Size : 0.010" Diameter : 2" From : 104' - 114' bgs
65	Competent Limestone, no cuttings returned to surface, smooth, steady drilling				65		65	SAND Type : #1 Morie Sand Amount : 10, 50 lb bags
68	Weathered Limestone with quartz chips, stabilizer and drill tools jumping		68		68		68	BENTONITE Type : 3/8" Hole Plug Amount : 214, 50 lb bags
70	Water Bearing Zone-yield >100 gpm Competent Limestone, no cuttings returned to surface		72		70	— 8" Drilling — Grout	70	GROUT Type : Benseal/ Portland Cement Amount : 5, 50 lb bags/ 40, 94 lb bags
75	VOID- sand and gravel filled, no cuttings returned to surface Weathered Limestone, no cuttings returned to surface				75	— 2" PVC Riser	75	WELL COVER Type : Locking Stick-up
80	Competent Limestone, no cuttings returned to surface		81		80		80	Notes: 10" Drilling (0 - 40' bgs) 8" Drilling (40' - 121' bgs) Bentonite Seal (87' - 93' bgs) 1.5, 50 lb bags
85					85		85	Bentonite used during grouting 212.5, 50 lb bags
90	Limestone with weathered and non-weathered quartz fragments. Competent. Gley 2 4/10B-4/5PB dark bluish gray				90	— 3/8" Hole Plug	90	Drilling undercut drill rig at approximately 5' - 15' bgs. 212.5, 50 lb bags of 3/8" Bentonite Hole Plug were used to fill void.
95					95	— Sand — Shale Trap	95	Static Water Level 20.07' below top of inside casing on 4/30/08
100					100		100	



Log of Monitoring Well MW-100D

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
Drilled By : Carey Knaub
Logged By : Emily Wade, Andy Sallaway
Drilling Method : Air Rotary
Total Depth of Boring : 121' bgs

Drilling Bit Diameter : Various - See Below
Drilling Started : 2/27/08
Final Completion : 3/10/08
Well Construction : 2" Schedule 40 PVC
Well Development : 4/30/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-100D Elev. 362.14:	Depth in Feet	Well Construction Information
100	Same As Above, Limestone				100	<p>2" PVC Riser</p> <p>U-Pack Screen</p>	100	WELL CONSTRUCTION Date Compl. : 3/10/08 Total Depth of Well : 114' bgs
105	VOID				105		WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2' - 114' bgs	
110	103-116- rotation required for bit to drop. 116-121- bit dropped under its own weight				110		WELL Screen Material : U-Pack Slot Size : 0.010" Diameter : 2" From : 104' - 114' bgs	
115					115		SAND Type : #1 Morie Sand Amount : 10, 50 lb bags	
120					120		BENTONITE Type : 3/8" Hole Plug Amount : 214, 50 lb bags	
125	END OF BORING @ 121				125		GROUT Type : Benseal/ Portland Cement Amount : 5, 50 lb bags/ 40, 94 lb bags	
130					130		WELL COVER Type : Locking Stick-up	
135					135		Notes: 10" Drilling (0 - 40' bgs) 8" Drilling (40' - 121' bgs) Bentonite Seal (87' - 93' bgs) 1.5, 50 lb bags	
140					140		Bentonite used during grouting 212.5, 50 lb bags Drilling undercut drill rig at approximately 5' - 15' bgs. 212.5, 50 lb bags of 3/8" Bentonite Hole Plug were used to fill void.	
145					145		Static Water Level 20.07' below top of inside casing on 4/30/08	
150					150			



Log of Monitoring Well MW-100I & MW-100S

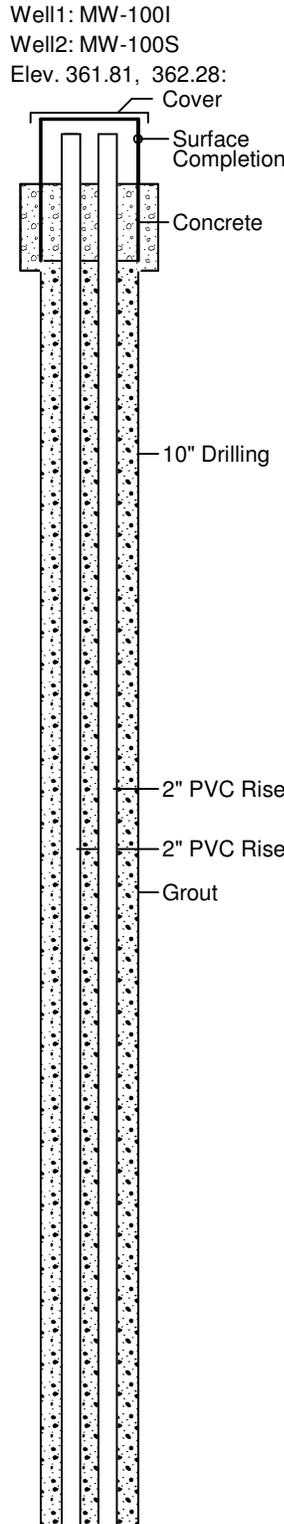
(Page 1 of 2)

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 66' bgs

Drilling Bit Diameter : 10" to 66' bgs
 Drilling Started : 3/11/08
 Final Completion : 3/14/08
 Well Construction : 2" Schedule 40 PVC
 Well Development : 5/1/08 - 5/2/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	GM, gravelly silt, 10YR 3/4 dark yellowish brown, moist, rounded to sub rounded quartzite gravel <40%, fine to coarse sand <20%			0.0	0	WELL CONSTRUCTION Date Compl. : 3/14/08 Total Depth of Well: 66' bgs : 51' bgs WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5' - 61' bgs From : +2' - 46' bgs WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 61' - 66' bgs From : 46' - 51' bgs SAND Type : #1 Morie Sand Amount : 11, 50 lb bags BENTONITE Type : 3/8" Hole Plug Amount : 21, 50 lb bags GROUT Type : Benseal/ : Portland Cement Amount : 2, 50 lb bags/ : 15, 94 lb bags WELL COVER Type : Locking Stick-up
5				0.0	5	
10	GM, gravelly silt, 10YR 4/6 dark yellowish brown, moist, rounded to sub rounded quartzite gravel <40%, fine to coarse sand <20%			0.0	10	
15				0.0	15	
20	GW, well graded gravel, sub rounded to rounded quartzite			0.0	20	
25				0.0	25	
30	CL, clay, 10YR 5/4 yellowish brown, moist, medium plasticity, semi dense, "balled" cuttings, <3% angular to sub angular quartzite fragments			0.0	30	Notes: 10" Drilling (0 - 66' bgs) Bentonite Seal (52.2' - 60' bgs) 3, 50 lb bags, (39.4' - 45' bgs) 2, 50 lb bags Bentonite used during grouting 16, 50 lb bags MW-100I static water level 19.98' below top of inside casing on 5/1/08 MW-100S static water level 20.60' below top of inside casing on 5/2/08
35	CL, clay, 10YR 5/4 yellowish brown, moist, medium plasticity, "balled" cuttings, <10% weathered limestone, Gley 2 3/5PB very dark bluish gray			0.0	35	





Log of Monitoring Well MW-100I & MW-100S

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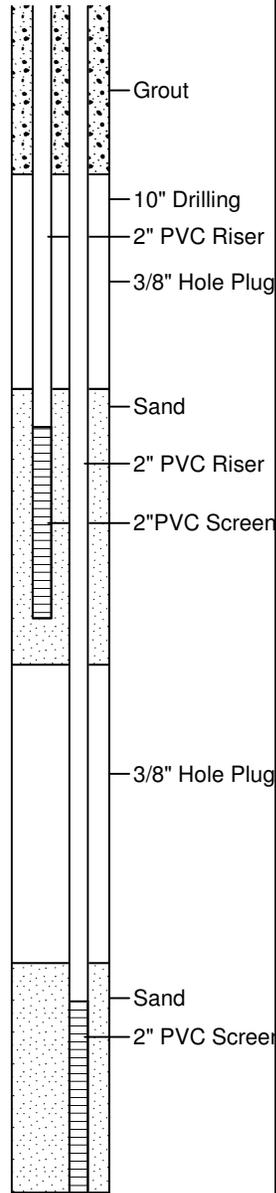
Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
Drilled By : Carey Knaub
Logged By : Emily Wade
Drilling Method : Air Rotary
Total Depth of Boring : 66' bgs

Drilling Bit Diameter : 10" to 66' bgs
Drilling Started : 3/11/08
Final Completion : 3/14/08
Well Construction : 2" Schedule 40 PVC
Well Development : 5/1/08 - 5/2/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
35	Same as above, CL, clay				35	WELL CONSTRUCTION Date Compl. : 3/14/08 Total Depth of Well: 66' bgs : 51' bgs WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2.5' - 61' bgs From : +2' - 46' bgs WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 61' - 66' bgs From : 46' - 51' bgs SAND Type : #1 Morie Sand Amount : 11, 50 lb bags BENTONITE Type : 3/8" Hole Plug Amount : 21, 50 lb bags GROUT Type : Benseal/ : Portland Cement Amount : 2, 50 lb bags/ : 15, 94 lb bags WELL COVER Type : Locking Stick-up Notes: 10" Drilling (0 - 66' bgs) Bentonite Seal (52.2' - 60' bgs) 3, 50 lb bags, (39.4' - 45' bgs) 2, 50 lb bags Bentonite used during grouting 16, 50 lb bags MW-100I static water level 19.98' below top of inside casing on 5/1/08 MW-100S static water level 20.60' below top of inside casing on 5/2/08
40	Weathered Limestone, Gley 2 3/5PB very dark bluish gray in clay matrix, 10YR 5/4 yellowish brown, saturated				40	
40	Approximately 3-5 gpm blown yield				40	
40	Competent Limestone, Gley 2 3/5PB very dark bluish gray				40	
45	Weathered Limestone, no cuttings returned to surface				45	
45	VOID, mud filled, tools dropped				45	
45	Weathered Limestone, no cuttings returned to surface				45	
45	VOID, mud filled, tools dropped				45	
45	Weathered Limestone, no cuttings returned to surface, drill tools jumpy				45	
50	VOID, mud filled, tools dropped				50	
50	Weathered Limestone, no cuttings returned to surface				50	
50	Competent Limestone, no cuttings returned to surface, smooth, steady drilling				50	
55	VOID, mud filled, tools dropped				55	
55	Weathered Limestone, no cuttings returned to surface				55	
60	VOID, mud filled, tools dropped				60	
60	Weathered Limestone, no cuttings returned to surface				60	
65	Competent Limestone, no cuttings returned to surface				65	
65	Weathered Limestone, no cuttings returned to surface				65	
65	Competent Limestone, no cuttings returned to surface				65	
65	END OF BORING @ 66'				65	
70					70	

Well1: MW-100I
Well2: MW-100S
Elev. 361.81, 362.28:





Log of Monitoring Well MW-101D

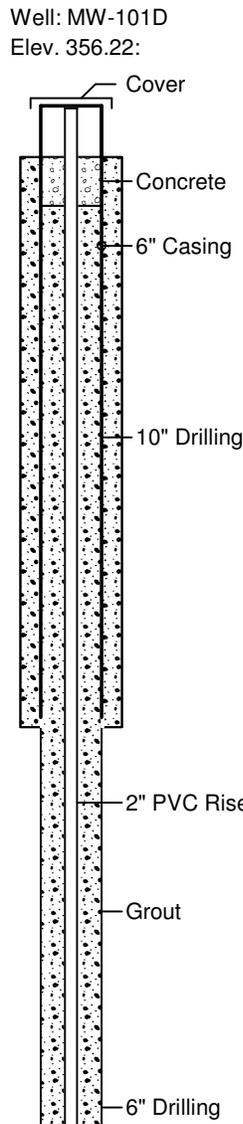
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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 151' bgs

Drilling Bit Diameter : Various - See Below
 Drilling Started : 2/19/08
 Final completion : 2/21/08
 Well Construction : 2" Schedule 40 PVC
 Well Development : 5/5/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	CL, silty clay, 10YR 4/3 brown, organics-grass and roots, medium plasticity, moist				0	WELL CONSTRUCTION Date Compl. : 2/21/08 Total Depth of Well : 115' bgs
5	GP, poorly graded gravel, sub angular to sub rounded quartzite			2.7	5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2' - 85' bgs
10	CL, silty clay, 10YR 4/6 dark yellowish brown, <5% sub angular gravel, moist			0.0	10	WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 85' - 115' bgs
15	ML, clayey silt, 10YR 4/6 dark yellowish brown, moist, medium plasticity, <2% fine sand			0.0	15	SAND Type : #1 Morie Sand Amount : 18, 50 lb bags
20	ML, clayey silt, 10YR 4/4 dark yellowish brown, moist, low plasticity, <3% fine to coarse sand, <2% sub rounded to sub angular gravel			0.0	20	BENTONITE Type : 3/8" Hole Plug Amount : 11, 50 lb bags
25	Weathered Limestone, Gley 2 3/5PB very dark bluish gray				25	GROUT Type : Benseal/ Portland Cement Amount : 2, 50 lb bags/ 20, 94 lb bags
30	Competent Limestone, Gley 2 4/5PB dark bluish gray		24		30	WELL COVER Type : Locking Stick-up
35	Soft Limestone, Gley 2 3/5 PB very dark bluish gray, fast drill penetration				35	Notes: 10" Drilling (0 - 23' bgs) 6" Drilling (23' - 151' bgs) 6" Diam steel casing (+2.5' - 23' bgs)
40	Limestone, Gley 2 5/5PB bluish gray		34		40	Bentonite Seal (68' - 76' bgs) 2, 50 lb bags Bentonite used during grouting 4, 50 lb bags
45	Soft Limestone, Gley 2 5/10G greenish gray		45		45	Borehole abandonment was completed from 132' - 151' bgs with 3/8" Bentonite Hole Plug, 3, 50 lb bags, and from 115' - 132' bgs with #1 Morie Sand, 11, 50lb bags.
50					50	Static water level 15.91' below top of inside casing on 5/5/08
55					55	





Log of Monitoring Well MW-101D

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 151' bgs

Drilling Bit Diameter : Various - See Below
 Drilling Started : 2/19/08
 Final completion : 2/21/08
 Well Construction : 2" Schedule 40 PVC
 Well Development : 5/5/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-101D Elev. 356.22:	Depth in Feet	Well Construction Information
55	Same As Above, Limestone				55		55	WELL CONSTRUCTION Date Compl. : 2/21/08 Total Depth of Well : 115' bgs
60			60		60		WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2' - 85' bgs	
65			65		65		WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 85' - 115' bgs	
70			70		70		SAND Type : #1 Morie Sand Amount : 18, 50 lb bags	
75			75		75		BENTONITE Type : 3/8" Hole Plug Amount : 11, 50 lb bags	
80			80		80		GROUT Type : Benseal/ Portland Cement Amount : 2, 50 lb bags/ 20, 94 lb bags	
85			85		85		WELL COVER Type : Locking Stick-up	
90			90		90		Notes: 10" Drilling (0 - 23' bgs) 6" Drilling (23' - 151' bgs) 6" Diam steel casing (+2.5' - 23' bgs)	
95	Hard Limestone, Gley 2 2.5/10B bluish black		95		95		Bentonite Seal (68' - 76' bgs) 2, 50 lb bags	
100			100		100		Bentonite used during grouting 4, 50 lb bags	
105			105		105		Borehole abandonment was completed from 132' - 151' bgs with 3/8" Bentonite Hole Plug, 3, 50 lb bags, and from 115' - 132' bgs with #1 Morie Sand, 11, 50lb bags.	
110			110		110		Static water level 15.91' below top of inside casing on 5/5/08	



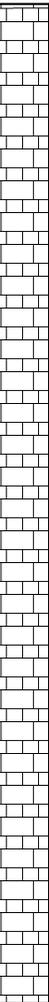
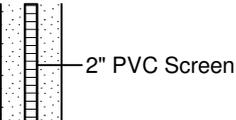
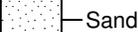
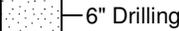
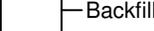
Log of Monitoring Well MW-101D

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 151' bgs

Drilling Bit Diameter : Various - See Below
 Drilling Started : 2/19/08
 Final completion : 2/21/08
 Well Construction : 2" Schedule 40 PVC
 Well Development : 5/5/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-101D Elev. 356.22:	Depth in Feet	Well Construction Information
110	Same As Above, Limestone				110		110	WELL CONSTRUCTION Date Compl. : 2/21/08 Total Depth of Well : 115' bgs
115					115		115	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2' - 85' bgs
120					120		120	WELL Screen Material : Sch. 40 PVC Slot Size : 0.010" Diameter : 2" From : 85' - 115' bgs
125					125		125	SAND Type : #1 Morie Sand Amount : 18, 50 lb bags
130					130		130	BENTONITE Type : 3/8" Hole Plug Amount : 11, 50 lb bags
135					135		135	GROUT Type : Benseal/ Portland Cement Amount : 2, 50 lb bags/ 20, 94 lb bags
140					140		140	WELL COVER Type : Locking Stick-up
145					145		145	Notes: 10" Drilling (0 - 23' bgs) 6" Drilling (23' - 151' bgs) 6" Diam steel casing (+2.5' - 23' bgs) Bentonite Seal (68' - 76' bgs) 2, 50 lb bags
150	END OF BORING @ 151				150		150	Bentonite used during grouting 4, 50 lb bags
155					155		155	Borehole abandonment was completed from 132' - 151' bgs with 3/8" Bentonite Hole Plug, 3, 50 lb bags, and from 115' - 132' bgs with #1 Morie Sand, 11, 50lb bags.
160					160		160	Static water level 15.91' below top of inside casing on 5/5/08
165					165		165	



Log of Monitoring Well MW-101S

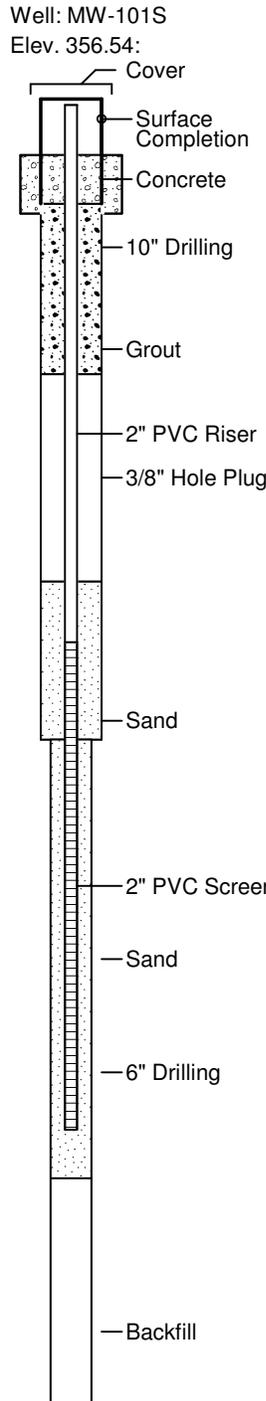
(Page 1 of 1)

Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
Drilled By : Carey Knaub
Logged By : Steve McFeaters
Drilling Method : Air Rotary
Total Depth of Boring : 51.3' bgs

Drilling Bit Diameter : Various - See Below
Drilling Started : 2/22/08
Final Completion : 2/25/08
Well Construction : 2" Schedule 40 PVC
Well Development : 5/5/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	ML, silt, 10YR 2/1 black, sub angular gravel fill material, moist, medium density, some sand			0.0	0	WELL CONSTRUCTION Date Compl. : 2/25/08 Total Depth of Well : 40' bgs
5				0.0	5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : +2' - 17.5' bgs
10	ML, silt, 10YR 4/6 dark yellowish brown, subrounded gravel, some clay, moist, medium density, slightly plastic			0.0	10	WELL Screen Material : Sch. 40 PVC Slot Size : 0.010 Diameter : 2" From : 20' - 40' bgs
15	Cuttings wet after placing new drilling rod on and resuming drilling at 17 ft				15	SAND Type : #1 Morie Sand Amount : 1/2, 50 lb bag
20					20	BENTONITE Type : 3/8" Hole Plug Amount : 5, 50 lb bags
25	Weathered Limestone Competent Limestone, cuttings dry and dusty Blown Yield < 0.5 gpm				25	GROUT Type : Benseal/ Portland Cement Amount : 1, 50 lb bag/ 8, 94 lb bags
30	Blown Yield 0.5 - 0.75 gpm				30	WELL COVER Type : Locking Stick-up
35	Blown Yield 1 gpm				35	Notes: 10" Drilling (0 - 24' bgs) 8" Drilling (24' - 51.30' bgs) Bentonite Seal (9' - 18' bgs) 2.5, 50 lb bags
40					40	Borehole abandonment was completed from 42' - 51.3' bgs with 3/8" Bentonite Hole Plug, 2.5, 50 lb bags
45					45	Static water level 16.16' below top of inside casing on 5/5/08
50	END OF BORING @ 51.3'				50	
55					55	



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Log of Monitoring Well MW-102D

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 99' bgs

Drilling Bit Diameter : 10" to 75' bgs, 6" to 99' bgs
 Final Completion : 9/20/07-9/21/07
 Well Construction : Open Rock
 Well Development : 1/8/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-102D Elev. 401.71:	Depth in Feet	Well Construction Information
0	ML, gravelly silt, 10YR 5/4 yellowish brown, sub angular to sub rounded gravel, dry, no plasticity			0.0	0		0	WELL CONSTRUCTION Date Compl. : 09/21/07 Hole Diameter : 10", 6" Total Depth of Well : 99' bgs
5	ML, clayey silt, 2.5Y 5/6 light olive brown, strong citrus odor, fine sand <3%, sub angular to sub rounded gravel <3%, slightly moist, low plasticity			0.8	5		5	WELL CASING Diameter : 6" Steel From : 0-75' bgs GROUT Type : Bentonite/ : Portland Cement Amount : 2 bags/18 bags
10	ML, clayey silt, 7.5YR 5/8 strong brown, slightly moist, coarse sand and fine gravel <5%, low plasticity			0.0	10		10	WELL COVER Type : Flush Mount
15				0.0	15		15	Static water level @ 29.94' bgs on 09/21/07.
20				0.0	20		20	10" Diameter Drilling (0 - 75' bgs) 6" Diameter Steel Casing (0 - 75' bgs) 6" Diameter Drilling (75' - 99' bgs)
25				0.0	25	25	25	
30	CL, silty clay, 5YR 5/8 yellowish red, fine sand, <2% gravel, moist, "balled" cuttings			0.0	30	30	30	
35				0.0	35	35	35	
40	CL, silty clay, 7.5YR 5/8 strong brown, moist, medium plasticity, "balled" cuttings, sub rounded gravel and coarse sand <3%			0.0	40	40	40	
45				0.0	45	45	45	
50	CL, silty clay, 7.5YR 5/8 strong brown, saturated cuttings, <2% coarse sand			0.0	50	50	50	

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Log of Monitoring Well MW-102D

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 99' bgs

Drilling Bit Diameter : 10" to 75' bgs, 6" to 99' bgs
 Final Completion : 9/20/07-9/21/07
 Well Construction : Open Rock
 Well Development : 1/8/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-102D Elev. 401.71:	Depth in Feet	Well Construction Information
50	Same As Above: CL, silty clay				50	10" Drilling	50	WELL CONSTRUCTION Date Compl. : 09/21/07 Hole Diameter : 10", 6" Total Depth of Well: 99' bgs
55					55		55	WELL CASING Diameter : 6" Steel From : 0-75' bgs
60					60		60	GROUT Type : Bentonite/ : Portland Cement Amount : 2 bags/18 bags
65					65	6" Casing	65	WELL COVER Type : Flush Mount
70	Silty Sandstone, 10YR 2/1 black, Fe staining 10YR 5/8 yellowish brown and 10YR 3/6 dark yellowish brown				70	Grout	70	Static water level @ 29.94' bgs on 09/21/07. 10" Diameter Drilling (0 - 75' bgs) 6" Diameter Steel Casing (0 - 75' bgs) 6" Diameter Drilling (75' - 99' bgs)
75	Slightly weathered sandstone, 2.5Y 3/1 very dark gray and 2.5Y 4/4 olive brown, Fe staining 2.5YR 3/4 dark reddish brown				75		75	
80					80		80	
85	VOID-mud filled Sandstone, fine grained, 2.5Y 3/1 very dark gray, 2.5Y 4/4 olive brown, Fe staining 2.5YR 3/4 dark reddish brown				85		85	
90					90	6" Drilling	90	
95					95		95	
100	END BORING @ 99 FEET BGS			96	100	Open Rock	100	



BORING LOG OF MW-102S

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 1-17-08

Drilling Completed : 1-17-08
 Well Construction : 1-21-08
 Well Development : 2-14-08
 Water Elev./Date : 39.50' bgs / 2-14-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-102S Elev. 401.95:	Well Construction Information
0		4	Clayey Silt, brownish yellow (10YR 6/6), low plasticity, damp	ML	0.0		<p>Cover Concrete Grout Riser</p>	WELL CONSTRUCTION Date Completed : 1-21-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Jerry Malecki WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 45' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 45' to 65' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 14-50 lb. bags Bentonite Seal (36.5' - 41' bgs) Pellets, 2-5 gallon buckets Type II Portland Cement with 5% bentonite crumbles, 6-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags Flush Mount Surface Completion
1.7/2.0'		5						
		6	Clayey Silt, dark yellowish brown (10YR 4/4), very low plasticity, dense	ML	0.0			
		7	Accumulated Lost Core					
1.3/2.0'		4	SAME AS ABOVE	ML	0.0			
		6						
		8	Clayey Silt, dark grayish brown (10YR 4/2), <5% sub angular to sub rounded gravel, dense, low plasticity	ML	0.0			
		8	Accumulated Lost Core					
		3	SAME AS ABOVE	ML	0.0			
5		5						
		7	Clayey Silt, dark grayish brown (10YR 4/2), <7% angular quartzite fragments, semi-dense, dry, medium plasticity, citrus like odor	ML	0.8			
		46	Accumulated Lost Core					
		5	SAME AS ABOVE	ML	0.3			
2.0/2.0'		8	Gravelly Clay, yellowish brown, angular to sub angular quartzite fragments, fine to coarse sand, no plasticity, semi to low density, dry	GC	0.0			
		10						
		13						
2.0/2.0'		10						
		9						
		11						
10		11						
		5						
		7						
2.0/2.0'		9						
		10						
		11						
1.7/2.0'		10	Clayey Silt, yellowish brown (10YR 5/6), low plasticity, semi-dense, damp, <5% sub rounded quartzite	ML	0.0			
		9						
		10	Accumulated Lost Core	O				
		6						
		6	SAME AS ABOVE	ML	0.0			
2.0/2.0'		7						
		9						
15		9						



BORING LOG OF MW-102S

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
Logged By : Emily M. Wade
Drilling Method : Hollow Stem Auger
Drilling Bit Diameter : 4 1/4"
Drilling Started : 1-17-08

Drilling Completed : 1-17-08
Well Construction : 1-21-08
Well Development : 2-14-08
Water Elev./Date : 39.50' bgs / 2-14-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-102S Elev. 401.95:	Well Construction Information
15	2.0'/2.0'	6 6 7 9	Silty Clay, yellowish brown (10YR 5/6), medium plasticity, dense, <3% angular quartzite fragments	CL	0.0		<p>Grout</p> <p>Riser</p>	WELL CONSTRUCTION Date Completed : 1-21-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Jerry Malecki WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 45' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 45' to 65' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 14-50 lb. bags Bentonite Seal (36.5' - 41' bgs) Pellets, 2-5 gallon buckets Type II Portland Cement with 5% bentonite crumbles, 6-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags Flush Mount Surface Completion
	2.0'/2.0'	6 9 10 12		CL	0.0			
	1.7'/2.0'	4 4 5	SAME AS ABOVE: dense, low plasticity, damp	CL	0.0			
		6	Accumulated Lost Core					
20	1.7'/2.0'	3 4 4	SAME AS ABOVE	CL	0.0			
		6	Accumulated Lost Core					
	0.2'/2.0'	5 5 5	Silty Clay, yellowish brown (10YR 5/8), medium plasticity, saturated, <2% sub angular to sub rounded gravel	CL	0.0			
		5	Accumulated Lost Core					
		2	SAME AS ABOVE	CL				
25	1.7'/2.0'	3 4	Clay, olive yellow (2.5YR 6/6), high plasticity clay with very pale brown (10YR 7/3) mottling	CH	0.0			
		8	Accumulated Lost Core					
		6	SAME AS ABOVE	CH				
	1.9'/2.0'	7 9 8	Gravelly Silt, strong brown (7.5YR 5/8), sub angular to sub rounded quartzite, <5% coarse sand, most	GM	0.0			
		3	Accumulated Lost Core					
	2.0'/2.0'	3 3	Clay, olive yellow (2.5Y 6/6), high plasticity, damp	CH	0.0			
		3 4	Silty Clay, brownish yellow (10YR 6/8) and dark yellowish brown (10YR 4/6) laminated, semi-dense, damp, medium plasticity	CL				



BORING LOG OF MW-102S

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
Logged By : Emily M. Wade
Drilling Method : Hollow Stem Auger
Drilling Bit Diameter : 4 1/4"
Drilling Started : 1-17-08

Drilling Completed : 1-17-08
Well Construction : 1-21-08
Well Development : 2-14-08
Water Elev./Date : 39.50' bgs / 2-14-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-102S Elev. 401.95:	Well Construction Information
30		4	SAME AS ABOVE	CL			<p>Well Construction Details: Date Completed : 1-21-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Jerry Malecki WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 45' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 45' to 65' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 14-50 lb. bags Bentonite Seal (36.5' - 41' bgs) Pellets, 2-5 gallon buckets Type II Portland Cement with 5% bentonite crumbles, 6-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags Flush Mount Surface Completion</p>	
2.0'/2.0'		3	Silty Clay, yellowish brown (10YR 5/8), medium plasticity, saturated, semi-dense, <3% sub rounded quartzite fragments	CL	0.0			
		4		CL				
2.0'/2.0'		6		CL	0.0			
		4		CL				
2.0'/2.0'		5		CL	0.0			
		5	Silty Clay, brownish yellow (10YR 6/8), low plasticity, moist, semi-dense, <3% sub rounded gravel	CL				
		6		CL				
35		2	Clay, olive yellow (2.5Y 6/6), medium plasticity, moist, semi-dense, yellowish brown (10YR 5/8) mottling	CH	0.0			
2.0'/2.0'		4		CH				
		6	Silty Clay, yellowish brown (10YR 5/8), moist, low plasticity, yellowish red (5YR 4/6) mottling	CL	0.0			
		10		CL				
		2		CL				
1.7'/2.0'		2		CL	0.0			
		4	Silty Clay, dark yellowish brown (10YR 4/4), low plasticity, semi-dense, yellowish brown (10YR 5/8) mottling	CL				
		6		CL				
		2	Accumulated Lost Core					
2.0'/2.0'		2	SAME AS ABOVE		0.0			
		4						
40		6						
		2		CL				
2.0'/2.0'		2		CL	0.0			
		2		CL				
		2		CL	0.0			
		2		CL				
2.0'/2.0'		2		CL	0.0			
		2		CL				
		2		CL	0.0			
		2		CL				
2.0'/2.0'		4	Clayey Silt, dark yellowish brown (10YR 3/6), low plasticity, semi-dense, moist, <3% fine sand	ML	0.0			
		5		ML				
		2		ML				
1.8'/2.0'		3	Silty Clay, dark yellowish brown (10YR 4/6), saturated, medium plasticity, <5% fine sand	CL	0.0			
		5		CL				
		8		CL				



BORING LOG OF MW-102S

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
Logged By : Emily M. Wade
Drilling Method : Hollow Stem Auger
Drilling Bit Diameter : 4 1/4"
Drilling Started : 1-17-08

Drilling Completed : 1-17-08
Well Construction : 1-21-08
Well Development : 2-14-08
Water Elev./Date : 39.50' bgs / 2-14-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-102S Elev. 401.95:	Well Construction Information
45	1.8'/2.0'	2 3 5	SAME AS ABOVE	CL	0.0		<p>#1 Sand Screen</p>	WELL CONSTRUCTION Date Completed : 1-21-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Jerry Malecki WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 45' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 45' to 65' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 14-50 lb. bags Bentonite Seal (36.5' - 41' bgs) Pellets, 2-5 gallon buckets Type II Portland Cement with 5% bentonite crumbles, 6-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags Flush Mount Surface Completion
		8	Accumulated Lost Core					
	2.0'/2.0'	4 5 8 9	SAME AS ABOVE	CL	0.0			
		3	Accumulated Lost Core					
	1.6'/2.0'	2 5	SAME AS ABOVE	CL	0.0			
		5	Accumulated Lost Core					
50	1.6'/2.0'	6 5 8	SAME AS ABOVE	CL	0.0			
		8	Highly Weathered Limestone, very dark gray (10YR 3/1), clay yellowish brown (10YR 5/6)	LS				
		8	Accumulated Lost Core					
	1.7'/2.0'	9 7 8	SAME AS ABOVE	LS				
		7	Gravelly Clay, dark yellowish brown (10YR 4/4), highly weathered limestone, saturated, no plasticity	GC	0.0			
		8	Accumulated Lost Core					
	1.8'/2.0'	5 6 8	Silty Clay, dark yellowish brown (10YR 4/6), saturated, low plasticity, semi-dense, <3% rounded to sub rounded quartzite	CL	0.0			
		8	Accumulated Lost Core					
		9	Silty Clay, brown (10YR 4/3), saturated, medium plasticity, semi-dense, <3% quartzite and fine sand	CL				
	2.0'/2.0'	5 7 9	Accumulated Lost Core					
		7	Gravelly Clay, dark yellowish brown (10YR 4/6), saturated, sub rounded to sub angular fragments, <5% coarse to fine sand	GC	0.0			
		9	Accumulated Lost Core					
		13	Silty Clay, dark yellowish brown (10YR 4/6), <5% sub angular to sub rounded quartzite, <5% coarse and fine sand	CL				
	2.0'/2.0'	5 4	Accumulated Lost Core					
		4	Silty Clay, yellowish brown (10YR 5/6), saturated, <3% fine sand, <3% rounded gravel	CL	0.0			
		6	Accumulated Lost Core					
60		6	<5% fine sand and sub rounded gravel	CL				

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 1-17-08

Drilling Completed : 1-17-08
 Well Construction : 1-21-08
 Well Development : 2-14-08
 Water Elev./Date : 39.50' bgs / 2-14-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-102S Elev. 401.95:	Well Construction Information
60	2.0'/2.0'	3	Gravelly Clay, dark yellowish brown (10YR 4/6), saturated, <8% sub rounded gravel, <3% fine sand	GC	0.0		<p>Well: MW-102S Elev. 401.95:</p>	<p>WELL CONSTRUCTION</p> <p>Date Completed : 1-21-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Jerry Malecki</p> <p>WELL CASING :</p> <p>Material : Sch 40 PVC Diameter : 2" From : 0' to 45' BGL Joints : Flush Threaded</p> <p>WELL SCREEN :</p> <p>Material : Sch 40 PVC Diameter : 2" From : 45' to 65' BGL Joints : Flush Threaded Opening : 0.010 slot</p>
		4		CL				
	3	Clay, dark yellowish brown (10YR 4/6), medium plasticity, <3% fine sand	CL	0.0				
	3							
	2							
	2.0'/2.0'	3	SAME AS ABOVE: with yellowish brown (10YR 5/6) laminations	CL	0.0			
		3						
	1.2'/0.75'	7	Weathered Sandstone, black (10YR 2/1)	SS	0.0			
		50/3						
65	Split Spoon Refusal @ 64.75' BGS							
70								
75								



Log of Monitoring Well MW-103D

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Todd Eaby
 Drilling Method : Air Rotary
 Total Depth of Boring : 107' bgs

Drilling Bit Diameter : 10"to 91'bgs, 6"to 107'bgs
 Final completion : 9/17/07-9/19/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 12/7/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	ML, clayey silt, 10YR 3/2 very dark grayish brown, slightly moist, <2% fine gravel and coarse sand				0	WELL CONSTRUCTION Date Compl. : 9/19/07 Hole Diameter : 10", 6" Total Depth of Well: 106.7' bgs WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-96.7 bgs Shale Trap Depth : 94.7' bgs WELL Screen Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 96.7-106.7' bgs SAND Type : #1 Morie Sand Amount : 1/2 bag BENTONITE Type : 3/8" Hole Plug Amount : 1/2 bag GROUT Type : Benseal/ Portland Cement Amount : 4 bags/40 bags WELL COVER Type : Flush Mount
5	CL, silty clay, 7.5YR 5/6 strong brown, slightly moist, <2% fine gravel, sub rounded to sub angular quartzite, <2% coarse sand, low plasticity		0.0	0.0	5	Cover Concrete 10" Drilling 2" PVC Riser Grout
10				10		
15				15		
20				20		
25				25		
30				30	Static water level @ 18.58' BGS on 9/20/07. 10" Diameter Drilling (0 - 91' bgs) 6" Diameter Drilling (91' - 107' bgs) Bentonite Seal (90.2' - 94.7' bgs) 1, 50 lb bag	
35				35		
40				40		
45				45		
50				50		



Log of Monitoring Well MW-103D

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Todd Eaby
 Drilling Method : Air Rotary
 Total Depth of Boring : 107' bgs

Drilling Bit Diameter : 10" to 91' bgs, 6" to 107' bgs
 Final completion : 9/17/07-9/19/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 12/7/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-103D Elev. 397.62:	Depth in Feet	Well Construction Information
50	Same As Above: CL, silty clay				50		50	WELL CONSTRUCTION Date Compl. : 9/19/07 Hole Diameter : 10", 6" Total Depth of Well: 106.7' bgs WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-96.7 bgs Shale Trap Depth : 94.7' bgs WELL Screen Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 96.7-106.7' bgs SAND Type : #1 Morie Sand Amount : 1/2 bag BENTONITE Type : 3/8" Hole Plug Amount : 1/2 bag GROUT Type : Benseal/ Portland Cement Amount : 4 bags/40 bags WELL COVER Type : Flush Mount
55					55		55	
60					60		60	
65					65		65	
70					70	10" Drilling Grout 2" PVC Riser	70	
75					75		75	
80					80		80	Static water level @ 18.58' BGS on 9/20/07. 10" Diameter Drilling (0 - 91' bgs) 6" Diameter Drilling (91' - 107' bgs) Bentonite Seal (90.2' - 94.7' bgs) 1, 50 lb bag
85	Phyllite, Gley 1 3/N very dark gray, weathered				85		85	
89	VOID				89		89	
90	Quartzite, 5Y 6/3 pale olive, very fine crystalline, hard, rough drilling				90		90	
95					95	6" Drilling 3/8" Hole Plug Shale Trap	95	
96					96		96	
100	VOID, silty, clayey water from void, 30-40 gpm				100	U-Pack Screen	100	



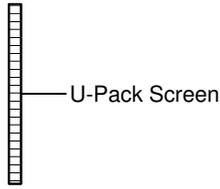
Log of Monitoring Well MW-103D

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Todd Eaby
 Drilling Method : Air Rotary
 Total Depth of Boring : 107' bgs

Drilling Bit Diameter : 10" to 91' bgs, 6" to 107' bgs
 Final completion : 9/17/07-9/19/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 12/7/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-103D Elev. 397.62:	Depth in Feet	Well Construction Information
100	Same As Above: VOID				100		100	WELL CONSTRUCTION Date Compl. : 9/19/07 Hole Diameter : 10", 6" Total Depth of Well: 106.7' bgs
105				105	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-96.7 bgs Shale Trap Depth : 94.7' bgs			
110	END BORING @ 107 FEET BGS, still in void			110	WELL Screen Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 96.7-106.7' bgs			
115				115	SAND Type : #1 Morie Sand Amount : 1/2 bag BENTONITE Type : 3/8" Hole Plug Amount : 1/2 bag			
120				120	GROUT Type : Benseal/ : Portland Cement Amount : 4 bags/40 bags			
125				125	WELL COVER Type : Flush Mount			
130				130	Static water level @ 18.58' BGS on 9/20/07. 10" Diameter Drilling (0 - 91' bgs) 6" Diameter Drilling (91' - 107' bgs)			
135				135	Bentonite Seal (90.2' - 94.7' bgs) 1, 50 lb bag			
140				140				
145				145				
150				150				



BORING LOG OF MW-103S

(Page 1 of 6)

Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
Logged By : Emily M. Wade
Drilling Method : Hollow Stem Auger
Drilling Bit Diameter : 4 1/4"
Drilling Started : 1-23-08

Drilling Completed : 1-23-08
Well Construction : 1-24-08
Well Development : 2-14-08
Water Elev./Date : 13.74' bgs / 2-14-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-103S Elev. 397.96:	Well Construction Information
0		4	Clayey Silt, dark yellowish brown (10YR 3/4), slightly moist, <2% fine to coarse sand	ML	0.8		<p>Cover Concrete Grout Riser</p>	WELL CONSTRUCTION Date Completed : 1-24-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Jerry Malecki WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 67.5' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 67.5' to 87.5' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 15-50 lb. bags Bentonite Seal (57.7' - 62.3' bgs) Coated Bentonite Pellets, 2-5 gallon buckets Type II Portland Cement with 5% bentonite crumbles, 12-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags Flush Mount Surface Completion
1.0'/2.0'		7	Clayey Silt, very dark grayish brown (10YR 3/2), <3% angular gravel, <3% coarse sand	ML				
		15	Accumulated Lost Core					
		8	Clay, yellowish brown (10YR 5/4), low plasticity, semi-dense, damp	CL	13.3			
1.5'/2.0'		7	Silty Sandy Gravel, very dark grayish brown (10YR 3/2), <8% sub angular gravel and sand, damp	GC				
		25	Accumulated Lost Core					
		13	Silt, brown (10YR 4/3), very low clay, slight plasticity, damp	ML				
		13	Accumulated Lost Core					
5		6	Silty Clay, strong brown (7.5YR 5/6), medium plasticity, slightly moist, <2% fine sub angular gravel and fine to coarse sand	CL	7.0			
		7	Accumulated Lost Core					
		8	SAME AS ABOVE					
1.7'/2.0'		5	Accumulated Lost Core					
		5	SAME AS ABOVE					
		7	Accumulated Lost Core					
		8	Accumulated Lost Core					
1.0'/2.0'		5	Silty Clay, yellowish brown (10YR 5/6), medium plasticity, <3% sub rounded fine gravel, damp	CL	9.2			
		6	Accumulated Lost Core					
		9	Accumulated Lost Core					
10		9	Accumulated Lost Core					
		5	SAME AS ABOVE					
		6	Accumulated Lost Core					
1.7'/2.0'		5	SAME AS ABOVE	CL	3.4			
		5	Accumulated Lost Core					
		6	Accumulated Lost Core					
1.7'/2.0'		4	SAME AS ABOVE: <3% angular quartzite fragments	CL	1.4			
		4	Accumulated Lost Core					
		4	Accumulated Lost Core					
1.4'/2.0'		2	SAME AS ABOVE	ML	1.9			
		3	Accumulated Lost Core					
		3	Silt, strong brown (7.5YR 5/6), no plasticity, moist	ML				
15		3	Accumulated Lost Core					

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BORING LOG OF MW-103S

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
Logged By : Emily M. Wade
Drilling Method : Hollow Stem Auger
Drilling Bit Diameter : 4 1/4"
Drilling Started : 1-23-08

Drilling Completed : 1-23-08
Well Construction : 1-24-08
Well Development : 2-14-08
Water Elev./Date : 13.74' bgs / 2-14-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-103S Elev. 397.96:	Well Construction Information
15	1.4'/2.0'	2 3 3	SAME AS ABOVE	ML	1.9		<p>Grout</p> <p>Riser</p>	WELL CONSTRUCTION Date Completed : 1-24-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Jerry Malecki WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 67.5' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 67.5' to 87.5' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 15-50 lb. bags Bentonite Seal (57.7' - 62.3' bgs) Coated Bentonite Pellets, 2-5 gallon buckets Type II Portland Cement with 5% bentonite crumbles, 12-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags Flush Mount Surface Completion
			Accumulated Lost Core					
	1.9'/2.0'	4 3	SAME AS ABOVE: Saturated	ML	0.7			
			Clayey Silt, yellowish brown (10YR5/8), slight plasticity, <5% coarse sand, moist	ML				
	1.9'/2.0'	2 3	Accumulated Lost Core SAME AS ABOVE	CL	0.8			
			Silty Clay, brownish yellow (10YR 6/8), semi-dense, medium to high plasticity, damp	CL				
20	1.8'/2.0'	2 3 4	Accumulated Lost Core SAME AS ABOVE	CL	1.1			
			Accumulated Lost Core SAME AS ABOVE	CL				
	1.9'/2.0'	4 5 6 9	Clay, yellowish brown (10YR 5/6), <8% sub angular quartzite fragments, moist	CL	0.5			
			Accumulated Lost Core SAME AS ABOVE: saturated	CL				
25	1.0'/2.0'	5 5 7	Accumulated Lost Core		0.8			
	0.9'/2.0'	18 8 4	Gravelly Clay, yellowish brown (10YR 5/8), angular quartzite fragments in saturated clay Accumulated Lost Core	GC	1.4			
			SAME AS ABOVE	GC				
	2.0'/2.0'	3 3 4 5	Silty Clay, yellowish brown (10YR 5/8), medium plasticity, <3% angular quartzite fragments	CL	1.9			



BORING LOG OF MW-103S

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
Logged By : Emily M. Wade
Drilling Method : Hollow Stem Auger
Drilling Bit Diameter : 4 1/4"
Drilling Started : 1-23-08

Drilling Completed : 1-23-08
Well Construction : 1-24-08
Well Development : 2-14-08
Water Elev./Date : 13.74' bgs / 2-14-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-103S Elev. 397.96:	Well Construction Information
30	1.9'/2.0'	3 4 4	SAME AS ABOVE: no quartzite fragments	CL	1.0		<p>Grout</p> <p>Riser</p>	WELL CONSTRUCTION Date Completed : 1-24-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Jerry Malecki WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 67.5' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 67.5' to 87.5' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 15-50 lb. bags Bentonite Seal (57.7' - 62.3' bgs) Coated Bentonite Pellets, 2-5 gallon buckets Type II Portland Cement with 5% bentonite crumbles, 12-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags Flush Mount Surface Completion
	1.9'/2.0'	5 5 7	Accumulated Lost Core SAME AS ABOVE: <2% quartzite fragments	CL	2.3			
35	2.0'/2.0'	3 4 4	Accumulated Lost Core SAME AS ABOVE: yellowish brown (10YR 5/8)	CL	2.1			
	1.3'/2.0'	4 6 7	Silty Clay, very dark brown (10YR 2/2), <4% quartzite fragments Accumulated Lost Core	CL	1.1			
	1.8'/2.0'	4 5 5	Clay, yellowish brown (10YR 5/6), medium plasticity, <2% sub rounded quartzite fragments, saturated Accumulated Lost Core	CL	0.3			
40	1.8'/2.0'	2 3 3	Accumulated Lost Core SAME AS ABOVE	CL	0.3			
	1.7'/2.0'	5 5 6	Accumulated Lost Core SAME AS ABOVE	CL	0.3			
	1.5'/2.0'	3 3 5 6	Accumulated Lost Core SAME AS ABOVE	CL	0.8			
45								



BORING LOG OF MW-103S

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
Logged By : Emily M. Wade
Drilling Method : Hollow Stem Auger
Drilling Bit Diameter : 4 1/4"
Drilling Started : 1-23-08

Drilling Completed : 1-23-08
Well Construction : 1-24-08
Well Development : 2-14-08
Water Elev./Date : 13.74' bgs / 2-14-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-103S Elev. 397.96:	Well Construction Information
45	1.5'/2.0'	3 3 5	SAME AS ABOVE	CL	0.8		<p>Grout</p> <p>Riser</p> <p>Bentonite Chips</p>	WELL CONSTRUCTION Date Completed : 1-24-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Jerry Malecki WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 67.5' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 67.5' to 87.5' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 15-50 lb. bags Bentonite Seal (57.7' - 62.3' bgs) Coated Bentonite Pellets, 2-5 gallon buckets Type II Portland Cement with 5% bentonite crumbles, 12-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags Flush Mount Surface Completion
		6	Accumulated Lost Core					
	2.0'/2.0'	5 6 8	SAME AS ABOVE	CL	0.3			
	0.7'/2.0'	3 3 4	Silty Clay, yellowish brown, (10YR 5/4), saturated, medium plasticity, mottling	CL	0.0			
		5	Accumulated Lost Core					
50	1.3'/2.0'	3 5 7	Clay, yellowish brown (10YR 5/6), medium plasticity, <3% sub angular to sub rounded quartzite fragments, saturated	CL	0.0			
		11	Accumulated Lost Core					
	1.8'/2.0'	10 11 13	SAME AS ABOVE	CL	0.0			
		12	Accumulated Lost Core					
	0.5'/2.0'	3 5	SAME AS ABOVE	CL	0.0			
		9	Accumulated Lost Core					
	1.3'/2.0'	4 3	SAME AS ABOVE	CL	0.0			
		14	Accumulated Lost Core					
	1.8'/2.0'	6 9 6	SAME AS ABOVE	CL	0.0			
60		5	Accumulated Lost Core					



BORING LOG OF MW-103S

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 1-23-08

Drilling Completed : 1-23-08
 Well Construction : 1-24-08
 Well Development : 2-14-08
 Water Elev./Date : 13.74' bgs / 2-14-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-103S Elev. 397.96:	Well Construction Information
60	1.4'/2.0'	4	SAME AS ABOVE	CL	0.0			WELL CONSTRUCTION Date Completed : 1-24-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Jerry Malecki WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 67.5' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 67.5' to 87.5' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 15-50 lb. bags Bentonite Seal (57.7' - 62.3' bgs) Coated Bentonite Pellets, 2-5 gallon buckets Type II Portland Cement with 5% bentonite crumbles, 12-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags Flush Mount Surface Completion
		4						
		4	Silt, brownish yellow (10YR 6/6), mottling, moist, very low plasticity	ML	0.0			
		7	Accumulated Lost Core					
	1.8'/2.0'	5	SAME AS ABOVE	CL	0.0			
		9						
		10						
		13	Accumulated Lost Core					
	1.7'/2.0'	4	SAME AS ABOVE	ML				
65		3	Silty Clay, yellowish brown (10YR 5/6), low to medium plasticity, moist	CL				
		4						
		5	Accumulated Lost Core					
	1.9'/2.0'	5	SAME AS ABOVE	CL				
		7						
		9						
		13	Accumulated Lost Core					
	1.8'/2.0'	5	SAME AS ABOVE	CL				
		9						
		8						
		8	Accumulated Lost Core					
70	1.6'/2.0'	4	SAME AS ABOVE	CL				
		6						
		8						
		8	Accumulated Lost Core					
	1.8'/2.0'	6	SAME AS ABOVE	CL				
		8						
		10						
		10	Silty Clay, dark yellowish brown (10YR 4/4), low plasticity, moist, semi-dense	CL				
	1.8'/2.0'	3	Accumulated Lost Core					
		4						
		5	SAME AS ABOVE: saturated	CL				
75		6						

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 1-23-08

Drilling Completed : 1-23-08
 Well Construction : 1-24-08
 Well Development : 2-14-08
 Water Elev./Date : 13.74' bgs / 2-14-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-103S Elev. 397.96:	Well Construction Information
75	1.8'/2.0'	3 4 5	SAME AS ABOVE	CL				WELL CONSTRUCTION Date Completed : 1-24-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Jerry Malecki WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 67.5' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 67.5' to 87.5' BGL Joints : Flush Threaded Opening : 0.010 slot
		6	Accumulated Lost Core					
	1.6'/2.0'	4 5 7	Clay, dark yellowish brown (10YR 4/4), medium plasticity, saturated, <3% fine sand	CL				
		10	Accumulated Lost Core					
	2.0'/2.0'	6 10 15 19	SAME AS ABOVE: <5% fine sand	CL				
80	1.5'/2.0'	6 8 11	Silty Clay, strong brown (7.5YR 5/6), <5% fine sand, saturated, medium plasticity	CL ME				
		19	Weathered Phyllite, Black (10YR 2/1)					
		8	Accumulated Lost Core	ME				
	1.5'/2.0'	11 11	SAME AS ABOVE Silty Clay, strong brown (7.5YR 5/6), <3% fine sand, <3% angular quartzite fragments	CL				
		16	Accumulated Lost Core					
	1.7'/2.0'	4 8 13	SAME AS ABOVE	CL				
		20	Weathered Phyllite, black (10YR 2/1)	ME				
	0.9'/2.0'	15 50/2	SAME AS ABOVE	ME				
			Split Spoon Refusal @ 86.4' bgs					
90								

WELL CONSTRUCTION
 Date Completed : 1-24-08
 Auger I.D. : 4 1/4"
 Drilling Method : Hollow Stem Auger
 Driller : Jerry Malecki

WELL CASING :
 Material : Sch 40 PVC
 Diameter : 2"
 From : 0' to 67.5' BGL
 Joints : Flush Threaded

WELL SCREEN :
 Material : Sch 40 PVC
 Diameter : 2"
 From : 67.5' to 87.5' BGL
 Joints : Flush Threaded
 Opening : 0.010 slot

ADDITIONAL CONSTRUCTION DETAILS
 #1 Morie Sand, 15-50 lb. bags
 Bentonite Seal (57.7' - 62.3' bgs)
 Coated Bentonite Pellets, 2-5 gallon buckets
 Type II Portland Cement with 5% bentonite crumbles, 12-94 lb. bags
 Sakrete Surface Completion, 2-84 lb. bags
 Flush Mount Surface Completion

Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
Logged By : Emily M. Wade
Drilling Method : Hollow Stem Auger
Drilling Bit Diameter : 4 1/4"
Drilling Started : 9-12-07

Drilling Completed : 9-12-07
Well Construction : 9-12-07
Well Development : 1-8-08
Water Elev./Date : 30.65' btoc / 10-19-07

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well Construction Information				
0		4	SILT and GRAVELLY SILT: very dark grayish brown (10YR 3/2) and red (2.5YR 5/6), some organic material, ~5% sub-rounded sandstone gravel, dry, crumbly.	ML	0.0		Well: MW-104 Elev. 428.72: Well Construction Information WELL CONSTRUCTION Date Completed : 9-12-07 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer WELL CASING : Material : Sch 40 PVC Diameter : 2" From : +2.3' to 18' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 18' to 28' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 7-50 lb. bags Bentonite Seal (12' - 15' bgs) 2, 50 lb. bags Type II Portland Cement with 5% bentonite crumbles, 2-94 lb. bags Sakrete Surface Completion, 2-80 lb. bags				
1.6'/2.0'		7						Accumulated Lost Core.			
		7						SILT: red (2.5YR 5/6), sub-rounded sandstone and quartzite gravel, crumbly.	ML	0.0	
1.4'/2.0'		7	SILT: yellowish brown (10YR 5/8), sub-rounded sandstone and quartzite gravel, crumbly.	ML	0.0						
		7	Accumulated Lost Core.								
		7	AS ABOVE.	ML	0.0						
5		8	CLAY: dusky red (2.5YR 3/2), high plasticity, dense.	CH	0.0						
		9	SILT: yellowish brown (10YR 5/8), sub-rounded sandstone and quartzite gravel, crumbly.	ML	0.0						
		12	Accumulated Lost Core.								
		6	AS ABOVE.	ML	0.0						
1.5'/2.0'		7	Accumulated Lost Core.								
		8	Accumulated Lost Core.								
		7	Accumulated Lost Core.								
		12	AS ABOVE.	ML	0.0						
1.2'/2.0'		10	Accumulated Lost Core.								
		16	Accumulated Lost Core.								
10		16	Accumulated Lost Core.								
		5	SILT: as above with very little, very fine sand.	ML	0.0						
1.4'/2.0'		5	Accumulated Lost Core.								
		6	Accumulated Lost Core.								
		12	Accumulated Lost Core.								
		6	CLAY: yellowish brown (10YR 5/8), with silt and ~10% sub-angular sandstone fragments, low to medium plasticity, semi-dense.	CL	0.0						
2.0'/2.0'		7	Accumulated Lost Core.								
		9	Accumulated Lost Core.								
		11	Accumulated Lost Core.								
		10	CLAY: as above with ~15% sub-angular sandstone and quartzite fragments.	CL	0.0						
2.0'/2.0'		14	Accumulated Lost Core.								
		14	Accumulated Lost Core.								
15		14	Accumulated Lost Core.								

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 9-12-07

Drilling Completed : 9-12-07
 Well Construction : 9-12-07
 Well Development : 1-8-08
 Water Elev./Date : 30.65' btoc / 10-19-07

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-104 Elev. 428.72:	Well Construction Information
15	2.0'/2.0'	10 14 14 14	AS ABOVE	CL	0.0			
	1.7'/2.0'	7 6 5	CLAY: yellowish brown (10YR 5/8), ~10% sub-angular sandstone fragments, interbeds of very fine sand and silt.	CL	0.0			
		7	Accumulated Lost Core.					
	2.0'/2.0'	5 6 7	AS ABOVE.	ML	0.0			
		10	CLAY: as above, decreasing clay content.	CL				
20	2.0'/2.0'	13 10 7	CLAY: as above with quartzite fragments.	CL	0.0			
	2.0'/2.0'	8 6 9 11	CLAY: as above CLAY and SILTY CLAY: dark brown (10YR 3/3) mottled with yellowish brown (10YR 5/8), decreasing very fine sand content, ~3% sub-rounded sandstone fragments, moist to saturated.	CL	0.0			
	2.0'/2.0'	10 11	AS ABOVE.	CL	0.0			
25	2.0'/2.0'	11 12	SILTY SAND: dark yellowish brown (10YR 4/4), fine to coarse grain, ~3% sandstone fragments, saturated.	SW	0.0			
	2.0'/2.0'	5 5 6 7	SILT with SAND: dark yellowish brown (10YR 4/4), decreasing very fine sand content, ~3% sub-rounded sandstone fragments.	ML	0.0			
	0.9'/1.0'	9	SILT with SAND: dark yellowish brown (10YR 4/6), fine to medium sand, sandstone fragments, saturated	ML	0.0			
30		50/5	SPLIT-SPOON REFUSAL.					

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 9-11-07

Drilling Completed : 9-11-07
 Well Construction : 9-11-07
 Well Development : 10-18-07
 Water Elev./Date : 23.68' btoc / 10-18-07

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well Construction Information
0		9	FILL MATERIAL: silt and gravel, yellowish brown (10YR 5/4),	ML	0.0		<p>WELL CONSTRUCTION</p> <p>Date Completed : 9-11-07 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer</p> <p>WELL CASING :</p> <p>Material : Sch 40 PVC Diameter : 2" From : +2.0' to 12' BGL Joints : Flush Threaded</p> <p>WELL SCREEN :</p> <p>Material : Sch 40 PVC Diameter : 2" From : 12' to 22' BGL Joints : Flush Threaded Opening : 0.010 slot</p> <p>ADDITIONAL CONSTRUCTION DETAILS</p> <p>#1 Morie Sand, 8-50 lb. bags</p> <p>Bentonite Seal (8' - 10' bgs) 1-50 lb. bag</p> <p>Type II Portland Cement with 5% bentonite crumbles, 2-94 lb. bags</p> <p>Sakrete Surface Completion, 2-80 lb. bags</p>
2.0'/2.0'		8					
		10	FILL MATERIAL: silt, cinders, ash.	ML			
		11					
0.8'/2.0'		6	FILL MATERIAL: silt, cinders.	ML			
		9	SILT with CLAY: brown (10YR 4/3), medium plasticity, quartzite fragments.	ML	0.0		
		7	Accumulated Lost Core.				
		9					
1.3'/2.0'		7	AS ABOVE.	ML			
		8					
		8	SILT with CLAY: yellowish brown (10YR 5/6), medium plasticity, quartzite fragments.	ML	0.3		
		10	Accumulated Lost Core.				
1.5'/2.0'		2	SILT: yellowish brown (10YR 5/6), trace clay, low plasticity.	ML	0.3		
		3					
		6	Accumulated Lost Core.				
2.0'/2.0'		6	SILT: yellowish brown (10YR 5/6) mottled with yellowish brown (10YR 5/8), interbeds of very fine sand.	ML	1.0		
		6					
		6					
10		7		ML			
		2					
		3					
1.8'/2.0'		4			0.8		
		5	SILT: light reddish brown (2.5YR 6/3), with fine to medium sand.	ML			
		5	Accumulated Lost Core.				
		9	AS ABOVE.	ML			
1.6'/2.0'		16	SILTY SAND with GRAVEL: light reddish brown (2.5YR 6/3), fine to coarse sand, sub-rounded quartzite gravel.	SM	0.1		
		20					
1.6'/2.0'		17	Accumulated Lost Core.				
		13					
		18	AS ABOVE.	SM	0.0		
		8					



BORING LOG OF MW-105

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 9-11-07

Drilling Completed : 9-11-07
 Well Construction : 9-11-07
 Well Development : 10-18-07
 Water Elev./Date : 23.68' btoc / 10-18-07

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-105 Elev. 362.05:	Well Construction Information
15	1.6'/2.0'	17 13 18	AS ABOVE	SM	0.0		<p>#1 Sand</p> <p>Screen</p>	<p>WELL CONSTRUCTION</p> <p>Date Completed : 9-11-07 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer</p> <p>WELL CASING :</p> <p>Material : Sch 40 PVC Diameter : 2" From : +2.0' to 12' BGL Joints : Flush Threaded</p> <p>WELL SCREEN :</p> <p>Material : Sch 40 PVC Diameter : 2" From : 12' to 22' BGL Joints : Flush Threaded Opening : 0.010 slot</p> <p>ADDITIONAL CONSTRUCTION DETAILS</p> <p>#1 Morie Sand, 8-50 lb. bags</p> <p>Bentonite Seal (8' - 10' bgs) 1-50 lb. bag</p> <p>Type II Portland Cement with 5% bentonite crumbles, 2-94 lb. bags</p> <p>Sakrete Surface Completion, 2-80 lb. bags</p>
		8	Accumulated Lost Core.					
	1.1'/2.0'	3	AS ABOVE.	SM	0.0			
		3	Accumulated Lost Core.					
		2						
	1.0'/2.0'	2 18	AS ABOVE: with limestone fragments, saturated.	SM	0.2			
		13	Accumulated Lost Core.					
		11						
20	1.2'/2.0'	2	AS ABOVE.	SM	0.0			
		5						
		8	Accumulated Lost Core.					
		29						
			AUGER REFUSAL.					
25								
30								

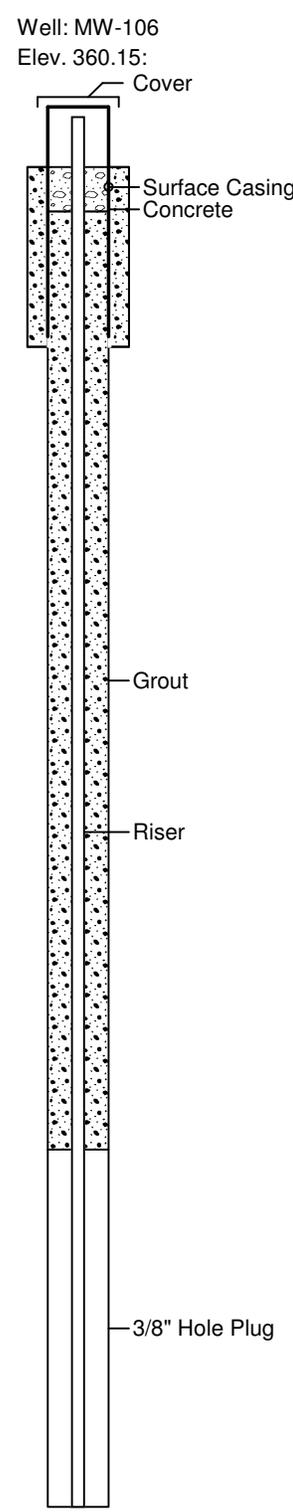
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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 9-10-07

Drilling Completed : 9-10-07
 Well Construction : 9-10-07
 Well Development : 10-19-07
 Water Elev./Date : 24.95' btoc / 10-19-07

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well Construction Information
0			ASPHALT	CG			
0.5'/1.5'		5	GRAVEL SUB-BASE with ash, silt, nails.	GW			
		6	Accumulated Lost Core.		0.0		ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 8-50 lb. bags Bentonite Seal (11' - 15' bgs) 1, 50 lb. bag Type II Portland Cement with 5% bentonite crumbles, 2-94 lb. bags Sakrete Surface Completion, 3-80 lb. bags
		7					
0.7'/2.0'		7	GRAVEL SUB-BASE with cinders, ash, silt.	GW			
		8	Accumulated Lost Core.		0.0		
		5					
		3					
1.8'/2.0'		1	SILT: dark gray (2.5Y 4/1) grading to olive yellow (2.5Y 6/6), soft.	ML	0.0		
		2					
		2					
		4	Accumulated Lost Core.				
1.2'/2.0'		4	SILT: olive yellow (2.5Y 6/6), soft, moist, cinders and 1/8" diameter metal rod in first 0.3' of run.	ML	0.0		
		4	Accumulated Lost Core.				
		5					
2.0'/2.0'		5	SILT: olive yellow (2.5Y 6/6) mottled with strong brown, very fine sand interbeds.	ML	0.0		
		5					
		6					
		8					
10		6	SAND with SILT and GRAVEL: strong brown (7.5YR 5/6), fine to coarse sand, ~20% angular to sub-rounded quartz gravel, ~15-20% silt, dry.	SW/SM	0.0		
1.7'/2.0'		8					
		9					
		13	Accumulated Lost Core.				
		16	AS ABOVE: ~30% gravel.				
1.5'/2.0'		17		SW/SM	0.0		
		18					
		20	Accumulated Lost Core.				
2.0'/2.0'		9	AS ABOVE.	SW/SM	0.0		
		13					
		19					
		23					
15							



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BORING LOG OF MW-106

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
Logged By : Emily M. Wade
Drilling Method : Hollow Stem Auger
Drilling Bit Diameter : 4 1/4"
Drilling Started : 9-10-07

Drilling Completed : 9-10-07
Well Construction : 9-10-07
Well Development : 10-19-07
Water Elev./Date : 24.95' btoc / 10-19-07

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-106 Elev. 360.15:	Well Construction Information
15	2.0'/2.0'	9 13 19 23	SAME AS ABOVE.		0.0		<p>Riser</p> <p>#1 Sand</p> <p>Screen</p>	WELL CONSTRUCTION Date Completed : 9-10-07 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0.0' to 18' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 18' to 28' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 8-50 lb. bags Bentonite Seal (11' - 15' bgs) 1, 50 lb. bag Type II Portland Cement with 5% bentonite crumbles, 2-94 lb. bags Sakrete Surface Completion, 3-80 lb. bags
		20		SW/SM				
	1.5'/2.0'	18 23			0.0			
		30	Accumulated Lost Core.					
		27	AS ABOVE: slightly moist at 19.6'.					
	1.6'/2.0'	24 28		SW/SM	0.0			
		40	Accumulated Lost Core.					
20		8	AS ABOVE: saturated at 21.7'.					
	1.7'/2.0'	9 9		SM	0.0			
		13	Accumulated Lost Core.					
		12	AS ABOVE.					
	1.8'/2.0'	10 9 8		SW/SM	0.0			
		8	Accumulated Lost Core.					
		12	AS ABOVE.	SW/SM				
		9	Accumulated Lost Core.					
25	0.6'/2.0'	12 13			0.0			
		12						
		4	NO RECOVERY.					
	0.0'/2.0'	5 5 6						
		5	SILTY GRAVEL: red (2.5YR 5/6), angular gravel, saturated.	GM	0.0			
	0.4'/1.1'	30 50/1	Accumulated Lost Core.					
			SPLIT-SPOON REFUSAL					

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 9-12-07

Drilling Completed : 9-12-07
 Well Construction : 9-12-07
 Well Development : 10-18-07
 Water Elev./Date : 23.20' btoc / 10-18-07

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC
0			0.0'-6.0' pre-cleared for utilities with air-knife and hand tools. Material consisted of silt, sub-angular to sub-rounded gravel.	ML	0.0	
1.8'/2.0'	6		SILT: yellowish brown (10YR 5/6) mottled with yellowish brown (10YR 5/8), semi-dense.	ML	0.0	
	6		Accumulated Lost Core. AS ABOVE.			
1.4'/2.0'	4		Accumulated Lost Core.	ML	0.8	
	6		Accumulated Lost Core. AS ABOVE.			
1.8'/2.0'	4		SILT: yellowish brown (10YR 5/6), very fine sand interbeds.	ML	1.8	
	4		Accumulated Lost Core. AS ABOVE.			
2.0'/2.0'	4		Accumulated Lost Core. AS ABOVE.	ML	1.5	
	6		Accumulated Lost Core. AS ABOVE.			
1.7'/2.0'	12		SANDY SILT with GRAVEL: dark yellowish brown (10YR 4/6), fine to coarse sand, ~15% sub-rounded quartzite gravel.	ML	1.2	
	9		Accumulated Lost Core. AS ABOVE.	ML	1.2	
	10		Accumulated Lost Core. AS ABOVE.			
	11		Accumulated Lost Core. AS ABOVE.			

Well Construction Information

WELL CONSTRUCTION
 Date Completed : 9-12-07
 Auger I.D. : 4 1/4"
 Drilling Method : Hollow Stem Auger
 Driller : Nate Moyer

WELL CASING :
 Material : Sch 40 PVC
 Diameter : 2"
 From : +2.5' to 13' BGL
 Joints : Flush Threaded

WELL SCREEN :
 Material : Sch 40 PVC
 Diameter : 2"
 From : 13' to 23' BGL
 Joints : Flush Threaded
 Opening : 0.010 slot

ADDITIONAL CONSTRUCTION DETAILS

- #1 Morie Sand, 8-50 lb. bags
- Bentonite Seal (8' - 11' bgs) 2-50 lb. bags
- Type II Portland Cement with 5% bentonite crumbles, 1-94 lb. bag
- Sakrete Surface Completion, 2-80 lb. bags

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 9-12-07

Drilling Completed : 9-12-07
 Well Construction : 9-12-07
 Well Development : 10-18-07
 Water Elev./Date : 23.20' btoc / 10-18-07

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-107 Elev. 363.56:	Well Construction Information	
15	1.7'/2.0'	12 9 10 11	SAME AS ABOVE Accumulated Lost Core.	ML	1.2			WELL CONSTRUCTION Date Completed : 9-12-07 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer WELL CASING : Material : Sch 40 PVC Diameter : 2" From : +2.5' to 13' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 13' to 23' BGL Joints : Flush Threaded Opening : 0.010 slot	
	1.5'/2.0'	4 7 9 7	AS ABOVE: moist Accumulated Lost Core.	ML	1.6				
	0.8'/2.0'	4 3 4 5	AS ABOVE: moist to saturated. SILT with SAND: limestone fragments, saturated. Accumulated Lost Core.	ML ML	0.4				
20	1.4'/2.0'	19 16 12 15	CLAY: dark yellowish brown (10YR 3/4), some silt, dense to semi-dense, limestone fragments. Accumulated Lost Core.	CL	0.5				ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 8-50 lb. bags Bentonite Seal (8' - 11' bgs) 2-50 lb. bags Type II Portland Cement with 5% bentonite crumbles, 1-94 lb. bag Sakrete Surface Completion, 2-80 lb. bags
	0.5'/0.5'	50/0.5	CLAYEY SAND, CLAY: dark yellowish brown (10YR 3/4), medium to high plasticity, saturated, ~15% limestone fragments. -Split Spoon Refusal AUGER REFUSAL @ 23' BGS	CL	0.0				
25									
30									



Log of Monitoring Well MW-108D

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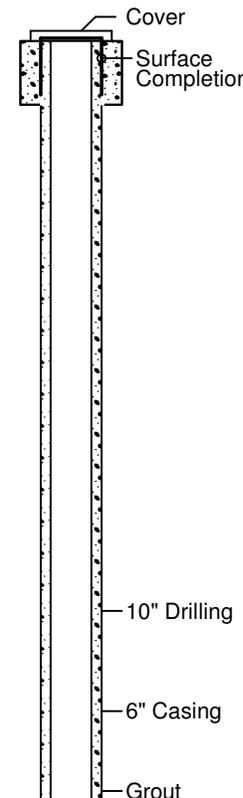
Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 149' bgs

Drilling Bit Diameter : 10" to 72'bgs, 6" to 149'bgs
 Final Completion : 10/30/07-11/1/07
 Well Construction : Open Rock
 Well Development : 1/10/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	ML, clayey silt, 10YR 4/6 dark yellowish brown, low plasticity, <2% angular sandstone fragments, dry			0.1	0	WELL CONSTRUCTION Date Compl. : 11/1/07 Hole Diameter : 10", 6" Total Depth of Well : 149' bgs
5	ML, silt, v. low clay, 10YR 4/6 dark yellowish brown, <7% sub rounded to sub angular quartzite			0.2	5	WELL CASING Diameter : 6" Steel From : 0-72' bgs
10	ML, silt, 10YR 4/6 dark yellowish brown, <3% sub rounded to sub angular quartzite fragments			0.1	10	BENTONITE Type : 3/8" Hole Plug Amount : 1 Bag
15	ML, clayey silt, 10YR 4/4 dark yellowish brown, low plasticity, moist			0.0	15	GROUT Type : Bentonite/ Amount : Portland Cement : 3 bags/25 bags
20	CL, clayey silt, 10YR 4/6 dark yellowish brown, medium plasticity, "balled" cuttings			0.4	20	WELL COVER Type : Flush Mount
25	CL, clay, 10YR 4/4 dark yellowish brown, medium plasticity, moist, semi-dense			0.3	25	Static water level @ 27.23' bgs on 11/1/07.
30	CL, clay, 10YR 4/6 dark yellowish brown, dense, medium to low plasticity, moist, <3% sub rounded quartzite			0.0	30	10" Diameter Drilling (0 - 72' bgs) 6" Steel Casing (0 - 72' bgs) 6" Diameter Drilling (72' - 149' bgs)
40	CL, clay, medium plasticity, saturated, semi-dense			0.1	40	
50					50	

Well: MW-108D
 Elev. 426.35:



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Log of Monitoring Well MW-108D

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
Drilled By : Carey Knaub
Logged By : Emily Wade
Drilling Method : Air Rotary
Total Depth of Boring : 149' bgs

Drilling Bit Diameter : 10" to 72'bgs, 6" to 149'bgs
Final Completion : 10/30/07-11/1/07
Well Construction : Open Rock
Well Development : 1/10/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-108D Elev. 426.35:	Depth in Feet	Well Construction Information
50	Same As Above: CL, clay			0.1	50		50	WELL CONSTRUCTION Date Compl. : 11/1/07 Hole Diameter : 10", 6" Total Depth of Well: 149' bgs
55					55		55	WELL CASING Diameter : 6" Steel From : 0-72' bgs
60					60		60	BENTONITE Type : 3/8" Hole Plug Amount : 1 Bag
65					65		65	GROUT Type : Bentonite/ Amount : Portland Cement : 3 bags/25 bags
70	Sandy Limestone bedrock, slight HCl reaction, Gley 1 7/10Y light greenish gray to Gley 1 4/10GY dark greenish gray		68.5		70		70	WELL COVER Type : Flush Mount
75					75		75	Static water level @ 27.23' bgs on 11/1/07. 10" Diameter Drilling (0 - 72' bgs) 6" Steel Casing (0 - 72' bgs) 6" Diameter Drilling (72' - 149' bgs)
85	Sandy Limestone, fine sand grains, Gley 2 3/10B very dark bluish gray to Gley 2 7/5PB light bluish gray				85		85	
90	Sandy Limestone, Gley 1 8/10Y light greenish gray, 2.5YR 7/3 light reddish brown, fine sand grains				90		90	
95	Quartzite, 2.5Y 8/6 yellow to 2.5Y 8/2 pale yellow, hard, no HCl reaction				95		95	
100					100		100	



Log of Monitoring Well MW-108D

(Page 3 of 3)

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 149' bgs

Drilling Bit Diameter : 10" to 72'bgs, 6" to 149'bgs
 Final Completion : 10/30/07-11/1/07
 Well Construction : Open Rock
 Well Development : 1/10/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-108D Elev. 426.35:	Depth in Feet	Well Construction Information	
100	Same As Above: Quartzite				100	— 6" Drilling — Open Rock	100	WELL CONSTRUCTION Date Compl. : 11/1/07 Hole Diameter : 10", 6" Total Depth of Well: 149' bgs	
	Limestone, Gley 2 3/10B very dark bluish gray							105	WELL CASING Diameter : 6" Steel From : 0-72' bgs
105	Quartzite, Gley 2 3/5 to Gley 2 5/5PB, very dark bluish gray to bluish gray				105				BENTONITE Type : 3/8" Hole Plug Amount : 1 Bag
	Quartzite, Gley 2 4/10B, dark bluish gray							110	GROUT Type : Bentonite/ Amount : Portland Cement : 3 bags/25 bags
110					110				WELL COVER Type : Flush Mount
115					115			120	Static water level @ 27.23' bgs on 11/1/07. 10" Diameter Drilling (0 - 72' bgs) 6" Steel Casing (0 - 72' bgs) 6" Diameter Drilling (72' - 149' bgs)
120					120			125	
	VOID				125				
	Fine Grained Sandstone, 7.5YR 3/4 dark brown							130	
130					130			135	
135	Quartzite, Gley 1 5/N gray				135			140	
	Fine grained weathered sandstone, Gley 1 3/10GY very dark greenish gray							145	
140	Sandy Limestone, Gley 1 5/5G, greenish gray				140			145	
	Weathered fine grained sandstone, 7.5YR 3/1, very dark gray							150	
145					145				
150	END BORING @ 149 FEET BGS				150				



BORING LOG OF MW-108S

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
Logged By : Emily M. Wade
Drilling Method : Hollow Stem Auger
Drilling Bit Diameter : 4 1/4"
Drilling Started : 1-25-08

Drilling Completed : 1-25-08
Well Construction : 1-28-08
Well Development : 2-15-08
Water Elev./Date : 33.28' bgs / 2-15-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.1	GRAPHIC	Well: MW-108S Elev. 425.46:	Well Construction Information
0		3	Clayey Silt, dark yellowish brown (10YR 4/6), semi-dense, dry	ML			<p>Cover Concrete Grout Riser</p>	WELL CONSTRUCTION Date Completed : 1-28-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 25.1' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 25.1' to 55.1' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 22-50 lb. bags Bentonite Seal (18' - 22.9' bgs) 5, 50 lb. bags Type II Portland Cement with 5% bentonite crumbles, 4-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags MW-108S was backfilled from 68.5' bgs to 55.1' bgs with 3/8" Bentonite Chips and #1 Morie Sand. Flush Mount Surface Completion
0.9'/2.0'		2	Accumulated Lost Core		0.1			
1.8'/2.0'		2	SAME AS ABOVE	ML				
		3	Silt, yellowish brown (10YR 5/6), no plasticity, <3% sub rounded quartzite, damp	ML	0.0			
		5	Accumulated Lost Core					
		11	SAME AS ABOVE	ML				
5		8	Accumulated Lost Core					
		6	SAME AS ABOVE	ML	0.0			
1.6'/2.0'		17	Accumulated Lost Core					
		22	SAME AS ABOVE	ML				
0.9'/2.0'		5	Accumulated Lost Core					
		7	SAME AS ABOVE	ML	0.2			
		17	Accumulated Lost Core					
		16	SAME AS ABOVE	ML				
1.6'/2.0'		10	Silt, dark yellowish brown (10YR 5/6), no plasticity, low density, <5% sub angular to sub rounded quartzite fragments, <5% fine to coarse sand	ML	0.3			
		10	Accumulated Lost Core					
		13	SAME AS ABOVE	ML				
10		14	Accumulated Lost Core					
		8	SAME AS ABOVE	ML	0.0			
1.9'/2.0'		8	Accumulated Lost Core					
		12	SAME AS ABOVE	ML				
		16	Accumulated Lost Core					
2.0'/2.0'		5	SAME AS ABOVE	ML				
		5	Silty Clay, yellowish brown (10YR 5/6), low to medium plasticity, semi-dense, <5% fine sand, moist	CL	0.0			
		7	Accumulated Lost Core					
		8	SAME AS ABOVE	CL				
2.0'/2.0'		8	Accumulated Lost Core					
		7	SAME AS ABOVE: yellowish brown (10YR 5/8), brownish yellow (10YR 6/8) mottling	CL	0.2			
15		7						



BORING LOG OF MW-108S

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
Logged By : Emily M. Wade
Drilling Method : Hollow Stem Auger
Drilling Bit Diameter : 4 1/4"
Drilling Started : 1-25-08

Drilling Completed : 1-25-08
Well Construction : 1-28-08
Well Development : 2-15-08
Water Elev./Date : 33.28' bgs / 2-15-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.1	GRAPHIC	Well: MW-108S Elev. 425.46:	Well Construction Information
15	2.0'/2.0'	7	SAME AS ABOVE	CL	0.2			WELL CONSTRUCTION Date Completed : 1-28-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 25.1' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 25.1' to 55.1' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 22-50 lb. bags Bentonite Seal (18' - 22.9' bgs) 5, 50 lb. bags Type II Portland Cement with 5% bentonite crumbles, 4-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags MW-108S was backfilled from 68.5' bgs to 55.1' bgs with 3/8" Bentonite Chips and #1 Morie Sand. Flush Mount Surface Completion
		9						
	2.0'/2.0'	3	Clay, strong brown (7.5YR 4/6), low plasticity, semi-dense, <3% fine sand, reddish yellow (7.5YR 6/8) and red (2.5YR 4/8) mottling, moist	CL	0.3			
		3						
		6						
	2.0'/2.0'	7	Clay, yellowish brown (10YR 5/8), low plasticity, semi-dense, moist	CL	0.0			
		7						
		8						
		9	Clay, strong brown (7.5YR 4/6), low plasticity, semi-dense, moist, red (2.5YR 4/6) mottling	CL				
20	2.0'/2.0'	2	SAME AS ABOVE: with black (10YR 2/1) mottling	CL	0.1			
		3						
		5						
		6						
	2.0'/2.0'	6	SAME AS ABOVE	CL	0.1			
		8						
		9						
		12	SAME AS ABOVE: with <2% sub angular to sub rounded quartzite fragments	CL				
	2.0'/2.0'	11	Clay, yellowish brown (10YR 5/8), medium plasticity, semi-dense, <5% sub angular to sub rounded quartzite fragments, mottling brownish yellow (10YR 6/8) and very pale brown (10YR 7/4)	CL	0.1			
25	2.0'/2.0'	10						
		12						
		13						
	2.0'/2.0'	4	SAME AS ABOVE: low plasticity	CL	0.1			
		7						
		11						
		12						
	2.0'/2.0'	9	SAME AS ABOVE: <7% angular to sub angular quartzite fragments and coarse sand	CL	0.1			
		13						
		12						
30		22						



BORING LOG OF MW-108S

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Former York Naval Ordnance Plant
Supplemental RI
1425 Eden Road, York, PA
SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
Logged By : Emily M. Wade
Drilling Method : Hollow Stem Auger
Drilling Bit Diameter : 4 1/4"
Drilling Started : 1-25-08

Drilling Completed : 1-25-08
Well Construction : 1-28-08
Well Development : 2-15-08
Water Elev./Date : 33.28' bgs / 2-15-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.1	GRAPHIC	Well: MW-108S Elev. 425.46:	Well Construction Information
30		4	SAME AS ABOVE	CL			<p>Screen #1 Sand</p>	WELL CONSTRUCTION Date Completed : 1-28-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 25.1' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 25.1' to 55.1' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 22-50 lb. bags Bentonite Seal (18' - 22.9' bgs) 5, 50 lb. bags Type II Portland Cement with 5% bentonite crumbles, 4-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags MW-108S was backfilled from 68.5' bgs to 55.1' bgs with 3/8" Bentonite Chips and #1 Morie Sand. Flush Mount Surface Completion
2.0'/2.0'		5	Clay, yellowish brown (10YR 5/8), low plasticity, dense, very pale brown (10YR 7/4) mottling	CL	0.1			
		7						
		9						
2.0'/2.0'		9	SAME AS ABOVE: <3% quartzite fragments					
		9			0.1			
		12		CL				
		18						
35	0.9'/2.0'	13	Accumulated Lost Core		0.1			
		12						
		11						
		17						
		8	No recovery					
		9						
	0.0'/2.0'	11						
		13						
		4	SAME AS ABOVE	CL				
2.0'/2.0'		5			0.1			
		8	Clay, yellowish brown (10YR 5/8), low plasticity, semi-dense, saturated, <3% fine sand	CL				
		13						
40		5	SAME AS ABOVE: dark yellowish brown (10YR 3/4) mottling					
		5			0.0			
	2.0'/2.0'	7		CL				
		10						
		5	Clay, brownish yellow (10YR 6/8), medium plasticity, semi-dense, saturated, <3% fine sand					
	2.0'/2.0'	5		CL	0.0			
		5						
		6						
		1	SAME AS ABOVE: dark brown (7.5YR 3/4) and brown (7.5YR 4/4) mottling					
	2.0'/2.0'	1		CL	0.0			
45								



BORING LOG OF MW-108S

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 1-25-08

Drilling Completed : 1-25-08
 Well Construction : 1-28-08
 Well Development : 2-15-08
 Water Elev./Date : 33.28' bgs / 2-15-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.1	GRAPHIC	Well: MW-108S Elev. 425.46:	Well Construction Information		
45	2.0'/2.0'	3	SAME AS ABOVE	CL	0.0			WELL CONSTRUCTION Date Completed : 1-28-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 25.1' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 25.1' to 55.1' BGL Joints : Flush Threaded Opening : 0.010 slot		
		3								
		2								
	2.0'/2.0'	4								
		8								
		10								
	2.0'/2.0'	6								
		4								
		5								
		12								
50	2.0'/2.0'	2								
		3								
		4								
		8								
	2.0'/2.0'	5	SAME AS ABOVE: <3% fine sand		0.0		ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 22-50 lb. bags Bentonite Seal (18' - 22.9' bgs) 5, 50 lb. bags Type II Portland Cement with 5% bentonite crumbles, 4-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags MW-108S was backfilled from 68.5' bgs to 55.1' bgs with 3/8" Bentonite Chips and #1 Morie Sand. Flush Mount Surface Completion			
		13								
		20								
		29								
	2.0'/2.0'	2	Clay, strong brown (7.5 YR 5/8), low plasticity, dense, moist, <3% fine sand, yellowish brown (10YR 5/8) mottling	CL	0.0					
		9								
		6								
		13								
	2.0'/2.0'	11								
		13								
		15								
		23								
	2.0'/2.0'	2					Clay, yellowish brown (10YR 5/8), medium plasticity, saturated, <3% fine sand, <3% sub angular to sub rounded quartzite fragments, strong brown (7.5 YR 5/8) mottling	CL	0.0	
		6								
		5								
		10								
60										

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BORING LOG OF MW-108S

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 1-25-08

Drilling Completed : 1-25-08
 Well Construction : 1-28-08
 Well Development : 2-15-08
 Water Elev./Date : 33.28' bgs / 2-15-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.1	GRAPHIC	Well: MW-108S Elev. 425.46:	Well Construction Information
60	2.0'/2.0'	6	SAME AS ABOVE				Backfill	WELL CONSTRUCTION Date Completed : 1-28-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 25.1' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 25.1' to 55.1' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 22-50 lb. bags Bentonite Seal (18' - 22.9' bgs) 5, 50 lb. bags Type II Portland Cement with 5% bentonite crumbles, 4-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags MW-108S was backfilled from 68.5' bgs to 55.1' bgs with 3/8" Bentonite Chips and #1 Morie Sand. Flush Mount Surface Completion
		7		CL	0.0			
		13						
		23						
	2.0'/2.0'	23	Clay, brown (7.5 YR 4/4), low plasticity, dense, moist, <3% fine sand, <3% sub rounded quartzite fragments, yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8) mottling	CL	0.0			
		22						
		35						
		31						
65	2.0'/2.0'	7	SAME AS ABOVE: with subrounded, weathered limestone fragments		0.0			
		12						
		24						
		31		CL				
	2.0'/2.0'	9						
		41			0.0			
		50/4						
			Split Spoon Refusal @ 68' bgs					
			Auger refusal @ 68.5' bgs					
70								
75								



Log of Monitoring Well MW-109D

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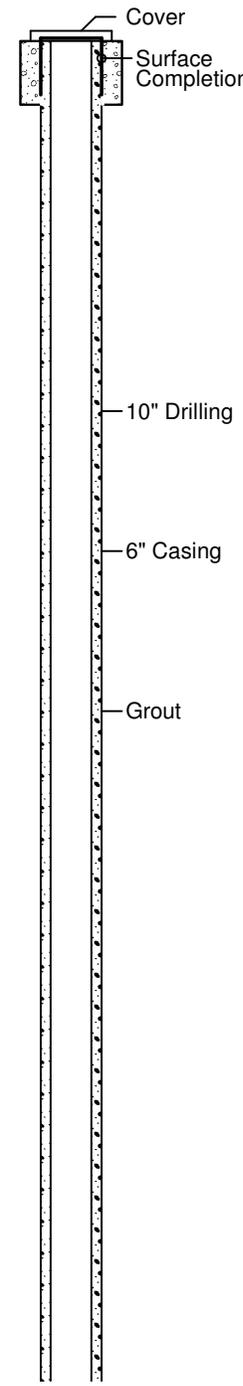
Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 100' bgs

Drilling Bit Diameter : 10" to 88'bgs, 6" to 100'bgs
 Final Completion : 11/2/07-11/6/07
 Well Construction : Open Rock
 Well Development : 1/10/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	Fill, 10YR 4/6 dark yellowish brown Asphalt and B3 gravel, B4 Limestone gravel for road construction			0.1	0	WELL CONSTRUCTION Date Compl. : 11/6/07 Hole Diameter : 10", 6" Total Depth of Well : 100' bgs
5	ML, silt, 10YR 5/6 yellowish brown, semi-dense, damp, no plasticity ML, clayey silt, 10YR 5/6 yellowish brown, low plasticity, mottling, damp			0.2	5	
10	CL, clayey silt, 10YR 4/6 dark yellowish brown, slight plasticity, moist, sub rounded gravel <5%			0.1	10	WELL COVER Type : Flush Mount
15	CL, clay, 7.5YR 4/6 strong brown, medium plasticity, moist, "balled" cuttings, <3% angular quartzite fragments			0.0	15	Static water level @ 37.81' bgs on 11/7/07. 10" Diameter Drilling (0 - 88' bgs) 6" Diameter Steel Casing (0 - 88' bgs) 6" Diameter Drilling (88' - 100'bgs)
20	SM, silty sand, 10YR 6/6 brownish yellow, fine to coarse sand, <8% quartzite fragments, moist			0.4	20	
25	SM, silty sand, 10YR 5/6 yellowish brown, <5% angular quartzite, moist, fine to coarse sand			0.4	25	
30	SC, slightly clayey sand, 2.5Y 7/6 yellow, low plasticity, moist, <3% angular quartzite fragments			0.3	30	
35	SC, clayey sand, 10YR 5/8 yellowish brown, fine to coarse grains, low plasticity, <5% angular quartzite fragments			0.0	35	
40	CL, clay, 10YR 3/4 dark yellowish brown, low plasticity, moist, semi-dense, <8% fine to coarse sand			0.4	40	
45	CL, clay, 10YR 4/6 dark yellowish brown, medium plasticity, "balled" cuttings, semi-dense			0.1	45	
50	CL, clay, 10YR 5/6 dark yellowish brown, medium to low plasticity, moist, "balled" cuttings, semi-dense			0.1	50	

Well: MW-109D
 Elev. 389.12:



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Log of Monitoring Well MW-109D

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 100' bgs

Drilling Bit Diameter : 10" to 88'bgs, 6" to 100'bgs
 Final Completion : 11/2/07-11/6/07
 Well Construction : Open Rock
 Well Development : 1/10/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-109D Elev. 389.12:	Depth in Feet	Well Construction Information
50	Same As Above: CL, clay	[Hatched Pattern]		0.1	50		50	WELL CONSTRUCTION Date Compl. : 11/6/07 Hole Diameter : 10", 6" Total Depth of Well: 100' bgs
55					55		55	WELL CASING Diameter : 6" Steel From : 0-88' bgs
60					60		60	BENTONITE Type : 3/8" Hole Plug Amount : 13 bags
65					65		65	GROUT Type : Bentonite/ Amount : Portland Cement : 5 bags/55 bags
68.5	CL, clay, 10YR 6/8 brownish yellow, medium plasticity, saturated, slight hydrocarbon odor	[Hatched Pattern]			68.5		68.5	WELL COVER Type : Flush Mount
70	Weathered Limestone, Gley 2 3/5PB very dark bluish gray	[Brick Pattern]			70		70	Static water level @ 37.81' bgs on 11/7/07.
75	Limestone, Gley 2 3/5PB	[Brick Pattern]			75		75	10" Diameter Drilling (0 - 88' bgs) 6" Diameter Steel Casing (0 - 88' bgs) 6" Diameter Drilling (88' - 100'bgs)
80	VOID	[Empty]			80		80	
85	Weathered Limestone, Gley 2 3/5PB	[Brick Pattern]			85		85	
90	Limestone, Gley 2 3/5PB	[Brick Pattern]			90		90	
95	Strong Hydro-carbon odor, Weathered Limestone, Gley 2 3/5PB	[Brick Pattern]			95	95		
100	Limestone, Gley 2 3/5PB END BORING @ 100' BGS	[Brick Pattern]			100	100		

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BORING LOG OF MW-109S

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Former York Naval Ordnance Plant
 Supplemental Ri
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 1-29-08

Drilling Completed : 1-29-08
 Well Construction : 1-30-08
 Well Development : 2-15-08
 Water Elev./Date : 33.90' bgs / 2-15-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC
0		4	Clayey Silt, dark yellowish brown (10YR 4/4), low plasticity, semi-dense, dry, <5% quartzite fragments, fill	ML	0.0	
1.1'/2.0'		6	Clayey Silt, brown (10YR 4/3), fill	ML	0.0	
		50/2	Accumulated Lost Core			
			Asphalt sub road--no split spoons			
5	2.0'/2.0'	3	Clayey Silt, yellowish brown (10YR 5/6), no plasticity, semi-dense, <3% sub angular to sub rounded quartzite fragments, damp	ML	0.5	
		5				
		6				
		7				
		2	Silty Clay, dark yellowish brown (10YR 4/6), semi-dense, <5% sub angular quartzite fragments, damp	CL	0.5	
0.9'/2.0'		5	Accumulated Lost Core			
		5				
		8				
		8	Silty Clay, strong brown (7.5YR 4/6), low plasticity, semi-dense, <5% sub rounded quartzite, dry	CL	0.5	
2.0'/2.0'		7				
		8				
10	1.6'/2.0'	2	SAME AS ABOVE: damp	CL	0.0	
		2				
		3				
		4	Accumulated Lost Core			
		2	SAME AS ABOVE			
		3				
		3				
		5				
		4	Clayey Silt, strong brown (7.5YR 5/6), low plasticity, semi-dense, moist	CL	0.0	
1.7'/2.0'		4				
		6				
15		6				

Well: MW-109S
 Elev. 388.39:

Well Construction Information

WELL CONSTRUCTION
 Date Completed : 1-30-08
 Auger I.D. : 4 1/4"
 Drilling Method : Hollow Stem Auger
 Driller : Nate Moyer

WELL CASING :
 Material : Sch 40 PVC
 Diameter : 2"
 From : 0' to 45.0' BGL
 Joints : Flush Threaded

WELL SCREEN :
 Material : Sch 40 PVC
 Diameter : 2"
 From : 45.0' to 65.0' BGL
 Joints : Flush Threaded
 Opening : 0.010 slot

ADDITIONAL CONSTRUCTION DETAILS
 #1 Morie Sand, 15-50 lb. bags
 Bentonite Seal (38.5' - 42.9' bgs)
 Bentonite Chips, 1-50 lb. bag
 Bentonite Pellets, 1-5 gallon bucket
 Type II Portland Cement with 5% bentonite crumbles, 19-94 lb. bags
 Sakrete Surface Completion, 2-84 lb. bags
 Flush Mount Surface Completion

First attempt drilling MW-109S, refusal at 46.5' bgs. The location was abandoned by grouting. The location was moved and the second attempt refusal was at 65' bgs. The monitoring well was constructed in the second boring.



BORING LOG OF MW-109S

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Former York Naval Ordnance Plant
 Supplemental Ri
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 1-29-08

Drilling Completed : 1-29-08
 Well Construction : 1-30-08
 Well Development : 2-15-08
 Water Elev./Date : 33.90' bgs / 2-15-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-109S Elev. 388.39:	Well Construction Information
15	1.7'/2.0'	4	SAME AS ABOVE	CL	0.0		<p>Grout</p> <p>Riser</p>	WELL CONSTRUCTION Date Completed : 1-30-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 45.0' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 45.0' to 65.0' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 15-50 lb. bags Bentonite Seal (38.5' - 42.9' bgs) Bentonite Chips, 1-50 lb. bag Bentonite Pellets, 1-5 gallon bucket Type II Portland Cement with 5% bentonite crumbles, 19-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags Flush Mount Surface Completion First attempt drilling MW-109S, refusal at 46.5' bgs. The location was abandoned by grouting. The location was moved and the second attempt refusal was at 65' bgs. The monitoring well was constructed in the second boring.
		4	Accumulated Lost Core					
	1.6'/2.0'	3	Silty Clay, light yellowish brown (10YR 6/4), low plasticity, dense, damp, brownish yellow (10YR 6/8) mottling	CL	0.1			
		2						
		3	Accumulated Lost Core					
		7	Accumulated Lost Core					
	1.4'/2.0'	10	SAME AS ABOVE	CL	0.0			
		9						
		9	Accumulated Lost Core					
		12	Accumulated Lost Core					
20	1.8'/2.0'	3	SAME AS ABOVE	CL	0.0			
		6	Gravelly Silt, very pale brown (10YR 7/4), <8% sub rounded quartzite, <5% fine and coarse sand, low density, dry	GM	0.0			
		6						
		9	Accumulated Lost Core					
		12	SAME AS ABOVE	GM	0.0			
	0.4'/2.0'	12	Accumulated Lost Core		0.0			
		12						
		15	Accumulated Lost Core					
		6	SAME AS ABOVE	GM	0.1			
	0.2'/2.0'	7	Accumulated Lost Core					
25		7						
		9						
	2.0'/2.0'	3	Silty Clay, yellow (10YR 7/6), medium plasticity, dense, damp, light gray (10YR 7/2) mottling, <3% sub rounded quartzite	CL	0.0			
		5						
		8	SAME AS ABOVE: no mottling					
		9						
	2.0'/2.0'	7		CL	0.1			
		6						
		17						
30		12						

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BORING LOG OF MW-109S

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Former York Naval Ordnance Plant
 Supplemental Ri
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 1-29-08

Drilling Completed : 1-29-08
 Well Construction : 1-30-08
 Well Development : 2-15-08
 Water Elev./Date : 33.90' bgs / 2-15-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-109S Elev. 388.39:	Well Construction Information
30	2.0'/2.0'	3 5 7	Silty Clay, yellowish brown (10YR 5/6), low plasticity, dense, dry, <5% sub angular to sub rounded quartzite, <2% fine sand	CL	0.0		<p>Well: MW-109S Elev. 388.39:</p> <p>Well Construction Information</p> <p>WELL CONSTRUCTION</p> <p>Date Completed : 1-30-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer</p> <p>WELL CASING :</p> <p>Material : Sch 40 PVC Diameter : 2" From : 0' to 45.0' BGL Joints : Flush Threaded</p> <p>WELL SCREEN :</p> <p>Material : Sch 40 PVC Diameter : 2" From : 45.0' to 65.0' BGL Joints : Flush Threaded Opening : 0.010 slot</p> <p>ADDITIONAL CONSTRUCTION DETAILS</p> <p>#1 Morie Sand, 15-50 lb. bags</p> <p>Bentonite Seal (38.5' - 42.9' bgs) Bentonite Chips, 1-50 lb. bag Bentonite Pellets, 1-5 gallon bucket</p> <p>Type II Portland Cement with 5% bentonite crumbles, 19-94 lb. bags</p> <p>Sakrete Surface Completion, 2-84 lb. bags</p> <p>Flush Mount Surface Completion</p> <p>First attempt drilling MW-109S, refusal at 46.5' bgs. The location was abandoned by grouting. The location was moved and the second attempt refusal was at 65' bgs. The monitoring well was constructed in the second boring.</p>	
	2.0'/2.0'	9 10 12 15	Clay, yellow (10YR 8/8), low plasticity, dense, dry, brownish yellow (10YR 6/8) mottling, <3% sub rounded quartzite fragments	CL	0.1			
	0.2'/2.0'	10 8	SAME AS ABOVE Accumulated Lost Core	CL	0.2			
35	2.0'/2.0'	2 4 6	Clay, yellowish brown (10YR 5/8), low plasticity, dense, damp, <5% sub rounded quartzite fragments	CL	0.1			
	1.8'/2.0'	2 3 5 7	SAME AS ABOVE: semi-dense, medium plasticity, moist	CL	0.0			
40	1.5'/2.0'	5 10 10 15	Accumulated Lost Core Clay, yellowish brown (10YR 5/6), medium plasticity, semi-dense, saturated, <5% sub angular to sub rounded quartzite Accumulated Lost Core	CL	0.0			
	1.9'/2.0'	12 12 13 13	SAME AS ABOVE SAME AS ABOVE: moist, dense, <8% angular quartzite fragments	CL	0.0			
45	1.6'/2.0'	9 10 12 15	Accumulated Lost Core SAME AS ABOVE	CL	0.0			

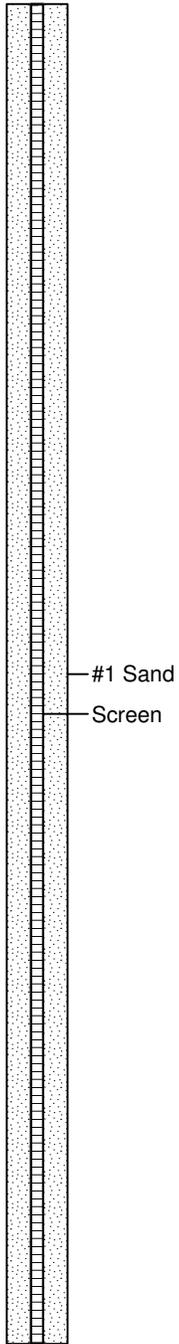
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Former York Naval Ordnance Plant
 Supplemental Ri
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 1-29-08

Drilling Completed : 1-29-08
 Well Construction : 1-30-08
 Well Development : 2-15-08
 Water Elev./Date : 33.90' bgs / 2-15-08

Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-109S Elev. 388.39:	Well Construction Information
45	1.6'/2.0'	9 10 12 15	SAME AS ABOVE	CL	0.0		<p>WELL CONSTRUCTION</p> <p>Date Completed : 1-30-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer</p> <p>WELL CASING :</p> <p>Material : Sch 40 PVC Diameter : 2" From : 0' to 45.0' BGL Joints : Flush Threaded</p> <p>WELL SCREEN :</p> <p>Material : Sch 40 PVC Diameter : 2" From : 45.0' to 65.0' BGL Joints : Flush Threaded Opening : 0.010 slot</p> <p>ADDITIONAL CONSTRUCTION DETAILS</p> <p>#1 Morie Sand, 15-50 lb. bags</p> <p>Bentonite Seal (38.5' - 42.9' bgs) Bentonite Chips, 1-50 lb. bag Bentonite Pellets, 1-5 gallon bucket</p> <p>Type II Portland Cement with 5% bentonite crumbles, 19-94 lb. bags</p> <p>Sakrete Surface Completion, 2-84 lb. bags</p> <p>Flush Mount Surface Completion</p> <p>First attempt drilling MW-109S, refusal at 46.5' bgs. The location was abandoned by grouting. The location was moved and the second attempt refusal was at 65' bgs. The monitoring well was constructed in the second boring.</p>	
			Accumulated Lost Core					
	1.4'/2.0'	4 8 9 15	SAME AS ABOVE: Saturated	CL	0.0			
			Accumulated Lost Core					
	2.0'/2.0'	12 12 12	Gravelly clay, brownish yellow (10YR 6/8), low density, no plasticity, saturated, <15% sub rounded gravel	GC	0.0			
			Clay, yellowish brown (10YR 5/8), high plasticity, semi-dense, moist, brownish yellow (10YR 6/8) mottling	CL				
50	2.0'/2.0'	5 5 12	Gravelly clay, brownish yellow (10YR 6/8), low density, no plasticity, saturated, <15% sub rounded gravel	GC CL	0.0			
			Clay, yellowish brown (10YR 5/8), high plasticity, semi-dense, moist, brownish yellow (10YR 6/8) mottling	GC				
	2.0'/2.0'	8 12 15	Gravelly clay, brownish yellow (10YR 6/8), low density, no plasticity, saturated, <15% sub rounded gravel	CL	0.0			
			Clay, yellowish brown (10YR 5/8), high plasticity, semi-dense, moist, brownish yellow (10YR 6/8) mottling	GC				
55	0.8'/2.0'	9 9 17	Gravelly clay, yellowish brown (10YR 5/8), low density, no plasticity, saturated, <15% sub rounded gravel	GC	0.0			
			Accumulated Lost Core					
	2.0'/2.0'	4 4 7	SAME AS ABOVE	GC	0.0			
			Clay, yellowish brown (10YR 5/6), dense, moist, <3% sub rounded quartzite, brownish yellow (10YR 6/8) mottling	CL				
	2.0'/2.0'	3 5 6 6	Gravelly Clay, yellowish brown (10YR 5/6), saturated, <15% sub rounded quartzite	GC	0.0			
			Clay, yellowish brown (10YR 5/6), low plasticity, dense, moist, <3% sub rounded quartzite, yellow (10YR 7/6) mottling	CL				



Former York Naval Ordnance Plant
 Supplemental Ri
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelberger's Inc.
 Logged By : Emily M. Wade
 Drilling Method : Hollow Stem Auger
 Drilling Bit Diameter : 4 1/4"
 Drilling Started : 1-29-08

Drilling Completed : 1-29-08
 Well Construction : 1-30-08
 Well Development : 2-15-08
 Water Elev./Date : 33.90' bgs / 2-15-08

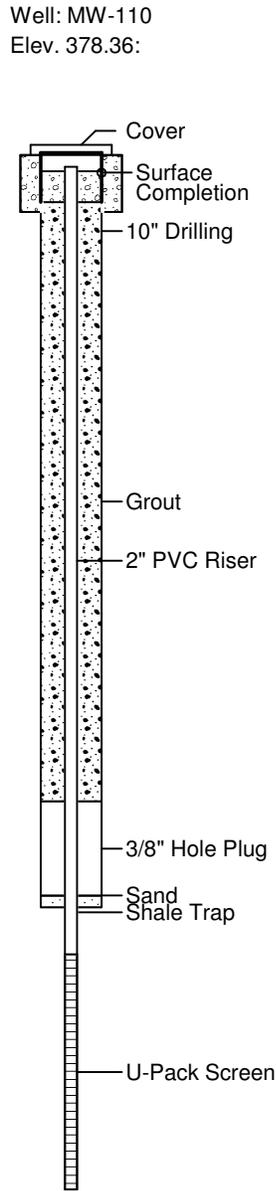
Depth in Feet	Recovery	Blow Count	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-109S Elev. 388.39:	Well Construction Information
60	2.0'/2.0'	4	Gravelly Clay, yellowish brown (10YR 5.6), saturated, <15 sub rounded quartzite	GC	0.0			WELL CONSTRUCTION Date Completed : 1-30-08 Auger I.D. : 4 1/4" Drilling Method : Hollow Stem Auger Driller : Nate Moyer WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0' to 45.0' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 45.0' to 65.0' BGL Joints : Flush Threaded Opening : 0.010 slot
		5						
		10	Clay, yellowish brown (10YR 5/8), low plasticity, dense, moist, <3% sub rounded quartzite fragments	CL				
	2.0'/2.0'	14	Clay, yellowish brown (10YR 5/8), saturated, weathered limestone fragments, very dark bluish gray (Gley 2 3/5PB), sub angular fragments	CL	0.0			
		27	Accumulated Lost Core					
		50/2	Split spoon refusal @ 64' bgs				ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 15-50 lb. bags Bentonite Seal (38.5' - 42.9' bgs) Bentonite Chips, 1-50 lb. bag Bentonite Pellets, 1-5 gallon bucket Type II Portland Cement with 5% bentonite crumbles, 19-94 lb. bags Sakrete Surface Completion, 2-84 lb. bags Flush Mount Surface Completion First attempt drilling MW-109S, refusal at 46.5' bgs. The location was abandoned by grouting. The location was moved and the second attempt refusal was at 65' bgs. The monitoring well was constructed in the second boring.	
65			Auger refusal @ 65" bgs					
70								
75								

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 55' bgs

Drilling Bit Diameter : 10" to 55'bgs
 Final completion : 11/7/07-11/8/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 1/10/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	ML, silt, 10YR 5/6 yellowish brown, no plasticity, 2% sub rounded quartzite fragments, damp			0.2	0	WELL CONSTRUCTION Date Compl. : 11/8/07 Hole Diameter : 10" Total Depth of Well: 55' bgs
5	ML, silt, 10YR 4/6 dark yellowish brown, very low plasticity, moist, <3% rounded quartzite			0.2	5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-34 bgs
10	ML, silt, dry, no plasticity, <3% sub rounded quartzite			0.1	10	Shale Trap Depth : 32' bgs WELL SCREEN Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 34-44' bgs
20	ML, clayey silt, low plasticity, moist, sub angular to sub rounded quartzite fragments (<3%)			0.2	20	SAND Type : #1 Morie Sand Amount : 1 bag
25	Limestone boulder, Gley 2 3/10B very dark bluish gray			0.1	25	BENTONITE Type : 3/8" Hole Plug Amount : 10 bags GROUT Type : Benseal/ Portland Cement Amount : 3 bags/15 bags
30	CL, clay, 10YR 5/8 yellowish brown, high plasticity, moist, "balled" cuttings, <3% angular quartzite and limestone fragments				30	WELL COVER Type : Flush Mount
35	Weathered Limestone, Gley 2 3/5PB very dark bluish gray, 10YR 4/4 brown clay				35	Notes: 10" Diameter Drilling (0 - 55' bgs) Bentonite Seal (27.5' - 31.5' bgs) Static water level @ 26.58' bgs on 1/10/08.
40	Competent Limestone, Gley 3/5PB very dark bluish gray		34		40	
45	VOID		37		45	
55	Bottom of Void Not Determined END BORING @ 55 FEET BGS				55	



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Log of Monitoring Well MW-111

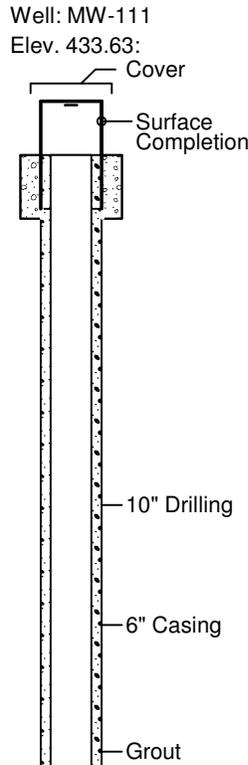
(Page 1 of 3)

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade, Andy Sallaway
 Drilling Method : Air Rotary
 Total Depth of Boring : 149' bgs

Drilling Bit Diameter : 10" to 85'bgs, 6" to 149'bgs
 Final Completion : 09/24/07-09/26/07
 Well Construction : Open Rock
 Well Development : 12/6/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	ML, silt, v. low clay, 7.5YR 4/4 brown, <2% rounded to sub rounded gravel, low plasticity, damp			0.0	0	WELL CONSTRUCTION Date Compl. : 09/26/07 Hole Diameter : 10", 6" Total Depth of Well : 149' bgs
5				0.0	5	WELL CASING Diameter : 6" Steel From : 0-82' bgs
10				0.0	10	GROUT Type : Bentonite/ : Portland Cement Amount : 3 bags/39 bags
15	ML, clayey silt, 5YR 4/6 yellowish red, <2% sub angular to sub rounded quartzite, low plasticity, damp			0.0	15	WELL COVER Type : Stick Up
20				0.0	20	Static water level @ 37.81' bgs on 11/7/07.
25				0.0	25	
30	CL, silty clay, 7.5YR 4/6 strong brown, medium plasticity, moist, <3% angular quartzite fragments			0.0	30	
35				0.0	35	
40	CL, silty clay, 7.5YR 4/4 brown, moist, medium to high plasticity 48' bgs driller turned on water			0.0	40	
45				0.0	45	
50				0.0	50	





Log of Monitoring Well MW-111

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade, Andy Sallaway
 Drilling Method : Air Rotary
 Total Depth of Boring : 149' bgs

Drilling Bit Diameter : 10" to 85'bgs, 6" to 149'bgs
 Final Completion : 09/24/07-09/26/07
 Well Construction : Open Rock
 Well Development : 12/6/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-111 Elev. 433.63:	Depth in Feet	Well Construction Information
50	Same As Above: CL, silty clay				50		50	WELL CONSTRUCTION Date Compl. : 09/26/07 Hole Diameter : 10", 6" Total Depth of Well : 149' bgs
55	CL, clay, 10YR 5/6 yellowish brown, <5% rounded to sub rounded quartzite fragments				55		55	WELL CASING Diameter : 6" Steel From : 0-82' bgs
60					60		60	GROUT Type : Bentonite/ : Portland Cement Amount : 3 bags/39 bags
65					65		65	WELL COVER Type : Stick Up
70	CL, clay, 10YR 6/8 brownish yellow, <5% sub rounded to rounded quartzite fragments				70		70	Static water level @ 37.81' bgs on 11/7/07.
75	Phyllite, Gley 1 3/N very dark gray, quartzite fragments from side wall, rounded to sub rounded				75		75	
80					80		80	
85	Quartzite, Gley 1 7/N to Gley 1 5/N, light gray to gray				85		85	
90					90		90	
95	Competent Quartzite, Gley 1 3/N to Gley 1 5/10Y, very dark gray to greenish gray, very fine crystalline chips, <1 cm				95		95	
100					100	100		



Log of Monitoring Well MW-111

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade, Andy Sallaway
 Drilling Method : Air Rotary
 Total Depth of Boring : 149' bgs

Drilling Bit Diameter : 10" to 85'bgs, 6" to 149'bgs
 Final Completion : 09/24/07-09/26/07
 Well Construction : Open Rock
 Well Development : 12/6/07

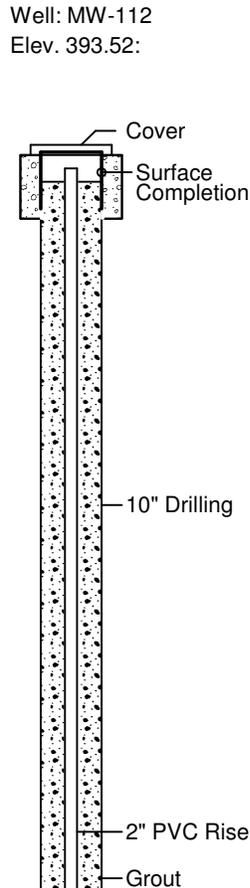
Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-111 Elev. 433.63:	Depth in Feet	Well Construction Information
100	Same As Above: Quartzite				100		100	WELL CONSTRUCTION Date Compl. : 09/26/07 Hole Diameter : 10", 6" Total Depth of Well : 149' bgs
105					105		105	WELL CASING Diameter : 6" Steel From : 0-82' bgs
110					110		110	GROUT Type : Bentonite/ : Portland Cement Amount : 3 bags/39 bags
115					115		115	WELL COVER Type : Stick Up
120	Competent Quartzite, Gley 1 5/10Y greenish gray, smaller chips, <1 cm				120	— 6" Drilling	120	Static water level @ 37.81' bgs on 11/7/07.
125					125	— Open Rock	125	
130	Quartzite, Gley 1 4/10Y dark greenish gray				130		130	
135					135		135	
140					140		140	
145	Competent Quartzite, Gley 1 3/N very dark greenish gray				145		145	
150	END BORING@ 149' BGS				150		150	

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 120' bgs

Drilling Bit Diameter : 10"to 92'bgs, 6"to 120'bgs
 Final completion : 10/18/07-10/22/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 12/6/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	Fill, 10YR 4/6, dark yellowish brown, silty, dense hard clay, sub angular gravel <7%			0.0	0	WELL CONSTRUCTION Date Compl. : 11/8/07 Hole Diameter : 10", 6" Total Depth of Well : 120' bgs
5				0.0	5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-100' bgs
10				0.0	10	WELL Screen Material : Sch. 40 PVC Slot Size : 0.010 Diameter : 2" From : 100-120' bgs
15	ML, silt, 7.5 YR 4/6 strong brown, very low clay, very low plasticity, sub rounded quartzite <3%			0.0	15	SAND Type : #1 Morie Sand Amount : 6.5 bags BENTONITE Type : 3/8" Hole Plug Amount : 4 bags
15	CL, silty clay, 7.5 YR 4/6 strong brown, low plasticity, moist, 5% sub angular quartzite			0.0	15	GROUT Type : Benseal/ Portland Cement Amount : 4 bags/40 bags
20	ML, silt, 10YR 4/6 dark yellowish brown, no plasticity, dry, <3% very fine sand			0.0	20	
20	ML, silt, 10YR 4/6 dark yellowish brown, moist, low plasticity			0.0	20	
25	ML, silt with very low clay, 7.5YR 4/6, moist, very low plasticity			0.0	25	WELL COVER Type : Flush Mount
30				0.0	30	Static water level @ 52.30' bgs on 10/22/07. 10" Diameter Drilling (0 - 92' bgs) 6" Diameter Drilling (92' - 120' bgs)
35				0.0	35	Bentonite Seal (92 - 97.5' bgs) 4, 50 lb bags
40				0.0	40	
45	ML, clayey silt, 10YR 4/4 dark yellowish brown, low to medium plasticity, moist, <3% sub rounded quartzite			0.0	45	
45	CL, silty clay, 10YR 3/4 dark yellowish brown, medium plasticity, moist, "balled" cuttings, <3% sub rounded quartzite fragments			0.0	45	
50				0.0	50	





Log of Monitoring Well MW-112

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 120' bgs

Drilling Bit Diameter : 10"to 92'bgs, 6"to 120'bgs
 Final completion : 10/18/07-10/22/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 12/6/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-112 Elev. 393.52:	Depth in Feet	Well Construction Information
50	Same As Above: CL, silty clay				50		50	WELL CONSTRUCTION Date Compl. : 11/8/07 Hole Diameter : 10", 6" Total Depth of Well: 120' bgs
55	CL, med. plasticity clay, 10YR 4/4 dark yellowish brown, 5% angular Limestone Gley 2 2.5/5PB bluish black			0.0	55		55	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-100' bgs
60	Same As Above--no limestone fragments				60		60	WELL Screen Material : Sch. 40 PVC Slot Size : 0.010 Diameter : 2" From : 100-120' bgs
65					65		65	SAND Type : #1 Morie Sand Amount : 6.5 bags BENTONITE Type : 3/8" Hole Plug Amount : 4 bags
70					70		70	GROUT Type : Benseal/ Portland Cement Amount : 4 bags/40 bags
75					75		75	WELL COVER Type : Flush Mount
80					80		80	Static water level @ 52.30' bgs on 10/22/07. 10" Diameter Drilling (0 - 92' bgs) 6" Diameter Drilling (92' - 120' bgs)
85					85		85	Bentonite Seal (92 - 97.5' bgs) 4, 50 lb bags
90	Limestone, Gley 2 2.5/5PB bluish black				90		90	
95					95		95	
100					100	100		



Log of Monitoring Well MW-112

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Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 120' bgs

Drilling Bit Diameter : 10"to 92'bgs, 6"to 120'bgs
 Final completion : 10/18/07-10/22/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 12/6/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-112 Elev. 393.52:	Depth in Feet	Well Construction Information
100	Limestone, Gley 2 2.5/5PB bluish black		111		100		100	WELL CONSTRUCTION Date Compl. : 11/8/07 Hole Diameter : 10", 6" Total Depth of Well: 120' bgs
105					105		WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-100' bgs	
110					110		WELL Screen Material : Sch. 40 PVC Slot Size : 0.010 Diameter : 2" From : 100-120' bgs	
115					115		SAND Type : #1 Morie Sand Amount : 6.5 bags BENTONITE Type : 3/8" Hole Plug Amount : 4 bags	
120	END BORING @ 120 FEET BGS,				120		GROUT Type : Benseal/ : Portland Cement Amount : 4 bags/40 bags	
125		125	WELL COVER Type : Flush Mount					
130		130		Static water level @ 52.30' bgs on 10/22/07. 10" Diameter Drilling (0 - 92' bgs) 6" Diameter Drilling (92' - 120' bgs) Bentonite Seal (92 - 97.5' bgs) 4, 50 lb bags				
135		135						
140		140						
145		145						
150		150						

Former York Naval Ordnance Plant
 Supplemental RI
 1324 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 159' bgs

Drilling Bit Diameter : 10"to 110'bgs,6"to 159'bgs
 Final completion : 10/9/07-10/29/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 12/7/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-113 Elev. 371.02:	Depth in Feet	Well Construction Information
0	Asphalt and B4 limestone gravel			0.0	0		0	WELL CONSTRUCTION Date Compl. : 10/29/07 Hole Diameter : 10", 6" Total Depth of Well : 151' bgs
	ML, clayey silt, 10YR 5/4 yellowish brown, moist, low plasticity			0.0			5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-131 bgs Shale Trap Depth : 129' bgs
5	CL, silty clay, 10YR 4/4 dark yellowish brown, low to medium plasticity			0.0	5			WELL Screen Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 131'-151' bgs
	CL, medium plasticity clay, <5% fine sand, moist			0.0				SAND Type : #1 Morie Sand Amount : 1 bag
10	GC, sub rounded quartzite, clay matrix, 10YR 5/6 yellowish brown, low plasticity			0.0	10			BENTONITE Type : 3/8" Hole Plug Amount : 10 bags GROUT Type : Benseal/ : Portland Cement Amount : 3 bags/15 bags
15	CH, high plasticity clay, 10YR 5/6 yellowish brown, moist, "balled" cuttings, <3% sub rounded quartzite			0.0	15			WELL COVER Type : Flush Mount
20				0.0	20			Static water level @ 26.89' bgs on 10/29/07. 10" Diameter Drilling (0 - 110' bgs) 6" Diameter Drilling (110' - 159' bgs)
25				0.0	25			Bentonite Seal (119.5' - 125' bgs) 18, 50 lb bags Lost 6" Diameter stabilizer and rollercone bit in void, threads broke.
30				0.0	30			
35				0.0	35			
40				0.0	40			
45				0.0	45			
50	Weathered Limestone, Gley 2 3/5PB very dark bluish gray, in clay matrix, 10YR 5/8 yellowish brown			0.0	50			

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Log of Monitoring Well MW-113

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Former York Naval Ordnance Plant
 Supplemental RI
 1324 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 159' bgs

Drilling Bit Diameter : 10" to 110' bgs, 6" to 159' bgs
 Final completion : 10/9/07-10/29/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 12/7/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-113 Elev. 371.02:	Depth in Feet	Well Construction Information
50	Same As Above: Weathered Limestone				50	<p>10" Drilling</p> <p>2" PVC Riser</p> <p>Grout</p>	50	WELL CONSTRUCTION Date Compl. : 10/29/07 Hole Diameter : 10", 6" Total Depth of Well: 151' bgs
	VOID						55	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-131 bgs Shale Trap Depth : 129' bgs
55	Rounded to sub rounded quartzite and limestone fragments				55		60	WELL Screen Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 131'-151' bgs
	VOID						65	SAND Type : #1 Morie Sand Amount : 1 bag
60	Limestone, Gley 2 3/5PB very dark bluish gray				60		70	BENTONITE Type : 3/8" Hole Plug Amount : 10 bags GROUT Type : Benseal/ : Portland Cement Amount : 3 bags/15 bags
65					65		75	WELL COVER Type : Flush Mount
70					70		80	Static water level @ 26.89' bgs on 10/29/07. 10" Diameter Drilling (0 - 110' bgs) 6" Diameter Drilling (110' - 159' bgs)
	VOID						85	Bentonite Seal (119.5' - 125' bgs) 18, 50 lb bags Lost 6" Diameter stabilizer and rollercone bit in void, threads broke.
75					75		90	
80					80		95	
85	Weathered/Fractured Limestone, Gley 2 3/5PB				85	100		
	VOID, clay filled							
90					90			
95	Weathered Limestone, Gley 2 3/5PB				95			
	VOID							
100					100			



Log of Monitoring Well MW-113

(Page 3 of 4)

Former York Naval Ordnance Plant
 Supplemental RI
 1324 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 159' bgs

Drilling Bit Diameter : 10" to 110' bgs, 6" to 159' bgs
 Final completion : 10/9/07-10/29/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 12/7/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-113 Elev. 371.02:	Depth in Feet	Well Construction Information
100	Same As Above: VOID				100	10" Drilling	100	WELL CONSTRUCTION Date Compl. : 10/29/07 Hole Diameter : 10", 6" Total Depth of Well : 151' bgs
105					105	Grout	105	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-131 bgs Shale Trap Depth : 129' bgs
110	Competent Limestone, Gley 2 3/5PB very dark bluish gray				110	6" Drilling	110	WELL Screen Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 131'-151' bgs
115					115	Grout	115	SAND Type : #1 Morie Sand Amount : 1 bag
120					120	2" PVC Riser	120	BENTONITE Type : 3/8" Hole Plug Amount : 10 bags GROUT Type : Benseal/ : Portland Cement Amount : 3 bags/15 bags
125					125	3/8" Hole Plug	125	WELL COVER Type : Flush Mount
130					130	Sand	130	Static water level @ 26.89' bgs on 10/29/07. 10" Diameter Drilling (0 - 110' bgs) 6" Diameter Drilling (110' - 159' bgs)
135					135	Shale Trap	135	Bentonite Seal (119.5' - 125' bgs) 18, 50 lb bags
140	VOID				140	2" U-Pack Screen	140	Lost 6" Diameter stabilizer and rollercone bit in void, threads broke.
145					145		145	
150					150		150	



Log of Monitoring Well MW-113

(Page 4 of 4)

Former York Naval Ordnance Plant
 Supplemental RI
 1324 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 159' bgs

Drilling Bit Diameter : 10" to 110' bgs, 6" to 159' bgs
 Final completion : 10/9/07-10/29/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 12/7/07

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-113 Elev. 371.02:	Depth in Feet	Well Construction Information
150	Same As Above: VOID				150	 2" U-Pack Screen	150	WELL CONSTRUCTION Date Compl. : 10/29/07 Hole Diameter : 10", 6" Total Depth of Well: 151' bgs
	Weathered Limestone, Gley 2 3/5PB						155	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-131 bgs Shale Trap
155	Competent Limestone Bedrock, Gley 2 3/5PB				155		160	Depth : 129' bgs WELL Screen Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 131'-151' bgs
	VOID						165	SAND Type : #1 Morie Sand Amount : 1 bag
	Bottom of Void Not Determined						170	BENTONITE Type : 3/8" Hole Plug Amount : 10 bags GROUT Type : Benseal/ : Portland Cement Amount : 3 bags/15 bags
160	END BORING @ 159 FEET BGS				160		175	WELL COVER Type : Flush Mount
165					165		180	Static water level @ 26.89' bgs on 10/29/07. 10" Diameter Drilling (0 - 110' bgs) 6" Diameter Drilling (110' - 159' bgs)
170					170		185	Bentonite Seal (119.5' - 125' bgs) 18, 50 lb bags Lost 6" Diameter stabilizer and rollercone bit in void, threads broke.
175					175		190	
180					180		195	
185					185	200		
190					190			
195					195			
200					200			



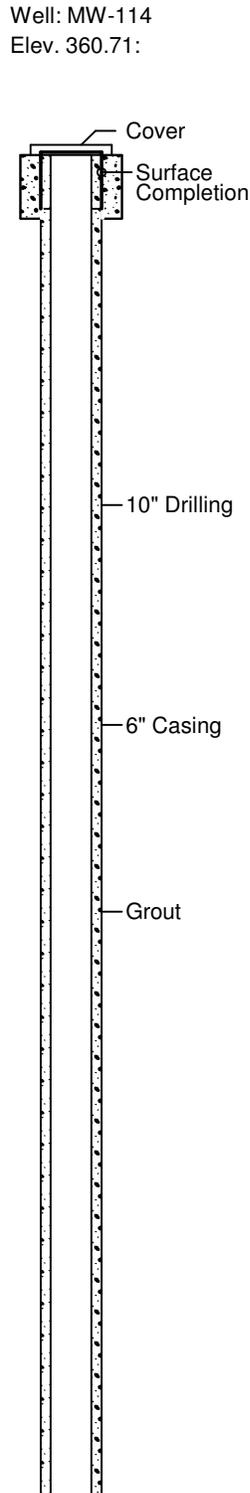
Log of Monitoring Well MW-114

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Larry Smith
 Drilling Method : Air Rotary
 Total Depth of Boring : 143.7' bgs

Drilling Bit Diameter : 10" to 90' bgs, 6" to 143.7' bgs
 Final Completion : 11/10/07-11/12/07
 Well Construction : Open Rock
 Well Development : 1/9/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	7.5YR 5/6 strong brown				0	WELL CONSTRUCTION Date Compl. : 11/12/07 Hole Diameter : 10", 6" Total Depth of Well : 143.7' bgs
5					5	WELL CASING Diameter : 6" Steel From : 0-90' bgs
10	7.5YR 3/2 dark brown Strong Brown				10	BENTONITE Type : 3/8" Hole Plug Amount : 20 bags GROUT Type : Bentonite/ Amount : Portland Cement : 5 bags/40 bags
15					15	WELL COVER Type : Flush Mount
20					20	Static water level @ 21' bgs on 11/12/07. 10" Diameter Drilling (0 - 90' bgs) 6" Diameter Steel Casing (0 - 90' bgs) 6" Diameter Drilling (90' - 143.7' bgs)
25	10YR 5/4, Yellowish Brown				25	
30	10YR 4/2, dark grayish brown				30	
35	2.5Y 5/4 light olive brown, LS fragments, Gley 2 5/1, bluish gray				35	
40					40	
45					45	
50	Limestone, Gley 2 5/1 greenish gray				50	



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Log of Monitoring Well MW-114

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Larry Smith
 Drilling Method : Air Rotary
 Total Depth of Boring : 143.7' bgs

Drilling Bit Diameter : 10" to 90' bgs, 6" to 143.7' bgs
 Final Completion : 11/10/07-11/12/07
 Well Construction : Open Rock
 Well Development : 1/9/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-114 Elev. 360.71:	Depth in Feet	Well Construction Information
50	Fractured Limestone, clayey void?				50		50	WELL CONSTRUCTION Date Compl. : 11/12/07 Hole Diameter : 10", 6" Total Depth of Well: 143.7' bgs
55	Fractured Limestone, strong brown discoloration				55		55	WELL CASING Diameter : 6" Steel From : 0-90' bgs BENTONITE Type : 3/8" Hole Plug Amount : 20 bags GROUT Type : Bentonite/ : Portland Cement Amount : 5 bags/40 bags
60	Competent Limestone, Gley 2 4/1 dark bluish gray, white calcite				60		60	WELL COVER Type : Flush Mount
65	Fractured limestone, strong brown discoloration				65	10" Drilling	65	Static water level @ 21' bgs on 11/12/07. 10" Diameter Drilling (0 - 90' bgs) 6" Diameter Steel Casing (0 - 90' bgs) 6" Diameter Drilling (90' - 143.7' bgs)
70	Competent Limestone, Gley 2 4/1 dark bluish gray to bluish gray				70		70	
75					75	6" Casing	75	
80	VOID- clay filled, strong brown discoloration				80		80	
85	Fractured limestone, trace of strong brown discoloration				85	Grout	85	
90	Competent Limestone, Gley 2 2.5/5PB, bluish black, calcite				90		90	
95			93		95	6" Drilling	95	
100					100	Open Rock	100	



Log of Monitoring Well MW-114

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Larry Smith
 Drilling Method : Air Rotary
 Total Depth of Boring : 143.7' bgs

Drilling Bit Diameter : 10" to 90' bgs, 6" to 143.7' bgs
 Final Completion : 11/10/07-11/12/07
 Well Construction : Open Rock
 Well Development : 1/9/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-114 Elev. 360.71:	Depth in Feet	Well Construction Information
100	Competent Limestone, bluish gray, calcite				100	— 6" Drilling — Open Rock	100	WELL CONSTRUCTION Date Compl. : 11/12/07 Hole Diameter : 10", 6" Total Depth of Well : 143.7' bgs
105			108		105		105	WELL CASING Diameter : 6" Steel From : 0-90' bgs
110			112		110		110	BENTONITE Type : 3/8" Hole Plug Amount : 20 bags
115					115		115	GROUT Type : Bentonite/ Amount : Portland Cement : 5 bags/40 bags
120	Competent Limestone, dark bluish gray, calcite				120		120	WELL COVER Type : Flush Mount
125					125		125	Static water level @ 21' bgs on 11/12/07. 10" Diameter Drilling (0 - 90' bgs) 6" Diameter Steel Casing (0 - 90' bgs) 6" Diameter Drilling (90' - 143.7' bgs)
130			132		130		130	
135					135		135	
140	Fracture 0.6 gpm, water discoloration				140		140	
140	Competent Limestone, dark bluish gray, calcite				140		140	
145	END BORING @ 143.7' BGS				145		145	
150					150		150	

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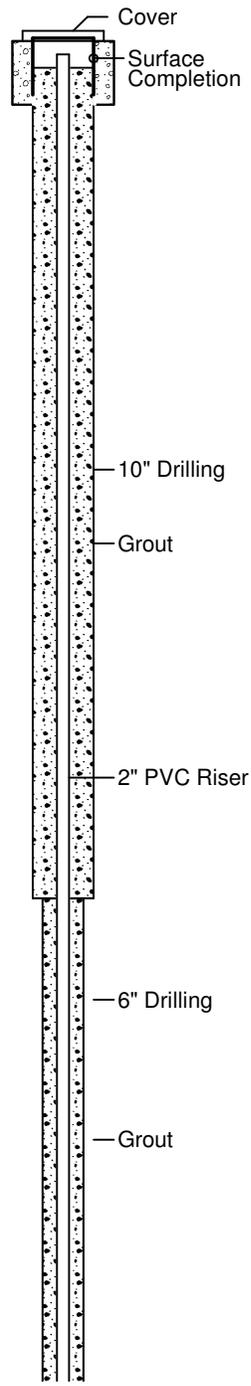
Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 125' bgs

Drilling Bit Diameter : 10" to 32' bgs, 6" to 125' bgs
 Final completion : 10/22/07-10/25/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 1/8/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	Asphalt and B4 limestone gravel				0	WELL CONSTRUCTION Date Compl. : 10/25/07 Hole Diameter : 10", 6" Total Depth of Well : 124.5' bgs
5	ML, clayey silt, 10YR 3/4 dark yellowish brown, damp, low plasticity, <5% sub rounded gravel			3.0	5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-114.5 bgs Shale Trap Depth : 112.5' bgs
10	ML, clayey silt, 10YR 5/6 yellowish brown, low plasticity, moist			1.2	10	WELL Screen Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 114.5'-124.5' bgs
15	ML, silt, very low clay, 7.5YR 4/6 strong brown, low plasticity, damp, <2% sub rounded gravel			0.0	15	SAND Type : #1 Morie Sand Amount : 1 bag
20	SM, silty sand, 10YR 5/6 yellowish brown, fine to medium sand, moist			0.0	20	BENTONITE Type : 3/8" Hole Plug Amount : 1 bag GROUT Type : Benseal/ : Portland Cement Amount : 4 bags/16 bags
25	CL, clay, medium plasticity, mottling, semi-dense, moist, <5% rounded to sub rounded gravel, <7% quartzite fragments			0.0	25	WELL COVER Type : Flush Mount
30	Weathered Limestone, Gley 2 4/5PB dark bluish gray			0.9	30	Static water level @ 33.14' bgs on 10/25/07. 10" Diameter Drilling (0 - 32' bgs) 6" Diameter Drilling (32' - 125' bgs)
35	Competent Limestone, Gley 2 4/5PB				35	Bentonite Seal (104' - 111.5' bgs) 1, 50 lb bag
40	Competent Limestone, Gley 2 2.5/10B bluish black				40	
45					45	
50					50	

Well: MW-115
 Elev. 373.30:





Log of Monitoring Well MW-115

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 125' bgs

Drilling Bit Diameter : 10" to 32' bgs, 6" to 125' bgs
 Final completion : 10/22/07-10/25/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 1/8/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-115 Elev. 373.30:	Depth in Feet	Well Construction Information
50	Same As Above: Competent Limestone				50		50	WELL CONSTRUCTION Date Compl. : 10/25/07 Hole Diameter : 10", 6" Total Depth of Well: 124.5' bgs
55					55		55	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-114.5 bgs Shale Trap Depth : 112.5' bgs
60					60		60	WELL Screen Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 114.5'-124.5' bgs
65					65		65	SAND Type : #1 Morie Sand Amount : 1 bag
70					70	— 6" Drilling	70	BENTONITE Type : 3/8" Hole Plug Amount : 1 bag GROUT Type : Benseal/ : Portland Cement Amount : 4 bags/16 bags
75					75	— Grout	75	WELL COVER Type : Flush Mount
80					80	— 2" PVC Riser	80	Static water level @ 33.14' bgs on 10/25/07. 10" Diameter Drilling (0 - 32' bgs) 6" Diameter Drilling (32' - 125' bgs)
85					85		85	Bentonite Seal (104' - 111.5' bgs) 1, 50 lb bag
90	Competent Limestone, Gley 2 5/5PB bluish gray				90		90	
95					95		95	
100	Limestone bedrock, Gley 2 3/10B very dark bluish gray				100		100	



Log of Monitoring Well MW-115

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Emily Wade
 Drilling Method : Air Rotary
 Total Depth of Boring : 125' bgs

Drilling Bit Diameter : 10" to 32' bgs, 6" to 125' bgs
 Final completion : 10/22/07-10/25/07
 Well Construction : 2" Schedule 40 PVC
 Well Development : 1/8/08

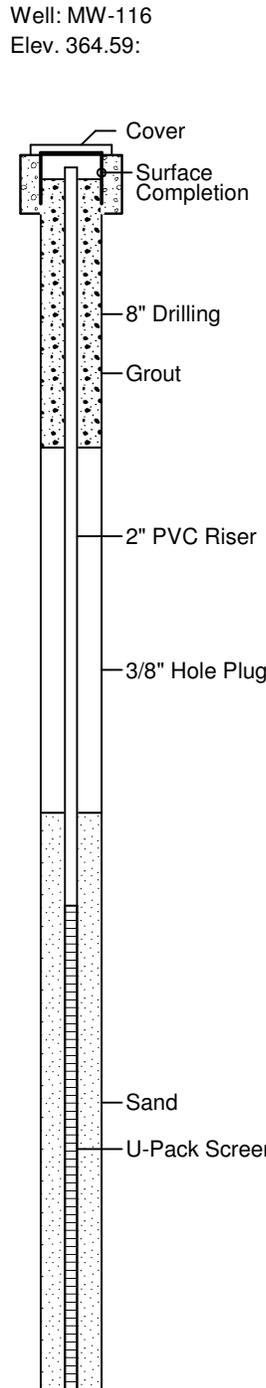
Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well: MW-115 Elev. 373.30:	Depth in Feet	Well Construction Information
100	Same As Above: Limestone bedrock				100		100	WELL CONSTRUCTION Date Compl. : 10/25/07 Hole Diameter : 10", 6" Total Depth of Well: 124.5' bgs
105			105		105		105	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5-114.5 bgs Shale Trap Depth : 112.5' bgs
110			110		110		110	WELL Screen Material : U-Pack Well Screen Slot Size : 0.010 Diameter : 2" From : 114.5'-124.5' bgs
115			115		115		115	SAND Type : #1 Morie Sand Amount : 1 bag
120	VOID--Mud filled, Gley 1 4/10Y dark greenish gray, approx. 40 gpm		120		120		120	BENTONITE Type : 3/8" Hole Plug Amount : 1 bag
120	Competent Limestone, Gley 2 3/10B very dark bluish gray		120		120		120	GROUT Type : Benseal/ Portland Cement Amount : 4 bags/16 bags
125	END BORING @ 125 FEET BGS		125		125		125	WELL COVER Type : Flush Mount
130			130		130		130	Static water level @ 33.14' bgs on 10/25/07. 10" Diameter Drilling (0 - 32' bgs) 6" Diameter Drilling (32' - 125' bgs)
135			135		135		135	Bentonite Seal (104' - 111.5' bgs) 1, 50 lb bag
140			140		140		140	
145			145		145		145	
150			150		150		150	

Former York Naval Ordnance Plant
 Supplemental RI
 1425 Eden Road, York, PA
 SAIC Project #01-1633-00-9806-200

Drilling Company : Eichelbergers, Inc.
 Drilled By : Carey Knaub
 Logged By : Steve McFeaters
 Drilling Method : Air Rotary
 Total Depth of Boring : 50.8' bgs

Drilling Bit Diameter : 8" to 50.8' bgs
 Drilling Started : 4/15/08
 Final Completion : 4/17/08
 Well Construction : 2" Schedule 40 PVC
 Well Development : 5/6/08

Depth in Feet	DESCRIPTION	GRAPHIC	Fractures	PID ppm	Depth in Feet	Well Construction Information
0	Asphalt			0.0	0	WELL CONSTRUCTION Date Compl. : 4/17/08 Total Depth of Well : 50.8' bgs
5	CL, silty clay, 10YR 4/2 dark grayish brown, moist, medium plasticity			0.0	5	
5	ML, clayey silt, 10YR 6/4 light yellowish brown, moist, low plasticity, some sub rounded gravel			0.0	5	WELL CASING Material : Sch. 40 PVC Riser Diameter : 2" From : 0.5' - 30.8' bgs
10	CL, silty clay, 10YR 5/4 yellowish brown, moist, medium density, low to medium plasticity			0.0	10	WELL Screen Material : U-Pack Slot Size : 0.010" Diameter : 2" From : 30.8' - 50.8' bgs
15	Same As Above, with sub angular quartzite gravel			0.0	15	SAND Type : #1 Morie Sand Amount : 10, 50 lb bags
20	CL, silty clay, 10YR 5/3 brown, moist, medium density, low to medium plasticity			0.0	20	BENTONITE Type : 3/8" Hole Plug Amount : 2, 50 lb bags
20	CL, silty clay, 10YR 5/4 yellowish brown, slightly wet, medium plasticity			0.0	20	GROUT Type : Benseal/ Portland Cement Amount : 1, 50 lb bag/ 8, 94 lb bags
25	Cuttings wet at 22' bgs			0.0	25	WELL COVER Type : Locking Flush Mount
25	CL, silty clay, 10YR 5/6 yellowish brown, gravel, wet, medium plasticity			0.0	25	
30	Weathered Phyllite			0.0	30	Notes: 8" Drilling (0 - 50.8' bgs) Bentonite Seal (12' - 27' bgs) 2.5, 50 lb bags MW-116 was constructed with U-Pack well screen and conventional sand pack. Three attempts were made to construct MW-116, resulting in the final construction as described above. Static water level 18.65' below top of inside casing on 5/6/08.
35				0.0	35	
40	Competent Limestone with quartz		38	0.0	40	
40	WBZ at 38' bgs, >2 gpm			0.0	40	
45				0.0	45	
50				0.0	50	
50	END OF BORING @ 50.8' BGS			0.0	50	
55				0.0	55	





BORING LOG OF MW-117

Harley Davidson
Building 41 Remediation
1425 Eden Road, York, PA

SAIC Project # 01-1633-00-6072-100

Drilling Company : Environ. Equip. and Supply
Logged By : Emily M. Wade
Drilling Method : Direct Push Geoprobe/HSA
Drilling Bit Diameter : 2" / 6.25" OD
Drilling Started : 2/13/09

Drilling Completed : 2/14/09
Well Construction : 2/14/09
Well Development : 2/19/09
Water Elev./Date : 14.88' btoc / 2/19/09

Depth in Feet	Recovery	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-117 Elev.:	Well Construction Information
0		Utility Clearance with Air Knife. Silty Clay, yellowish brown (10YR 5/6), medium plasticity, moist, semi dense		0.0			WELL CONSTRUCTION Date Completed : 2-14-09 Auger I.D. : 4 1/4" Drilling Method : 6620DT Geoprobe Driller : Nate Womer WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0.5' to 16.18' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 16.18' to 29.5' BGL Joints : Flush Threaded Opening : 0.010 slot ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 7-50 lb. bags Bentonite Seal (1' - 15.4' bgs) 6, 50 lb. bag Sakrete Surface Completion, 1-80 lb. bags A Geoprobe was used to collect continuous soil samples to 28' BGL. Hollow Stem Augers were than advanced at the same location to 29.5' BGL for MW-117 construction. Sample locations: HD-B41-SB-117-6/6.5-0 HD-B41-SB-117-12/12.5-0 HD-B41-SB-117-19.5/20-0
2	4.0/4.0'		CL	0.2			
4				0.3			
6	4.0/4.0'	Clay, dark grayish brown (10YR 4/2), high plasticity, wet, low density	CH	0.1			
		Silty Clay, yellowish brown (10YR 5/8), dense, hard, crumbly	CL	0.4			
		Clay, dark grayish brown (10YR 4/2), high plasticity, wet, low density	CH	0.4			
8		Silty Clay, yellowish brown (10YR 5/8), dense, hard, crumbly	CL	0.4			
10	4.0/4.0'	Clay, dark grayish brown (10YR 4/2), dense, hard	CH	0.3			
		Silty Clay, yellowish brown (10YR 5/8), dense, hard, crumbly	CL	0.3			
12		Sluff		0.9			
		Silty Clay, yellowish brown (10YR 5/4), low plasticity, damp, crumbly, gray mottling (10YR 5/1)	CL	0.7			
14	4.0/4.0'	Silty Clay, yellowish brown (10YR 5/6), very low plasticity, damp, dense, crumbly	CL	0.6			
				0.8			
16		Sluff		1.0			
				0.5			
18	4.0/4.0'	Silty Clay, yellowish brown (10YR 5/6), very low plasticity, damp, dense, crumbly	CL	1.5			
			CL				



BORING LOG OF MW-117

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Harley Davidson
Building 41 Remediation
1425 Eden Road, York, PA

SAIC Project # 01-1633-00-6072-100

Drilling Company : Environ. Equip. and Supply
Logged By : Emily M. Wade
Drilling Method : Direct Push Geoprobe/HSA
Drilling Bit Diameter : 2" / 6.25" OD
Drilling Started : 2/13/09

Drilling Completed : 2/14/09
Well Construction : 2/14/09
Well Development : 2/19/09
Water Elev./Date : 14.88' btoc / 2/19/09

Depth in Feet	Recovery	DESCRIPTION	USCS	PID (ppm) - bkgd = 0.0	GRAPHIC	Well: MW-117 Elev.:	Well Construction Information	
18	4.0/4.0'	Silty Clay, yellowish brown (10YR 5/6), moist, medium plasticity, semi dense, <3% angular quartzite fragments	CL	2.1		<p>#1 Sand Screen</p>	WELL CONSTRUCTION Date Completed : 2-14-09 Auger I.D. : 4 1/4" Drilling Method : 6620DT Geoprobe Driller : Nate Womer WELL CASING : Material : Sch 40 PVC Diameter : 2" From : 0.5' to 16.18' BGL Joints : Flush Threaded WELL SCREEN : Material : Sch 40 PVC Diameter : 2" From : 16.18' to 29.5' BGL Joints : Flush Threaded Opening : 0.010 slot	
20		Silt with gravel, yellowish brown (10YR 5/6), <10% angular quartzite fragments, <3% sub rounded to rounded quartzite, wet	ML	2.8				
22	3.0/4.0'	Silty Clay, yellowish brown (10YR 5/6), saturated, <8% angular quartzite fragments	CL	1.1				
		Gravelly clay, yellowish brown (10YR 5/6), saturated, 50% small, medium, and large angular quartzite gravel	CG	0.5				
		SAME AS ABOVE: moist	CG	0.7				
24	2.8/4.0'	Accumulated Lost Core		0.8				
24		Clay, yellowish brown (10YR 5/4), saturated, <30% angular quartzite fragments	CL	0.5				
26		Accumulated Lost core		0.4				
28		END SOIL BORING @ 28' BGS		0.7				ADDITIONAL CONSTRUCTION DETAILS #1 Morie Sand, 7-50 lb. bags Bentonite Seal (1' - 15.4' bgs) 6, 50 lb. bag Sakrete Surface Completion, 1-80 lb. bags A Geoprobe was used to collect continous soil samples to 28' BGL. Hollow Stem Augers were than advanced at the same location to 29.5' BGL for MW-117 construction.
30		AUGER REFUSAL @ 29.5' BGS						
32						Sample locations: HD-B41-SB-117-6/6.5-0 HD-B41-SB-117-12/12.5-0 HD-B41-SB-117-19.5/20-0		
34								
36								