

**SUMMARY OF POTENTIAL ARARS
NORTH OAKS, MINNESOTA**

POTENTIAL ARAR	REQUIREMENT/PURPOSE	APPLICABILITY
CHEMICAL SPECIFIC		
<i>Federal</i>		
Federal Safe Drinking Water Maximum Concentration Limits (MCLs); 40 CFR 264.94	Maximum concentration limits of constituents from a regulated facility for groundwater protection.	Relevant to the effectiveness of remedial alternatives considered.
<i>State</i>		
Groundwater Quality; Minnesota Rules Chapter 4717	Establishes groundwater quality standards for substances detected in groundwater.	Relevant to the effectiveness of remedial alternatives considered.
LOCATION SPECIFIC		
<i>Federal</i>		
Endangered Species Act of 1973; 16 USC Section 1533; 50 CFR 17.11, 40 CFR 6.302 (h)	Action to conserve endangered species or threatened species, including activities by Department of the Interior.	Relevant, if construction of a remedial system is near a wetland.
Fish and Wildlife Coordination Act; 16 USC Sections 662-664; 33 CFR 323, 40 CFR 6.302 (g)	Requires protection of fish and wildlife resources if modification of any stream or water body.	Relevant, if construction of a remedial system is near a wetland.
Clean Water Act; 33 USC 1341, Section 401; 40 CFR 230-231	Discharge of dredged or fill material into wetlands without permit is prohibited.	Relevant, if construction of a remedial system is near a wetland.
Floodplain Management; 40 CFR 6.302 (b) and Appendix A	Facility must be designed, constructed, operated, and maintained to prevent washout.	Relevant, if remedial system is constructed in floodplain.
Executive Order on Floodplain Management; Executive Order 11988, Section 2; 40 CFR 6.302 (b)	Requires federal agencies to evaluate the potential effects of direct and indirect development of a floodplain.	Relevant, if remedial system is constructed in floodplain.
Executive Order Protecting Wetlands; Executive Order 11990, Section 2; 40 CFR 6.302 (a)	Requires federal agencies to minimize the destruction, loss, or degradation of wetlands.	Relevant to remediation activities taking place in and around wetlands.
Statement of Procedures on Floodplain Management and Wetlands Protection; 40 CFR Part 6, Appendix A	Procedures for USEPA to avoid impacts associated with the destruction of wetlands and the occupancy and modification of floodplains and wetlands.	Relevant to remediation activities taking place in and around wetlands and within floodplain.
Navigation and Navigable Waters; 33 CFR Parts 320-329	Requires permits for construction work that may affect navigable waters, and include wetlands.	Relevant to discharge of treated effluent which may impact nearby surface water bodies.
<i>State</i>		
Navigation and Navigable Waters; Minnesota Rules Chapters 6115, 7001	Requires permits for construction work that may affect navigable waters, and include wetlands.	Relevant to discharge of treated effluent which may impact nearby surface water bodies.

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POTENTIAL ARAR	REQUIREMENT/PURPOSE	APPLICABILITY
ACTION SPECIFIC		
<i><u>Federal</u></i>		
National Pollutant Elimination Discharge System (NPDES); 40 CFR 122	Applicable regulations which set surface water quality based standards and ambient water quality based standards. Used to determine NPDES discharge limits.	Relevant to maintaining surface water quality during remediation activities.
Clean Air Act- Sections 107, 109, 110, 111, and 112	Air emission requirements.	Relevant to remedial action which may produce airborne pollutants.
National Primary and Secondary Ambient Air Quality Standards; 40 CFR 50.6, 50.7	For national primary and secondary ambient air quality standards.	Relevant to remedial action which may produce airborne pollutants.
National Primary and Secondary Ambient Air Quality Standards; 40 CFR 50 Appendices	Permit must demonstrate that air quality standards are achieved.	Relevant to remedial action which may produce airborne pollutants.
<i><u>State</u></i>		
Responses When a Groundwater Standard is Attained or Exceeded; Minnesota Rules Chapters 7035, 7050	Groundwater monitoring and exceedence requirements.	Relevant to the effectiveness of remedial alternatives considered.
Groundwater Monitoring Well Requirements; Minnesota Rules Chapter 4725	Standards for design, construction, installation, abandonment, and documentation of groundwater monitoring wells.	Relevant to modifications of the monitoring well network.
Effluent Standards and Limitations; Minnesota Rules Chapter 7065	Establishes effluent standards and limitations for pollutants in effluent discharged to surface water	Relevant to remedial alternatives which may result in the discharge of water to surface water.
Well Construction and Pump Installation; Minnesota Rules Chapter 4725	Requirements on well construction and installation and maintenance on pumping and treatment equipment.	Relevant to the pump and treat alternative.

TABLE 4.1
SUMMARY OF COST ESTIMATES
MPCA SCENARIO A
NORTH OAKS, MINNESOTA

<u>Alternative</u>	<u>Description</u>	<u>Total Cost</u>
A1	No Further Remediation	\$ 0
A2	Long-Term Monitoring	\$ 680,208
A3a	Groundwater Extraction (Discharge to Infiltration Gallery) and Monitoring	\$ 1,087,434
A3b	Groundwater Extraction (Discharge to Gilfillan Lake) and Monitoring	\$ 1,129,434

TABLE 4.2

COST ESTIMATE - ALTERNATIVE A2
 LONG-TERM MONITORING
 NORTH OAKS, MINNESOTA

<i>Item Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
<u>Capital Costs</u>				
1. Upper St. Peter Sandstone Aquifer Monitoring Well under Gilfillan Lake (angle well from shoreline)	2	EA	\$ 44,000	\$ 88,000
2. Upper St. Peter Sandstone Aquifer Monitoring Well in Ski Lane Ravine	2	EA	\$ 9,000	\$ 18,000
Subtotal - Capital Costs				\$ 106,000
<u>Annual Costs</u>				
1. Residential Well Sampling	1	LS/YR	\$ 35,000	\$ 35,000
2. Off-Site Monitoring Well and Converted Residential Monitoring Well Sampling	1	LS/YR	\$ 8,500	\$ 8,500
Subtotal - Annual Costs				\$ 43,500
Present Worth of Annual Costs (20 yrs @ 7%)				\$ 460,840
Subtotal - Capital Costs and Present Worth of Annual Costs				\$ 566,840
Contingency (20%)				\$ 113,368
TOTAL				\$ 680,208

TABLE 4.3a

**COST ESTIMATE - ALTERNATIVE A3a
GROUNDWATER EXTRACTION (DISCHARGE TO INFILTRATION GALLERY) AND MONITORING
NORTH OAKS, MINNESOTA**

<i>Item</i>	<i>Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
<u>Capital Costs</u>					
1.	Upper St. Peter Sandstone Aquifer extraction well	1	EA	\$ 40,000	\$ 40,000
2.	Commission Groundwater Extraction System	1	LS	\$ 34,000	\$ 34,000
3.	Infiltration Gallery in Ski Lane Ravine	1	LS	\$ 45,000	\$ 45,000
4.	Upper St. Peter Sandstone Aquifer Monitoring Well under Gilfillan Lake (angle well from shoreline)	2	EA	\$ 44,000	\$ 88,000
5.	Upper St. Peter Sandstone Aquifer Monitoring Well in Ski Lane Ravine	2	EA	\$ 9,000	\$ 18,000
Subtotal - Capital Costs					\$ 225,000
<u>Annual Costs</u>					
1.	O&M of Groundwater Extraction System	1	LS/YR	\$ 20,800	\$ 20,800
2.	Residential Well Sampling	1	LS/YR	\$ 35,000	\$ 35,000
3.	Off-Site Monitoring Well and Converted Residential Monitoring Well Sampling	1	LS/YR	\$ 8,500	\$ 8,500
Subtotal - Annual Costs					\$ 64,300
Present Worth of Annual Costs (20 yrs @ 7%)					\$ 681,195
Subtotal - Capital Costs and Present Worth of Annual Costs					\$ 906,195
Contingency (20%)					\$ 181,239
TOTAL					\$ 1,087,434

TABLE 4.3b

**COST ESTIMATE - ALTERNATIVE A3b
GROUNDWATER EXTRACTION (DISCHARGE TO GILFILLAN LAKE) AND MONITORING
NORTH OAKS, MINNESOTA**

<i>Item</i>	<i>Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
<u>Capital Costs</u>					
1.	Upper St. Peter Sandstone Aquifer extraction well	1	EA	\$ 40,000	\$ 40,000
2.	Commission Groundwater Extraction System	1	LS	\$ 34,000	\$ 34,000
3.	Discharge Forcemain to Gilfillan Lake	1	LS	\$ 80,000	\$ 80,000
4.	Upper St. Peter Sandstone Aquifer Monitoring Well under Gilfillan Lake (angle well from shoreline)	2	EA	\$ 44,000	\$ 88,000
5.	Upper St. Peter Sandstone Aquifer Monitoring Well in Ski Lane Ravine	2	EA	\$ 9,000	\$ 18,000
Subtotal - Capital Costs					\$ 260,000
<u>Annual Costs</u>					
1.	O&M of Groundwater Extraction System	1	LS/YR	\$ 20,800	\$ 20,800
2.	Residential Well Sampling	1	LS/YR	\$ 35,000	\$ 35,000
3.	Off-Site Monitoring Well and Converted Residential Monitoring Well Sampling	1	LS/YR	\$ 8,500	\$ 8,500
Subtotal - Annual Costs					\$ 64,300
Present Worth of Annual Costs (20 yrs @ 7%)					\$ 681,195
Subtotal - Capital Costs and Present Worth of Annual Costs					\$ 941,195
Contingency (20%)					\$ 188,239
TOTAL					\$ 1,129,434

TABLE 4.4

SUMMARY OF COMPARITIVE ANALYSIS OF ALTERNATIVES
MPCA SCENARIO A
NORTH OAKS, MINNESOTA

	<i>Overall Protection of Human Health and the Environment</i>	<i>Compliance with ARARs</i>	<i>Long-Term Effectiveness and Permanence</i>	<i>Reduction of Toxicity, Mobility, or Volume Through Treatment</i>	<i>Short-Term Effectiveness</i>	<i>Implementability</i>	<i>Cost Effectiveness</i>
Alternative A1 - No Further Action	Protective of human health, as under MPCA Scenario A, no HRLs are exceeded. Environmental protection not applicable due to lack of receptors. Status would not be evaluated, because monitoring is not provided.	Not compliant with chemical-specific ARARs because monitoring is not provided. No location or action-specific ARARs are associated with this alternative.	Long-term effectiveness is not attained, because monitoring is not provided.	No reduction of TMV through active treatment, because no further action would be taken. Reduces TMV in aquifer over time through natural processes. Reduction of TMV would not be evaluated, because monitoring is not provided.	There would be no short-term impacts because no further action would be taken.	Does not apply to this alternative, because no further action would be taken.	Present Worth - \$0
Alternative A2 - Long-Term Monitoring	Protective of human health, as under MPCA Scenario A, no HRLs are exceeded. Environmental protection not applicable due to lack of receptors. Status would be evaluated through monitoring.	Compliant with chemical-specific ARARs, as under MPCA Scenario A, no HRLs are exceeded. Compliant with action-specific ARARs for installation of monitoring wells, sampling, and analysis. No location-specific ARARs are associated with this alternative.	Long-term effectiveness would be evaluated through monitoring.	No reduction of TMV through active treatment. Reduces TMV in aquifer over time through natural processes. Reduction of TMV would be evaluated through monitoring.	Minimal impact incurred to residents and environment during installation of additional monitoring wells. No impact to workers during sampling activities.	Installation of monitoring wells is an established procedure and is readily implemented by licensed well drillers. Monitoring is also an established procedure and is readily implemented. Alternative requires agreements and coordination with NOHOA and property owners.	Present Worth - \$680,208
Alternative A3 - Groundwater Extraction and Monitoring	Protective of human health, as under MPCA Scenario A, no HRLs are exceeded. Environmental protection not applicable due to lack of receptors, unless extraction system is constructed in wetlands. Status would be evaluated through monitoring.	Compliant with chemical-specific ARARs, as under MPCA Scenario A, no HRLs are exceeded. Compliant with action-specific ARARs for construction and operation of extraction system, installation of monitoring wells, sampling, and analysis. No location-specific ARARs are associated with this alternative, unless the extraction system is constructed in wetlands.	The objective of this alternative is to prevent migration of groundwater with VOC concentrations above HRLs. Under MPCA Scenario A, no HRLs are exceeded, therefore there is no way to evaluate the effectiveness or permanence of this alternative.	Reduces TMV through treatment by hydraulic extraction and treatment of extracted groundwater. Reduces TMV in aquifer over time through natural processes. Reduction of TMV would be evaluated through monitoring.	Minimal to moderate impact incurred to residents and environment during installation of monitoring wells, extraction wells, and treatment system. Extraction system may change groundwater flow patterns and cause additional well locations to become impacted.	Construction and operation of groundwater extraction systems would take several months to implement due to design, approval and construction times. Infiltration of treated groundwater may be limited by existing subsurface geology. Discharge of treated groundwater to Gilfillan Lake may be difficult because of access. Alternative requires agreements and coordination with NOHOA, the City, and property owners.	Present Worth - \$1,087,434 (discharge to infiltration gallery) \$1,129,434 (discharge to Gilfillan Lake)

TABLE 5.1

**SUMMARY OF COST ESTIMATES
MPCA SCENARIO B
NORTH OAKS, MINNESOTA**

<u>Alternative</u>	<u>Description</u>	<u>Total Cost</u>
B1	No Further Remediation	\$ 0
B2a	Residential Carbon Filter (3 homes) and Monitoring	\$ 748,530
B2b	Residential Carbon Filter (33 homes) and Monitoring	\$ 1,368,192
B2c	Residential Carbon Filter (82 homes) and Monitoring	\$ 2,494,721
B3a	New/Deeper Residential Well (3 homes) and Monitoring	\$ 740,575
B3b	New/Deeper Residential Well (33 homes) and Monitoring	\$ 1,280,682
B3c	New/Deeper Residential Well (82 homes) and Monitoring	\$ 2,277,274
B4a	Municipal Water (3 homes) and Monitoring	\$ 1,209,705
B4b	Municipal Water (33 homes) and Monitoring	\$ 2,021,583
B4c	Municipal Water (82 homes) and Monitoring	\$ 3,116,757

TABLE 5.2a

COST ESTIMATE - ALTERNATIVE B2a
 RESIDENTIAL CARBON FILTER (3 HOMES) AND MONITORING
 NORTH OAKS, MINNESOTA

<i>Item Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
<u>Capital Costs</u>				
1. Residential Carbon Filter System	3	EA	\$ 4,500	\$ 13,500
2. Upper St. Peter Sandstone Aquifer Monitoring Well under Gilfillan Lake (angle well from shoreline)	2	EA	\$ 44,000	\$ 88,000
3. Upper St. Peter Sandstone Aquifer Monitoring Well in Ski Lane Ravine	2	EA	\$ 9,000	\$ 18,000
Subtotal - Capital Costs				\$ 119,500
<u>Annual Costs</u>				
1. O&M of Carbon Filter System	3	EA/YR	\$ 1,700	\$ 5,100
2. Residential Well Sampling	1	LS/YR	\$ 34,000	\$ 34,000
3. Off-Site Monitoring Well and Converted Residential Monitoring Well Sampling	1	LS/YR	\$ 8,500	\$ 8,500
Subtotal - Annual Costs				\$ 47,600
Present Worth of Annual Costs (20 yrs @ 7%)				\$ 504,275
Subtotal - Capital Costs and Present Worth of Annual Costs				\$ 623,775
Contingency (20%)				\$ 124,755
TOTAL				\$ 748,530

TABLE 5.2b

COST ESTIMATE - ALTERNATIVE B2b
 RESIDENTIAL CARBON FILTER (33 HOMES) AND MONITORING
 NORTH OAKS, MINNESOTA

<i>Item Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
<u>Capital Costs</u>				
1. Residential Carbon Filter System	33	EA	\$ 4,500	\$ 148,500
2. Upper St. Peter Sandstone Aquifer Monitoring Well under Gilfillan Lake (angle well from shoreline)	2	EA	\$ 44,000	\$ 88,000
3. Upper St. Peter Sandstone Aquifer Monitoring Well in Ski Lane Ravine	2	EA	\$ 9,000	\$ 18,000
			Subtotal - Capital Costs	\$ 254,500
<u>Annual Costs</u>				
1. O&M of Carbon Filter System	33	EA/YR	\$ 1,700	\$ 56,100
2. Residential Well Sampling	1	LS/YR	\$ 19,000	\$ 19,000
3. Off-Site Monitoring Well and Converted Residential Monitoring Well Sampling	1	LS/YR	\$ 8,500	\$ 8,500
			Subtotal - Annual Costs	\$ 83,600
			Present Worth of Annual Costs (20 yrs @ 7%)	\$ 885,660
			Subtotal - Capital Costs and Present Worth of Annual Costs	\$ 1,140,160
			Contingency (20%)	\$ 228,032
			TOTAL	\$ 1,368,192

TABLE 5.2c

**COST ESTIMATE - ALTERNATIVE B2c
RESIDENTIAL CARBON FILTER (82 HOMES) AND MONITORING
NORTH OAKS, MINNESOTA**

<i>Item Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
<u>Capital Costs</u>				
1. Residential Carbon Filter System	82	EA	\$ 4,500	\$ 369,000
2. Upper St. Peter Sandstone Aquifer Monitoring Well under Gilfillan Lake (angle well from shoreline)	2	EA	\$ 44,000	\$ 88,000
3. Upper St. Peter Sandstone Aquifer Monitoring Well in Ski Lane Ravine	2	EA	\$ 9,000	\$ 18,000
			Subtotal - Capital Costs	\$ 475,000
<u>Annual Costs</u>				
1. O&M of Carbon Filter System	82	EA/YR	\$ 1,700	\$ 139,400
2. Residential Well Sampling	1	LS/YR	\$ 3,500	\$ 3,500
3. Off-Site Monitoring Well and Converted Residential Monitoring Well Sampling	1	LS/YR	\$ 8,500	\$ 8,500
			Subtotal - Annual Costs	\$ 151,400
			Present Worth of Annual Costs (20 yrs @ 7%)	\$ 1,603,934
			Subtotal - Capital Costs and Present Worth of Annual Costs	\$ 2,078,934
			Contingency (20%)	\$ 415,787
			TOTAL	\$ 2,494,721

TABLE 5.3a

COST ESTIMATE - ALTERNATIVE B3a
 NEW/DEEPER RESIDENTIAL WELL (3 HOMES) AND MONITORING
 NORTH OAKS, MINNESOTA

<i>Item Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
<u>Capital Costs</u>				
1. New/Deep Residential Well	3	EA	\$ 19,000	\$ 57,000
2. Seal Existing Well	3	EA	\$ 1,300	\$ 3,900
3. Upper St. Peter Sandstone Aquifer Monitoring Well under Gilfillan Lake (angle well from shoreline)	2	EA	\$ 44,000	\$ 88,000
4. Upper St. Peter Sandstone Aquifer Monitoring Well in Ski Lane Ravine	2	EA	\$ 9,000	\$ 18,000
Subtotal - Capital Costs				\$ 166,900
<u>Annual Costs</u>				
1. Residential Well Sampling	1	LS/YR	\$ 34,000	\$ 34,000
2. Off-Site Monitoring Well and Converted Residential Monitoring Well Sampling	1	LS/YR	\$ 8,500	\$ 8,500
Subtotal - Annual Costs				\$ 42,500
Present Worth of Annual Costs (20 yrs @ 7%)				\$ 450,246
Subtotal - Capital Costs and Present Worth of Annual Costs				\$ 617,146
Contingency (20%)				\$ 123,429
TOTAL				\$ 740,575

TABLE 5.3b

COST ESTIMATE - ALTERNATIVE B3b
 NEW/DEEPER RESIDENTIAL WELL (33 HOMES) AND MONITORING
 NORTH OAKS, MINNESOTA

<i>Item Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
<u>Capital Costs</u>				
1. New/Deep Residential Well	33	EA	\$ 19,000	\$ 627,000
2. Seal Existing Well	33	EA	\$ 1,300	\$ 42,900
3. Upper St. Peter Sandstone Aquifer Monitoring Well under Gilfillan Lake (angle well from shoreline)	2	EA	\$ 44,000	\$ 88,000
4. Upper St. Peter Sandstone Aquifer Monitoring Well in Ski Lane Ravine	2	EA	\$ 9,000	\$ 18,000
			Subtotal - Capital Costs	\$ 775,900
<u>Annual Costs</u>				
1. Residential Well Sampling	1	LS/YR	\$ 19,000	\$ 19,000
2. Off-Site Monitoring Well and Converted Residential Monitoring Well Sampling	1	LS/YR	\$ 8,500	\$ 8,500
			Subtotal - Annual Costs	\$ 27,500
			Present Worth of Annual Costs (20 yrs @ 7%)	\$ 291,335
			Subtotal - Capital Costs and Present Worth of Annual Costs	\$ 1,067,235
			Contingency (20%)	\$ 213,447
			TOTAL	\$ 1,280,682

TABLE 5.3c

COST ESTIMATE - ALTERNATIVE B3c
 NEW/DEEPER RESIDENTIAL WELL (82 HOMES) AND MONITORING
 NORTH OAKS, MINNESOTA

<i>Item Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
<u>Capital Costs</u>				
1. New/Deep Residential Well	82	EA	\$ 19,000	\$ 1,558,000
2. Seal Existing Well	82	EA	\$ 1,300	\$ 106,600
3. Upper St. Peter Sandstone Aquifer Monitoring Well under Gilfillan Lake (angle well from shoreline)	2	EA	\$ 44,000	\$ 88,000
4. Upper St. Peter Sandstone Aquifer Monitoring Well in Ski Lane Ravine	2	EA	\$ 9,000	\$ 18,000
Subtotal - Capital Costs				\$ 1,770,600
<u>Annual Costs</u>				
1. Residential Well Sampling	1	LS/YR	\$ 3,500	\$ 3,500
2. Off-Site Monitoring Well and Converted Residential Monitoring Well Sampling	1	LS/YR	\$ 8,500	\$ 8,500
Subtotal - Annual Costs				\$ 12,000
Present Worth of Annual Costs (20 yrs @ 7%)				\$ 127,128
Subtotal - Capital Costs and Present Worth of Annual Costs				\$ 1,897,728
Contingency (20%)				\$ 379,546
TOTAL				\$ 2,277,274

TABLE 5.4a

**COST ESTIMATE - ALTERNATIVE B4a
MUNICIPAL WATER (3 HOMES) AND MONITORING
NORTH OAKS, MINNESOTA**

<i>Item Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
<u>Capital Costs</u>				
1. Mobilization	1	LS	\$ 21,516	\$ 21,516
2. Watermain (8-inch)	5,000	LF	\$ 45	\$ 225,000
3. Watermain (6-inch)	0	LF	\$ 35	\$ -
4. Valves and Tees	3	EA	\$ 2,450	\$ 7,350
5. Hydrants	3	EA	\$ 6,300	\$ 18,900
6. Connections	3	EA	\$ 4,650	\$ 13,950
7. Water Availability Charge	3	EA	\$ 2,250	\$ 6,750
8. Seal Existing Well	3	EA	\$ 1,300	\$ 3,900
9. Restoration	1	LS	\$ 55,170	\$ 55,170
10. Engineering Design and Construction Oversight	1	LS	\$ 99,306	\$ 99,306
11. Upper St. Peter Sandstone Aquifer Monitoring Well under Gilfillan Lake (angle well from shoreline)	2	EA	\$ 44,000	\$ 88,000
12. Upper St. Peter Sandstone Aquifer Monitoring Well in Ski Lane Ravine	2	EA	\$ 9,000	\$ 18,000
			Subtotal - Capital Costs	\$ 557,842
<u>Annual Costs</u>				
1. Residential Well Sampling	1	LS/YR	\$ 34,000	\$ 34,000
2. Off-Site Monitoring Well and Converted Residential Monitoring Well Sampling	1	LS/YR	\$ 8,500	\$ 8,500
			Subtotal - Annual Costs	\$ 42,500
			Present Worth of Annual Costs (20 yrs @ 7%)	\$ 450,246
			Subtotal - Capital Costs and Present Worth of Annual Costs	\$ 1,008,088
			Contingency (20%)	\$ 201,618
			TOTAL	\$ 1,209,705

TABLE 5.4b

**COST ESTIMATE - ALTERNATIVE B4b
MUNICIPAL WATER (33 HOMES) AND MONITORING
NORTH OAKS, MINNESOTA**

<i>Item Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
<u>Capital Costs</u>				
1. Mobilization	1	LS	\$ 61,301	\$ 61,301
2. Watermain (8-inch)	13,320	LF	\$ 45	\$ 599,400
3. Watermain (6-inch)	180	LF	\$ 35	\$ 6,300
4. Valves and Tees	6	EA	\$ 2,450	\$ 14,700
5. Hydrants	6	EA	\$ 6,300	\$ 37,800
6. Connections	33	EA	\$ 4,650	\$ 153,450
7. Water Availability Charge	33	EA	\$ 2,250	\$ 74,250
8. Seal Existing Well	33	EA	\$ 1,300	\$ 42,900
9. Restoration	1	LS	\$ 92,880	\$ 92,880
10. Engineering Design and Construction Oversight	1	LS	\$ 204,336	\$ 204,336
11. Upper St. Peter Sandstone Aquifer Monitoring Well under Gilfillan Lake (angle well from shoreline)	2	EA	\$ 44,000	\$ 88,000
12. Upper St. Peter Sandstone Aquifer Monitoring Well in Ski Lane Ravine	2	EA	\$ 9,000	\$ 18,000
			Subtotal - Capital Costs	\$ 1,393,317
<u>Annual Costs</u>				
1. Residential Well Sampling	1	LS/YR	\$ 19,000	\$ 19,000
2. Off-Site Monitoring Well and Converted Residential Monitoring Well Sampling	1	LS/YR	\$ 8,500	\$ 8,500
			Subtotal - Annual Costs	\$ 27,500
			Present Worth of Annual Costs (20 yrs @ 7%)	\$ 291,335
			Subtotal - Capital Costs and Present Worth of Annual Costs	\$ 1,684,652
			Contingency (20%)	\$ 336,930
			TOTAL	\$ 2,021,583

TABLE 5.4c

COST ESTIMATE - ALTERNATIVE B4c
MUNICIPAL WATER (82 HOMES) AND MONITORING
NORTH OAKS, MINNESOTA

<i>Item Description</i>	<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
<u>Capital Costs</u>				
1. Mobilization	1	LS	\$ 112,580	\$ 112,580
2. Watermain (8-inch)	20,210	LF	\$ 45	\$ 909,450
3. Watermain (6-inch)	290	LF	\$ 35	\$ 10,150
4. Valves and Tees	13	EA	\$ 2,450	\$ 31,850
5. Hydrants	13	EA	\$ 6,300	\$ 81,900
6. Connections	82	EA	\$ 4,650	\$ 381,300
7. Water Availability Charge	82	EA	\$ 2,250	\$ 184,500
8. Seal Existing Well	82	EA	\$ 1,300	\$ 106,600
9. Restoration	1	LS	\$ 170,575	\$ 170,575
10. Engineering Design and Construction Oversight	1	LS	\$ 375,265	\$ 375,265
11. Upper St. Peter Sandstone Aquifer Monitoring Well under Gilfillan Lake (angle well from shoreline)	2	EA	\$ 44,000	\$ 88,000
12. Upper St. Peter Sandstone Aquifer Monitoring Well in Ski Lane Ravine	2	EA	\$ 9,000	\$ 18,000
Subtotal - Capital Costs				\$ 2,470,170
<u>Annual Costs</u>				
1. Residential Well Sampling	1	LS/YR	\$ 3,500	\$ 3,500
2. Off-Site Monitoring Well and Converted Residential Monitoring Well Sampling	1	LS/YR	\$ 8,500	\$ 8,500
Subtotal - Annual Costs				\$ 12,000
Present Worth of Annual Costs (20 yrs @ 7%)				\$ 127,128
Subtotal - Capital Costs and Present Worth of Annual Costs				\$ 2,597,298
Contingency (20%)				\$ 519,460
TOTAL				\$ 3,116,757

TABLE 5.5

SUMMARY OF COMPARITIVE ANALYSIS OF ALTERNATIVES
MPCA SCENARIO B
NORTH OAKS, MINNESOTA

	<i>Overall Protection of Human Health and the Environment</i>	<i>Compliance with ARARs</i>	<i>Long-Term Effectiveness and Permanence</i>	<i>Reduction of Toxicity, Mobility, or Volume Through Treatment</i>	<i>Short-Term Effectiveness</i>	<i>Implementability</i>	<i>Cost Effectiveness</i>
Alternative B1 - No Further Action	Not protective of human health because no action proposed to address HRL exceedences. Environmental protection not applicable due to lack of receptors. Status would not be evaluated because monitoring is not provided.	Not compliant with chemical-specific ARARs due to HRL exceedences. No location or action-specific ARARs are associated with this alternative.	Long-term effectiveness is not attained because monitoring is not provided and no further action is proposed to address HRL exceedences.	No reduction of TMV through active treatment, because no further action would be taken. Reduces TMV in aquifer over time through natural processes. Reduction of TMV would not be evaluated, because monitoring is not provided.	There would be no short-term impacts because no further action would be taken.	No implementation is required because no further action would be taken.	Present Worth - \$0
Alternative B2 - Residential Carbon Filter and Monitoring	Protective of human health as exposure to impacted groundwater is eliminated by provision of carbon filter. Environmental protection not applicable due to lack of receptors. Status would be evaluated through monitoring.	Compliant with chemical-specific ARARs (HRLs) and action-specific ARARs for installation of monitoring wells, sampling, and analysis. No location-specific ARARs are associated with this alternative.	Carbon filters are a proven technology for use as a long-term or permanent remedy. Long-term effectiveness would be evaluated through monitoring.	Reduces TMV through treatment in potable water by provision of carbon filter. Reduces TMV in aquifer over time through natural processes. Reduction of TMV would be evaluated through monitoring.	Minimal impact incurred to residents during installation of carbon filters and additional monitoring wells. No impact to environment or workers during sampling activities.	Installation and maintenance of carbon filters is an established procedure and is readily implemented. This alternative would require agreements with property owners and NOHOA. This alternative also requires long-term coordination with the property owner related to maintenance of the carbon filters.	Present Worth - \$748,530 (3 homes) \$1,368,192 (33 homes) \$2,494,721 (82 homes)
Alternative B3 - New/Deeper Residential Well and Monitoring	Protective of human health as exposure to impacted groundwater is eliminated by provision of a new/deeper well. Environmental protection not applicable due to lack of receptors. Status would be evaluated through monitoring.	Compliant with chemical-specific ARARs (HRLs) and action-specific ARARs for installation of residential wells and monitoring wells, sampling, and analysis. No location-specific ARARs are associated with this alternative.	New/deeper residential wells are a proven technology for use as a permanent remedy. Long-term effectiveness would be evaluated through monitoring.	No reduction of TMV through active treatment. Reduces TMV in aquifer over time through natural processes. Reduction of TMV would be evaluated through monitoring.	Minimal impact incurred to residents during installation of new/deeper residential wells and additional monitoring wells. No impact to environment or workers during sampling activities.	Installation of residential wells and monitoring wells is an established procedure and is readily implemented by licensed well drillers. This alternative would require agreements and coordination with property owners and NOHOA.	Present Worth - \$740,575 (3 homes) \$1,280,682 (33 homes) \$2,277,274 (82 homes)
Alternative B4 - Municipal Water and Monitoring	Protective of human health as exposure to impacted groundwater is eliminated by provision of municipal water. Environmental protection not applicable due to lack of receptors, unless watermains are constructed through wetlands. Status would be evaluated through monitoring.	Compliant with chemical-specific ARARs (HRLs) and action-specific ARARs for watermain construction, installation of monitoring wells, sampling, and analysis. No location-specific ARARs are associated with this alternative, unless watermains are constructed through wetlands.	Provision of municipal water is a proven technology for use as a permanent remedy. Long-term effectiveness would be evaluated through monitoring.	No reduction of TMV through active treatment. Reduces TMV in aquifer over time through natural processes. Reduction of TMV would be evaluated through monitoring.	Moderate impact incurred to residents during installation of municipal water and additional monitoring wells. No impact to environment or workers during sampling activities.	Installation of municipal water is an established procedure, but would take 6 to 12 months to implement due to design, approval, and construction time. This alternative would require agreements and coordination with the City, property owners, and NOHOA.	Present Worth - \$1,209,705 (3 homes) \$2,021,583 (33 homes) \$3,116,757 (82 homes)