DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
WISCONSIN DEPARTMENT OF NATURAL RESOURCES

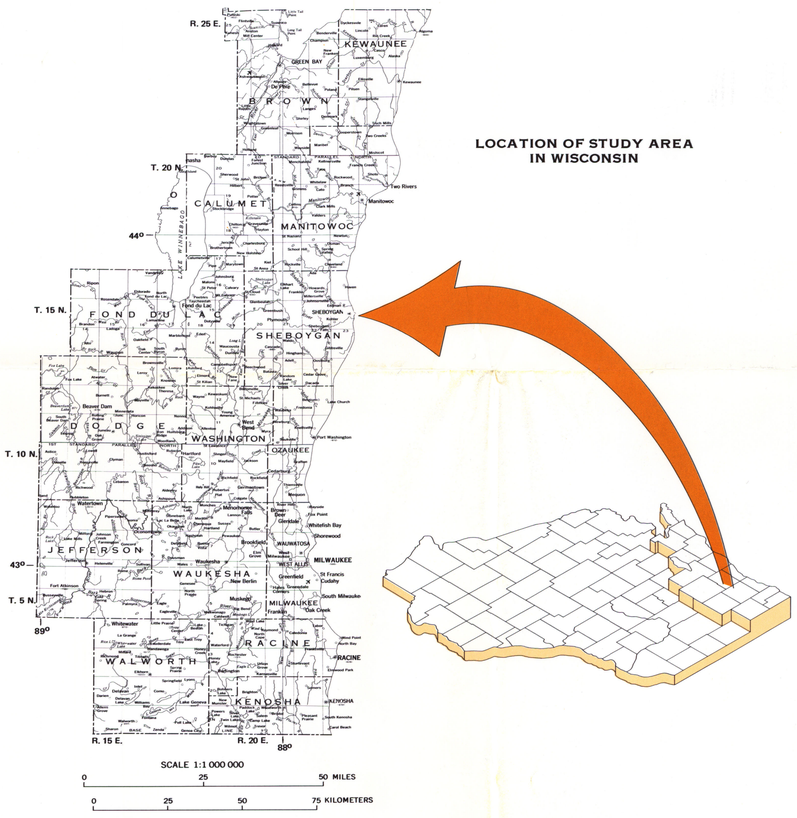
WATER RESOURCES INVESTIGATIONS
OPEN-FILE REPORT 78-108
(SHEET 1 OF 2)

INTRODUCTION

The purpose of this report is to indicate the relative potential for contamination of the Silurian dolomite aquifer in a 14-county area bordering the shoreline of Lake Michigan in eastern Wisconsin. More than half the population of Wisconsin lives in this area.

Water from the dolomite aquifer is used for supply in much of the mapped area. Water movement in these rocks is mostly through interconnected joints and solution zones. Because of the rapidity of the movement, the water in the aquifer is susceptible to contamination by water percolating downward from the surface. The dolomite has a greater potential for contamination where it is jointed at or near the surface, where it is overlain by a relatively thin cover of very permeable material, and where the water table is close to the land surface.

This report is composed of four maps. Two of the maps show the distribution and their relative permeability and thickness of unconsolidated materials that overlie the dolomite aquifer at the surface. The third map shows the depth to the water table below land surface. These are very important geohydrologic factors that affect contamination potential. The fourth map combines these factors to show the relative contamination potential of the dolomite aquifer in eastern Wisconsin.



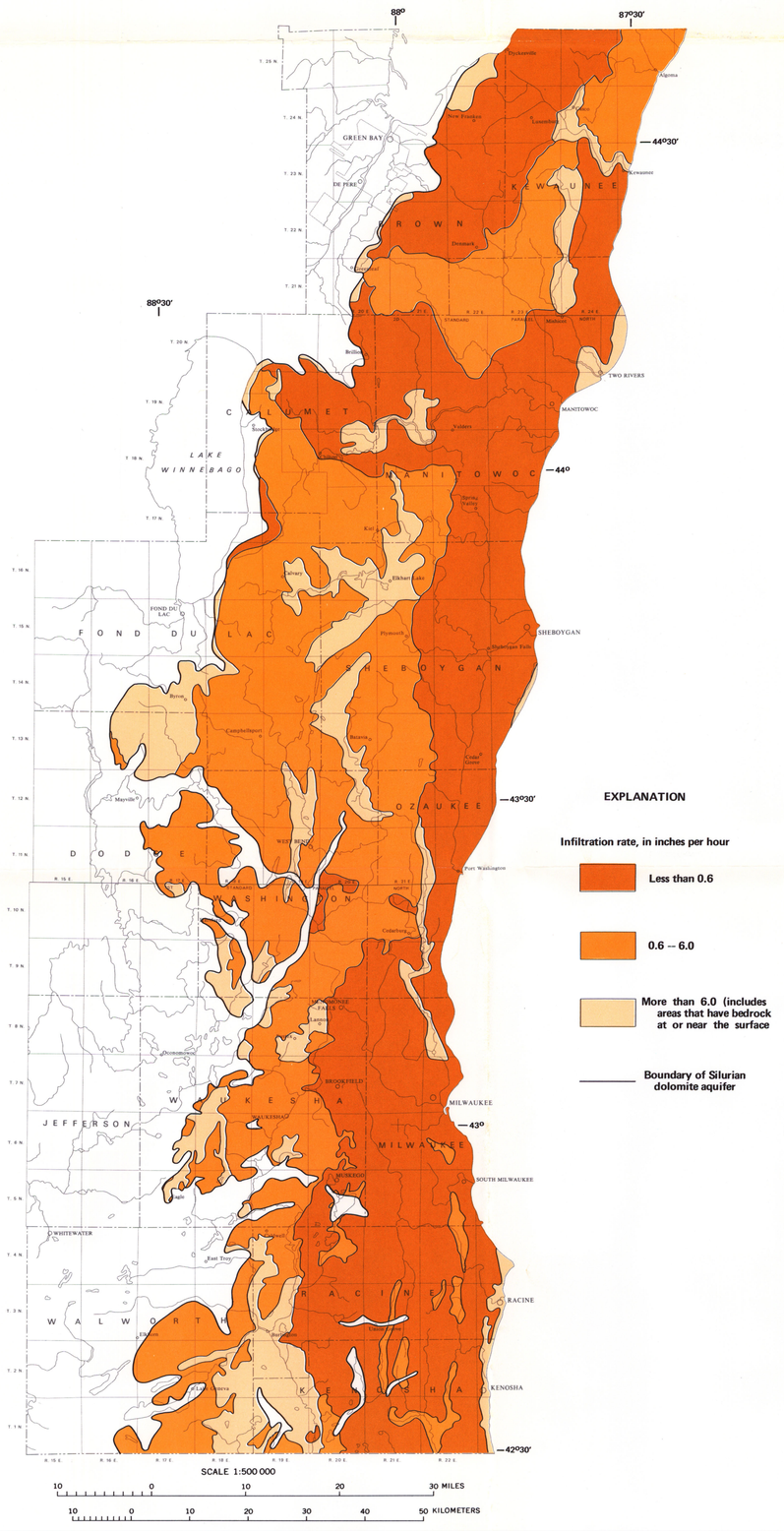
LOCATION OF STUDY AREA IN WISCONSIN

PERMEABILITY OF UNCONSOLIDATED MATERIALS

Where the permeability of unconsolidated materials is high, infiltration of water from the surface rapidly recharges the dolomite aquifer. But where it is low, infiltration is slower, and, consequently, surface runoff increases.

The permeability map presents information on an important factor in determining contamination potential. Unconsolidated materials with high or medium permeability will pass a volume of fluid equal to or exceeding that discharged from an average septic-tank system. The underlying dolomite aquifer has the potential for receiving and transmitting contaminated water from the unconsolidated materials. This potential is diminished if there are considerable thicknesses of unconsolidated materials or a lower water table. These factors increase filtration and aerobic bacterial action as well as dilution.

This map divides the unconsolidated materials into three permeability categories./1 Materials with high permeability would allow 6.0 in/hr or more of infiltration; those with moderate permeability would allow between 0.6 and 6.0 in/hr; and those with low permeability would allow 0.6 in/hr or less.



EXPLANATION

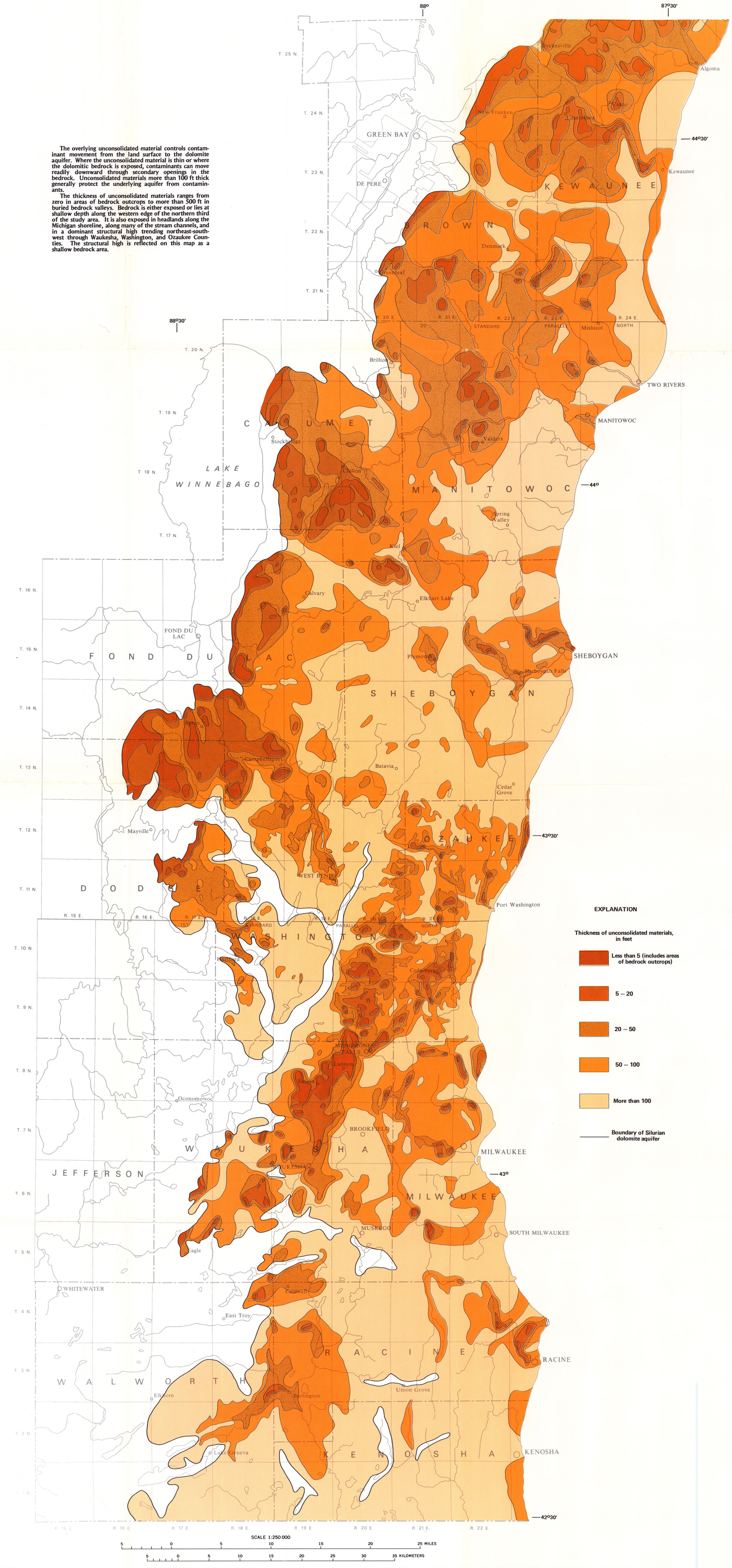
Infiltration rate, in inches per hour

- Less than 0.6
- 0.6 – 6.0
- More than 6.0 (includes areas that have bedrock at or near the surface
- Boundary of Silurian dolomite aquifer

THICKNESS OF UNCONSOLIDATED MATERIALS

The overlying unconsolidated material controls contaminant movement from the land surface to the dolomite aquifer. Where the unconsolidated material is thin or where the dolomitic bedrock is exposed, contaminants can move readily downward through secondary openings in the bedrock. Unconsolidated materials more than 100 ft thick generally protect the underlying aquifer from contaminants.

The thickness of unconsolidated materials ranges from zero in areas of bedrock outcrops to more than 500 ft in buried bedrock valleys. Bedrock is either exposed or lies at shallow depth along the western edge of the northern third of the study area. It is also exposed in headlands along the Michigan shoreline, along many of the stream channels, and in a dominant structural high trending northeast-southwest through Waukesha, Washington, and Ozaukee Counties. The structural high is reflected on this map as a shallow bedrock area.



EXPLANATION

Thickness of unconsolidated materials, in feet

- Less than 5 (includes areas of bedrock outcrops)
- 5 – 20
- 20 – 50
- 50 – 100
- More than 100
- Boundary of Silurian dolomite aquifer

BASE FROM U. S. GEOLOGICAL SURVEY
STATE BASE MAP, 1968

INTERIOR-GEOLOGICAL SURVEY, MADISON, WI, 1979

CONTAMINATION POTENTIAL IN THE SILURIAN DOLOMITE AQUIFER, EASTERN WISCONSIN

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1979

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