

Hydrogeologic Cross Sections

By James A. Berg and Meagan E. Harold

2017

CROSS SECTION EXPLANATION

Aquifers and aquitards grouped by stratigraphy

Interpreted tritium age is indicated by background color

Surficial sand

ss
Hydraulically connected combinations of surficial aquifer and portions of buried aquifers csa, csr, cse, and scs

Buried sand and gravel and Quaternary sediment

csa
csr
cse
scs
fs1
mfs
fs2
suu
Undifferentiated Pleistocene sediment (ups)

Bedrock

Ctr Upper Tunnel City
Cw Wonewoc
Ce Eau Claire Formation*
Cm Mt. Simon
Mes Mesoproterozoic sedimentary bedrock including Hinckley and Fond du Lac
pCu Precambrian crystalline bedrock*
Enhanced-permeability zone
*aquitard

Quaternary aquitards

Grouped by texture ranging from highest to lowest sand content indicating relative hydraulic conductivity.

Hydrogeologic unit code

cta, ctr, cte
nt
mlt
sct

Percent sand

> 60%
> 50% and ≤ 60%
> 30% and ≤ 40%
≤ 30%

Tritium age

Darker color in small vertical rectangle (well screen symbol) indicates tritium age of water sampled in well. Lighter color indicates interpreted age of water in aquifer.

Recent: water entered the ground since about 1953 (8 to 15 tritium units [TU]).
Mixed: water is a mixture of recent and vintage waters (greater than 1 TU to less than 8 TU).
Vintage: water entered the ground before 1953 (less than or equal to 1 TU).
Well not sampled for tritium.

Symbols and labels

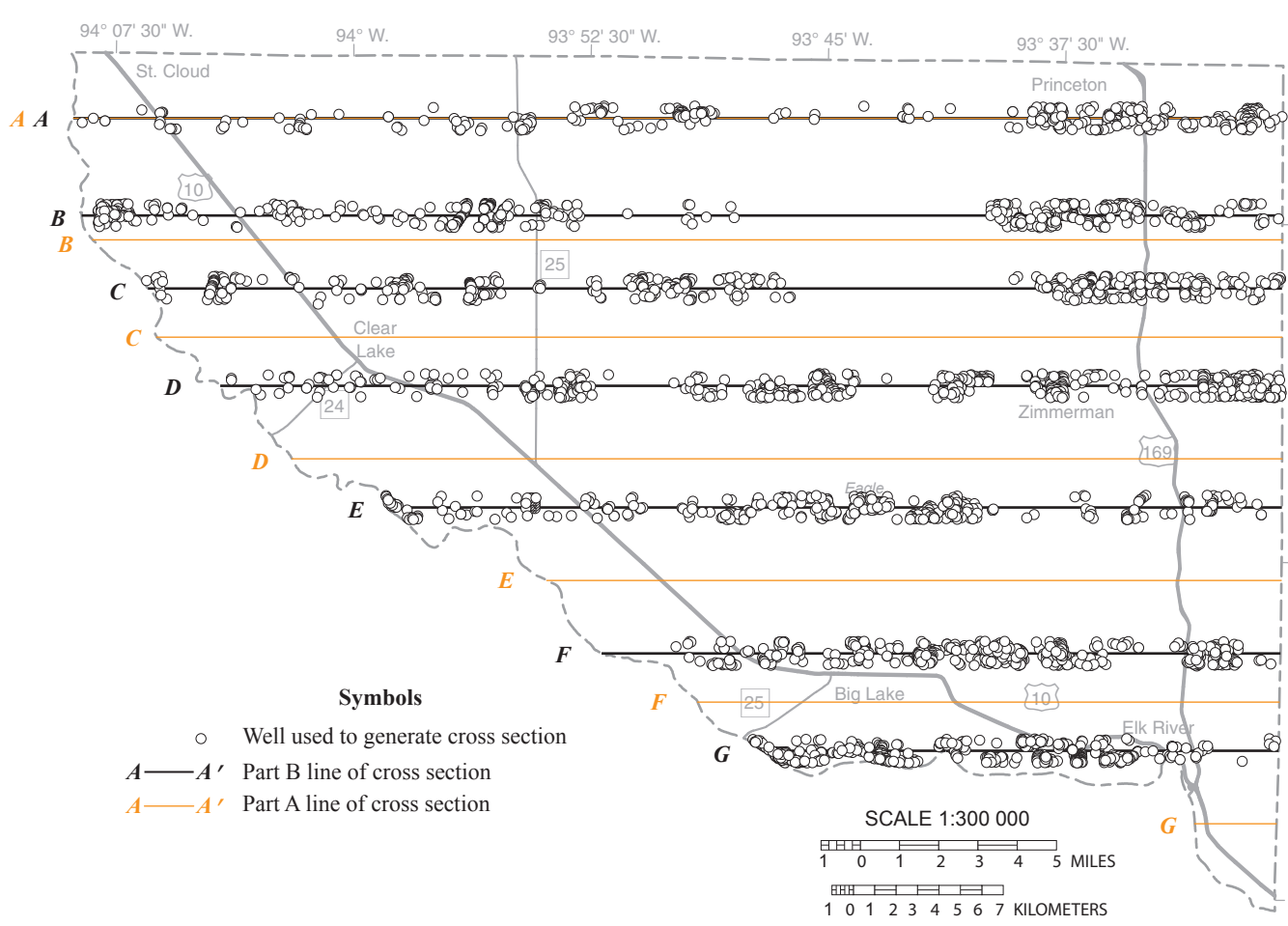
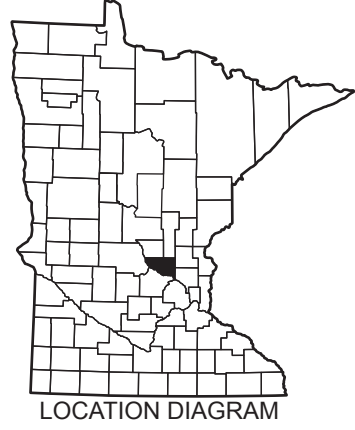
32.1 If shown, chloride concentration equals or exceeds 5 ppm.
(*) indicates source of chloride is unknown
12.7 If shown, arsenic concentration equals or exceeds 10 ppb.
14.4 If shown, nitrate-nitrogen concentration equals or exceeds 1 ppm.
2000 If shown, groundwater residence time in years as estimated by carbon-14 (¹⁴C) isotope analysis.

General groundwater flow direction
Approximate equipotential contour; contour interval 20 feet
Geologic contact
Land or bedrock surface
Water table
Lake

Groundwater conditions

1 Water from the surface moves through a thin layer of overlying fine-grained material to an underlying aquifer.
2 Groundwater moves from an overlying surficial aquifer to a buried aquifer.
3 Groundwater moves from an overlying buried aquifer to an underlying buried aquifer.
4 Groundwater flows laterally.
5 Groundwater flowpath is unknown.
6 Groundwater discharges to a surface-water body.

SCALE 1:100 000
VERTICAL EXAGGERATION X 50
1 0 1 2 3 4 5 MILES
1 0 1 2 3 4 5 6 7 8 9 KILOMETERS



This map was compiled and generated in a geographic information system. Digital data products are available on the DNR County Geologic Atlas Program page (mndnr.gov/groundwatermapping). This map was prepared from publicly available information. Every reasonable effort has been made to ensure the accuracy of the factual data on which this map interpretation is based. However, the DNR does not warrant the accuracy, completeness, or any implied uses of these data. Users may wish to verify critical information; sources include both the references in the report and information on file in the offices of the Minnesota Geological Survey and the DNR. Every effort has been made to ensure the interpretation shown conforms to sound geologic and cartographic principles. This map should not be used to establish legal title, boundaries, or locations of improvements. Base modified from Minnesota Geological Survey, Sherburne County Geologic Atlas, Part A, 2013. Universal Transverse Mercator projection, zone 15N, North American Datum of 1983. North American Vertical Datum of 1988. GIS and cartography by James A. Berg, Meagan E. Harold, Valerie Woelfel, and Holly Johnson. Edited by Ruth MacDonald.

DEPARTMENT OF
NATURAL RESOURCES

500 Lafayette Road
St. Paul, MN 55155-4025
For more information call 651-296-6157 or 888-646-6367
mndnr.gov

This information is available in alternative format on request.

The Minnesota DNR prohibits discrimination in its programs and services based on race, color, creed, religion, national origin, sex, public assistance status, age, sexual orientation, or disability. Persons with disabilities may request reasonable modifications to access or participate in DNR programs and services by contacting the DNR ADA Title II Coordinator at info.dnr@state.mn.us or 651-296-6157. Discrimination inquiries should be sent to Minnesota DNR, 500 Lafayette Road, St. Paul, MN 55155-4049; or Office of Civil Rights, U.S. Department of the Interior, 1849 C Street NW, Washington, DC 20240.

© 2017, State of Minnesota, Department of Natural Resources and the Regents of the University of Minnesota

