UNIVERSITY OF MINNESOTA
MINNESOTA GEOLOGICAL SURVEY
D.L. Southwick, Director

PREPARED WITH THE SUPPORT OF THE U.S. GEOLOGICAL SURVEY AS PART OF THE
2000 STATE GEOLOGIC MAPPING PROGRAM ELEMENT (STATEMAP) OF THE NATIONAL GEOLOGIC MAPPING PROGRAM

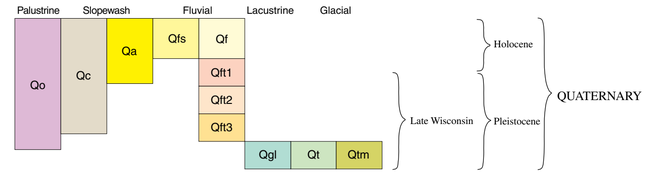
MISCELLANEOUS MAP SERIES
MAP M-109
Belle Plaine North Quadrangle

SURFICIAL GEOLOGIC MAP OF THE BELLE PLAINE NORTH QUADRANGLE, CARVER, SCOTT, AND SIBLEY COUNTIES, MINNESOTA

By
Barbara A. Lusardi

2001

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

This map emphasizes the origin of surficial materials in the area of the Belle Plaine North 7.5-minute quadrangle. It was constructed in part using aerial photographs taken in 1977 (1:80,000 scale) and U.S. Soil Conservation Service soil-survey maps for Carver, Scott, and Sibley counties (Edwards, 1968; Harms, 1955; Domeier, 1997).

Field work was conducted during the summer and fall of 2000. Most exposures consisted of excavations, including construction sites and road cuts. Surface samples were supplemented with soil borings drilled to a depth of about 18 feet (5.5 meters). Additional data from previous mapping (Meyer and Lusardi, 2000) were also included in the analyses and interpretation of map units.

PALUSTRINE DEPOSITS

Qo **Organic deposits (Holocene to Pleistocene)**—Ponded and shallow-water sediments consisting of dark-brown to black, drained and undrained peat and muck. Typically found in depressions and surrounding lakes; may include sandy beach sediments.

SLOPEWASH DEPOSITS

Qc **Colluvial deposits (Holocene to Pleistocene)**—Reworked sediments consisting of a friable mixture of sand, silt, clay, and pebbles; resembles the till or sand and gravel from which it is derived; may contain disseminated organic debris. Unit includes the till along steep bluffs, sediment that accumulates at the base of steep slopes, and sediment that is deposited along small streams in deep gullies.

Qa **Alluvial fan deposits (Holocene to Pleistocene)**—Slopewash sediments consisting of loam to loamy sand; beds of silt loam to silty clay loam, fine sand, and gravel; disseminated organic debris. Deposited at the base of steep slopes and at the mouths of deep gullies. Forms apron of sediment as thick as 30 feet (9 meters) over terrace and floodplain deposits.

FLUVIAL DEPOSITS

Qf **Alluvium of the Minnesota River (Holocene)**—River-channel, overbank, and slackwater sediments consisting of dark-brown to gray silt loam to sandy loam. Amount of sand increases adjacent to river channel and in areas of channel migration (indicated on map by scroll bars). Organic debris is both disseminated in the sediments and forms discrete peat beds.

Qfs **Alluvium along small streams (Holocene)**—Creek-channel, overbank, and slackwater sediments consisting of dark-grayish-brown to olive-brown loam; layers of fine sand and gravel. May contain organic debris, both disseminated in the sediments and in discrete peat beds.

Alluvial terrace deposits (Holocene and Pleistocene)—River-channel and slackwater sediments of Glacial River Warren preserved as terraces above the floodplain of the modern Minnesota River. Sediments consist predominantly of fluvial sand and gravel; coarsens to cobble gravel locally; also includes layers of very fine grained sand to silt. Terraces are numbered from lowest to highest elevation.

Qft1 ***Alluvium of terrace 1***—Elevation approximately 770 feet.

Qft2 ***Alluvium of terrace 2***—Elevation approximately 830 feet.

Qft3 ***Alluvium of terrace 3***—Elevation approximately 870 feet.

LACUSTRINE DEPOSITS

Qgl **Glacial lake deposits (Pleistocene)**—Lacustrine sediment consisting of dark-grayish-brown to light-yellowish-brown, generally homogeneous silt loam to silty clay loam; interbedded in places with thin layers of fine sand and pebbles; patchy distribution, mostly on broad level areas; variable thickness (2–15 feet or 0.6–4.5 meters). In regions of high relief, these broad level areas stand out as plateaus from the surrounding hummocky topography. The generally low-relief landscape in this region makes it difficult to identify places where lakes may have formed on top of stagnant ice—small areas of lake sediment may not be shown.

GLACIAL DEPOSITS

Sediment deposited by ice of the northwest-source Des Moines lobe. Deposits contain abundant gray siliceous shale fragments. Color of till is variable but is typically yellow brown to gray brown where oxidized. Surficial till deposits are interpreted to be stagnation deposits. Distinctions are made, in part, based on the degree of collapse or changes in topographic relief.

Till (Pleistocene)—Unsorted sediment consisting of pebbles (common), cobbles (uncommon), and boulders (rare) in a loamy matrix; pockets of silt, sand, and gravel in places. Average composition of the very coarse sand fraction includes crystalline rocks (36 ± 6 percent), carbonate rocks (23 ± 5 percent), and shale fragments (41 ± 6 percent).

Qtm ***Moderate-relief deposits***—Till as above; includes coalescing round or elliptical hills; overall relief about 40–50 feet (12–15 meters).

Qt ***Till-plain deposits***—Till as above; undulating topography; low relief (10-30 feet; 3-9 meters).

DESCRIPTION OF MAP SYMBOLS

Contact—Dashed where gradational. Established from aerial photographs, geomorphic expression, soils maps, well logs, borings, and examination of surficial material.

Scarp—Ticks point downscarp; dashed where discontinuous or obscure. Marks former channel. Symbol appears at the base of the scarp at the boundary between upland and channel sediments.

Alluvial fan—Indicates area where fan morphology is distinct.

Scroll bars—Indicates migration of river channel; may be slightly elevated; surface composed of loam to fine to medium sand. Symbol is schematic representation; individual bars not mapped.

Soil boring—Auger depths average 18 feet (5.5 meters).

Sample location—Includes outcrops, roadcuts, and construction sites.

Sandy area—Area where soil texture is sandier than surrounding till as indicated on soils maps. May be additional small, discontinuous patches within till that are not shown.

Record of water-well construction—Location of a water well for which there is a log prepared by a well driller. The information on the log is interpreted by a geologist and the location of the well verified. There are 104 well records for the Belle Plaine North quadrangle.

SELECTED BIBLIOGRAPHY

Domeier, Michael, J., 1997, Soil survey of Sibley County, Minnesota: U.S. Soil Conservation Service, scale 1:20,000, W94°38'45"–93°46'55"/N44°43'01"–44°27'21" [printed diagrams, 41 numbered, fold-out diagrams bound with text].

Edwards, R.J., 1968, Soil survey of Carver County, Minnesota: U.S. Soil Conservation Service, scale 1:15,840, W94°57'31"–93°31'13"/N44°58'42"–44°38' [printed diagrams, 65 numbered, fold-out diagrams bound with text].

Harms, G.F., 1955, Soil survey of Scott County, Minnesota: U.S. Soil Conservation Service, scale 1:20,000, W93°54'40"–93°16'41"/N44°48'46"–44°32'38" [printed diagrams, 36 numbered, fold-out diagrams bound with text].

Lusardi, B.A., 1998, Surficial geologic map of the Victoria quadrangle, Carver County, Minnesota: Minnesota Geological Survey Miscellaneous Map Series M-88, scale 1:24,000, W93°45'–93°37'30"/N44°52'30"–44°45' [electronic file].

———1999, Surficial geologic map of the Jordan West quadrangle, Carver and Scott Counties, Minnesota: Minnesota Geological Survey Miscellaneous Map Series M-93, scale 1:24,000, W93°45'–93°37'30"/N44°45'–44°37'30" [electronic file].

———2000, Surficial geologic map of the Waconia quadrangle, Carver County, Minnesota: Minnesota Geological Survey Miscellaneous Map Series M-103, scale 1:24,000, W93°52'30"–93°45'/N44°52'30"–44°45' [electronic file].

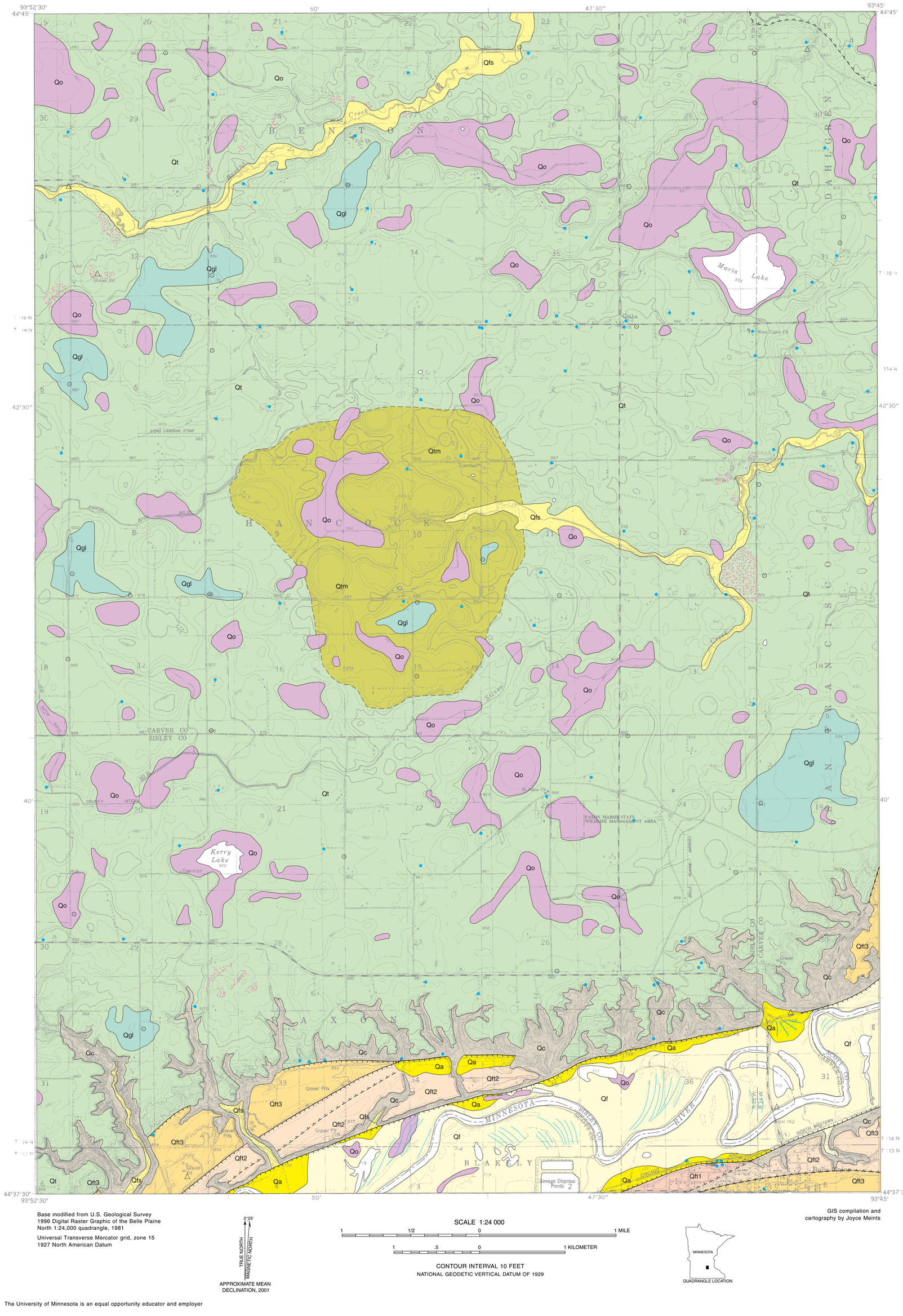
———2001, Surficial geologic map of the Watertown quadrangle, Carver, Hennepin, and Wright counties, Minnesota: Minnesota Geological Survey Miscellaneous Map Series M-108, scale 1:24,000, W93°52'30"–93°45'/N45°00'–44°52'30" [electronic file].

Meyer, G.N., and Lusardi, B.A., 2000, Surficial geology of the St. Paul 30 x 60 minute quadrangle, Minnesota: Minnesota Geological Survey Miscellaneous Map Series M-106, scale 1:100,000, W94°00'–93°00'/N45°00'–44°30' [electronic file].

ACKNOWLEDGMENTS

Chad Kolstad, Hong Truong, Kelly Wheaton, and Alan R. Knaeble drilled the soil borings and described 85 samples collected in the Belle Plaine North quadrangle.

The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government. This manuscript is submitted for publication with the understanding that the United States Government is authorized to produce and distribute reprints for governmental use. Supported by the U.S. Geological Survey, Department of the Interior, under award no. 00HQAG0116.



Base modified from U.S. Geological Survey
1996 Digital Raster Graphic of the Belle Plaine North 1:24,000 quadrangle, 1981

Universal Transverse Mercator grid, zone 15
1927 North American Datum

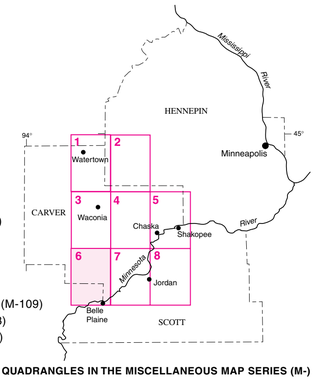
2°25'
TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 2001

SCALE 1:24 000
1 1/2 0 1 MILE
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

GIS compilation and cartography by Joyce Meints



INDEX TO STATEMAP QUADRANGLES IN THE MISCELLANEOUS MAP SERIES (M-)