Appendix

Review of Highway 96 Site
Groundwater Impacts for City of North Oaks

March 2007

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Residential Wells Outside Municipal Water Supply Area
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Period of Record	Sum of Detected VOCs (ug/L)		Number of Samples	Number with Detections	Percent with Detections
		Maximum	Mean			
Area 3, west:						
N. O. G. C. Clb Hse	3/29/05 - 3/29/05	0.00	0.00	1	0	0%
1 Buffalo Rd	5/23/05 - 11/22/05	0.00	0.00	5	0	0%
3 Buffalo Rd	5/24/05 - 11/15/05	0.00	0.00	5	0	0%
1 Eagle Ridge Rd	3/31/05 - 11/9/05	0.00	0.00	3	0	0%
2 Eagle Ridge Rd	3/29/05 - 11/10/05	0.00	0.00	6	0	0%
3 Eagle Ridge Rd	3/30/05 - 11/15/05	0.00	0.00	2	0	0%
4 Eagle Ridge Rd	3/29/05 - 11/15/05	0.00	0.00	5	0	0%
6 Eagle Ridge Rd	4/1/05 - 11/10/05	0.00	0.00	4	0	0%
44 East Oaks Rd	**11/3/94 - 11/15/05**	**0.19**	**0.03**	7	**1**	**14%**
50 East Oaks Rd	4/29/05 - 8/29/05	0.00	0.00	5	0	0%
1 Hummingbird Ln	5/23/05 - 11/9/05	0.00	0.00	4	0	0%
2 Hummingbird Ln	**3/28/05 - 11/9/05**	**0.33**	**0.20**	7	**6**	**86%**
8 Poplar Ln	10/9/96 - 11/10/05	0.00	0.00	10	0	0%
10 Poplar Ln	**4/19/94 - 11/14/05**	**0.24**	**0.02**	15	**1**	**7%**
3 Quail Ln	11/15/05 - 11/15/05	0.00	0.00	1	0	0%
2 Ski Ln	5/23/05 - 11/16/05	0.00	0.00	4	0	0%
4 Ski Ln	5/23/05 - 11/9/05	0.00	0.00	5	0	0%
6 Ski Ln	5/23/05 - 11/14/05	0.00	0.00	5	0	0%
8 Ski Ln	5/23/05 - 11/14/05	0.00	0.00	4	0	0%
10 Ski Ln	**7/6/05 - 11/14/05**	**0.47**	**0.12**	4	**1**	**25%**
12 Ski Ln	5/23/05 - 11/9/05	0.00	0.00	5	0	0%
14 Ski Ln	5/24/05 - 11/15/05	0.00	0.00	6	0	0%
16 Ski Ln	5/24/05 - 11/10/05	0.00	0.00	5	0	0%
1 Thompson Ln	4/1/05 - 11/14/05	0.00	0.00	6	0	0%
2 Thompson Ln	3/31/05 - 11/9/05	0.00	0.00	7	0	0%
3 Thompson Ln	3/28/05 - 11/10/05	0.00	0.00	3	0	0%
4 Thompson Ln	8/30/05 - 11/9/05	0.00	0.00	3	0	0%
8 West Shore Rd	9/2/93 - 8/29/05	0.00	0.00	5	0	0%
9 West Shore Rd	10/29/98 - 11/14/05	0.00	0.00	5	0	0%
10 West Shore Rd	**8/5/93 - 11/15/05**	**0.19**	**0.01**	15	**1**	**7%**
11 West Shore Rd	4/19/94 - 11/10/05	0.00	0.00	16	0	0%
12 West Shore Rd	**8/5/93 - 11/15/05**	**0.39**	**0.10**	28	**13**	**46%**
13 West Shore Rd	**4/19/94 - 4/29/05**	**0.50**	**0.14**	15	**6**	**40%**
15 West Shore Rd	**4/19/94 - 11/16/05**	**0.30**	**0.02**	13	**1**	**8%**
Area 4, east:						
3 Mallard Ln	1/26/94 - 11/17/05	0.00	0.00	4	0	0%
5 Mallard Ln	10/29/98 - 10/14/03	0.00	0.00	2	0	0%
6 Mallard Ln	9/2/93 - 11/22/05	0.00	0.00	5	0	0%
7 Mallard Ln	1/26/94 - 10/14/03	0.00	0.00	4	0	0%
1 Robb Farm Rd	10/8/97 - 11/16/05	0.00	0.00	3	0	0%
2 Robb Farm Rd	**1/26/94 - 10/14/03**	**0.33**	**0.08**	4	**1**	**25%**
4 Robb Farm Rd	1/26/94 - 10/14/03	0.00	0.00	3	0	0%

Groundwater Detection Summary for Selected VOCs
Residential Wells Outside Municipal Water Supply Area
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Period of Record	Sum of Detected VOCs (ug/L)		Number of Samples	Number with Detections	Percent with Detections
		Maximum	Mean			
Area 4, west:						
9 Duck Pass Rd	**10/9/96 - 11/17/05**	**1.87**	**0.62**	3	**1**	**33%**
11 Duck Pass Rd	**11/3/94 - 10/14/03**	**0.22**	**0.07**	3	**1**	**33%**
13 Duck Pass Rd	7/27/93 - 11/17/05	0.00	0.00	6	0	0%
15 Duck Pass Rd	10/8/97 - 11/18/05	0.00	0.00	3	0	0%
20 Duck Pass Rd	**6/24/93 - 11/17/05**	**0.46**	**0.11**	6	**2**	**33%**
22 Duck Pass Rd	**10/26/95 - 11/21/05**	**3.00**	**1.00**	3	**1**	**33%**
24 Duck Pass Rd	6/24/93 - 11/17/05	0.00	0.00	4	0	0%
26 Duck Pass Rd	8/5/93 - 11/18/05	0.00	0.00	4	0	0%
28 Duck Pass Rd	10/29/98 - 10/4/01	0.00	0.00	2	0	0%
10 Eagle Ridge Rd	11/9/05 - 11/9/05	0.00	0.00	1	0	0%
32 East Oaks Rd	**11/3/94 - 11/17/05**	**0.21**	**0.04**	5	**1**	**20%**
36 East Oaks Rd	8/5/93 - 11/9/05	0.00	0.00	6	0	0%
38 East Oaks Rd	**6/24/93 - 11/9/05**	**0.18**	**0.03**	6	**1**	**17%**
1 Gadwall Ln	11/3/94 - 11/18/05	0.00	0.00	4	0	0%
2 Gadwall Ln	**11/3/94 - 11/17/05**	**0.25**	**0.06**	4	**1**	**25%**
3 Gadwall Ln	10/8/97 - 11/22/05	0.00	0.00	4	0	0%
4 Gadwall Ln	10/9/96 - 11/22/05	0.00	0.00	3	0	0%
1 Poplar Ln	8/5/93 - 11/10/05	0.00	0.00	6	0	0%
3 Poplar Ln	11/3/94 - 3/29/05	0.00	0.00	5	0	0%
4 Poplar Ln	9/2/93 - 4/14/05	0.00	0.00	5	0	0%
6 Poplar Ln	8/5/93 - 11/11/05	0.00	0.00	7	0	0%
Area 5, west:						
1 Birch Ln	11/11/05 - 11/11/05	0.00	0.00	1	0	0%
2 Birch Ln	11/10/05 - 11/10/05	0.00	0.00	1	0	0%
3 Birch Ln	11/10/05 - 11/10/05	0.00	0.00	1	0	0%
2 Heron Ln	10/8/97 - 11/11/05	0.00	0.00	5	0	0%
1 Quail Ln	11/10/05 - 11/10/05	0.00	0.00	1	0	0%
35 Robb Farm Rd	9/2/93 - 11/15/05	0.00	0.00	5	0	0.0%
37 Robb Farm Rd	9/2/93 - 11/10/05	0.00	0.00	6	0	0%
41 Robb Farm Rd	9/2/93 - 11/14/05	0.00	0.00	6	0	0%
43 Robb Farm Rd	9/2/93 - 11/10/05	0.00	0.00	5	0	0%
44 Robb Farm Rd	9/2/93 - 6/27/05	0.00	0.00	5	0	0%
45 Robb Farm Rd	10/29/98 - 11/10/05	0.00	0.00	5	0	0%
1 West Shore Rd	10/8/97 - 11/10/05	0.00	0.00	5	0	0%
2 West Shore Rd	9/2/93 - 11/9/05	0.00	0.00	6	0	0%
3 West Shore Rd	10/26/95 - 11/9/05	0.00	0.00	6	0	0%
4 West Shore Rd	8/5/93 - 11/10/05	0.00	0.00	5	0	0%
5 West Shore Rd	10/10/96 - 11/11/05	0.00	0.00	4	0	0%
6 West Shore Rd	8/5/93 - 11/10/05	0.00	0.00	5	0	0%
7 West Shore Rd	10/26/95 - 11/9/05	0.00	0.00	7	0	0%

Note: The statistics in this table are specifically for the compounds 1,1-dichloroethane; 1,2-dichloroethane; dichlorodifluoromethane; dichlorofluoromethane; and vinyl chloride. Data qualifiers are ignored in statistics shown here; hence, estimated values (close to detection limits) are treated as though accurate. Non-detections are treated as zeroes. The North Oaks Golf Club Club House well is included here because it is close to the west portion of Area 3.

Table 1-2
Groundwater Detection Summary for Selected VOCs
Former Residential Wells in Area Now Served by Municipal Water
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Period of Record	Sum of Detected VOCs (ug/L)		Number of Samples	Number with Detections	Percent with Detections
		Maximum	Mean			
Area 3, east:						
8 Edgewater Ln	**6/24/93 - 6/24/93**	**0.15**	**0.15**	1	**1**	**100%**
11 Gilfillan Rd	**7/7/93 - 5/6/94**	**0.34**	**0.13**	3	**2**	**67%**
15 Gilfillan Rd	**7/7/93 - 7/7/93**	**5.0**	**5.0**	1	**1**	**100%**
17 Gilfillan Rd	**7/7/93 - 5/6/94**	**6.5**	**4.0**	2	**2**	**100%**
18 Gilfillan Rd	7/27/93 - 7/27/93	0.00	0.00	1	0	0%
20 Gilfillan Rd	**7/7/93 - 7/7/93**	**0.19**	**0.19**	1	**1**	**100%**
21 Gilfillan Rd	**7/7/93 - 7/7/93**	**0.11**	**0.11**	1	**1**	**100%**
22 Gilfillan Rd	**6/24/93 - 5/6/94**	**5.2**	**4.5**	3	**3**	**100%**
24 Gilfillan Rd	**7/27/93 - 7/27/93**	**0.14**	**0.14**	1	**1**	**100%**
2 Lily Pond Rd	**6/7/93 - 6/7/93**	**0.05**	**0.05**	1	**1**	**100%**
7 Lily Pond Rd	7/27/93 - 7/27/93	0.00	0.00	1	0	0%
13 Robb Farm Rd	**7/27/93 - 7/27/93**	**1.66**	**1.66**	1	**1**	**100%**
15 Robb Farm Rd	8/5/93 - 8/5/93	0.00	0.00	1	0	0%
2 Wren Ln	**5/5/93 - 7/27/93**	**0.25**	**0.09**	4	**2**	**50%**
4 Wren Ln	**6/7/93 - 4/27/94**	**0.16**	**0.10**	3	**2**	**67%**
Area 4, east:						
2 Blue Goose Rd	**3/10/93 - 6/24/93**	**5.4**	**3.0**	3	**3**	**100%**
3 Blue Goose Rd	6/24/93 - 6/24/93	0.00	0.00	1	0	0%
4 Blue Goose Rd	**6/24/93 - 6/24/93**	**0.35**	**0.35**	1	**1**	**100%**
7 Blue Goose Rd	6/24/93 - 6/24/93	0.00	0.00	1	0	0%
3 Duck Pass Rd	7/27/93 - 7/27/93	0.00	0.00	1	0	0%
4 Lily Pond Rd	**5/5/93 - 7/27/93**	**0.22**	**0.14**	3	**2**	**67%**
6 Lily Pond Rd	**5/5/93 - 4/26/94**	**44**	**29**	10	**10**	**100%**
8 Lily Pond Rd	**5/24/93 - 4/26/94**	**47**	**31**	4	**4**	**100%**
7 Robb Farm Rd	**3/10/93 - 4/27/94**	**2.9**	**2.1**	6	**6**	**100%**
9 Robb Farm Rd	**3/10/93 - 4/27/94**	**44**	**33**	7	**7**	**100%**
Area 5, east:						
5 Dove Ln	6/24/93 - 6/24/93	0.00	0.00	1	0	0%
8 Dove Ln	**7/27/93 - 7/27/93**	**0.04**	**0.04**	1	**1**	**100%**
9 Dove Ln	**7/27/93 - 7/27/93**	**0.33**	**0.33**	1	**1**	**100%**
14 Dove Ln	8/5/93 - 8/5/93	0.00	0.00	1	0	0%
15 Dove Ln	9/2/93 - 9/2/93	0.00	0.00	1	0	0%
17 Dove Ln	**8/5/93 - 4/26/94**	**0.41**	**0.31**	3	**3**	**100%**
19 Dove Ln	**8/5/93 - 9/16/93**	**0.31**	**0.08**	4	**1**	**25%**
21 Dove Ln	9/2/93 - 9/2/93	0.00	0.00	1	0	0%
2 Edgewater Ln	7/27/93 - 7/27/93	0.00	0.00	1	0	0%
9 Gilfillan Rd	9/2/93 - 9/2/93	0.00	0.00	1	0	0%
10 Gilfillan Rd	7/27/93 - 7/27/93	0.00	0.00	1	0	0%
14 Gilfillan Rd	7/27/93 - 7/27/93	0.00	0.00	1	0	0%
25 Robb Farm Rd	9/2/93 - 9/2/93	0.00	0.00	1	0	0%

Note: The statistics in this table are specifically for the compounds 1,1-dichloroethane; 1,2-dichloroethane; dichlorodifluoromethane; dichlorofluoromethane; and vinyl chloride. Data qualifiers are ignored in statistics shown here; hence, estimated values (close to detection limits) are treated as though accurate. Non-detections are treated as zeroes.

Table 1-3
Groundwater Detection Summary for Selected VOCs
Monitoring Wells and Converted-Residential Monitoring Wells
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Period of Record	Sum of Detected VOCs (ug/L)		Number of Samples	Number with Detections	Percent with Detections
		Maximum	Mean			
Site Extraction Wells EW-1 and EW-1A (Area 1, central):						
EW-1/EW-1A	**6/2/88 - 11/17/05**	**145**	**33**	182	**178**	**98%**
St. Peter Near-Source Compliance Monitoring Wells (Area 1, central):						
EW-2	**10/21/05 - 10/21/05**	**13**	**13**	1	**1**	**100%**
MW8B	**11/3/87 - 11/23/05**	**218**	**59**	49	**46**	**94%**
St. Peter Downgradient Compliance Monitoring Wells (Area 1, west):						
MW10B	**2/14/90 - 11/15/05**	**1.75**	**0.18**	34	**8**	**24%**
MW12B	**10/15/90 - 11/23/05**	**4.3**	**0.76**	32	**17**	**53%**
MW13B	**10/17/90 - 11/22/05**	**6.5**	**0.69**	36	**15**	**42%**
MW16B	**10/25/05 - 11/23/05**	**6.4**	**5.3**	2	**2**	**100%**
St. Peter Converted-Residential Monitoring Wells (Areas 3 and 4, east) :						
6 Blue Goose Rd	**6/24/93 - 11/15/05**	**4.3**	**1.21**	14	**11**	**79%**
1 Lily Pond Rd	**5/5/93 - 11/15/05**	**30**	**15**	16	**15**	**94%**
11 Lily Pond Rd	**6/7/93 - 11/15/05**	**350**	**27**	14	**5**	**36%**
11 Robb Farm Rd	**5/5/93 - 11/22/05**	**5.7**	**1.72**	23	**19**	**83%**
6 Wren Ln	**7/27/93 - 10/13/99**	**0.27**	**0.14**	5	**3**	**60%**
St. Peter and Prairie du Chien Off-Site Monitoring Wells, East of Gilfillan Lake (Area 3, east) :						
Upper St. Peter Sandstone Aquifer:						
MW17A	**10/25/05 - 11/21/05**	**2.3**	**1.31**	2	**2**	**100%**
Lowerer St. Peter Sandstone Aquifer:						
MW17B	10/19/05 - 11/22/05	0.00	0.00	3	0	0%
Upper Prairie du Chien Limestone Aquifer:						
Shallower Samples:						
MW17-L (255 ft)	10/19/05 - 11/23/05	0.00	0.00	2	0	0%
Deeper Samples:						
MW17-L (285 ft)	10/19/05 - 11/23/05	0.00	0.00	2	0	0%
St. Peter and Prairie du Chien Off-Site Monitoring Wells, West of Gilfillan Lake (Area 3, west) :						
Lowerer St. Peter Sandstone Aquifer:						
MW19B	11/23/05 - 11/23/05	0.00	0.00	2	0	0%
Upper Prairie du Chien Limestone Aquifer:						
MW19-L	12/23/05 - 1/10/06	0.00	0.00	2	0	0%

Note: The statistics in this table are specifically for the compounds 1,1-dichloroethane; 1,2-dichloroethane; dichlorodifluoromethane; dichlorofluoromethane; and vinyl chloride. Data qualifiers are ignored in statistics shown here; hence, estimated values (close to detection limits) are treated as though accurate. Non-detections are treated as zeroes.

Table 1-4
Groundwater Data for Selected VOCs, 1993 - 2005
Residential Wells in Area 3, West Portion
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
N. O. Golf Club Clb Hs	3/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Buffalo Rd	5/23/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Buffalo Rd	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Buffalo Rd	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Buffalo Rd	11/22/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Buffalo Rd	11/22/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 Buffalo Rd	5/24/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 Buffalo Rd	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 Buffalo Rd	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 Buffalo Rd	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 Buffalo Rd	11/15/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Eagle Ridge Rd	3/31/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Eagle Ridge Rd	8/30/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Eagle Ridge Rd	11/9/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Eagle Ridge Rd	3/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Eagle Ridge Rd	5/23/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Eagle Ridge Rd	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Eagle Ridge Rd	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Eagle Ridge Rd	8/31/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Eagle Ridge Rd	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 Eagle Ridge Rd	3/30/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 Eagle Ridge Rd	11/15/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
4 Eagle Ridge Rd	3/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
4 Eagle Ridge Rd	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
4 Eagle Ridge Rd	8/29/05	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0
4 Eagle Ridge Rd	8/29/05	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0
4 Eagle Ridge Rd	11/15/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
6 Eagle Ridge Rd	4/1/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
6 Eagle Ridge Rd	8/30/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
6 Eagle Ridge Rd	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
6 Eagle Ridge Rd	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
44 East Oaks Rd	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
44 East Oaks Rd	**10/12/99**	< 0.20	**0.19**	< 0.25	< 0.088	< 0.20	**0.19**
44 East Oaks Rd	10/5/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
44 East Oaks Rd	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
44 East Oaks Rd	3/31/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
44 East Oaks Rd	8/30/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
44 East Oaks Rd	11/15/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
50 East Oaks Rd	4/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
50 East Oaks Rd	5/24/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
50 East Oaks Rd	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
50 East Oaks Rd	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
50 East Oaks Rd	8/29/05	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0
1 Hummingbird Ln	5/23/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Hummingbird Ln	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Hummingbird Ln	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Hummingbird Ln	11/9/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0

Groundwater Data for Selected VOCs, 1993 - 2005
Residential Wells in Area 3, West Portion
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
2 Hummingbird Ln	**3/28/05**	**0.13**	< 0.20	< 1.00	< 0.50	< 0.20	**0.13**
2 Hummingbird Ln	**4/29/05**	**0.13**	< 0.20	< 1.00	< 0.50	**0.20**	**0.33**
2 Hummingbird Ln	**5/23/05**	**0.11**	< 0.20	< 1.00	< 0.50	**0.16**	**0.27**
2 Hummingbird Ln	**6/27/05**	**0.14**	< 0.20	< 1.00	< 0.50	< 0.20	**0.14**
2 Hummingbird Ln	**8/29/05**	< 0.20	< 0.20	< 1.00	*	0.18	**0.18**
2 Hummingbird Ln	8/29/05	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0
2 Hummingbird Ln	**11/9/05**	**0.15**	< 0.20	< 1.00	< 0.50	**0.18**	**0.33**
8 Poplar Ln	8/5/93	#	#	#	#	#	0
8 Poplar Ln	8/5/93	#	#	#	#	#	0
8 Poplar Ln	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
8 Poplar Ln	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
8 Poplar Ln	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
8 Poplar Ln	3/31/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
8 Poplar Ln	3/31/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
8 Poplar Ln	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
8 Poplar Ln	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
8 Poplar Ln	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
10 Poplar Ln	4/19/94	< 0.10	< 0.075	*	< 0.034	< 0.036	0
10 Poplar Ln	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
10 Poplar Ln	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
10 Poplar Ln	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
10 Poplar Ln	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
10 Poplar Ln	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
10 Poplar Ln	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
10 Poplar Ln	**10/12/99**	< 0.20	**0.24**	< 0.25	< 0.088	< 0.20	**0.24**
10 Poplar Ln	10/4/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
10 Poplar Ln	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
10 Poplar Ln	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
10 Poplar Ln	5/24/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
10 Poplar Ln	5/24/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
10 Poplar Ln	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
10 Poplar Ln	11/14/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 Quail Ln	11/15/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Ski Ln	5/23/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Ski Ln	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Ski Ln	8/30/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Ski Ln	11/16/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
4 Ski Ln	5/23/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
4 Ski Ln	6/28/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
4 Ski Ln	8/31/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
4 Ski Ln	8/31/05	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0
4 Ski Ln	11/9/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
6 Ski Ln	5/23/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
6 Ski Ln	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
6 Ski Ln	8/30/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
6 Ski Ln	11/14/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
6 Ski Ln	11/14/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
8 Ski Ln	5/23/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
8 Ski Ln	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
8 Ski Ln	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
8 Ski Ln	11/14/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
10 Ski Ln	**7/6/05**	< 0.50	< 0.50	**0.47**	*	< 0.20	**0.47**
10 Ski Ln	7/6/05	< 0.50	< 0.50	< 0.50	*	< 0.20	0
10 Ski Ln	9/6/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
10 Ski Ln	11/14/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
12 Ski Ln	5/23/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
12 Ski Ln	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
12 Ski Ln	8/30/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
12 Ski Ln	8/30/05	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0
12 Ski Ln	11/9/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0

Groundwater Data for Selected VOCs, 1993 - 2005
Residential Wells in Area 3, West Portion
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
14 Ski Ln	5/24/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
14 Ski Ln	6/28/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
14 Ski Ln	6/28/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
14 Ski Ln	8/30/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
14 Ski Ln	8/30/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
14 Ski Ln	11/15/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
16 Ski Ln	5/24/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
16 Ski Ln	6/28/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
16 Ski Ln	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
16 Ski Ln	8/29/05	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0
16 Ski Ln	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Thompson Ln	4/1/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Thompson Ln	4/1/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Thompson Ln	5/23/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Thompson Ln	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Thompson Ln	8/30/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Thompson Ln	11/14/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Thompson Ln	3/31/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Thompson Ln	5/23/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Thompson Ln	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Thompson Ln	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Thompson Ln	8/30/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Thompson Ln	8/30/05	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0
2 Thompson Ln	11/9/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 Thompson Ln	3/28/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 Thompson Ln	6/28/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 Thompson Ln	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
4 Thompson Ln	8/30/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
4 Thompson Ln	8/30/05	< 0.50	< 0.50	< 0.50	*	< 0.50	0
4 Thompson Ln	11/9/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
8 West Shore Rd	9/2/93	#	#	#	#	#	0
8 West Shore Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
8 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
8 West Shore Rd	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
8 West Shore Rd	8/29/05	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0
9 West Shore Rd	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
9 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
9 West Shore Rd	3/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
9 West Shore Rd	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
9 West Shore Rd	11/14/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
10 West Shore Rd	8/5/93	#	#	#	#	#	0
10 West Shore Rd	4/19/94	< 0.10	< 0.075	*	< 0.034	< 0.036	0
10 West Shore Rd	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
10 West Shore Rd	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
10 West Shore Rd	10/10/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
10 West Shore Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
10 West Shore Rd	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
10 West Shore Rd	**10/12/99**	< 0.20	**0.19**	< 0.25	< 0.088	< 0.20	**0.19**
10 West Shore Rd	10/4/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
10 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
10 West Shore Rd	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
10 West Shore Rd	3/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
10 West Shore Rd	5/24/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
10 West Shore Rd	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
10 West Shore Rd	11/15/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0

Groundwater Data for Selected VOCs, 1993 - 2005
Residential Wells in Area 3, West Portion
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
11 West Shore Rd	4/19/94	< 0.10	< 0.075	*	< 0.034	< 0.036	0
11 West Shore Rd	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
11 West Shore Rd	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
11 West Shore Rd	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
11 West Shore Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
11 West Shore Rd	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
11 West Shore Rd	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
11 West Shore Rd	10/12/99	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
11 West Shore Rd	10/12/99	< 3.0	< 1.50	< 3.8	< 1.30	< 3.0	0
11 West Shore Rd	10/4/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
11 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
11 West Shore Rd	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
11 West Shore Rd	3/28/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
11 West Shore Rd	5/23/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
11 West Shore Rd	8/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
11 West Shore Rd	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
12 West Shore Rd	**8/5/93**	#	#	#	#	**0.071**	**0.07**
12 West Shore Rd	**8/16/93**	#	#	#	#	**0.075**	**0.08**
12 West Shore Rd	**8/16/93**	#	#	#	#	**0.066**	**0.07**
12 West Shore Rd	4/19/94	< 0.10	< 0.075	*	< 0.034	< 0.036	0
12 West Shore Rd	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
12 West Shore Rd	12/22/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.20	0
12 West Shore Rd	5/17/95	< 0.10	< 0.075	< 0.25	*	< 0.036	0
12 West Shore Rd	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
12 West Shore Rd	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
12 West Shore Rd	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
12 West Shore Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
12 West Shore Rd	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
12 West Shore Rd	**10/12/99**	< 0.20	**0.22**	< 0.25	< 0.088	< 0.20	**0.22**
12 West Shore Rd	10/4/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
12 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
12 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
12 West Shore Rd	**10/19/04**	**0.14**	< 0.076	< 0.097	< 0.14	**0.12**	**0.26**
12 West Shore Rd	**1/12/05**	**0.13**	< 0.076	< 0.097	< 0.14	**0.12**	**0.25**
12 West Shore Rd	2/16/05	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0
12 West Shore Rd	**2/16/05**	**0.19**	< 0.20	< 1.00	< 0.50	**0.15**	**0.34**
12 West Shore Rd	3/31/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
12 West Shore Rd	4/29/05	**0.13**	< 0.20	< 1.00	< 0.50	**0.14**	0
12 West Shore Rd	**5/24/05**	**0.12**	< 0.20	< 1.00	< 0.50	**0.14**	**0.26**
12 West Shore Rd	**5/24/05**	**0.13**	< 0.20	< 1.00	< 0.50	**0.12**	**0.25**
12 West Shore Rd	**6/27/05**	< 0.20	< 0.20	< 1.00	< 0.50	**0.19**	**0.19**
12 West Shore Rd	**8/31/05**	**0.20**	< 0.20	< 1.00	< 0.50	**0.19**	**0.39**
12 West Shore Rd	**8/31/05**	< 0.5	< 0.50	< 0.50	*	**0.16**	**0.16**
12 West Shore Rd	**11/15/05**	**0.19**	< 0.20	< 1.00	< 0.50	**0.15**	**0.34**
13 West Shore Rd	4/19/94	< 0.10	< 0.075	*	< 0.034	< 0.036	0
13 West Shore Rd	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
13 West Shore Rd	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
13 West Shore Rd	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
13 West Shore Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
13 West Shore Rd	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
13 West Shore Rd	10/4/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
13 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
13 West Shore Rd	**10/19/04**	**0.14**	< 0.076	< 0.097	< 0.14	**0.12**	**0.26**
13 West Shore Rd	**10/19/04**	**0.14**	< 0.076	< 0.097	< 0.14	**0.12**	**0.26**
13 West Shore Rd	**1/14/05**	**0.18**	< 0.076	< 0.097	< 0.14	**0.16**	**0.34**
13 West Shore Rd	2/16/05	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0
13 West Shore Rd	**2/16/05**	**0.18**	< 0.20	< 1.00	< 0.50	**0.11**	**0.29**
13 West Shore Rd	**3/30/05**	**0.30**	< 0.20	< 1.00	< 0.50	**0.20**	**0.50**
13 West Shore Rd	**4/29/05**	**0.20**	< 0.20	< 1.00	< 0.50	**0.20**	**0.40**

Groundwater Data for Selected VOCs, 1993 - 2005
Residential Wells in Area 3, West Portion
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
15 West Shore Rd	4/19/94	< 0.10	< 0.075	*	< 0.034	< 0.036	0
15 West Shore Rd	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
15 West Shore Rd	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
15 West Shore Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
15 West Shore Rd	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
15 West Shore Rd	**10/12/99**	< 0.20	**0.30**	< 0.25	< 0.088	< 0.20	**0.30**
15 West Shore Rd	10/4/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
15 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
15 West Shore Rd	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
15 West Shore Rd	3/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
15 West Shore Rd	5/24/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
15 West Shore Rd	8/30/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
15 West Shore Rd	11/16/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
Maximum Concentration		**0.30**	**0.30**	**0.47**	< 1.30	**0.20**	**0.50**
Sample Count		227	227	221	215	230	234
Number of Detections		**19**	**5**	**1**	0	**23**	**30**
Number > Current HRL		0	0	0	**--**	0	**--**
Number > Draft HRL		--	0	0	**--**	**20**	**--**

Data sources: Annual Monitoring Reports for 2003 (1994 - 2003 data), 2004, and 2005 by CRA.

Note: 1,1-DCA = 1,1-dichloroethane; 1,2-DCA = 1,2-dichloroethane; DCDFM = dichlorodifluoromethane; DCFM = dichlorofluoromethane; and VC = vinyl chloride. Data qualifiers have been trimmed and are ignored in statistics shown here; hence, estimated values (close to detection limits) are treated as though accurate. Asterisk indicates compound not anlayzed in sample. Number sign indicates no value reported in source document, probably meaning non-detection. The above wells are outside the area served by municipal wate The North Oaks Golf Club Club House well is included here because it is close to the west portion of Area 3.

Table 1-5
Groundwater Data for Selected VOCs, 1993 - 2005
Residential Wells in Area 4, West Portion
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
9 Duck Pass Rd	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
9 Duck Pass Rd	10/2/01	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
9 Duck Pass Rd	**11/17/05**	**0.50**	< 0.20	**0.93**	**0.44**	< 0.20	**1.87**
11 Duck Pass Rd	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
11 Duck Pass Rd	**10/12/99**	< 0.20	**0.22**	< 0.25	< 0.088	< 0.20	**0.22**
11 Duck Pass Rd	10/14/03	< 0.097	< 0.12	< 0.12	< 0.19	< 0.14	0
13 Duck Pass Rd	7/27/93	#	#	#	#	#	0
13 Duck Pass Rd	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
13 Duck Pass Rd	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
13 Duck Pass Rd	10/12/99	< 3.0	< 1.5	< 3.8	< 1.3	< 3.0	0
13 Duck Pass Rd	10/14/03	< 0.097	< 0.12	< 0.12	< 0.19	< 0.14	0
13 Duck Pass Rd	11/17/05	< 0.20	< 0.20	< 1.0	< 0.5	< 0.20	0
15 Duck Pass Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
15 Duck Pass Rd	10/2/01	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
15 Duck Pass Rd	11/18/05	< 0.20	< 0.20	< 1.0	< 0.5	< 0.20	0
20 Duck Pass Rd	6/24/93	#	#	#	#	#	0
20 Duck Pass Rd	4/19/94	< 0.10	< 0.075	*	< 0.034	< 0.036	0
20 Duck Pass Rd	**10/12/99**	< 0.20	**0.16**	**0.30**	< 0.088	< 0.20	**0.46**
20 Duck Pass Rd	**10/14/03**	< 0.097	< 0.12	**0.20**	< 0.19	< 0.14	**0.20**
20 Duck Pass Rd	11/17/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
20 Duck Pass Rd	11/17/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
22 Duck Pass Rd	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
22 Duck Pass Rd	10/5/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
22 Duck Pass Rd	**11/21/05**	**0.50**	< 0.20	**1.6**	**0.90**	< 0.20	**3.00**
24 Duck Pass Rd	6/24/93	#	#	#	#	#	0
24 Duck Pass Rd	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
24 Duck Pass Rd	10/5/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
24 Duck Pass Rd	11/17/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
26 Duck Pass Rd	8/5/93	#	#	#	#	#	0
26 Duck Pass Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
26 Duck Pass Rd	10/4/01	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
26 Duck Pass Rd	11/18/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
28 Duck Pass Rd	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
28 Duck Pass Rd	10/4/01	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
10 Eagle Ridge Rd	11/9/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
32 East Oaks Rd	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
32 East Oaks Rd	**10/12/99**	< 0.20	**0.21**	< 0.25	< 0.088	< 0.20	**0.21**
32 East Oaks Rd	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
32 East Oaks Rd	3/29/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
32 East Oaks Rd	11/17/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
36 East Oaks Rd	8/5/93	#	#	#	#	#	0
36 East Oaks Rd	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
36 East Oaks Rd	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
36 East Oaks Rd	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
36 East Oaks Rd	3/29/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
36 East Oaks Rd	11/9/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0

Groundwater Data for Selected VOCs, 1993 - 2005
Residential Wells in Area 4, West Portion
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
38 East Oaks Rd	6/24/93	#	#	#	#	#	0
38 East Oaks Rd	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
38 East Oaks Rd	**10/12/99**	< 0.20	**0.18**	< 0.25	< 0.088	< 0.20	**0.18**
38 East Oaks Rd	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
38 East Oaks Rd	4/14/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
38 East Oaks Rd	11/9/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
1 Gadwall Ln	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
1 Gadwall Ln	10/12/99	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
1 Gadwall Ln	10/14/03	< 0.097	< 0.12	< 0.12	< 0.19	< 0.14	0
1 Gadwall Ln	11/18/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
2 Gadwall Ln	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
2 Gadwall Ln	**10/12/99**	< 0.20	**0.25**	< 0.25	< 0.088	< 0.20	**0.25**
2 Gadwall Ln	10/14/03	< 0.097	< 0.12	< 0.12	< 0.19	< 0.14	0
2 Gadwall Ln	11/17/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
3 Gadwall Ln	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
3 Gadwall Ln	10/2/01	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
3 Gadwall Ln	11/22/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
3 Gadwall Ln	11/22/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
4 Gadwall Ln	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
4 Gadwall Ln	10/5/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
4 Gadwall Ln	11/22/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
1 Poplar Ln	8/5/93	#	#	#	#	#	0
1 Poplar Ln	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
1 Poplar Ln	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
1 Poplar Ln	3/29/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
1 Poplar Ln	5/23/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
1 Poplar Ln	11/10/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
3 Poplar Ln	11/3/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
3 Poplar Ln	10/12/99	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
3 Poplar Ln	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
3 Poplar Ln	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
3 Poplar Ln	3/29/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
4 Poplar Ln	9/2/93	#	#	#	#	#	0
4 Poplar Ln	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
4 Poplar Ln	10/6/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
4 Poplar Ln	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
4 Poplar Ln	4/14/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
6 Poplar Ln	8/5/93	#	#	#	#	#	0
6 Poplar Ln	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
6 Poplar Ln	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
6 Poplar Ln	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
6 Poplar Ln	4/1/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
6 Poplar Ln	4/1/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
6 Poplar Ln	11/11/05	< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
Maximum Concentration		**0.50**	**0.25**	**1.60**	**0.90**	< 3.0	**3.0**
Sample Count		81	81	80	77	81	90
Number of Detections		**2**	**5**	**4**	**2**	0	**8**
Number > Current HRL		0	0	0	--	0	**--**
Number > Draft HRL		--	0	0	--	0	**--**

Data sources: Annual Monitoring Reports for 2003 (1994 - 2003 data), 2004, and 2005 by CRA.

Note: 1,1-DCA = 1,1-dichloroethane; 1,2-DCA = 1,2-dichloroethane; DCDFM = dichlorodifluoromethane; DCFM = dichlorofluoromethane; and VC = vinyl chloride. Data qualifiers have been trimmed and are ignored in statistics shown here; hence, estimated values (close to detection limits) are treated as though accurate. Asterisk indicates compound not anlayzed in sample. Number sign indicates no value reported in source document, probably meaning non-detection. The above wells are outside the area served by municipal wate

Table 1-6
Groundwater Data for Selected VOCs, 1993 - 2005
Residential Wells in Area 5, West Portion
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
1 Birch Ln	11/11/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Birch Ln	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 Birch Ln	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Heron Ln	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
2 Heron Ln	10/2/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
2 Heron Ln	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
2 Heron Ln	11/11/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 Heron Ln	11/11/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Quail Ln	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
35 Robb Farm Rd	9/2/93	#	#	#	#	#	0
35 Robb Farm Rd	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
35 Robb Farm Rd	10/4/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
35 Robb Farm Rd	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
35 Robb Farm Rd	11/15/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
37 Robb Farm Rd	9/2/93	#	#	#	#	#	0
37 Robb Farm Rd	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
37 Robb Farm Rd	10/4/01	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
37 Robb Farm Rd	10/4/01	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
37 Robb Farm Rd	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
37 Robb Farm Rd	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
41 Robb Farm Rd	9/2/93	#	#	#	#	#	0
41 Robb Farm Rd	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
41 Robb Farm Rd	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
41 Robb Farm Rd	10/2/01	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
41 Robb Farm Rd	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
41 Robb Farm Rd	11/14/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
43 Robb Farm Rd	9/2/93	#	#	#	#	#	0
43 Robb Farm Rd	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
43 Robb Farm Rd	10/4/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
43 Robb Farm Rd	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
43 Robb Farm Rd	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
44 Robb Farm Rd	9/2/93	#	#	#	#	#	0
44 Robb Farm Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
44 Robb Farm Rd	10/2/01	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
44 Robb Farm Rd	10/2/01	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
44 Robb Farm Rd	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
45 Robb Farm Rd	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
45 Robb Farm Rd	10/14/03	< 0.097	< 0.12	< 0.12	< 0.19	< 0.14	0
45 Robb Farm Rd	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
45 Robb Farm Rd	6/27/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
45 Robb Farm Rd	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0

Groundwater Data for Selected VOCs, 1993 - 2005
Residential Wells in Area 5, West Portion
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
1 West Shore Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
1 West Shore Rd	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
1 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
1 West Shore Rd	3/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 West Shore Rd	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 West Shore Rd	9/2/93	#	#	#	#	#	0
2 West Shore Rd	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
2 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
2 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
2 West Shore Rd	3/31/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
2 West Shore Rd	11/9/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 West Shore Rd	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
3 West Shore Rd	10/4/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
3 West Shore Rd	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
3 West Shore Rd	3/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 West Shore Rd	11/9/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
3 West Shore Rd	11/9/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
4 West Shore Rd	8/5/93	#	#	#	#	#	0
4 West Shore Rd	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
4 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
4 West Shore Rd	3/31/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
4 West Shore Rd	11/10/05	< 0.20	< 0.20	< 1.00	< 0.5	< 0.20	0
5 West Shore Rd	10/10/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
5 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
5 West Shore Rd	3/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
5 West Shore Rd	11/11/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
6 West Shore Rd	8/5/93	#	#	#	#	#	0
6 West Shore Rd	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
6 West Shore Rd	10/1/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
6 West Shore Rd	3/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
6 West Shore Rd	11/10/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
7 West Shore Rd	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
7 West Shore Rd	10/4/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
7 West Shore Rd	10/4/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
7 West Shore Rd	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
7 West Shore Rd	3/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
7 West Shore Rd	3/29/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
7 West Shore Rd	11/9/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
Maximum Concentration		< 0.20	< 0.20	< 1.0	< 0.50	< 0.20	0
Sample Count		71	71	71	67	71	79
Number of Detections		0	0	0	0	0	0
Number > Current HRL		0	0	0	--	0	--
Number > Draft HRL		--	0	0	--	0	--

Data sources: Annual Monitoring Reports for 2003 (1994 - 2003 data), 2004, and 2005 by CRA.

Note: 1,1-DCA = 1,1-dichloroethane; 1,2-DCA = 1,2-dichloroethane; DCDFM = dichlorodifluoromethane; DCFM = dichlorofluoromethane; and VC = vinyl chloride. Data qualifiers have been trimmed and are ignored in statistics shown here; hence, estimated values (close to detection limits) are treated as though accurate. Asterisk indicates compound not anlayzed in sample. Number sign indicates no value reported in source document, probably meaning non-detection. The above wells are outside the area served by municipal wate The east portion of Area 5, however, is within the municipal water area. Since 1994, no residential wells have been sampled in the east portion of Area 5.

Table 1-7
Groundwater Data for Selected VOCs, 1993 - 2005
Residential Wells in Area 4, East Portion
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
3 Mallard Ln	1/26/94	< 0.10	< 0.075	< 0.25	*	< 0.036	0
3 Mallard Ln	10/26/95	< 0.16	< 0.12	< 0.38	*	< 0.056	0
3 Mallard Ln	10/5/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
3 Mallard Ln	11/17/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
5 Mallard Ln	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
5 Mallard Ln	10/14/03	< 0.097	< 0.12	< 0.12	< 0.19	< 0.14	0
6 Mallard Ln	9/2/93	#	#	#	#	#	0
6 Mallard Ln	1/26/94	< 0.10	< 0.075	< 0.25	*	< 0.036	0
6 Mallard Ln	10/9/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
6 Mallard Ln	10/2/01	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
6 Mallard Ln	11/22/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
7 Mallard Ln	1/26/94	< 0.10	< 0.075	< 0.25	*	< 0.036	0
7 Mallard Ln	10/27/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
7 Mallard Ln	10/14/03	< 0.097	< 0.12	< 0.12	< 0.19	< 0.14	0
7 Mallard Ln	10/14/03	< 0.097	< 0.12	< 0.12	< 0.19	< 0.14	0
1 Robb Farm Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
1 Robb Farm Rd	10/2/01	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
1 Robb Farm Rd	11/16/05	< 0.20	< 0.20	< 1.00	< 0.5	< 0.20	0
2 Robb Farm Rd	1/26/94	< 0.10	< 0.075	< 0.25	*	< 0.036	0
2 Robb Farm Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
2 Robb Farm Rd	**10/14/99**	< 0.20	**0.33**	< 0.25	< 0.088	< 0.20	**0.33**
2 Robb Farm Rd	10/14/03	< 0.097	< 0.12	< 0.12	< 0.19	< 0.14	0
4 Robb Farm Rd	1/26/94	< 0.10	< 0.075	< 0.25	*	< 0.036	0
4 Robb Farm Rd	11/11/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
4 Robb Farm Rd	10/14/03	< 0.097	< 0.12	< 0.12	< 0.19	< 0.14	0
Maximum Concentration		< 0.2	**0.33**	< 1.0	< 0.5	< 0.2	**0.33**
Sample Count		24	24	24	18	24	25
Number of Detections		0	**1**	0	0	0	**1**
Number > Current HRL		0	0	0	**--**	0	**--**
Number > Draft HRL		**--**	0	0	**--**	0	**--**

Data sources: Annual Monitoring Reports for 2003 (1994 - 2003 data), 2004, and 2005 by CRA.

Note: 1,1-DCA = 1,1-dichloroethane; 1,2-DCA = 1,2-dichloroethane; DCDFM = dichlorodifluoromethane; DCFM = dichlorofluoromethane; and VC = vinyl chloride. Data qualifiers have been trimmed and are ignored in statistics shown here; hence, estimated values (close to detection limits) are treated as though accurate. Asterisk indicates compound not anlayzed in sample. Number sign indicates no value reported in source document, probably meaning non-detection. The above wells are outside the area served by municipal wate

Table 1-8
Groundwater Data for Selected VOCs, 1993 - 1994
Former Residential Wells in Municipal Water Supply Area
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
Area 3, east:							
8 Edgewater Ln	**6/24/93**	**0.10**	#	#	#	**0.05**	**0.15**
11 Gilfillan Rd	**7/7/93**	#	#	#	#	**0.054**	**0.05**
11 Gilfillan Rd	**7/27/93**	**0.14**	#	#	#	**0.20**	**0.34**
11 Gilfillan Rd	5/6/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.036	0
15 Gilfillan Rd	**7/7/93**	**1.50**	#	**0.88**	**0.67**	**1.90**	**5.0**
17 Gilfillan Rd	**7/7/93**	**2.1**	#	**1.10**	**0.81**	**2.50**	**6.5**
17 Gilfillan Rd	**5/6/94**	**0.64**	< 0.075	< 0.25	**0.34**	**0.46**	**1.44**
18 Gilfillan Rd	7/27/93	#	#	#	#	#	0
20 Gilfillan Rd	**7/7/93**	**0.14**	#	#	#	**0.054**	**0.19**
21 Gilfillan Rd	**7/7/93**	#	#	#	#	**0.11**	**0.11**
22 Gilfillan Rd	**6/24/93**	**1.90**	#	**0.92**	#	**2.40**	**5.2**
22 Gilfillan Rd	**7/7/93**	**1.70**	#	**0.76**	**0.60**	**1.80**	**4.9**
22 Gilfillan Rd	**5/6/94**	**1.30**	< 0.075	**0.28**	**0.83**	**0.95**	**3.4**
24 Gilfillan Rd	**7/27/93**	**0.14**	#	#	#	#	**0.14**
2 Lily Pond Rd	**6/7/93**	#	#	#	#	**0.05**	**0.05**
7 Lily Pond Rd	7/27/93	#	#	#	#	#	0
13 Robb Farm Rd	**7/27/93**	**0.62**	#	**1.00**	#	**0.04**	**1.66**
15 Robb Farm Rd	8/5/93	#	#	#	#	#	0
2 Wren Ln	5/5/93	#	#	#	#	#	0
2 Wren Ln	5/14/93	#	#	#	#	#	0
2 Wren Ln	**6/7/93**	#	#	#	**0.14**	**0.11**	**0.25**
2 Wren Ln	**7/27/93**	#	#	#	#	**0.10**	**0.10**
4 Wren Ln	**6/7/93**	#	#	#	#	**0.13**	**0.13**
4 Wren Ln	**7/27/93**	#	#	#	#	**0.16**	**0.16**
4 Wren Ln	4/27/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.036	0

Groundwater Data for Selected VOCs, 1993 - 1994
Former Residential Wells in Municipal Water Supply Area
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
Area 4, east:							
2 Blue Goose Rd	**3/10/93**	**0.70**	#	#	#	#	**0.70**
2 Blue Goose Rd	**3/10/93**	#	#	**3.0**	#	#	**3.0**
2 Blue Goose Rd	**6/24/93**	**1.40**	#	**4.0**	#	**0.04**	**5.4**
3 Blue Goose Rd	6/24/93	#	#	#	#	#	0
4 Blue Goose Rd	**6/24/93**	#	#	**0.35**	#	#	**0.35**
7 Blue Goose Rd	6/24/93	#	#	#	#	#	0
3 Duck Pass Rd	7/27/93	#	#	#	#	#	0
4 Lily Pond Rd	5/5/93	#	#	#	#	#	0
4 Lily Pond Rd	**6/7/93**	**0.10**	#	#	**0.07**	**0.05**	**0.22**
4 Lily Pond Rd	**7/27/93**	**0.13**	#	#	#	**0.074**	**0.20**
6 Lily Pond Rd	**5/5/93**	**11**	**0.50**	**20**	**4.2**	**1.00**	**37**
6 Lily Pond Rd	**5/14/93**	**12**	**0.60**	**23**	**4.9**	**1.00**	**42**
6 Lily Pond Rd	**5/14/93**	**13**	**0.60**	**23**	**5.1**	**0.80**	**43**
6 Lily Pond Rd	**5/14/93**	**7.2**		**7.4**	**4.8**	**2.50**	**22**
6 Lily Pond Rd	**5/14/93**	**4.2**		**5.5**	**2.7**	**1.60**	**14**
6 Lily Pond Rd	**5/14/93**	#	#	**5.2**	#	#	**5.2**
6 Lily Pond Rd	**5/14/93**	#	#	**9.2**	#	#	**9.2**
6 Lily Pond Rd	**6/7/93**	**13**		**18**	**5.1**	**0.66**	**37**
6 Lily Pond Rd	**6/7/93**	**15**	**0.50**	**23**	**5.1**	**0.50**	**44**
6 Lily Pond Rd	**4/26/94**	**15**	**<** 0.075	**17**	**5.8**	**0.37**	**38**
8 Lily Pond Rd	**5/24/93**	**16**	#	**24**	**6.1**	**0.40**	**47**
8 Lily Pond Rd	**6/7/93**	**1.00**	**0.60**	**22**	#	**0.29**	**24**
8 Lily Pond Rd	**6/7/93**	**19**	**0.50**	#	**6.6**	**0.30**	**26**
8 Lily Pond Rd	**4/26/94**	**9.5**	**<** 0.075	**14**	**5.0**	**0.12**	**29**
7 Robb Farm Rd	**3/10/93**	**0.7**	#	#	#	**1.80**	**3**
7 Robb Farm Rd	**3/10/93**	#	#	#	#	**1.8**	**1.8**
7 Robb Farm Rd	**3/10/93**	#	#	#	#	**1.8**	**1.8**
7 Robb Farm Rd	**3/19/93**	**1**	#	#	#	**1.80**	**3**
7 Robb Farm Rd	**6/7/93**	**1**	#	#	**0.5**	**1.80**	**3**
7 Robb Farm Rd	**4/27/94**	**0.67**	**<** 0.075	**< 0.25**	**0.1**	**0.56**	**1**
9 Robb Farm Rd	**3/10/93**	**15**	**0.30**	**21**	#	**1.2**	**38**
9 Robb Farm Rd	**3/10/93**	**15**	#	**12**	**5.0**	#	**32**
9 Robb Farm Rd	**3/10/93**	#	#	**14**	#	#	**14**
9 Robb Farm Rd	**3/19/93**	**14**	**0.50**	**12**	#	#	**26**
9 Robb Farm Rd	**6/7/93**	**16**	#	**14**	**4.0**	**0.32**	**34**
9 Robb Farm Rd	**6/7/93**	**18**	#	**21**	**4.5**	**0.51**	**44**
9 Robb Farm Rd	**4/27/94**	**19**	**<** 0.075	**16**	**5.1**	**0.12**	**40**

Groundwater Data for Selected VOCs, 1993 - 1994
Former Residential Wells in Municipal Water Supply Area
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
Area 5, east:							
5 Dove Ln	6/24/93	#	#	#	#	#	0
8 Dove Ln	**7/27/93**	#	#	#	#	**0.039**	**0.04**
9 Dove Ln	**7/27/93**	#	#	**0.33**	#	#	**0.33**
14 Dove Ln	8/5/93	#	#	#	#	#	0
15 Dove Ln	9/2/93	#	#	#	#	#	0
17 Dove Ln	**8/5/93**	#	#	#	#	**0.32**	**0.32**
17 Dove Ln	**9/2/93**	#	#	#	#	**0.41**	**0.41**
17 Dove Ln	**4/26/94**	**<** 0.10	**<** 0.075	**<** 0.25	**<** 0.034	**0.20**	**0.20**
19 Dove Ln	**8/5/93**	#	#	#	#	**0.31**	**0.31**
19 Dove Ln	9/2/93	#	#	#	#	#	0
19 Dove Ln	9/16/93	#	#	#	#	#	0
19 Dove Ln	9/16/93	#	#	#	#	#	0
21 Dove Ln	9/2/93	#	#	#	#	#	0
2 Edgewater Ln	7/27/93	#	#	#	#	#	0
9 Gilfillan Rd	9/2/93	#	#	#	#	#	0
10 Gilfillan Rd	7/27/93	#	#	#	#	#	0
14 Gilfillan Rd	7/27/93	#	#	#	#	#	0
25 Robb Farm Rd	9/2/93	#	#	#	#	#	0
Maximum Concentration		**19**	**0.60**	**24**	**6.6**	**2.5**	**47**
Sample Count		40	17	35	27	49	80
Number of Detections		**37**	**8**	**30**	**24**	**47**	**57**
Number > Current HRL		0	0	0	**--**	**29**	**--**
Number > Draft HRL		--	0	0	**--**	**38**	**--**

Data sources: Annual Monitoring Reports for 2003 (1994 - 2003 data), 2004, and 2005 by CRA.

Note: 1,1-DCA = 1,1-dichloroethane; 1,2-DCA = 1,2-dichloroethane; DCDFM = dichlorodifluoromethane; DCFM = dichlorofluoromethane; and VC = vinyl chloride. Data qualifiers have been trimmed and are ignored in statistics shown here; hence, estimated values (close to detection limits) are treated as though accurate. Asterisk indicates compound not anlayzed in sample. Number sign indicates no value reported in source document, probably meaning non-detection. The above wells are in the area served by municipal water.

Table 1-9
Groundwater Data for Selected VOCs, 1993 - 2005
St. Peter Converted-Residential Monitoring Wells
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
6 Blue Goose Rd	**6/24/93**	**0.14**	#	**0.43**	#	**0.06**	**0.63**
6 Blue Goose Rd	**6/24/93**	#	#	**3.80**	#	#	**3.80**
6 Blue Goose Rd	**10/10/96**	< 0.10	< 0.075	**1.80**	< 0.034	**0.11**	**1.91**
6 Blue Goose Rd	**10/8/97**	< 0.20	< 0.10	**1.50**	**0.33**	< 0.10	**1.83**
6 Blue Goose Rd	**10/28/98**	**0.25**	< 0.10	**3.60**	**0.45**	< 0.20	**4.30**
6 Blue Goose Rd	**10/14/99**	< 0.20	**0.28**	< 0.25	**0.39**	< 0.20	**0.67**
6 Blue Goose Rd	**10/6/00**	< 0.20	< 0.10	**1.10**	< 0.088	< 0.20	**1.10**
6 Blue Goose Rd	**10/5/01**	< 0.20	< 0.10	**0.49**	< 0.088	< 0.20	**0.49**
6 Blue Goose Rd	10/3/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
6 Blue Goose Rd	**10/15/03**	**0.11**	< 0.12	**1.10**	< 0.19	< 0.14	**1.21**
6 Blue Goose Rd	**10/15/03**	**0.11**	< 0.12	**0.34**	< 0.19	< 0.14	**0.45**
6 Blue Goose Rd	**10/19/04**	**0.093**	< 0.076	**0.51**	< 0.14	< 0.083	**0.60**
6 Blue Goose Rd	11/15/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
6 Blue Goose Rd	11/15/05	< 0.20	< 0.20	< 1.00	< 0.50	< 0.20	0
1 Lily Pond Rd	**5/5/93**	**2.4**	#	**11**	**2.8**	**0.50**	**17**
1 Lily Pond Rd	**5/14/93**	**2.5**	#	**12**	**3.4**	**0.70**	**19**
1 Lily Pond Rd	**5/14/93**	**1.10**	#	**6.4**	**3.1**	**1.10**	**12**
1 Lily Pond Rd	**5/14/93**	#	#	**2.9**	#	#	**2.9**
1 Lily Pond Rd	**6/7/93**	**2.1**	#	**9.3**	**3.4**	**0.28**	**15**
1 Lily Pond Rd	**6/7/93**	**2.5**	#	**13**	#	**0.30**	**16**
1 Lily Pond Rd	**10/10/96**	**4.0**	< 0.075	**11**	**3.7**	**0.34**	**19**
1 Lily Pond Rd	**10/8/97**	**1.6**	< 0.10	**4.0**	**2.0**	< 0.10	**7.6**
1 Lily Pond Rd	**10/28/98**	**6.4**	**0.27**	**19**	**4.5**	**0.25**	**30**
1 Lily Pond Rd	**10/13/99**	< 0.20	**0.38**	< 0.25	< 0.088	< 0.20	**0.38**
1 Lily Pond Rd	**10/6/00**	**6.7**	< 0.10	**11**	**3.9**	< 0.20	**22**
1 Lily Pond Rd	**10/4/01**	**6.2**	< 0.10	**8.9**	**3.6**	< 0.20	**19**
1 Lily Pond Rd	**10/3/02**	**6.9**	< 0.10	**10**	**3.9**	< 0.20	**21**
1 Lily Pond Rd	**10/14/03**	**6.5**	**0.23**	**8.4**	**2.8**	< 0.14	**18**
1 Lily Pond Rd	**10/19/04**	**7.0**	< 0.076	**6.5**	**3.5**	**0.17**	**17**
1 Lily Pond Rd	11/15/05	< 0.20	< 0.20	< 1	< 0.5	< 0.20	0
11 Lily Pond Rd	**6/7/93**	#	#	**3.0**	**0.10**	**0.12**	**3.2**
11 Lily Pond Rd	**7/27/93**	#	#	**0.75**	#	**0.10**	**0.85**
11 Lily Pond Rd	**5/6/94**	< 0.10	< 0.075	**350**	< 0.034	< 0.036	**350**
11 Lily Pond Rd	10/10/96	< 0.10	< 0.075	< 0.25	< 0.034	< 0.10	0
11 Lily Pond Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
11 Lily Pond Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
11 Lily Pond Rd	10/28/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
11 Lily Pond Rd	**10/13/99**	< 0.20	**0.28**	< 0.25	< 0.088	< 0.20	**0.28**
11 Lily Pond Rd	10/6/00	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
11 Lily Pond Rd	10/5/01	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
11 Lily Pond Rd	10/3/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
11 Lily Pond Rd	10/14/03	< 0.097	< 0.12	< 0.12	< 0.19	< 0.14	0
11 Lily Pond Rd	10/19/04	< 0.062	< 0.076	< 0.097	< 0.14	< 0.083	0
11 Lily Pond Rd	**11/15/05**	**8.6**	**0.30**	**7.4**	**3.4**	< 0.20	**20**

Groundwater Data for Selected VOCs, 1993 - 2005
St. Peter Converted-Residential Monitoring Wells
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	--
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	--
11 Robb Farm Rd	**5/5/93**	**1.30**	#	**1.00**	#	#	**2.3**
11 Robb Farm Rd	**5/5/93**	**1.30**	#	**1.00**	#	#	**2.3**
11 Robb Farm Rd	**7/27/93**	#	#	**0.27**	#	#	**0.27**
11 Robb Farm Rd	**7/27/93**	#	#	**0.27**	#	#	**0.27**
11 Robb Farm Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
11 Robb Farm Rd	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
11 Robb Farm Rd	**10/28/98**	**1.90**	< 0.10	**3.1**	**0.65**	< 0.20	**5.7**
11 Robb Farm Rd	**10/28/98**	**1.90**	< 0.10	**3.1**	**0.65**	< 0.20	**5.7**
11 Robb Farm Rd	**10/14/99**	< 0.20	**0.27**	< 0.25	< 0.088	< 0.20	**0.27**
11 Robb Farm Rd	**10/14/99**	< 0.20	**0.27**	< 0.25	< 0.088	< 0.20	**0.27**
11 Robb Farm Rd	**10/6/00**	< 0.20	< 0.10	**1.90**	**0.44**	< 0.20	**2.34**
11 Robb Farm Rd	**10/6/00**	< 0.20	< 0.10	**1.90**	**0.09**	< 0.20	**1.90**
11 Robb Farm Rd	**10/6/00**	< 0.20	< 0.10	**1.90**	**0.44**	< 0.20	**2.34**
11 Robb Farm Rd	**10/6/00**	< 0.20	< 0.10	**1.90**	< 0.088	< 0.20	**1.90**
11 Robb Farm Rd	**10/4/01**	**1.10**	< 0.10	**0.70**	**0.31**	< 0.20	**2.11**
11 Robb Farm Rd	**10/4/01**	**1.10**	< 0.10	**0.70**	**0.31**	< 0.20	**2.11**
11 Robb Farm Rd	10/2/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
11 Robb Farm Rd	10/2/02	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
11 Robb Farm Rd	**10/14/03**	**1.00**	< 0.12	**1.20**	**0.35**	< 0.14	**2.55**
11 Robb Farm Rd	**10/14/03**	**1.00**	< 0.12	**1.20**	**0.35**	< 0.14	**2.55**
11 Robb Farm Rd	**10/19/04**	**0.87**	< 0.076	**0.60**	**0.30**	< 0.083	**1.77**
11 Robb Farm Rd	**10/19/04**	**0.87**	< 0.076	**0.60**	**0.30**	< 0.083	**1.77**
11 Robb Farm Rd	**11/22/05**	**0.80**	< 0.20	**0.53**	< 0.50	< 0.20	**1.33**
6 Wren Ln	**7/27/93**	#	#	#	#	0.19	**0.19**
6 Wren Ln	10/8/97	< 0.20	< 0.10	< 0.25	< 0.088	< 0.10	0
6 Wren Ln	10/29/98	< 0.20	< 0.10	< 0.25	< 0.088	< 0.20	0
6 Wren Ln	**10/13/99**	< 0.20	**0.26**	< 0.25	< 0.088	< 0.20	**0.26**
6 Wren Ln	**10/13/99**	< 0.20	**0.27**	< 0.25	< 0.088	< 0.20	**0.27**
Maximum Concentration		**8.6**	**0.38**	**350**	**4.5**	**1.10**	**350**
Sample Count		65	57	71	62	66	72
Number of Detections		**30**	**10**	**45**	**27**	**13**	**53**
Number > Current HRL		0	0	0	**--**	**7**	**--**
Number > Draft HRL		**--**	0	0	**--**	**12**	**--**

Data sources: Annual Monitoring Reports for 2003 (1994 - 2003 data), 2004, and 2005 by CRA.

Note: 1,1-DCA = 1,1-dichloroethane; 1,2-DCA = 1,2-dichloroethane; DCDFM = dichlorodifluoromethane; DCFM = dichlorofluoromethane; and VC = vinyl chloride. Data qualifiers have been trimmed and are ignored in statistics shown here; hence, estimated values (close to detection limits) are treated as though accurate. Number sign indicates no value reported in source document, probably meaning non-detection. The above wells are in eastern portions of Areas 3 and 4, all within the area now supplied with municipal water.

Table 1-10
Groundwater Data for Selected VOCs, 2005 - 2006
St. Peter and Prairie du Chien Off-Site Monitoring Wells
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Current MDH Health Risk Limit		**70**	**4**	**1000**	**--**	**0.2**	**--**
Draft MDH Health Risk Limit		**--**	**0.6**	**500**	**--**	**0.08**	**--**
Area 3, East Portion:							
Upper St. Peter Sandstone Aquifer:							
MW17A	10/25/05	**<** 0.70	**<** 0.20	**<** 1.00	**0.32**	**<** 0.50	**0.32**
MW17A	11/21/05	**1.00**	**<** 0.20	**<** 1.00	**0.60**	**0.70**	**2.3**
Lowerer St. Peter Sandstone Aquifer:							
MW17B	10/19/05	**<** 0.50	**<** 0.50	**<** 0.50	**<** 0.50	**<** 0.50	0
MW17B	10/19/05	**<** 0.50	**<** 0.50	**<** 0.50	**<** 0.50	**<** 0.50	0
MW17B	11/22/05	**<** 0.20	**<** 0.20	**<** 1.00	**<** 0.50	**<** 0.20	0
Upper Prairie du Chien Limestone Aquifer:							
Shallower Samples:							
MW17-L (255 ft)	10/19/05	**<** 0.50	**<** 0.50	**<** 0.50	**<** 0.50	**<** 0.50	0
MW17-L (255 ft)	11/23/05	**<** 0.20	**<** 0.20	**<** 1.00	**<** 0.50	**<** 0.20	0
Deeper Samples:							
MW17-L (285 ft)	10/19/05	**<** 0.50	**<** 0.50	**<** 0.50	**<** 0.50	**<** 0.50	0
MW17-L (285 ft)	11/23/05	**<** 0.20	**<** 0.20	**<** 1.00	**<** 0.50	**<** 0.20	0
Area 3, West Portion:							
Lowerer St. Peter Sandstone Aquifer:							
MW19B	11/23/05	**<** 0.20	**<** 0.20	**<** 1.00	**<** 0.50	**<** 0.20	0
MW19B	11/23/05	**<** 0.20	**<** 0.20	**<** 1.00	**<** 0.50	**<** 0.20	0
Upper Prairie du Chien Limestone Aquifer:							
MW19-L	12/23/05	**<** 0.20	**<** 0.20	**<** 1.00	**<** 0.50	**<** 0.20	0
MW19-L	1/10/06	**<** 0.20	**<** 0.20	**<** 1.00	**<** 0.50	**<** 0.20	0
Maximum Concentration		**1.00**	**<** 0.50	**<** 1.0	**0.60**	**0.70**	**2.3**
Sample Count		13	13	13	13	13	13
Number of Detections		**1**	0	0	**2**	**1**	**2**
Number > Current HRL		0	0	0	**--**	**1**	**--**
Number > Draft HRL		**--**	0	0	**--**	**1**	**--**

Data sources: Annual Monitoring Reports for 2003 (1994 - 2003 data), 2004, and 2005 by CRA.

Note: 1,1-DCA = 1,1-dichloroethane; 1,2-DCA = 1,2-dichloroethane; DCDFM = dichlorodifluoromethane; DCFM = dichlorofluoromethane; and VC = vinyl chloride. Data qualifiers have been trimmed and are ignored in statistics shown here; hence, estimated values (close to detection limits) are treated as though accurate.

Table 1-11
Groundwater Data for Selected VOCs, 1990 - 2005
St. Peter Downgradient Compliance Monitoring Wells
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Site Cleanup Goals		**70**	**4**	**1000**	**--**	**2**	--
MW10B	**2/14/90**	**0.70**	< 0.20	< 1.00	< 1.00	< 0.50	**0.70**
MW10B	**2/14/90**	**0.50**	< 0.20	< 1.50	< 1.00	< 1.50	**0.50**
MW10B	5/24/90	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW10B	5/24/90	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW10B	9/11/90	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW10B	3/21/91	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW10B	6/19/91	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW10B	12/17/91	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW10B	5/12/92	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW10B	11/5/92	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW10B	5/17/93	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW10B	5/17/93	*	*	< 2.0	*	< 2.0	0
MW10B	**8/20/93**	**0.44**	< 0.075	< 0.25	*	**0.91**	**1.35**
MW10B	**8/20/93**	**0.20**	< 0.075	< 0.25	*	**0.60**	**0.80**
MW10B	**8/23/93**	**0.65**	< 0.075	< 0.25	*	**1.10**	**1.75**
MW10B	10/14/93	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW10B	**10/14/93**	*	*	*	*	**0.32**	**0.32**
MW10B	12/22/94	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	5/15/95	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	10/30/95	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	5/22/96	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	10/8/96	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	5/28/97	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	10/2/97	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	5/18/98	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	10/27/98	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	10/5/99	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	**10/3/00**	**0.35**	< 1.00	< 1.00	< 2.00	< 1.00	**0.35**
MW10B	**10/3/00**	**0.33**	< 1.00	< 1.00	< 2.00	< 1.00	**0.33**
MW10B	10/3/01	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	10/1/02	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	10/16/03	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	10/19/04	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW10B	11/15/05	< 1.00	< 1.00	< 1.00	< 2.00	< 1.00	0
MW12B	10/15/90	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW12B	12/19/90	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW12B	3/21/91	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW12B	6/19/91	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW12B	12/17/91	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0

Groundwater Data for Selected VOCs, 1990 - 2005
St. Peter Downgradient Compliance Monitoring Wells
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Site Cleanup Goals		**70**	**4**	**1000**	**--**	**2**	--
MW12B	5/12/92	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW12B	11/5/92	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW12B	5/18/93	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW12B	**5/18/93**	< 0.20	< 0.20	**1.10**	< 1.00	< 0.30	**1.10**
MW12B	10/14/93	< 1.00	< 1.00	< 1.00	< 1.00	< 0.50	0
MW12B	10/14/93	*	*	*	*	< 0.20	0
MW12B	8/5/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.036	0
MW12B	12/22/94	< 1.00	< 1.00	< 1.00	< 2.0	< 1.00	0
MW12B	5/16/95	< 1.00	< 1.00	< 1.00	< 2.0	< 1.00	0
MW12B	10/31/95	< 1.00	< 1.00	< 1.00	< 2.0	< 1.00	0
MW12B	**5/23/96**	**1.60**	< 1.00	< 1.00	< 2.0	< 1.00	**1.60**
MW12B	**10/9/96**	< 1.00	< 1.00	**0.45**	**0.56**	< 1.00	**1.01**
MW12B	**5/29/97**	**0.45**	< 1.00	**0.21**	< 2.0	< 1.00	**0.66**
MW12B	**10/2/97**	< 1.00	< 1.00	**0.20**	**0.29**	< 1.00	**0.49**
MW12B	**5/18/98**	**0.50**	< 1.00	**0.34**	**0.49**	< 1.00	**1.33**
MW12B	**10/27/98**	**0.49**	< 1.00	< 1.00	**0.33**	< 1.00	**0.82**
MW12B	**10/6/99**	**0.55**	< 1.00	**1.10**	< 2.0	< 1.00	**1.65**
MW12B	**10/6/99**	**0.54**	< 1.00	**1.10**	< 2.0	< 1.00	**1.64**
MW12B	**11/16/99**	**1.30**	**0.38**	**2.0**	**0.61**	< 0.20	**4.3**
MW12B	**11/16/99**	**0.78**	**0.28**	**2.0**	**0.58**	< 0.20	**3.6**
MW12B	**1/26/00**	**0.63**	< 0.28	**1.90**	**0.54**	< 0.20	**3.1**
MW12B	**10/3/00**	**0.72**	< 1.00	< 1.00	< 2.0	< 1.00	**0.72**
MW12B	**10/2/01**	**0.46**	< 1.00	< 1.00	**0.78**	< 1.00	**1.24**
MW12B	10/2/02	< 1.00	< 1.00	< 1.00	< 2.0	< 1.00	0
MW12B	**10/14/03**	**0.47**	< 1.00	< 1.00	< 2.0	< 1.00	**0.47**
MW12B	**10/25/05**	< 1.00	< 1.00	< 1.00	**0.27**	< 1.00	**0.27**
MW12B	**11/23/05**	**0.22**	< 1.00	< 1.00	**0.23**	< 1.00	**0.45**
MW13B	10/17/90	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW13B	12/19/90	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW13B	3/21/91	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW13B	3/21/91	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW13B	6/19/91	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW13B	12/17/91	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW13B	5/12/92	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW13B	5/12/92	< 0.20	< 0.20	< 1.00	< 1.00	< 1.00	0
MW13B	11/5/92	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW13B	**5/18/93**	< 1.00	< 1.00	**2.5**	**1.50**	**2.5**	**6.5**
MW13B	5/18/93	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW13B	5/18/93	< 0.20	< 0.20	< 1.00	< 1.00	< 0.30	0

Groundwater Data for Selected VOCs, 1990 - 2005
St. Peter Downgradient Compliance Monitoring Wells
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Site Cleanup Goals		**70**	**4**	**1000**	**--**	**2**	--
MW13B	**5/18/93**	*	*	< 2.00	*	**1.30**	**1.30**
MW13B	10/14/93	< 1.00	< 1.00	< 1.00	< 1.00	< 0.50	0
MW13B	10/14/93	*	*	*	*	< 0.20	0
MW13B	8/5/94	< 0.10	< 0.075	< 0.25	< 0.034	< 0.036	0
MW13B	12/22/94	< 1.00	< 1.00	< 1.00	< 2.0	< 1.00	0
MW13B	5/16/95	< 1.00	< 1.00	< 1.00	< 2.0	< 1.00	0
MW13B	10/31/95	< 1.00	< 1.00	< 1.00	< 2.0	< 1.00	0
MW13B	5/23/96	< 1.00	< 1.00	< 1.00	< 2.0	< 1.00	0
MW13B	10/9/96	< 1.00	< 1.00	< 1.00	< 2.0	< 1.00	0
MW13B	**5/29/97**	< 1.00	< 1.00	**0.13**	< 2.0	< 1.00	**0.13**
MW13B	5/29/97	< 1.00	< 1.00	< 1.00	< 2.0	< 1.00	0
MW13B	**10/2/97**	< 1.00	< 1.00	**0.47**	**0.17**	< 1.00	**0.64**
MW13B	5/18/98	< 1.00	< 1.00	< 1.00	< 2.0	< 1.00	0
MW13B	**10/27/98**	**0.11**	< 1.00	< 1.00	**0.20**	< 1.00	**0.31**
MW13B	**10/6/99**	**0.29**	< 1.00	**0.89**	< 2.0	< 1.00	**1.18**
MW13B	**11/17/99**	**0.30**	**0.27**	**0.97**	**0.42**	< 0.20	**1.96**
MW13B	**1/26/00**	**0.29**	< 0.33	**0.96**	**0.39**	< 0.20	**1.64**
MW13B	**10/3/00**	**0.37**	< 1.00	< 1.00	**0.31**	< 1.00	**0.68**
MW13B	**10/2/01**	**0.46**	< 1.00	< 1.00	< 2.0	< 1.00	**0.46**
MW13B	**10/2/02**	**0.79**	< 1.00	< 1.00	**1.10**	< 1.00	**1.89**
MW13B	**10/2/02**	**0.70**	< 1.00	< 1.00	**0.78**	< 1.00	**1.48**
MW13B	**10/14/03**	**0.64**	< 1.00	< 1.00	**0.36**	< 1.00	**1.00**
MW13B	**10/26/05**	**0.91**	< 1.00	**0.31**	**1.20**	< 1.00	**2.4**
MW13B	**11/22/05**	**1.30**	< 1.00	**0.37**	**1.40**	< 1.00	**3.1**
MW16B	**10/25/05**	< 1.00	< 1.00	**5.5**	**0.91**	< 1.00	**6.4**
MW16B	**11/23/05**	**0.22**	< 1.00	**3.0**	**0.98**	< 1.00	**4.2**
Maximum Concentration		**1.60**	**0.38**	**5.5**	**1.50**	**2.5**	**6.5**
Sample Count		99	99	101	96	104	104
Number of Detections		**32**	**3**	**20**	**23**	**6**	**42**
Number > Site Cleanup Goal		0	0	0	**--**	**1**	**--**

Data sources: Annual Monitoring Reports for 2003 (1994 - 2003 data), 2004, and 2005 by CRA.

Note: 1,1-DCA = 1,1-dichloroethane; 1,2-DCA = 1,2-dichloroethane; DCDFM = dichlorodifluoromethane; DCFM = dichlorofluoromethane; and VC = vinyl chloride. Data qualifiers have been trimmed and are ignored in statistics shown here; hence, estimated values (close to detection limits) are treated as though accurate. Asterisk indicates compound not anlayzed in sample.

Table 1-12
Groundwater Data for Selected VOCs, 1987 - 2005
St. Peter Near-Source Compliance Monitoring Wells
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Site Cleanup Goals		70	4	1000	--	2	--
EW-2	10/21/05	4.8	0.32	1.9	4.5	1.6	13
MW8B	11/3/87	3.9	0.20	5.1	< 1.00	5.1	14
MW8B	1/27/88	87	4.0	27	5.2	2.1	125
MW8B	8/12/88	49	1.8	22	4.3	< 2.5	77
MW8B	3/22/89	94	4.8	24	5.6	20	148
MW8B	7/27/89	54	2.3	9.6	4.4	2.2	73
MW8B	10/30/89	89	5.1	13	2.3	6.8	116
MW8B	1/23/90	130	< 10.0	88	*	< 10.0	218
MW8B	5/24/90	75	< 5.0	25	< 5.0	20	120
MW8B	9/11/90	55	< 10.0	16	< 10.0	18	89
MW8B	9/11/90	61	< 10.0	19	< 10.0	< 10.0	80
MW8B	12/19/90	25	< 3.0	26	< 3.0	4.0	55
MW8B	3/21/91	21	< 3.0	11	< 3.0	3.0	35
MW8B	6/19/91	14	< 1.00	< 1.00	1.0	< 1.00	15
MW8B	12/17/91	8.0	< 1.00	5.0	< 1.00	< 1.00	13
MW8B	12/17/91	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	0
MW8B	5/12/92	5.0	< 1.00	2.0	2.0	< 1.00	9.0
MW8B	11/5/92	9.0	< 1.00	7.0	3.0	< 1.00	19
MW8B	11/5/92	5.0	< 1.00	1.0	2.0	1.0	9.0
MW8B	11/5/92	5.0	< 1.00	1.0	2.0	1.0	9.0
MW8B	5/17/93	3.3	< 1.00	1.3	1.3	1.3	7.2
MW8B	5/17/93	*	*	1.2	*	< 2.0	1.2
MW8B	10/14/93	4.2	< 1.00	4.5	< 1.00	< 1.00	8.7
MW8B	10/14/93	*	*	3.0	*	< 1.00	3.0
MW8B	12/21/94	72	4.7	13	6.4	2.7	99
MW8B	5/15/95	27	1.7	6.6	4.2	3.4	43
MW8B	5/15/95	26	1.6	6.1	3.9	3.2	41
MW8B	10/31/95	< 1.00	< 1.00	< 1.00	< 2.0	< 1.00	0
MW8B	10/31/95	< 1.00	< 1.00	< 1.00	< 2.0	< 1.00	0
MW8B	5/14/96	1.30	< 1.00	< 1.00	< 2.0	< 1.00	1.30
MW8B	5/14/96	1.30	< 1.00	< 1.00	< 2.0	< 1.00	1.30
MW8B	10/8/96	1.10	< 1.00	0.63	< 2.0	< 1.00	1.73
MW8B	10/8/96	1.20	< 1.00	0.49	< 2.0	< 1.00	1.69
MW8B	5/27/97	0.60	< 1.00	0.26	0.53	0.13	1.52
MW8B	10/2/97	0.78	< 1.00	0.41	0.64	< 1.00	1.83
MW8B	5/18/98	1.20	< 1.00	1.4	3.1	0.29	6.0
MW8B	10/27/98	2.8	< 1.00	5.6	10	0.58	19
MW8B	10/5/99	11	0.76	10	28	2.6	52
MW8B	10/5/99	11	0.73	10	25	2.7	49
MW8B	11/16/99	45	3.0	18	21	9.1	96
MW8B	1/27/00	55	4.1	17	17	10.0	103
MW8B	1/27/00	55	4.1	17	16	10.0	102
MW8B	10/3/00	43	2.8	21	61	9.6	137
MW8B	10/3/01	43	2.7	6.9	15	13	81
MW8B	10/1/02	12	0.83	11	36	6.9	67
MW8B	10/16/03	66	4.1	17	32	43	162
MW8B	10/16/03	67	4.0	19	32	44	166
MW8B	10/20/04	43	2.4	16	25	30	116
MW8B	10/20/04	43	2.6	16	26	32	120
MW8B	11/23/05	80	5.2	9.0	27	69	190
Maximum Concentration		130	5.2	88	61	69	218
Sample Count		48	48	50	47	50	50
Number of Detections		45	23	44	32	32	47
Number > Site Cleanup Goal		7	7	0	--	25	--

Data sources: Annual Monitoring Reports for 2003 (1994 - 2003 data), 2004, and 2005 by CRA.

Note: 1,1-DCA = 1,1-dichloroethane; 1,2-DCA = 1,2-dichloroethane; DCDFM = dichlorodifluoromethane; DCFM = dichlorofluoromethane; and VC = vinyl chloride. Data qualifiers have been trimmed and are ignored in statistics shown here; hence, estimated values (close to detection limits) are treated as though accurate. Asterisk indicates compound not anlayzed in sample.

Table 1-13
Groundwater Data for Selected VOCs, 1988 - 2005
Site Extraction Wells EW-1 and EW-1A
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Site Cleanup Goals		**70**	**4**	**1000**	**--**	**2**	--
EW-1	**6/2/88**	**100**	**6.4**	**14**	**13**	**3.5**	**137**
EW-1	**6/15/89**	**55**	**7.4**	**6.3**	**7.4**	**1.9**	**78**
EW-1	**6/22/89**	**100**	**5.9**	**28**	**6.4**	**4.3**	**145**
EW-1	**6/29/89**	**63**	**3.2**	**< 3.0**	**3.5**	**< 3.0**	**70**
EW-1	7/6/89	< 0.20	< 0.20	< 1.50	< 1.00	< 1.50	0
EW-1	**8/3/89**	**78**	**4.4**	**12**	**5.7**	**4.5**	**105**
EW-1	**9/15/89**	**53**	**4.0**	**26**	**6.5**	**4.6**	**94**
EW-1	**10/26/89**	**57**	**3.2**	**17**	**< 1.00**	**< 0.80**	**77**
EW-1	**12/1/89**	**43**	**3.8**	**31**	**11**	**11**	**100**
EW-1	**1/23/90**	**56**	**< 10.0**	**58**	*	**< 10.0**	**114**
EW-1	**2/27/90**	**47**	**< 1.00**	**64**	*	**3.0**	**114**
EW-1	**3/23/90**	**33**	**2.0**	**10.0**	*	**1.00**	**46**
EW-1	**4/30/90**	**45**	**< 3.0**	**48**	*	**< 3.0**	**93**
EW-1	**5/16/90**	**58**	**< 3.0**	**25**	*	**< 3.0**	**83**
EW-1	**6/8/90**	**41**	**< 5.0**	**28**	**< 5.0**	**< 5.0**	**69**
EW-1	**7/6/90**	**42**	**< 3.0**	**31**	**< 3.0**	**< 3.0**	**73**
EW-1	**8/29/90**	**29**	**< 2.0**	**21**	**< 2.0**	**< 2.0**	**50**
EW-1	**9/11/90**	**27**	**< 10.0**	**12**	**< 10.0**	**< 10**	**39**
EW-1	**10/15/90**	**34**	**1.00**	**57**	**< 1.00**	**2.0**	**94**
EW-1	**11/5/90**	**28**	**< 5.0**	**55**	**< 5.0**	**< 5.0**	**83**
EW-1	**12/17/90**	**26**	**< 1.00**	**24**	**< 5.0**	**< 5.0**	**50**
EW-1	**1/16/91**	**< 10**	**< 10.0**	**30**	**< 10.0**	**< 10**	**30**
EW-1	**1/16/91**	**33**	**1.40**	**14**	**< 1.00**	**1.10**	**50**
EW-1	**2/6/91**	**23**	**< 5.0**	**12**	**< 5.0**	**< 5.0**	**35**
EW-1	**4/18/91**	**19**	**< 5.0**	**10.0**	**< 5.0**	**< 5.0**	**29**
EW-1	**5/17/91**	**34**	**< 3.0**	**11**	**< 3.0**	**< 3.0**	**45**
EW-1	**6/19/91**	**45**	**< 1.00**	**< 1.00**	**10.0**	**< 1.00**	**55**
EW-1	**7/19/91**	**28**	**< 5.0**	**37**	11	**< 5.0**	**76**
EW-1	**8/26/91**	**33**	**< 5.0**	**28**	**< 5.0**	**7.0**	**68**
EW-1	**9/27/91**	**3.0**	**< 1.00**	**5.0**	**2.0**	**< 1.00**	**10.0**
EW-1	**10/15/91**	**13**	**< 1.00**	**5.0**	**< 1.00**	**3.0**	**21**
EW-1	**11/19/91**	**39**	**< 1.00**	**< 1.00**	**23**	**< 1.00**	**62**
EW-1	**12/17/91**	**24**	**< 3.0**	**14**	**< 3.0**	**< 3.0**	**38**
EW-1	**2/26/92**	**26**	**1.00**	**< 1.00**	**< 1.00**	**< 1.00**	**27**
EW-1	**3/30/92**	*	*	**28**	**3.0**	*	**31**
EW-1	**4/29/92**	**19**	**< 4.0**	**< 4.0**	**< 4.0**	**< 4.0**	**19**
EW-1	**5/12/92**	**18**	**< 2.0**	**5.0**	**14**	**< 2.0**	**37**
EW-1	**5/12/92**	**24**	**1.80**	**6.7**	**< 1.00**	**< 1.00**	**33**
EW-1	**6/16/92**	**17**	**< 1.00**	**5.0**	**< 1.00**	**2.0**	**24**
EW-1	**7/31/92**	**20**	**< 1.00**	**3.0**	**4.0**	**< 1.00**	**27**
EW-1	**8/18/92**	**15**	**< 1.00**	**6.0**	**3.0**	**9.0**	**33**
EW-1	**9/29/92**	**29**	**1.00**	**11**	**< 1.00**	**11**	**52**
EW-1	**10/29/92**	**15**	**< 2.0**	**< 2.0**	**6.0**	**12**	**33**
EW-1	**11/24/92**	**21**	**1.00**	**6.0**	**4.0**	**6.0**	**38**
EW-1	**12/31/92**	**12**	**< 3.0**	**6.0**	**4.0**	**6.0**	**28**
EW-1	**1/21/93**	**18**	**< 1.00**	**7.0**	**3.0**	**7.0**	**35**
EW-1	**1/21/93**	*	*	**4.0**	*	**1.00**	**5.0**

Groundwater Data for Selected VOCs, 1988 - 2005
Site Extraction Wells EW-1 and EW-1A
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Site Cleanup Goals		**70**	**4**	**1000**	**--**	**2**	--
EW-1	**2/8/93**	**13**	**< 1.00**	**< 1.00**	**2.0**	**< 1.00**	**15**
EW-1	**2/8/93**	*	*	**7.0**	*	**1.00**	**8.0**
EW-1	**3/10/93**	**15**	**< 2.0**	**18**	**6.0**	**< 2.0**	**39**
EW-1	**3/10/93**	**19**	**0.80**	**16**	**< 5.0**	**3.5**	**39**
EW-1	**3/10/93**	*	*	**7.0**	*	**1.00**	**8.0**
EW-1	**4/21/93**	**15**	**< 1.00**	**12**	**12**	**1.50**	**41**
EW-1	**4/21/93**	*	*	**2.4**	*	**1.60**	**4.0**
EW-1	**5/17/93**	**9.8**	**< 1.00**	**11**	**4.0**	**11**	**36**
EW-1	**5/17/93**	*	*	**4.8**	*	**1.70**	**6.5**
EW-1	**6/22/93**	**16**	**< 1.00**	**9.3**	**6.0**	**1.30**	**33**
EW-1	**6/22/93**	*	*	**2.0**	*	**< 2.0**	**2.0**
EW-1	**7/28/93**	**17**	**< 1.00**	**9.1**	**10.0**	**< 1.00**	**36**
EW-1	**7/28/93**	*	*	**6.3**	*	**1.30**	**7.6**
EW-1	**9/16/93**	**12**	**< 1.00**	**16**	**8.1**	**3.3**	**39**
EW-1	9/16/93	*	*	**< 1.0**	*	**< 1.00**	0
EW-1	**9/30/93**	**13**	**< 1.00**	**27**	**< 1.0**	**2.2**	**42**
EW-1	**9/30/93**	*	*	**7.8**	*	**1.2**	**9.0**
EW-1	**10/14/93**	**17**	**< 1.00**	**7.0**	**14**	**1.40**	**39**
EW-1	**10/14/93**	*	*	**8.8**	*	**1.10**	**9.9**
EW-1	**11/18/93**	**14**	**< 1.00**	**< 1.00**	**10.0**	**< 1.00**	**24**
EW-1	**11/18/93**	**9.5**	**< 1.00**	**< 1.00**	*	**< 1.00**	**9.5**
EW-1	**11/18/93**	*	*	**4.2**	*	**1.20**	**5.4**
EW-1	**12/21/93**	**16**	**< 2.5**	**23**	**< 2.5**	**< 2.5**	**39**
EW-1	**12/21/93**	**21**	**< 2.5**	**14**	**< 2.5**	**< 2.5**	**35**
EW-1	**12/21/93**	**22**	*	**5.8**	*	*	**28**
EW-1	**1/12/94**	**21**	**< 1.00**	**4.3**	**6.6**	**1.60**	**34**
EW-1	**1/12/94**	**26**	**1.7**	*	*	**2.1**	**30**
EW-1	**2/24/94**	**13**	**< 1.70**	**3.2**	**11**	**< 1.70**	**27**
EW-1	**4/26/94**	**12**	**1.30**	**4.8**	**3.3**	**< 1.00**	**21**
EW-1	**5/27/94**	**14**	**< 1.00**	**5.5**	**3.4**	**1.20**	**24**
EW-1	**6/24/94**	**13**	**1.20**	**< 1.00**	**2.2**	**< 1.00**	**16**
EW-1	**7/27/94**	**15**	**1.10**	**7.3**	**4.3**	**1.40**	**29**
EW-1	**8/30/94**	**15**	**1.20**	**10.0**	**3.7**	**< 1.00**	**30**
EW-1	**9/28/94**	**14**	**1.20**	**< 1.00**	**3.1**	**< 1.00**	**18**
EW-1	**10/28/94**	**14**	**1.20**	**11**	**2.8**	**< 1.00**	**29**
EW-1	**11/29/94**	**15**	**1.20**	**9.1**	**4.2**	**1.30**	**31**
EW-1	**12/22/94**	**14**	**1.20**	**8.4**	**3.3**	**1.30**	**28**
EW-1A	**1/31/95**	**21**	**1.80**	**11**	**4.7**	**1.90**	**40**
EW-1A	**2/27/95**	**20**	**1.50**	**11**	**4.5**	**1.90**	**39**
EW-1A	**3/20/95**	**16**	**1.30**	**10.0**	**4.4**	**1.60**	**33**
EW-1A	**4/27/95**	**13**	**1.30**	**10.0**	**3.8**	**1.10**	**29**
EW-1A	**5/17/95**	**12**	**1.10**	**9.9**	**3.8**	**1.60**	**28**
EW-1A	**6/14/95**	**11**	**1.10**	**8.1**	**3.3**	**1.40**	**25**
EW-1A	**7/24/95**	**11**	**1.10**	**9.8**	**3.8**	**1.50**	**27**
EW-1A	**8/17/95**	**9.6**	**1.10**	**7.5**	**3.7**	**1.20**	**23**
EW-1A	**9/18/95**	**10.0**	**< 1.00**	**7.8**	**1.8**	**1.60**	**21**
EW-1	11/1/95	**< 1.00**	**< 1.00**	**< 1.00**	**< 2.0**	**< 1.00**	0
EW-1	11/1/95	**< 1.00**	**< 1.00**	**< 1.00**	**< 2.0**	**< 1.00**	0
EW-1A	**11/1/95**	**9.1**	**1.30**	**7.3**	**1.6**	**1.20**	**21**

Groundwater Data for Selected VOCs, 1988 - 2005
Site Extraction Wells EW-1 and EW-1A
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
	Site Cleanup Goals	70	4	1000	--	2	--
EW-1A	11/21/95	9.5	1.00	7.1	2.1	1.20	21
EW-1A	12/14/95	9.8	1.10	7.9	2.1	1.30	22
EW-1A	1/12/96	8.6	1.10	6.5	2.1	1.10	19
EW-1A	2/26/96	8.6	< 1.00	6.8	2.1	1.10	19
EW-1A	3/18/96	8.3	< 1.00	7.1	2.3	1.10	19
EW-1A	4/25/96	8.9	< 1.00	7.2	2.4	1.00	20
EW-1A	5/15/96	9.2	< 1.00	6.6	4.0	1.30	21
EW-1A	6/24/96	8.7	< 1.00	6.2	3.4	1.00	19
EW-1A	7/12/96	10.0	1.00	7.6	3.8	1.20	24
EW-1A	8/14/96	8.5	0.82	6.2	3.6	1.10	20
EW-1A	9/9/96	8.4	0.88	5.9	3.7	1.00	20
EW-1	10/10/96	< 1.00	< 1.00	< 1.00	< 2.0	0.79	0.8
EW-1	10/10/96	< 1.00	< 1.00	< 1.00	< 2.0	0.71	0.7
EW-1A	10/10/96	9.5	1.10	7.1	3.8	1.10	23
EW-1A	11/14/96	8.6	< 1.00	6.5	3.3	1.00	19
EW-1A	12/20/96	9.3	0.92	7.5	3.1	1.20	22
EW-1A	1/21/97	8.6	0.88	6.6	3.4	< 1.00	19
EW-1A	2/20/97	8.4	< 1.00	6.9	3.3	1.00	20
EW-1A	3/31/97	8.6	1.00	6.9	3.4	0.90	21
EW-1A	4/30/97	8.7	< 1.00	6.2	3.7	0.89	19
EW-1A	5/29/97	7.9	0.96	6.0	3.5	0.93	19
EW-1A	6/20/97	10.0	1.10	8.3	3.4	1.30	24
EW-1A	7/30/97	9.2	< 1.00	7.4	4.4	1.20	22
EW-1A	8/20/97	9.3	< 1.00	7.6	4.4	1.10	22
EW-1A	9/18/97	10.0	1.20	< 1.00	4.6	< 1.00	16
EW-1	10/6/97	0.58	< 1.00	0.14	0.37	< 1.00	1.09
EW-1	10/6/97	0.64	< 1.00	0.16	0.38	< 1.00	1.18
EW-1A	10/6/97	11	1.10	9.2	4.7	1.30	27
EW-1A	11/26/97	11	1.30	4.3	4.3	1.50	22
EW-1A	12/18/97	14	1.40	4.4	6.7	1.70	28
EW-1/EW-1A	1/20/98	7.9	0.60	7.1	2.9	0.67	19
EW-1/EW-1A	2/17/98	14	1.60	8.4	4.7	1.60	30
EW-1/EW-1A	3/18/98	13	1.40	13	5.9	1.80	35
EW-1/EW-1A	4/22/98	19	2.9	12	9.3	2.10	45
EW-1/EW-1A	5/18/98	17	2.4	14	9.4	2.10	45
EW-1/EW-1A	6/22/98	16	2.4	7.9	9.4	1.60	37
EW-1/EW-1A	7/24/98	15	2.2	12	7.1	1.90	38
EW-1/EW-1A	8/28/98	20	2.8	11	8.7	< 1.00	43
EW-1/EW-1A	9/16/98	8.7	1.10	9.3	4.2	< 1.00	23
EW-1	10/16/98	3.9	< 1.00	7.2	1.9	< 1.00	13
EW-1/EW-1A	10/29/98	11	2.0	9.2	5.8	< 2.0	28
EW-1/EW-1A	11/30/98	12	1.70	5.9	5.3	6.1	31
EW-1/EW-1A	12/11/98	8.6	1.30	6.7	3.2	0.97	21
EW-1/EW-1A	1/15/99	11	1.60	8.2	5.6	< 1.00	26
EW-1/EW-1A	2/26/99	24	5.2	12	12	2.1	55
EW-1/EW-1A	3/24/99	5.3	< 1.20	6.8	2.9	< 1.20	15
EW-1/EW-1A	4/8/99	14	2.9	9.7	7.2	1.50	35
EW-1/EW-1A	5/6/99	17	4.0	5.7	8.9	1.60	37
EW-1/EW-1A	6/9/99	6.9	1.40	11	3.7	1.40	24

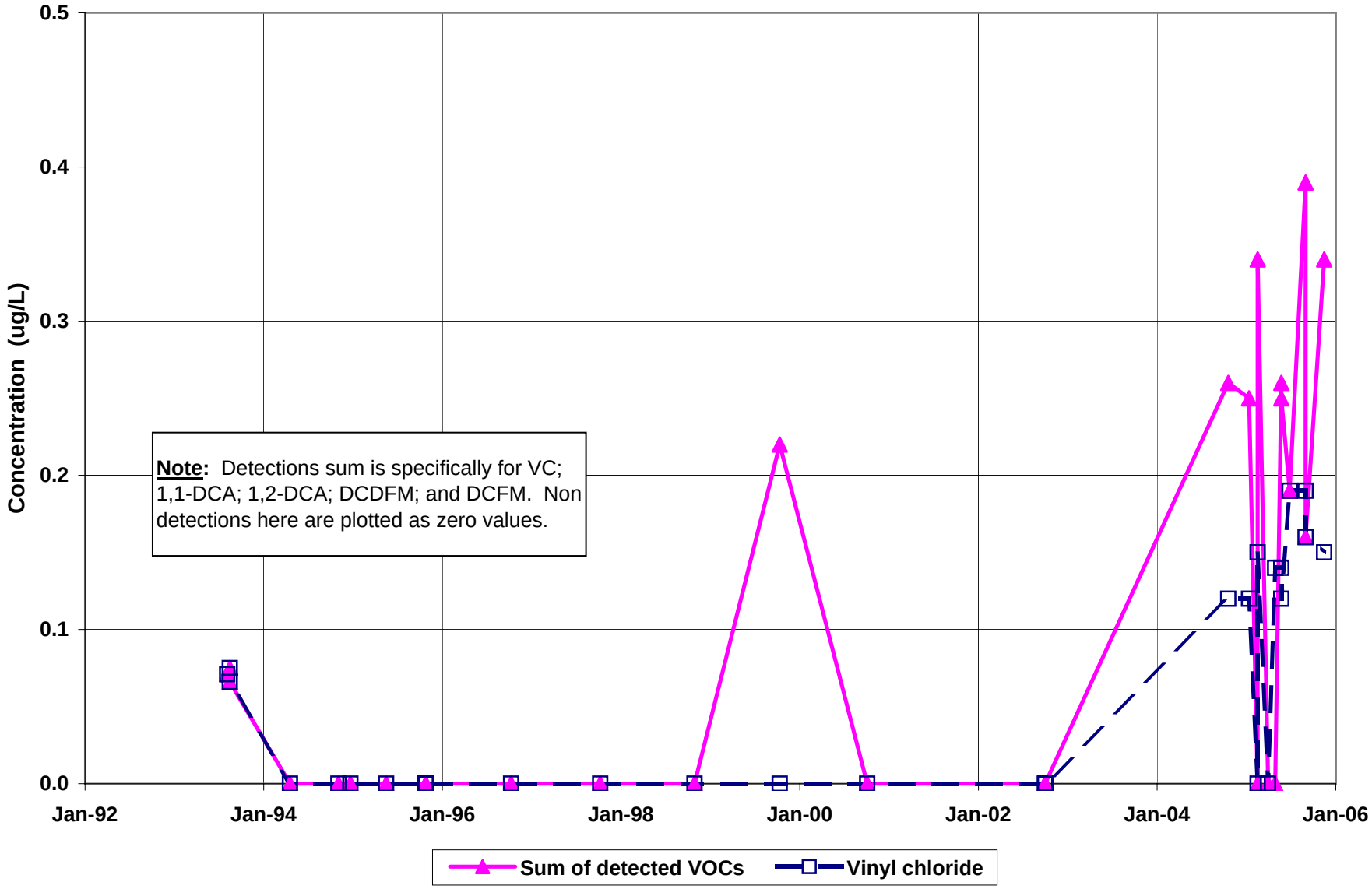
Groundwater Data for Selected VOCs, 1988 - 2005
Site Extraction Wells EW-1 and EW-1A
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Location	Sample Date	1,1-DCA ug/L	1,2-DCA ug/L	DCDFM ug/L	DCFM ug/L	VC ug/L	Detected Sum ug/L
Site Cleanup Goals		70	4	1000	--	2	--
EW-1	7/9/99	5.8	1.10	12	3.0	1.00	23
EW-1	8/5/99	7.3	< 1.00	11	4.3	1.60	24
EW-1	9/9/99	6.6	1.10	10.0	6.5	1.20	25
EW-1	10/7/99	6.6	0.93	< 1.00	1.90	1.50	11
EW-1	11/16/99	2.3	0.65	1.6	2.1	8.6	15
EW-1A	11/16/99	3.8	3.0	2.2	1.80	2.7	14
EW-1A	1/27/00	6.3	5.2	2.0	1.40	1.60	17
EW-1	2/2/00	3.5	< 0.54	4.2	6.1	5.2	19
EW-1	2/2/00	4.5	0.48	4.8	5.8	5.6	21
EW-1	3/10/00	7.4	1.20	15	4.7	1.80	30
EW-1/EW-1A	6/28/00	11	1.60	14	6.3	2.3	35
EW-1/EW-1A	7/26/00	8.4	1.20	11	4.4	2.0	27
EW-1	10/26/00	5.2	0.38	12	2.7	1.40	22
EW-1A	10/26/00	20	3.8	16	14	2.4	56
EW-1/EW-1A	1/9/01	9.9	2.0	12	6.6	1.70	32
EW-1/EW-1A	5/8/01	4.8	0.50	8.5	3.6	< 1.00	17
EW-1/EW-1A	8/17/01	7.8	1.70	9.8	4.9	1.60	26
EW-1	10/2/01	5.0	0.33	7.2	2.1	1.10	16
EW-1A	10/2/01	12	3.0	11	5.8	1.70	34
EW-1/EW-1A	1/31/02	8.2	1.50	6.9	6.9	1.70	25
EW-1/EW-1A	5/29/02	9.2	1.30	9.9	6.5	2.2	29
EW-1/EW-1A	8/14/02	5.2	0.63	9.9	3.8	1.40	21
EW-1	10/1/02	2.1	< 1.00	4.1	2.1	0.46	8.8
EW-1A	10/1/02	10.0	1.50	11	10.0	3.2	36
EW-1A	10/1/02	8.5	1.50	11	9.4	2.6	33
EW-1A	1/30/03	8.1	0.91	8.8	4.6	2.8	25
EW-1A	4/16/03	7.2	0.82	6.8	4.0	1.90	21
EW-1A	8/7/03	8.2	0.83	7.8	5.6	< 1.00	22
EW-1A	10/15/03	9.1	0.83	8.4	4.8	2.0	25
EW-1A	1/15/04	10.0	1.10	14	6.3	6.4	38
EW-1A	4/14/04	8.0	0.85	6.9	5.4	2.6	24
EW-1A	7/8/04	7.8	0.78	10.0	5.8	2.7	27
EW-1A	10/20/04	11	1.00	9.1	6.1	3.5	31
EW-1A	1/12/05	9.6	0.98	11	5.3	4.4	31
EW-1A	4/14/05	10.0	0.88	8.5	5.1	4.3	29
EW-1A	7/6/05	10.0	0.81	12	6.8	3.9	34
EW-1A	11/17/05	12	0.94	5.7	6.5	6.4	32
Maximum Concentration		**100**	**7.4**	**64**	**23**	**12**	**145**
Sample Count		170	169	181	163	180	182
Number of Detections		**164**	**101**	**162**	**133**	**125**	**178**
Number > Site Cleanup Goal		0	**2**	0	**--**	**22**	**--**

Data sources: Annual Monitoring Reports for 2003 (1994 - 2003 data), 2004, and 2005 by CRA.

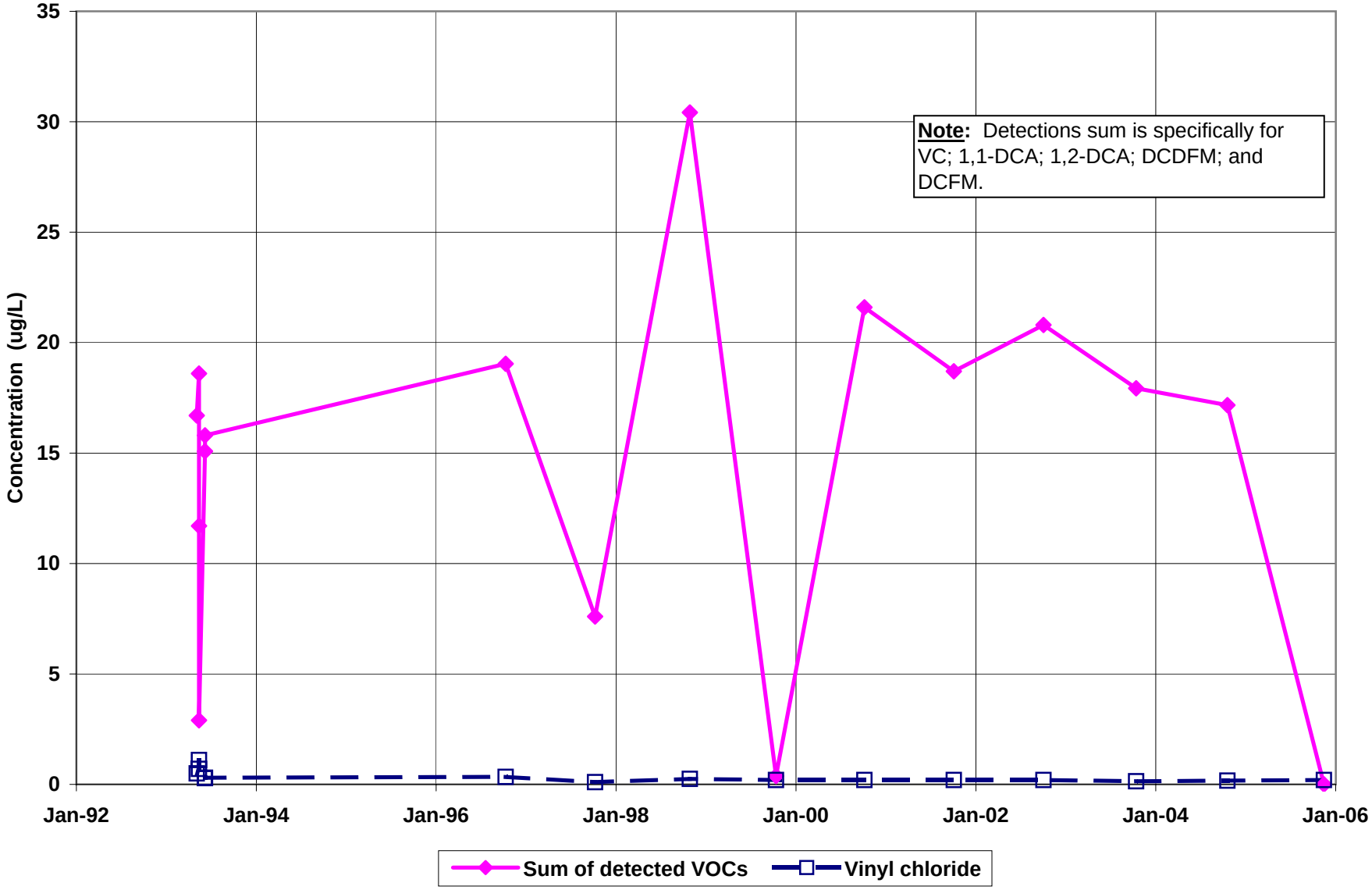
Note: 1,1-DCA = 1,1-dichloroethane; 1,2-DCA = 1,2-dichloroethane; DCDFM = dichlorodifluoromethane; DCFM = dichlorofluoromethane; and VC = vinyl chloride. Data qualifiers have been trimmed and are ignored in statistics shown here; hence, estimated values (close to detection limits) are treated as though accurate. Asterisk indicates compound not anlayzed in sample.

Figure 1-1
VOC Concentrations, 1993 - 2005
St. Peter Residential Well at 12 West Shore Rd



Wenck 1806-01

Figure 1-2
VOC Concentrations, 1993 - 2005
St. Peter Converted-Residential Monitoring Well at 1 Lily Pond Rd



Wenck 1806-01

Figure 1-3
VOC Concentrations, 1990 - 2005
St. Peter Downgradient Monitoring Well MW-12B

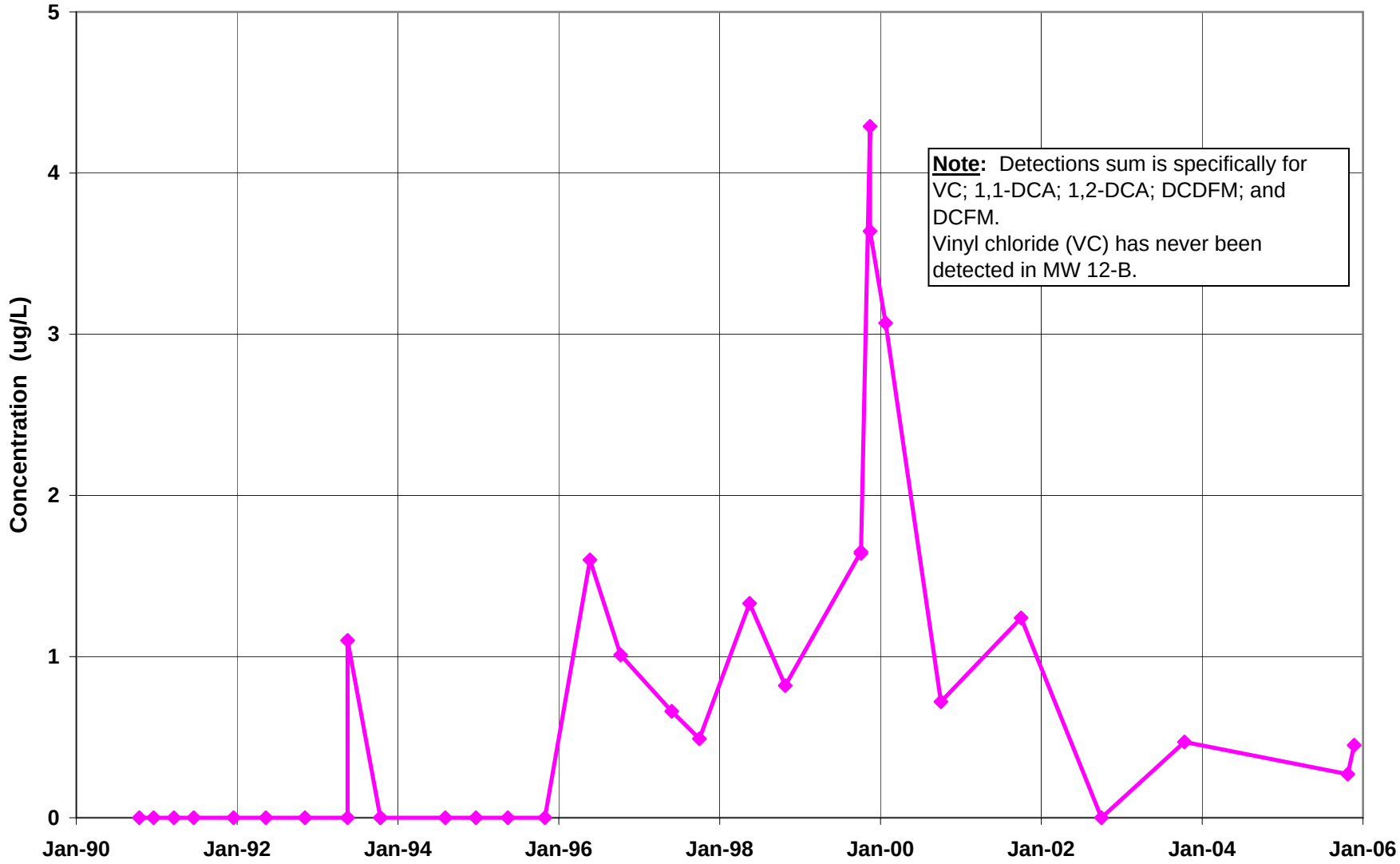


Figure 1-4
VOC Concentrations, 1987 - 2005
St. Peter Near-Source Compliance Monitoring Well MW-8B

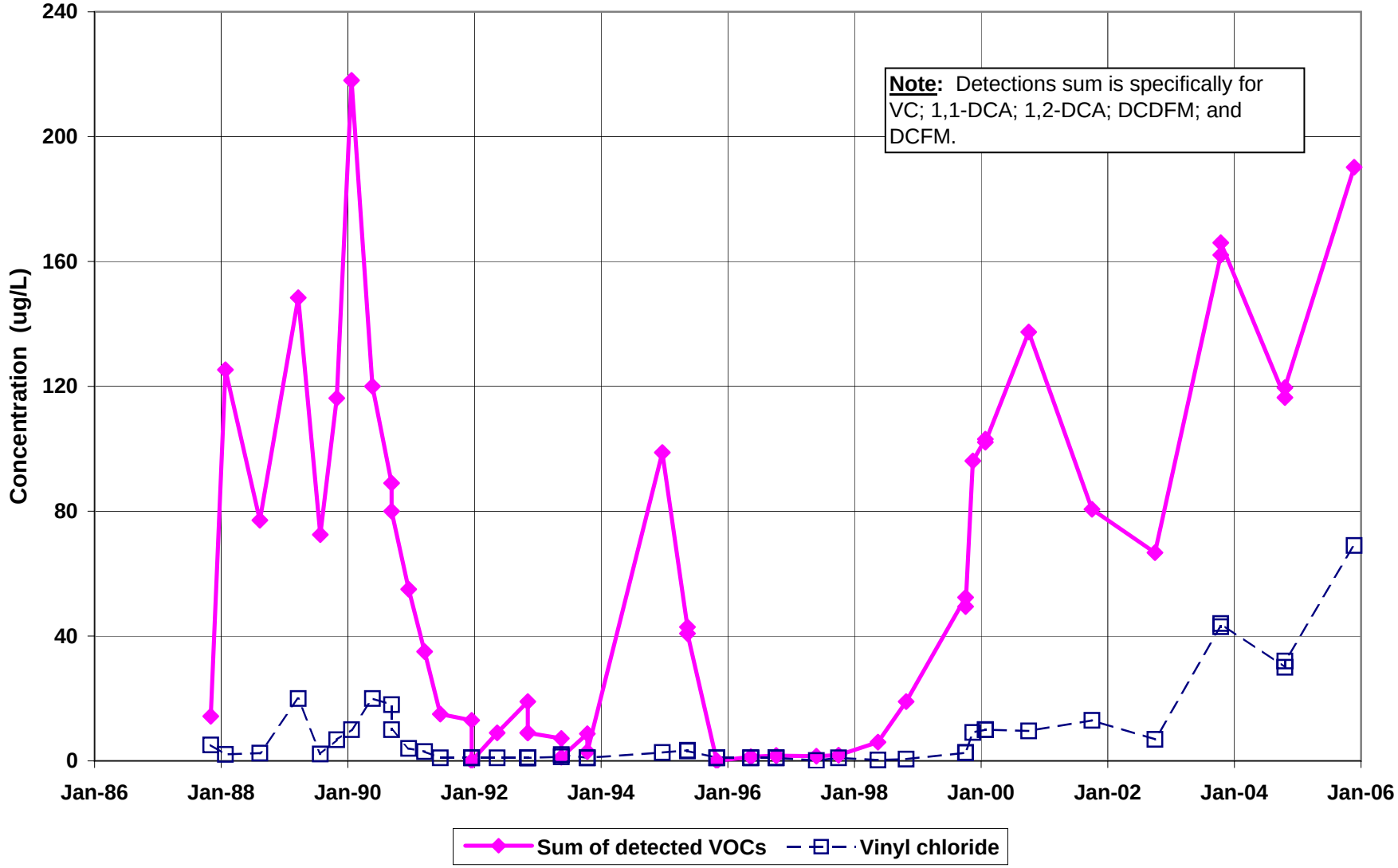
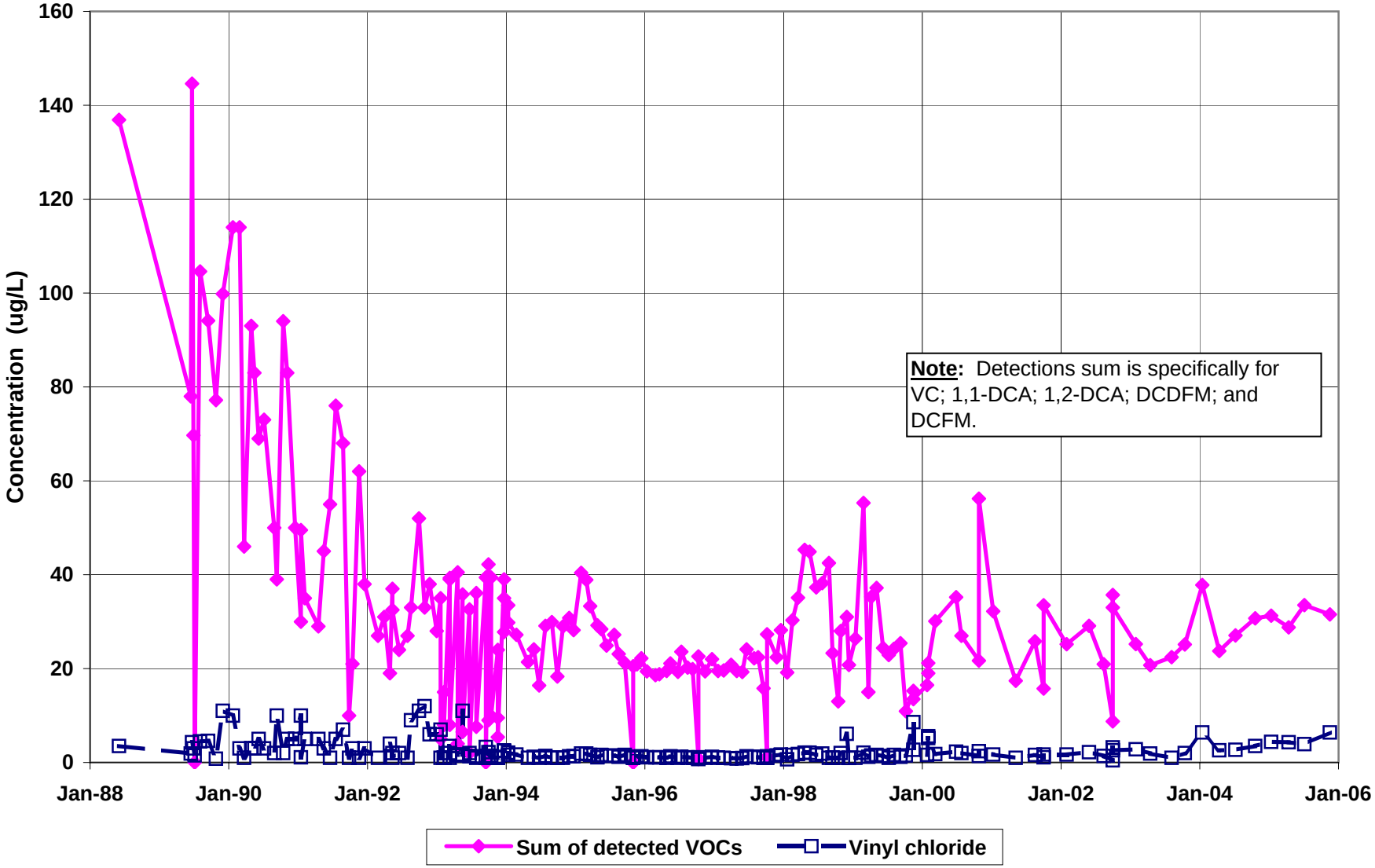


Figure 1-5
VOC Concentrations, 1988 - 2005
Site Extraction Wells EW-1/EW-1A



2 – Well Construction, Stratigraphic, and VOC Data

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Table 2-1
Well Construction, Stratigraphic, and VOC Data for Residential Wells
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Address	Unique Well No.	Date Completed	Data Source	Well Location Area	Well Location Aquifer[4]	Ground Elevation (ft)	Well Depth (ft)	Depth (ft) Below Ground Surface: Open-Hole Interval Top	Depth (ft) Below Ground Surface: Open-Hole Interval Bottom	Depth (ft) Below Ground Surface: St. Peter Top	Depth (ft) Below Ground Surface: PdC Top	Elevation (ft) Above Mean Sea Level: Open-Hole Interval Top	Elevation (ft) Above Mean Sea Level: Open-Hole Interval Bottom	Elevation (ft) Above Mean Sea Level: St. Peter Top	Elevation (ft) Above Mean Sea Level: PdC Top	Sum of Detected VOCs (ug/L): Max	Sum of Detected VOCs (ug/L): Mean	Number of Samples	Number with Detects	Percent with Detects
Former Residential Wells (in area now served with municipal water) Converted to Monitoring Wells - St. Peter Sandstone Aquifer:																				
6 Blue Goose Rd[1]	13929	12/17/69	MDH Well Record	4 E	StPb	*952*	230	194	230	137	--	758	722	815	--	**4.3**	**1.21**	14	**11**	**79%**
1 Lily Pond[1]	13933	12/11/72	MDH Well Record	4 E	StPb	*930*	220	170	220	104	--	760	710	826	--	**30**	**15**	16	**15**	**94%**
11 Lily Pond[1]	13936	6/1/69	MDH Well Record	4 E	StPb	*928*	210	172	210	77	--	756	718	851	--	**350**	**27**	14	**5**	**36%**
11 Robb Farm Rd[1]	109776	9/20/76	MDH Well Record	3 E	StPb	*942*	233	185	233	88	230	757	709	854	712	**5.7**	**1.72**	23	**19**	**83%**
6 Wren Ln	13941	5/5/72	MDH Well Record	3 E	StPb	920	245	180	245	79	--	740	675	841	--	**0.27**	**0.14**	5	**3**	**60%**
					Max	**952**	**245**	**194**	**245**	**137**	**230**	**760**	**722**	**854**	**712**	**350**	**27**	23	**19**	**94%**
					Min	**920**	**210**	**170**	**210**	**77**	**230**	**740**	**675**	**815**	**712**	**0.27**	**0.14**	5	**3**	**36%**
					Mean	**934**	**228**	**180**	**228**	**97**	**230**	**754**	**707**	**837**	**712**	**78**	**8.9**	14.4	**11**	**70%**
Former Residential Wells in Area Now Served with Municipal Water:																				
Wells in St. Peter Sandstone Aquifer:																				
7 Dove Ln	112470	8/11/76	MDH Well Record	3 E	StPb	925	202	156	202	110	--	769	723	815	--	--	--	0	--	--
11 Gilfillan Rd	13938	4/30/63	MDH Well Record	3 E	StPu/b	922	185	157	185	56	--	765	737	866	--	**0.34**	**0.13**	3	**2**	**67%**
18 Gilfillan Rd	13943	7/16/69	MDH Well Record	3 E	StPb	921	209	168	209	62	--	753	712	859	--	0.00	0.00	1	0	0%
22 Gilfillan Rd[1]	186989	9/14/82	MDH Well Record	3 E	StPu	*925*	170	150	170	85	--	775	755	840	--	**5.2**	**4.5**	3	**3**	**100%**
24 Gilfillan Rd	13940	2/28/69	MDH Well Record	3 E	StPb	925	190	161	190	58	--	764	735	867	--	**0.14**	**0.14**	1	**1**	**100%**
2 Lily Pond[1]	13932	7/5/67	MDH Well Record	3 E	StPb	*938*	243	179	243	85	--	759	695	853	--	**0.05**	**0.05**	1	**1**	**100%**
13 Robb Farm Rd	420627	6/25/86	MDH Well Record	3 E	StPu	928	186	157	186	102	--	771	742	826	--	**1.66**	**1.66**	1	**1**	**100%**
15 Robb Farm Rd[1]	226325	11/9/73	MDH Well Record	3 E	StPb	*924*	215	167	215	65	215	757	709	859	709	0.00	0.00	1	0	0%
4 Wren Ln	--	12/2/73	CRA Oct 1993	3 E	StPb	925	226	175	226	--	--	750	699	--	--	**0.16**	**0.10**	3	**2**	**67%**
7 Duck Pass	13876	1/4/63	MDH Well Record	4 E	StPb	925	214	166	214	120	--	759	711	805	--	--	--	0	--	--
2 Blue Goose Rd	165948	12/6/79	MDH Well Record	4 E	StPb	943	230	195	230	155	195	748	713	788	748	**5.4**	**3.0**	3	**3**	**100%**
3 Blue Goose Rd	164657	5/20/81	MDH Well Record	4 E	StPb	943	235	183	235	160	234	760	708	783	709	0.00	0.00	1	0	0%
4 Blue Goose Rd	13930	3/25/69	MDH Well Record	4 E	StPb	945	260	204	260	105	252	741	685	840	693	**0.35**	**0.35**	1	**1**	**100%**
4 Lily Pond	13931	2/5/72	MDH Well Record	4 E	StPb	931	237	174	237	75	--	757	694	856	--	**0.22**	**0.14**	3	**2**	**67%**
8 Lily Pond	--	--	CRA Oct 1993	4 E	StPb	923	185	165	185	--	--	758	738	--	--	**47**	**31**	4	**4**	**100%**
15 Lily Pond	13935	9/28/73	MDH Well Record	4 E	StPu	922	170	158	170	155	--	764	752	767	--	--	--	0	--	--
7 Robb Farm Rd	112469	8/12/76	MDH Well Record	4 E	StPu	945	187	150	187	56	--	795	758	889	--	**2.9**	**2.1**	6	**6**	**100%**
9 Robb Farm Rd	497603	11/8/91	MDH Well Record	4 E	StPb	952	215	186	215	100	--	766	737	852	--	**44**	**33**	7	**7**	**100%**
4 Dove Ln	105302	11/22/77	MDH Well Record	5 E	StPu	922	171	--	171	50	--	--	751	872	--	--	--	0	--	--
9 Dove Ln	106320	10/5/76	MDH Well Record	5 E	StPb	928	202	165	202	65	--	763	726	863	--	**0.33**	**0.33**	1	**1**	**100%**
15 Dove Ln	13927	11/29/65	MDH Well Record	5 E	StPb	930	213	175	213	53	--	755	717	877	--	0.00	0.00	1	0	0%
23 Dove Ln	112322	8/22/75	MDH Well Record	5 E	StPb	925	215	172	215	50	--	753	710	875	--	--	--	0	--	--
14 Gilfillan Rd	--	12/12/73	CRA Oct 1993	5 E	StPb?[5]	925	--	172	--	--	--	753	--	--	--	0.00	0.00	1	0	0%
25 Robb Farm Rd	13928	8/1/72	MDH Well Record	5 E	StPb	920	210	169	210	57	--	751	710	863	--	0.00	0.00	1	0	0%
					Max	**952**	**260**	**204**	**260**	**160**	**252**	**795**	**758**	**889**	**748**	**47**	**33**	7	**7**	**100%**
					Min	**920**	**170**	**150**	**170**	**50**	**195**	**741**	**685**	**767**	**693**	0.00	0.00	0	0	0%
					Mean	**930**	**208**	**170**	**208**	**86**	**224**	**760**	**722**	**845**	**715**	**5.6**	**4.0**	1.9	**1.8**	**63%**

Well Construction, Stratigraphic, and VOC Data for Residential Wells
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Address	Unique Well No.	Date Completed	Data Source	Well Location Area	Well Location Aquifer[4]	Ground Elevation (ft)	Well Depth (ft)	Depth (ft) Below Ground Surface: Open-Hole Interval Top	Depth (ft) Below Ground Surface: Open-Hole Interval Bottom	Depth (ft) Below Ground Surface: St. Peter Top	Depth (ft) Below Ground Surface: PdC Top	Elevation (ft) Above Mean Sea Level: Open-Hole Interval Top	Elevation (ft) Above Mean Sea Level: Open-Hole Interval Bottom	Elevation (ft) Above Mean Sea Level: St. Peter Top	Elevation (ft) Above Mean Sea Level: PdC Top	Sum of Detected VOCs (ug/L): Max	Sum of Detected VOCs (ug/L): Mean	Number of Samples	Number with Detects	Percent with Detects
Wells in Prairie du Chien Limestone Aquifer or in Both Prairie du Chien and St. Peter:																				
21 Gilfillan Rd	13937	8/10/60	MDH Well Record	3 E	PdC	920	259	226	259	70	224	694	661	850	696	0.11	0.11	1	1	**100%**
7 Lily Pond	13939	10/27/69	MDH Well Record	3 E	StP/PdC	920	255	224	255	68	226	696	665	852	694	0.00	0.00	1	0	0%
19 Dove Ln	249666	--	MDH Well Record	5 E	StP/PdC	927	250	222	250	59	227	705	677	868	700	0.31	0.08	4	1	**25%**
					Max	**927**	**259**	**226**	**259**	**70**	**227**	**705**	**677**	**868**	**700**	**0.31**	**0.11**	4	**1**	**100%**
					Min	**920**	**250**	**222**	**250**	**59**	**224**	**694**	**661**	**850**	**694**	0.00	0.00	1	0	0%
					Mean	**922**	**255**	**224**	**255**	**66**	**226**	**698**	**668**	**857**	**697**	**0.14**	**0.06**	2.0	**0.7**	**42%**
Residential Wells Outside Municipal Water Service Area:																				
Arera 3 West - St. Peter Sandstone Aquifer:																				
1 Buffalo Rd	13919	9/7/62	CRA Jun 2005	3 W	StPb	930	237	177	237	100	--	753	693	830	--	0.00	0.00	5	0	0%
44 East Oaks Rd[2]	13917	6/17/66	CRA Jun 2005	3 W	StPb	930	230	*186*	*230*	130	--	*744*	*700*	800	--	**0.19**	**0.03**	7	**1**	**14%**
8 Ski Ln	664406	8/22/01	CRA Jun 2005	3 W	StPu	948	160	126	160	68	--	822	788	880	--	0.00	0.00	4	0	0%
2 Thompson Ln	413598	8/7/87	CRA Jun 2005	3 W	StPb	925	200	170	200	90	--	755	725	835	--	0.00	0.00	7	0	0%
8 West Shore Rd	13922	2/8/66	CRA Jun 2005	3 W	StPb	912	216	164	216	90	--	748	696	822	--	0.00	0.00	5	0	0%
10 West Shore Rd[3]	691729	6/17/03	CRA Jun 2005	3 W	StPb	*920*	200	168	200	100	--	752	720	820	--	**0.19**	**0.01**	15	**1**	**7%**
12 West Shore Rd	13921	10/10/70	CRA Jun 2005	3 W	StPb	920	211	174	211	99	--	746	709	821	--	**0.39**	**0.12**	25	**11**	**44%**
15 West Shore Rd	13920	8/24/65	CRA Jun 2005	3 W	StPb	930	218	180	218	92	--	750	712	838	--	**0.30**	**0.02**	13	**1**	**8%**
					Max	**948**	**237**	**186**	**237**	**130**	**--**	**822**	**788**	**880**	**--**	**0.39**	**0.12**	25	**11**	**44%**
					Min	**912**	**160**	**126**	**160**	**68**	**--**	**744**	**693**	**800**	**--**	0.00	0.00	4	0	0%
					Mean	**927**	**209**	**168**	**209**	**96**	**--**	**759**	**718**	**831**	**--**	**0.13**	**0.02**	10.1	**1.8**	**9%**
Arera 4 East - St. Peter Sandstone Aquifer or Lower Sand-St. Peter:																				
3 Mallard Ln	205721	10/21/61	MDH Well Record	4 E	StPb	930	225	185	225	160	185	745	705	770	745	0.00	0.00	4	0	0%
6 Mallard Ln	175157	9/17/80	MDH Well Record	4 E	StPb	950	230	190	230	185	--	760	720	765	--	0.00	0.00	5	0	0%
1 Robb Farm Rd	173902	10/21/82	MDH Well Record	4 E	StPu	970	214	205	214	190	--	765	756	780	--	0.00	0.00	3	0	0%
2 Robb Farm Rd	436587	11/4/87	MDH Well Record	4 E	LS/StPu[6]	959	154	148	154	153	--	811	805	806	--	**0.33**	**0.08**	4	**1**	**25%**
4 Robb Farm Rd	450572	8/30/88	MDH Well Record	4 E	StPb	949	230	199	230	140	--	750	719	809	--	0.00	0.00	3	0	0%
					Max	**970**	**230**	**205**	**230**	**190**	**185**	**811**	**805**	**809**	**745**	**0.33**	**0.08**	5	**1**	**25%**
					Min	**930**	**154**	**148**	**154**	**140**	**185**	**745**	**705**	**765**	**745**	0.00	0.00	3	0	0%
					Mean	**952**	**211**	**185**	**211**	**166**	**185**	**766**	**741**	**786**	**745**	**0.07**	**0.02**	3.8	**0.2**	**5%**
Arera 4 West - St. Peter Sandstone Aquifer:																				
13 Duck Pass	13872	5/30/60	MDH Well Record	4 W	StPu	930	184	165	184	149	--	765	746	781	--	0.00	0.00	6	0	0%
15 Duck Pass	13873	7/25/64	MDH Well Record	4 W	StPb	932	203	170	203	144	--	762	729	788	--	0.00	0.00	3	0	0%
22 Duck Pass	507732	4/30/90	MDH Well Record	4 W	StPb	918	200	165	200	152	--	753	718	766	--	**3.0**	**1.00**	3	**1**	**33%**
24 Duck Pass[2]	13874	3/30/63	MDH Well Record	4 W	StPb	920	210	*162*	*210*	125	--	*758*	*710*	795	--	0.00	0.00	4	0	0%
38 East Oaks Rd	407074	8/2/85	CRA Jun 2005	4 W	StPb	930	230	185	230	120	--	745	700	810	--	**0.18**	**0.03**	6	**1**	**17%**
1 Gadwall Ln	13913	8/25/68	MDH Well Record	4 W	StPb	920	210	170	210	128	--	750	710	792	--	0.00	0.00	4	0	0%
4 Gadwall Ln	13914	6/25/73	MDH Well Record	4 W	StPb	930	223	190	223	143	--	740	707	787	--	0.00	0.00	3	0	0%
					Max	**932**	**230**	**190**	**230**	**152**	**--**	**765**	**746**	**810**	**--**	**3.0**	**1.00**	6	**1**	**33%**
					Min	**918**	**184**	**162**	**184**	**120**	**--**	**740**	**700**	**766**	**--**	0.00	0.00	3	0	0%
					Mean	**926**	**209**	**172**	**209**	**137**	**--**	**753**	**717**	**788**	**--**	**0.45**	**0.15**	4.1	**0.3**	**7%**

Well Construction, Stratigraphic, and VOC Data for Residential Wells
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Address	Unique Well No.	Date Completed	Data Source	Well Location Area	Well Location Aquifer[4]	Ground Elevation (ft)	Well Depth (ft)	Depth (ft) Below Ground Surface: Open-Hole Interval Top	Depth (ft) Below Ground Surface: Open-Hole Interval Bottom	Depth (ft) Below Ground Surface: St. Peter Top	Depth (ft) Below Ground Surface: PdC Top	Elevation (ft) Above Mean Sea Level: Open-Hole Interval Top	Elevation (ft) Above Mean Sea Level: Open-Hole Interval Bottom	Elevation (ft) Above Mean Sea Level: St. Peter Top	Elevation (ft) Above Mean Sea Level: PdC Top	Sum of Detected VOCs (ug/L): Max	Sum of Detected VOCs (ug/L): Mean	Number of Samples	Number with Detects	Percent with Detects
Arera 4 West - St. Peter-Prairie du Chien or Jordan Sandstone Aquifer:																				
9 Duck Pass	13875	10/20/60	MDH Well Record	4 W	Jdn[7]	920	403	350	403	125	212	570	517	795	708	**1.87**	**0.62**	3	**1**	**33%**
20 Duck Pass[1]	177937	3/25/82	CRA Oct 1993	4 W	StP/PdC	*923*	248	166	248	157	217	757	675	766	706	**0.46**	**0.11**	6	**2**	**33%**
1 Poplar Ln	13916	5/1/56	CRA Jun 2005	4 W	StP/PdC	922	250	165	250	138	215	757	672	784	707	0.00	0.00	6	0	0%
					Max	**923**	**403**	**350**	**403**	**157**	**217**	**757**	**675**	**795**	**708**	**1.87**	**0.62**	6	**2**	**33%**
					Min	**920**	**248**	**165**	**248**	**125**	**212**	**570**	**517**	**766**	**706**	0.00	0.00	3	0	0%
					Mean	**922**	**300**	**227**	**300**	**140**	**215**	**695**	**621**	**782**	**707**	**0.78**	**0.24**	5.0	**1.0**	**22%**
Arera 5 West - St. Peter Sandstone Aquifer:																				
37 Robb Farm Rd	13926	5/11/72	CRA Jun 2005	5 W	StPb	920	228	164	228	95	--	756	692	825	--	0.00	0.00	6	0	0%
44 Robb Farm Rd	13925	2/5/69	MDH Well Record	5 W	StPb	920	238	176	238	89	--	744	682	831	--	0.00	0.00	5	0	0%
3 West Shore Rd	13924	9/23/61	CRA Jun 2005	5 W	StPb	930	235	184	235	82	--	746	695	848	--	0.00	0.00	6	0	0%
5 West Shore Rd	13923	11/25/66	CRA Jun 2005	5 W	StPb	925	230	173	230	78	--	752	695	847	--	0.00	0.00	4	0	0%
6 West Shore Rd	500485	8/30/89	CRA Jun 2005	5 W	StPb	915	200	170	200	100	--	745	715	815	--	0.00	0.00	5	0	0%
					Max	**930**	**238**	**184**	**238**	**100**	**--**	**756**	**715**	**848**	**--**	0.00	0.00	6	0	0%
					Min	**915**	**200**	**164**	**200**	**78**	**--**	**744**	**682**	**815**	**--**	0.00	0.00	4	0	0%
					Mean	**922**	**226**	**173**	**226**	**89**	**--**	**749**	**696**	**833**	**--**	0.00	0.00	5.2	0	0%

Notes:

[1]Surveyed ground elevation reported in CRA (Oct 1993).

[2]Open-hole depth interval estimated as interval of hard sandstone noted on driller's log (consistent with other well logs above).

[3]Ground elevation for 10 West Shore Rd *(920)* estimated from USGS topo.

[4]Aquifer designations are as follows: StPb, StPu = St. Peter Sandstone, basal and upper, respectively; PdC = Prairie du Chien Limestone (upper portion, generally); Jdn = Jordan Sandstone; and LS = Lower Sand.

[5]Well at 14 Gilfillan Rd is probably finished in the basal St. Peter Sandstone, but total depth is unknown.

[6]Well at 2 Robb Farm Rd is screened from 15 feet above the top of the St. Peter Sandstone, to 1 foot below.

[7]Well log at 9 Duck Pass Rd indicates top of Jordan at 340-foot depth (elevation 580 feet). This log thus shows a Prairie du Chien thickness of 128 feet and a minimum Jordan thickness of 63 feet.

Table 2-2
Well Construction, Stratigraphic, and VOC Data for Monitoring Wells Finished in Bedrock
Review of Highway 96 Site Groundwater Impacts for City of North Oaks

Site Well ID	Unique Well No.	Date Completed	Well Log Source	Well Location		Riser Top Elevation (ft)	Ground Elevation (ft)	Borehole Depth (ft)	Depth (ft) Below Ground Surface				Elevation (ft) Above Mean Sea Level				Sum of Detected VOCs (ug/L)		Number of Samples	Number with Detects	Percent with Detects
									Screen Interval		St. Peter	PdC	Screen Interval		St. Peter	PdC					
				Area	Aquifer				Top	Bottom	Top	Top	Top	Bottom	Top	Top	Max	Mean			
MW-16B	717785	10/5/05	CRA Feb 2006	1 W	StP	940.71	938.1	160	150	160	97	--	788.1	778.1	841.1	--	**6.4**	**5.3**	2	**2**	**100%**
MW-17A	717794	10/3/05	CRA Feb 2006	3 E	StPu	914.58	912.6	105	95	105	69	--	817.6	807.6	843.6	--	**2.3**	**1.31**	2	**2**	**100%**
MW-17B	717788	9/29/05	CRA Feb 2006	3 E	StPb	914.50	912.6	190	180	190	69	--	732.6	722.6	843.6	--	0.00	0.00	3	0	0%
MW-17L	717787	9/28/05	CRA Feb 2006	3 E	PdC	914.65	912.7	290	250	290	69	208	662.7	622.7	843.7	704.7	0.00	0.00	4	0	0%
MW-19B	717798	12/7/05	CRA Feb 2006	3 W	StPb	913.33	912.0	265	255	265	70	*207*	657.0	647.0	842.0	705.0	0.00	0.00	2	0	0%
MW-19L	717799	12/19/05	CRA Feb 2006	3 W	PdC	914.18	911.9	267	255	267	70	207	656.9	644.9	841.9	704.9	0.00	0.00	2	0	0%
EW-2	717789	9/30/05	CRA Feb 2006	1 C	StPu	938.67	936.5	138	128	138	90	--	808.5	798.5	846.5	--	**13**	**13**	1	**1**	**100%**
MW-8B	--	11/2/87	CRA Mar 1988	1 C	StPu	941.00	938.3	132.5	122	132	100	--	816.3	806.3	838.3	--	**218**	**59**	49	**46**	**94%**

Note: Prairie du Chien monitoring wells are open-hole, not screened; thus, the "screen intervals" shown for MW17L (250-290) and MW-19L (255-267) are actually the open-hole intervals for these wells.
The borehole for well MW-19B extended to 265 feet but was grouted back up to 200 feet for well completion.

Figure 2-1
Percentage of Samples with VOC Detections vs. Top-of-Open Hole Elevation
Residential Wells Outside Municipal Water Service Area

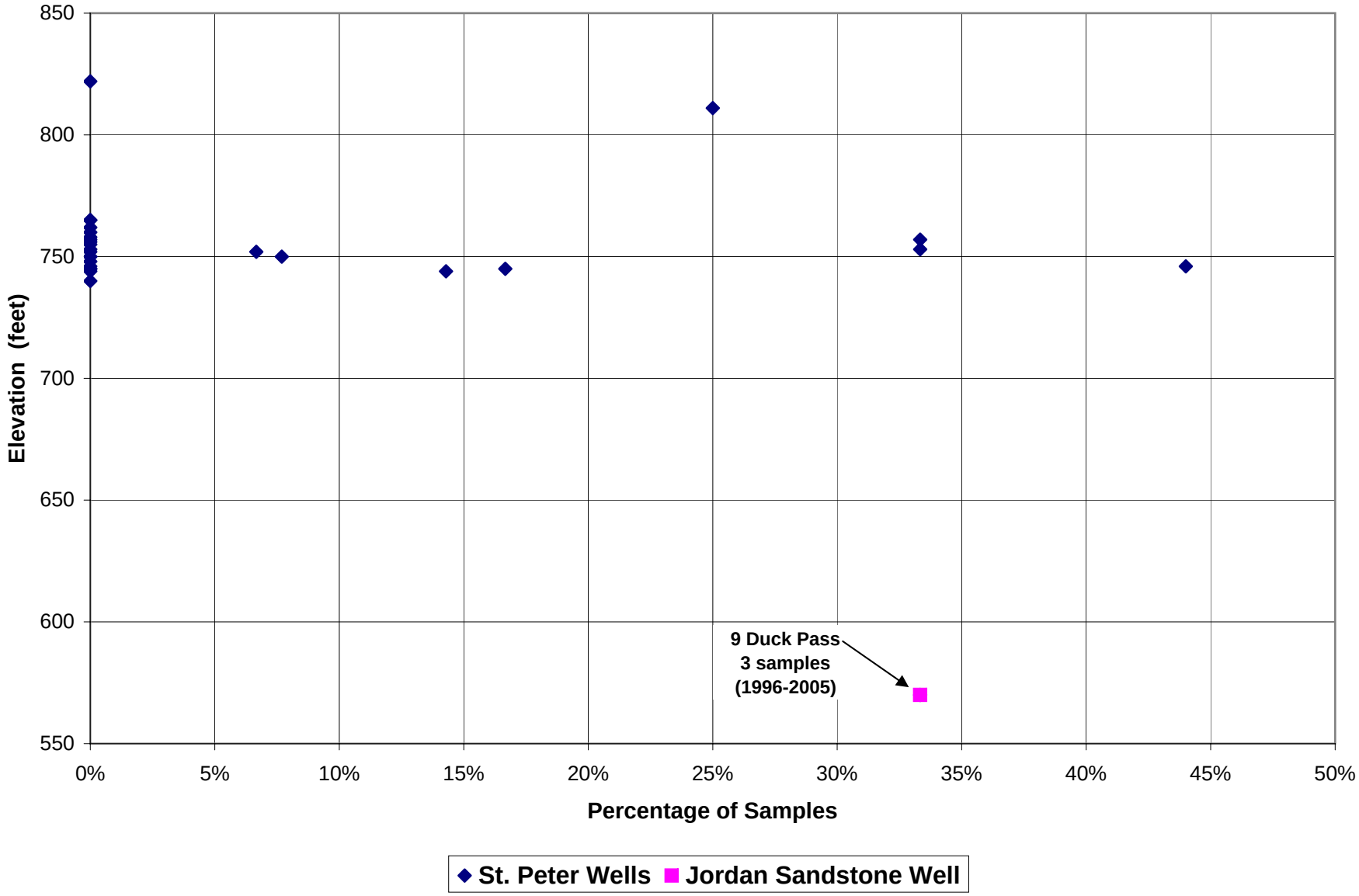
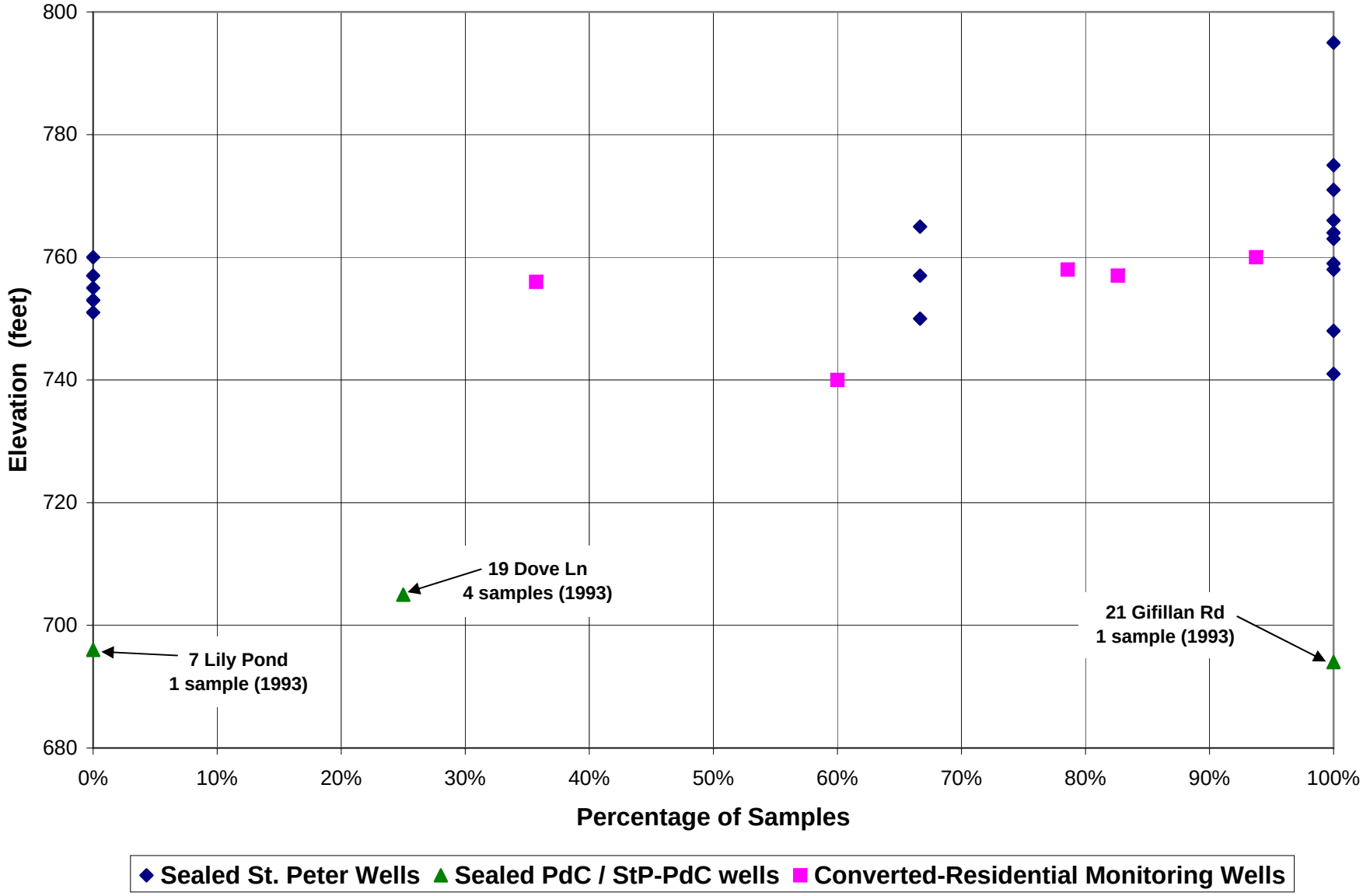


Figure 2-2
Percentage of Samples with VOC Detections vs. Top-of-Open Hole Elevation
Former Residential Wells in Municipal Water Service Area



3 – Effects of St. Paul Regional Water Services' Wells

Effects of St. Paul Regional Water Services' Wells

Introduction

St. Paul Regional Water Services (SPRWS) supplies water to the City of St. Paul and several other nearby municipalities, drawing most of its water from the Mississippi River by way of Vadnais Lake and a series of connecting lakes and channels. However, the SPRWS also maintains high-capacity wells that tap the Prairie du Chien-Jordan aquifer for the purposes of emergency water supply and to substitute for surface water during taste and odor episodes that commonly occur in the summer. These wells can interfere with the use of private wells in North Oaks and have the potential to affect the movement of contaminated groundwater in the Highway 96 Site-Gilfillan Lake area.

At present, the SPRWS has six high-capacity water wells tapping the Prairie du Chien-Jordan aquifer, located approximately three miles south of the Highway 96 Site-Gilfillan Lake area. Three of the wells (B, C, and D) are adjacent to the southwest shore of Vadnais Lake, and the other three (E, F, and G) are about one half mile south of Vadnais Lake. The six wells have a total capacity of approximately 18,000 gallons per minute (gpm) (Graupman, November 28, 2006), implying an average capacity of 3,000 gpm, typical for municipal wells tapping the Prairie du Chien-Jordan aquifer. The Minnesota Department of Natural Resources (MDNR) granted permits for wells F and G in the summer of 2006; the other wells were permitted at an earlier time.

The SPRWS envisions construction of five additional Prairie du Chien-Jordan wells, with the goal of achieving a total well capacity equal to the water system's average daily use, roughly 45 to 50 million gallons per day (mgd) (Graupman, November 28, 2006). The flow range of 45 to 50 mgd is equivalent to 31,000 to 35,000 gpm. Thus, the SPRWS's goal is approximately to double the current total well capacity. The additional wells would be located between the existing ones and the water treatment plant at Rice Street and Roselawn Avenue, generally along the course of the aqueduct that connects the pumping station at Vadnais Lake with the treatment plant (Graupman, November 28, 2006).

Prior to permitting wells F and G, the MDNR required the SPRWS to investigate the expanded well system's potential for adverse effects on private wells in North Oaks and on the groundwater contaminant plume originating from the Twin Cities Army Ammunition Plant in Arden Hills. The investigation is documented in a report prepared for the SPRWS by Bonestroo Rosene Anderlik & Associates (September 14, 2004).

Following are a discussion of the SPRWS 2004 report and independent calculations that serve to check the report's results.

SPRWS 2004 Report by Bonestroo Rosene Anderlik & Associates

Bonestroo Rosene Anderlik & Associates (BRA) modeled the effects of the expanded well field using the MODFLOW computer program. Three cases were modeled: one with a total well capacity of 50 mgd, as desired by the SPRWS; a second with a total of capacity of 33.2 mgd, representing maximum flows achievable with existing and designed pump intake elevations; and a third with a total of 48.9 mgd, representing the drawdown for maximum flow rates achievable with

lower, but still feasible, pump intake elevations. BRA's main findings relative to North Oaks are as follows:

- For the first case, with 50 mgd, maximum drawdowns in North Oaks would be 23 feet in Prairie du Chien wells and 16 feet in St. Peter wells, and well interference could begin within a week of the onset of pumping; however, it may be impossible to sustain a total flow rate of 50 mgd with the expanded well field as envisioned.
- For the second case, with 33.2 mgd, maximum drawdowns in North Oaks would be 13 feet in Prairie du Chien wells and 10 feet in St. Peter wells.
- For the third case, with 48.9 mgd, maximum drawdowns in North Oaks would be 22 feet in Prairie du Chien wells and 16 feet in St. Peter wells, approximately the same as in the first case.

As modeled by BRA, drawdowns in the Highway 96 Site-Gilfillan Lake area are about 3 feet less than the reported maximum drawdowns in North Oaks in the second case, and about 5 feet less in the third case. These relationships are inferred from Figures 2 and 3 of BRA's report. There is no corresponding figure for the first case.

Independent Drawdown Calculations

Drawdown $\Delta\varphi$ caused by a single well in a confined aquifer having uniform transmissivity T can be calculated from the following equation (Strack, 1989; page 26):

$$\Delta\varphi = \frac{Q}{2\pi T} \ln\left(\frac{r_o}{r}\right)$$

in which Q is the well's flow rate, r_o is the distance from the well at which drawdown is negligible, and r is the distance from the well to the point of interest.

The importance of transmissivity can be understood as follows. At a given locale in an aquifer where there are three or more non-pumping wells not all in a straight line, the slope in any direction of the aquifer's so-called potentiometric surface can be determined from the height of water in the wells. (The water table is essentially the potentiometric surface in an unconfined, or "water table", aquifer. In a confined, or artesian, aquifer such as the Prairie du Chien-Jordan, the potentiometric surface is above the top of the aquifer, which is defined by an overlying layer of low-permeability rock or sediment. For example, the elevation of the top of the Prairie du Chien Limestone in the Highway 96 Site-Gilfillan Lake area is close to 700 feet, but water in a Prairie du Chien well there rises to an elevation of close to 900 feet.) Groundwater in the aquifer flows in the direction of the potentiometric surface's steepest slope. Multiplying the steepest slope by the transmissivity gives the volumetric rate of flow in the aquifer per unit width (by definition, "width" is perpendicular to the flow). A typical slope for the Prairie du Chien-Jordan's potentiometric surface is 10 feet per mile, or about 0.002 (feet per foot). A transmissivity value of 17,000 cubic feet per day per foot (ft^2/day) is typical of the Prairie du Chien-Jordan aquifer in some locales. Where these conditions occur, the aquifer's flow per unit width is $17{,}000 \times 0.002 = 34$ ft^3/day per foot (written, as for transmissivity, ft^2/day). Drawdown is inversely proportional to transmissivity. Thus, other factors being equal, the greater the transmissivity, the less the drawdown.

A simplification often used to calculate drawdown from a well field is to treat the set of wells in it as a single "equivalent well" whose flow rate equals the total of the individual wells' flow rates, and whose location is at the flow-weighted average of the individual wells' locations ("center of pumping"). For a well equivalent to the SPRWS well field, the desired future total capacity of 50 mgd, or 35,000 gpm, translates to Q = 6,700,000 ft^3/day in units compatible with transmissivity as above. The future center of pumping would be approximately 3.5 miles from the center of Gilfillan Lake (a convenient central location for the area of interest); i.e., r = 3.5 miles. The parameters which must be specified to complete the drawdown calculation are the aquifer's transmissivity T and the distance to negligible drawdown r_o.

Data from the Minnesota Pollution Control Agency's groundwater flow "Metro Model" (Seaberg and Hansen, May 2000) suggest a transmissivity value for the area of interest of 8,000 ft^2/day. If the distance to negligible drawdown is on the order of 10 miles, as suggested by the Metro Model's very small rate of leakage into the Prairie du Chien-Jordan, then the predicted drawdown at the center of Gilfillan Lake is 140 feet.

However, the Prairie du Chien-Jordan's transmissivity is variable, and it appears that BRA's model reflects a value of around 17,000 ft^2/day in the general vicinity of the SPRWS well field. (An even greater value has been determined for the Prairie du Chien-Jordan at the Twin Cities Army Ammunition Plant.) BRA's model results also suggest a distance to negligible drawdown of about 5.5 miles. On the basis of these numbers, the predicted drawdown at the center of Gilfillan Lake is 28 feet. As this is a very simplified analysis, it is a reasonable confirmation of BRA's model results for the Prairie du Chien-Jordan aquifer.

Drawdown in the St. Peter Sandstone caused by the SPRWS's wells is not calculated here. But it is certain that, at a given location, drawdown in the St. Peter would be significantly less than in the Prairie du Chien-Jordan. BRA's model results reflect this relationship. At the lower total well flow rate in BRA's second case, St. Peter drawdown is about 3 feet less than Prairie du Chien-Jordan drawdown at the center of Gilfillan Lake. At the higher total well flow rate in BRA's third case, St. Peter drawdown is about 6 feet less than Prairie du Chien-Jordan drawdown at the center of Gilfillan Lake.

The difference in drawdown between the aquifers is important to the transport of contaminated groundwater. There is always some groundwater leakage from the St. Peter to the Prairie du Chien, but the differential drawdown caused by pumping from the Prairie du Chien-Jordan increases the leakage rate. So, where groundwater in the St. Peter is contaminated, sustained pumping at capacity from the SPRWS well field will contribute to the downward transport of contaminants from the St. Peter to the Prairie du Chien.

References:

Bonestroo Rosene Anderlik & Associates, September 14, 2004. St. Paul Regional Water Services Groundwater Modeling and Well Field Design. Prepared for St. Paul Regional Water Services.

Graupman, J., November 28, 2006. Personal communication, telephone conference between J. Graupman, SPRWS, and J. Erdmann, Wenck Associates, Inc.

Seaberg, J.K., and Hansen, D.D., May 2000. Metropolitan Area Groundwater Model Project Summary – Northeast Province, Layers 1, 2, and 3 Model. Minnesota Pollution Control Agency.

Strack, O.D.L., 1989. *Groundwater Mechanics*. Prentice Hall, Englewood Cliffs, NJ.

4 – Questions and Answers

QUESTIONS AND ANSWERS

Review of Highway 96 Site Groundwater Impacts for City of North Oaks

City Council member Beth Cliffe provided the following questions in an e-mail dated September 29, 2006, to Jeff Roos, McCombs Frank Roos Associates, Inc. John B. Erdmann, Ph.D., P.E., Wenck Associates, Inc., prepared the answers below.

1. What is your reaction to the research that has been done?

My reaction to the investigations conducted at and in connection with the Highway 96 Site is overall positive. The investigations and remedial actions performed to date have met industry standards and, in general, have been a cut above average. Since the great majority of the investigative work has been performed by Conestoga-Rovers and Associates, Ltd., (CRA) on behalf of the responsible parties, this is primarily an affirmation of CRA's work. But I also commend the roles played by the Minnesota Pollution Control Agency and the Minnesota Department of Health.

That is not to say the work has been perfect in all regards. See points 5 and 6 of Wenck's January 3, 2007 Key Findings memorandum to the City of North Oaks.

2. Has the perimeter of the plume(s) been conservatively identified and characterized?

The extent of vinyl chloride contamination in the St. Peter Sandstone aquifer is adequately delimited. The finding of vinyl chloride and other volatile organic compounds (VOCs) in four residential wells in the vicinity that extend into the Prairie du Chien-Jordan aquifer indicate some degree of contamination in this aquifer directly underlying the St. Peter Sandstone and caution against the replacement of contaminated St. Peter wells with Prairie du Chien wells. See points 2 and 3 of Wenck's January 3, 2007 Key Findings memorandum to the City of North Oaks.

3. Efficacy of research to date – Are there any "gaps" in the data collected to date? Is it comprehensive enough?

The investigations performed to date been more than sufficiently comprehensive with respect to industry standards. Nevertheless, data gaps are sometimes inevitable simply because of the hydrogeologic setting or other factors. In the present case, the unavailability of VOC data for groundwater beneath Gilfillan Lake is a data gap of this kind. Gilfillan Lake is shallow (maximum depth < 10 feet) and does not materially influence groundwater flow in the St. Peter aquifer because glacial deposits that are approximately 50 to 100 feet thick separate the lake from the aquifer. But the lake represents a barrier to groundwater sampling.

4. Should there be more vertical profiling to evaluate the plume?

No. More vertical profiling would yield marginal benefit. There is a clear general pattern of plume deepening in the downgradient direction: VOCs occur in the glacial drift and upper St. Peter aquifer on and very close to the old dump property; VOCs occur throughout the thickness of the St. Peter in most of the area east of Gilfillan Lake that is now served with municipal water; and VOCs occur in the basal St. Peter in a handful of wells west of Gilfillan Lake. Apart from

this general pattern, the determinant of whether or not VOCs occur in a given well is the well's map-view location, not its depth.

5. How would the MDH proposed reduction of the vinyl chloride health standard affect the situation?

The practical effect of the proposed Health Risk Limit (HRL) reduction for vinyl chloride, from 0.20 to 0.08 micrograms per liter (ug/L), would be virtually nil for the near term. The change would not trigger action for additional wells beyond those three for which granular activated carbon filters are currently supplied (or offered) because vinyl chloride has not been detected in any additional wells. The HRL reduction would, however, cause the Minnesota Department of Health to issue drinking water advisories for all three residential wells with vinyl chloride detections, as all the vinyl chloride detections in these wells since 2004 have exceeded the proposed HRL of 0.08 ug/L.

Beyond the near term, the proposed HRL reduction would probably result in additional drinking water advisories. Because it is difficult to measure vinyl chloride at concentrations as low as 0.08 ug/L, virtually every future vinyl chloride detection can be expected to exceed the proposed HRL. At the same time, occurrences of vinyl chloride and other VOCs in additional wells on the west side of Gilfillan Lake should be anticipated (see point 9 of Wenck's January 3, 2007 Key Findings memorandum to the City of North Oaks). Thus, beyond the near term, additional drinking water advisories can also be expected.

6. How would future plans of the St. Paul Regional Water Services Commissioners to install "super wells" with possible "dewaterization" of and well interference of private drinking wells affect the plume?

The existing and planned St. Paul Regional Water Services' wells have the potential to induce significant contaminant transport downward from the St. Peter to the Prairie du Chien in the Gilfillan Lake-Site vicinity. See point 11 of Wenck's January 3, 2007 Key Findings memorandum to the City of North Oaks.

7. How would the probability of an amendment to the Minnesota Decision Document impact residents?

It appears that an amendment to the Minnesota Decision Document for the Highway 96 Site has been under discussion that would remove the specification of public water supply as the automatic remedy for newly impacted wells west of Gilfillan Lake. The Minnesota Pollution Control Agency is evidently reluctant to require the provision of public water supply based on impacts to a very small number of wells. This, I submit, is common sense. The drafters of the existing Minnesota Decision Document apparently did not foresee the present scenario. However, the current amendment drafters should not fall into similar shortsightedness by simply ruling out the public water supply alternative. Individual-well remedies make sense for the present, when only three wells are at issue. But as stated elsewhere, occurrences of vinyl chloride and other VOCs in additional wells on the west side of Gilfillan Lake should be anticipated. Therefore, the Decision Document amendments should retain a broad scope of alternatives with provision for re-evaluation in light of changing future conditions.

8. What other recommendations do you have for residents to insure their well water is safe from VOCs?

First, I recommend that residents in the Gilfillan Lake-Site vicinity avail themselves of every opportunity to have their well water sampled for VOCs by the Site's responsible parties and/or the state (Minnesota Pollution Control Agency or Minnesota Department of Health).

Second, I recommend the use of granular activated carbon (GAC) filtration units for drinking water from residential wells near Gilfillan Lake (in addition to those three residences where vinyl chloride has been detected) as follows:

a) The five wells in Area 3 west in which VOCs other than vinyl chloride have been detected (see Figure 1 of Wenck's January 3, 2007 Key Findings memorandum to the City of North Oaks),

b) The eight wells within Area 4, but outside the municipal water supply area, in which VOCs other than vinyl chloride have been detected (see again Figure 1 of Wenck's January 3, 2007 Key Findings memorandum), and

c) Other wells in Area 3 west where residents desire an extra margin of safety.

Residents who use GAC filters should follow the manufacturer's recommendations regarding the frequency of filter replacement.

9. What else should the City be doing? NOHOA?

Wenck's January 3, 2007 Recommendations memorandum to the City of North Oaks presents the following four specific actions for the City:

a) Communicate Wenck's finding to the Minnesota Pollution Control Agency (MPCA) that vinyl chloride and other VOC occurrences should be anticipated in additional wells on the west side of Gilfillan Lake.

b) Urge the MPCA to continue residential well sampling in the western portion of Area 3 at frequencies appropriate to each well's location. Higher frequency monitoring is needed for wells along the west shore of Gilfillan Lake, and for wells near the vinyl chloride plume axis. A minimum frequency of annual sampling is recommended for the remaining portions of Area 3 west.

c) Urge the MPCA to require groundwater extraction at EW-3 at a rate that will ensure capture of the full width of Area 3 west.

d) Urge the MPCA to consider means other than deeper wells for providing safe water to residents with impacted St. Peter wells. Point-of-entry treatment with granular activated carbon may be a preferable alternative.

In addition to the above four points, and in light of the discussion under question 7 above, the City should urge the MPCA to retain for possible future consideration, all reasonable alternatives for providing safe water to residents with impacted St. Peter wells.

More generally, both the City of North Oaks and the North Oaks Home Owners' Association should maintain periodic communications with the MPCA, Minnesota Department of Health, and Minnesota Department of Natural Resources' Division of Waters. It is especially important

to stay in touch with the MPCA during the current drafting of changes to the Minnesota Decision Document for the Highway 96 Site.

The responsible parties' consultant, Conestoga-Rovers and Associates, Ltd., has produced a long stream of high-quality reports on the Highway 96 Site and the adjacent portion of North Oaks, continuing through the present. The City has wisely made the more recent reports available to all through the City's web site, and this practice should continue. Knowledgeable staff, officials, and community members associated with the City and the NOHOA should also continue to review these reports and communicate their questions appropriately.

10. Response to the Ski Lane ravine experiment?

Operating an extraction well in the Ski Lane ravine area is reasonable and necessary. Conestoga-Rovers installed and tested extraction well EW-3 in that location in late 2006. A report has not been available as yet for Wenck's review.