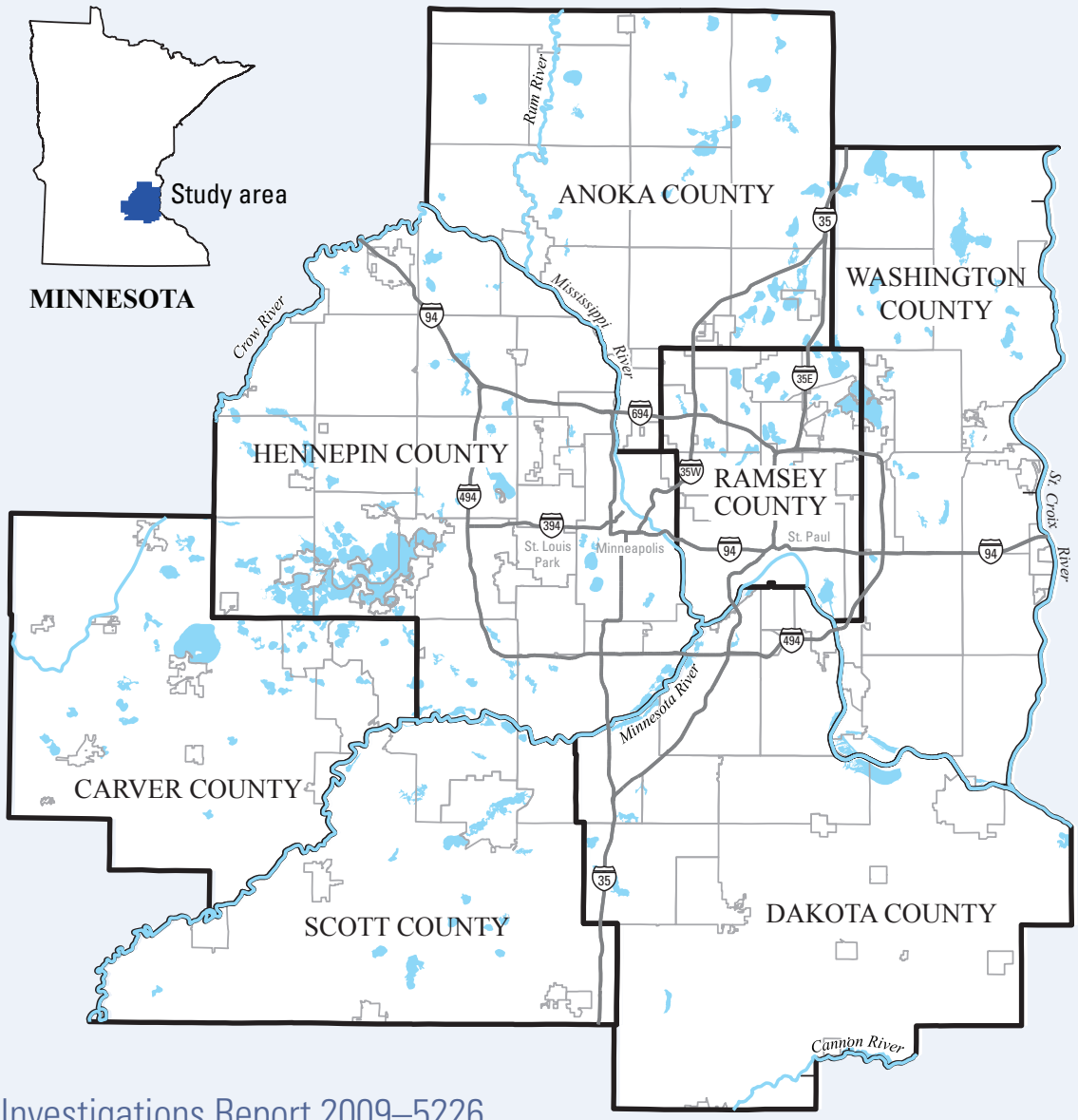
Potentiometric Surfaces and Changes in Groundwater Levels in Selected Bedrock Aquifers in the Twin Cities Metropolitan Area, March–August 2008 and 1988–2008



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U.S. Department of the Interior
U.S. Geological Survey

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By Christopher A. Sanocki, Susan K. Langer, and Jason C. Menard

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Conversion Factors, Abbreviations, and Datums

Inch/Pound to SI

Multiply	By	To obtain
	Length	
inch (in.)	2.54	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	259.0	hectare (ha)
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
gallon (gal)	3.785	liter (L)
gallon (gal)	0.003785	cubic meter (m^3)
gallon (gal)	3.785	cubic decimeter (dm^3)
million gallons (Mgal)	3,785	cubic meter (m^3)
	Flow rate	
gallon per day (gal/d)	0.003785	cubic meter per day (m^3/d)
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$°F=(1.8\times°C)+32$$

Vertical coordinate information is referenced to the North American Vertical Datum of 1988 (NAVD 88).

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Altitude, as used in this report, refers to distance above the vertical datum.

Acronyms

CWI	County Well Index
DEM	digital elevation model
GIS	geographic information system
MSP	Minneapolis-Saint Paul International Airport
TCMA	Twin Cities Metropolitan Area
USGS	U.S. Geological Survey

Potentiometric Surfaces and Changes in Groundwater Levels in Selected Bedrock Aquifers in the Twin Cities Metropolitan Area, March–August 2008 and 1988–2008

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Abstract

This report depicts potentiometric surfaces and groundwater-level changes in three aquifers that underlie the seven-county Twin Cities Metropolitan Area. Approximately 350 groundwater levels were measured in wells from the three aquifers—the Prairie du Chien-Jordan, the Franconia-Ironton-Galesville, and the Mount Simon-Hinckley aquifers—in March and August of 2008. The report presents maps, associated data tables, and 22 geographic information system datasets. The maps presented in this report show the potentiometric surfaces in March and August of 2008 for all three aquifers, groundwater-level changes from March to August 2008 for each aquifer, revised potentiometric-surface contours for the winter of 1988–89 for the Prairie du Chien-Jordan and the Mount Simon-Hinckley aquifers, and the estimated long-term (winter of 1988–89 to March 2008) groundwater-level changes for the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers. This report documents the methods used to construct the maps and provides a context for the period of the measurements.

Although withdrawal demand is increasing in the Twin Cities Metropolitan area, particularly in the Prairie du Chien-Jordan aquifer, year-to-year changes in withdrawals can be substantial, and the relation between potentiometric surfaces in the major aquifers and year-to-year withdrawals is not well established. The estimated long-term (19-year) groundwater-level changes for the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers have not been large based on data and maps produced during this study, despite the large seasonal fluctuations shown by the March and August 2008 synoptic measurements.

Introduction

Over half of the people in Minnesota live within the Twin Cities Metropolitan Area (TCMA). The TCMA includes Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties. The TCMA encompasses an area of 2,985 square miles (mi^2) in the east-central part of Minnesota, roughly 3.5 percent of the total area of the State of Minnesota (fig. 1). The population of the State in 2007 was estimated at 5,263,493 people, of which 2,849,003, or 54 percent live within the TCMA (Minnesota State Demographic Center, 2009). Water resources in the TCMA are drawn from groundwater and surface water. Approximately 66 percent of municipal water consumed in the TCMA is drawn from groundwater sources, and 33 percent from surface water. About 1.8 million people rely on groundwater, and 940,000 people rely on surface water in the TCMA (Metropolitan Council, 2008, 2009). Three major aquifers supply groundwater to the TCMA— the Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and Mount Simon-Hinckley aquifers.

Groundwater-level data are needed by State and local water managers to calibrate groundwater models and manage concerns about an increasing population causing additional lowering of groundwater levels in the three major aquifers supplying the TCMA. Water managers also use groundwater-level data to assist in estimating the effects of increased groundwater withdrawal on the flow of water through the aquifer systems and possible effects on nearby surface-water features such as lakes, streams, and wetlands. Groundwater sustainability is a complex subject that takes into account hydrogeologic, hydraulic, and other environmental and social factors to determine sustainable yield or the use of water that provides for the current and future needs of society without unacceptable social, economic, or environmental consequences (Minnesota Department of Natural Resources, 2005). The effects of pumping are one of the most important issues that need to be considered in defining yield and sustainability (Alley and others 1999). Groundwater recharge, discharge, and aquifer storage are among the factors used to determine the amount of groundwater that can be withdrawn from aquifers without having detrimental environmental effects.

The U.S. Geological Survey (USGS), in cooperation with the Minnesota Pollution Control Agency, Minnesota Department of Natural Resources, and the Metropolitan Council, conducted a synoptic study of groundwater levels in the three major aquifers underlying the TCMA. As part of this study, groundwater levels were measured in approximately 350

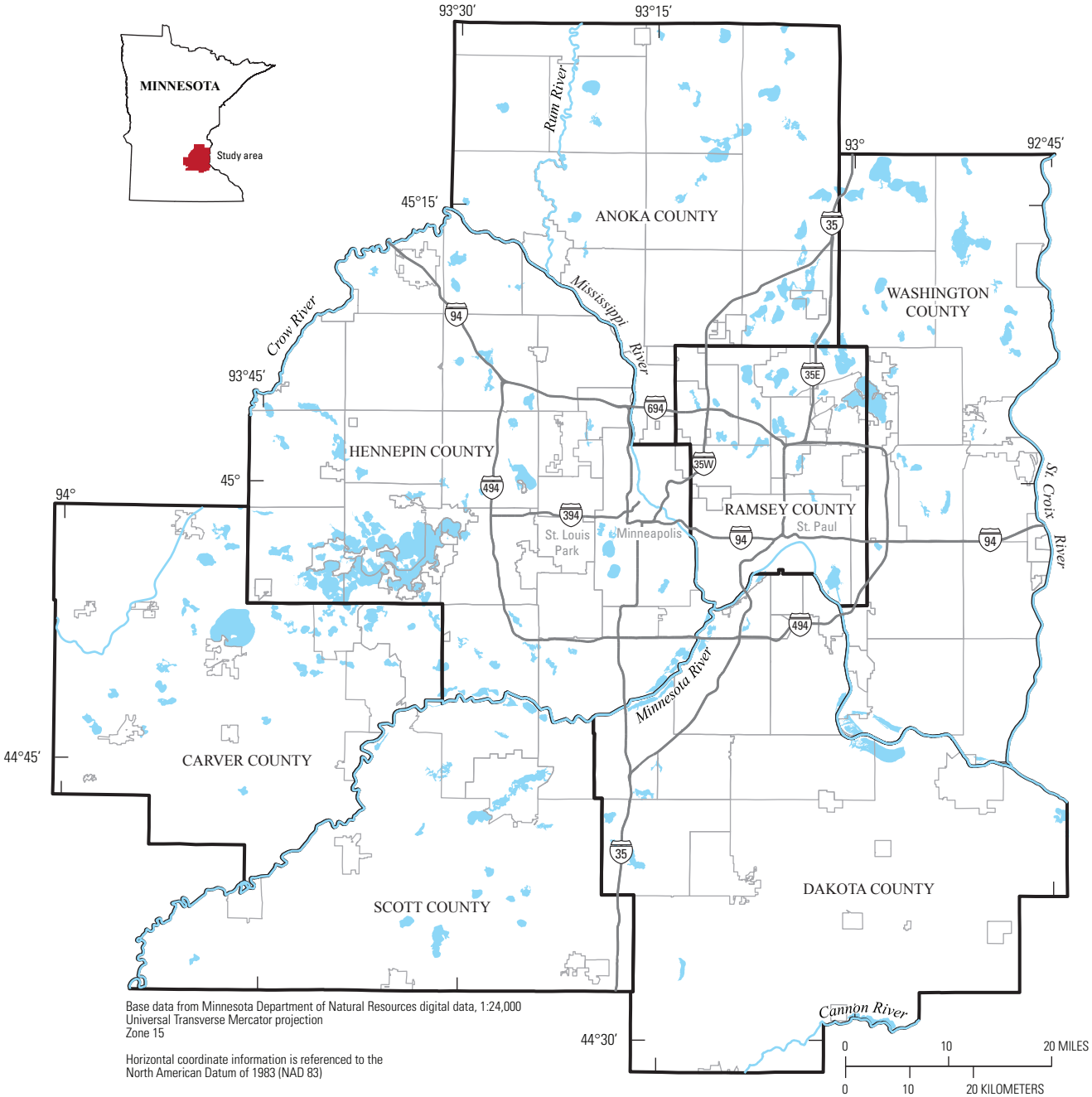

Figure 1. Study area where synoptic groundwater-level measurements were made during the winter of 1988–89 and during March and August 2008.

wells during March and August 2008. Specific objectives of the study were to (1) establish a comprehensive database to serve as a framework for this study and to facilitate future groundwater-level measurements in the TCMA, (2) determine groundwater levels in three aquifers (Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and Mount Simon-Hinckley aquifers) in winter and summer 2008, (3) document methods used to construct maps, and document short-term (winter 2008 to summer 2008) groundwater-level changes for the three aquifers and long-term groundwater-level changes (winter of 1988–89 to March 2008) for the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers. Before the 2008 synoptic study, the last synoptic measurement of groundwater levels in the major bedrock aquifers underlying the TCMA occurred during the winter of 1988–89 19 years before this study (Andrews and others, 1995). Moreover, the groundwater levels for the winter of 1988–89 were measured after a severe drought in 1988, complicating interpretation of long-term

groundwater-level changes. The 1988–89 measurements included only the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers; thus, this study is the first to document potentiometric surfaces and groundwater-level changes in the Franconia-Ironton-Galesville aquifer.

Purpose and Scope

This report presents potentiometric surfaces and changes in groundwater levels, associated groundwater-level data, and geographic information system (GIS) datasets for groundwater levels collected during winter (March) 2008 and summer (August) 2008 for the Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and Mount Simon-Hinckley aquifers. Potentiometric-surface maps for the winter of 1988–89 were revised from Andrews and others (1995) for the Prairie du Chien-Jordan and Mount Simon-Hinkley aquifers. This report also presents groundwater-level changes between March and August 2008 for all three aquifers and between the winter of 1988–89 and March 2008 for the Prairie du Chien-Jordan and Mount Simon-Hinkley aquifers. Specifically, this report presents 14 maps, associated data tables, and 22 GIS datasets. Of the 14 maps presented in this report, 1 map outlines the study area, 6 maps show the potentiometric surface in March and August of 2008 for all three aquifers, 3 maps show groundwater-level changes from March to August 2008 for each aquifer, 2 maps present revised potentiometric-surface contours for the winter of 1988–89 for the Prairie du Chien-Jordan and the Mount Simon-Hinckley aquifers, and 2 maps show the estimated long-term (winter of 1988–89 to March 2008) groundwater-level changes for the Prairie du Chien-Jordan and the Mount Simon-Hinckley aquifers.

This report documents the methods used to construct the maps and provides a context for the period of the measurements. Substantive explanation of long-term groundwater-level trends is difficult with two datasets that are widely spaced in time (1988–89 and 2008). Although the data and maps produced for this report will be useful to water managers in assessing groundwater levels and groundwater-level changes with time, their relation to groundwater sustainability is beyond the scope of this report.

Acknowledgments

The authors are grateful to all of the well owners who allowed groundwater levels to be measured in their wells, and to the municipalities and their staff for adjusting their pumping schedules and assisting in measuring groundwater levels. The Minnesota Department of Natural Resources, Metropolitan Council, and Minnesota Geological Survey staff are acknowledged for their assistance in making synoptic measurements. A special note of thanks is given to Jan Falteisek of the Minnesota Department of Natural Resources for taking extra time to coordinate Department of Natural Resources staff to assist with the synoptic measurements and for assisting with documentation and research of previous synoptic measurements.

Previous Investigations

The study of groundwater levels in the major bedrock aquifers underlying the TCMA is strengthened by extensive previous work during the last 40 years documenting previous groundwater-level conditions, hydrogeology, and flow patterns, and groundwater withdrawal with time. Reeder (1966) presented maps of groundwater levels and groundwater-level changes for the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers in the TCMA for selected periods from 1885 to 1965. Similarly, Horn (1983) summarized groundwater withdrawal data for 1880 to 1980.

In the 1970s, Norvitch and others (1973) described the hydrogeologic setting of the TCMA and presented maps of potentiometric surfaces for the winter of 1970–71 and groundwater-level changes from December 1970 to August 1971 for the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers, and long-term groundwater-level changes from winter 1965 to winter 1970 for the Prairie du Chien-Jordan aquifer. Moreover, Schoenberg (1984) described groundwater flow and changes in groundwater levels in these aquifers during 1971–80. Guswa and others (1982) described the hydrogeologic setting and flow-system dynamics of the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers in the 1980s, and Delin and Woodward (1982) presented maps of the hydrogeologic setting and groundwater levels in southeastern Minnesota, including the TCMA.

In the 1990s, Schoenberg (1990) described the hydrogeologic setting of the TCMA and examined the effects of simulated withdrawals on the principal aquifers in the TCMA. Andrews and others (1995) presented groundwater-level maps of the Prairie du Chien-Jordan and Mount Simon-Hinckley for the winter of 1988–89.

Description of Study Area

The study area consists of the 2,985-mi^2 TCMA in east-central Minnesota (fig. 1). This section of the report describes the climate and antecedent conditions, population, water use, and hydrogeology of the TCMA.

Climate and Antecedent Conditions

The TCMA has a humid continental climate, with cold winters and warm, humid summers. Wind direction primarily is from the west and northwest. During the winter of 1988–89 when the previous synoptic measurements were made, January 1989 had an average temperature of 11.6 degrees Fahrenheit (˚F); July 1988 had an average temperature of 78.1 ˚F. Winter

temperatures in 2008 were warmer than in 1989, with an average January temperature of 13.2 ˚F; the July 2008 average temperature was 75.6 ˚F, similar to that of 1989 (National Oceanic and Atmospheric Association, 2009).

The average annual precipitation at the Minneapolis-Saint Paul International Airport (MSP) based on 30-year data (1978–2007) from the National Oceanic and Atmospheric Association (2009) is 30.40 inches (in.). Annual precipitation at the MSP for 1989 was 23.32 in., which was 7.08 in. less than the 30-year average. Data from the winter 1988–89 synoptic study of TCMA groundwater-levels were collected between December 1988 and March 1989 for the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers (Andrews and others, 1995). The winter 1988–89 synoptic study was conducted following a period of unusually dry conditions. During the summer of 1988, all but the northeastern part of Minnesota had a Palmer Drought Index score of -4 or lower, indicating extreme drought (Minnesota Department of Natural Resources, 1989). Annual precipitation for 1988 at MSP was 19.08 in., which was 11.32 in. less than the 30-year average. For April through October 1988, precipitation for every month was less than the monthly averages for the 30-year period (1978–2007), with only 0.22 in. of precipitation during the entire month of June, which was 4.22 in. less than the 30-year monthly average for June. Precipitation in August and November 1988 contributed some recharge in soil moisture. During the intense dry summer period, groundwater levels in the Prarie du Chien and Mount Simon-Hinckley aquifers decreased beneath the TCMA from increased summer pumping, especially for air conditioning and irrigation purposes, but began to recover soon after the pumping season ended in late August 1988 (Minnesota Department of Environment and Natural Resources, 1989).

Although the synoptic study during the winter of 1988–89 was marked by dry conditions, previous years were wet. Precipitation during the years from 1981–1987 was a combined 21.86 in. greater than the 30-year (1978–2007) average. For 2008, annual precipitation at MSP was 22.38 in., which was 8.02 in. less than the 30-year average. Unlike the winter 1988–89 synoptic study, precipitation in the years before the 2008 synoptic study were more mixed. Annual precipitation in 2007 was 3.92 in. greater than average, while 2006 was 2.83 in. less than average. 2005 was 3.01 in. greater than average, 2004 and 2003 were 3.01 and 7.68 in. less than average, respectively, and 2002 and 2001 were 7.98 and 3.83 in. greater than average. Although the years preceding 1988 and the 1988–89 synoptic study were unusually wet, the precipitation pattern for the years preceding the 2008 synoptic study appears to be less variable, with wet and dry years roughly alternating about the average.

Population and Reported Water Use in the Twin Cities Metropolitan Area

Population in the seven-county TCMA increased from 2,288,271 to 2,642,056 persons (15.5 percent) between 1990 and 2000. From 2000 to 2007, the population increased by an estimated 207,000 people, which is an estimated increase of 24.5 percent from the 1990 population as recorded by the decennial census (Metropolitan Council, 2008). Municipal water in the TCMA is supplied by groundwater and surface water, with most residents supplied by groundwater from the three major bedrock aquifers underlying the TCMA. As population increased from 1990 to 2007, reported annual groundwater withdrawals increased similarly during the same period.

For this report, annual water-use data were obtained from the Minnesota Department of Natural Resources Water Appropriations Permit Program, which tracks water use at sites using more than 10,000 gallons per day (gal/d) , or 1 million gallons per year (Mgal/yr) (Minnesota Department of Natural Resources, 2009; Sean Hunt, Minnesota Department of Natural Resources, written communication, 2009). In 1990, approximately 264 million gallons of water per day (Mgal/d) were withdrawn from groundwater sources underlying the TCMA. Of that total, 229 Mgal/d was withdrawn from the Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and Mount Simon-Hinckley aquifers. In 2007, 338 Mgal/d of groundwater was withdrawn in the TCMA, with 282 Mgal/d coming from the three major aquifers, an increase of 23.6 percent. Although the amount of groundwater being withdrawn within the TCMA has increased with time, the proportion of the groundwater from the three aquifers with respect to total groundwater withdrawals has remained relatively the same. In 1990, 87 percent of groundwater in the TCMA was withdrawn from the Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and Mount Simon-Hinckley aquifers. By 2007, even with increased withdrawals, the proportional withdrawal from the three major aquifers, with respect to total groundwater, was 83 percent.

Withdrawals from individual aquifers have increased at different rates. Demand from the Prairie du Chien-Jordan aquifer has increased roughly at the rate of population increase, from 185 Mgal/d in 1990 to 226 Mgal/d in 2007, an increase of 41 Mgal/d, or 22 percent. Withdrawals from the Franconia-Ironton-Galesville aquifer have increased greatly. Withdrawals from the Franconia-Ironton-Galesville aquifer totaled 14.9 Mgal/d in 1990 and 26.9 Mgal/d in 2007, an increase of 12 Mgal/d, or 80 percent. Withdrawals from the Mount Simon-Hinckley aquifer have increased slightly, from 28.6 Mgal/d in 1990 to 29.1 Mgal/d in 2007, an increase of 0.5 Mgal/d, or 1.7 percent (Sean Hunt, Minnesota Department of Natural Resources, written communication, 2009).

Hydrogeology

The Prairie du Chien-Jordan aquifer is contained within two geologic units—the Prairie du Chien Group and the Jordan Sandstone—that have different lithologies and hydraulic properties. The Ordovician-age Prairie du Chien Group is composed by two formations that are dominated by carbonate rocks: the Oneota Dolomite, and the overlying Shakopee Formation (mixed siliciclastic-carbonate rocks). Both formations

have low intergranular permeability, but well developed secondary porosity, with the flow of water controlled by fractures, joints, and dissolution-enlarged cavities (Runkel and others, 2003). The Cambrian-age Jordan Sandstone is a permeable quartz and feldspathic sandstone with lenses of siltstone and shale. Flowmeter data show that hydraulically active fractures within the Jordan Sandstone often provide most of the transmissivity within the open hole (Robert Tipping, Minnesota Geological Survey, written communication, 2009).

Recent studies indicate that the Prairie du Chien Group should no longer be combined with the underlying Jordan Sandstone into a single aquifer (Runkel and others, 2003). Where measured, hydraulic head differences exist between wells finished in the Shakopee Formation and Jordan Sandstone. These differences are larger in areas where the Jordan aquifer is pumped, or in areas where waters discharge from the Shakopee Formation (Tipping and others, 2006); however, for purposes of comparison between 1988–89 and 2008 data, and to incorporate data from wells drawing water from the Prairie du Chien Group and the Jordan Formation, this report continues the historical practice of grouping the Prairie du Chien-Jordan into a single aquifer.

The Prairie du Chien-Jordan aquifer is discontinuous in many parts of the study area where intersected by glacial sediment-filled bedrock valleys and present-day streams valleys. In major stream valleys, where the overlying confining units have been removed by erosion, hydraulic connection may exist between the aquifer and the streams. The degree of hydraulic connection between the Prairie du Chien-Jordan and these streams depends on the hydraulic conductivity of the valley-fill deposits.

Underlying the Prairie du Chien-Jordan aquifer, the Franconia-Ironton-Galesville aquifer is contained in the Late Cambrian-age Franconia Formation (sandstone with some shale and dolomite), Ironton Sandstone, and Galesville Sandstone. Historically, the Franconia-Ironton-Galesville aquifer has been treated as a single aquifer and will be treated as such for purposes of this study; however, research by Runkel and others (2003) does not support the idea of the Franconia-Ironton-Galesville functioning as a single aquifer, but rather indicates that the Franconia aquifer acts as a separate aquifer from the Ironton-Galesville aquifer. Based on flowmeter data, outcrop investigations, potentiometric surfaces, and spring stratigraphy, the upper Franconia Formation is characterized as having flow mostly through bedding plane fractures; the lower Franconia Formation is characterized as a confining unit similar to the late-Cambrian Eau Claire Formation (Runkel and others, 2006). Water in the Ironton-Galesville aquifer moves through well-connected intergranular spaces (Delin and Woodward, 1982; Runkel and others, 2003)

The Mount Simon-Hinckley aquifer is contained in the late Cambrian-age Mount Simon Sandstone and the Proterozoic-age Hinckley Sandstone. The aquifer is composed of a fine- to coarse-grained sandstone with interbeds of siltstone and shale. The two formations that compose the Mount Simon-Hinckley aquifer are continuous throughout the study area and have similar hydraulic characteristics, primarily intergranular flow (Delin and Woodward, 1982).

Methods

The groundwater-level synoptic study, or the measurement of groundwater levels in many wells within a short period of time, for the Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and the Mount Simon-Hinckley aquifers was conducted in March and August of 2008, with most wells measured in the first 2 weeks of March and the last 2 weeks of August. The synoptic measurements were made during a 2-week period to provide a “snapshot” of the potentiometric surface during winter and summer conditions. The winter 1988–89 synoptic study included groundwater levels from December 1988 through March 1989 for the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers (Andrews and others, 1995). The 2008 synoptic study included additional groundwater-level data for the winter 1988–89 synoptic study by expanding the measurement period to include November 1988. Some wells used in Andrews and others (1995) were not used in the 2008 study because of their classification as multi-aquifer.

Groundwater-level measurements were obtained by steel tape, electric tape, and from reports of well operators. Measurements were made when wells were not being pumped; however, antecedent conditions and pumping status of nearby wells can affect the groundwater levels included in this study. Wells used in this study were field located, and latitude/longitude coordinates were acquired from the Global Positioning System (GPS) or digitization from USGS 1:24,000-scale topographic maps. Land-surface altitudes were obtained from a 10-meter digital elevation model (DEM) from the National Elevation Dataset (U.S. Geological Survey, 2008). The 10-meter DEM was generated from 10-foot (ft) contours from USGS 1:24,000-scale topographic maps. The contours on the maps meet USGS National Map Accuracy Standards and require that 90 percent of well-defined points fall within one-half the contour interval, for an estimated accuracy of plus or minus 5 feet (U.S. Geological Survey and Metropolitan Council, 2001).

For the winter of 1988–89, groundwater-level measurements from 356 wells were identified from the U.S. Geological Survey National Water Information System (NWIS; *http://waterdata.usgs.gov/nwis*) as representing the Prairie du Chien-Jordan and the Mount Simon-Hinckley aquifers and having measurement dates ranging from November 1988 to March 1989. In March 2008, groundwater levels in 356 wells were measured: 208 wells in the Prairie du Chien-Jordan aquifer, 111 in the Franconia-Ironton-Galesville aquifer, and 37 in the Mount Simon-Hinckley aquifer (table 1). Slightly fewer wells (330) were measured in August 2008: 192 in the Prairie du Chien-Jordan aquifer, 103 in the Franconia-Ironton-Galesville aquifer, and 35 in the Mount Simon-Hinckley aquifer.

Table 1. Number of wells measured during the winter of 1988–89, March 2008, and August 2008.

Aquifer	Winter 1988–89	March 2008	August 2008
Prairie du Chien-Jordan	332	208	192
Franconia-Ironton-Galesville	0	111	103
Mount Simon-Hinckley	24	37	35
Total wells measured	356	356	330

The potentiometric-surface maps for March and August 2008 were created with data points from three sources: (1) groundwater levels measured for this study; (2) water levels derived from river surface altitudes where aquifers discharge to river systems; and (3) static groundwater levels from the Minnesota Department of Health/Minnesota Geological Survey's County Well Index (CWI) data (Minnesota Department of Health/Minnesota Geological Survey, 2008). The CWI static groundwater levels were selected for each of the three bedrock aquifers as a means of bordering the potentiometric-surface interpolation of each aquifer in the TCMA with known static groundwater levels. CWI static groundwater levels likewise were selected to provide data points in areas that were not measured during the winter of 1988–89, March 2008, or August 2008. Most of the CWI wells used were outside the boundaries of the TCMA, and all such wells have static groundwater levels similar to wells used for this report. CWI wells were selected through a visual process in a GIS, and checked by interpolating their static groundwater levels with those from the measured wells to identify and remove outliers. This process produced a TCMA-wide estimation of potentiometric surfaces fully based on measured groundwater levels in each aquifer. Maps of potentiometric surfaces were developed by using a GIS to generate a raster representation of each potentiometric surface using Natural Neighbor interpolation (Sibson, 1981; Watson, 1992) of the data points. This raster surface was used to generate contours in the GIS. The final contours for each map were then hand-edited in the GIS to correct obvious interpolation errors.

Seasonal groundwater-level change maps for each of the three aquifers were constructed with groundwater-level change values, which were calculated as the difference between March 2008 and August 2008 groundwater-level altitudes at the same well. Raster surfaces were generated from well points with groundwater-level difference values using Natural Neighbor interpolation. Additionally, two closely located wells, with a single measurement each, were used to estimate the seasonal groundwater-level change for the Mount Simon-Hinckley aquifer in St. Louis Park. This was done to provide an estimate of groundwater-level change in an area of the map that lacked a measurement from the same well for March and August 2008. For the three 2008 seasonal change maps, both shaded areas and groundwater-level change values are shown.

This report includes revised maps of the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers during the winter of 1988–89. These maps supersede those of Andrews and others (1995, figs. 69 and 71). The maps were revised based on additional groundwater-level data, and information for the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers that became available subsequent to the publication of the original maps. The revised maps use methods consistent with all the other maps in this report.

For the 19-year long-term groundwater-level change maps, fewer wells with groundwater-level measurements at the same well were available. For these maps, 73 wells in the Prairie du Chien-Jordan aquifer and 8 wells in the Mount Simon-Hinckley aquifer were identified as having groundwater-level data in both the winter of 1988-89 and March 2008. A raster surface was generated from the groundwater-level differences using Natural Neighbor interpolation for the Prairie du Chien-Jordan aquifer. There was insufficient data to interpolate a change map for winter of 1988-89 and March 2008 in the Mount Simon Hinckley Aquifer, therefore only groundwater-level change values for 8 wells are shown on figure 14.

Potentiometric Surfaces

Potentiometric-surface maps for the winter of 1988–89 were revised from Andrews and others (1995) for the Prairie du Chien-Jordan and Mount Simon-Hinkley aquifers (figs. 2 and 3, respectively). The groundwater-level measurements used to construct the revised potentiometric–surface maps for the winter of 1988–89 are presented in table A1 in appendix 1 for the Prairie du Chien-Jordan aquifer and in table A2 in appendix 1 for the Mount Simon-Hinkley aquifer.

Potentiometric-surface maps for March and August 2008 were constructed for the Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and Mount Simon-Hinckley aquifers. The potentiometric-surface maps for March 2008 are presented in figures 4–6 for the Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and Mount Simon-Hinckley aquifers, respectively. The potentiometric-surface maps for August 2008 are presented in figures 7–9 for the Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and Mount Simon-Hinckley aquifers, respectively. The groundwater-level measurements used in preparing the potentiometric surface maps for March 2008 are presented in table A3 in appendix 1 for the Prairie du Chien-Jordan aquifer, table A4 in appendix 1 for the Franconia-Ironton-Galesville aquifer, and in table A5 in appendix 1 for the Mount Simon-Hinkley aquifer. The groundwater-level measurements used in preparing the potentiometric- surface maps for August 2008 are presented in table A6 in appendix 1 for the Prairie du Chien-Jordan aquifer, table A7 in appendix 1 for the Franconia-Ironton-Galesville aquifer, and in table A8 in appendix 1 for the Mount Simon-Hinkley aquifer.

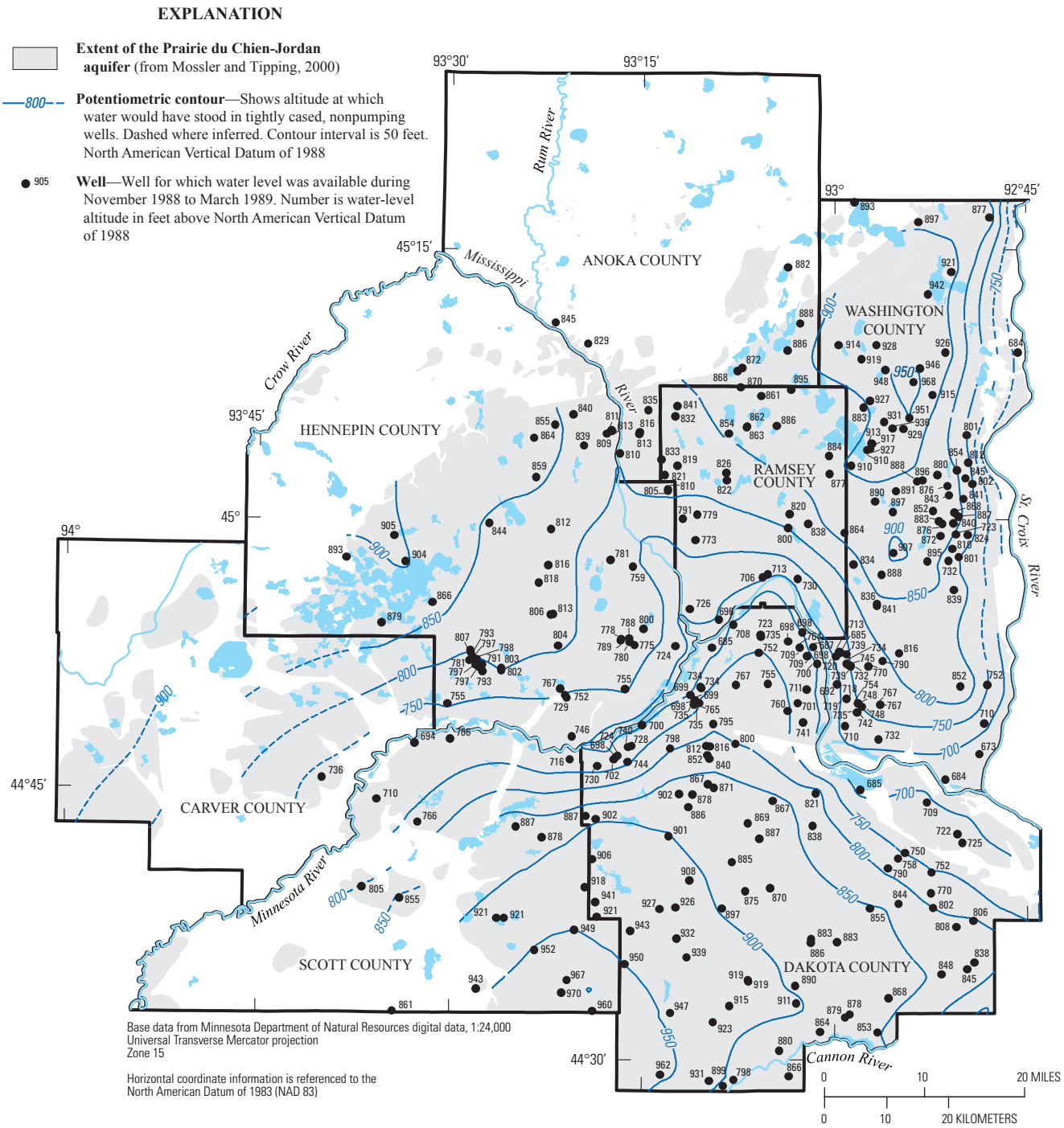

Figure 2. Potentiometric surface of the Prairie du Chien-Jordan aquifer, winter of 1988–89 (revised from Andrews and others, 1995).

Groundwater-Level Changes

Maps were constructed to show the seasonal groundwater-level changes (March and August 2008) in the Prairie du Chien-Jordan (fig. 10), Franconia-Ironton-Galesville (fig. 11), and Mount Simon-Hinckley (fig. 12) aquifers. The groundwater-level difference between March and August 2008 at the same well were used to prepare the seasonal change maps. The groundwater-level difference data are presented in table A9 in appendix 1 for the Prairie du Chien-Jordan aquifer, table A10 in appendix 1 for the Franconia-Ironton-Galesville aquifer,

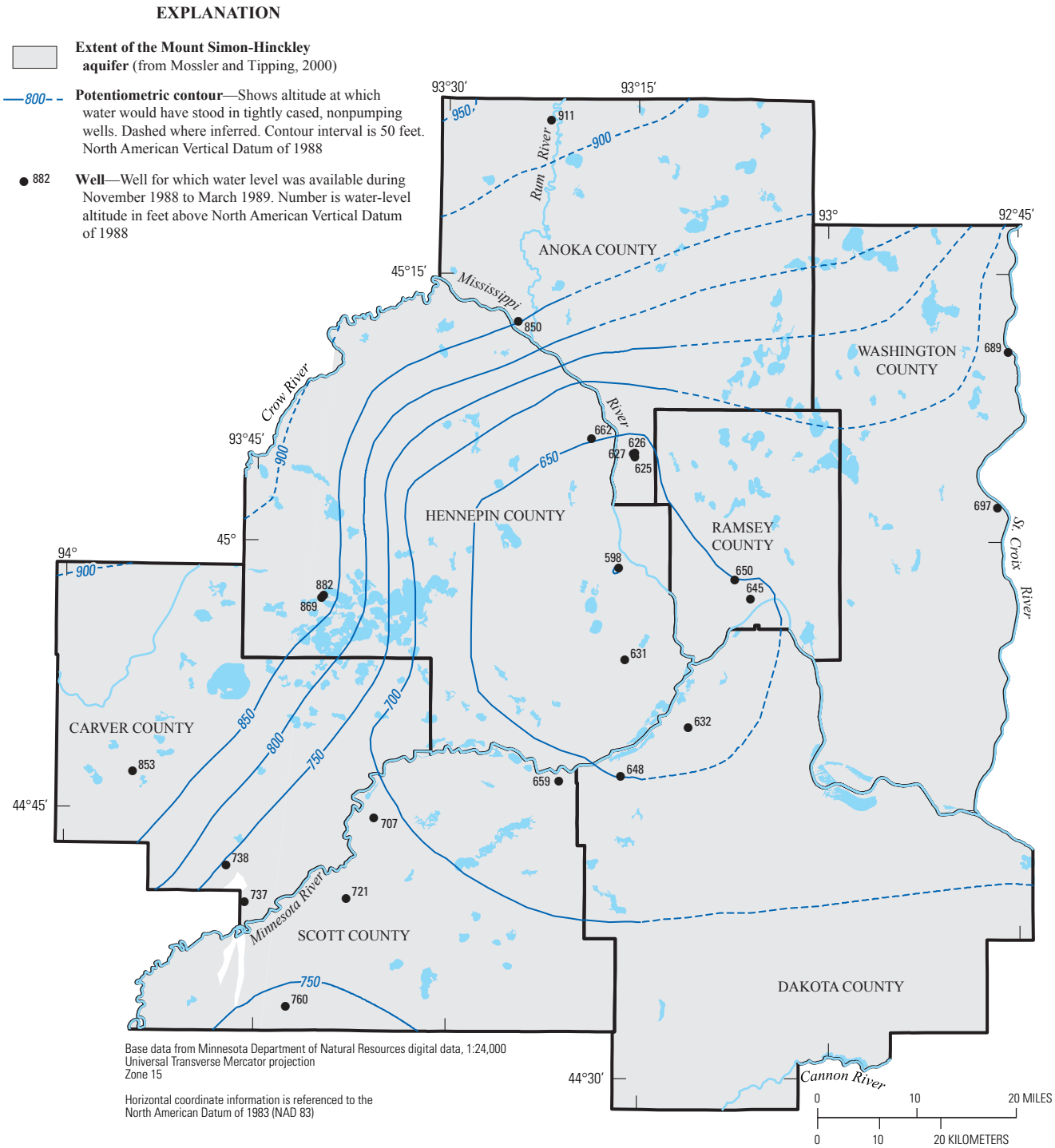

Figure 3. Potentiometric surface of the Mount Simon-Hinckley aquifer, winter of 1988–89 (revised from Andrews and others, 1995).

and in table A11 in appendix 1 for the Mount Simon-Hinkley aquifer.

Groundwater levels in the Prairie du Chien-Jordan aquifer (fig. 10) declined as much as 44 and 60 ft in south-central Hennepin County and in northwestern Dakota County, respectively, between March and August 2008. Groundwater levels in the Prairie du Chien-Jordan aquifer declined as much as 46 ft in parts of Washington County, 26 ft in southeastern Anoka County, and 13 ft in southeastern Scott County. Groundwater levels in the Franconia-Ironton-Galesville aquifer (fig. 11) declined in southern Anoka County, southeastern Carver County, and northern Scott County between March and August

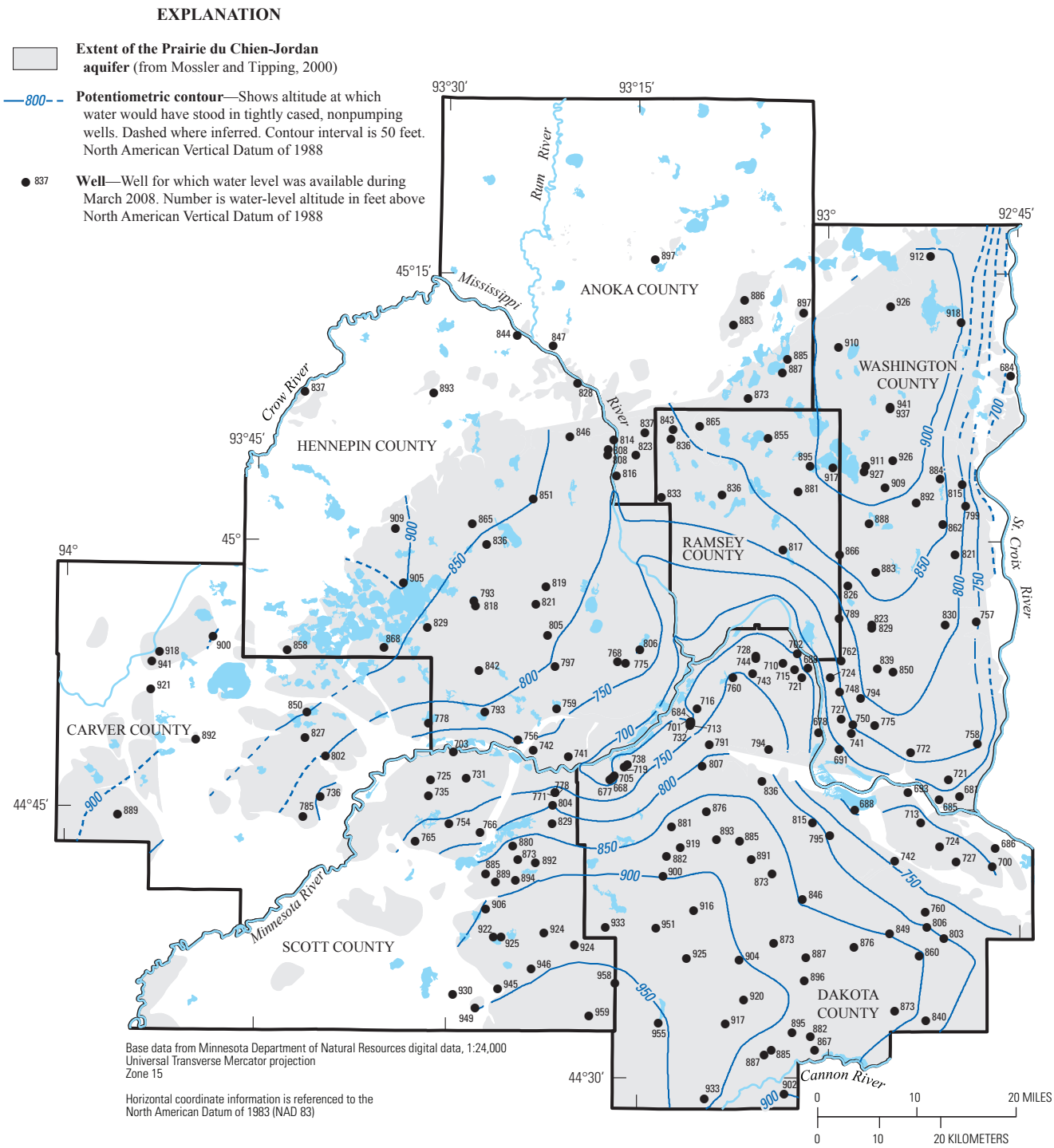

Figure 4. Potentiometric surface of the Prairie du Chien-Jordan aquifer, March 2008.

2008. Two wells in Washington County and and two wells in Dakota County in the Franconia-Ironton-Galesville aquifer had groundwater-level declines of 15 ft or greater. Groundwater levels in the Mount Simon-Hinckley aquifer (fig. 12) had the greatest decline in east-central Hennepin County and southern Anoka County.

Maps were constructed to show the long-term groundwater-level changes between the winter of 1988–89 and March 2008 for the Prairie du Chien-Jordan (fig. 13) and Mount Simon-Hinckley (fig. 14) aquifers. Groundwater levels in the Franconia-Ironton-Galesville aquifer were not measured in the 1988–89 synoptic study (Andrews and others, 1995). Wells

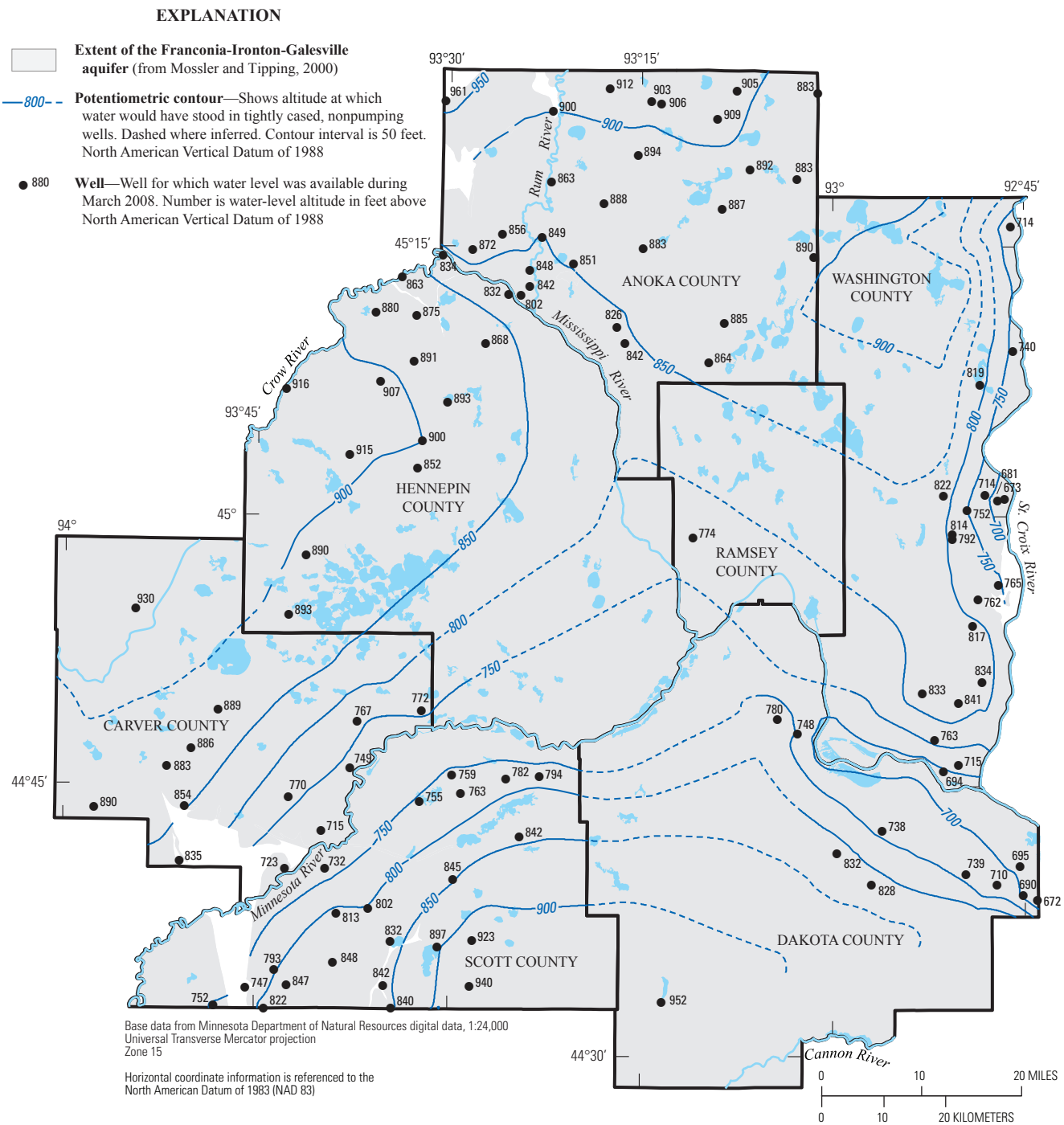

Figure 5. Potentiometric surface of the Franconia-Ironton-Galesville aquifer, March 2008.

that had groundwater-levels in the winter of 1988–89 and March 2008 were used to prepare the long-term change maps. The list of wells used are presented in table A12 in appendix 1 for the Prairie du Chien-Jordan aquifer and in table A13 in appendix 1 for the Mount Simon-Hinkley aquifer.

The map for the Prairie du Chien-Jordan aquifer (fig. 13) shows a slight groundwater-level rise. The mean and median groundwater-level changes between the winter of 1988–89 and March 2008 for the 73 wells completed in the Prairie du Chien-Jordan aquifer were rises of 0.26 ft and 1.87 ft, respectively. Groundwater-levels rose as much as 17 ft in Ramsey, 8

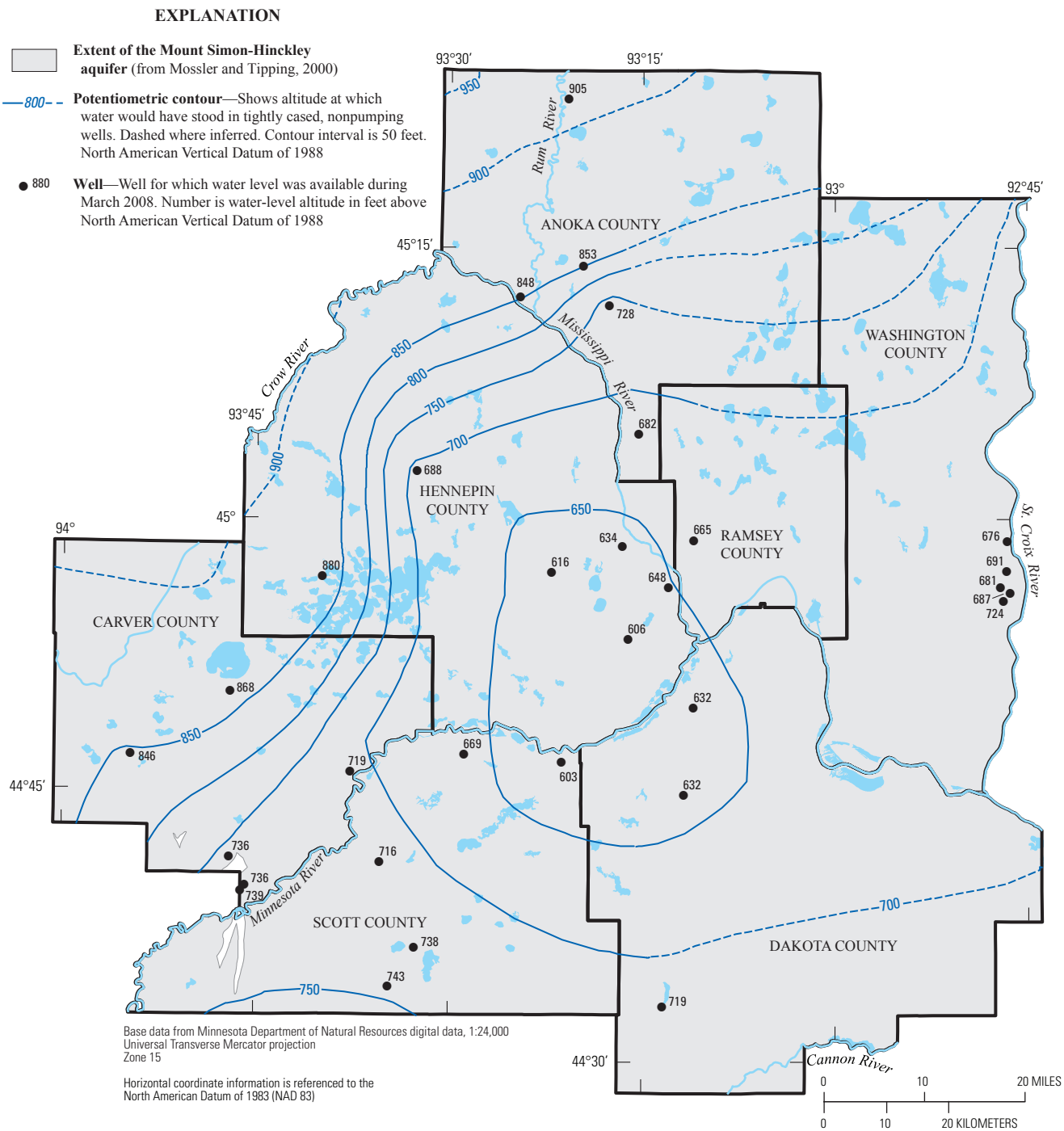

Figure 6. Potentiometric surface of the Mount Simon-Hinckley aquifer, March 2008.

ft in southern Anoka, 6 ft in east-central Hennepin, and 12 ft in northern Dakota; one well in southern Washington County had a 48-ft groundwater-level rise. Groundwater levels declined in the Prairie du Chien-Jordan as much as 9 ft in south Hennepin, 31 ft in northwestern Dakota, and as much as 13 ft in central Washington Counties. Small areas of groundwater-level declines were apparent in eastern Dakota County, central Hennepin and eastern Scott Counties.

The map of groundwater-level changes between the winter of 1988–89 and March 2008 for the Mount Simon-Hinckley aquifer (fig. 14) shows a slight groundwater-level decline. The mean and median groundwater-level changes for the eight wells completed in the Mount Simon-Hinckley were

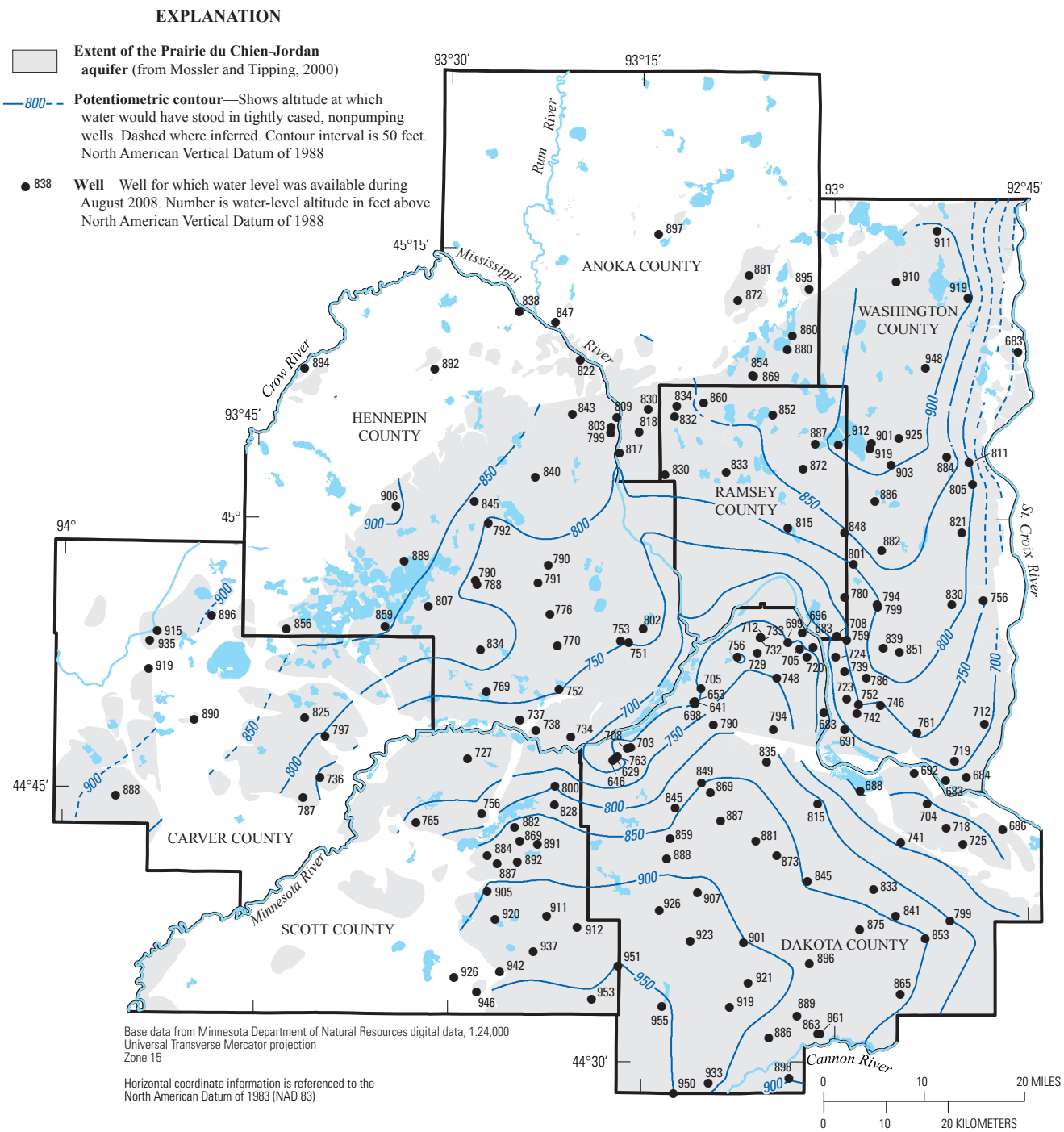

Figure 7. Potentiometric surface of the Prairie du Chien-Jordan aquifer, August 2008.

declines of 0.45 ft and 2.47 ft, respectively. Groundwater-levels declined in southern Hennepin County, and northeastern Scott County; groundwater levels rose in southern Anoka County and east central Hennepin County. The 650-ft potentiometric-surface contour that overlies the central area of the TCMA shifts between 5.5 and 6.5 miles south from the winter of 1988–89 (fig. 3) to March 2008 (fig. 6). This change reflects a recovery of groundwater levels in east central Hennepin County and the southern handle of Anoka County.

Although withdrawal demand is trending upward in the TCMA, particularly in the Prairie du Chien-Jordan aquifer, year-to-year changes in withdrawals can be substantial, and the relation between potentiometric surfaces in the major aquifers and year-to-year withdrawals is not well established.

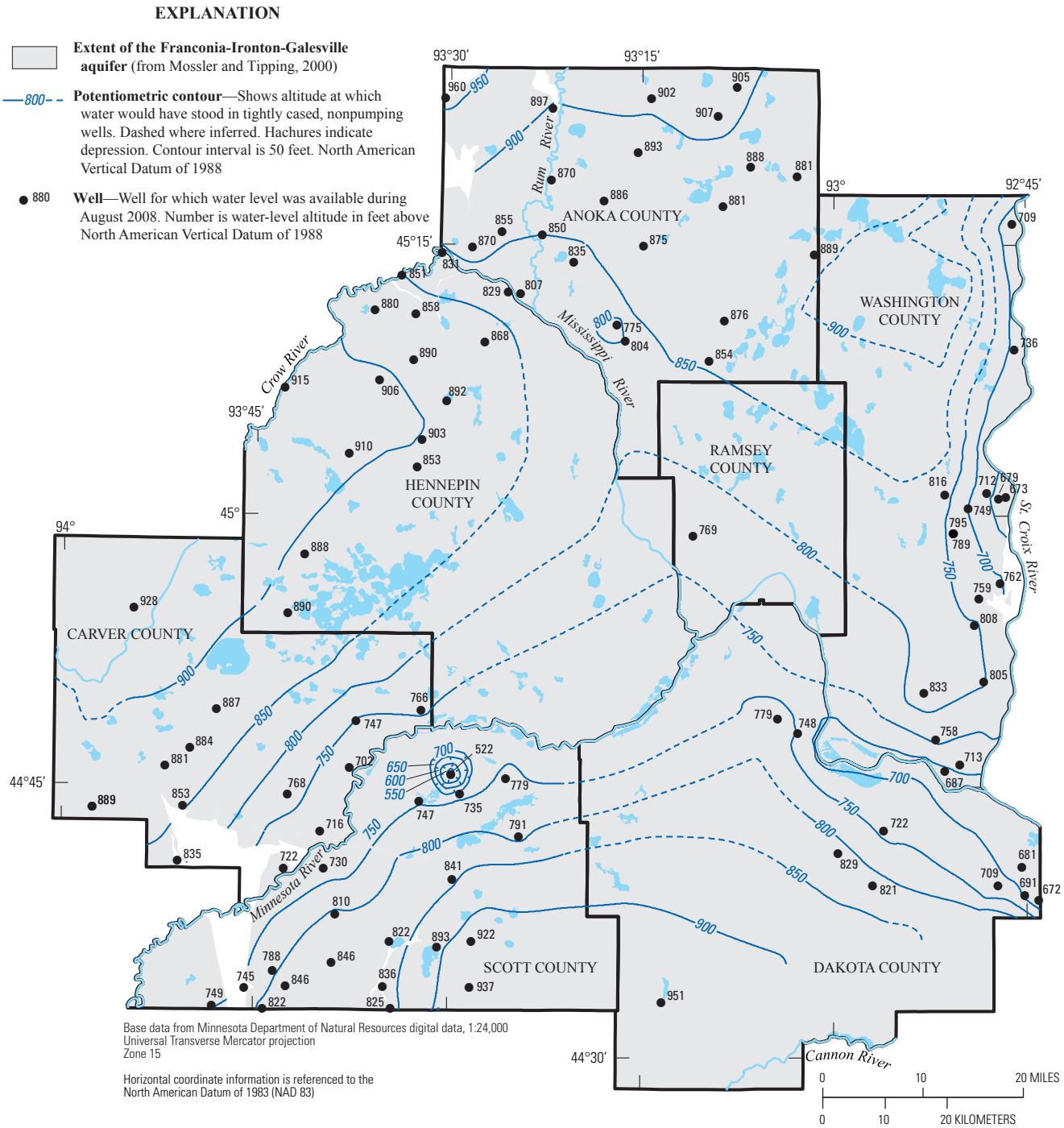

Figure 8. Potentiometric surface of the Franconia-Ironton-Galesville aquifer, August 2008.

The estimated long-term (19-year) groundwater-level changes for the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers have not been large based on data and maps produced during this study, despite the large seasonal fluctuations indicated by the March and August 2008 synoptic measurements.

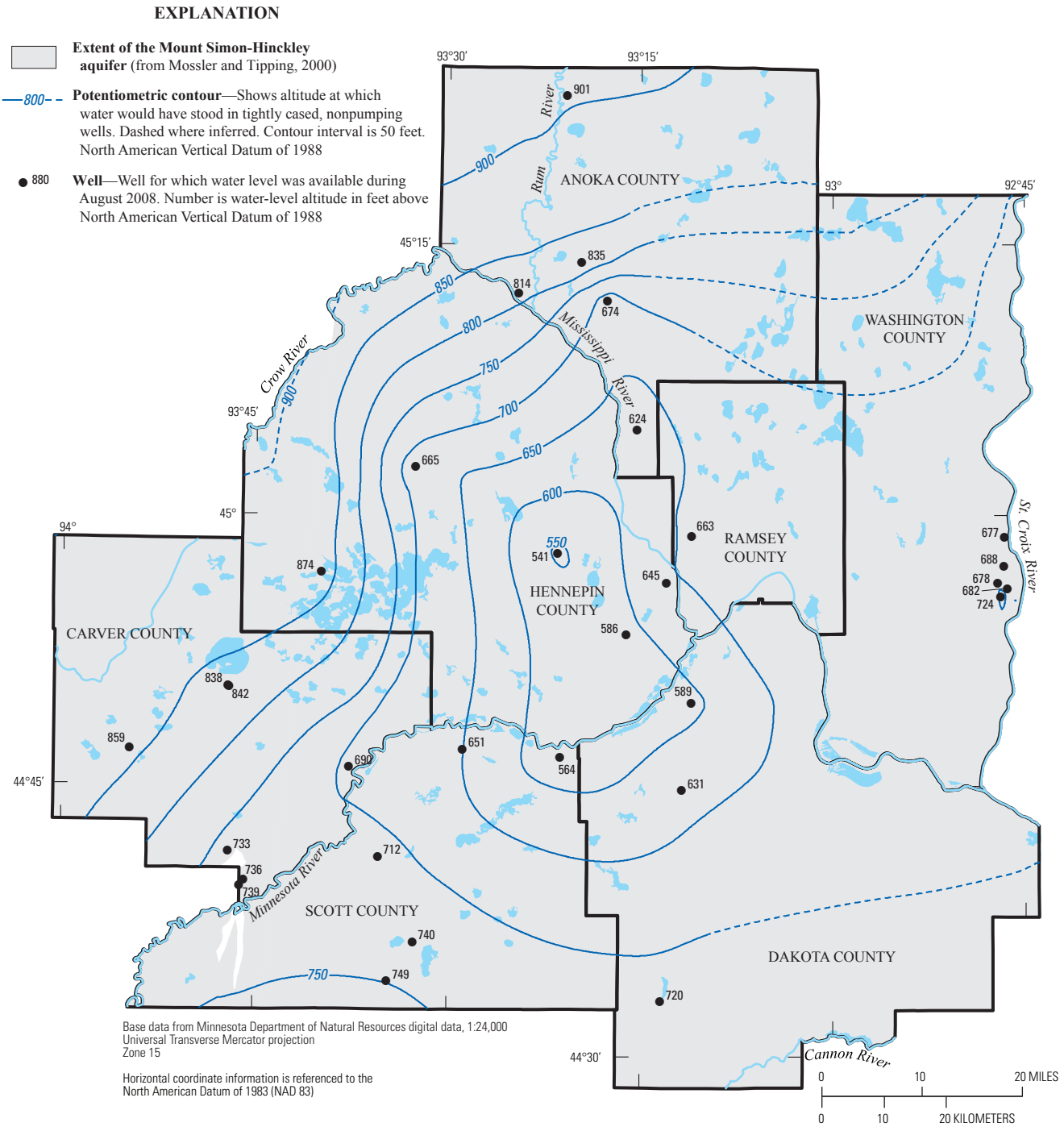

Figure 9. Potentiometric surface of the Mount Simon-Hinckley aquifer, August 2008.

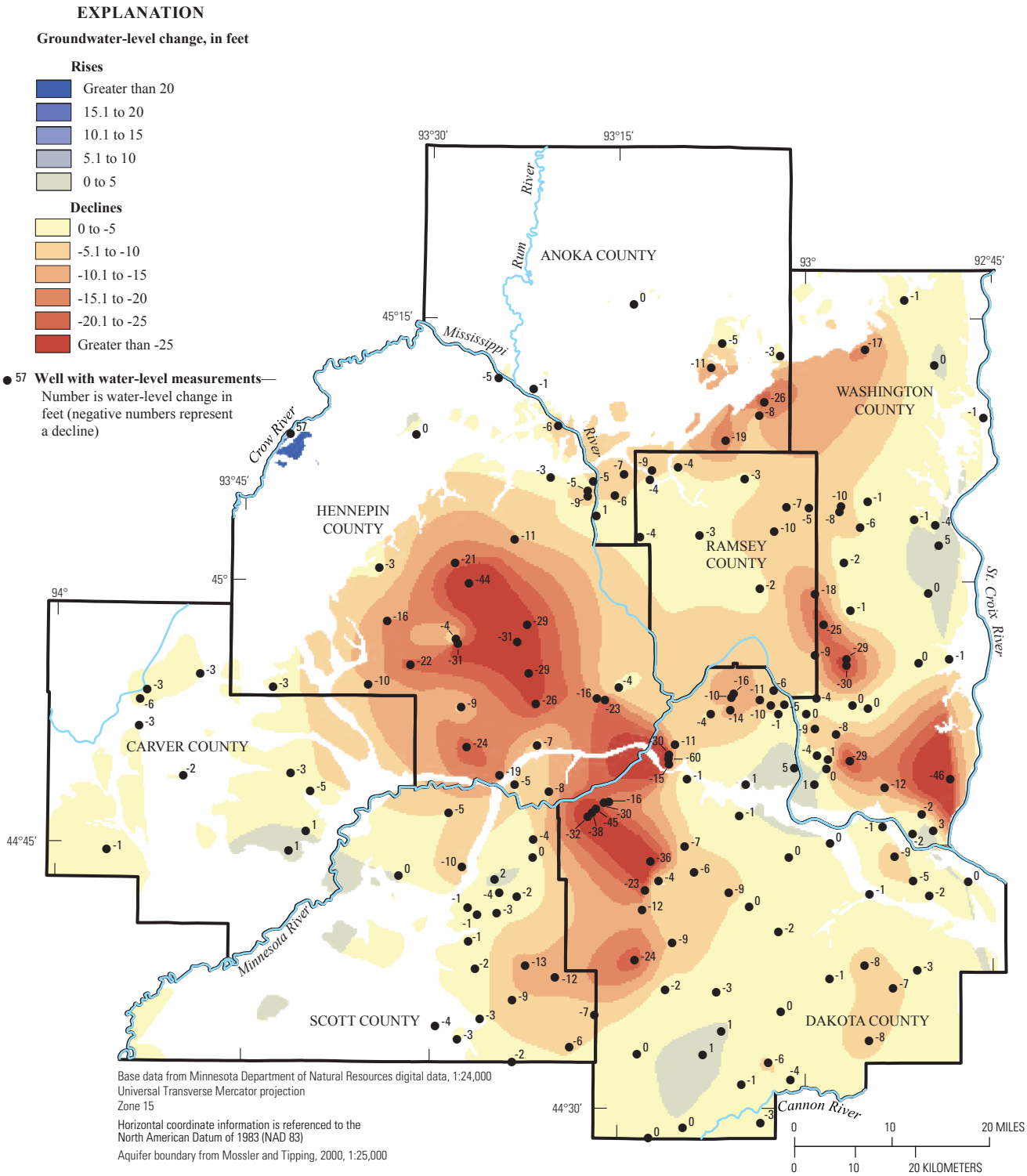

Figure 10. Groundwater-level changes in the Prairie du Chien-Jordan aquifer between March 2008 and August 2008.

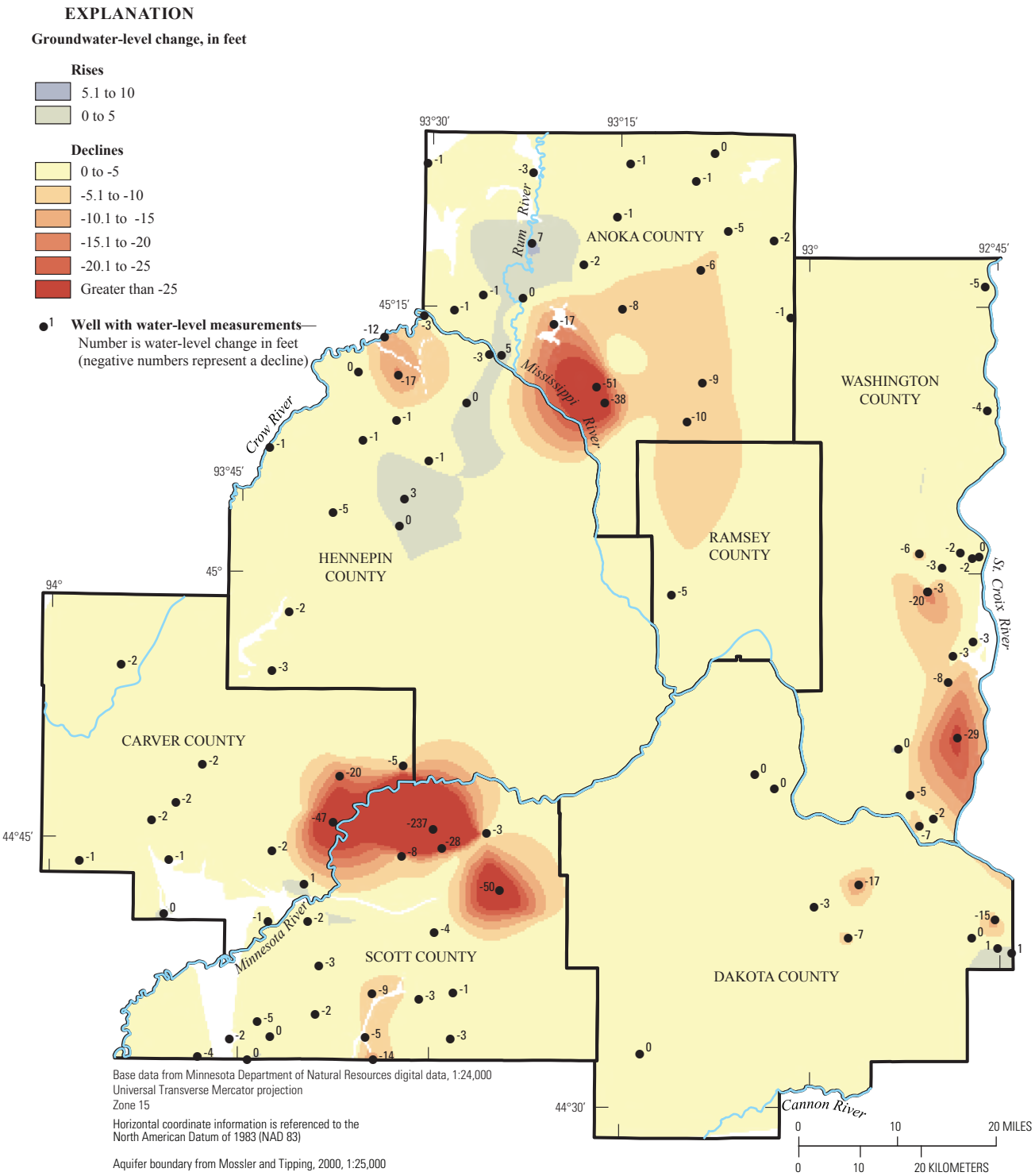

Figure 11. Groundwater-level changes in the Franconia-Ironton-Galesville aquifer between March 2008 and August 2008.

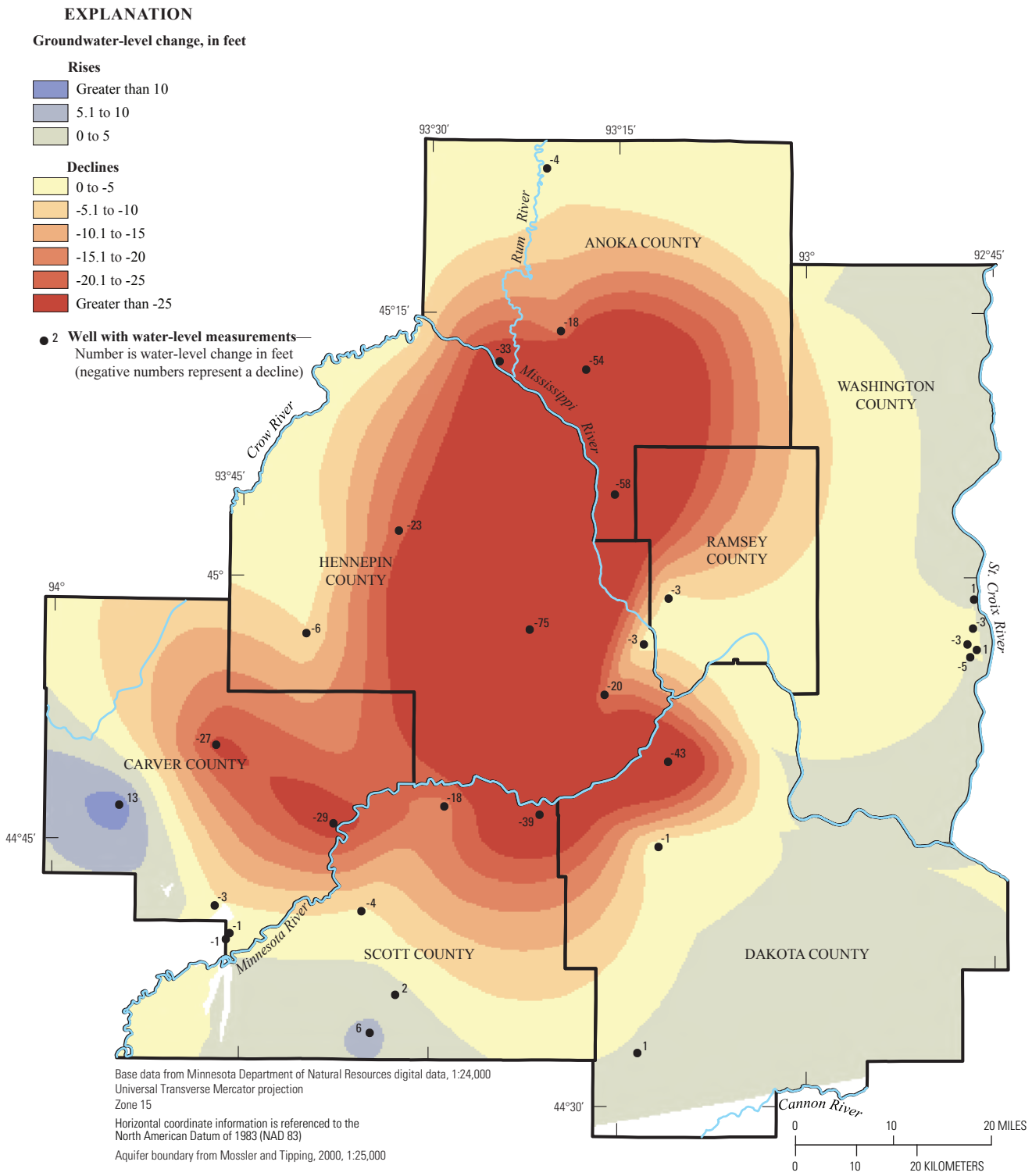

Figure 12. Groundwater-level changes in the Mount Simon-Hinckley aquifer between March 2008 and August 2008.

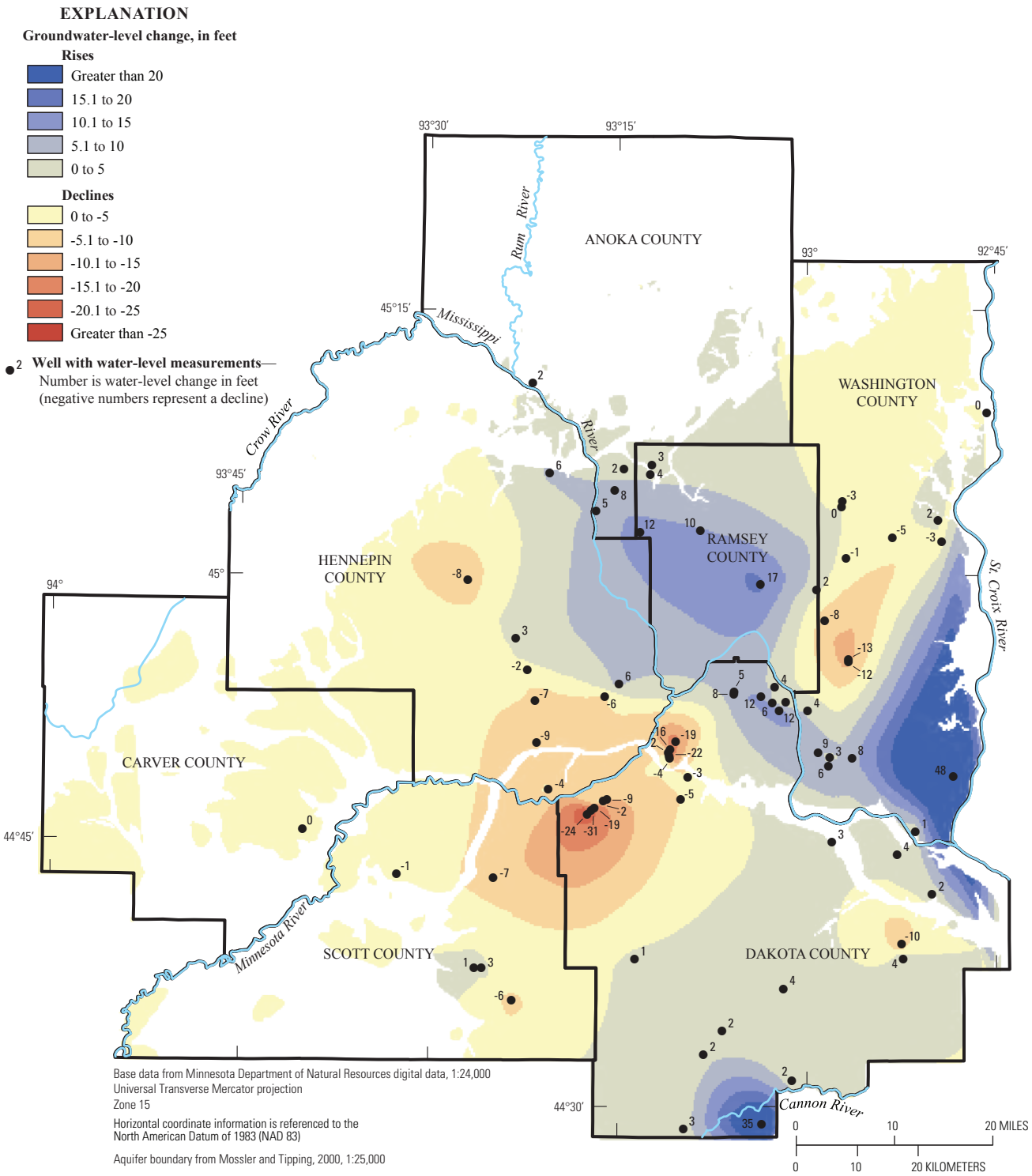

Figure 13. Groundwater-level changes in the Prairie du Chien-Jordan aquifer between the winter of 1988–89 and March 2008.

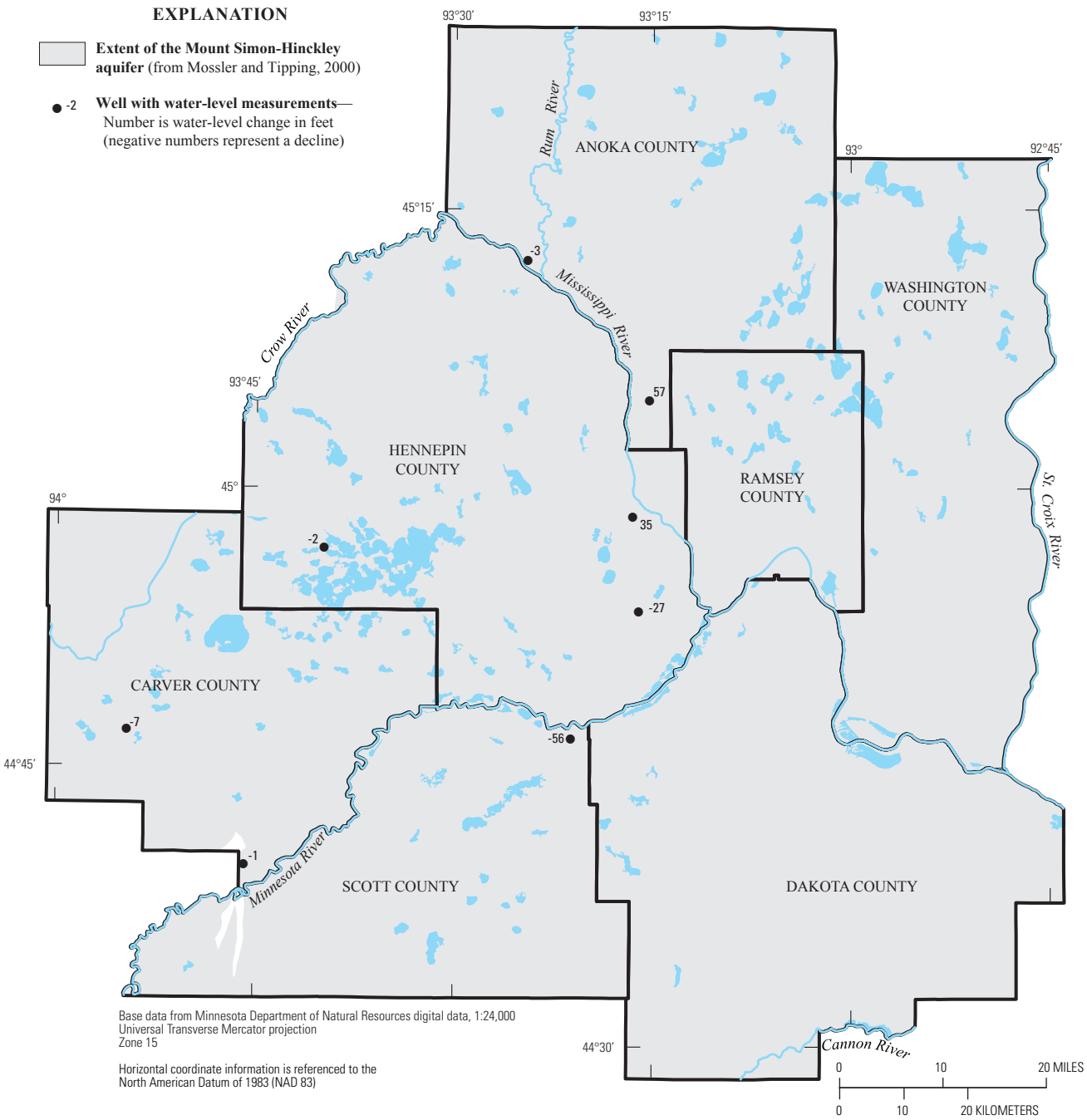

Figure 14. Groundwater-level changes in the Mount Simon-Hinckley aquifer between the winter of 1988–89 and March 2008.

Data Products

Included in this report are 22 GIS datasets in two data exchange formats: (1) an ESRI geodatabase, and (2) GIS shapefiles. Both types of data exchange formats include documentation (metadata) that explains the procedures used to generate and edit the datasets. The GIS datasets are listed in appendix 2.

Summary

This report depicts potentiometric surfaces and groundwater-level changes in three aquifers that underlie the seven-county Twin Cities Metropolitan Area. Approximately 350 groundwater levels were measured in wells from the three aquifers—the Prairie du Chien-Jordan, the Franconia-Ironton-Galesville, and the Mount Simon-Hinckley aquifers—in March and August of 2008. The report presents potentiometric surfaces and changes in groundwater-levels, associated data tables, and 22 geographic information system datasets. The maps presented in this report show the potentiometric surfaces in March and August of 2008 for all three aquifers, groundwater-level changes from March to August 2008 for each aquifer, revised potentiometric-surface contours for the winter of 1988–89 for the Prairie du Chien-Jordan and the Mount Simon-Hinckley aquifers, and the estimated long-term (winter of 1988–89 to March 2008) groundwater-level changes for the Prairie du Chien-Jordan and the Mount Simon-Hinckley aquifers. This report documents the methods used to construct the maps and provides a context for the period of the measurements.

Synoptic measurements of groundwater levels in the Prairie du Chien Jordan and Mount Simon-Hinckley aquifers were collected during the winter of 1988–89. Precipitation during 1981 to 1987 was substantially greater than the 30-year average (1978–2007). This was followed by an extreme drought in 1988, and moisture conditions had not yet fully recovered by the time of the winter 1988-89 synoptic measurement. For the two synoptic measurements during March and August, 2008, preceding precipitation was much more mixed, with alternating years of precipitation greater and less than the 30-year average.

Population in the TCMA has increased an estimated 24.5 percent since the 1990 decennial census. Withdrawals from the three major aquifers as a proportion to total withdrawal of groundwater in the TCMA has remained steady since 1988; however, withdrawals from the Prairie du Chien-Jordan aquifer since 1990 roughly have kept pace with the rate of population increase in the TCMA, from 185 million gallons per day (Mgal/d) in 1990 to 226 Mgal/d in 2007, or 22 percent.

Withdrawals from the Franconia-Ironton-Galesville aquifer have increased greatly. In 1990, withdrawal demand on the Franconia-Ironton-Galesville was 14.9 Mgal/d. By 2007, withdrawals had increased to 26.9 Mgal/d, an increase of 80 percent from withdrawal volumes in 1990. Withdrawals from the Mount Simon-Hinckley aquifer have increased slightly, from 28.6 Mgal/d in 1990 to 29.1 Mgal/d in 2007, or 1.7 percent. Although withdrawal demand is trending upward in the Twin Cities Metropolitan Area, particularly in the Prairie du Chien-Jordan aquifer, year-to-year changes in withdrawals can be substantial, and the relation between potentiometric surfaces in the major aquifers and year-to-year withdrawals is not well established. The estimated long-term (19- year) groundwater-level changes for the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers have not been large based on data and maps produced during this study, despite the large seasonal fluctuations shown by the March and August 2008 synoptic measurements.

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Appendix 1

http://pubs.usgs.gov/sir/2009/5226/downloads/Groundwater_level_data.xlsx

Groundwater-Level Data

The *http://pubs.usgs.gov/sir/2009/5226/downloads/Groundwater_level_data.xlsx* spreadsheet contains groundwater-level data and groundwater-level change data for wells completed in the Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and Mount Simon-Hinckley aquifers in the TCMA study area. Groundwater-level measurements are available for the winter of 1988-89 for the Prairie du Chien-Jordan and Mount Simon-Hinckley aquifers and for March and August 2008 for the Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and Mount Simon-Hinckley aquifers. Groundwater-level differences at same wells are available for seasonal comparisons between March and August 2008 for all three aquifers and long-term comparisons between the winter of 1988-89 and March 2008 for the Prairie du Chien-Jordan, and Mount Simon-Hinckley aquifers.

The spreadsheet contains 13 worksheets, one for each of 13 tables presented in Appendix 1. The following worksheets are contained in the spreadsheet:

1. Table A1 (from GIS dataset PDCJ_W89): Groundwater-level measurements used to construct the revised potentiometric-surface map of the Prairie du Chien-Jordan aquifer, winter 1988–89;
2. Table A2 (from GIS dataset MSH_W89): Groundwater-level measurements used to construct the revised potentiometric-surface map of the Mount Simon-Hinckley aquifer, winter 1988–89;
3. Table A3 (from GIS dataset PDCJ_M08): Groundwater-level measurements used to construct the potentiometric-surface map of the Prairie du Chien-Jordan aquifer, March 2008;
4. Table A4 (from GIS dataset FIG_M08): Groundwater-level measurements used to construct the potentiometric-surface map of the Franconia-Ironton-Galesville aquifer, March 2008;
5. Table A5 (from GIS dataset MSH_M08): Groundwater-level measurements used to construct the potentiometric-surface map of the Mount Simon-Hinckley aquifer, March 2008;
6. Table A6 (from GIS dataset PDCJ_A08): Groundwater-level measurements used to construct the potentiometric-surface map of the Prairie du Chien-Jordan aquifer, August 2008;
7. Table A7 (from GIS dataset FIG_A08): Groundwater-level measurements used to construct the potentiometric-surface map of the Franconia-Ironton-Galesville aquifer, August 2008;
8. Table A8 (from GIS dataset MSH_A08): Groundwater-level measurements used to construct the potentiometric-surface map of the Mount Simon-Hinckley aquifer, August 2008;
9. Table A9 (from GIS dataset PDCJ_M08_A08): Groundwater-level differences between March 2008 and August 2008 for wells used to construct the seasonal change map for the Prairie du Chien-Jordan aquifer;
10. Table A10 (from GIS dataset FIG_M08_A08): Groundwater-level differences between March 2008 and August 2008 for wells used to construct the seasonal change map for the Franconia-Ironton-Galesville aquifer;
11. Table A11 (from GIS dataset MSH_M08_A08): Groundwater-level differences between March 2008 and August 2008 for wells used to construct the seasonal change map for the Mount Simon-Hinckley aquifer;

12. Table A12 (from GIS dataset PDCJ_W89_M08): Groundwater-level differences between the winter of 1988–89 and March 2008 for wells used to construct the long-term change map for the Prairie du Chien-Jordan aquifer;

13. Table A13 (from GIS dataset MSH_W89_M08): Groundwater-level differences between the winter of 1988–89 and March 2008 for wells used to construct the long-term change map for the Mount Simon-Hinckley aquifer.

Table A1. Groundwater-level measurements used to construct the revised potentiometric-surface map of the Prairie du Chien-Jordan aquifer, winter 1988–89.

[Agency code: MN040, Minnesota Geological Survey, USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	450818093073401	367PRDC	12/--/1988	28.00	895.67	867.67	455748
MN040	451056093023901	371JRDN	11/02/1988	14.00	902.23	888.23	448867
MN040	451403093033701	371JRDN	12/21/1988	10.00	892.39	882.39	452594
MN040	442855093074801	371JRDN	11/07/1988	140.00	937.70	797.70	451609
MN040	442911093133101	367PRDC	11/07/1988	18.00	980.03	962.03	451178
MN040	443032093041401	371JRDN	12/14/1988	4.00	884.05	880.05	441260
MN040	443427093064001	371JRDN	12/19/1988	10.00	928.72	918.72	451176
MN040	443504092493801	367PRDC	12/23/1988	80.00	925.14	845.14	457130
MN040	444323093183401	367PRDC	12/22/1988	145.00	1047.03	902.03	452595
MN040	444503092575701	371JRDN	11/09/1988	100.00	785.33	685.33	451611
MN040	444520093095001	367PRDC	12/06/1988	40.00	906.73	866.73	457143
MN040	444657093095201	367PRDC	12/28/1988	201.40	1053.32	851.92	434019
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MN040	444842093092401	371JRDN	12/28/1988	91.00	885.56	794.56	186310
MN040	445017093053701	367PRDC	11/21/1988	200.00	1141.29	941.29	451578
MN040	445017093111401	371JRDN	12/28/1988	141.40	840.36	698.96	205593
MN040	445051093073801	367PRDC	12/28/1988	100.00	867.22	767.22	124343
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MN040	445007093205201	371JRDN	12/05/1988	140.40	869.05	728.65	222910
MN040	445146093255801	367PRDC	01/01/1989	57.00	859.53	802.53	205897
MN040	445146093255801	367PRDC	03/06/1989	57.31	859.53	802.22	205897
MN040	445446093215601	367PRDC	12/21/1988	100.00	912.65	812.65	242300
MN040	450510093065001	367PRDC	11/02/1988	65.00	928.48	863.48	449164
MN040	443425093204601	367PRDC	12/02/1988	165.00	1131.95	966.95	451185
MN040	444700092483901	371JRDN	12/20/1988	138.00	810.81	672.81	453266
MN040	444835092590701	371JRDN	12/15/1988	40.00	750.32	710.32	453262
MN040	445153092584101	367PRDC	11/18/1988	260.00	998.61	738.61	453251
MN040	445154092571801	367PRDC	12/13/1988	150.00	919.67	769.67	453260
MN040	445233092590001	367PRDC	11/08/1988	217.00	956.46	739.46	453242
MN040	445236092545501	367PRDC	12/08/1988	125.00	940.79	815.79	453258
MN040	445242092593601	367PRDC	12/08/1988	130.00	843.31	713.31	450644
MN040	445757092501301	371JRDN	12/20/1988	105.00	905.58	800.58	453265
MN040	445824092504401	371JRDN	11/04/1988	138.00	948.16	810.16	453231
MN040	445911092493101	371JRDN	12/14/1988	206.00	1029.61	823.61	453261
MN040	445913092502701	371JRDN	12/12/1988	218.00	940.72	722.72	453259
MN040	445950092503901	367PRDC	12/08/1988	90.00	929.94	839.94	242104
MN040	450529092560301	367PRDC	12/17/1988	99.00	1030.18	931.18	441796
MN040	450549092540401	367PRDC	12/02/1988	20.00	971.13	951.13	453780
MN040	450616092574101	367PRDC	11/01/1988	85.00	967.85	882.85	450621
MN040	450822092555901	367PRDC	11/10/1988	40.00	987.53	947.53	439242
MN040	450826092531601	367PRDC	12/09/1988	58.00	1003.94	945.94	453257
MN040	450919092511501	367PRDC	11/02/1988	45.00	971.13	926.13	453240

Table A1. Groundwater-level measurements used to construct the revised potentiometric-surface map of the Prairie du Chien-Jordan aquifer, winter 1988–89.—Continued

[Agency code: MN040, Minnesota Geological Survey, USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	451347092504801	367PRDC	12/03/1988	24.00	944.88	920.88	441792
MN040	441450093265701	367PRDC	11/23/1988	95.00	1085.51	990.51	451200
MN040	442218093170901	367PRDC	11/11/1988	70.00	1059.31	989.31	451202
MN040	442724093174101	367PRDC	11/14/1988	35.00	1013.63	978.63	451201
MN040	443133093243801	367PRDC	11/15/1988	119.00	1077.02	958.02	451207
MN040	443210093185801	367PRDC	12/22/1988	170.00	1120.56	950.56	451206
MN040	441545092573401	367PRDC	11/22/1988	236.00	1221.28	985.28	451194
MN040	442302092481901	367PRDC	12/15/1988	150.00	1139.69	989.69	457129
MN040	442939092531301	367PRDC	11/03/1988	240.00	1069.56	829.56	451584
MN040	443207092450901	371JRDN	11/28/1988	260.00	986.27	726.27	451580
MN040	443220092434401	371JRDN	11/03/1988	360.00	981.85	621.85	451585
MN040	450828093071201	367PRDC	02/07/1989	27.00	898.95	871.95	124357
MN040	450947093191701	371JRDN	03/28/1989	40.00	869.42	829.42	452389
USGS	450343093164401	378PDCJ	02/07/1989	23.00	833.33	810.33	206696
USGS	450447093151602	367PRDC	02/07/1989	66.00	879.27	813.27	206669
USGS	450453093151403	367PRDC	02/07/1989	67.00	882.55	815.55	206678
USGS	450607093143101	371JRDN	02/07/1989	54.00	889.11	835.11	209207
USGS	450927093033802	371JRDN	01/26/1989	13.00	898.95	885.95	208573
USGS	451057093214901	371JRDN	02/08/1989	24.00	869.42	845.42	202937
MN040	444540093395501	371JRDN	02/14/1989	101.00	836.76	735.76	137419
MN040	442849093094002	371JRDN	02/10/1989	36.00	966.77	930.77	119647
MN040	442909093033201	367PRDC	02/10/1989	125.00	991.45	866.45	119649
MN040	443132092563701	371JRDN	01/11/1989	7.00	860.17	853.17	451579
MN040	443207093092501	378PDCJ	02/10/1989	1.00	924.47	923.47	207697
MN040	443222092590701	378PDCJ	02/21/1989	-1.00	877.92	878.92	207651
MN040	443310093025601	367PRDC	01/26/1989	30.00	940.86	910.86	457133
MN040	443446092513801	367PRDC	02/21/1989	63.00	911.26	848.26	170867
MN040	443519093161801	367PRDC	02/10/1989	61.00	1011.04	950.04	207536
MN040	443633093014901	367PRDC	01/03/1989	40.00	925.50	885.50	457135
MN040	443646093121501	367PRDC	02/10/1989	12.00	943.94	931.94	207514
MN040	443745092491001	378PDCJ	02/17/1989	115.00	921.25	806.25	170869
MN040	443757093182701	367PRDC	01/18/1989	204.00	1125.10	921.10	458487
MN040	443824093133401	371JRDN	02/13/1989	24.00	950.63	926.63	207727
MN040	443826092571301	371JRDN	02/01/1989	50.00	904.85	854.85	104138
MN040	443925093065401	367PRDC	01/05/1989	15.00	890.25	875.25	457146
MN040	443934093045801	378PDCJ	02/20/1989	5.00	875.15	870.15	207706
MN040	443959093111501	367PRDC	02/10/1989	62.00	970.19	908.19	100982
MN040	444040092554801	378PDCJ	02/17/1989	48.00	838.40	790.40	216366
MN040	444110093185001	367PRDC	02/09/1989	89.00	994.64	905.64	207764
MN040	444113092550001	367PRDC	03/21/1989	73.00	831.25	758.25	179822
MN040	444131092542901	378PDCJ	02/17/1989	78.00	828.02	750.02	207623
MN040	444302093014001	367PRDC	02/08/1989	67.00	904.63	837.63	104112

Table A1. Groundwater-level measurements used to construct the revised potentiometric-surface map of the Prairie du Chien-Jordan aquifer, winter 1988–89.—Continued

[Agency code: MN040, Minnesota Geological Survey, USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	444333093191901	367PRDC	02/13/1989	75.00	962.15	887.15	126944
MN040	444403093112201	371JRDN	01/31/1989	98.00	984.42	886.42	207675
MN040	444423093044701	371JRDN	03/18/1989	73.00	940.13	867.13	457167
MN040	444447093110301	371JRDN	01/31/1989	105.00	982.57	877.57	151563
MN040	444448093120501	371JRDN	01/31/1989	115.00	1017.42	902.42	151561
MN040	444508093092001	367PRDC	01/31/1989	66.00	937.05	871.05	207592
MN040	444620093182901	371JRDN	02/16/1989	67.00	797.03	730.03	207691
MN040	444633093160501	371JRDN	01/31/1989	125.00	869.47	744.47	112235
MN040	444644093165801	371JRDN	02/16/1989	95.00	793.40	698.40	206174
MN040	444645093094301	367PRDC	02/28/1989	133.00	973.12	840.12	242324
MN040	444654093165201	371JRDN	02/16/1989	41.00	765.23	724.23	206177
MN040	444718093124601	371JRDN	02/28/1989	108.00	906.21	798.21	205802
MN040	444724093160301	371JRDN	02/16/1989	95.00	835.29	740.29	127259
MN040	444726093094001	371JRDN	02/27/1989	201.00	1016.97	815.97	439839
MN040	444838093145801	378PDCJ	02/16/1989	7.00	707.09	700.09	207690
MN040	444925093033701	367PRDC	01/11/1989	180.00	940.01	760.01	451620
MN040	444950093103001	371JRDN	02/27/1989	134.00	898.62	764.62	434030
MN040	444951093104901	371JRDN	02/22/1989	104.00	839.34	735.34	207258
MN040	444956093105301	371JRDN	02/22/1989	130.00	828.27	698.27	235373
MN040	444957093104901	371JRDN	02/22/1989	127.00	861.85	734.85	205595
MN040	445041093102101	371JRDN	02/27/1989	166.00	900.18	734.18	205809
MN040	445202093011701	371JRDN	03/28/1989	3.00	702.85	699.85	457170
MN040	445230093015501	378PDCJ	02/07/1989	90.00	787.73	697.73	208347
MN040	445255093013301	371JRDN	02/07/1989	3.00	690.11	687.11	200676
MN040	445316093033401	371JRDN	02/07/1989	209.00	906.60	697.60	127251
USGS	442830093085201	371JRDN	01/24/1989	-8.00	891.48	899.48	217751
USGS	443134093010601	367PRDC	01/24/1989	16.00	880.36	864.36	207650
USGS	443233092584501	367PRDC	02/21/1989	-1.00	876.58	877.58	207651
USGS	443237093124201	367PRDC	02/10/1989	38.00	985.27	947.27	--
USGS	443303093080701	367PRDC	02/10/1989	24.00	939.41	915.41	--
USGS	443327092554501	378PDCJ	02/21/1989	2.00	870.26	868.26	--
USGS	443408093030101	378PDCJ	02/20/1989	113.00	1003.43	890.43	--
USGS	443429093063401	367PRDC	02/20/1989	11.00	929.88	918.88	--
USGS	443525092490501	378PDCJ	02/21/1989	99.00	937.04	838.04	255865
USGS	443542093112601	367PRDC	02/10/1989	29.00	967.89	938.89	19W0000696
USGS	443635092594701	371JRDN	02/20/1989	106.00	989.09	883.09	205799
USGS	443645093014701	367PRDC	01/24/1989	31.00	914.21	883.21	101062
USGS	443711093155001	367PRDC	02/09/1989	69.00	1011.94	942.94	--
USGS	443724092502901	367PRDC	02/17/1989	103.00	911.12	808.12	224392
USGS	443825093084501	378PDCJ	02/21/1989	8.00	905.02	897.02	200932
USGS	443827092521801	378PDCJ	01/24/1989	65.00	866.65	801.65	243754
USGS	443829093122101	367PRDC	02/10/1989	15.00	940.72	925.72	--

Table A1. Groundwater-level measurements used to construct the revised potentiometric-surface map of the Prairie du Chien-Jordan aquifer, winter 1988–89.—Continued

[Agency code: MN040, Minnesota Geological Survey, USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
USGS	443841092545801	378PDCJ	02/21/1989	35.00	879.06	844.06	W0000581
USGS	443919092522501	378PDCJ	02/17/1989	91.00	860.57	769.57	207900
USGS	444026092522401	367PRDC	02/17/1989	75.00	826.51	751.51	170856
USGS	444100093075701	378PDCJ	02/15/1989	101.00	986.02	885.02	401150
USGS	444205092500001	367PRDC	02/20/1989	101.00	825.93	724.93	243739
USGS	444220093055001	371JRDN	01/24/1989	59.00	946.35	887.35	207608
USGS	444227093125201	378PDCJ	02/13/1989	39.00	939.80	900.80	212650
USGS	444234092502301	367PRDC	02/17/1989	112.00	834.07	722.07	--
USGS	444311093064201	378PDCJ	02/15/1989	66.00	934.56	868.56	207617
USGS	444420092524501	371JRDN	02/17/1989	150.00	858.70	708.70	207639
USGS	444451093012501	367PRDC	02/08/1989	29.00	849.94	820.94	235755
USGS	444643093172701	371JRDN	02/16/1989	79.00	780.63	701.63	206179
USGS	444727093095801	371JRDN	02/22/1989	118.00	930.31	812.31	112234
USGS	444728093154701	371JRDN	02/16/1989	152.00	880.11	728.11	206170
USGS	444846093022501	367PRDC	02/07/1989	179.00	919.57	740.57	--
USGS	444951093025101	367PRDC	02/07/1989	207.00	908.15	701.15	251568
USGS	445000093105001	371JRDN	02/22/1989	137.00	836.17	699.17	205596
USGS	445037093020801	371JRDN	02/08/1989	178.00	888.83	710.83	225846
USGS	445044093102401	371JRDN	01/20/1989	162.00	895.56	733.56	205809
USGS	445227093020601	378PDCJ	02/07/1989	90.00	798.55	708.55	208347
USGS	445239093055201	367PRDC	02/07/1989	228.00	980.19	752.19	--
USGS	445255093023901	371JRDN	02/07/1989	135.00	844.19	709.19	200674
USGS	445255093093201	378PDCJ	02/17/1989	156.00	841.10	685.10	200864
USGS	445256093023901	371JRDN	02/07/1989	66.00	829.86	763.86	200674
USGS	445330093054101	378PDCJ	01/25/1989	315.00	1037.53	722.53	200660
USGS	445330093054301	367PRDC	02/20/1989	311.00	1046.36	735.36	200661
USGS	445348093022901	378PDCJ	02/07/1989	54.00	751.56	697.56	200665
USGS	445412093075001	367PRDC	02/08/1989	99.00	806.85	707.85	--
MN040	444946093300901	378PDCJ	02/01/1989	163.00	918.41	755.41	125905
MN040	445015093205901	371JRDN	02/01/1989	125.00	877.42	752.42	222914
MN040	445037093212401	371JRDN	02/01/1989	138.00	905.45	767.45	222916
MN040	445135093272801	378PDCJ	02/24/1989	66.00	858.90	792.90	205905
MN040	445151093274301	378PDCJ	02/21/1989	48.00	844.79	796.79	147454
MN040	445157093272901	378PDCJ	02/21/1989	44.00	834.69	790.69	112242
MN040	445158093275901	378PDCJ	02/24/1989	65.00	861.72	796.72	147453
MN040	445211093282801	371JRDN	01/30/1989	57.00	838.46	781.46	424924
MN040	445215093275401	378PDCJ	02/24/1989	67.00	864.75	797.75	147452
MN040	445223093281301	371JRDN	02/27/1989	60.00	857.13	797.13	424925
MN040	445237093282001	371JRDN	02/24/1989	76.00	868.50	792.50	424926
MN040	445246093282301	371JRDN	02/24/1989	64.00	870.93	806.93	424927
MN040	445300093122301	378PDCJ	02/01/1989	94.00	818.40	724.40	208322
MN040	445301093213201	378PDCJ	02/01/1989	66.00	870.27	804.27	204884

Table A1. Groundwater-level measurements used to construct the revised potentiometric-surface map of the Prairie du Chien-Jordan aquifer, winter 1988–89.—Continued

[Agency code: MN040, Minnesota Geological Survey, USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	445313093155701	378PDCJ	01/13/1989	49.00	829.46	780.46	206276
MN040	445358093145201	367PRDC	01/25/1989	40.00	840.18	800.18	200586
MN040	445415093352201	371JRDN	02/01/1989	76.00	954.96	878.96	206942
MN040	445445093220801	371JRDN	02/01/1989	90.00	896.34	806.34	207674
MN040	445524093312401	371JRDN	02/01/1989	99.00	965.35	866.35	205649
MN040	445630093230301	378PDCJ	02/01/1989	114.00	932.13	818.13	203196
MN040	445725093154301	371JRDN	02/17/1989	102.00	861.47	759.47	433286
MN040	445730093222101	378PDCJ	02/01/1989	84.00	899.79	815.79	206437
MN040	445747093172901	367PRDC	03/08/1989	115.00	895.67	780.67	242344
MN040	445906093342301	378PDCJ	02/01/1989	84.00	989.22	905.22	208849
MN040	445950093265801	371JRDN	02/01/1989	137.00	980.97	843.97	204617
MN040	450143093125901	371JRDN	02/01/1989	206.00	1010.50	804.50	200803
MN040	450408093193401	371JRDN	02/01/1989	21.00	859.58	838.58	203317
MN040	450432093232901	371JRDN	02/01/1989	19.00	882.55	863.55	203291
MN040	450447093174701	378PDCJ	02/01/1989	34.00	843.18	809.18	203321
MN040	450459093172501	371JRDN	02/01/1989	39.00	849.74	810.74	203257
MN040	450517093215101	371JRDN	02/01/1989	18.00	872.70	854.70	241373
MN040	450553093202601	371JRDN	02/01/1989	26.00	866.14	840.14	203021
USGS	444801093202801	371JRDN	02/20/1989	77.00	822.96	745.96	233183
USGS	445038093161801	378PDCJ	02/01/1989	75.00	830.24	755.24	205245
USGS	445303093153401	378PDCJ	01/13/1989	56.00	830.93	774.93	206279
USGS	445318093163801	371JRDN	01/13/1989	47.00	836.30	789.30	206354
USGS	445324093163702	371JRDN	01/13/1989	48.00	826.25	778.25	206353
USGS	445325093160101	378PDCJ	01/13/1989	53.00	840.87	787.87	206361
USGS	445740093333001	378PDCJ	02/20/1989	32.00	935.96	903.96	--
USGS	445752093380901	371JRDN	02/01/1989	53.00	945.53	892.53	207011
USGS	445930093220901	371JRDN	02/01/1989	57.00	869.42	812.42	236585
USGS	450144093125901	378PDCJ	02/01/1989	204.00	1013.78	809.78	200804
USGS	450223093231801	371JRDN	02/20/1989	66.00	925.20	859.20	27011
USGS	450456093172401	371JRDN	02/01/1989	37.00	849.74	812.74	203258
MN040	445429093085801	378PDCJ	02/10/1989	84.00	780.29	696.29	200434
MN040	445503093111701	378PDCJ	02/01/1989	131.00	857.11	726.11	200435
MN040	445651093053301	378PDCJ	02/14/1989	62.00	767.63	705.63	200022
MN040	445937093033501	371JRDN	02/09/1989	69.00	869.42	800.42	225903
MN040	450005093114801	371JRDN	02/07/1989	174.00	964.57	790.57	200149
MN040	450019093104101	371JRDN	02/07/1989	199.00	977.69	778.69	200139
MN040	450212093082401	371JRDN	02/06/1989	129.00	951.44	822.44	206834
MN040	450235093002001	378PDCJ	02/15/1989	91.00	967.85	876.85	226566
MN040	450513093064701	367PRDC	01/04/1989	70.00	931.76	861.76	448709
MN040	450652093054201	367PRDC	02/06/1989	45.00	905.51	860.51	14093
USGS	445645093025001	371JRDN	02/13/1989	4.00	733.94	729.94	424921
USGS	445700093051001	378PDCJ	02/20/1989	36.00	749.16	713.16	200517

Table A1. Groundwater-level measurements used to construct the revised potentiometric-surface map of the Prairie du Chien-Jordan aquifer, winter 1988–89.—Continued

[Agency code: MN040, Minnesota Geological Survey, USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
USGS	445853093105001	378PDCJ	02/08/1989	133.00	905.51	772.51	--
USGS	445918092590901	371JRDN	01/31/1989	137.00	1000.66	863.66	200874
USGS	445947093020201	367PRDC	02/07/1989	61.00	898.95	837.95	225902
USGS	450020093033001	378PDCJ	02/07/1989	66.00	885.83	819.83	200453
USGS	450231093131301	371JRDN	02/16/1989	137.00	958.01	821.01	200524
USGS	450238093082501	371JRDN	02/20/1989	139.00	964.57	825.57	206833
USGS	450302093121601	371JRDN	02/16/1989	100.00	918.64	818.64	206791
USGS	450323093133102	371JRDN	02/16/1989	204.00	1036.75	832.75	206797
USGS	450336093002201	378PDCJ	02/15/1989	81.00	964.57	883.57	226567
USGS	450449093081501	378PDCJ	02/15/1989	61.00	915.35	854.35	206752
USGS	450514093042801	371JRDN	02/15/1989	36.00	921.92	885.92	13875
USGS	450546093122601	378PDCJ	02/14/1989	67.00	898.95	831.95	206722
USGS	450620093121701	371JRDN	02/14/1989	65.00	905.51	840.51	206720
USGS	450715093032101	367PRDC	02/15/1989	37.00	931.76	894.76	--
USGS	450723093071801	367PRDC	01/26/1989	29.00	898.95	869.95	206707
MN040	443248093184501	378PDCJ	03/09/1989	199.00	1159.11	960.11	502729
MN040	443605093231801	378PDCJ	03/24/1989	60.00	1012.25	952.25	129152
MN040	443859093335101	371JRDN	03/23/1989	79.00	934.09	855.09	207432
MN040	443937093192401	367PRDC	03/24/1989	188.00	1106.30	918.30	207188
MN040	444222093224601	367PRDC	03/24/1989	62.00	940.11	878.11	207920
USGS	443241093342001	378PDCJ	03/22/1989	135.00	995.98	860.98	240054
USGS	443344093211201	371JRDN	03/24/1989	174.00	1144.29	970.29	534373
USGS	443357093275201	371JRDN	03/24/1989	77.00	1020.06	943.06	--
USGS	443714093201401	367PRDC	03/24/1989	141.00	1090.37	949.37	207890
USGS	443752093254401	378PDCJ	03/24/1989	87.00	1008.48	921.48	119589
USGS	443752093261701	378PDCJ	03/24/1989	48.00	969.14	921.14	207938
USGS	443935093364601	371JRDN	03/22/1989	120.00	924.90	804.90	221333
USGS	444258093244701	371JRDN	03/24/1989	41.00	928.18	887.18	207308
USGS	444315093322301	371JRDN	03/24/1989	194.00	960.23	766.23	213938
USGS	444427093353901	371JRDN	03/14/1989	42.00	752.37	710.37	244436
USGS	444641093203601	371JRDN	03/21/1989	5.00	720.58	715.58	208836
USGS	444735093324401	367PRDC	03/21/1989	59.00	753.43	694.43	--
USGS	444750093295801	371JRDN	01/31/1989	44.00	749.90	705.90	249581
MN040	444920092581201	371JRDN	03/01/1989	77.00	819.36	742.36	208809
MN040	444945092562301	378PDCJ	03/01/1989	106.00	873.32	767.32	208807
MN040	444950092580601	371JRDN	03/01/1989	55.00	808.54	753.54	208808
MN040	445004092590101	371JRDN	02/16/1989	96.00	813.75	717.75	208804
MN040	445156092584201	367PRDC	01/13/1989	250.00	982.47	732.47	453275
MN040	445157092584701	367PRDC	03/13/1989	240.00	985.03	745.03	457692
MN040	445203092585901	367PRDC	03/07/1989	225.00	958.61	733.61	457689
MN040	445211092561201	367PRDC	02/23/1989	230.00	1020.46	790.46	457685
MN040	445238092592901	367PRDC	02/08/1989	120.00	804.79	684.79	457676

Table A1. Groundwater-level measurements used to construct the revised potentiometric-surface map of the Prairie du Chien-Jordan aquifer, winter 1988–89.—Continued

[Agency code: MN040, Minnesota Geological Survey, USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	445514092563601	371JRDN	02/08/1989	190.00	1030.94	840.94	208423
MN040	445521092563601	371JRDN	02/08/1989	166.00	1001.90	835.90	208005
MN040	445659092561701	371JRDN	02/08/1989	134.00	1021.98	887.98	208467
MN040	445733092582901	371JRDN	02/09/1989	190.00	1023.62	833.62	208463
MN040	445744092524101	371JRDN	02/08/1989	24.00	918.64	894.64	208468
MN040	445745092510101	371JRDN	03/17/1989	180.00	912.07	732.07	457693
MN040	445811092552001	367PRDC	02/16/1989	120.00	1026.90	906.90	457683
MN040	445908092514001	367PRDC	01/31/1989	50.00	921.92	871.92	441775
MN040	445948092513101	367PRDC	01/06/1989	46.00	921.92	875.92	442437
MN040	445957092514801	367PRDC	01/06/1989	36.00	918.64	882.64	442457
MN040	450013092501501	371JRDN	02/07/1989	44.00	931.29	887.29	242354
MN040	450032092521301	367PRDC	03/31/1989	80.00	931.76	851.76	457703
MN040	450110092495201	371JRDN	02/22/1989	100.00	940.71	840.71	457684
MN040	450122092505801	367PRDC	01/31/1989	85.00	928.48	843.48	457686
MN040	450136092550901	367PRDC	02/17/1989	60.00	951.44	891.44	457681
MN040	450210092532901	367PRDC	02/20/1989	60.00	948.16	888.16	457682
MN040	450220092494201	371JRDN	02/07/1989	109.00	953.53	844.53	127284
MN040	450247092502201	371JRDN	02/07/1989	69.00	922.82	853.82	224608
MN040	450302092583701	367PRDC	03/15/1989	94.00	1003.94	909.94	433255
MN040	450354092572301	371JRDN	03/05/1989	87.00	997.38	910.38	208506
MN040	450415092570101	378PDCJ	03/22/1989	64.00	980.97	916.97	208497
MN040	450504092543401	367PRDC	02/--/1989	88.00	1017.06	929.06	455761
MN040	450638092571001	367PRDC	03/24/1989	70.00	997.38	927.38	450669
MN040	450658092521501	367PRDC	01/23/1989	40.00	954.72	914.72	448705
MN040	450943092593901	371JRDN	02/22/1989	18.00	931.76	913.76	208521
MN040	450944092563901	367PRDC	02/13/1989	89.00	1017.06	928.06	112437
MN040	451741092582301	371JRDN	02/09/1989	13.00	905.51	892.51	112708
USGS	444534092512601	378PDCJ	02/14/1989	176.00	860.29	684.29	--
USGS	444751092563101	367PRDC	01/24/1989	76.00	808.22	732.22	224647
USGS	444843092481801	367PRDC	02/16/1989	183.00	893.23	710.23	134757
USGS	444919092581501	371JRDN	02/14/1989	84.00	819.04	735.04	208809
USGS	444938092574701	367PRDC	02/14/1989	48.00	796.26	748.26	233510
USGS	444946092562101	371JRDN	02/14/1989	114.00	881.27	767.27	208807
USGS	444950092580701	371JRDN	02/14/1989	62.00	809.58	747.58	208808
USGS	445004092590001	371JRDN	02/16/1989	96.00	814.73	718.73	208804
USGS	445047092500801	378PDCJ	02/14/1989	81.00	933.12	852.12	--
USGS	445052092480201	367PRDC	02/16/1989	219.00	971.12	752.12	--
USGS	445054092594501	371JRDN	02/16/1989	55.00	747.30	692.30	208414
USGS	445227092595101	371JRDN	02/16/1989	29.00	748.50	719.50	208353
USGS	445607092503701	367PRDC	02/08/1989	57.00	895.58	838.58	177085
USGS	450027092503501	367PRDC	02/08/1989	65.00	933.36	868.36	--
USGS	450028092552301	371JRDN	01/17/1989	41.00	938.32	897.32	--

Table A1. Groundwater-level measurements used to construct the revised potentiometric-surface map of the Prairie du Chien-Jordan aquifer, winter 1988–89.—Continued

[Agency code: MN040, Minnesota Geological Survey, USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
USGS	450103092564901	378PDCJ	02/22/1989	32.00	921.92	889.92	--
USGS	450153092510501	378PDCJ	02/07/1989	59.00	935.04	876.04	--
USGS	450201092491101	371JRDN	02/08/1989	139.00	941.00	802.00	112205
USGS	450213092530601	367PRDC	02/07/1989	52.00	948.16	896.16	242357
USGS	450232092515401	367PRDC	02/08/1989	91.00	971.13	880.13	542039
USGS	450312092492802	371JRDN	02/22/1989	71.00	883.37	812.37	208786
USGS	450358092571103	371JRDN	02/09/1989	84.00	1010.50	926.50	208506
USGS	450417092570401	378PDCJ	02/09/1989	61.00	974.41	913.41	208497
USGS	450444092493601	367PRDC	02/21/1989	58.00	858.69	800.69	--
USGS	450505092552501	367PRDC	02/09/1989	61.00	997.38	936.38	208485
USGS	450740092534401	371JRDN	02/13/1989	10.00	977.69	967.69	249969
USGS	450818092453501	371JRDN	02/22/1989	15.00	699.14	684.14	--
USGS	450858092575001	367PRDC	01/26/1989	13.00	931.76	918.76	124395
USGS	451234092584401	378PDCJ	02/22/1989	26.00	967.85	941.85	208534
USGS	451633092532301	371JRDN	02/06/1989	104.00	1000.66	896.66	--
USGS	451648092474801	371JRDN	02/07/1989	128.00	1005.27	877.27	249968
MN040	441717093134101	367PRDC	02/27/1989	135.00	1117.98	982.98	502344
MN040	441742093203901	367PRDC	01/18/1989	2.00	979.57	977.57	443157
MN040	441815093190901	367PRDC	01/03/1989	40.00	1014.23	974.23	443154
MN040	442412093204401	371JRDN	01/10/1989	45.00	1028.74	983.74	441263
MN040	442423093123201	371JRDN	03/10/1989	6.00	953.95	947.95	458485
MN040	442502093104901	367PRDC	01/30/1989	145.00	1106.81	961.81	458488
MN040	442651093204501	367PRDC	01/31/1989	48.00	1014.87	966.87	441262
MN040	442750093204101	367PRDC	03/21/1989	88.00	1068.17	980.17	451220
MN040	443125093193401	367PRDC	02/10/1989	134.00	1099.63	965.63	502716
USGS	441912093162901	371JRDN	01/24/1989	9.00	986.11	977.11	101041
MN040	442808092502401	367PRDC	02/01/1989	350.00	1150.77	800.77	457132
MN040	442840092430501	371JRDN	03/30/1989	60.00	1004.35	944.35	457168
MN040	442921092474601	367PRDC	01/16/1989	205.00	1100.03	895.03	427083
MN040	442959092555901	371JRDN	01/05/1989	30.00	890.42	860.42	457138
MN040	443127092465101	371JRDN	03/28/1989	140.00	935.07	795.07	457163
MN040	442556093523801	371JRDN	03/10/1989	94.00	907.25	813.25	452647

Table A2. Groundwater-level measurements used to construct the revised potentiometric-surface map of the Mount Simon-Hinckley aquifer, winter 1988–89.

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371MSHK, Mount Simon-Hinckley Aquifer; 371MSMN, Mount Simon Sandstone; 371ECMS, Eau Claire-Mount Simon Formations; 400HCKL, Hinckley Formation; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	444146093471401	371MSMN	02/15/1989	203.90	942.37	738.47	214184
MN040	444652093161901	371MSMN	03/01/1989	196.00	844.23	648.23	150359
MN040	444935093110101	371MSMN	02/27/1989	190.50	822.80	632.30	433275
USGS	443944093454501	371MSMN	02/14/1989	202.23	939.30	737.07	122978
USGS	445646093395301	371MSHK	03/16/1989	70.92	939.70	868.78	--
USGS	443352093423001	371MSMN	01/24/1989	224.59	984.48	759.89	119705
USGS	444427093353903	371MSMN	12/20/1988	45.20	752.37	707.17	244438
USGS	450403093544501	371MSHK	03/16/1989	77.26	992.32	915.06	218013
MN040	450457093151401	371MSMN	02/07/1989	261.00	885.83	624.83	206670
MN040	452333093215701	371MSMN	02/09/1989	8.00	919.21	911.21	209221
USGS	450455093152401	371MSHK	02/07/1989	239.00	866.14	627.14	206674
USGS	450456093151601	371MSHK	02/07/1989	253.00	879.27	626.27	201158
USGS	451217093243201	371MSHK	02/01/1989	29.00	879.27	850.27	201191
MN040	444657093543901	371MSMN	02/15/1989	143.00	996.44	853.44	132256
MN040	445323093160201	371MSMN	02/01/1989	203.00	834.49	631.49	133362
MN040	445648093395201	371MSHK	01/25/1989	71.00	953.19	882.19	208866
MN040	445831093163101	371MSMN	02/01/1989	248.00	846.46	598.46	201005
MN040	450543093184101	371ECMS	12/21/1988	188.00	849.74	661.74	203026
MN040	445646093060701	371ECMS	02/10/1989	143.00	787.69	644.69	208328
USGS	445751093072301	400HCKL	01/17/1989	216.00	866.14	650.14	200164
MN040	443957093374801	371MSMN	03/21/1989	29.00	750.34	721.34	207994
MN040	444634093211001	371MSMN	02/01/1989	68.00	726.56	658.56	208816
MN040	450152092464101	371MSHK	02/21/1989	-7.00	690.02	697.02	231885
USGS	451035092454801	371MSMN	02/22/1989	19.00	707.70	688.70	--

Table A3. Groundwater-level measurements used to construct the potentiometric-surface map of the Prairie du Chien-Jordan aquifer, March 2008.

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	445041093102101	371JRDN	03/03/2008	184.67	900.18	715.51	205809
MN040	445546092591001	371JRDN	03/11/2008	240.49	1029.78	789.29	200054
MN040	450928093033903	371JRDN	03/12/2008	8.43	895.67	887.24	208573
MN040	443221093012401	367PRDC	03/03/2008	17.57	899.39	881.82	243772
MN040	443312092522201	367PRDC	03/03/2008	53.50	893.27	839.77	120158
MN040	443733093041801	367PRDC	03/03/2008	25.62	899.00	873.38	243775
MN040	444151092471001	367PRDC	03/03/2008	118.80	819.28	700.48	243773
MN040	444215093060401	371JRDN	03/05/2008	57.85	948.65	890.80	207608
MN040	444128093042501	367PRDC	03/03/2008	99.49	972.41	872.92	170885
USGS	444224093124401	371JRDN	03/11/2008	57.50	939.79	882.29	212650
MN040	444337092595401	367PRDC	03/03/2008	95.50	890.30	794.80	243774
MN040	444812093293001	371JRDN	03/04/2008	29.48	732.77	703.29	211835
MN040	445309093531701	371JRDN	03/10/2008	30.40	971.45	941.05	220954
MN040	450222093231801	378PDCJ	03/19/2008	74.44	925.20	850.76	203542
USGS	443304093132101	371JRDN	03/15/2008	44.98	1000.46	955.48	225965
USGS	444420092524501	371JRDN	03/13/2008	145.90	858.70	712.80	207639
USGS	444727093095801	371JRDN	03/05/2008	123.29	930.31	807.02	112234
USGS	445255093023901	371JRDN	03/06/2008	129.18	844.19	715.01	200674
MN040	444654093165201	371JRDN	03/12/2008	59.88	765.23	705.35	206177
MN040	444323093084901	371JRDN	03/04/2008	57.20	950.28	893.08	509060
MN040	442816093125901	371JRDN	03/11/2008	39.70	989.99	950.29	509102
MN040	443641093110701	367PRDC	03/12/2008	13.95	938.83	924.88	119678
MN040	445321092590101	367PRDC	03/14/2008	219.28	981.54	762.26	415681
MN040	443645092525501	371JRDN	03/17/2008	152.29	1012.01	859.72	443901
MN040	443505093255201	367PRDC	03/18/2008	23.20	968.15	944.95	427107
MN040	444059093260901	367PRDC	03/17/2008	102.19	991.07	888.88	127106
MN040	444854093242501	371JRDN	03/18/2008	90.29	846.12	755.83	413372
MN040	444202093225901	378PDCJ	03/14/2008	56.44	948.91	892.47	207461
MN040	443328093184701	367PRDC	03/18/2008	181.40	1140.78	959.38	212377
MN040	443119093050101	367PRDC	03/11/2008	12.97	900.05	887.08	443920
MN040	444211092544601	371JRDN	03/12/2008	81.62	823.18	741.56	457211
MN040	445245092545501	367PRDC	03/14/2008	77.34	927.66	850.32	427865
MN040	451602092515601	367PRDC	03/04/2008	29.58	941.60	912.02	138286
MN040	445919092500101	367PRDC	03/13/2008	101.90	923.16	821.26	199550
USGS	443645093014701	367PRDC	03/03/2008	27.45	914.21	886.76	101062
USGS	443429093063401	367PRDC	03/12/2008	9.48	929.88	920.40	--
MN040	443824093133401	371JRDN	03/11/2008	23.00	950.63	927.63	207727
USGS	443744092502101	371JRDN	03/17/2008	99.79	902.33	802.54	186016
USGS	443827092521801	378PDCJ	03/03/2008	60.97	866.65	805.68	243754
USGS	443919092522501	378PDCJ	03/13/2008	100.52	860.57	760.05	207900
USGS	444205092500001	367PRDC	03/03/2008	99.13	825.93	726.80	243739
USGS	443303093080701	367PRDC	03/12/2008	21.95	939.41	917.46	--

Table A3. Groundwater-level measurements used to construct the potentiometric-surface map of the Prairie du Chien-Jordan aquifer, March 2008.—Continued

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
USGS	443640093070501	378PDCJ	03/12/2008	18.15	922.21	904.06	--
USGS	443134093010601	367PRDC	03/19/2008	13.57	880.36	866.79	207650
MN040	442909093033201	367PRDC	03/12/2008	89.79	991.45	901.66	119649
USGS	444728093154701	371JRDN	03/12/2008	161.43	880.11	718.68	206170
MN040	444951093104901	371JRDN	03/05/2008	107.50	839.34	731.84	207258
MN040	444957093104901	371JRDN	03/03/2008	149.12	861.85	712.73	205595
MN040	444956093105301	371JRDN	03/13/2008	127.75	828.27	700.52	235373
USGS	445000093105001	371JRDN	03/03/2008	152.60	836.17	683.57	205596
USGS	445227093020601	378PDCJ	03/11/2008	77.69	798.55	720.86	208347
MN040	445316093033401	371JRDN	03/06/2008	196.94	906.60	709.66	127251
MN040	445255093013301	371JRDN	03/06/2008	2.10	690.11	688.01	200676
USGS	445348093022901	378PDCJ	03/06/2008	49.96	751.56	701.60	200665
USGS	445330093054301	367PRDC	03/03/2008	302.75	1046.36	743.61	200661
USGS	445330093054101	378PDCJ	03/14/2008	309.54	1037.53	727.99	200660
MN040	444644093165801	371JRDN	03/12/2008	125.74	793.40	667.66	206174
USGS	444643093172701	371JRDN	03/12/2008	103.22	780.63	677.41	206179
MN040	442849093094002	371JRDN	03/12/2008	33.27	966.77	933.50	119647
MN040	445025093410201	367PRDC	03/12/2008	105.32	955.77	850.45	208920
MN040	444540093395501	371JRDN	03/19/2008	101.19	836.76	735.57	137419
USGS	450607093143101	371JRDN	03/07/2008	51.95	889.11	837.16	209207
USGS	450453093151403	367PRDC	03/07/2008	59.23	882.55	823.32	206678
USGS	450343093164401	378PDCJ	03/07/2008	17.55	833.33	815.78	206696
USGS	451057093214901	371JRDN	03/11/2008	22.02	869.42	847.40	202937
MN040	445037093212401	371JRDN	03/13/2008	146.95	905.45	758.50	222916
MN040	444825093230501	378PDCJ	03/14/2008	99.17	841.61	742.44	114377
USGS	444801093202801	371JRDN	03/11/2008	81.50	822.96	741.46	233183
MN040	450553093202601	371JRDN	03/07/2008	20.32	866.14	845.82	203021
USGS	450451093172601	371JRDN	03/07/2008	38.65	846.46	807.81	203260
USGS	450510093172501	378PDCJ	03/07/2008	42.12	849.74	807.62	127269
MN040	445358093145201	367PRDC	03/14/2008	34.14	840.18	806.04	200586
MN040	445301093213201	378PDCJ	03/06/2008	73.40	870.27	796.87	204884
MN040	445445093220801	371JRDN	03/06/2008	91.68	896.34	804.66	207674
MN040	445741093333001	367PRDC	03/14/2008	32.36	937.19	904.83	206915
MN040	445630093230301	378PDCJ	03/04/2008	110.67	932.13	821.46	203196
MN040	445950093265801	371JRDN	03/05/2008	145.05	980.97	835.92	204617
MN040	445937093033501	371JRDN	03/11/2008	52.38	869.42	817.04	225903
USGS	445918092590901	371JRDN	03/11/2008	134.88	1000.66	865.78	200874
USGS	450620093121701	371JRDN	03/06/2008	62.26	905.51	843.25	206720
USGS	450546093122601	378PDCJ	03/06/2008	62.66	898.95	836.29	206722
USGS	450238093082501	371JRDN	03/11/2008	128.57	964.57	836.00	206833
USGS	450231093131301	371JRDN	03/10/2008	124.69	958.01	833.32	200524
USGS	443752093261701	378PDCJ	03/17/2008	47.25	969.14	921.89	207938

Table A3. Groundwater-level measurements used to construct the potentiometric-surface map of the Prairie du Chien-Jordan aquifer, March 2008.—Continued

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	443605093231801	378PDCJ	03/19/2008	66.43	1012.25	945.82	129152
MN040	443352093274201	371JRDN	03/19/2008	134.84	1083.82	948.98	120101
USGS	444258093244701	371JRDN	03/19/2008	48.48	928.18	879.70	207308
USGS	444315093322301	371JRDN	03/17/2008	194.87	960.23	765.36	213938
USGS	444843092481801	367PRDC	03/11/2008	135.15	893.23	758.08	134757
USGS	450213092530601	367PRDC	03/05/2008	56.52	948.16	891.64	242357
USGS	445227092595101	371JRDN	03/06/2008	24.80	748.50	723.70	208353
USGS	450201092491101	371JRDN	03/12/2008	141.71	941.00	799.29	112205
USGS	450312092492802	371JRDN	03/04/2008	68.62	883.37	814.75	208786
USGS	450358092571103	371JRDN	03/04/2008	83.58	1010.50	926.92	208506
USGS	450818092453501	371JRDN	03/04/2008	15.50	699.14	683.64	--
USGS	450417092570401	378PDCJ	03/05/2008	63.55	974.41	910.86	208497
USGS	450103092564901	378PDCJ	03/14/2008	33.43	921.92	888.49	--
MN040	445733092582901	371JRDN	03/12/2008	197.57	1023.62	826.05	208463
MN040	445514092563601	371JRDN	03/07/2008	201.70	1030.94	829.24	208423
USGS	444534092512601	378PDCJ	03/11/2008	175.36	860.29	684.93	--
USGS	444919092581501	371JRDN	03/06/2008	77.77	819.04	741.27	208809
USGS	444950092580701	371JRDN	03/06/2008	59.42	809.58	750.16	208808
USGS	444946092562101	371JRDN	03/06/2008	106.49	881.27	774.78	208807
MN040	445004092590101	371JRDN	03/06/2008	86.70	813.75	727.05	208804
MN040	451211093073201	371JRDN	03/03/2008	15.88	898.95	883.07	139656
MN040	451014093031401	367PRDC	03/04/2008	3.73	889.11	885.38	188272
MN040	451334093063801	371JRDN	03/03/2008	19.56	905.51	885.95	126900
MN040	451250093015701	378PDCJ	03/03/2008	1.57	898.95	897.38	136792
MN040	450802093062101	367PRDC	03/04/2008	28.75	902.23	873.48	145775
USGS	451548093134501	371JRDN	03/10/2008	11.90	908.79	896.89	535185
USGS	445137093532101	371JRDN	03/04/2008	59.03	980.51	921.48	671135
USGS	444432093555001	367PRDC	03/10/2008	108.99	998.16	889.17	601594
USGS	445341093524301	371JRDN	03/05/2008	58.71	976.77	918.06	540826
MN040	444433093411601	371JRDN	03/18/2008	69.85	855.12	785.27	433402
USGS	445436093482901	371JRDN	03/05/2008	87.19	986.72	899.53	505023
MN040	444858093411001	371JRDN	03/12/2008	155.53	982.63	827.10	208931
USGS	444758093393501	367PRDC	03/19/2008	149.42	951.01	801.59	681641
MN040	444950093312801	367PRDC	03/12/2008	102.04	879.71	777.67	464905
USGS	444848093494601	367PRDC	03/04/2008	84.45	976.06	891.61	467063
MN040	444257092511701	371JRDN	03/12/2008	99.85	823.79	723.94	185299
MN040	444253092465401	371JRDN	03/12/2008	75.89	761.94	686.05	194085
MN040	444001093020401	371JRDN	03/10/2008	40.89	887.28	846.39	185293
MN040	444825093044201	367PRDC	03/05/2008	80.80	874.50	793.70	136467
MN040	444842093092401	371JRDN	03/03/2008	94.35	885.56	791.21	186310
MN040	444419093011301	367PRDC	03/12/2008	66.69	882.11	815.42	172709
MN040	445227093073101	367PRDC	03/10/2008	119.53	879.47	759.94	128709

Table A3. Groundwater-level measurements used to construct the potentiometric-surface map of the Prairie du Chien-Jordan aquifer, March 2008.—Continued

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	444922093004701	371JRDN	03/04/2008	168.67	847.01	678.34	402553
MN040	443528093015301	371JRDN	03/10/2008	112.31	1008.38	896.07	216464
MN040	445113093042401	367PRDC	03/05/2008	72.27	948.01	875.74	418665
MN040	445240093055801	367PRDC	03/10/2008	253.60	996.18	742.58	402587
USGS	443234093025301	371JRDN	03/11/2008	34.88	929.58	894.70	502118
USGS	444116093130101	367PRDC	03/11/2008	87.62	987.89	900.27	474609
MN040	444503092575701	371JRDN	03/12/2008	97.01	785.33	688.32	451611
USGS	443720092580201	367PRDC	03/10/2008	77.73	953.30	875.57	558820
MN040	444637093051301	367PRDC	03/04/2008	176.27	1011.98	835.71	198283
USGS	443827093173301	367PRDC	03/18/2008	141.76	1075.09	933.33	625592
MN040	444600092535101	371JRDN	03/12/2008	73.59	766.55	692.96	518691
USGS	443806092551301	371JRDN	03/10/2008	134.04	982.64	848.60	585123
MN040	445403093345901	367PRDC	03/11/2008	95.14	963.31	868.17	168996
MN040	450819093412401	371JRDN	03/06/2008	113.94	951.33	837.39	155291
MN040	450852093195001	371JRDN	03/11/2008	24.63	853.02	828.39	105124
MN040	450043093341101	371JRDN	03/05/2008	134.30	1042.86	908.56	104841
MN040	451132093243901	371JRDN	03/17/2008	15.79	859.58	843.79	133219
MN040	450819093311401	371JRDN	03/14/2008	49.01	941.60	892.59	159603
MN040	450542093165801	367PRDC	03/11/2008	22.64	836.61	813.97	174897
MN040	445248093273001	367PRDC	03/11/2008	134.68	977.17	842.49	203151
MN040	445511093313601	367PRDC	03/11/2008	119.29	948.24	828.95	419409
MN040	445353093423801	371JRDN	03/10/2008	110.44	968.83	858.39	433412
MN040	450100093280501	367PRDC	03/04/2008	92.75	958.01	865.26	204318
MN040	450630093101101	367PRDC	03/06/2008	34.33	898.95	864.62	183469
MN040	450551093044701	367PRDC	03/03/2008	53.69	908.79	855.10	205707
MN040	443805093221801	367PRDC	03/18/2008	92.20	1016.15	923.95	216758
MN040	443438093292701	371JRDN	03/19/2008	72.33	1002.52	930.19	216770
USGS	444411093295001	371JRDN	03/17/2008	205.43	959.09	753.66	428650
MN040	444610093274701	371JRDN	03/12/2008	69.07	800.47	731.40	404380
USGS	444640093311701	371JRDN	03/12/2008	96.53	821.41	724.88	109939
USGS	443726093195601	378PDCJ	03/19/2008	143.41	1067.22	923.81	585362
MN040	443518093164501	367PRDC	03/19/2008	54.38	1012.57	958.19	518202
USGS	444123093265501	367PRDC	03/17/2008	102.43	987.59	885.16	637835
USGS	443926093265301	367PRDC	03/18/2008	110.06	1016.01	905.95	502727
USGS	444103093243601	367PRDC	03/17/2008	91.98	986.15	894.17	451973
USGS	444414093214401	367PRDC	03/13/2008	91.19	919.77	828.58	540275
MN040	451312092550601	367PRDC	03/04/2008	15.19	941.60	926.41	110438
MN040	445117092572801	367PRDC	03/03/2008	122.31	916.22	793.91	109685
MN040	445137092590901	367PRDC	03/03/2008	254.17	1001.99	747.82	156361
MN040	450331092511101	367PRDC	03/05/2008	31.13	915.35	884.22	195656
MN040	451218092493101	371JRDN	03/04/2008	65.27	983.70	918.43	423840
USGS	445819092561801	367PRDC	03/12/2008	176.95	1059.71	882.76	512491

Table A3. Groundwater-level measurements used to construct the potentiometric-surface map of the Prairie du Chien-Jordan aquifer, March 2008.—Continued

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	450305092553201	367PRDC	03/05/2008	150.57	1059.71	909.14	519108
USGS	450434092545701	367PRDC	03/05/2008	74.17	1000.66	926.49	505390
USGS	450059092510101	367PRDC	03/12/2008	46.40	908.79	862.39	542598
USGS	445533092482301	371JRDN	03/11/2008	89.04	845.90	756.86	599989
USGS	444813092533501	371JRDN	03/04/2008	127.93	900.21	772.28	617669
USGS	445256092561001	367PRDC	03/14/2008	150.95	990.23	839.28	634277
USGS	444547092494201	371JRDN	03/10/2008	226.43	907.44	681.01	672771
USGS	444642092503701	371JRDN	03/06/2008	237.10	958.25	721.15	710065
USGS	444824092591101	371JRDN	03/05/2008	37.77	728.36	690.59	534336
USGS	445520092504901	371JRDN	03/11/2008	103.79	933.48	829.69	670797
MN040	450735092550801	367PRDC	03/04/2008	46.04	987.53	941.49	413669
MN040	450735092550801	367PRDC	03/04/2008	50.50	987.53	937.03	413669
MN040	444318093065901	367PRDC	03/05/2008	68.65	953.55	884.90	101119
USGS	444543093312601	371JRDN	03/18/2008	179.91	914.41	734.50	417548
MN040	444724093160301	371JRDN	03/12/2008	97.05	835.29	738.24	127259
MN040	445319093163801	371JRDN	03/12/2008	68.20	836.30	768.10	206354
MN040	445729093221601	378PDCJ	03/04/2008	87.05	905.67	818.62	206436
MN040	450251093022401	378PDCJ	03/04/2008	73.34	954.72	881.38	112222
MN040	445313093155701	378PDCJ	03/12/2008	54.75	829.46	774.71	206276
MN040	444514093214301	371JRDN	03/08/2008	83.40	887.55	804.15	151582
USGS	444213093242401	371JRDN	03/14/2008	71.59	945.08	873.49	686263
USGS	451056092591301	378PDCJ	03/12/2008	18.28	928.48	910.20	551576
USGS	443347092545101	371JRDN	03/10/2008	19.90	893.16	873.26	540405
USGS	443939093105901	371JRDN	03/12/2008	26.15	942.06	915.91	731123
USGS	444342093272301	371JRDN	03/08/2008	193.20	959.01	765.81	603083
USGS	445639093275801	378PDCJ	03/13/2008	153.45	946.94	793.49	661401
USGS	445625093275001	378PDCJ	03/13/2008	134.90	953.23	818.33	661402
MN040	445521092563601	371JRDN	03/07/2008	179.20	1001.90	822.70	208005
USGS	444557093212901	367PRDC	03/04/2008	99.95	877.79	777.84	578964
USGS	444557093212902	371JRDN	03/04/2008	107.22	877.79	770.57	578965
USGS	450412092594001	367PRDC	03/11/2008	21.65	938.32	916.67	551564
USGS	443135093043101	367PRDC	03/03/2008	7.83	892.82	884.99	243771
USGS	445029093270401	378PDCJ	03/14/2008	43.17	836.32	793.15	244762
USGS	450414093012702	367PRDC	03/11/2008	27.36	921.92	894.56	481807
USGS	443752093254401	378PDCJ	03/04/2008	83.89	1008.48	924.59	119589
MN040	443232093230901	367PRDC	03/17/2008	95.87	1066.31	970.44	436444
USGS	444402093122001	378PDCJ	03/04/2008	73.35	954.68	881.33	205823
USGS	442524093543701	378PDCJ	03/03/2008	80.30	856.09	775.79	129234
USGS	441914093163401	371JRDN	03/10/2008	17.47	988.94	971.47	101041
USGS	442749093240401	367PRDC	03/10/2008	137.63	1093.78	956.15	244390

Table A4. Groundwater-level measurements used to construct the potentiometric-surface map of the Franconia-Ironton-Galesville aquifer, March 2008.

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371FIGV, Franconia-Ironton-Galesville Formations; 371FRNC, Franconia Sandstone; 371IGLV, Ironton Sandstone; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	451918093062901	371FRNC	03/12/2008	16.53	908.79	892.26	243000
USGS	452305093141501	371FRNC	03/12/2008	21.89	924.91	903.02	122537
MN040	452208093090201	371FRNC	03/12/2008	12.31	920.98	908.67	114319
MN040	443353093422701	371IGLV	03/04/2008	131.86	978.40	846.54	119705
USGS	445851093105601	371IGLV	03/11/2008	131.92	905.51	773.59	249803
USGS	443304093132102	371FRNC	03/15/2008	48.64	1000.46	951.82	225965
USGS	444434093290101	371FIGV	03/14/2008	160.97	924.18	763.21	705731
USGS	451033093165602	371FIGV	03/11/2008	62.78	889.11	826.33	202926
USGS	443237093441301	371IGLV	03/19/2008	168.54	990.40	821.86	207144
USGS	443241093342001	371FIGV	03/08/2008	156.40	995.98	839.58	240054
MN040	451427093012901	371FRNC	03/03/2008	9.34	898.95	889.61	153483
MN040	452334093010901	371FRNC	03/03/2008	28.56	911.24	882.68	153478
MN040	451542093255701	371FRNC	03/10/2008	20.42	875.98	855.56	114351
MN040	451725093175601	371FRNC	03/05/2008	21.21	908.79	887.58	131272
MN040	452257093132801	371FRNC	03/04/2008	11.25	916.78	905.53	158317
MN040	451047093083001	371FRNC	03/03/2008	23.98	908.79	884.81	155088
MN040	451835093220501	371FRNC	03/04/2008	45.72	908.79	863.07	104802
MN040	452348093173101	371FRNC	03/04/2008	17.98	930.38	912.40	111087
MN040	451532093224901	371FRNC	03/06/2008	26.67	875.98	849.31	410618
MN040	452125093102201	371FRNC	03/03/2008	21.03	900.12	879.09	191978
MN040	452259093302601	371IGLV	03/04/2008	26.15	987.53	961.38	406281
MN040	452233093220001	371FRNC	03/04/2008	18.95	919.20	900.25	409532
MN040	450940093161701	371FRNC	03/05/2008	63.27	905.51	842.24	202950
MN040	451249093234601	371FRNC	03/11/2008	27.30	869.42	842.12	431617
MN040	452005093151801	371FRNC	03/03/2008	6.67	900.29	893.62	434658
MN040	451450093281701	371FRNC	03/10/2008	24.09	895.67	871.58	432526
MN040	451707093084001	371FRNC	03/05/2008	22.07	908.79	886.72	448062
MN040	452343093073201	371FRNC	03/04/2008	12.79	917.96	905.17	442057
USGS	451848093025001	371FRNC	03/03/2008	12.39	895.67	883.28	624184
USGS	451455093145401	371FRNC	03/05/2008	18.95	902.23	883.28	461866
USGS	444910093475901	371FRNC	03/04/2008	91.58	980.67	889.09	614895
MN040	444601093515601	371FRNC	03/10/2008	116.34	999.45	883.11	481227
MN040	444229093395201	371FRNC	03/19/2008	125.54	840.58	715.04	164877
USGS	444348093503301	371IGLV	03/10/2008	108.44	962.13	853.69	450963
USGS	444023093424101	371FIGV	03/19/2008	150.59	873.88	723.29	536924
USGS	444423093422601	371FRNC	03/18/2008	125.83	895.89	770.06	453881
MN040	451403093202101	371FIGV	03/08/2008	21.47	872.70	851.23	133294
MN040	444046093505401	371FRNC	03/19/2008	135.55	970.32	834.77	214815
USGS	444701093500401	371FRNC	03/10/2008	128.76	1014.71	885.95	430455
USGS	445444093543001	371IGLV	03/05/2008	50.57	980.38	929.81	478465

Table A4. Groundwater-level measurements used to construct the potentiometric-surface map of the Franconia-Ironton-Galesville aquifer, March 2008.–Continued

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371FIGV, Franconia-Ironton-Galesville Formations; 371FRNC, Franconia Sandstone; 371IGLV, Ironton Sandstone; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
USGS	444343093573501	371FRNC	03/10/2008	111.47	1001.59	890.12	679273
USGS	444911093320601	371FRNC	03/12/2008	143.50	915.09	771.59	404365
MN040	444758093024501	371FRNC	03/04/2008	173.58	921.73	748.15	122276
MN040	444856093032301	371FRNC	03/04/2008	110.61	890.45	779.84	418682
USGS	443843092440201	371FRNC	03/13/2008	169.73	841.37	671.64	481459
USGS	443902092451001	371FRNC	03/13/2008	151.63	841.52	689.89	487044
USGS	444234092560801	371FRNC	03/10/2008	103.85	842.09	738.24	692877
USGS	444034092452301	371FRNC	03/13/2008	95.74	791.21	695.47	596098
USGS	443932092471301	371FRNC	03/13/2008	129.33	838.84	709.51	596096
USGS	444008092493801	371FRNC	03/13/2008	99.23	837.87	738.64	585146
USGS	444119092594001	371FRNC	03/10/2008	67.96	900.13	832.17	679263
USGS	443934092565901	371FRNC	03/10/2008	75.02	902.86	827.84	692892
MN040	451120093355201	371FRNC	03/17/2008	66.96	947.42	880.46	104726
MN040	450836093325001	371FRNC	03/14/2008	32.87	924.12	891.25	104743
MN040	450728093352801	371FRNC	03/17/2008	92.77	999.37	906.60	104810
MN040	445749093411201	371FRNC	03/10/2008	89.73	980.12	890.39	118895
MN040	450702093425101	371FRNC	03/14/2008	30.49	946.25	915.76	178176
MN040	451431093303801	371FRNC	03/12/2008	94.44	928.48	834.04	183697
MN040	450936093271501	371FRNC	03/17/2008	34.30	902.23	867.93	415969
MN040	450619093301201	371FRNC	03/15/2008	55.62	948.16	892.54	416105
MN040	451317093334801	371FRNC	03/12/2008	28.70	891.71	863.01	421127
MN040	451221093252701	371FRNC	03/17/2008	18.19	849.74	831.55	425090
MN040	445430093423101	371FRNC	03/10/2008	44.75	937.71	892.96	426570
MN040	443625093280401	371FRNC	03/18/2008	17.65	940.58	922.93	207930
USGS	444527093252901	371FIGV	03/13/2008	111.68	893.49	781.81	119657
USGS	444408093321301	371FRNC	03/17/2008	196.13	951.29	755.16	675952
MN040	443511093385301	371FRNC	03/19/2008	146.21	994.52	848.31	523922
USGS	443603093304601	371FIGV	03/19/2008	87.11	983.64	896.53	658118
USGS	443354093345801	371FRNC	03/19/2008	125.95	967.86	841.91	560345
USGS	443752093384001	371FRNC	03/18/2008	127.30	939.85	812.55	672774
USGS	444024093393401	371FIGV	03/18/2008	100.37	832.35	731.98	578334
MN040	443246093480801	371FRNC	03/25/2008	218.29	970.64	752.35	198999
MN040	443622093342501	371FRNC	03/19/2008	77.88	909.50	831.62	498274
USGS	443811093361101	371FIGV	03/19/2008	83.16	885.16	802.00	675259
USGS	443351093281401	371FIGV	03/19/2008	128.45	1068.77	940.32	641517
USGS	443951093293501	371FRNC	03/17/2008	115.35	960.31	844.96	634486
USGS	443345093454001	371IGLV	03/19/2008	227.63	974.77	747.14	666431
USGS	443444093432801	371FIGV	03/19/2008	198.25	991.14	792.89	500943
MN040	444552092512001	371FRNC	03/05/2008	166.30	860.34	694.04	142573
MN040	445357092491101	371FRNC	03/11/2008	163.44	980.00	816.56	110432

Table A4. Groundwater-level measurements used to construct the potentiometric-surface map of the Franconia-Ironton-Galesville aquifer, March 2008.–Continued

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371FIGV, Franconia-Ironton-Galesville Formations; 371FRNC, Franconia Sandstone; 371IGLV, Ironton Sandstone; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	445011092525901	371FRNC	03/04/2008	81.95	914.66	832.71	424141
USGS	445048092482101	371FRNC	03/10/2008	107.49	941.19	833.70	425202
USGS	450912092455201	371IGLV	03/04/2008	93.20	832.93	739.73	478957
USGS	444613092501101	371FRNC	03/06/2008	220.30	935.31	715.01	558794
USGS	450023092492901	371FRNC	03/13/2008	198.04	949.77	751.73	548900
USGS	450720092482701	371FRNC	03/05/2008	71.64	890.72	819.08	544380
USGS	444737092520201	371FRNC	03/03/2008	134.73	897.50	762.77	609808
USGS	450114092480301	371FRNC	03/13/2008	167.75	882.07	714.32	686639
USGS	445524092484001	371FRNC	03/11/2008	181.40	943.76	762.36	546303
USGS	445903092503901	371FRNC	03/14/2008	172.99	964.61	791.62	651975
USGS	444938092501101	371FRNC	03/10/2008	106.34	947.80	841.46	596089
USGS	445900092503901	371FRNC	03/13/2008	151.55	965.95	814.40	700690
USGS	450109092511901	371FRNC	03/13/2008	109.70	931.76	822.06	621551
USGS	451609092460001	371FRNC	03/04/2008	189.24	903.25	714.01	556149
MN040	450411093321001	371FRNC	03/06/2008	113.94	1014.03	900.09	140121
MN040	450835093094301	371FIGV	03/04/2008	38.05	902.23	864.18	208995
MN040	450101092463201	371FRNC	03/14/2008	15.55	688.96	673.41	208797
MN040	450056092470601	371FRNC	03/14/2008	92.90	773.86	680.96	208795
USGS	444212093242601	371FIGV	03/14/2008	100.80	942.39	841.59	686264
USGS	444538093294301	371FIGV	03/19/2008	139.31	898.63	759.32	694904
USGS	444558093373801	371FIGV	03/14/2008	62.08	810.93	748.85	705487
MN040	451342093234701	371IGLV	03/13/2008	11.78	859.58	847.80	161441
USGS	444833093370701	371FIGV	03/07/2008	132.42	899.53	767.11	674318
MN040	450240093323001	371FIGV	03/07/2008	155.40	1007.76	852.36	122239
USGS	451109093324101	371FIGV	03/10/2008	89.76	964.62	874.86	625354
USGS	444533093225201	371FIGV	03/13/2008	126.93	921.15	794.22	603069
USGS	451217093243001	371FIGV	03/11/2008	77.38	879.27	801.89	201218
USGS	445613092470201	371FIGV	03/11/2008	107.12	872.31	765.19	603059
USGS	440323093375001	371FRNC	03/14/2008	145.55	1060.34	914.79	596647
USGS	451443093354501	371FIGV	03/10/2008	30.11	926.54	896.43	724631
USGS	451443093354502	371FIGV	03/10/2008	22.96	926.54	903.58	730108

Table A5. Groundwater-level measurements used to construct the potentiometric-surface map of the Mount Simon-Hinckley aquifer, March 2008.

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371MSHK, Mount Simon-Hinckley Aquifer; 371MSMN, Mount Simon Sandstone; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is a Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
USGS	445615092470501	371MSMN	03/11/2008	177.06	858.24	681.18	603058
MN040	445831093163101	371MSMN	03/11/2008	212.86	846.46	633.60	201005
MN040	450457093151401	371MSMN	03/07/2008	203.85	885.83	681.98	206670
USGS	453418093140001	371MSHK	03/11/2008	6.71	952.44	945.73	217868
USGS	453340093141601	371MSMN	03/04/2008	6.62	947.78	941.16	219420
MN040	444634093211001	371MSMN	03/13/2008	123.68	726.56	602.88	208816
USGS	445615093125501	371MSMN	03/11/2008	177.06	824.96	647.90	603058
USGS	445851093105603	371MSMN	03/11/2008	240.26	905.51	665.25	249805
USGS	443304093132105	371MSMN	03/21/2008	281.34	1000.46	719.12	225965
MN040	444657093543901	371MSMN	03/17/2008	150.32	996.44	846.12	132256
USGS	443944093454501	371MSMN	03/19/2008	203.62	939.30	735.68	122978
USGS	451217093243201	371MSHK	03/11/2008	31.58	879.27	847.69	201191
MN040	445648093395201	371MSHK	03/07/2008	73.36	953.19	879.83	208866
MN040	443554093322701	371MSMN	03/19/2008	210.36	948.16	737.80	119701
MN040	444103093351801	371MSMN	03/20/2008	225.19	941.00	715.81	424680
MN040	445531092465101	371MSMN	03/08/2008	89.15	813.00	723.85	109721
MN040	445709092463701	371MSMN	03/04/2008	90.45	781.87	691.42	437305
MN040	451401093193701	371MSMN	03/08/2008	35.94	889.11	853.17	133341
MN040	445903092463001	371MSMN	03/04/2008	138.34	814.20	675.86	521819
USGS	443932093460401	371MSMN	03/18/2008	209.98	949.38	739.40	526666
MN040	445704093220101	371MSMN	03/04/2008	304.58	921.05	616.47	206439
MN040	452314093204801	371MSMN	03/07/2008	7.82	913.16	905.34	184885
MN040	451150093173501	371MSMN	03/12/2008	160.84	889.11	728.27	110469
MN040	445323093160201	371MSMN	03/12/2008	228.35	834.49	606.14	133362
USGS	444700093284601	371MSMN	03/19/2008	88.51	757.15	668.64	578948
USGS	444601093373501	371MSMN	03/14/2008	116.65	835.43	718.78	419465
USGS	450238093323101	371MSMN	03/13/2008	321.90	1009.91	688.01	520048
USGS	443408093343501	371MSMN	03/20/2008	202.01	944.60	742.59	433280
MN040	444118093465801	371MSMN	03/18/2008	194.97	931.16	736.19	164895
MN040	445556092461901	371MSMN	03/04/2008	32.92	720.15	687.23	533517
USGS	445027093470301	371MSMN	03/07/2008	97.40	1001.06	903.66	559340
USGS	445025093465801	371MSMN	03/07/2008	156.33	1024.73	868.40	568103
USGS	444542093114901	371MSMN	03/14/2008	356.30	988.10	631.80	519955
USGS	444935093105701	371MSMN	03/05/2008	205.33	836.94	631.61	433275
USGS	453122092445801	371MSMN	03/11/2008	41.54	863.53	821.99	133334
USGS	450404093544501	371MSHK	03/11/2008	74.94	992.08	917.14	218013
USGS	451117093521801	371MSMN	03/14/2008	39.12	991.62	952.50	235851

Table A6. Groundwater-level measurements used to construct the potentiometric-surface map of the Prairie du Chien-Jordan aquifer, August 2008.

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is a Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	450758093061501	367PRDC	08/22/2008	33.11	902.23	869.12	170633
MN040	450802093062101	367PRDC	08/22/2008	47.92	902.23	854.31	145775
MN040	450928093033903	371JRDN	08/25/2008	16.03	895.67	879.64	208573
MN040	451014093031401	367PRDC	08/20/2008	29.26	889.11	859.85	188272
MN040	451211093073201	371JRDN	08/20/2008	26.88	898.95	872.07	139656
MN040	451250093015701	378PDCJ	08/21/2008	4.08	898.95	894.87	136792
MN040	451334093063801	371JRDN	08/20/2008	24.29	905.51	881.22	126900
MN040	444433093411601	371JRDN	08/19/2008	68.46	855.12	786.66	433402
MN040	444540093395501	371JRDN	08/20/2008	100.65	836.76	736.11	137419
MN040	444858093411001	371JRDN	08/23/2008	158.07	982.63	824.56	208931
MN040	445309093531701	371JRDN	08/18/2008	36.65	971.45	934.80	220954
MN040	442849093094002	371JRDN	08/20/2008	33.35	966.77	933.42	119647
MN040	442909093033201	367PRDC	08/20/2008	93.05	991.45	898.40	119649
MN040	443119093050101	367PRDC	08/20/2008	14.19	900.05	885.86	443920
MN040	443528093015301	371JRDN	08/20/2008	112.41	1008.38	895.97	216464
MN040	443641093110701	367PRDC	08/20/2008	16.13	938.83	922.70	119678
MN040	443645092525501	371JRDN	08/19/2008	159.26	1012.01	852.75	443901
MN040	443824093133401	371JRDN	08/22/2008	24.40	950.63	926.23	207727
MN040	443934092565601	371JRDN	08/28/2008	71.69	904.23	832.54	412478
MN040	444001093020401	371JRDN	08/19/2008	42.49	887.28	844.79	185293
MN040	444128093042501	367PRDC	08/18/2008	99.46	972.41	872.95	170885
MN040	444211092544601	371JRDN	08/20/2008	82.20	823.18	740.98	457211
MN040	444215093060401	371JRDN	08/18/2008	67.34	948.65	881.31	207608
MN040	444253092465401	371JRDN	08/21/2008	75.84	761.94	686.10	194085
MN040	444257092511701	371JRDN	08/21/2008	105.31	823.79	718.48	185299
MN040	444323093084901	371JRDN	08/19/2008	63.38	950.28	886.90	509060
MN040	444419093011301	367PRDC	08/20/2008	66.91	882.11	815.20	172709
MN040	444503092575701	371JRDN	08/20/2008	97.14	785.33	688.19	451611
MN040	444527093101601	367PRDC	08/19/2008	67.27	916.40	849.13	129255
MN040	444600092535101	371JRDN	08/21/2008	74.60	766.55	691.95	518691
MN040	444637093051301	367PRDC	08/19/2008	176.90	1011.98	835.08	198283
MN040	444644093165801	371JRDN	08/22/2008	164.12	793.40	629.28	206174
MN040	444654093165201	371JRDN	08/22/2008	2.12	765.23	763.11	206177
MN040	444724093160301	371JRDN	08/22/2008	127.10	835.29	708.19	127259
MN040	444825093044201	367PRDC	08/19/2008	80.18	874.50	794.32	136467
MN040	444842093092401	371JRDN	08/18/2008	95.76	885.56	789.80	186310
MN040	444922093004701	371JRDN	08/19/2008	164.13	847.01	682.88	402553
MN040	444956093105301	371JRDN	08/25/2008	187.59	828.27	640.68	235373
MN040	444957093104901	371JRDN	08/25/2008	163.93	861.85	697.92	205595
MN040	445041093102101	371JRDN	08/18/2008	195.39	900.18	704.79	205809
MN040	445113093042401	367PRDC	08/19/2008	78.78	948.01	869.23	418665
MN040	445117093042701	367PRDC	08/19/2008	221.79	970.12	748.33	427141

Table A6. Groundwater-level measurements used to construct the potentiometric-surface map of the Prairie du Chien-Jordan aquifer, August 2008.—Continued

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is a Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	445227093073101	367PRDC	08/18/2008	123.75	879.47	755.72	128709
MN040	445240093055801	367PRDC	08/18/2008	267.13	996.18	729.05	402587
MN040	445255093013301	371JRDN	08/19/2008	7.23	690.11	682.88	200676
MN040	445316093033401	371JRDN	08/19/2008	208.03	906.60	698.57	127251
MN040	444825093230501	378PDCJ	08/20/2008	103.87	841.61	737.74	114377
MN040	444854093242501	371JRDN	08/19/2008	109.17	846.12	736.95	413372
MN040	445037093212401	371JRDN	08/20/2008	153.80	905.45	751.65	222916
MN040	445248093273001	367PRDC	08/19/2008	143.30	977.17	833.87	203151
MN040	445301093213201	378PDCJ	08/19/2008	99.80	870.27	770.47	204884
MN040	445313093155701	378PDCJ	08/25/2008	78.15	829.46	751.31	206276
MN040	445319093163801	371JRDN	08/25/2008	83.70	836.30	752.60	206354
MN040	445353093423801	371JRDN	08/23/2008	113.16	968.83	855.67	433412
MN040	445358093145201	367PRDC	08/19/2008	38.06	840.18	802.12	200586
MN040	445403093345901	367PRDC	08/26/2008	104.79	963.31	858.52	168996
MN040	445445093220801	371JRDN	08/19/2008	120.76	896.34	775.58	207674
MN040	445511093313601	367PRDC	08/23/2008	141.09	948.24	807.15	419409
MN040	445630093230301	378PDCJ	08/21/2008	141.28	932.13	790.85	203196
MN040	445729093221601	378PDCJ	08/21/2008	115.80	905.67	789.87	206436
MN040	445741093333001	367PRDC	08/19/2008	48.05	937.19	889.14	206915
MN040	445950093265801	371JRDN	08/21/2008	189.30	980.97	791.67	204617
MN040	450043093341101	371JRDN	08/26/2008	137.12	1042.86	905.74	104841
MN040	450100093280501	367PRDC	08/27/2008	113.28	958.01	844.73	204318
MN040	450222093231801	378PDCJ	08/19/2008	85.31	925.20	839.89	203542
MN040	450542093165801	367PRDC	08/26/2008	27.76	836.61	808.85	174897
MN040	450553093202601	371JRDN	08/25/2008	22.84	866.14	843.30	203021
MN040	450819093311401	371JRDN	08/18/2008	49.40	941.60	892.20	159603
MN040	450819093412401	371JRDN	08/20/2008	57.01	951.33	894.32	155291
MN040	450852093195001	371JRDN	08/26/2008	30.67	853.02	822.35	105124
MN040	451132093243901	371JRDN	08/18/2008	21.22	859.58	838.36	133219
MN040	445335092594601	371JRDN	08/19/2008	178.79	886.68	707.89	185255
MN040	445546092591001	371JRDN	08/21/2008	249.41	1029.78	780.37	200054
MN040	445937093033501	371JRDN	08/20/2008	54.19	869.42	815.23	225903
MN040	450251093022401	378PDCJ	08/19/2008	83.21	954.72	871.51	112222
MN040	450551093044701	367PRDC	08/19/2008	57.04	908.79	851.75	205707
MN040	450630093101101	367PRDC	08/25/2008	38.51	898.95	860.44	183469
MN040	443328093184701	367PRDC	08/28/2008	187.80	1140.78	952.98	212377
MN040	443352093274201	371JRDN	08/19/2008	137.69	1083.82	946.13	120101
MN040	443438093292701	371JRDN	08/18/2008	76.60	1002.52	925.92	216770
MN040	443505093255201	367PRDC	08/28/2008	26.12	968.15	942.03	427107
MN040	443518093164501	367PRDC	08/27/2008	61.27	1012.57	951.30	518202
MN040	443605093231801	378PDCJ	08/27/2008	75.17	1012.25	937.08	129152
MN040	443805093221801	367PRDC	08/27/2008	104.82	1016.15	911.33	216758

Table A6. Groundwater-level measurements used to construct the potentiometric-surface map of the Prairie du Chien-Jordan aquifer, August 2008.—Continued

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is a Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	444059093260901	367PRDC	08/19/2008	103.66	991.07	887.41	127106
MN040	444202093225901	378PDCJ	08/20/2008	58.10	948.91	890.81	207461
MN040	444514093214301	371JRDN	08/20/2008	87.07	887.55	800.48	151582
MN040	444610093274701	371JRDN	08/22/2008	73.72	800.47	726.75	404380
MN040	445004092590101	371JRDN	08/20/2008	90.94	813.75	722.81	208804
MN040	445117092572801	367PRDC	08/18/2008	130.13	916.22	786.09	109685
MN040	445137092590901	367PRDC	08/18/2008	263.47	1001.99	738.52	156361
MN040	445245092545501	367PRDC	08/21/2008	76.84	927.66	850.82	427865
MN040	445321092590101	367PRDC	08/21/2008	223.01	981.54	758.53	415681
MN040	445514092563601	371JRDN	08/22/2008	231.62	1030.94	799.32	208423
MN040	445521092563601	371JRDN	08/27/2008	207.95	1001.90	793.95	208005
MN040	445733092582901	371JRDN	08/22/2008	222.94	1023.62	800.68	208463
MN040	445919092500101	367PRDC	08/25/2008	102.40	923.16	820.76	199550
MN040	450305092553201	367PRDC	08/19/2008	156.60	1059.71	903.11	519108
MN040	450331092511101	367PRDC	08/19/2008	31.68	915.35	883.67	195656
MN040	450825092524801	367PRDC	08/22/2008	48.93	997.38	948.45	195648
MN040	451218092493101	371JRDN	08/21/2008	64.99	983.70	918.71	423840
MN040	451312092550601	367PRDC	08/21/2008	31.70	941.60	909.90	110438
MN040	451602092515601	367PRDC	08/19/2008	30.51	941.60	911.09	138286
MN040	441944093194601	367PRDC	08/28/2008	52.73	1046.08	993.35	416242
MN040	442816093125901	371JRDN	08/20/2008	39.80	989.99	950.19	509102
MN040	443232093230901	367PRDC	08/27/2008	98.21	1066.31	968.10	436444
MN040	442733092532401	367PRDC	08/28/2008	205.33	1133.75	928.42	100029
USGS	450343093164401	378PDCJ	08/25/2008	16.75	833.33	816.58	206696
USGS	450453093151403	367PRDC	08/25/2008	64.90	882.55	817.65	206678
USGS	450607093143101	371JRDN	08/25/2008	58.70	889.11	830.41	209207
USGS	451057093214901	371JRDN	08/26/2008	22.76	869.42	846.66	202937
USGS	451548093134501	371JRDN	08/25/2008	12.19	908.79	896.60	535185
USGS	444432093555001	367PRDC	08/20/2008	110.26	998.16	887.90	601594
USGS	444758093393501	367PRDC	08/20/2008	154.02	951.01	796.99	681641
USGS	444848093494601	367PRDC	08/21/2008	86.40	976.06	889.66	467063
USGS	445137093532101	371JRDN	08/21/2008	61.91	980.51	918.60	671135
USGS	445341093524301	371JRDN	08/21/2008	61.58	976.77	915.19	540826
USGS	445436093482901	371JRDN	08/21/2008	90.33	986.72	896.39	505023
USGS	443134093010601	367PRDC	08/18/2008	17.22	880.36	863.14	207650
USGS	443134093010601	367PRDC	08/20/2008	18.94	880.36	861.42	207650
USGS	443234093025301	371JRDN	08/20/2008	41.08	929.58	888.50	502118
USGS	443303093080701	367PRDC	08/20/2008	20.62	939.41	918.79	--
USGS	443304093132101	371JRDN	08/15/2008	45.44	1000.46	955.02	225965
USGS	443347092545101	371JRDN	08/19/2008	27.88	893.16	865.28	540405
USGS	443429093063401	367PRDC	08/20/2008	8.51	929.88	921.37	--
USGS	443640093070501	378PDCJ	08/20/2008	21.14	922.21	901.07	--

Table A6. Groundwater-level measurements used to construct the potentiometric-surface map of the Prairie du Chien-Jordan aquifer, August 2008.—Continued

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is a Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
USGS	443720092580201	367PRDC	08/19/2008	78.35	953.30	874.95	558820
USGS	443744092502101	371JRDN	08/19/2008	103.08	902.33	799.25	186016
USGS	443806092551301	371JRDN	08/19/2008	141.57	982.64	841.07	585123
USGS	443939093105901	371JRDN	08/22/2008	35.10	942.06	906.96	731123
USGS	444116093130101	367PRDC	08/22/2008	99.41	987.89	888.48	474609
USGS	444205092500001	367PRDC	08/18/2008	101.40	825.93	724.53	243739
USGS	444224093124401	371JRDN	08/22/2008	80.70	939.79	859.09	212650
USGS	444402093122001	378PDCJ	08/20/2008	109.62	954.68	845.06	205823
USGS	444420092524501	371JRDN	08/20/2008	154.88	858.70	703.82	207639
USGS	444643093172701	371JRDN	08/22/2008	135.00	780.63	645.63	206179
USGS	444728093154701	371JRDN	08/22/2008	176.93	880.11	703.18	206170
USGS	445000093105001	371JRDN	08/25/2008	182.68	836.17	653.49	205596
USGS	445227093020601	378PDCJ	08/20/2008	78.77	798.55	719.78	208347
USGS	445255093023901	371JRDN	08/19/2008	139.02	844.19	705.17	200674
USGS	445330093054101	378PDCJ	08/20/2008	325.90	1037.53	711.63	200660
USGS	445330093054301	367PRDC	08/18/2008	312.92	1046.36	733.44	200661
USGS	445330093054301	367PRDC	08/20/2008	314.35	1046.36	732.01	200661
USGS	445348093022901	378PDCJ	08/21/2008	55.82	751.56	695.74	200665
USGS	444801093202801	371JRDN	08/20/2008	89.45	822.96	733.51	233183
USGS	445029093270401	378PDCJ	08/19/2008	67.26	836.32	769.06	244762
USGS	445625093275001	378PDCJ	08/29/2008	165.50	953.23	787.73	661402
USGS	445639093275801	378PDCJ	08/29/2008	157.00	946.94	789.94	661401
USGS	450451093172601	371JRDN	08/25/2008	47.63	846.46	798.83	203260
USGS	450510093172501	378PDCJ	08/25/2008	46.78	849.74	802.96	127269
USGS	445918092590901	371JRDN	08/21/2008	152.78	1000.66	847.88	200874
USGS	450231093131301	371JRDN	08/25/2008	128.43	958.01	829.58	200524
USGS	450238093082501	371JRDN	08/20/2008	131.29	964.57	833.28	206833
USGS	450412092594001	367PRDC	08/20/2008	26.72	938.32	911.60	551564
USGS	450414093012702	367PRDC	08/20/2008	34.70	921.92	887.22	481807
USGS	450546093122601	378PDCJ	08/26/2008	66.88	898.95	832.07	206722
USGS	450620093121701	371JRDN	08/26/2008	71.17	905.51	834.34	206720
USGS	443726093195601	378PDCJ	08/27/2008	155.57	1067.22	911.65	585362
USGS	443752093261701	378PDCJ	08/19/2008	48.79	969.14	920.35	207938
USGS	443926093265301	367PRDC	08/19/2008	111.04	1016.01	904.97	502727
USGS	444103093243601	367PRDC	08/20/2008	94.57	986.15	891.58	451973
USGS	444123093265501	367PRDC	08/19/2008	103.17	987.59	884.42	637835
USGS	444213093242401	371JRDN	08/26/2008	75.69	945.08	869.39	686263
USGS	444258093244701	371JRDN	08/20/2008	46.04	928.18	882.14	207308
USGS	444315093322301	371JRDN	08/22/2008	194.74	960.23	765.49	213938
USGS	444342093272301	371JRDN	08/20/2008	203.07	959.01	755.94	603083
USGS	444414093214401	367PRDC	08/20/2008	91.36	919.77	828.41	540275
USGS	444534092512601	378PDCJ	08/19/2008	176.93	860.29	683.36	--

Table A6. Groundwater-level measurements used to construct the potentiometric-surface map of the Prairie du Chien-Jordan aquifer, August 2008.—Continued

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is a Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
USGS	444547092494201	371JRDN	08/19/2008	223.35	907.44	684.09	672771
USGS	444642092503701	371JRDN	08/18/2008	239.46	958.25	718.79	710065
USGS	444813092533501	371JRDN	08/18/2008	139.48	900.21	760.73	617669
USGS	444824092591101	371JRDN	08/18/2008	37.02	728.36	691.34	534336
USGS	444843092481801	367PRDC	08/20/2008	181.20	893.23	712.03	134757
USGS	444919092581501	371JRDN	08/21/2008	77.39	819.04	741.65	208809
USGS	444946092562101	371JRDN	08/21/2008	135.33	881.27	745.94	208807
USGS	444950092580701	371JRDN	08/21/2008	57.99	809.58	751.59	208808
USGS	445227092595101	371JRDN	08/18/2008	24.84	748.50	723.66	208353
USGS	445256092561001	367PRDC	08/21/2008	151.07	990.23	839.16	634277
USGS	445520092504901	371JRDN	08/20/2008	103.92	933.48	829.56	670797
USGS	445533092482301	371JRDN	08/20/2008	89.81	845.90	756.09	599989
USGS	445819092561801	367PRDC	08/25/2008	177.88	1059.71	881.83	512491
USGS	450103092564901	378PDCJ	08/25/2008	35.50	921.92	886.42	--
USGS	450201092491101	371JRDN	08/22/2008	136.25	941.00	804.75	112205
USGS	450312092492802	371JRDN	08/18/2008	72.20	883.37	811.17	208786
USGS	450358092571103	371JRDN	08/19/2008	91.89	1010.50	918.61	208506
USGS	450417092570401	378PDCJ	08/18/2008	73.18	974.41	901.23	208497
USGS	450434092545701	367PRDC	08/19/2008	75.61	1000.66	925.05	505390
USGS	450818092453501	371JRDN	08/19/2008	16.25	699.14	682.89	--
USGS	441914093163401	371JRDN	08/19/2008	25.12	988.94	963.82	101041
USGS	442749093240401	367PRDC	08/19/2008	139.05	1093.78	954.73	244390
USGS	443112092513901	371JRDN	08/20/2008	63.56	883.91	820.35	162685
USGS	442524093543701	378PDCJ	08/11/2008	84.73	856.09	771.36	129234

Table A7. Groundwater-level measurements used to construct the potentiometric-surface map of the Franconia-Ironton-Galesville aquifer, August 2008.

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371FIGV, Franconia-Ironton-Galesville Formations; 371FRNC, Franconia Sandstone; 371IGLV, Ironton Sandstone; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	450835093094301	371FIGV	08/07/2008	48.01	902.23	854.22	208995
MN040	450940093161701	371FRNC	08/25/2008	101.76	905.51	803.75	202950
MN040	451047093083001	371FRNC	08/20/2008	32.55	908.79	876.24	155088
MN040	451403093202101	371FIGV	08/25/2008	38.20	872.70	834.50	133294
MN040	451427093012901	371FRNC	08/21/2008	10.20	898.95	888.75	153483
MN040	451450093281701	371FRNC	08/25/2008	25.33	895.67	870.34	432526
MN040	451532093224901	371FRNC	08/25/2008	26.38	875.98	849.60	410618
MN040	451542093255701	371FRNC	08/25/2008	21.04	875.98	854.94	114351
MN040	451707093084001	371FRNC	08/25/2008	27.92	908.79	880.87	448062
MN040	451725093175601	371FRNC	08/25/2008	22.76	908.79	886.03	131272
MN040	451835093220501	371FRNC	08/19/2008	39.00	908.79	869.79	104802
MN040	451918093062901	371FRNC	08/25/2008	21.23	908.79	887.56	243000
MN040	452005093151801	371FRNC	08/18/2008	7.64	900.29	892.65	434658
MN040	452125093102201	371FRNC	08/18/2008	21.35	900.12	878.77	191978
MN040	452208093090201	371FRNC	08/25/2008	13.59	920.98	907.39	114319
MN040	452233093220001	371FRNC	08/18/2008	22.40	919.20	896.80	409532
MN040	452259093302601	371IGLV	08/19/2008	27.52	987.53	960.01	406281
MN040	452343093073201	371FRNC	08/20/2008	13.27	917.96	904.69	442057
MN040	444046093505401	371FRNC	08/19/2008	135.44	970.32	834.88	214815
MN040	444229093395201	371FRNC	08/19/2008	124.95	840.58	715.63	164877
MN040	444601093515601	371FRNC	08/20/2008	118.41	999.45	881.04	481227
MN040	444758093024501	371FRNC	08/19/2008	174.02	921.73	747.71	122276
MN040	444856093032301	371FRNC	08/19/2008	111.02	890.45	779.43	418682
MN040	445430093423101	371FRNC	08/23/2008	47.39	937.71	890.32	426570
MN040	445749093411201	371FRNC	08/23/2008	91.82	980.12	888.30	118895
MN040	450240093323001	371FIGV	08/20/2008	154.97	1007.76	852.79	122239
MN040	450411093321001	371FRNC	08/18/2008	110.79	1014.03	903.24	140121
MN040	450619093301201	371FRNC	08/18/2008	56.14	948.16	892.02	416105
MN040	450702093425101	371FRNC	08/18/2008	31.18	946.25	915.07	178176
MN040	450728093352801	371FRNC	08/18/2008	93.41	999.37	905.96	104810
MN040	450836093325001	371FRNC	08/18/2008	34.20	924.12	889.92	104743
MN040	450936093271501	371FRNC	08/18/2008	33.84	902.23	868.39	415969
MN040	451120093355201	371FRNC	08/18/2008	67.08	947.42	880.34	104726
MN040	451221093252701	371FRNC	08/18/2008	21.22	849.74	828.52	425090
MN040	451317093334801	371FRNC	08/18/2008	40.92	891.71	850.79	421127
MN040	451431093303801	371FRNC	08/18/2008	97.22	928.48	831.26	183697
MN040	443246093480801	371FRNC	08/22/2008	221.89	970.64	748.75	198999
MN040	443353093422701	371IGLV	08/29/2008	132.00	978.40	846.40	119705
MN040	443511093385301	371FRNC	08/21/2008	148.09	994.52	846.43	523922
MN040	443622093342501	371FRNC	08/21/2008	87.17	909.50	822.33	498274
MN040	443625093280401	371FRNC	08/19/2008	18.90	940.58	921.68	207930
MN040	444552092512001	371FRNC	08/19/2008	173.01	860.34	687.33	142573

Table A7. Groundwater-level measurements used to construct the potentiometric-surface map of the Franconia-Ironton-Galesville aquifer, August 2008.—Continued

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371FIGV, Franconia-Ironton-Galesville Formations; 371FRNC, Franconia Sandstone; 371IGLV, Ironton Sandstone; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	445011092525901	371FRNC	08/18/2008	81.75	914.66	832.91	424141
MN040	445357092491101	371FRNC	08/20/2008	171.65	980.00	808.35	110432
MN040	450056092470601	371FRNC	08/30/2008	94.65	773.86	679.21	208795
MN040	450101092463201	371FRNC	08/22/2008	15.49	688.96	673.47	208797
USGS	451033093165602	371FIGV	08/26/2008	114.10	889.11	775.01	202926
USGS	451217093243001	371FIGV	08/28/2008	72.50	879.27	806.77	201218
USGS	451455093145401	371FRNC	08/25/2008	26.95	902.23	875.28	461866
USGS	451848093025001	371FRNC	08/20/2008	14.61	895.67	881.06	624184
USGS	452305093141501	371FRNC	08/25/2008	22.65	924.91	902.26	122537
USGS	444023093424101	371FIGV	08/19/2008	151.99	873.88	721.89	536924
USGS	444343093573501	371FRNC	08/20/2008	112.95	1001.59	888.64	679273
USGS	444343093573501	371FRNC	08/20/2008	112.95	1001.59	888.64	679273
USGS	444348093503301	371IGLV	08/20/2008	109.17	962.13	852.96	450963
USGS	444423093422601	371FRNC	08/20/2008	127.54	895.89	768.35	453881
USGS	444423093422601	371FRNC	08/20/2008	127.54	895.89	768.35	453881
USGS	444558093373801	371FIGV	08/21/2008	109.00	810.93	701.93	705487
USGS	444701093500401	371FRNC	08/20/2008	131.14	1014.71	883.57	430455
USGS	444833093370701	371FIGV	08/28/2008	152.60	899.53	746.93	674318
USGS	444910093475901	371FRNC	08/21/2008	93.22	980.67	887.45	614895
USGS	444911093320601	371FRNC	08/23/2008	148.60	915.09	766.49	404365
USGS	445444093543001	371IGLV	08/21/2008	52.18	980.38	928.20	478465
USGS	443304093132102	371FRNC	08/15/2008	49.03	1000.46	951.43	225965
USGS	443843092440201	371FRNC	08/19/2008	169.00	841.37	672.37	481459
USGS	443902092451001	371FRNC	08/19/2008	150.76	841.52	690.76	487044
USGS	443932092471301	371FRNC	08/20/2008	129.60	838.84	709.24	596096
USGS	443934092565901	371FRNC	08/19/2008	81.56	902.86	821.30	692892
USGS	444034092452301	371FRNC	08/20/2008	110.38	791.21	680.83	596098
USGS	444119092594001	371FRNC	08/19/2008	70.66	900.13	829.47	679263
USGS	444234092560801	371FRNC	08/19/2008	120.58	842.09	721.51	692877
USGS	440323093375001	371FRNC	08/26/2008	150.75	1060.34	909.59	596647
USGS	451109093324101	371FIGV	08/26/2008	106.36	964.62	858.26	625354
USGS	445851093105601	371IGLV	08/20/2008	136.60	905.51	768.91	249803
USGS	443237093441301	371IGLV	08/21/2008	168.53	990.40	821.87	207144
USGS	443241093342001	371FIGV	08/21/2008	170.53	995.98	825.45	240054
USGS	443345093454001	371IGLV	08/22/2008	229.57	974.77	745.20	666431
USGS	443351093281401	371FIGV	08/18/2008	131.67	1068.77	937.10	641517
USGS	443354093345801	371FRNC	08/21/2008	131.41	967.86	836.45	560345
USGS	443444093432801	371FIGV	08/21/2008	202.80	991.14	788.34	500943
USGS	443603093304601	371FIGV	08/19/2008	90.21	983.64	893.43	658118
USGS	443752093384001	371FRNC	08/19/2008	130.34	939.85	809.51	672774
USGS	443951093293501	371FRNC	08/19/2008	118.88	960.31	841.43	634486
USGS	444024093393401	371FIGV	08/19/2008	102.03	832.35	730.32	578334

Table A7. Groundwater-level measurements used to construct the potentiometric-surface map of the Franconia-Ironton-Galesville aquifer, August 2008.—Continued

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371FIGV, Franconia-Ironton-Galesville Formations; 371FRNC, Franconia Sandstone; 371IGLV, Ironton Sandstone; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
USGS	444212093242601	371FIGV	08/26/2008	151.20	942.39	791.19	686264
USGS	444408093321301	371FRNC	08/22/2008	204.35	951.29	746.94	675952
USGS	444434093290101	371FIGV	08/22/2008	188.74	924.18	735.44	705731
USGS	444527093252901	371FIGV	08/20/2008	114.92	893.49	778.57	119657
USGS	444538093294301	371FIGV	08/29/2008	376.45	898.63	522.18	694904
USGS	444613092501101	371FRNC	08/18/2008	222.21	935.31	713.10	558794
USGS	444737092520201	371FRNC	08/18/2008	139.66	897.50	757.84	609808
USGS	445048092482101	371FRNC	08/20/2008	136.57	941.19	804.62	425202
USGS	445524092484001	371FRNC	08/20/2008	184.44	943.76	759.32	546303
USGS	445613092470201	371FIGV	08/26/2008	109.97	872.31	762.34	603059
USGS	445900092503901	371FRNC	08/25/2008	171.23	965.95	794.72	700690
USGS	445903092503901	371FRNC	08/25/2008	175.56	964.61	789.05	651975
USGS	450023092492901	371FRNC	08/25/2008	201.03	949.77	748.74	548900
USGS	450109092511901	371FRNC	08/25/2008	115.58	931.76	816.18	621551
USGS	450114092480301	371FRNC	08/25/2008	170.14	882.07	711.93	686639
USGS	450912092455201	371IGLV	08/19/2008	97.33	832.93	735.60	478957
USGS	451609092460001	371FRNC	08/19/2008	194.28	903.25	708.97	556149
USGS	451443093354501	371FIGV	08/19/2008	32.36	926.54	894.18	724631
USGS	451443093354502	371FIGV	08/19/2008	24.49	926.54	902.05	730108

Table A8. Groundwater-level measurements used to construct the potentiometric-surface map of the Mount Simon-Hinckley aquifer, August 2008.

[Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371MSHK, Mount Simon-Hinckley Aquifer; 371MSMN, Mount Simon Sandstone; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is a Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Date of water-level measurement (month/day/year) (LEV_DT)	Water level, in feet below land surface (WLEVL)	Land-surface altitude, in feet above NAVD88 (ALT_VA)	Water-level altitude, in feet above NAVD88 (WLEVSL)	Minnesota unique number (MN_UNIQUE)
MN040	450457093151401	371MSMN	08/25/2008	262.00	885.83	623.83	206670
MN040	451150093173501	371MSMN	08/26/2008	215.00	889.11	674.11	110469
MN040	451401093193701	371MSMN	08/25/2008	54.37	889.11	834.74	133341
MN040	452314093204801	371MSMN	08/19/2008	12.15	913.16	901.01	184885
MN040	444118093465801	371MSMN	08/19/2008	198.36	931.16	732.80	164895
MN040	444657093543901	371MSMN	08/28/2008	137.03	996.44	859.41	132256
MN040	445323093160201	371MSMN	08/26/2008	248.77	834.49	585.72	133362
MN040	445648093395201	371MSHK	08/19/2008	78.88	953.19	874.31	208866
MN040	445754093212401	371MSMN	08/28/2008	361.00	902.23	541.23	206424
MN040	443554093322701	371MSMN	08/21/2008	208.20	948.16	739.96	119701
MN040	444103093351801	371MSMN	08/22/2008	229.42	941.00	711.58	424680
MN040	444634093211001	371MSMN	08/27/2008	162.78	726.56	563.78	208816
MN040	445531092465101	371MSMN	08/20/2008	88.53	813.00	724.47	109721
MN040	445556092461901	371MSMN	08/25/2008	38.24	720.15	681.91	533517
MN040	445709092463701	371MSMN	08/21/2008	93.52	781.87	688.35	437305
MN040	445903092463001	371MSMN	08/25/2008	137.49	814.20	676.71	521819
USGS	451217093243201	371MSHK	08/18/2008	65.04	879.27	814.23	201191
USGS	443932093460401	371MSMN	08/19/2008	210.24	949.38	739.14	526666
USGS	443944093454501	371MSMN	08/19/2008	203.76	939.30	735.54	122978
USGS	444601093373501	371MSMN	08/21/2008	145.80	835.43	689.63	419465
USGS	445025093465801	371MSMN	08/25/2008	182.86	1024.73	841.87	568103
USGS	445027093470301	371MSMN	08/25/2008	162.77	1001.06	838.29	559340
USGS	443304093132105	371MSMN	08/15/2008	280.64	1000.46	719.82	225965
USGS	443408093343501	371MSMN	08/21/2008	195.51	944.60	749.09	433280
USGS	444542093114901	371MSMN	08/19/2008	357.48	988.10	630.62	519955
USGS	444935093105701	371MSMN	08/25/2008	248.03	836.94	588.91	433275
USGS	450238093323101	371MSMN	08/20/2008	344.47	1009.91	665.44	520048
USGS	445851093105603	371MSMN	08/26/2008	242.92	905.51	662.59	249805
USGS	444700093284601	371MSMN	08/29/2008	106.53	757.15	650.62	578948
USGS	445615092470501	371MSMN	08/26/2008	180.01	858.24	678.23	603058
USGS	445615093125501	371MSMN	08/26/2008	180.01	824.96	644.95	--
USGS	453122092445801	371MSMN	08/19/2008	41.77	863.53	821.76	133334
USGS	453340093141601	371MSMN	08/28/2008	2.46	947.78	945.32	219420
USGS	453418093140001	371MSHK	08/26/2008	8.59	952.44	943.85	--
USGS	450404093544501	371MSHK	08/20/2008	76.87	992.08	915.21	218013

Table A9. Groundwater-level differences between March 2008 and August 2008 for wells used to construct the seasonal change map for the Prairie du Chien-Jordan aquifer.

Seasonal Difference (SEAS_DIFF) calculated as March water-level (LEV_VA) minus August water-level (LEV_VA), therefore, a negative value represents a decline in groundwater level. [Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien -Jordan Aquifer ; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Water-level difference between March and August 2008, in feet (SEAS_DIFF)	Minnesota unique number (MN_UNIQUE)
MN040	445041093102101	371JRDN	-10.72	205809
MN040	445546092591001	371JRDN	-8.92	200054
MN040	450928093033903	371JRDN	-7.60	208573
MN040	444215093060401	371JRDN	-9.49	207608
MN040	444128093042501	367PRDC	.03	170885
USGS	444224093124401	371JRDN	-23.20	212650
MN040	445309093531701	371JRDN	-6.25	220954
MN040	450222093231801	378PDCJ	-10.87	203542
USGS	443304093132101	371JRDN	-0.46	255965
USGS	444420092524501	371JRDN	-8.98	207639
USGS	445255093023901	371JRDN	-9.84	200674
MN040	444654093165201	371JRDN	-45.00	206177
MN040	444323093084901	371JRDN	-6.18	509060
MN040	442816093125901	371JRDN	-0.10	509102
MN040	443641093110701	367PRDC	-2.18	119678
MN040	445321092590101	367PRDC	-3.73	415681
MN040	443645092525501	371JRDN	-6.97	443901
MN040	443505093255201	367PRDC	-2.92	427107
MN040	444059093260901	367PRDC	-1.47	127106
MN040	444854093242501	371JRDN	-18.88	413372
MN040	444202093225901	378PDCJ	-1.66	207461
MN040	443328093184701	367PRDC	-6.40	212377
MN040	443119093050101	367PRDC	-1.22	443920
MN040	444211092544601	371JRDN	-.58	457211
MN040	445245092545501	367PRDC	.50	427865
MN040	451602092515601	367PRDC	-.93	138286
MN040	445919092500101	367PRDC	-.50	199550
USGS	443429093063401	367PRDC	.97	--
MN040	443824093133401	371JRDN	-24.40	207727
USGS	443744092502101	371JRDN	-3.29	186016
USGS	444205092500001	367PRDC	-2.27	243739
USGS	443303093080701	367PRDC	1.33	--
USGS	443640093070501	378PDCJ	-2.99	--
USGS	443134093010601	367PRDC	-3.65	207650
MN040	442909093033201	367PRDC	-3.26	119649
USGS	444728093154701	371JRDN	-15.50	206170
MN040	444957093104901	371JRDN	-14.81	205595
MN040	444956093105301	371JRDN	-59.84	235373
USGS	445000093105001	371JRDN	-30.08	205596

Table A9. Groundwater-level differences between March 2008 and August 2008 for wells used to construct the seasonal change map for the Prairie du Chien-Jordan aquifer.—Continued

Seasonal Difference (SEAS_DIFF) calculated as March water-level (LEV_VA) minus August water-level (LEV_VA), therefore, a negative value represents a decline in groundwater level. [Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien -Jordan Aquifer ; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Water-level difference between March and August 2008, in feet (SEAS_DIFF)	Minnesota unique number (MN_UNIQUE)
USGS	445227093020601	378PDCJ	-1.08	208347
MN040	445316093033401	371JRDN	-11.09	127251
MN040	445255093013301	371JRDN	-5.13	200676
USGS	445348093022901	378PDCJ	-5.86	200665
USGS	445330093054301	367PRDC	-10.17	200661
USGS	445330093054101	378PDCJ	-16.36	200660
MN040	444644093165801	371JRDN	-38.38	206174
USGS	444643093172701	371JRDN	-31.78	206179
MN040	442849093094002	371JRDN	-.08	119647
MN040	444540093395501	371JRDN	.54	137419
USGS	450607093143101	371JRDN	-6.75	209207
USGS	450453093151403	367PRDC	-5.67	206678
USGS	450343093164401	378PDCJ	.80	206696
USGS	451057093214901	371JRDN	-.74	202937
MN040	445037093212401	371JRDN	-6.85	222916
MN040	444825093230501	378PDCJ	-4.70	114377
USGS	444801093202801	371JRDN	-7.95	233183
MN040	450553093202601	371JRDN	-2.52	203021
USGS	450451093172601	371JRDN	-8.98	203260
USGS	450510093172501	378PDCJ	-4.66	127269
MN040	445358093145201	367PRDC	-3.92	200586
MN040	445301093213201	378PDCJ	-26.40	204884
MN040	445445093220801	371JRDN	-29.08	207674
MN040	445741093333001	367PRDC	-15.69	206915
MN040	445630093230301	378PDCJ	-30.61	203196
MN040	445950093265801	371JRDN	-44.25	204617
MN040	445937093033501	371JRDN	-1.81	225903
USGS	445918092590901	371JRDN	-17.90	200874
USGS	450620093121701	371JRDN	-8.91	206720
USGS	450546093122601	378PDCJ	-4.22	206722
USGS	450238093082501	371JRDN	-2.72	206833
USGS	450231093131301	371JRDN	-3.74	200524
USGS	443752093261701	378PDCJ	-1.54	207938
MN040	443605093231801	378PDCJ	-8.74	129152
MN040	443352093274201	371JRDN	-2.85	120101
USGS	444258093244701	371JRDN	2.44	207308
USGS	444315093322301	371JRDN	.13	213938
USGS	444843092481801	367PRDC	-46.05	134757
USGS	445227092595101	371JRDN	-.04	208353

Table A9. Groundwater-level differences between March 2008 and August 2008 for wells used to construct the seasonal change map for the Prairie du Chien-Jordan aquifer.—Continued

Seasonal Difference (SEAS_DIFF) calculated as March water-level (LEV_VA) minus August water-level (LEV_VA), therefore, a negative value represents a decline in groundwater level. [Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien -Jordan Aquifer ; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Water-level difference between March and August 2008, in feet (SEAS_DIFF)	Minnesota unique number (MN_UNIQUE)
USGS	450201092491101	371JRDN	5.46	112205
USGS	450312092492802	371JRDN	-3.58	208786
USGS	450358092571103	371JRDN	-8.31	208506
USGS	450818092453501	371JRDN	-.75	--
USGS	450417092570401	378PDCJ	-9.63	208497
USGS	450103092564901	378PDCJ	-2.07	--
MN040	445733092582901	371JRDN	-25.37	208463
MN040	445514092563601	371JRDN	-29.92	208423
USGS	444534092512601	378PDCJ	-1.57	--
USGS	444919092581501	371JRDN	.38	208809
USGS	444950092580701	371JRDN	1.43	208808
USGS	444946092562101	371JRDN	-28.84	208807
MN040	445004092590101	371JRDN	-4.24	208804
MN040	451211093073201	371JRDN	-11.00	139656
MN040	451014093031401	367PRDC	-25.53	188272
MN040	451334093063801	371JRDN	-4.73	126900
MN040	451250093015701	378PDCJ	-2.51	136792
MN040	450802093062101	367PRDC	-19.17	145775
USGS	451548093134501	371JRDN	-.29	535185
USGS	445137093532101	371JRDN	-2.88	671135
USGS	444432093555001	367PRDC	-1.27	601594
USGS	445341093524301	371JRDN	-2.87	540826
MN040	444433093411601	371JRDN	1.39	433402
USGS	445436093482901	371JRDN	-3.14	505023
MN040	444858093411001	371JRDN	-2.54	208931
USGS	444758093393501	367PRDC	-4.60	681641
USGS	444848093494601	367PRDC	-1.95	467063
MN040	444257092511701	371JRDN	-5.46	185299
MN040	444253092465401	371JRDN	.05	194085
MN040	444001093020401	371JRDN	-1.60	185293
MN040	444825093044201	367PRDC	.62	136467
MN040	444842093092401	371JRDN	-1.41	186310
MN040	444419093011301	367PRDC	-.22	172709
MN040	445227093073101	367PRDC	-4.22	128709
MN040	444922093004701	371JRDN	4.54	402553
MN040	443528093015301	371JRDN	-.10	216464
MN040	445113093042401	367PRDC	-6.51	418665
MN040	445240093055801	367PRDC	-13.53	402587
USGS	443234093025301	371JRDN	-6.20	502118

Table A9. Groundwater-level differences between March 2008 and August 2008 for wells used to construct the seasonal change map for the Prairie du Chien-Jordan aquifer.—Continued

Seasonal Difference (SEAS_DIFF) calculated as March water-level (LEV_VA) minus August water-level (LEV_VA), therefore, a negative value represents a decline in groundwater level. [Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien -Jordan Aquifer ; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Water-level difference between March and August 2008, in feet (SEAS_DIFF)	Minnesota unique number (MN_UNIQUE)
USGS	444116093130101	367PRDC	-11.79	474609
MN040	444503092575701	371JRDN	-.13	451611
USGS	443720092580201	367PRDC	-.62	558820
MN040	444637093051301	367PRDC	-.63	198283
MN040	444600092535101	371JRDN	-1.01	518691
USGS	443806092551301	371JRDN	-7.53	585123
MN040	445403093345901	367PRDC	-9.65	168996
MN040	450819093412401	371JRDN	56.93	155291
MN040	450852093195001	371JRDN	-6.04	105124
MN040	450043093341101	371JRDN	-2.82	104841
MN040	451132093243901	371JRDN	-5.43	133219
MN040	450819093311401	371JRDN	-.39	159603
MN040	450542093165801	367PRDC	-5.12	174897
MN040	445248093273001	367PRDC	-8.62	203151
MN040	445511093313601	367PRDC	-21.80	419409
MN040	445353093423801	371JRDN	-2.72	433412
MN040	450100093280501	367PRDC	-20.53	204318
MN040	450630093101101	367PRDC	-4.18	183469
MN040	450551093044701	367PRDC	-3.35	205707
MN040	443805093221801	367PRDC	-12.62	216758
MN040	443438093292701	371JRDN	-4.27	216770
MN040	444610093274701	371JRDN	-4.65	404380
USGS	443726093195601	378PDCJ	-12.16	585362
MN040	443518093164501	367PRDC	-6.89	518202
USGS	444123093265501	367PRDC	-.74	637835
USGS	443926093265301	367PRDC	-.98	502727
USGS	444103093243601	367PRDC	-.59	451973
USGS	444414093214401	367PRDC	-.17	540275
MN040	451312092550601	367PRDC	-16.51	110438
MN040	445117092572801	367PRDC	-7.82	109685
MN040	445137092590901	367PRDC	-9.30	156361
MN040	450331092511101	367PRDC	-.55	195656
MN040	451218092493101	371JRDN	.28	423840
USGS	445819092561801	367PRDC	-.93	512491
MN040	450305092553201	367PRDC	-6.03	519108
USGS	450434092545701	367PRDC	-1.44	505390
USGS	445533092482301	371JRDN	-.77	599989
USGS	444813092533501	371JRDN	-11.55	617669
USGS	445256092561001	367PRDC	-.12	634277

Table A9. Groundwater-level differences between March 2008 and August 2008 for wells used to construct the seasonal change map for the Prairie du Chien-Jordan aquifer.—Continued

Seasonal Difference (SEAS_DIFF) calculated as March water-level (LEV_VA) minus August water-level (LEV_VA), therefore, a negative value represents a decline in groundwater level. [Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien -Jordan Aquifer ; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Water-level difference between March and August 2008, in feet (SEAS_DIFF)	Minnesota unique number (MN_UNIQUE)
USGS	444547092494201	371JRDN	3.08	672771
USGS	444642092503701	371JRDN	-2.36	710065
USGS	444824092591101	371JRDN	.75	534336
USGS	445520092504901	371JRDN	-.13	670797
MN040	444724093160301	371JRDN	-30.05	127259
MN040	445319093163801	371JRDN	-15.50	206354
MN040	445729093221601	378PDCJ	-28.75	206436
MN040	450251093022401	378PDCJ	-9.87	112222
MN040	445313093155701	378PDCJ	-23.40	206276
MN040	444514093214301	371JRDN	-3.67	151582
USGS	444213093242401	371JRDN	-4.10	686263
USGS	443347092545101	371JRDN	-7.98	540405
USGS	443939093105901	371JRDN	-8.95	731123
USGS	444342093272301	371JRDN	-9.87	603083
USGS	445639093275801	378PDCJ	-3.55	661401
USGS	445625093275001	378PDCJ	-30.60	661402
MN040	445521092563601	371JRDN	-28.75	208005
USGS	450412092594001	367PRDC	-5.07	551564
USGS	445029093270401	378PDCJ	-24.09	244762
USGS	450414093012702	367PRDC	-7.34	481807
MN040	443232093230901	367PRDC	-2.34	436444
USGS	444402093122001	378PDCJ	-36.27	205823
USGS	442524093543701	378PDCJ	-4.43	129234
USGS	441914093163401	371JRDN	-7.65	101041
USGS	442545093114001	367PRDC	-3.52	244389
USGS	442749093240401	367PRDC	-1.42	244390

Table A10. Groundwater-level differences between March 2008 and August 2008 for wells used to construct the seasonal change map for the Franconia-Ironton-Galesville aquifer.

Seasonal Difference (SEAS_DIFF) calculated as March water-level (LEV_VA) minus August water-level (LEV_VA), therefore, a negative value represents a decline in groundwater level. [Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371FIGV, Franconia-Ironton-Galesville Formations; 371FRNC, Franconia Sandstone; 371IGLV, Ironton Sandstone; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Water-level difference between March and August 2008, in feet (SEAS_DIFF)	Minnesota unique number (MN_UNIQUE)
MN040	451918093062901	371FRNC	-4.70	243000
USGS	452305093141501	371FRNC	-.76	122537
MN040	452208093090201	371FRNC	-1.28	114319
MN040	443353093422701	371IGLV	-.14	119705
USGS	445851093105601	371IGLV	-4.68	249803
USGS	443304093132102	371FRNC	-.39	255965
USGS	444434093290101	371FIGV	-27.77	705731
USGS	451033093165602	371FIGV	-51.32	202926
USGS	443237093441301	371IGLV	.01	207144
USGS	443241093342001	371FIGV	-14.13	240054
MN040	451427093012901	371FRNC	-.86	153483
MN040	451542093255701	371FRNC	-.62	114351
MN040	451725093175601	371FRNC	-1.55	131272
MN040	451047093083001	371FRNC	-8.57	155088
MN040	451835093220501	371FRNC	6.72	104802
MN040	451532093224901	371FRNC	.29	410618
MN040	452125093102201	371FRNC	-.32	191978
MN040	452259093302601	371IGLV	-1.37	406281
MN040	452233093220001	371FRNC	-3.45	409532
MN040	450940093161701	371FRNC	-38.49	202950
MN040	452005093151801	371FRNC	-.97	434658
MN040	451450093281701	371FRNC	-1.24	432526
MN040	451707093084001	371FRNC	-5.85	448062
MN040	452343093073201	371FRNC	-.48	442057
USGS	451848093025001	371FRNC	-2.22	624184
USGS	451455093145401	371FRNC	-8.00	461866
USGS	444910093475901	371FRNC	-1.64	614895
MN040	444601093515601	371FRNC	-2.07	481227
MN040	444229093395201	371FRNC	.59	164877
USGS	444348093503301	371IGLV	-.73	450963
USGS	444023093424101	371FIGV	-1.40	536924
USGS	444423093422601	371FRNC	-1.71	453881
MN040	451403093202101	371FIGV	-16.73	133294
MN040	444046093505401	371FRNC	.11	214815
USGS	444701093500401	371FRNC	-2.38	430455
USGS	445444093543001	371IGLV	-1.61	478465
USGS	444343093573501	371FRNC	-1.48	679273
USGS	444911093320601	371FRNC	-5.10	404365
MN040	444758093024501	371FRNC	-.44	122276
MN040	444856093032301	371FRNC	-.41	418682
USGS	443843092440201	371FRNC	.73	481459

Table A10. Groundwater-level differences between March 2008 and August 2008 for wells used to construct the seasonal change map for the Franconia-Ironton-Galesville aquifer.—Continued

Seasonal Difference (SEAS_DIFF) calculated as March water-level (LEV_VA) minus August water-level (LEV_VA), therefore, a negative value represents a decline in groundwater level. [Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371FIGV, Franconia-Ironton-Galesville Formations; 371FRNC, Franconia Sandstone; 371IGLV, Ironton Sandstone; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Water-level difference between March and August 2008, in feet (SEAS_DIFF)	Minnesota unique number (MN_UNIQUE)
USGS	443902092451001	371FRNC	0.87	487044
USGS	444234092560801	371FRNC	-16.73	692877
USGS	444034092452301	371FRNC	-14.64	596098
USGS	443932092471301	371FRNC	-.27	596096
USGS	444119092594001	371FRNC	-2.70	679263
USGS	443934092565901	371FRNC	-6.54	692892
MN040	451120093355201	371FRNC	-.12	104726
MN040	450836093325001	371FRNC	-1.33	104743
MN040	450728093352801	371FRNC	-.64	104810
MN040	445749093411201	371FRNC	-2.09	118895
MN040	450702093425101	371FRNC	-.69	178176
MN040	451431093303801	371FRNC	-2.78	183697
MN040	450936093271501	371FRNC	.46	415969
MN040	450619093301201	371FRNC	-.52	416105
MN040	451317093334801	371FRNC	-12.22	421127
MN040	451221093252701	371FRNC	-3.03	425090
MN040	445430093423101	371FRNC	-2.64	426570
MN040	443625093280401	371FRNC	-1.25	207930
USGS	444527093252901	371FIGV	-3.24	119657
USGS	444408093321301	371FRNC	-8.22	675952
MN040	443511093385301	371FRNC	-1.88	523922
USGS	443603093304601	371FIGV	-3.10	658118
USGS	443354093345801	371FRNC	-5.46	560345
USGS	443752093384001	371FRNC	-3.04	672774
USGS	444024093393401	371FIGV	-1.66	578334
MN040	443246093480801	371FRNC	-3.60	198999
MN040	443622093342501	371FRNC	-9.29	498274
USGS	443351093281401	371FIGV	-3.22	641517
USGS	443951093293501	371FRNC	-3.53	634486
USGS	443345093454001	371IGLV	-1.94	666431
USGS	443444093432801	371FIGV	-4.55	500943
MN040	444552092512001	371FRNC	-6.71	142573
MN040	445357092491101	371FRNC	-8.21	110432
MN040	445011092525901	371FRNC	.20	424141
USGS	445048092482101	371FRNC	-29.08	425202
USGS	450912092455201	371IGLV	-4.13	478957
USGS	444613092501101	371FRNC	-1.91	558794
USGS	450023092492901	371FRNC	-2.99	548900
USGS	444737092520201	371FRNC	-4.93	609808
USGS	450114092480301	371FRNC	-2.39	686639
USGS	445524092484001	371FRNC	-3.04	546303

Table A10. Groundwater-level differences between March 2008 and August 2008 for wells used to construct the seasonal change map for the Franconia-Ironton-Galesville aquifer.—Continued

Seasonal Difference (SEAS_DIFF) calculated as March water-level (LEV_VA) minus August water-level (LEV_VA), therefore, a negative value represents a decline in groundwater level. [Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371FIGV, Franconia-Ironton-Galesville Formations; 371FRNC, Franconia Sandstone; 371IGLV, Ironton Sandstone; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Water-level difference between March and August 2008, in feet (SEAS_DIFF)	Minnesota unique number (MN_UNIQUE)
USGS	445900092503901	371FRNC	-19.68	700690
USGS	450109092511901	371FRNC	-5.88	621551
USGS	451609092460001	371FRNC	-5.04	556149
MN040	450411093321001	371FRNC	3.15	140121
MN040	450835093094301	371FIGV	-9.96	208995
MN040	450101092463201	371FRNC	.06	208797
MN040	450056092470601	371FRNC	-1.75	208795
USGS	444212093242601	371FIGV	-50.40	686264
USGS	444538093294301	371FIGV	-237.14	694904
USGS	444558093373801	371FIGV	-46.92	705487
USGS	444833093370701	371FIGV	-20.18	674318
MN040	450240093323001	371FIGV	.43	122239
USGS	451109093324101	371FIGV	-16.60	625354
USGS	451217093243001	371FIGV	4.88	201218
USGS	445613092470201	371FIGV	-2.85	603059
USGS	440323093375001	371FRNC	-5.20	596647
USGS	451443093354501	371FIGV	-2.25	724631
USGS	451443093354502	371FIGV	-1.53	730108

Table A11. Groundwater-level differences between March 2008 and August 2008 for wells used to construct the seasonal change map for the Mount Simon-Hinckley aquifer.

Seasonal Difference (SEAS_DIFF) calculated as March water-level (LEV_VA) minus August water-level (LEV_VA), therefore, a negative value represents a decline in groundwater level. [Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371MSHK, Mount Simon-Hinckley Aquifer; 371MSMN, Mount Simon Sandstone; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Water-level difference between March and August 2008, in feet (SEAS_DIFF)	Minnesota unique number (MN_UNIQUE)
USGS	445615092470501	371MSMN	-2.95	603058
MN040	450457093151401	371MSMN	-58.15	206670
USGS	453418093140001	371MSHK	-1.88	217868
USGS	453340093141601	371MSMN	4.16	219420
MN040	444634093211001	371MSMN	-39.10	208816
USGS	445615093125501	371MSMN	-2.95	603058
USGS	445851093105603	371MSMN	-2.66	249805
USGS	443304093132105	371MSMN	.70	225965
MN040	444657093543901	371MSMN	13.29	132256
USGS	443944093454501	371MSMN	-.14	122978
USGS	451217093243201	371MSHK	-33.46	201191
MN040	445648093395201	371MSHK	-5.52	208866
MN040	443554093322701	371MSMN	2.16	119701
MN040	444103093351801	371MSMN	-4.23	424680
MN040	445531092465101	371MSMN	.62	109721
MN040	445709092463701	371MSMN	-3.07	437305
MN040	451401093193701	371MSMN	-18.43	133341
MN040	445903092463001	371MSMN	0.85	521819
USGS	443932093460401	371MSMN	-0.26	526666
MN040	452314093204801	371MSMN	-4.33	184885
MN040	451150093173501	371MSMN	-54.16	110469
MN040	445323093160201	371MSMN	-20.42	133362
USGS	444700093284601	371MSMN	-18.02	578948
USGS	444601093373501	371MSMN	-29.15	419465
USGS	450238093323101	371MSMN	-22.57	520048
USGS	443408093343501	371MSMN	6.50	433280
MN040	444118093465801	371MSMN	-3.39	164895
MN040	445556092461901	371MSMN	-5.32	533517
USGS	445025093465801	371MSMN	-26.53	568103
USGS	444542093114901	371MSMN	-1.18	519955
USGS	444935093105701	371MSMN	-42.70	433275
USGS	453122092445801	371MSMN	-.23	133334
USGS	450404093544501	371MSHK	-1.93	218013

Table A12. Groundwater-level differences between the winter of 1988–89 and March 2008 for wells used to construct the long-term change map for the Prairie du Chien-Jordan aquifer.

Long-term difference (YEAR_DIFF) calculated as winter 1988-89 water-level value (LEV_VA) minus March 2008 water-level (LEV_VA), therefore, a negative value represents a decline in groundwater level. [Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Water-level difference between March and August 2008, in feet (YEAR_DIFF)	Minnesota unique number (MN_UNIQUE)
MN040	445041093102101	371JRDN	-18.67	205809
USGS	444420092524501	371JRDN	4.10	207639
USGS	444727093095801	371JRDN	-5.29	112234
USGS	445255093023901	371JRDN	5.82	200674
MN040	444654093165201	371JRDN	-18.88	206177
USGS	443645093014701	367PRDC	3.55	101062
USGS	443429093063401	367PRDC	1.52	--
MN040	443824093133401	371JRDN	1.00	207727
USGS	443827092521801	378PDCJ	4.03	243754
USGS	443919092522501	378PDCJ	-9.52	207900
USGS	444205092500001	367PRDC	1.87	243739
USGS	443303093080701	367PRDC	2.05	--
USGS	443134093010601	367PRDC	2.43	207650
MN040	442909093033201	367PRDC	35.21	119649
USGS	444728093154701	371JRDN	-9.43	206170
MN040	444951093104901	371JRDN	-3.50	207258
MN040	444957093104901	371JRDN	-22.12	205595
MN040	444956093105301	371JRDN	2.25	235373
USGS	445000093105001	371JRDN	-15.60	205596
USGS	445227093020601	378PDCJ	12.31	208347
MN040	445316093033401	371JRDN	12.06	127251
MN040	445255093013301	371JRDN	0.90	200676
USGS	445348093022901	378PDCJ	4.04	200665
USGS	445330093054301	367PRDC	8.25	200661
USGS	445330093054101	378PDCJ	5.46	200660
MN040	444644093165801	371JRDN	-30.74	206174
USGS	444643093172701	371JRDN	-24.22	206179
MN040	442849093094002	371JRDN	2.73	119647
MN040	444540093395501	371JRDN	-.19	137419
USGS	450607093143101	371JRDN	2.05	209207
USGS	450453093151403	367PRDC	7.77	206678
USGS	450343093164401	378PDCJ	5.45	206696
USGS	451057093214901	371JRDN	1.98	202937
MN040	445037093212401	371JRDN	-8.95	222916
USGS	444801093202801	371JRDN	-4.50	233183
MN040	450553093202601	371JRDN	5.68	203021
MN040	445358093145201	367PRDC	5.86	200586
MN040	445301093213201	378PDCJ	-7.40	204884
MN040	445445093220801	371JRDN	-1.68	207674

Table A12. Groundwater-level differences between the winter of 1988–89 and March 2008 for wells used to construct the long-term change map for the Prairie du Chien-Jordan aquifer.—Continued

Long-term difference (YEAR_DIFF) calculated as winter 1988-89 water-level value (LEV_VA) minus March 2008 water-level (LEV_VA), therefore, a negative value represents a decline in groundwater level. [Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 367PRDC, Prairie du Chien Group; 371JRDN, Jordan Sandstone; 378PDCJ, Prairie du Chien-Jordan Aquifer; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey; --, not applicable]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Water-level difference between March and August 2008, in feet (YEAR_DIFF)	Minnesota unique number (MN_UNIQUE)
MN040	445630093230301	378PDCJ	3.33	203196
MN040	445950093265801	371JRDN	-8.05	204617
MN040	445937093033501	371JRDN	16.62	225903
USGS	445918092590901	371JRDN	2.12	200874
USGS	450620093121701	371JRDN	2.74	206720
USGS	450546093122601	378PDCJ	4.34	206722
USGS	450238093082501	371JRDN	10.43	206833
USGS	450231093131301	371JRDN	12.31	200524
USGS	443752093261701	378PDCJ	.75	207938
MN040	443605093231801	378PDCJ	-6.43	129152
USGS	444258093244701	371JRDN	-7.48	207308
USGS	444315093322301	371JRDN	-0.87	213938
USGS	444843092481801	367PRDC	47.85	134757
USGS	450213092530601	367PRDC	-4.52	242357
USGS	445227092595101	371JRDN	4.20	208353
USGS	450201092491101	371JRDN	-2.71	112205
USGS	450312092492802	371JRDN	2.38	208786
USGS	450358092571103	371JRDN	.42	208506
USGS	450818092453501	371JRDN	-.50	--
USGS	450417092570401	378PDCJ	-2.55	208497
USGS	450103092564901	378PDCJ	-1.43	--
MN040	445733092582901	371JRDN	-7.57	208463
MN040	445514092563601	371JRDN	-11.70	208423
USGS	444534092512601	378PDCJ	.64	--
USGS	444919092581501	371JRDN	6.23	208809
USGS	444950092580701	371JRDN	2.58	208808
USGS	444946092562101	371JRDN	7.51	208807
MN040	445004092590101	371JRDN	9.30	208804
MN040	444842093092401	371JRDN	-3.35	186310
MN040	444503092575701	371JRDN	2.99	451611
MN040	444724093160301	371JRDN	-2.05	127259
MN040	445313093155701	378PDCJ	-5.75	206276
MN040	445521092563601	371JRDN	-13.20	208005
USGS	443752093254401	378PDCJ	3.11	119589

Table A13. Groundwater-level differences between the winter of 1988–89 and March 2008 for wells used to construct the long-term change map for the Mount Simon-Hinckley aquifer.

Long-term difference (YEAR_DIFF) calculated as winter 1988-89 water-level value (LEV_VA) minus March 2008 water-level (LEV_VA), therefore, a negative value represents a decline in groundwater level. [Agency code: MN040, Minnesota Geological Survey; USGS, U.S. Geological Survey; Aquifer code: 371MSHK, Mount Simon-Hinckley Aquifer; 371MSMN, Mount Simon Sandstone; NAVD88, North American Vertical Datum of 1988; Minnesota unique number is a is the identifier used in the well database maintained by the Minnesota Department of Health and the Minnesota Geological Survey]

Agency code (AGENCY_CD)	Site number (SITE_NO)	Aquifer code (AQFR_CD)	Water-level difference between March and August 2008, in feet (YEAR_DIFF)	Minnesota unique number (MN_UNIQUE)
MN040	450457093151401	371MSMN	57.15	206670
USGS	451217093243201	371MSHK	-2.58	201191
MN040	444657093543901	371MSMN	-7.32	132256
MN040	445323093160201	371MSMN	-26.58	133362
MN040	445648093395201	371MSHK	-2.36	208866
MN040	445831093163101	371MSMN	35.14	201005
MN040	444634093211001	371MSMN	-55.68	208816
USGS	443944093454501	371MSMN	-1.39	122978

Appendix 2

Geographic Information System Datasets

Twenty-two GIS datasets are included in this appendix. The 22 GIS datasets are provided in two data exchange formats: (1) an ESRI geodatabase, and (2) GIS shapefiles. The following lists the GIS datasets included in this report.

Prairie du Chien-Jordan Aquifer

- Point groundwater-level dataset, winter 1988–89, revised from Andrews and others (1995) (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_data/PDCJ_W89.zip*)
- Potentiometric-surface contours, winter 1988–89, revised from Andrews and others (1995) (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_contours/PDCJ_W89_Contours.zip*)
- Point groundwater-level dataset for March 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_data/PDCJ_M08.zip*)
- Potentiometric-surface contours for March 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_contours/PDCJ_M08_Contours.zip*)
- Point groundwater-level dataset for August 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_data/PDCJ_A08.zip*)
- Potentiometric-surface contours for August 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_contours/PDCJ_A08_Contours.zip*)
- Point groundwater-level change dataset for water-level differences between March 2008 and August 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_change_data/PDCJ_M08_A08.zip*)
- Point groundwater-level change dataset for groundwater-level differences between the winter of 1988–89 and March 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_change_data/PDCJ_W89_M08.zip*)

Franconia-Ironton-Galesville Aquifer

- Point groundwater-level dataset for March 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_data/FIG_M08.zip*)
- Potentiometric-surface contours for March 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_contours/FIG_M08_Contours.zip*)
- Point groundwater-level dataset for August 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_data/FIG_A08.zip*)
- Potentiometric-surface contours for August 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_contours/FIG_A08_Contours.zip*)
- Point groundwater-level change dataset for groundwater-level differences between March 2008 and August 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_change_data/FIG_M08_A08.zip*)

Mount Simon-Hinckley Aquifer

- Point groundwater-level dataset, winter 1988–89, revised from Andrews and others (1995) (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_data/MSH_W89.zip*)
- Potentiometric-surface contours, winter 1988–89, revised from Andrews and others (1995) (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_contours/MSH_W89_Contours.zip*)
- Point groundwater-level dataset for March 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_data/MSH_M08.zip*)
- Potentiometric-surface contours for March 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_contours/MSH_M08_Contours.zip*)
- Point groundwater-level dataset for August 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_data/MSH_A08.zip*)

- Potentiometric-surface contours for August 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_contours/MSH_A08_Contours.zip*)
- Point groundwater-level change dataset for groundwater-level differences between March 2008 and August 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_change_data/MSH_M08_A08.zip*)
- Point groundwater-level change dataset for groundwater-level differences between the winter of 1988–89 and March 2008 (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/Groundwater_level_change_data/MSH_W89_M08.zip*)

Minnesota Geological Survey/Minnesota Department of Health County Well Index

- Point CWI static groundwater-levels for the Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and Mount Simon-Hinckley aquifers (*http://pubs.usgs.gov/sir/2009/5226/downloads/SIR_2009_5226_SHAPEFILES/CWI/CWI_Static_Water_Levels.zip*)

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