

**CITY OF MINNEAPOLIS SOURCE WATER PROTECTION PLAN**

**PART 1: DELINEATED SOURCE WATER PROTECTION AREA**

**AND**

**SENSITIVITY AND SUSCEPTIBILITY ANALYSIS**

**MAY 2005**

## CHAPTER 1

### BACKGROUND

In 1996, Congress amended the Safe Drinking Water Act (SDWA), requiring states to prepare source water assessments for all public water supplies by May 2003. In Minnesota, the Minnesota Department of Health (MDH) was charged with the responsibility for preparing source water assessments for all ground or surface water-based public water supplies. The MDH convened an advisory workgroup charged with the preparation of an environmental Protection Agency-required program description detailing Minnesota's approach to the preparation of source water assessments. This report can be accessed at [www.health.state.mn.us/divs/eh/water/swp/swa/index.htm](http://www.health.state.mn.us/divs/eh/water/swp/swa/index.htm).

The MDH completed assessments for all public water suppliers in the state by the required May 2003 deadline. Source water assessments are intended to inform users of public water supply systems of 1) the source of their drinking water, 2) the susceptibility of the source water to contamination, 3) potential contaminants of concern to the source water intake, and, 4) to the extent practical, the sources of the potential contaminants of concern.

Source water assessments were prepared collaboratively for St. Cloud, St. Paul, and Minneapolis with financial support from a Minnesota Pollution Control Agency (MPCA) Clean Water Partnership Grant. The Minneapolis Source Water Assessment can be accessed at [www.health.state.mn.us/divs/eh/water/swp/swa/index.htm](http://www.health.state.mn.us/divs/eh/water/swp/swa/index.htm).

Although not required by the SDWA, several public water suppliers in Minnesota that use surface water expressed interest in preparing a source water protection plan following completion of their source water assessment. Because of this interest and the lack of federal guidance, the MDH convened an advisory workgroup to develop guidance for source water protection. This workgroup's report, "Recommendations and Guidance Pertaining to the Development and Implementation of Source Water Protection Plans for Public Water Supplies Relying on Surface Waters," can be accessed at <http://www.health.state.mn.us/divs/eh/water/swp/index.htm>.

A source water protection plan will provide a means of reducing the risk of contamination of drinking water supplies by managing the potential sources of contamination within the area that supplies water to a public well or surface water intake. The source water protection plan is intended to build on the source water assessment by 1) delineating a "source water protection area," based on the source water assessment area, 2) responding to the contamination risks to the public water supply that were identified in the assessment, 3) developing implementation strategies and management practices designed to reduce the risk to the public water supply, and 4) raising awareness of the source of and risk to the public water supply.

The City of Minneapolis, in cooperation with the Cities of St. Cloud and St. Paul, began work in 2002 to prepare a Source Water Protection Plan, based in part on its Source Water Assessment. The preparation of these plans is being accomplished through the “Upper Mississippi River Source Water Protection Project,” funded in part by a Clean Water Act Section 319 Grant through the MPCA. Part 1 of the Source Water Protection Plan documents the delineation of the source water protection area and the sensitivity and susceptibility analysis. As a first step, an interagency “scoping” panel was convened by the MDH to identify the appropriate delineation criteria and data necessary to delineate source water protection areas and conduct the sensitivity and susceptibility analyses (the associated “Scoping Letter” from MDH to Minneapolis is attached as Appendix 1. This Scoping Letter lists the data elements and delineation criteria Minneapolis is to use to delineate Priority Areas A and B and the associated “Drinking Water Supply Management Areas” (“DWSMA”), delineate the Source Water Protection Watershed, and conduct the sensitivity and susceptibility analyses. The City of Minneapolis established a Source Water Protection Team (SWP) Team and a Source Water Protection Area Delineation Subcommittee to delineate the areas and conduct the sensitivity and susceptibility analyses.

## CHAPTER 2

### THE SOURCE WATER PROTECTION AREA DELINEATION

The Source Water Protection Area provides the geographic focus for developing and implementing strategies to protect the public water supply intake from contamination. The Source Water Protection Area for Minneapolis is comprised of the following delineated areas: 1) “Priority Area A” and its associated DWSMA; 2) “Priority Area B” and its associated DWSMA, and 3) the Source Water Protection Watershed, a delineated portion of the Mississippi River Watershed primarily upstream of the Minneapolis water intake but including Shingle Creek and its drainage area

The boundaries for Priority Areas A and B generally, but not always, follow natural topographic boundaries, such as watershed boundaries. These boundaries often will not be easily visible and will frequently cross a parcel of land in such a manner that it is difficult to inventory and manage potential contaminant sources. The boundaries of the DWSMA are geographic or cultural features such as 1) road or railroad rights of way, 2) U.S. Public Land Survey lines, 3) property or fence lines, 4) public utility lines, and 5) water features. The DWSMA boundaries follow the Priority A and B area boundaries as closely as possible. The boundaries of the Source Water Protection Watershed are the boundaries of the Mississippi River watershed upstream of the intake.

Minneapolis’ Source Water Assessment Area, which is included in Minneapolis’ Source Water Assessment, will be revised to incorporate the Source Water Protection Area boundaries delineated by the Minneapolis Source Water Protection Team.

#### **Minneapolis Source Water Setting**

The City of Minneapolis obtains its public water supply from the Mississippi River, with a water treatment facility located at the intake point in Fridley. The entire Mississippi River watershed upstream of the Minneapolis intake is the source of surface water for the Minneapolis public water supply. The Mississippi River drainage basin upstream of Minneapolis has a watershed area of approximately 19,000 square miles. Average draw from the river by the water utility is 65 million gallons per day; typical Mississippi River flow is approximately 3.9 billion gallons per day.

#### **The Minneapolis Source Water Protection Area**

##### **Delineation criteria**

The source water protection area delineation criteria are listed in the Scoping Letter. The data needed for the delineation criteria were readily available except the time of travel estimates in the Mississippi River and tributaries. Because time of travel is the main criterion for delineating the source water protection area, the Upper Mississippi River Source Water Protection Project provided time of travel estimates prepared by the U.S.

Army Corps of Engineers for the main stem of the Mississippi River and by the U.S. Geological Survey for several Mississippi River tributaries. This information is summarized in a “Time of Travel Synopsis,” attached as Appendix 2.

#### Data elements

A panel of natural resource professionals was convened to analyze and interpret the data elements for the Cities of St. Cloud, St. Paul, and Minneapolis. The work of this panel is summarized in “Guidance to the St. Cloud, St. Paul, and Minneapolis Source Water Protection Teams on the Delineation of Source Water Protection Areas.” This report is attached as Appendix 3.

#### **Priority Area A and the Associated DWSMA**

The delineated Priority Area A and associated DWSMA are shown in Figure 1. The purpose of the Priority Area A delineation is to assist the Minneapolis Water Utility identify, inventory, and manage potential sources of contamination that present an acute (immediate) health concern to water users. The release of such a contaminant within Priority Area A could require the closure of the water intake.

The delineation of Minneapolis’ Priority Area A started with an 8-hour time of travel, assuming high flow conditions, up the Mississippi River and the Rum River, and Elm, Rice, and Coon Creeks, measured from the Minneapolis water intake. The 8-hour time of travel was selected to provide for 1) notification in the event intake closure becomes necessary and 2) time for the water utility to maximize storage of finished water. It is recognized that a contaminant release within the delineated Priority Area A could result in a travel time to the intake of less than 8 hours. The boundaries indicated by the 8-hour time of travel locations were then adjusted outward from the 8-hour time of travel points, based on a review of the data elements and delineation criteria described in the Scoping Letter and Delineation Guidance Document. The teams also considered 1) sub-watershed boundaries, 2) the previously delineated source water assessment areas, and 3) knowledge of known potential point and non-point contaminant sources.

Minneapolis’ Priority Area A includes Shingle Creek and its watershed, even though the confluence of Shingle Creek and the Mississippi River is downstream of the Minneapolis water intake. Because of the pooling of the Mississippi River due to the St. Anthony Falls dam, the possibility exists that water downstream of the intake could travel upstream under certain conditions, such as high winds, and reach the intake.

In delineating Priority Area A, the Minneapolis Delineation and SWP Teams took particular consideration of the delineation criteria and data elements identified in the Scoping Letter and the advice of the panel of natural resources professionals. Various maps that were prepared for the teams to review are attached as Appendix 4.

The Minneapolis Priority Area A DWSMA boundary is described in Appendix 5. The Priority Area A DWSMA comprises an area of approximately 159 square miles.

### **Priority Area B and the Associated DWSMA**

The delineated Priority Area B and associated DWSMA are shown in Figure 2. Management of this area is designed to protect water users from chronic (long-term) health effects related to low levels of chemical contamination or the periodic presence of contaminants at low levels in the source water. Management of this area should also protect users from contaminants such as pathogens that may be 1) usually found at treatable levels in the source water, but 2) occasionally present an acute health concern within the delineated Priority Area B.

In delineating Priority Area B, the Minneapolis SWP Team considered the delineation criteria and data elements identified in the Scoping Letter, and the advice of the panel of natural resource professionals. Various maps that were prepared for the teams to review are attached as Appendix 6.

The Minneapolis Priority Area B DWSMA boundary is described in Appendix 7. The Priority Area B DWSMA comprises an area of approximately 5,291 square miles.

### **Source Water Protection Watershed**

The Source Water Protection Area Watershed is shown in Figure 3, and includes the entire Mississippi River drainage basin above the Minneapolis water intake, an area of approximately 19,000 square miles. In delineating the Source Water Protection Watershed, the Minneapolis SWP team considered the delineation criteria and data elements identified in the Scoping Letter and the advice of the panel of natural resource professionals.

## CHAPTER 3

### THE SENSITIVITY AND SUSCEPTIBILITY ANALYSES

#### **The Sensitivity and Susceptibility of Minneapolis' Source Water to Contamination**

In determining the sensitivity of Minneapolis' source water, the intrinsic physical properties of the geologic setting or landscape within the watershed must be considered. The large quantity of water in the Mississippi River, and flow velocity in the river, can help to attenuate the contaminants and affect their movement to the public water supply intake. However, a river also can deliver contaminants to the water intake, very rapidly under high flow conditions. Seasonal changes influence the sensitivity of the river to contamination. Other factors influencing the sensitivity of a surface water body include topography, hydrology, geology, vegetation, and the distribution of various soil types within the watersheds of the Mississippi River. The closer the potential source of contamination is to the water intake, the greater may be the potential impact on the source water at the intake. The farther the potential contaminant source is from the intake, the more likely that river water volumes and flows will help attenuate the movement of contaminants to the intake.

There are numerous point and non-point sources of potential chemical and pathogenic contaminants upstream of the Minneapolis water intake. These sources include oil and chemical storage sites, industrial, stormwater, and wastewater discharges, and urban and agricultural runoff, including animal feedlots.

The sensitivity of the source for Minneapolis is considered high based on the sensitivity factors.

Susceptibility is defined as the likelihood that a contaminant will enter a public water supply at a level which may result in an adverse human health impact. The susceptibility of any surface water-based water supplier is determined to be high because there is no practical means of preventing all potential contaminant releases into the surface waters. However, a susceptibility determination for a specific public water supply system is based on comparing the sensitivity of the surface water intake to the presence of a source which may release a contaminant of concern. This secondary analysis allows for differentiation between surface water-based public water supply systems.

Based on a comparison of the sensitivity of the surface water intake to the presence of potential contaminant sources, the susceptibility of the Minneapolis intake is considered to be high for a surface water-based public water supply system. While the Minneapolis source water is highly susceptible to contamination, the Minneapolis Water Works historically has effectively treated this source water to meet or exceed safe drinking water standards.

To analyze the sensitivity and susceptibility of the city's source water, the Minneapolis SWP Team considered the data elements identified in the Scoping Letter and the advice of the panel of natural resource professionals.

## **SUMMARY**

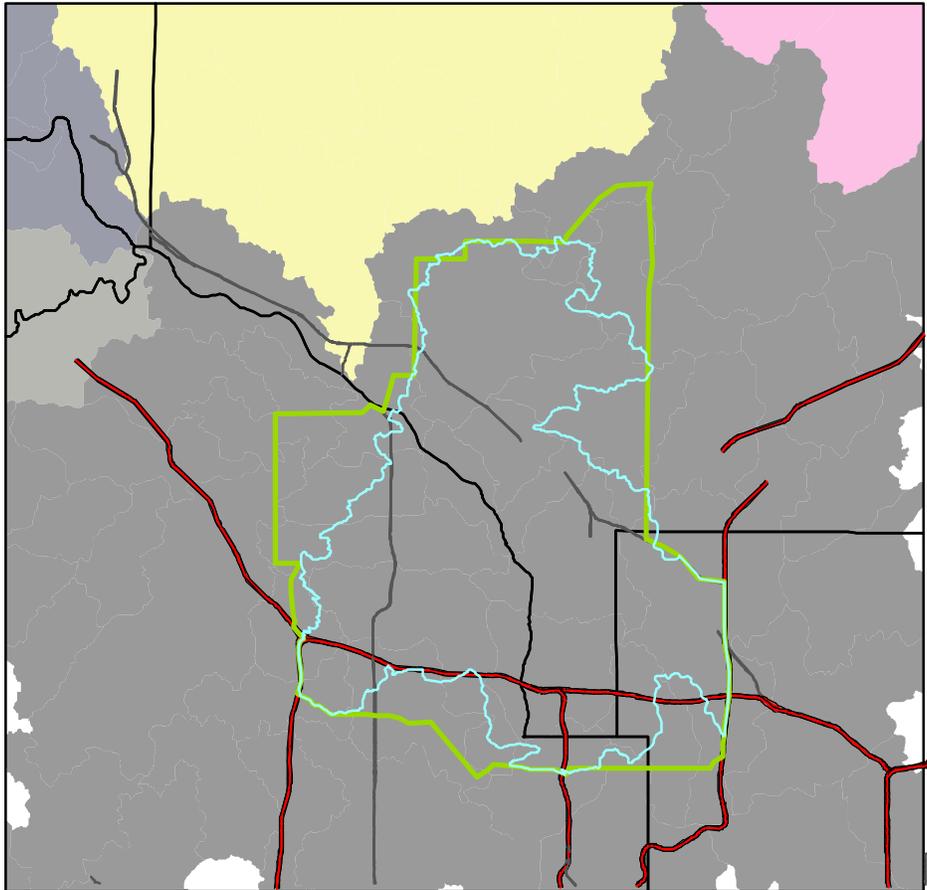
Protecting the drinking water is a wise and relatively inexpensive investment in Minneapolis' future. The overall intent of the Part 1 of the Source Water Protection Plan is to identify the geographic areas of interest that may impact the source of Minneapolis' drinking water, the Mississippi River.

The next step in source water protection is to prepare Part 2 of the Source Water Protection Plan. This part will include an inventory of potential sources of contamination within Minneapolis' Source Water Protection Areas and will identify practices and management strategies to address these sources.

The final step in source water protection will be to implement the Source Water Protection Plan developed by the City of Minneapolis

# Minneapolis Source Water Protection Area

Prepared by the Upper Mississippi River  
Source Water Protection Project  
May 2005



- Minneapolis Priority A SWP Area
- Minneapolis DWSMA (A)
- Roads
  - Interstate Highway
  - U.S. Highway
- County Lines
- Watersheds
  - Clearwater-Elk
  - North-Fork-Crow
  - Lower-St-Croix
  - Rum
  - Twin-Cities

FIGURE 1

# Minneapolis Source Water Protection Area

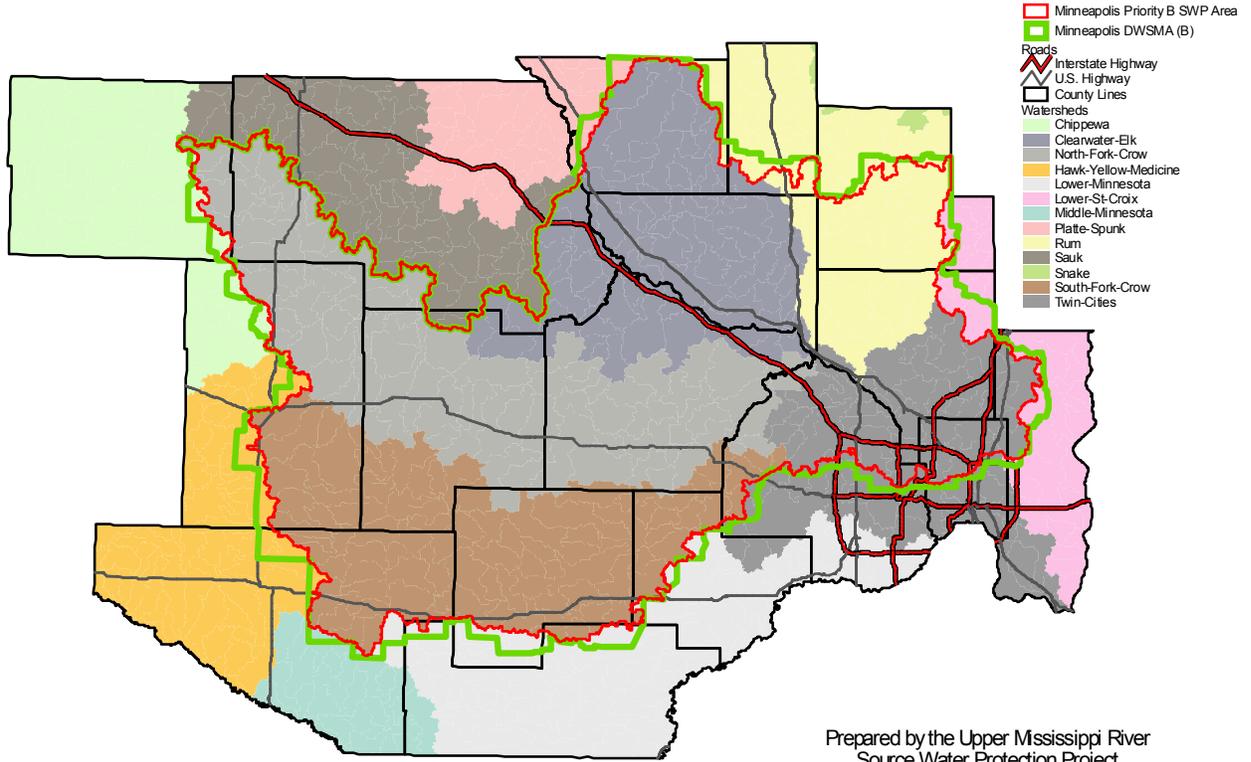


FIGURE 2

# Minneapolis Source Water Protection Watershed

Prepared by the Upper Mississippi Source Water Protection Project

May 2005

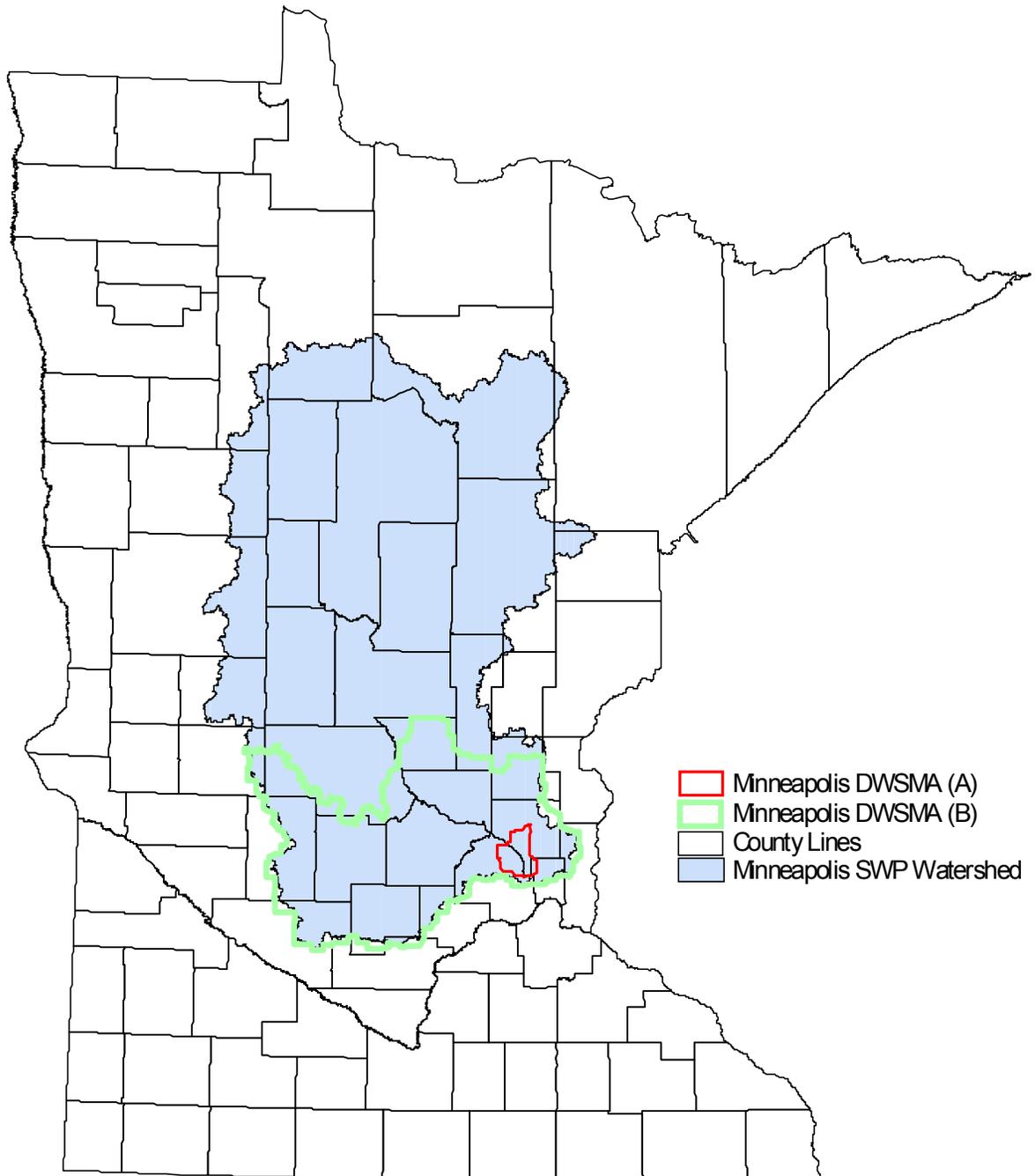


FIGURE 3