



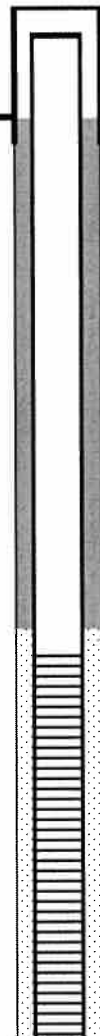
APPENDIX C
EXTRACTION WELL AND PIEZOMETER CONSTRUCTION LOGS

EXTRACTION WELL CONSTRUCTION LOG

MN NO.	767283
Site ID:	EW-1
Page	1 of 1
DATE OF WELL CONSTRUCTION:	9-Sep-08
WELL COMPLETION ZONE:	Unconsolidated
DEPTH TO WATER (ftoc):	90.02
TOTAL WELL DEPTH (fbgs):	224.00

CLIENT: Confidential
SITE NAME: Cottage Grove, MN
PROJECT NO.: 02181.002.050.0001
DRILLING CO.: Traut Drilling Services
LOGGED BY: John Hunter
COMMENTS: Well located in south of D9 along access road.

Northing: 4959120.60253
Easting: 507776.20251



781.23	TOC Elevation (fmsl)
779.48	GND Elevation (fmsl)
18.5	Boring Diameter (in) (0-118 fbgs)
90.02	Depth to Water (ftoc)
Well Construction:	
12.5	Boring Diameter (in) (118-225 fbgs)
12	Well Diameter (in)
CS	Riser Material
SS	Screen Material
60	Screen Length (ft)
0 - 118	Grout Interval (fbgs)
118.00	Top of Sand
164.00	Top of Screen
164 - 224	Screen Interval (fbgs)
Screen Slot Size (in)	Depth Interval (fbgs)
0.02	164-174
0.035	174-184
0.018	184-191
0.025	191-202
0.015	202-212
0.02	212-224
224.00	Bottom of Screen
225.00	Total Boring Depth

DRILLERS LOG

Interval	Lithology
0-5	Silty Sand
5-7	Silty Sand and Clay
7-11	Clay
11-21	Sand & Gravel
21-28	Sand & Gravel (Cobbles)
28-33	Sand & Gravel
33-38	Sand & Gravel (Cobbles)
38-73	Sand
73-89	Sand
89-94	Sand & Gravel
94-102	Sand
102-106	Sandy Clay
106-135	Fine-grained Sand
165-188	30% c.g. Sand, 20% Gr
188-195	70% Gravel
195-197	Sand
197-202	Sand & Gravel
202-206	Fine-grained Sand
206-208	Clay
208-218	Sand
218-225	Sand & Gravel

Date Developed: 9-22 Sept. 2008
Method: Water Jetting ~60 hours

Boring was constructed using Dual Rotary Reverse Circulation drilling techniques provided by Traut Drilling Services. The well annulus was constructed with a natural sand pack across the screen interval. Grout consisted of a bentonite slurry installed using positive pressure tremmie pipe pumping techniques. Development consisted of continued water jetting across the screen and recirculation of the fluids (after particulate removal) to avoid high-volume groundwater pumping. The estimated well yield is 2000 gallons per minute

fbgs: feet below ground surface **ftoc:** feet below top-of-casing
 CS Carbon Steel gal. Gallons
 SS Stainless Steel gpm Gallons Per Minute

Depths are presented as feet below ground surface unless otherwise indicated.



EXTRACTION WELL CONSTRUCTION LOG

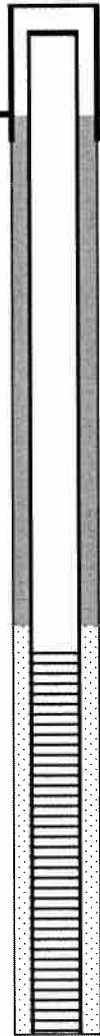
MN NO.	767284
Site ID:	EW-2
Page	1 of 1
DATE OF WELL CONSTRUCTION:	6-Oct-08
WELL COMPLETION ZONE:	Unconsolidated
DEPTH TO WATER (ftoc):	21.85
TOTAL WELL DEPTH (fbgs):	150.00

CLIENT: Confidential
SITE NAME: Cottage Grove, MN
PROJECT NO.: 02181.002.050.0001
DRILLING CO.: Traut Drilling Services
LOGGED BY: John Hunter
COMMENTS: Well located approximately 60 feet west of the East Cove along access road.

Northing: 4958923.11486
Easting: 508413.44195
 (NAD 83 UTM Zone 15 Meter)

DRILLERS LOG

Interval	Lithology
0-5	Sand & Gravel
5-10	Sand, Gravel, Silty Clay
10-15	f.g. Sand, Sand & Gravel
15-55	Sand & Gravel
55-60	f.g. Sand
60-75	Sand with fines
75-92	f.g. Sand
92-117	Sand & Gravel
117-120	f.g. Sand
120-125	Sand & Gravel
125-150	Sand & Gravel with weathered limestone



711.11	TOC Elevation (fmsl)
709.16	GND Elevation (fmsl)
18.5	Boring Diameter (in) (0-118 fbgs))
21.85	Depth to Water (ftoc)
Well Construction:	
12.5	Boring Diameter (in) (118-225 fbgs)
12	Well Diameter (in)
CS	Riser Material
SS	Screen Material
60	Screen Length (ft)
0-18	Grout Interval (fbgs)
18.00	Top of Sand
90.00	Top of Screen
90 - 150	Screen Interval (fbgs)
Screen Slot Size (in) Depth Interval (fbgs)	
0.035	100-115
0.02	115-125
0.035	125-150
150.00	Bottom of Screen
150.00	Total Boring Depth

Date Developed: 7-13 October 2008
Method: Water Jetting ~40 hours

Boring was constructed using Dual Rotary Reverse Circulation drilling techniques provided by Traut Drilling Services. The well annulus was constructed with a natural sand pack across the screen interval. Grout consisted of a bentonite slurry installed using positive pressure tremmie pipe pumping techniques. Development consisted of continued water jetting across the screen and recirculation of the fluids (after particulate removal) to avoid high-volume groundwater pumping. The estimated well yield is 2000 gallons per minute

fbgs: feet below ground surface **ftoc:** feet below top-of-casing
 CS Carbon Steel gal. Gallons
 SS Stainless Steel gpm Gallons Per Minute

Depths are presented as feet below ground surface unless otherwise indicated.



PIEZOMETER CONSTRUCTION LOG

ID NO. PZ 01

CLIENT: Confidential Client
SITE NAME: Cottage Grove, MN
PROJECT NO.: 02181-002-050-0001
DRILLING CO.: American Eng. & Testing
LOGGED BY: John Hunter

Page 1 of 1

DATE OF WELL CONSTRUCTION: 9-Jul-08

DEPTH TO WATER (toc): 72.00
TOTAL WELL DEPTH (toc): 112.00

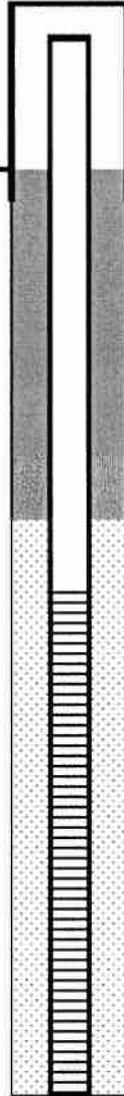
Northing: 4959007.286350
Easting: 508364.500710

Flush Mount Surface Cover
 Above Grade Cover

2.00 Well Diameter (in)

0.01 Screen Slot (in)

Well constructed with ten feet of 2-inch diameter 0.01-inch slotted stainless steel screen with 2-inch black steel riser to the surface.



	<u>762.92</u>	Elevation (toc - ft msl)
	<u>2.73</u>	Stickup Height (ft.)
	<u>760.19</u>	Elevation (ground - ft msl)
	<u>98.00</u>	Top of Grout Seal (Fine-grained Sand)
	<u>100.00</u>	Top of Sand
	<u>102.00</u>	Top of Screen
	<u>72.00</u>	Depth to Water (TOC)
	<u>112.00</u>	Bottom of Screen
	<u>112.00</u>	Boring Depth

All depths are given in feet below ground surface unless otherwise indicated.



PIEZOMETER CONSTRUCTION LOG

ID NO. PZ 02

CLIENT: Confidential Client
SITE NAME: Cottage Grove, MN
PROJECT NO.: 02181-002-050-0001
DRILLING CO.: American Eng. & Testing
LOGGED BY: T. Frinak

Page 1 of 1
DATE OF WELL CONSTRUCTION: 27-Jun-08

DEPTH TO WATER (toc): 2.49
TOTAL WELL DEPTH (toc): 44.09

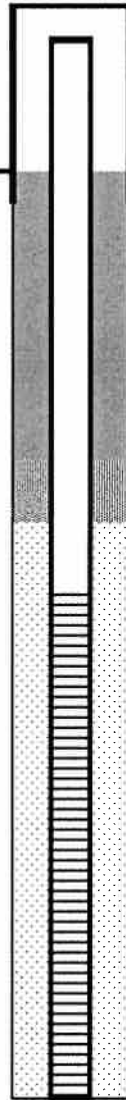
Northing: 4958935.471820
Easting: 508452.100801

- Flush Mount Surface Cover
- Above Grade Cover

Well Diameter (in)
 Well Material

Screen Slot (in)

Well constructed with ten feet of 2-inch diameter 0.01-inch slotted PVC screen and riser to the surface. Screen sand pack natural, followed by a fine-grained sand grout seal and cement/bentonite grout to the surface.



<input type="text" value="691.75"/>	Elevation (toc - ft msl)
<input type="text" value="2.66"/>	Stickup Height (ft.)
<input type="text" value="689.09"/>	Elevation (ground - ft msl)
<input type="text" value="27.00"/>	Top of Grout Seal (Fine-grained Sand)
<input type="text" value="32.00"/>	Top of Sand
<input type="text" value="33.00"/>	Top of Screen
<input type="text" value="2.49"/>	Depth to Water (TOC) (Artesian Level) Water Table ~1.15 feet above Top-of-Sediment
<input type="text" value="43.00"/>	Bottom of Screen
<input type="text" value="46.50"/>	Boring Depth

All depths are given in feet below ground surface unless otherwise indicated.



PIEZOMETER CONSTRUCTION LOG

ID NO. PZ 03

Page 1 of 1

CLIENT: Confidential Client
SITE NAME: Cottage Grove, MN
PROJECT NO.: 02181-002-050-0001
DRILLING CO.: American Eng. & Testing
LOGGED BY: T. Frinak

DATE OF WELL CONSTRUCTION: 27-Jun-08

DEPTH TO WATER (toc): 0.65
TOTAL WELL DEPTH (toc): 42.27

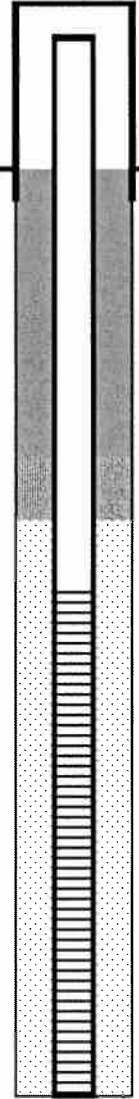
Northing: 4958934.945160
Easting: 508518.322616

- Flush Mount Surface Cover
- Above Grade Cover

Well Diameter (in)
 Well Material

Screen Slot (in)

Well constructed with ten feet of 2-inch diameter 0.01-inch slotted PVC screen and riser to the surface. Screen sand pack natural, followed by a fine-grained sand grout seal and cement/bentonite grout to the surface.



Elevation (toc - ft msl)
 Stickup Height (ft.)

Elevation (ground - ft msl)

Top-of-Sediment approximately 0.2 feet below surface water level.

Top of Grout Seal
 (Fine-grained Sand)

Top of Sand

Top of Screen

Depth to Water (TOC)
 (Artesian Level)
 Water Table ~2.19 feet above Top-of-Sediment

Bottom of Screen

Boring Depth

All depths are given in feet below ground surface unless otherwise indicated.

