

APPENDIX D

WELL CONSTRUCTION AND STRATIGRAPHIC LOGS



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Highway 96 Site

HOLE DESIGNATION: MW 18A

PROJECT NUMBER: 2012

DATE COMPLETED: November 7, 2006

CLIENT: Reynolds/Whirlpool

DRILLING METHOD: Rotasonic

LOCATION: White Bear Township, Minnesota

FIELD PERSONNEL: R. Aamot

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	Monitoring Well	SAMPLE			
				NUMBER	INTERVAL	REC (ft)	'N' VALUE
	TOP OF CASING GROUND SURFACE	925.39 924.50					
	Topsoil	924.00	<p style="font-size: small;">2" Diameter Steel Riser Pipe Cement Bentonite Grout 6" Diameter Borehole Fine Sand Sand Pack Stainless Steel Screen</p>				
10	SC-SAND, clayey, with silt, fine to medium grained, brown to rust, moist						
20	CL-CLAY, sandy, low plasticity, light brown, moist	909.50					
	SC-SAND, clayey, with silt, fine to medium grained, brown, moist	903.50					
30	SW-SAND, with silt, fine to medium grained, brown, moist	896.50					
40	-increasing silt with depth	884.50					
50							
60	SM-SAND, silty, cobbles, fine to medium grained, dark brown, moist	871.50					
70	SW-SAND, with silt, fine to medium grained, brown, moist	857.50					
80							
90	SANDSTONE (St. Peter Formation), poorly consolidated, fine grained, light gray to tan, moist	842.50					
100							
110							
120	END OF BOREHOLE @ 115.0ft BGS	809.50					
130							
140							
150							

WELL DETAILS
 Screened interval:
 819.50 to 809.50ft
 105.00 to 115.00ft BGS
 Length: 10ft
 Diameter: 2in
 Slot Size: #10
 Material: Stainless Steel
 Seal:
 824.50 to 821.50ft
 100.00 to 103.00ft BGS
 Material: Fine Sand
 Sand Pack:
 821.50 to 809.50ft
 103.00 to 115.00ft BGS
 Material: Coarse Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 2012.GPJ CRA_CORP.GDT 1/9/07



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Highway 96 Site
 PROJECT NUMBER: 2012
 CLIENT: Reynolds/Whirlpool
 LOCATION: White Bear Township, Minnesota

HOLE DESIGNATION: MW 18B
 DATE COMPLETED: November 3, 2006
 DRILLING METHOD: Rotasonic
 FIELD PERSONNEL: R. Aamot

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	Monitoring Well	SAMPLE					
				NUMBER	INTERVAL	REC (ft)	'N' VALUE		
	TOP OF CASING GROUND SURFACE	925.24 924.20							
	Topsoil	923.70							
10	SC-SAND, clayey, with silt, fine to medium grained, brown to rust, moist								
20	CL-CLAY, sandy, low plasticity, light brown, moist	909.20							
	SC-SAND, clayey, with silt, fine to medium grained, brown, moist	903.20	2" Diameter Steel Riser Pipe						
30	SW-SAND, with silt, fine to medium grained, brown, moist	896.20							
40	-increasing silt with depth	884.20	Cement Bentonite Grout						
50									
60	SM-SAND, silty, cobbles, fine to medium grained, dark brown, moist	871.20	6" Diameter Borehole						
70	SW-SAND, with silt, fine to medium grained, brown, moist	857.20							
80									
90	SANDSTONE (St. Peter Formation), poorly consolidated, fine grained, light gray to tan, moist	842.20							
100									
110									
120									
130									

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS

OVERBURDEN LOG 2012.GPJ CRA_CORP.GDT 1/9/07



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Highway 96 Site
 PROJECT NUMBER: 2012
 CLIENT: Reynolds/Whirlpool
 LOCATION: White Bear Township, Minnesota

HOLE DESIGNATION: MW 18B
 DATE COMPLETED: November 3, 2006
 DRILLING METHOD: Rotasonic
 FIELD PERSONNEL: R. Aamot

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	Monitoring Well	SAMPLE			
				NUMBER	INTERVAL	REC (ft)	'N' VALUE
150	SANDSTONE (St. Peter Formation), continued	783.20	<p style="font-size: small;">2" Diameter Steel Riser Pipe Cement Bentonite Grout 6" Diameter Borehole Fine Sand Stainless Steel Screen Sand Pack Cement/Bent. Grout</p>				
160	-increasing silt/shale	762.20					
170	SHALE, weathered, fine grained, dark gray, dry	759.20					
180	SANDSTONE (St. Peter Formation), poorly consolidated, fine grained, light gray, moist	745.20					
190	-becoming medium grained	742.20					
200	-becoming fine grained, with sandstone gravel	732.20					
210	-becoming medium to coarse grained, dark gray	717.20					
220	LIMESTONE (Prairie du Chein Group), weathered limestone gravel, gray to light red	715.20					
230	-becoming light gray with silt and clay	709.20					
240	END OF BOREHOLE @ 235.0ft BGS	689.20					
250	Chemical analysis sample was collected from 215' - 230' bgs.		<p style="font-size: x-small;">WELL DETAILS Screened interval: 739.20 to 729.20ft 185.00 to 195.00ft BGS Length: 10ft Diameter: 2in Material: Stainless Steel Seal: 743.20 to 740.20ft 181.00 to 184.00ft BGS Material: Fine Sand Sand Pack: 740.20 to 727.20ft 184.00 to 197.00ft BGS Material: Coarse Sand</p>				

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NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS

OVERBURDEN LOG 2012.GPJ CRA_CORP.GDT 1/9/07



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Highway 96 Site
 PROJECT NUMBER: 2012
 CLIENT: Reynolds/Whirlpool
 LOCATION: White Bear Township, Minnesota

HOLE DESIGNATION: MW 18L
 DATE COMPLETED: November 7, 2006
 DRILLING METHOD: Rotosonic
 FIELD PERSONNEL: R. Aamot

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	Monitoring Well	SAMPLE				
				NUMBER	INTERVAL	REC (ft)	'N' VALUE	PID (PPM)
	TOP OF CASING GROUND SURFACE	925.44 924.30						
5	Topsoil SC-SAND, clayey, with silt, fine to medium grained, brown to rust, moist	923.80		1		5.0		0
10				2		6.0		0
15	CL-CLAY, sandy, low plasticity, light brown, moist	909.30		3		10.0		0
20	SC-SAND, clayey, with silt, fine to medium grained, brown, moist	903.30		4		10.0		0
25				5		4.0		0
30	SW-SAND, with silt, fine to medium grained, brown, moist	896.30		6		4.0		0
35				7		10.0		0
40	-increasing silt with depth	884.30		8		10.0		0
45				9		10.0		0.2
50	SM-SAND, silty, cobbles, fine to medium grained, dark brown, moist	871.30		10		10.0		0.2
55								
60	SW-SAND, with silt, fine to medium grained, brown, moist	857.30						
65								
70								
75								
80								
85	SANDSTONE (St. Peter Formation), poorly consolidated, fine grained, light gray to tan, moist	842.30						
90								
95								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS

OVERBURDEN LOG 2012.GPJ CRA CORP.GDT 1/8/07



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Highway 96 Site

HOLE DESIGNATION: MW 18L

PROJECT NUMBER: 2012

DATE COMPLETED: November 7, 2006

CLIENT: Reynolds/Whirlpool

DRILLING METHOD: Rotosonic

LOCATION: White Bear Township, Minnesota

FIELD PERSONNEL: R. Aamot

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	Monitoring Well	SAMPLE				
				NUMBER	INTERVAL	REC (ft)	'N' VALUE	PID (PPM)
105	SANDSTONE (St. Peter Formation), continued	823.30		11	10.0	10.0		0.3
110		12		10.0	10.0		1	
115		13		10.0	10.0		0	
120		14		10.0	10.0		0	
125		15		10.0	10.0		0	
130		16		10.0	10.0		0	
135		17		10.0	10.0		0	
140		18		10.0	5.0		0	
145		19		7.0	7.0		0	
150		20		8.0	8.0		18.1	
155	SHALE, weathered, fine grained, dark gray, dry	762.30		21	10.0	10.0		26.1
160		165		759.30				
165		170		745.30				
170	SANDSTONE (St. Peter Formation), poorly consolidated, fine grained, light gray, moist -becoming medium grained	742.30						
175		180		732.30				
180		185						
185	-becoming fine grained, with sandstone gravel							
190		195						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS

OVERBURDEN LOG 2012.GPJ CRA_CORP.GDT 1/8/07



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Highway 96 Site
 PROJECT NUMBER: 2012
 CLIENT: Reynolds/Whirlpool
 LOCATION: White Bear Township, Minnesota

HOLE DESIGNATION: MW 20B
 DATE COMPLETED: November 15, 2006
 DRILLING METHOD: Rotasonic
 FIELD PERSONNEL: R. Aamot

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	Monitoring Well	SAMPLE					
				NUMBER	INTERVAL	REC (ft)	'N' VALUE	PID (PPM)	
	TOP OF CASING GROUND SURFACE	915.04 912.20							
	Topsoil, organic								
10	SW-SAND, trace gravel and silt, medium grained, brown, moist	908.20	6" Diameter Borehole	1		5.0		0	
20				2		7.0		0	
30				3		5.0		0	
40				4		5.0		0	
50	CL-CLAY, sandy, trace gravel, low plasticity, brown, moist	856.20	2" Diameter Black Steel Casing	5		10.0		0	
60		854.20		6		10.0		0	
	SW-SAND, gravelly, coarse grained, brown, saturated	852.20		7		8.0		0	
	GW-GRAVEL, sandy, fine grained to 3" diameter, brown, saturated	849.20		8		8.0		0	
70	SANDSTONE (St. Peter Formation), poorly consolidated, fine grained, light tan to white, moist			9		10.0		0.1	
80				10		10.0		0	
90				822.20	11		10.0		0
100	-with sandstone gravel			Cement/Bent. Grout	12		10.0		0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS

OVERBURDEN LOG 2012.GPJ CRA_CORP.GDT 1/9/07



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Highway 96 Site
 PROJECT NUMBER: 2012
 CLIENT: Reynolds/Whirlpool
 LOCATION: White Bear Township, Minnesota

HOLE DESIGNATION: MW 20B
 DATE COMPLETED: November 15, 2006
 DRILLING METHOD: Rotasonic
 FIELD PERSONNEL: R. Aamot

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	Monitoring Well	SAMPLE				
				NUMBER	INTERVAL	REC (ft)	'N' VALUE	PID (PPM)
130	SANDSTONE (St. Peter Formation), continued	791.20		13		0.0		NA
140				14		0.0		NA
150				15		10.0		0
150	SHALE, weathered, fine grained, gray to dark gray, dry	762.20		16		5.0		0
160			17		5.0		0	
170	SANDSTONE (St. Peter Formation), poorly consolidated, fine grained, gray, moist	748.20		18		10.0		0
180			19		10.0		0	
190			20		10.0		0	
200	END OF BOREHOLE @ 200.0ft BGS	712.20		21		10.0		0
210			22		5.0		0	
220								
230								

WELL DETAILS
 Screened interval:
 722.20 to 712.20ft
 190.00 to 200.00ft BGS
 Length: 10ft
 Diameter: 2in
 Slot Size: #10
 Material: Stainless Steel
 Seal:
 727.20 to 724.20ft
 185.00 to 188.00ft BGS
 Material: Fine Sand
 Sand Pack:
 724.20 to 712.20ft
 188.00 to 200.00ft BGS
 Material: Coarse Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS

OVERBURDEN LOG 2012.GPJ CRA_CORP.GDT 1/9/07



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Highway 96 Site

HOLE DESIGNATION: EW 3

PROJECT NUMBER: 2012

DATE COMPLETED: November 15, 2006

CLIENT: Reynolds/Whirlpool

DRILLING METHOD: Rotasonic

LOCATION: White Bear Township, Minnesota

FIELD PERSONNEL: R. Aamot

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	Extraction Well	SAMPLE			
				NUMBER	INTERVAL	REC (ft)	'N' VALUE
	TOP OF CASING GROUND SURFACE	913.88 910.50					
	Topsoil, organic	908.50	<p style="text-align: right;">Cement/Bentonite Grout</p> <p style="text-align: right;">6" Low Carbon Steel Casing</p> <p style="text-align: right;">10" Diameter Hole</p>				
10	SW-SAND, trace gravel and silt, medium grained, brown, saturated						
20							
30							
40	-cobbles	872.50					
50							
55	CL-CLAY, sandy, trace gravel, low plasticity, brown/red, moist	857.50 855.50					
60	SW-SAND, gravelly, coarse grained, brown, saturated	850.50					
65	GW-GRAVEL, sandy, fine to 3" gravel, brown, saturated						
70	SANDSTONE (St. Peter Formation), poorly consolidated, fine grained, light tan to white, moist	840.50					
80							
90							
100							
110							
120							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE



STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Highway 96 Site

HOLE DESIGNATION: EW 3

PROJECT NUMBER: 2012

DATE COMPLETED: November 15, 2006

CLIENT: Reynolds/Whirlpool

DRILLING METHOD: Rotasonic

LOCATION: White Bear Township, Minnesota

FIELD PERSONNEL: R. Aamot

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft	Extraction Well	SAMPLE			
				NUMBER	INTERVAL	REC (ft)	"N" VALUE
130	SANDSTONE (St. Peter Formation), continued	784.50	<p style="font-size: small;">6" Low Carbon Steel Casing</p> <p style="font-size: small;">Cement/Bentonite Grout</p> <p style="font-size: small;">10" Diameter Hole</p> <p style="font-size: small;">Fine sand</p> <p style="font-size: small;">Coarse Sand</p> <p style="font-size: small;">6" Screen</p> <p style="font-size: small;">6" Sump</p>				
140							
150	-becoming gray SHALE (St. Peter Formation), trace sand, very fine grained, gray, dry	762.50 760.50					
160							
170	SANDSTONE (St. Peter Formation), poorly consolidated, fine grained, gray to dark gray, moist	740.50					
180							
190							
200	END OF BOREHOLE @ 200.0ft BGS	710.50					
210							
220							
230							
240							

WELL DETAILS
 Screened interval:
 725.50 to 715.50ft
 185.00 to 195.00ft BGS
 Length: 10ft
 Diameter: 6in
 Slot Size: #10
 Material: Stainless Steel
 Seal:
 733.50 to 729.50ft
 177.00 to 181.00ft BGS
 Material: Fine Sand
 Sand Pack:
 729.50 to 710.50ft
 181.00 to 200.00ft BGS
 Material: Coarse Sand
 Sump interval:
 715.50 to 710.50ft
 195.00 to 200.00ft BGS
 Length: 5ft

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 2012.GPJ CRA_CORP.GDT 1/9/07