

# Baseline Water Quality of Minnesota's Principal Aquifers: Region 6, Twin Cities Metro Area

GWMAP, March 1999

## What was the baseline study?

Between 1992 and 1996, the Minnesota Pollution Control Agency's (MPCA) Ground Water Monitoring and Assessment Program (GWMAP) sampled 954 primarily domestic wells across Minnesota. The goal of this study, called the baseline study, was to determine ambient water quality in Minnesota's principal aquifers.

## What parameters were sampled?

Each well was sampled for 48 inorganic chemicals such as nitrate, chloride, arsenic and metals; 68 volatile organic compounds (VOCs), such as benzene; other parameters, such as pH and temperature; total dissolved solids and total organic carbon. In addition selected wells were tested for tritium, an indicator of water less than 50 years old.

## What is Region 6?

The MPCA has divided Minnesota into six regions. Region 6 encompasses the Twin Cities Metropolitan Area and includes the counties of Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington. The regional office is in St. Paul.

## How many wells were sampled and in which aquifers?

In 1993, 1994 and 1996, 93 wells were sampled in Region 6. Of these 93

samples, 25 were from wells completed in buried confined sand and gravel aquifers, 10 were from wells completed in surficial sand and gravel aquifers, one was from a well completed in a Precambrian aquifer, and 57 were from wells completed in Paleozoic bedrock aquifers.

## What is the quality of ground water in Region 6?

Water quality varied among the major aquifers of Region 6. The Franconia aquifer had high concentrations of many chemicals compared to other aquifers in the region, particularly for the major ions. The Prairie du Chien aquifer is sensitive to human activity, as evidenced by elevated nitrate and chloride concentrations. The Jordan aquifer has good-quality water, with low concentrations of dissolved solids compared to other aquifers. Water quality in the St. Peter aquifer varied widely, with half the samples showing impacts from human activity. The surficial drift aquifers showed impacts from humans, with concentrations of chloride, sodium and some trace metals being high compared to other aquifers. The number of exceedances of drinking water criteria are shown in the table on the back of this fact sheet. There were few exceedances of drinking criteria, but this may be related partly to sampling





Parameter	Number of exceedances of drinking criteria			
	Precambrian	Paleozoic	Surficial sand and gravel	Buried sand and gravel
Manganese (Mn)	0	1	1	1
Nitrate (NO <sub>3</sub> )	0	1	1	0
Selenium (Se)	0	0	0	2

bias, since few samples were collected from sensitive aquifers in the older, more industrialized portions of the Twin Cities. VOCs were found in four (4.3 percent) of the wells. In each of these four wells, more than one VOC was detected. The primary VOCs were compounds commonly associated with fuel oils, gasoline, and industrial or household solvents. All VOC concentrations were below drinking water criteria.

**What are the primary research needs in Region 6?**

The primary research needs for Region 6 include:

1. determining the overall distribution of VOCs in the major aquifers of the Twin Cities Metropolitan Area;
2. identifying major plumes containing chlorinated solvents;
3. determining relationships between land use and ground water quality, including evaluation of long-term changes in ground water quality in the major aquifers of the Twin Cities; and
4. determining the relationship between geology, particularly mineralogy, and water quality of the bedrock aquifers.

**What are the primary monitoring needs for Region 6?**

The primary monitoring needs for Region 6 include:

1. expanding databases for the Paleozoic and water table aquifers by approximately 10 wells each;
2. incorporating data from regulated sites into the regional baseline data;
3. employing models to assist in tracking plumes, particularly for chlorinated solvents;
4. conducting ambient monitoring in aquifers impacted by humans, particularly for VOCs;

5. establishing agency-wide sampling, data-management and data-analysis protocol by an interagency group consisting of staff from all programs dealing with ground water cleanup and monitoring; and
6. collecting monitoring information on the distribution of pesticides and metabolites.

**What is the role of GWMAP in addressing these research and monitoring needs?**

GWMAP discontinued baseline sampling in 1997. We feel the emerging ground water issues are identifying aquifer and regional water quality as impacted by human activity, assessing the effectiveness of environmental policies and programs, and establishing long-term monitoring networks to determine whether water quality is changing in response to human activity. We will strive to work with other ground water programs that deal directly with ground water problems and effectiveness monitoring, and attempt to secure funding for establishing long-term monitoring networks.