



Minnesota
Pollution
Control
Agency

Environmental
Outcomes
Division

Ground Water
Monitoring &
Assessment

Baseline Water Quality of Minnesota's Principal Aquifers: Region 5, Southeast Minnesota

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, the presence of which is an indicator of water less than 50 years old.

What is Region 5?

The MPCA has divided the state into six regions. Region 5 encompasses the southeastern portion of the state and includes the counties of Blue Earth, Brown, Dodge, Faribault, Fillmore, Freeborn, Goodhue, Houston, Le Sueur, Martin, Mower, Nicollet, Olmstead, Rice, Sibley, Steele, Wabasha, Waseca, Watonwan and Winona. The regional office is in Rochester.

How many wells were sampled and in which aquifers?

Between 1992 and 1994, 170 wells were sampled in Region 5. Of these 170 samples, 44 were from wells completed in buried confined sand and gravel aquifers, 10 were from wells completed in Cretaceous aquifers, and 116 were from wells completed in Paleozoic bedrock aquifers.

What is the quality of ground water in Region 5?

Ground water in the Paleozoic bedrock aquifers of Region 5 is generally very good compared to other aquifers in Region 5. The number of exceedances of drinking water criteria are shown in the table on the other side of this fact sheet. Locally, high concentrations of some trace elements, such as cadmium, lead and arsenic were observed in the Galena and Cedar Valley aquifers and appear to be related to the mineralogy of these deposits. The eastern portions of the Prairie du Chien, Jordan and Franconia aquifers are responsive to recharge and sensitive to anthropogenic chemicals, such as VOCs, nitrate, and lead. Water quality of the buried drift and Cretaceous aquifers is poor. Both of these aquifers have high concentrations of dissolved solids, boron, manganese, iron, and sulfate. The buried drift and





Parameter	Number of exceedances of drinking criteria		
	Cretaceous	Paleozoic	Buried sand and gravel
Beryllium (Be)	0	1	1
Boron (B)	0	0	1
Cadmium (Cd)	0	5	0
Manganese (Mn)	0	0	5
Nitrate (NO ₃)	0	2	0

Cretaceous aquifers appear to interact in the western part of Region 5, and water quality of buried drift aquifers in this area is particularly poor. VOCs were found in 17 (10 percent) of the wells. 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 5?

The primary research needs for Region 5 include:

1. using water quality information to evaluate conceptual hydrologic models of the Paleozoic aquifers in Region 5;
2. collecting land use information to determine whether correlations exist between VOCs and other parameters;
3. analyzing mineralogy of Upper Carbonate aquifers, particularly for cadmium, lead and arsenic, and of Cretaceous and buried drift aquifers, particularly for boron and manganese; and
4. expanding the understanding of spatial and temporal variability in water quality of the Paleozoic aquifers.

What are the primary monitoring needs for Region 5?

The primary monitoring needs for Region 5 include:

1. collecting additional samples for baseline analysis from the Cedar Valley, Cretaceous and Franconia aquifers;

2. assessing the need for an ambient network for VOCs and establishing a shallow ambient network for nitrates; and
3. establishing consistent sampling and data storage protocol between agencies.

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.