

PROJECT UPDATE

McLeod County Geologic Atlas

A cooperative project of the Minnesota Department of Natural Resources, the Minnesota Geological Survey, and McLeod County



McLeod County Geologic Atlas

The McLeod County Geologic Atlas is a systematic study of the county's geologic and groundwater resources. Geologic mapping (Part A), conducted by the Minnesota Geological Survey (MGS), was published by the MGS in 2009. Groundwater resource evaluation (Part B) is currently being conducted by the Minnesota Department of Natural Resources, Division of Ecological and Water Resources. The Part B atlas for McLeod County is expected to be published in the fall of 2012.

The Geologic and Groundwater Resources of McLeod County

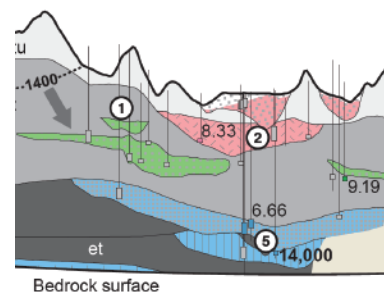
The Part A report defined the vertical and lateral extent of surficial sand and gravel deposits and the distribution of bedrock units underlying the county. These subsurface units were mapped using information from well logs and other sources to construct 48 east-west digital geologic cross sections across the county.

Water samples were collected from wells located along six of these cross sections. Water samples were collected from 78 wells and from Lake Marion in McLeod County during 2010 and 2011. The general chemistry of the sampled waters was characterized by a suite of chemical analyses that measure cations, anions, trace metals, and tritium. The locations of sampled wells were selected based on the geologic cross sections from Part A. The goal was to sample a combination of buried sand aquifers and bedrock aquifers along the six cross sections to evaluate the hydrogeologic connections between aquifers.

Tritium data collected for this investigation showed that 74 well samples contained vintage tritium age water that entered the ground before 1953; no well samples contained recent tritium age water that entered the ground since 1953; and the remaining 4 samples contained a mixture of recent and vintage waters (mixed tritium age). Mixed tritium age waters penetrated up to 100 feet below the land surface in selected areas, but wells as shallow as 50 feet deep often had water samples with vintage tritium age. All of the wells sampled had nitrate concentrations less than 1 parts per million. Forty-one samples (53 percent) had an arsenic concentration greater than or equal to 10 micrograms per liter, which is the federal Maximum Contaminant Level for drinking water.



The above excerpt shows water table elevation. The darker blues indicate a lower water table elevation and the yellows and oranges indicate a higher water table elevation. When water table elevations are known, the direction of horizontal groundwater flow can be better understood.



The levels of tritium found in well samples help determine when groundwater entered the ground. On the cross section (above), pink indicates recent tritium age, green indicates a mix of recent and vintage tritium age, and blue indicates vintage tritium age.

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Part B—Hydrogeology and Sensitivity to Pollution

Purpose of the Atlas

The maps, databases, and other information in an atlas are used by counties and other levels of government in planning and environmental protection efforts. Atlases support good decision making for permit applications, land management planning, and the use and protection of natural resources. Examples of programs that benefit from atlas information include water planning, wellhead protection, lake management, site assessments such as septic assessments, and land use/development planning. Atlases are additionally used by consultants, engineering firms, educators and the public.

Summary

Minnesota Department of Natural Resources staff began work in August 2010 to prepare Part B, Hydrogeology and Pollution Sensitivity of the Carver County Geologic Atlas. The report is expected to be published by fall 2012. The Geologic Atlas Part A report was published by the Minnesota Geological Survey in 2009.

Tentative Schedule

- Data Collection (Status: **Completed**)
Sample collection of wells and lake waters has been completed. Field parameters were collected at sample locations and water-level measurements were collected from sampled wells where possible. Carbon-14 sample collection was completed at nine wells in June 2011. Project data have been transferred to a database and chemistry results have been sent to participating residents.
- Report Production (Status: **In-progress**)
Three map sheets (Plates) compiled at 1:100,000 scale
Plate 7: Hydrogeology
Plate 8: Hydrogeologic Cross Sections
Plate 9: Pollution Sensitivity
- Publication (Status: **Planned for fall 2012**)
Printed report - fall 2012
Data CD - fall 2012
Map and data files to county - fall 2012
Training Workshop (Date to be determined)

Contacts

Jan Falteisek, program supervisor:
(651) 259-5665, jan.falteisek@state.mn.us
Todd Petersen, project hydrogeologist:
(651) 259-5698, todd.petersen@state.mn.us

Obtain a Report or More Information

Part A—Geology
Minnesota Geological Survey
2642 University Avenue
St. Paul, MN 55114-1057
(612) 627-4780

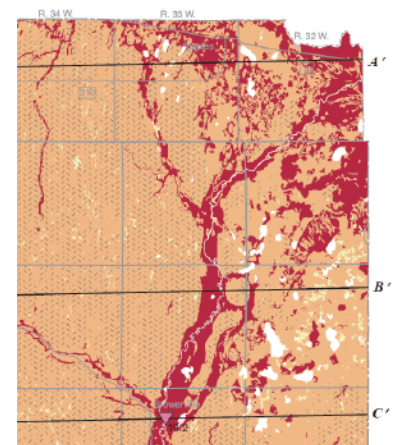
Part B—Groundwater and Pollution Sensitivity
DNR Waters
500 Lafayette Road
St. Paul, MN 55155-4032
(651) 259-5700



DNR hydrologist records data collected onsite from a residential well using various meters.



Additional samples are taken from selected wells for analyses that provide information about the type and tritium age of water.



One plate in each Part B report describes the sensitivity of groundwater resources to pollution. In the example above, the red areas show high sensitivity to pollution.

