Water Resources Data Minnesota Water Year 1992

Volume 2. Upper Mississippi and Missouri River Basins

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MN-92-2
Prepared in cooperation with the Minnesota Department of Natural Resources, Division of Waters; the Minnesota Department of Transportation; and with other State, municipal, and Federal agencies

CALENDAR FOR WATER YEAR 1992

1991

OCTOBER

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1992

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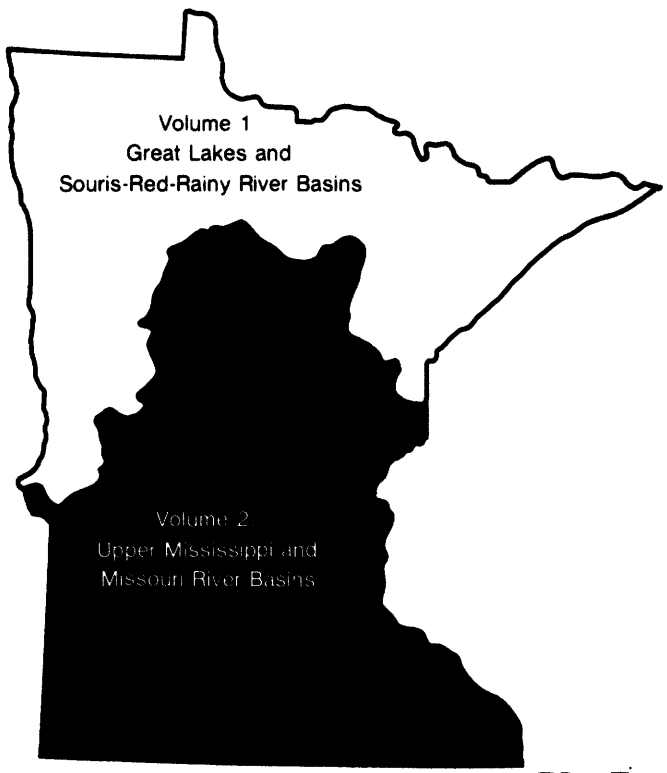
27	28	29	30			

Water Resources Data Minnesota Water Year 1992

Volume 2. Upper Mississippi and Missouri River Basins

by Kurt T. Gunard, Joseph H. Hess, and James L. Zirbel



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MN-92-2
Prepared in cooperation with the Minnesota Department of Natural Resources, Division of Waters; the Minnesota Department of Transportation; and with other State, municipal, and Federal agencies

DEPARTMENT OF THE INTERIOR

BRUCE BABBITT, Secretary

GEOLOGICAL SURVEY

Robert M. Hirsch, Acting Director

For additional information write to:

District Chief, Water Resources Division
U.S. Geological Survey
2280 Woodale Drive
Mounds View, Minnesota 55112

1993

PREFACE

This volume of the annual hydrologic data report of Minnesota is one of a series of annual reports that document hydrologic data gathered from the U.S. Geological Survey's surface- and ground-water data-collection networks in each State, Puerto Rico, and the Trust Territories. These records of streamflow, ground-water levels, and water quality provide the hydrologic information needed by State, local, and Federal agencies, and the private sector for developing and managing our Nation's land and water resources. Hydrologic data for Minnesota are contained in two volumes:

Volume 1. Great Lakes and Souris-Red-Rainy River Basins

Volume 2. Upper Mississippi and Missouri River Basins

This report is the culmination of a concerted effort by dedicated personnel of the U.S. Geological Survey who collected, compiled, analyzed, verified, and organized the data, and who typed, edited, and assembled the report. In addition to the authors, who had primary responsibility for assuring that the information contained herein is accurate, complete, and adheres to Geological Survey policy and established guidelines, the following individuals contributed significantly to the preparation of this report:

Gregory W. Stratton, Water-Quality Technician, Minnesota District

Alex Brietkrietz, Ground-Water Network Technician, Minnesota District

Most of the data were collected, processed, and tabulated by the following individuals:

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16. Abstract (Limit: 200 words)

Water-resources data for the 1992 water year for Minnesota consist of records of stage, discharge and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality in wells and springs. This volume contains discharge records for 59 gaging stations; stage and contents for 9 lakes and reservoirs; water quality for 23 stream stations, 1 lake station, 21 partial-record sites, 1 precipitation station, 74 wells; and water levels for 119 observation wells. Also included are 59 high-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program and are published as miscellaneous measurements. These data, together with the data in Volume 1, represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal Agencies in Minnesota.

17. Document Analysis a. Descriptors

*Minnesota, *Hydrologic data, *Surface water, *Ground water, *Water quality, Flow rate, Gaging stations, Lakes, Reservoirs, Chemical analyses, Precipitation, Sediments, Water temperatures, Sampling sites, Water levels, Water analyses, Data collection

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GAGING STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED

Note.--Data for partial-record stations and miscellaneous sites for both surface-water quantity and quality are published in separate sections of the data report. See references at the end of this list for page numbers for these sections.

[Letters after station name designates type of data: (d) discharge; (e) gage height, elevation, or contents; (c) chemical, radio-chemical, or pesticides; (b) biological or micro-biological; (p) physical (water temperature, sediment, or specific conductance)]

GAGING STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED--Continued

GAGING STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED--Continued

GROUND-WATER WELLS, BY COUNTY, FOR WHICH RECORDS ARE PUBLISHED IN THIS VOLUME

GROUND-WATER LEVELS

GROUND-WATER WELLS, BY COUNTY, FOR WHICH
RECORDS ARE PUBLISHED IN THIS VOLUME--Continued

GROUND-WATER LEVELS

GROUND-WATER WELLS, BY COUNTY, FOR WHICH
RECORDS ARE PUBLISHED IN THIS VOLUME--Continued

GROUND-WATER LEVELS

COUNTIES WITH QUALITY OF GROUND WATER RECORDS

PRECIPITATION SITES, FOR WHICH CHEMICAL QUALITY RECORDS ARE PUBLISHED

WATER RESOURCES DATA - MINNESOTA, 1992

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS

The following continuous-record surface-water discharge or stage-only stations (gaging stations) in Minnesota have been discontinued. Daily streamflow or stage records were collected and published for the period of record, expressed in water years, shown for each station. Those stations with an asterisk (*) after the station number are currently operated as crest-stage partial-record stations. Discontinued project stations with less than 3 years of record have not been included. Information regarding these stations may be obtained from the District Office at the address given on the back side of the title page of this report.

[Letters after station name designate type of the data collected:
(d) discharge, (e) elevation (stage only)]

Station name	Station number	Drainage area (mi^2)	Period of record
UPPER MISSISSIPPI RIVER BASIN			
Mississippi River near Deer River, MN (d)	05210000	a3,190	1945-50
Prairie River near Taconite, MN (d)	05212700	a360	1967-83
Prairie River near Grand Rapids, MN (d)	05213000*	485	1909†, 1925-49
O'Brien Creek near Pengilly, MN (d)	05216800	-	1963-68
Initial tailings basin outflow near Keewatin, MN (d)	05216820	2.5	1982-85
Swan River near Calumet, MN (d)	05216850	114	1964-90
Swan River near Warba, MN (d)	05217000	254	1954-69
Swan River near Swan River, MN (d)	05217500	a290	1929
Mississippi River above Sandy River near Libby (above Sandy River), MN (d)	05218000	4,560	1895-1915, 1925-29
Mississippi River below Sandy River near Libby, MN (d)	05220500	a5,060	1930-90
Willow River near Palisade, MN (d)	05221000	442	1929
Ripple (Mud) River near Wealthwood, MN (d)	05226200	-	1937-39
Pelican Brook (Long Lake) near Pequot Lakes, MN (d)	05232000	-	1938-42, 1943-47
Rabbit River near Crosby, MN (d)	05241500	8.38	1945-63
Little Sand Lake outlet (Sand Lake outlet) near Dorset, MN (d)	05242700	a74	1930-41
Straight River at County Highway 125 near Osage, MN (d)	05243721	-	1986-91
Straight River at County Highway 115 near Park Rapids, MN (d)	05243723	-	1986-89
Crow Wing River at Motley, MN (d)	05244500	a2,140	1909†, 1913-17, 1930-31

"See footnotes at end of table."

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi^2)	Period of record
UPPER MISSISSIPPI RIVER BASIN--Continued			
Diversion from Long Prairie River near Osakis, MN (d)	05244980	-	1939-47
Long Prairie River near Osakis, MN (d)	05245000	-	1949-54
Long Prairie River near Motley, MN (d)	05245500	973	1909-17, 1930-31
Crow Wing River at Pillager, MN (d)	05246000	a3,230	1903†, 1909-1913, 1925-1950
Nokasippi River near Fort Ripley, MN (d)	05261500	210	1929
Platte (Platt) River at Royalton, MN (d)	05268000*	338	1929-36
Mississippi River near Sauk Rapids, MN (d)	05269000	a12,400	1903-06
Mississippi River at Sartell, MN (d)	05270000	a12,450	1929, 1943-47†
Clearwater River at Clearwater, MN (d)	05273500	-	1937, 1940-42
Elk River above St. Francis River near Big Lake, MN (d)	05274500	384	1929
St. Francis River at Santiago, MN (d)	05274700	-	1965-70, 1980-81
St. Francis River above Zimmerman, MN (d)	05274750	-	1980-84
St. Francis River near Big Lake, MN (d)	05274900	-	1965-70
Mississippi River at Elk River, MN (d)	05275500	a14,500	1915-56
North Fork Crow River near Regal, MN (d)	05276000	215	1943-54
Middle Fork Crow River at New London, MN (d)	05277000	-	1939-42, 1943-47
Middle Fork Crow River (Calhoun Lake Diversion) near Spicer, MN (d)	05277500	-	1939, 1940-46
Middle Fork Crow River near Spicer, MN (d)	05278000	179	1949-87
North Fork Crow River near Rockford, MN (d)	05278400	-	1909-10
South Fork Crow River at Cosmos, MN (d)	05278500	221	1945-64
Buffalo Creek near Glencoe, MN (d)	05278930	374	1972-80
South Fork Crow River near Mayer, MN (d)	05279000	a1,170	1934-79
South Fork Crow River near Rockford, MN (d)	05279500	a1,250	1909-12
Mississippi River at Anoka, MN (d)	05283500	a17,100	1897, 1905-13

"See footnotes at end of table."

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi^2)	Period of record
UPPER MISSISSIPPI RIVER BASIN--Continued			
Rum River at Onamia, MN (d)	05284500	414	1910-12
Rum River at Spencer Brook MN (d)	05284750	-	1960-64
Rum River at Cambridge, MN (d)	05285000	a1,160	1909-14
Rum River at St. Francis, MN (d)	05285500	-	1903
Rum River near Anoka, MN (d)	05286500	1,430	1905-06, 1909
Minnetonka Lake (head of Minnehaha Creek) near Wayzata (at Excelsior), MN (d)	05289000	-	1938-64
Minnehaha Creek at Minnetonka Mills, MN (d)	05289500	130	1953-64
MINNESOTA RIVER BASIN			
Minnesota River near Odessa, MN (d)	05292500	a1,340	1909-12, 1944-63
Pomme de Terre River near Morris, MN (d)	05293500	-	1937-39, 1940-47
Canby Creek at Canby, MN (d)	05299500	-	1938-39, 1940-46
Ten Mile Creek near Boyd, MN (d)	05300500	82.8	1949-51
Little Chippewa River near Lowry, MN (d)	05302000	a54	1941
Little Chippewa River near Starbuck, MN (d)	05302500*	111	1938-39
Chippewa River at diversion dam near Hancock, MN (d)	05303000	-	1930-39, 1940-46
Chippewa River at Benson, MN (d)	05303500	a1,270	1949-51
Shakopee Creek near Benson, MN (d)	05304000	352	1949-54
Chippewa River near Watson, MN (d)	05305000	a2,050	1910-17, 1931-36
South Branch Yellow Medicine River at Minneota, MN (d)	05311400	111	1960-81, 1983-87
Yellow Medicine River near Cottonwood, MN (d)	05311500	465	1945-46
Spring Creek near Clarkfield, MN (d)	05312000	a89	1945-46
Spring Creek near Hazel Run, MN (d)	05312500	101	1945-48
Yellow Medicine River near Hanley Falls, MN (d)	05313000	606	1945-47
Hawk Creek at outlet of Eagle Lake near Willmar, MN (d)	05313521	-	1972-73

"See footnotes at end of table."

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi^2)	Period of record
MINNESOTA RIVER BASIN--Continued			
Eagle Lake tributary No. 7 near Willmar, MN (d)	05313560	-	1972-73
Eagle Lake tributary No. 8 near Willmar, MN (d)	05313570	-	1972-73
Chetomba Creek near Maynard, MN (d)	05314000	a200	1949-51
Hawk Creek near Maynard, MN (d)	05314500*	474	1949-54
Prairie Ravine near Marshall, MN (d)	05315200*	5.63	1959-64
Redwood River near Green Valley, MN (d)	05315500	436	1945-57
Redwood River near Seaforth, MN (d)	05316000	573	1945-46
Minnesota River at New Ulm, MN (d)	05316770	9,536	1968-76
Dry Creek near Jeffers, MN (d)	05316900	3.13	1982-85
Minnesota River at Judson, MN (d)	05317500	a11,200	1938-50
East Branch (East Fork) Blue Earth River near Bricelyn, MN (d)	05318000	132	1951-70
South Fork Watonwan River at diversion dam near St. James, MN (d)	05319000	-	1939, 1940-46
Blue Earth River at Mankato, MN (d)	05321000	a3,550	1938-39, 1940-42
Sand Creek at diversion dam near Jordan, MN (d)	05330400	-	1938-39, 1940-46
Purgatory Creek at Eden Prairie, MN (d)	05330800	-	1975-80
Nine Mile Creek at Bloomington, MN (d)	05330900	-	1963-73
ST. CROIX RIVER BASIN			
Glaisby Brook near Kettle River, MN (d)	05336200*	24.2	1959-70
Kettle River near Sandstone, MN (d)	05336500	825	1908-16
Grindstone River at Hinckley, MN (d)	05337000	-	1940-47
Snake River at Mora, MN (d)	05337500	422	1909-13
Snake River at Sanatorium Bridge near Pine City, MN (d)	05338000	-	1937-38
St. Croix River near Rush City, MN (d)	05339500	a5,120	1923-61
Sunrise River near Stacy, MN (d)	05340000	167	1949-65
Sunrise River near Lindstrom, MN (d)	05340050	231	1965-85

"See footnotes at end of table."

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi^2)	Period of record
LOWER MISSISSIPPI RIVER BASIN--Continued			
Vermillion River at Empire (Empire City), MN (d)	05345500	124	1942-44
Vermillion River at Hastings, MN (d)	05346000	195	1942-47, 1990
Mississippi River at Wabasha, MN (d)	05371500	a56,600	1934
South Fork Zumbro River on Belt Line at Rochester, MN (d)	05372800	155	1981
Bear Creek at Rochester, MN (d)	05372930	80.0	1981
Silver Creek at Rochester, MN (d)	05372950	17.3	1981
Cascade Creek at Rochester, MN (d)	05372990	35.8	1981
South Fork Zumbro River near Rochester, MN (d)	05373000	304	1952-81
Zumbro River (South Branch) near Zumbro Falls, MN (d)	05373500	821	1911-17
Zumbro River at Zumbro Falls, MN (d)	05374000	-	1909-17, 1929-80
Zumbro River at Theilman, MN (d)	05374500	a1,320	1938-56
Zumbro River at Kellogg, MN (d)	05374900	1,400	1975-90
South Fork Whitewater River near Altura, MN (d)	05376500	76.8	1939-71
Beaver Creek at Beaver, MN (d)	05377000	15.4	1939-40
Whitewater River at Beaver, MN (d)	05377500	288	1936-38, 1939-56
Stockton Valley Creek at Stockton, MN (d)	05378230	-	1982-85
Straight Valley Creek near Rollingstone, MN (d)	05378300	5.16	1970-85
Gilmore Creek at Winona, MN (d)	05379000	8.95	1939-63
Mississippi River at Lamoille, MN (d)	05380500	a60,000	1930-31
Mississippi River at LaCrosse, WI (d)	05383500	-	1929-55
North Branch Root River tributary near Stewartville, MN (d)	05383600	0.73	1959-64
Rush Creek near Rushford, MN (d)	05384500*	129	1942-79
Root River near Lanesboro, MN (d)	05384000	615	1910, 1911-17, 1940-85, 1987-90

"See footnotes at end of table."

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi^2)	Period of record
LOWER MISSISSIPPI RIVER BASIN--Continued			
South Fork Root River near Houston, MN (d)	b05385500	275	1953-83
Root River below South Fork near Houston, MN (d)	05386000	a1,560	1938-61
Turtle Creek near Austin, MN (d)	05456500	144	1947-51
Heron Lake outlet near Heron Lake, MN (d)	05475000	-	1930-43
BIG SIOUX RIVER BASIN			
Rock River at Luverne, MN (d)	06483000*	440	1911-14
Little Sioux River near Lakefield, MN (d)	06603000	17.1	1948-63
Jackson County ditch No. 11 near Lakefield, MN (d)	06603500	7.69	1948-61

* Presently operated as a high-flow partial-record station.

† Stage records only.

a Approximately.

b Discharge measurements made to maintain a current rating.

DISCONTINUED SURFACE-WATER QUALITY STATIONS

[The following stations were discontinued as continuous-record or periodic-record stations prior to the 1992 water year. Daily or periodic records of chemical, biological, sediment, temperature, dissolved oxygen, pH, or specific conductance were collected and published for the record shown for each station.]

Discontinued continuous-record and periodic-record surface-water-quality stations

Station name	Station number	Drainage area (sq mi)	Type of record	Period of record (water years)
Elk River near Big Lake, MN	05275000	615	Sed., Temp	1976-81
Crow River at Rockford, MN	05280000	2520	Sed., Temp	1975-81
Mississippi River at Fridley, MN	05288550		Temp, D.O., pH, S.C.	1975-86
Mississippi River at Ford Plant at St. Paul, MN	05288950	19,700	Temp, D.O., pH, S.C.	1974-78, 81-82
Whetstone River near Big Stone City, SD	05291000	389	Sed., Temp	1974-88
Yellow Bank River near Odessa, MN	05293000	398	Sed., Temp	1974-88
Chippewa River near Milan, MN	05304500	1870	Sed., Temp	1972-81
Yellow Medicine River near Granite Falls, MN	05313500	653	Sed., Temp	1971-75, 77-81
Cottonwood River near New Ulm, MN	05317000	1280	Sed.	1968-76
Watonwan River near Garden City, MN	05319500	812	Sed.	1977-80
Minnesota River at Burnsville, MN	05330908		Temp, D.O., pH, S.C.	1980-83
Minnesota River at Fort Snelling State Park, St. Paul, MN	05330920	16,900	Temp, D.O., pH, S.C.	1973-83
Mississippi River at Industrial Molasses, St. Paul, MN	05331005		Temp, D.O., pH, S.C.	1976-85
Mississippi River at Fifth Street at Newport, MN	05331545		Temp, D.O., pH, S.C.	1979-90
Mississippi River at Grey Cloud Island near Cottage Grove, MN	05331560		Temp, D.O., pH, S.C.	1977-90
Mississippi River at Lock and Dam 2 at Hastings, MN	05331578		Temp, D.O., pH, S.C.	1975-90
St. Croix River at Afton, MN	05341770		Temp, D.O., pH, S.C.	1977-83
Vermillion River near Empire, MN	05345000	110	Temp, D.O., pH, S.C.	1974-90
Mississippi River at Lock and Dam 3 near Red Wing, MN	05344980	46,600	Temp, D.O., pH, S.C.	1976-83
South Fork Zumbro River at Rochester, MN	05372995	303	Sed., Temp	1981-82
Zumbro River at Kellogg, MN	05374900	1400	Sed., Temp	1975-81
Whitewater River near Beaver, MN	05376800	271	Sed., Temp	1975-81
Mississippi River at Winona, MN	05378500	59,200	C.Bio., D.O., pH	1963-66
			S.C.	1980-84
			Sed., Temp	1976-88
Root River near Houston, MN	05385000	1270	Sed., Temp	1975-81
South Fork Root River near Houston, MN	05385500	275	Sed., Temp	1975-81
Cedar River near Austin, MN	05457000	425	Sed.	1971, 73-75, 78-81
			Temp	1973-75, 79-81
			S.C.	1973-75
Des Moines River at Jackson, MN	05476000	1220	Sed., Temp	1968-81

Type of record: C (chemical), Bio., (biological), Sed. (sediment), Temp. (temperature), D.O. (dissolved oxygen), pH (pH), S.C. (specific conductance).

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INTRODUCTION

The Water Resources Division of the U.S Geological Survey, in cooperation with State agencies, obtains a large amount of data pertaining to the water resources of Minnesota each water year.These data, accumulated during many years, constitute a valuable data base for developing an improved understanding of the water resources of the State. To make these data readily available to interested parties outside the Geological Survey, the data are published annually in this report series entitled "Water Resources Data - Minnesota."

Water resources data for the 1992 water year for Minnesota consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. This volume contains discharge records for 59 gaging stations; stage and contents for 9 lakes and reservoirs; water quality for 23 stream stations, 1 lake station, 21 partial-record sites, 1 precipitation station, 74 wells; and water levels for 119 observation wells. Also included are 59 high-flow partial-record stations. Additional water data were collected at various sites, not involved in the systematic data collection program, and are published as miscellaneous measurements or low-flow investigations. These data, together with the data in Volume 1, represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Minnesota.

This series of annual reports for Minnesota began with the 1961 water year with a report that contained only data relating to the quantities of surface water. For the 1964 water year, a similar report was introduced that contained only data relating to water quality. Beginning with the 1975 water year, the report was changed to present, in one volume, data on quantities of surface water, quality of surface and ground water, and ground-water levels.

Prior to introduction of this series and for several water years concurrent with it, water-resources data for Minnesota were published in U.S. Geological Survey Water-Supply Papers. Data on stream discharge and stage and on lake or reservoir contents and stage, through September 1960, were published annually under the title "Surface-Water Supply of the United States, Parts 4, 5 and 6A." For the 1961 through 1970 water years, the data were published in two 5-year reports. Data on chemical quality, temperature, and suspended sediment for the 1941 through 1970 water years were published annually under the title "Quality of Surface Waters of the United States," and water levels for the 1935 through 1974 water years were published under the title "Ground-Water Levels in the United States." The above mentioned Water-Supply papers can be consulted in the libraries of the principal cities of the United States and may be purchased from the books and Open-File Reports Section, Federal Center, Box 25425, Denver, Colorado 80225.

Publications similar to this report are published annually by the Geological Survey for all States. These official Survey reports have an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and volume number. For example, this volume is identified as the "U.S. Geological Survey Water-Data Report MN-92-2. For archiving and general distribution, the reports for 1971-1974 water years also are identified as water-data reports. These water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161. Beginning with the 1990 water year, all water-data reports will also be available on Compact Disc-Read Only Memory (CD-ROM). All data reports published for the current water year for the entire Nation, including Puerto Rico and the Trust Territories, will be reproduced on a single CD-ROM disc.

Additional information, including current prices, for ordering specific reports may be obtained from the district chief at the address given on the back of the title page or by telephone (612) 783-3101. A limited number of CD-ROM discs will be available for sale by the Books and Open-File Reports section, U.S. Geological Survey, Federal Center, Box 25425, Denver, Colorado 80225.

COOPERATION

The U.S. Geological Survey and organizations of the State of Minnesota have had cooperative agreements for the systematic collection of streamflow records since 1909, for ground-water levels since 1948, and for water-quality records since 1952. Organizations that assisted in collecting data through cooperative agreement with the Survey are:

Minnesota Department of Natural Resources, Division of Waters, Kenneth Lokkesmoe, director.

Minnesota Department of Transportation, Leonard W. Levine, commissioner.

Metropolitan Waste Control Commission of the Twin Cities Area, Louis R. Clark, chairperson.

Beltrami Soil and Water Conservation District, Floyd W. Jorgensen, chairperson.

Elm Creek Conservation Commission, Fred G. Moore, chairperson.

Leech Lake Reservation Business Committee, Daniel Brown, chairperson.

Lower Red River Watershed Management Board, Donald Ogaard, chairman.

Whitewater Joint Powers Board, Eugene Kalmes, chairman.

Assistance in the form of funds or services was given by the U.S. Army Corps of Engineers, in collecting records for 46 gaging stations and 12 water-quality stations published in this report of 2 volumes. Thirteen gaging stations in the Hudson Bay and St. Lawrence River basins were maintained by funds appropriated to the United States Department of State. Eight of these, on water adjacent to the international boundary, are maintained by the United States (or Canada) under agreement with Canada (or the United States), and the records are obtained and compiled in a manner equally acceptable in both countries. These stations are designated herein as "International gaging stations."

SUMMARY OF HYDROLOGIC CONDITIONS

PRECIPITATION

Normal annual precipitation in Minnesota ranges from less than 19 in. (inches) in the northwest to more than 33 in. in the southeast. Precipitation during water year 1992 ranged from less than 20 in. in part of the northwest and west-central areas up to 40 in. in part of the northeast, central, south-central and southeast areas (fig. 1). Precipitation ranged from 12 in. below normal (based on record period 1961-90) in a small area in central Minnesota to more than 12 in. above nor-

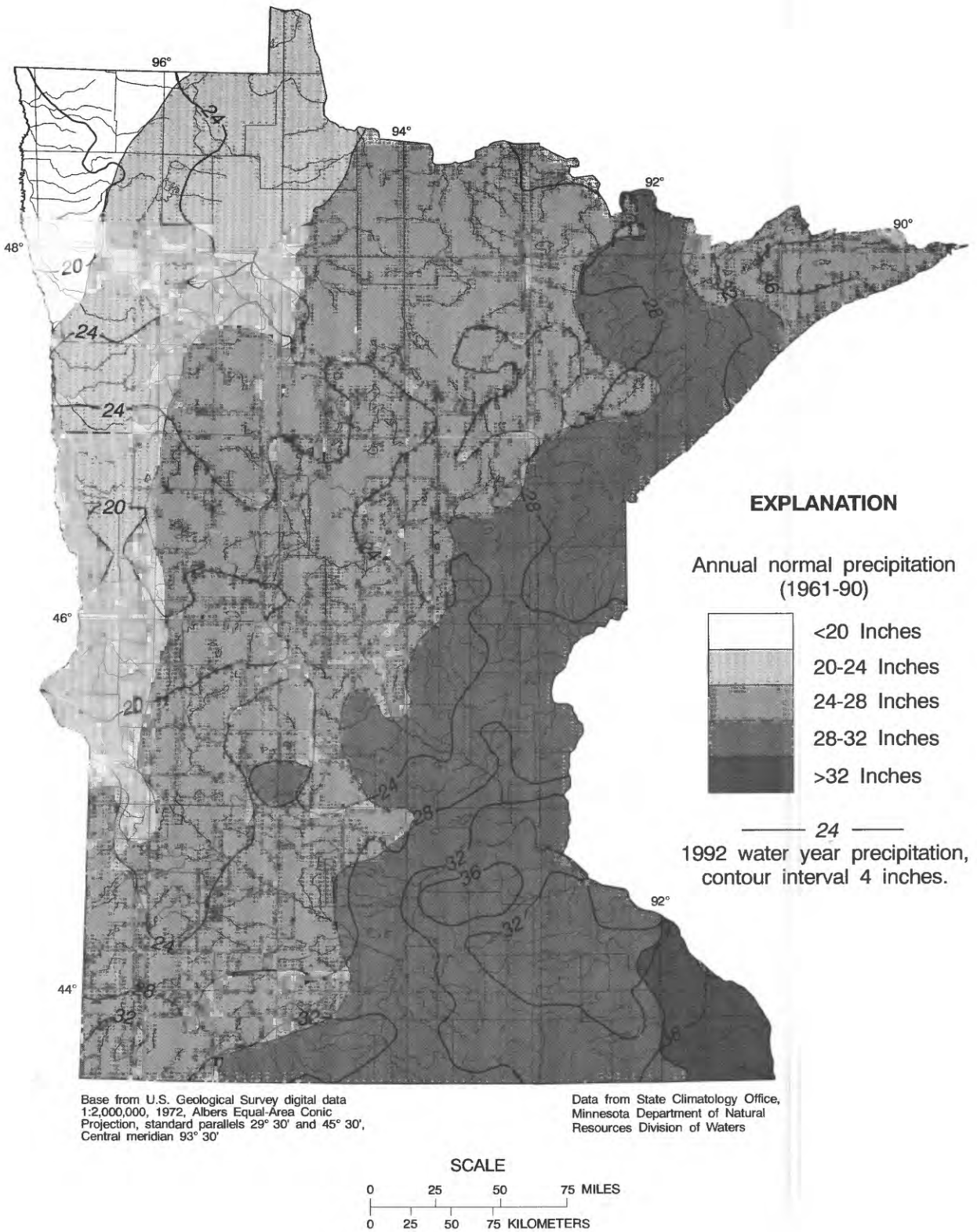


Figure 1.--Precipitation, in inches, during 1992 water year compared to normal annual precipitation in Minnesota.

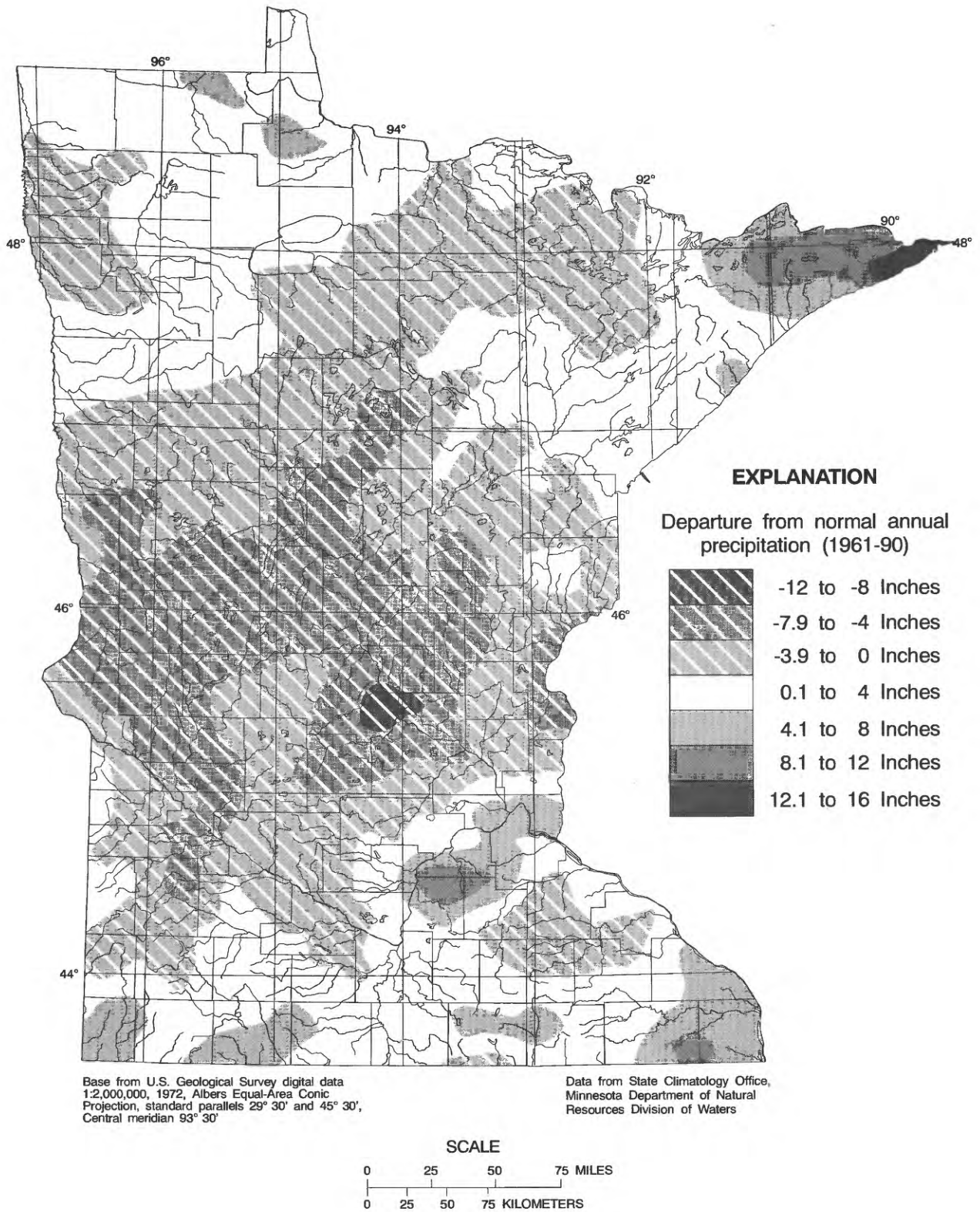


Figure 2.--Precipitation departure from normal, in inches, during 1992 water year in Minnesota.

mal in extreme tip of the "arrowhead" in northeastern Minnesota (fig. 2).

The water year began with a 0- to 4-in. precipitation deficit in parts of northern and southwestern Minnesota, and a 12- to 20- in. precipitation excess in parts of central, south-central and southwestern Minnesota. The following is a summary of precipitation during the 1992 water year.

October - below normal statewide.

November - above normal statewide except in the northwest and west-central regions where it was normal or below.

December - below normal statewide except for the southeast region where it was slightly above normal.

January - below normal statewide except for the southwest and south-central regions where it was above normal.

February - below normal statewide except for the north-central, northeast, and southwest regions where it was above normal.

March - below normal statewide except in the south where it was above normal.

April - below normal statewide except in the southeast where it was above normal.

May - below normal statewide.

June - below normal statewide except in the west-central and southwest regions where it was above normal.

July - above normal statewide except in the northeast where it was below normal.

August - above normal statewide except for the west-central, east-central, and southeast regions where it was below normal.

September - below normal statewide except for the northwest, northeast, and southeast regions where it was above normal.

Figure 3 shows total monthly precipitation compared to the normal 30-year (1961-90) monthly values by climatological division. Two notable precipitation events occurred during the 1992 water year. The first was the "Great Halloween Snowstorm" of October 31 - November 2, 1991 when up to 28 in. of snow fell in the Twin Cities of Minneapolis and St. Paul, and up to 36 in. in the "arrowhead" region in northeastern Minnesota. This storm produced the greatest 24-hour snowfall ever recorded at the Twin City Airport - 20.4 in.. The previous record was 18.5 in. which fell on January 22-23, 1982 (James A. Zandlo, State Climatologist, oral commun., 1993). Only one other storm in historical weather records, the "Great Armistice Day Storm" in November 1940, compares with this event. Both of these storms produced record snowfalls, in a short time period, unusually early in the fall. As a result of the "Halloween Storm", November 1991 precipitation was about 2 1/2 times normal in the regions covered by the storm.

The second event occurred on the evening of September 15 and early morning of September 16, 1992 when 7 in. or more of rain fell in a band from the area around Belle Plain and New Prague to the Wisconsin border just south of Hastings in southeastern Minnesota. This caused September precipitation in this region to reach 1.7 times the normal 30-year (1961-90) value.

STREAMFLOW

Average annual runoff in Minnesota ranges from 1 in. in the west to 14 in. in the northeast. Annual runoff in water year 1992 ranged from 0.20 in. (22 percent of average) in part of west-central Minnesota to 11.83 in. (225 percent of average) in part of south-central Minnesota (table 1). Except for these extremes, runoff generally was greater than 50 percent of the long-term average in the northwest and west and near 100 percent of average in most of the remainder of the State except for parts of southern Minnesota where runoff was greater than 200 percent of average.

In 1992, runoff in the upper Mississippi and Missouri River basins (Volume 2) ranged from a low of 52 percent of average in the Little Minnesota near Peever, South Dakota (05290000) in western Minnesota to a high of 225 percent of average in the Blue Earth River near Rapidan (05320000) in south-central Minnesota. The greatest percent-of-average runoff in the State occurred at all stations in the Minnesota River basin below the Cottonwood River, where runoff was more than 200 percent of average.

In east-central Minnesota, runoff for the index station, Mississippi River at Aitkin (05227500) was 4.98 in. - 78 percent of the 47-year average (1946-92) of 6.38 in. and only slightly higher than in the previous year when runoff was 4.71 in. and 74 percent of average.

Runoff for the index station, Crow River at Rockford (05280000), in the southern part of central Minnesota, was 8.42 in. or 209 percent of the station's 67 year average (1910-17, 1931, 1935-92) annual runoff of 4.03 in. This is very similar to last year when runoff was 8.54 in. and 216 percent of average. High runoff occurred even though the entire basin is in an area where normal to 4 in. below-normal precipitation occurred during the year. The high runoff, therefore, is probably the result of ground-water discharge that was built up from the year before when 8 to 20 in. of above-normal precipitation occurred.

In west-central Minnesota, runoff for the index station, Chippewa River near Milan (05304500), was 3.54 in., 155 percent of the stations 55-year average (1938-92) of 2.29 in.. This is 23 percent greater than the 2.88 in. that occurred in the previous year, and 244 percent greater than 1.03 in. that occurred in the 1990 water year.

In southwestern Minnesota, runoff for the index station, Des Moines River at Jackson (05476000), was 7.56 in., 208 percent of the station's 57-year average (1936-92) of 3.63 in. and 56 percent greater than runoff in the previous year (4.84 in.). An 8- to 16- in. precipitation excess in 1991 coupled with a 0- to 8- in. precipitation excess in 1992 has increased runoff from only 0.64 in. (18 percent of average) in 1990, to 136 percent of average in 1991, to 208 percent in 1992. Figure 4 shows the 1992 annual- and monthly- mean discharges for the above stations compared to the median of the monthly discharges for a 30-year base period.

The "Great Halloween Snowstorm" helped to maintain excessive streamflow throughout the winter months in the northeast, central, east-central, south-central, and southeast regions of the State. At several gaging stations record- or near-record -flows occurred during the months of November through March. One of the most notable was the Crow River at Rockford with the highest January mean flow in 66 years of record - 928 ft ^{3}/s. The previous high was 815 ft ^{3}/s in January of 1983.

The intense storm of September 15-16, 1992 caused flash flooding in southern Minnesota inundating cropland and several rural roads. The entire Vermillion River watershed was covered by 6 to 7+ in. of rain in this storm. Consequently, a new record peak discharge was recorded for the Vermillion River near Empire (05345000), a tributary to the Mississippi River below Prescott, Wisconsin. The peak discharge was 6,570 ft ^{3}/s on September 16, 1992. The previous peak of record (1942, 1974-92), 2,030 ft ^{3}/s occurred on September 18, 1942.

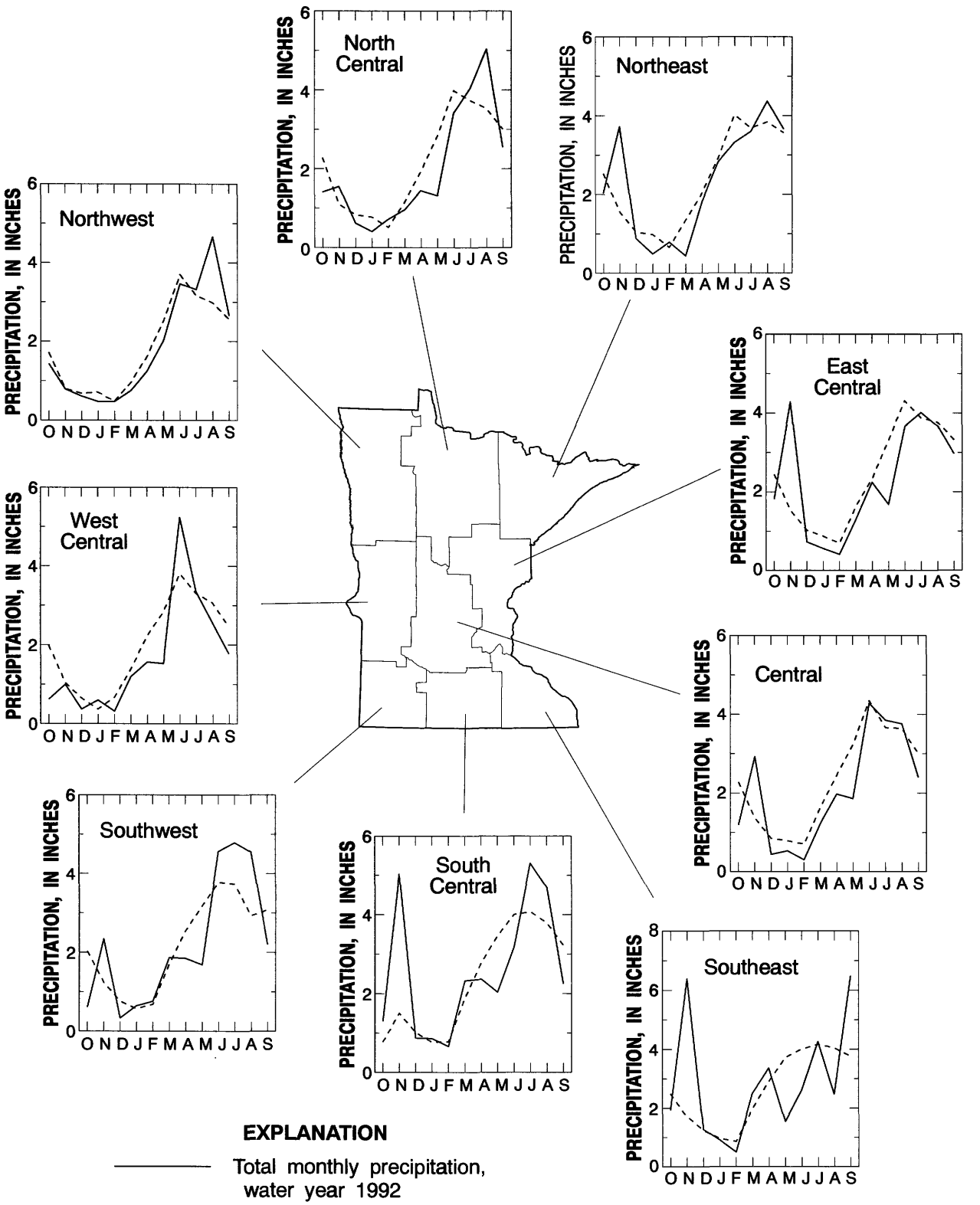


Figure 3.--Total monthly precipitation compared to average monthly precipitation by climatological division for a 30-year base period.

Table 1.--Runoff at streamflow stations in 1992 compared with long-term average for river basins in Minnesota

[Average runoff for station is based on period of record. Maximum and minimum runoff and year of occurrence are shown. mi^2, square miles.]

Station no.	Station name	Drainage area (mi^2)	Runoff (inches)		Maximum runoff		Minimum runoff		Years of record
			1992 Water year	Average	Inches	Water year	Inches	Water year	
05201500	Mississippi River at Winnibigoshish Dam near Deer River	1,442	3.83	4.87	11.61	1898*	0.85	1937*	108
05206500	Leech Lake River at Federal Dam	1,163	3.71	4.31	9.52	1899*	.40	1936*	108
05211000	Mississippi River at Grand Rapids	3,370	3.66	4.77	9.78	1906	.77	1934	109
05219000	Sandy River at Sandy Lake Dam at Libby	421	10.21	7.29	17.43	1986	.42	1931*	97
05227500	Mississippi River at Aitkin	6,140	4.98	6.38	11.03	1966	1.76	1977	47
05231000	Pine River at Cross Lake Dam at Cross Lake	562	4.04	5.29	13.48	1905*	.48	1931*	106
05244000	Crow Wing River at Nimrod	1,010	4.34	6.29	9.67	1966	3.09	1940	438
05245100	Long Prairie River at Long Prairie	432	3.63	4.74	11.51	1972	.79	1977	21
05247000	Gull River at Gull Lake Dam near Brainerd	287	3.71	5.11	10.79	1972	.76	1931*	81
05267000	Mississippi River near Royalton	11,600	4.32	5.36	10.44	1986	1.42	1934	68
05270500	Sauk River near St. Cloud	925	5.84	4.13	10.75	1972	.75	1931	53
05275000	Elk River near Big Lake	615	6.19	6.12	14.77	1986	1.94	1935	61

Table 1.--Runoff at streamflow stations in 1992 compared with long-term average for river basins in Minnesota--Continued

Station no.	Station name	Drainage area (mi^2)	Runoff (inches)		Maximum runoff		Minimum runoff		Years of record
			1992 Water year	Average	Inches	Water year	Inches	Water year	
05280000	Crow River at Rockford	2,520	8.42	4.03	14.84	1986	.35	1931	67δ
05286000	Rum River near St. Francis	1,360	6.50	6.25	15.10	1986	.66	1934	60δ
05287890	Elm Creek near Champlin	84.9	6.81	5.30	12.01	1986	.73	1988	14
05288500	Mississippi River near Anoka	19,100	5.71	5.62	12.62	1986	1.14	1934	61
05290000	Little Minnesota River near Peever	447	.67	1.29	4.64	1962	.04	1981	45δ
05291000	Whetstone River near Big Stone City	389	1.65	1.73	6.32	1986	.05	1934	61
05292000	Minnesota River at Ortonville	1,160	.98	1.24	4.26	1986	.03	1977, 1981	54
05293000	Yellow Bank River near Odessa	398	3.23	2.02	7.68	1986	.14	1981	53
05294000	Pomme de Terre River at Appleton	905	1.31	1.65	5.45	1986	.32	1977	57
05300000	Lac qui Parle River near Lac qui Parle	983	3.47	1.85	6.42	1986	.00	1934	61δ
05301000	Minnesota River near Lac qui Parle	4,050	3.09	2.29	8.41	1986	.25	1959	50
05304500	Chippewa River near Milan	1,870	3.54	2.29	9.49	1986	.33	1940	55
05311000	Minnesota River at Montevideo	6,180	2.67	1.65	6.51	1986	.01	1934	71δ
05313500	Yellow Medicine River near Granite Falls	653	2.54	2.56	9.98	1984	.17	1959	56δ
05315000	Redwood River near Redwood Falls	629	3.59	2.71	9.21	1983	.23	1959	58δ

Table 1.--Runoff at streamflow stations in 1992 compared with long-term average for river basins in Minnesota--Continued

Station no.	Station name	Drainage area (mi^2)	Runoff (inches)		Maximum runoff		Minimum runoff		Years of record
			1992 Water year	Average	Inches	Water year	Inches	Water year	
05317000	Cottonwood River near New Ulm	1,280	6.69	3.42	12.63	1969	.44	1940	58δ
05317200	Little Cottonwood River near Courtland	230	7.85	3.57	9.45	1983	.64	1977	19
05319500	Watonwan River near Garden City	812	11.70	5.63	13.83	1983	.86	1977	21δ
05320000	Blue Earth River near Rapidan	2,430	11.86	5.27	16.08	1983	.59	1940, 1977	49δ
05320500	Le Sueur River near Rapidan	1,100	12.60	5.88	16.53	1983	.63	1977	49δ
05325000	Minnesota River at Mankato	14,900	6.16	2.79	8.44	1986	.12	1934	71δ
05327000	High Island Creek near Henderson	237	10.14	5.09	13.54	1986	.53	1976	19
05330000	Minnesota River near Jordan	16,200	6.51	3.22	8.94	1986	.58	1940	58
05331000	Mississippi River at St. Paul	36,800	6.06	4.15	11.05	1986	.71	1934	94δ
05336700	Kettle River below Sandstone	863	12.35	11.32	21.87	1972	4.00	1977	25
05337400	Knife River near Mora	102	6.42	8.18	17.97	1986	2.25	1988	18
05338500	Snake River near Pine City	958	7.46	8.35	17.34	1972	2.51	1959	35
05340500	St. Croix River at St. Croix Falls	6,240	11.86	9.41	18.65	1986	3.82	1934	90
05344500	Mississippi River at Prescott	44,800	6.99	5.24	11.68	1986	1.86	1931	64
05345000	Vermillion River near Empire	110	11.89	6.81	13.72	1986	2.91	1977	20δ
05353800	Straight River near Fairbault	442	11.43	8.08	18.59	1983	1.35	1977	27
05355200	Cannon River at Welch	1,320	10.67	5.30	12.00	1965	1.41	1934	43

Table 1.--Runoff at streamflow stations in 1992 compared with long-term average for river basins in Minnesota--Continued

Station no.	Station name	Drainage area (mi^2)	Runoff (inches)		Maximum runoff		Minimum runoff		Years of record
			1992 Water year	Average	Inches	Water year	Inches	Water year	
05372995	South Fork Zumbro River at Rochester	303	11.11	9.41	16.13	1983	3.91	1989	11
05376000	North Fork Whitewater River near Elba	101	7.07	6.33	12.54	1974	2.61	1968	27δ
05378500	Mississippi River at Winona	59,200	8.82	6.42	13.04	1986	2.23	1934	64
05385000	Root River near Houston	1,270	12.18	7.55	16.48	1983	3.14	1931	62δ
05457000	Cedar River near Austin	425	12.99	6.93	18.15	1983	1.98	1958	53δ
05476000	Des Moines River at Jackson	1,220	7.56	3.63	13.35	1983	.17	1956	57

* Calendar year
δ Noncontinuous period

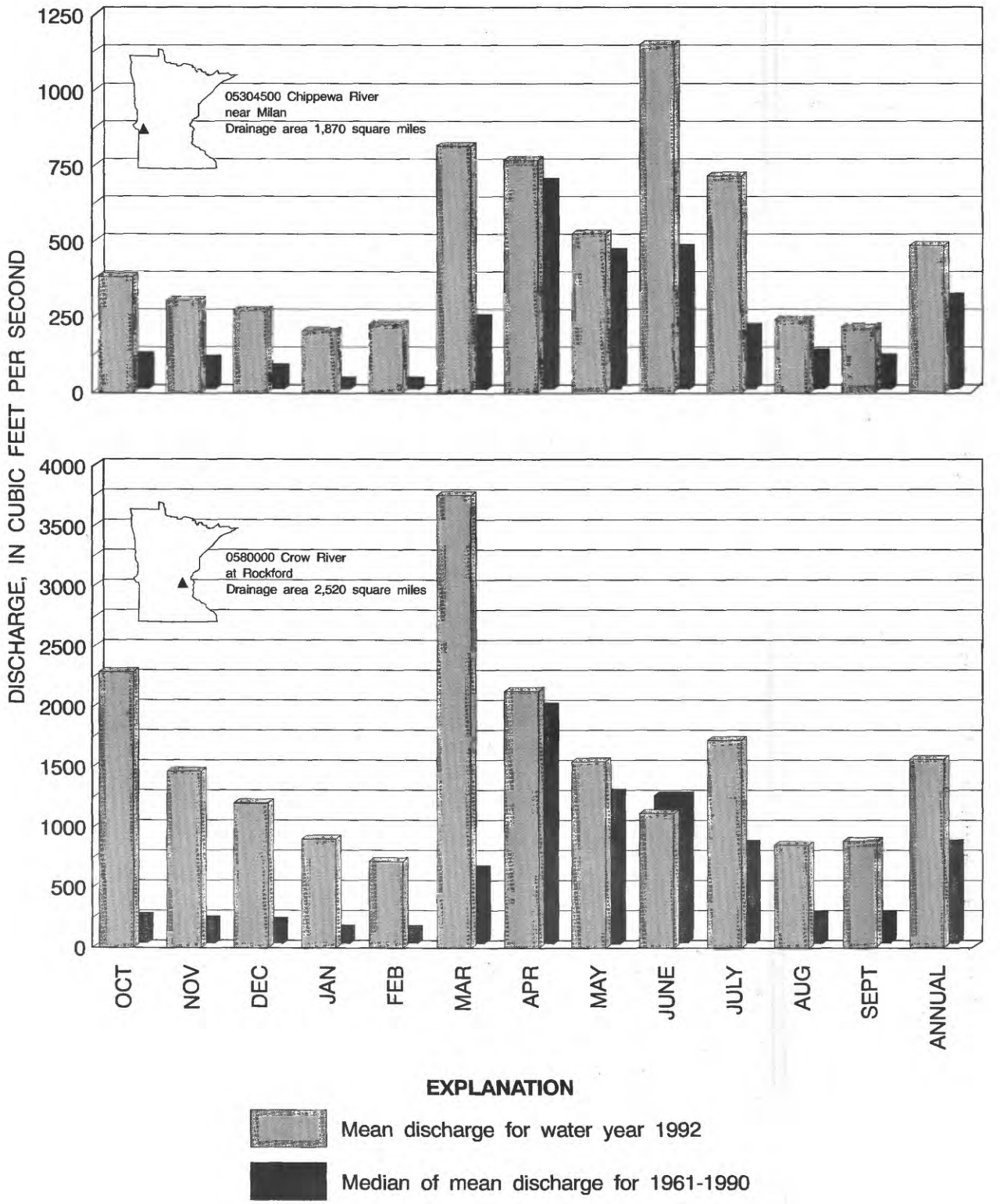
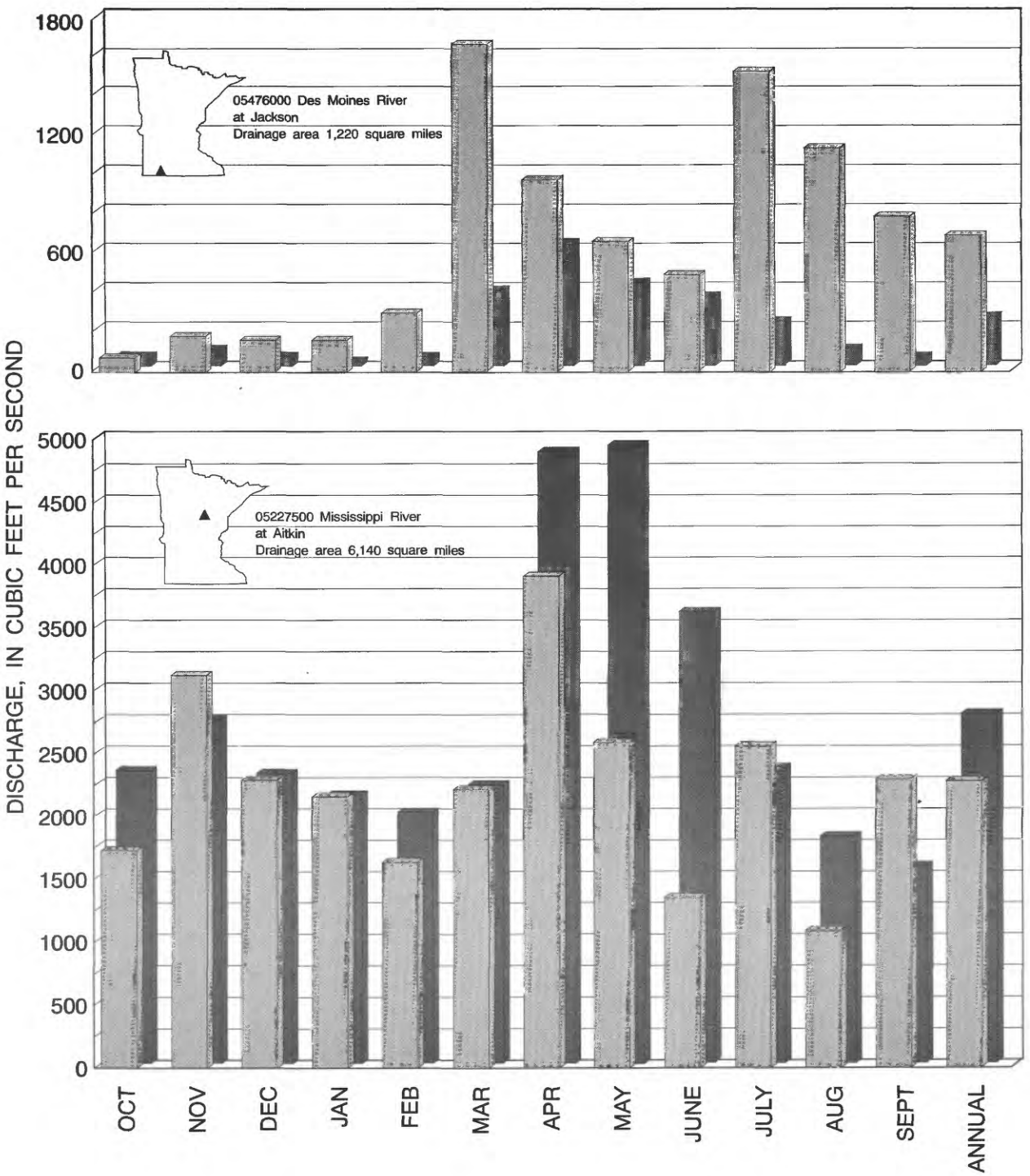


Figure 4.--Comparison of mean discharge for the 1992 water year with median



of mean discharge for 1961-90 at four long-term representative gaging stations.

A peak of 6,200 ft ^{3}/s occurred in April 1965 outside the period of record.

The combined storage in the six Mississippi River Headwater Reservoirs (Winnibigoshish, Leech, Pokegama, Pine, Sandy, and Gull), in northern and central Minnesota, was 1,547, 370 acre-feet at the close of the 1992 water year- a decrease of 7,938 acre-feet from the close of last year.

WATER QUALITY

Boxplots for three U.S. Geological Survey National Stream-Quality Accounting Network (NASQAN) stations and one benchmark station are used to depict variability in concentrations of dissolved solids and nitrate as nitrogen in the Upper Mississippi River basin (figs. 5 and 6); there are no water-quality stations in the Missouri River basin in Minnesota.

Boxplots are a useful graphical technique because they display the central tendency, variation, and skewness of a data set, as well as the presence or absence of extreme values. A boxplot consists of a centerline (the median) dividing a rectangle defined by the 75th and 25th percentiles. Whiskers are drawn from the ends of the box (75th and 25th percentiles) to the most extreme observation within 1.5 times the interquartile range (the distance from the 25th to the 75th percentile values) beyond the ends of the box. Values more than 1.5 interquartile ranges from the box ends may indicate extreme hydrologic and chemical conditions or sampling and analytical errors. Observations from 1.5 to 3 interquartile ranges from the box in either direction are plotted individually with an asterisk.

Observations greater than three interquartile ranges from the ends of the box are plotted with an open circle. Water year 1992 values are plotted with a closed circle to show where these data lie with respect to the historic distribution of data.

Dissolved-solids concentrations determined in 1992 generally were near the monthly medians in the Mississippi River near Royalton and the Minnesota River near Jordan. Dissolved- solids concentrations in the Mississippi River at Nininger were near the monthly medians in all quarterly samples except the February sample, which was higher than the median. Dissolved-solids concentrations in the North Fork Whitewater River near Elba were all above the montly medians except the February sample, which was very near the median.

Nitrate concentrations reported as nitrogen (analyzed for nitrate plus nitrite, with nitrite concentration assumed to be negligible) were near the median in samples collected in the Mississippi River near Royalton, with some above and some below the median. All of the nitrate concentrations in samples collected at the Mississippi River near Nininger, the Minnesota River near Jordan, and the North Fork Whitewater River near Elba were above the medians. The two samples with greatest departure from median were collected in November at the Nininger and Jordan stations where the nitrate concentrations were considerably above the median.

Seventy four wells were sampled in 17 counties. Nitrate concentrations were above the primary drinking-waters standard of 10 mg/L (Minnesota Pollution Control Agency, 1988) in 10 samples. Iron concentrations in eighteen samples were above the iron standard of 300 ug/L, and manganese concentrations in 31 samples were above the manganese standard of 50 ug/L.

GROUND-WATER LEVELS

Data for 16 wells completed in surficial sand aquifers, 17 in buried sand and gravel aquifers, 9 in the Upper Carbonate Aquifer, 6 in the St. Peter Aquifer, 34 in the Prairie du Chien-Jordan Aquifer, 11 in the Franconia-Ironton-Galesville Aquifer, and 9 in the Mount Simon-Hinckley, Fond du Lac Aquifer are published in this volume.

A phaseout of these wells from the ground-water network began in March, and by the end of August, all of the wells were eliminated from the network. However, county soil and water conservation personnel will make water-level measurements in these wells starting in October 1992.

Surficial Sand Aquifers

The surficial sand aquifer is recharged by direct infiltration of snowmelt and rainfall. For example, a water level rise of 1 foot occurred in a surficial water table well (440037094372601) in south-central Minnesota during March when above-freezing temperatures melted about 11 inches of snow near the well. During April, the water level rose an additional 1 foot in response to 3.5 inches of rainfall. Water levels in this well were above the average monthly levels throughout the water year. Water levels in another water table well (460444094212501) in central Minnesota were below the average monthly water levels throughout the water year (fig. 7a). Between May and August the water level rose about 1 foot or 0.25 foor per month in this well; however, rainfall amounts near this well were 2 inches below normal during this period and precipitation during the year was 4 inches below average. Record monthly-low levels occurred from November through March and June through September in well 465142094433201 in north-central Minnesota with 22 years of record, and an all-time record-low level was recorded in March (fig. 7a). Precipitation was deficient in nine out of twelve months and totaled 5 inches below average for the year. In the same well, record monthly low levels occurred during several months in the previous water year. In another well, number 473023094570901, in the same part of the State, water levels were below the average monthly level throughout the year.

Buried Sand and Gravel Aquifers

Record low water levels were observed in a Hennepin County well (444815093194901) for November, June and August. This well is in a local area of large ground-water withdrawals where pumping from the Prairie du Chien-Jordan aquifer has contributed to a decline in water levels in the overlying buried drift aquifer. In two wells, 450001093024701 and 45041409312701 in Ramsey County, record-low levels were measured in June. It is of some interest to note that two nearby wells in the underlying Prairie du Chien-Jordan aquifer also exhibited low levels in June. In two other wells, 445955093011002 and 445955093011003 in Ramsey County, new high levels occurred in March, April, July and August. Both wells have 26 years of record and the high levels probably reflect the continuation of rising water levels from the wet previous water year and the first quarter of 1992 when precipitation was 10 inches above average. Precipitation for the rest of the water year was very close to average near these wells. In well 455236093172301 in Kanabec County, water levels were in the average range throughout the year except in March when a record-low level occurred (fig. 7b).

Upper Carbonate Aquifer

In three of 9 wells in the Upper Carbonate aquifer, well 445538092232601 in southeastern Minnesota, and wells 435742093164001 and 435611093163001 in south-central Minnesota had record- high levels in March. These highs reflect the moderately wet previous water year and the extremely wet first quarter of 1992. Precipitation at Rochester was 9 inches above average and at Waseca 20 inches above average. In three other wells, record- low levels were measured in May; one well (445538092232601 is located in southeastern Minnesota and 2 wells (433846093220601 and

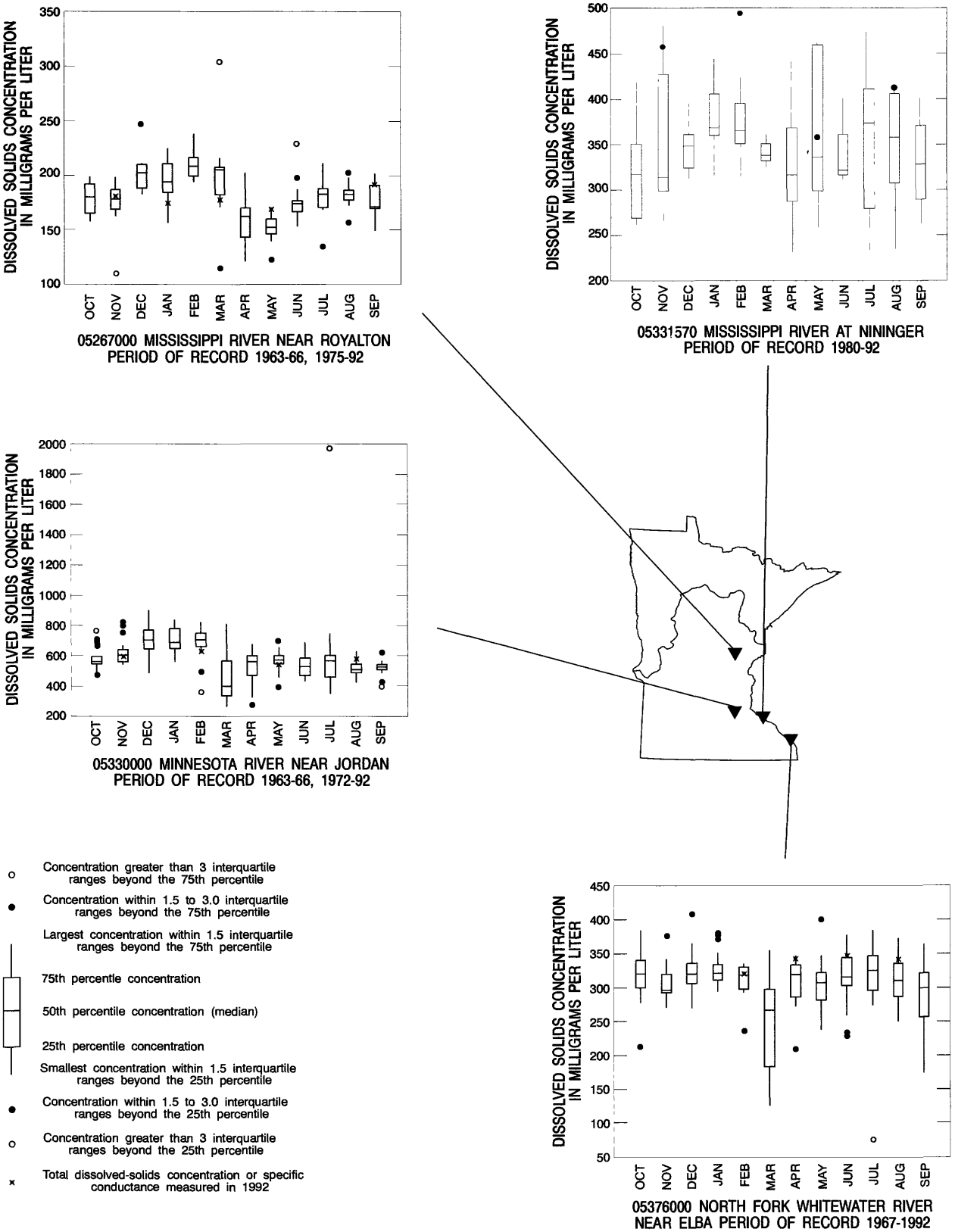


Figure 5--Comparison of dissolved-solids concentrations in samples collected during water year 1992 with median for period of record at four national network stations.

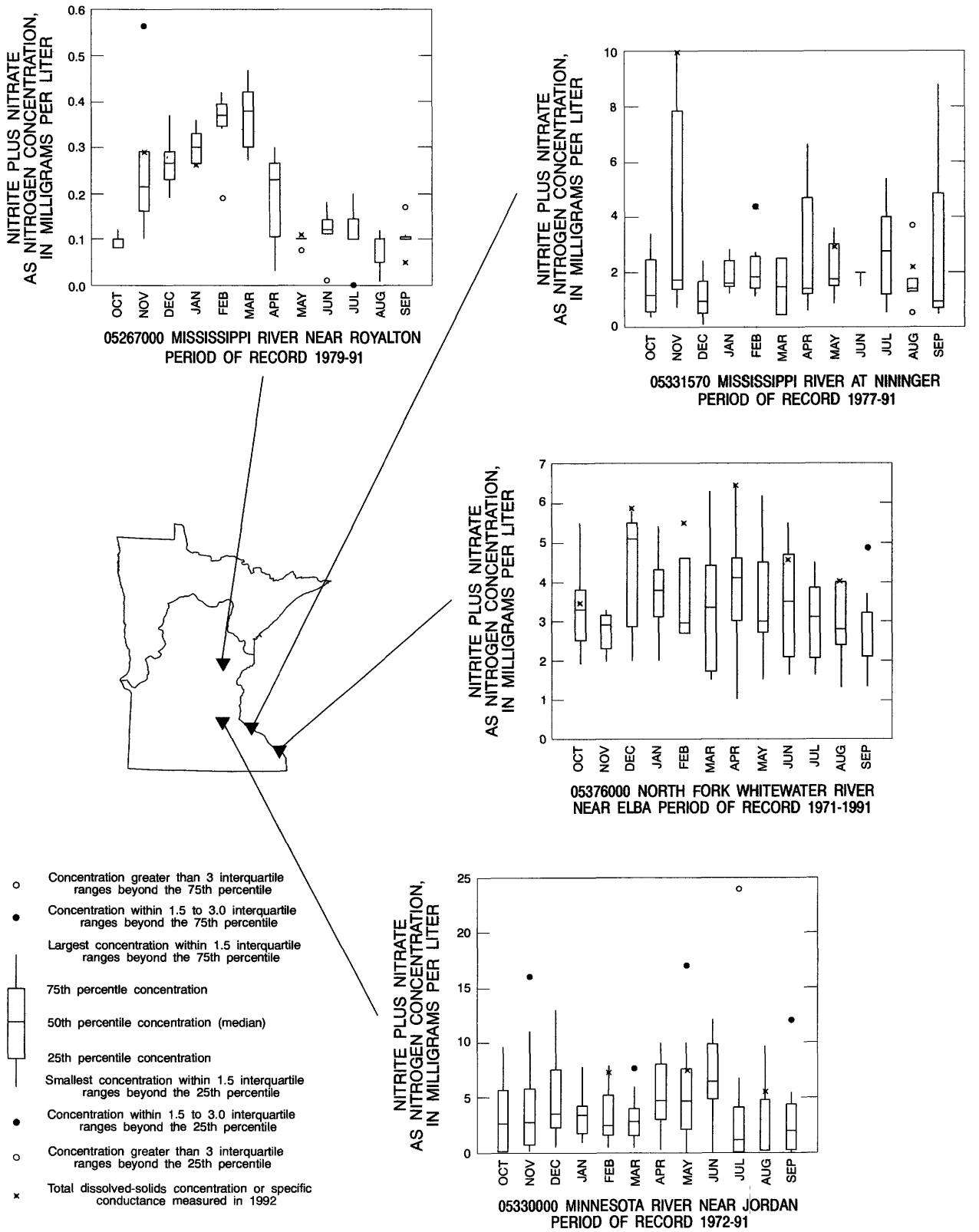


Figure 6--Comparison of nitrite plus nitrate concentrations in samples collected during water year 1992 with median for period of record at four national network stations.

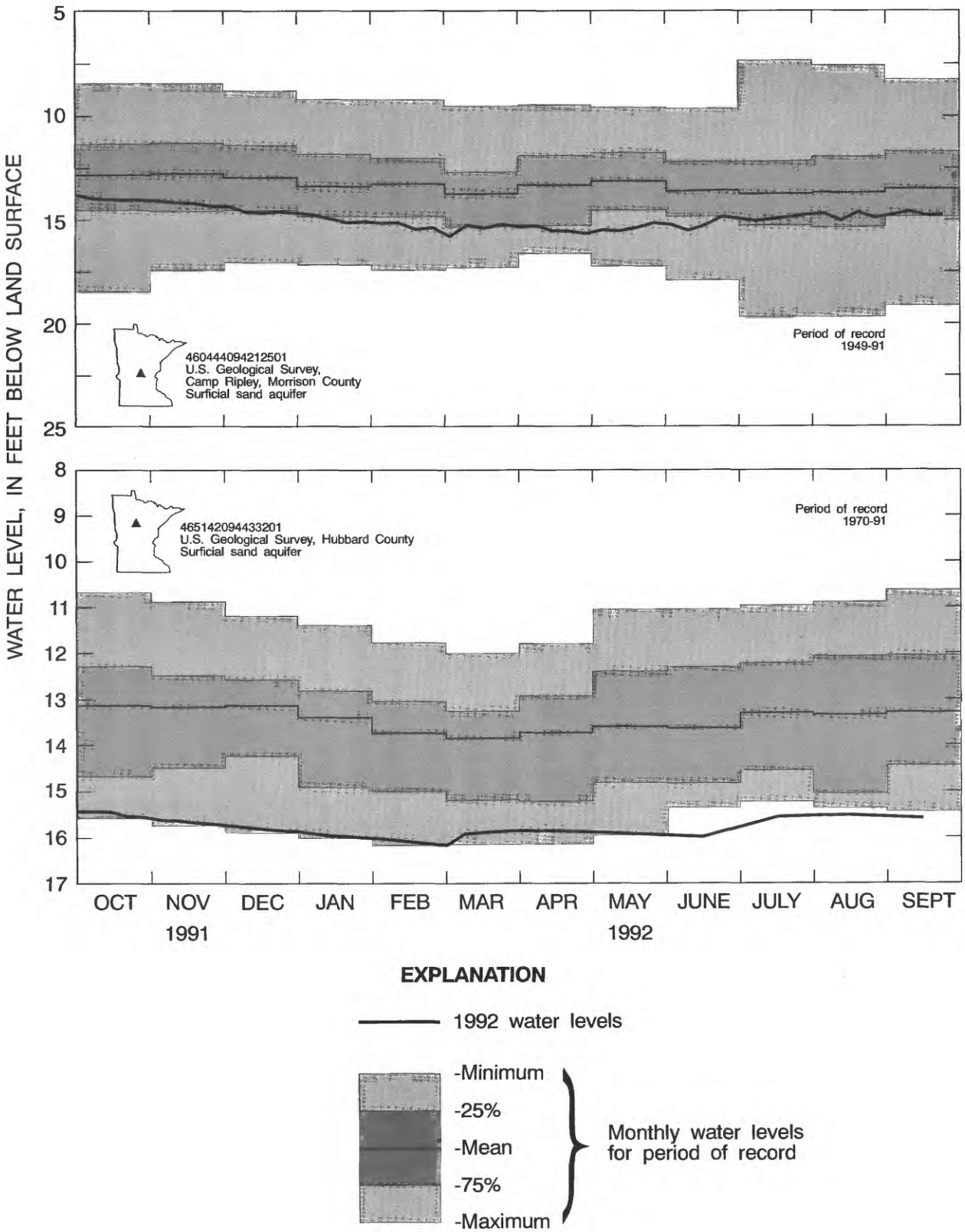


Figure 7a.--Comparison of water levels during 1992 to long-term levels in two representative wells in surficial sand aquifers.

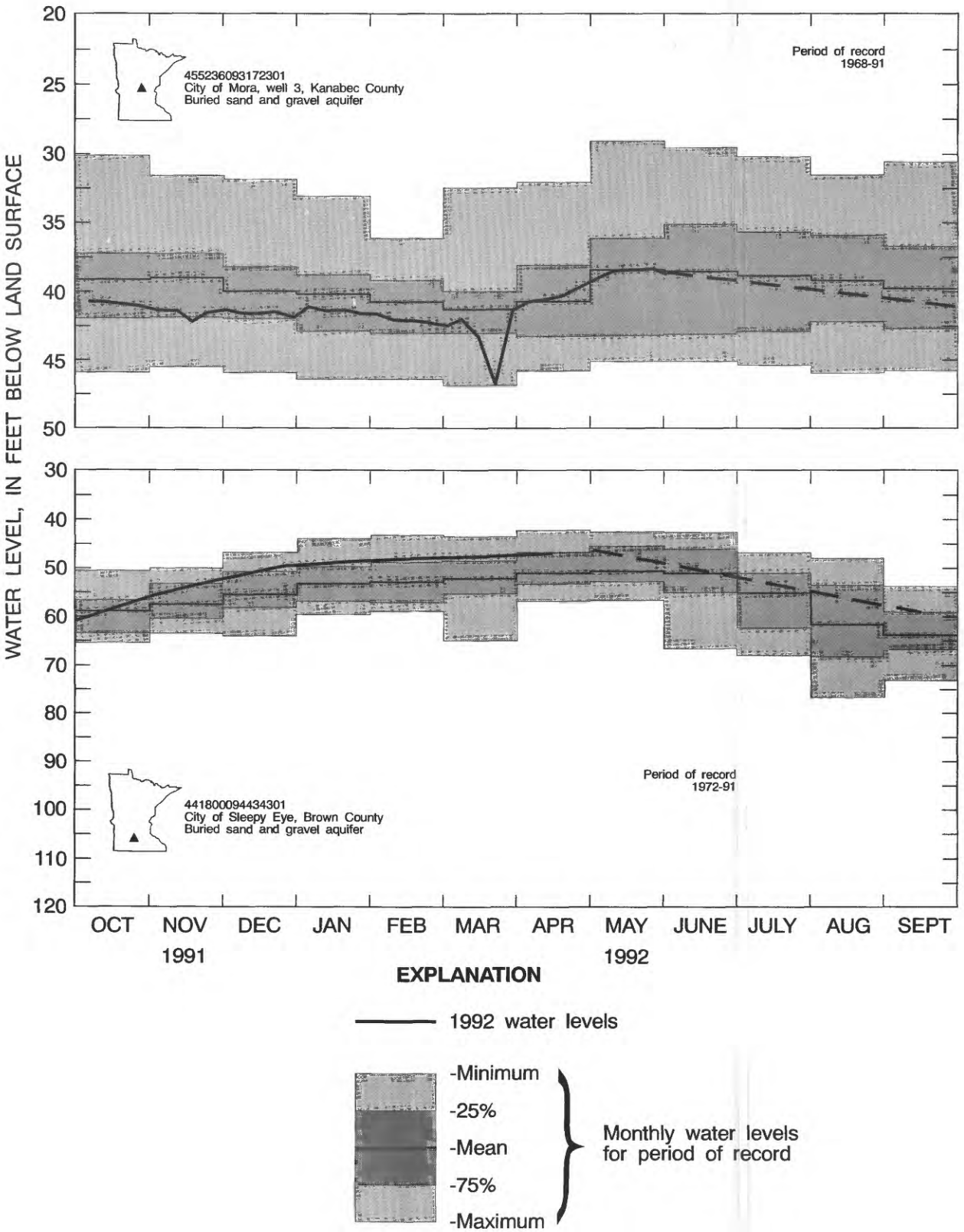


Figure 7b.--Comparison of water levels during 1992 to long-term levels in two representative wells in buried sand and gravel aquifers.

434308093322001) are located in south-central Minnesota. The daily maximum temperature for the first few days in May reached into the upper 80's which could have caused a large demand for ground water from the two wells in south-central Minnesota so early in the season. Both wells are in local centers of large ground-water withdrawal.

St. Peter Aquifer

Of the six wells completed in the St. Peter aquifer in the Twin Cities Metropolitan Area, record monthly high levels occurred in one well (450116093205301) in March and April and in another well (445739093081201) in March, April and June through September (fig. 7d). These new monthly high levels probably coincide with less ground water pumping from the aquifer because of cooler daily temperatures. Another well (450026093084201) with 22 years of record and located near a manufacturing plant had record monthly low levels in March and April.

Prairie du Chien-Jordan Aquifer

Record monthly high levels were recorded from January through April in three wells, one in Minneapolis (445833093154301), one in St. Paul (445700093051001), and one in West St. Paul (445330093054301) (fig. 7c). In the latter two wells, record high levels occurred on the same day in March. The St. Paul and West St. Paul wells are on opposite sides of the Mississippi River, and are about 4 miles apart. Both wells have 22 years of continuous water-level record. Record high levels also occurred at various other times during the water year in the above three mentioned wells. Record high levels in May and September occurred in the Minneapolis well, in the St. Paul well in August, and in the West St. Paul well in July and August. These high-water levels in the Prairie du Chien-Jordan aquifer, the primary center of ground-water withdrawal in the State, can be explained by less ground water demand from the aquifer because of cooler and wetter conditions than normal. Record low-water levels occurred from March through September in well 445918092590901 in Ramsey County with 23 years of record. Across the road from this well, the City of Oakdale recently completed some new wells in this aquifer because of an expanding housing development. New low levels occurred from October through June in a well (433935091251801) in southeastern Minnesota with declining water levels because of deficient precipitation in this part of the State. Between July and September 15 inches of rainfall was recorded near the well, raising the water level 3 feet and reversing the decline for the first time in 66 months. From January 1987 to June 1992, 25 feet of water-level decline was observed in this well. A new low level in February was measured in a well (450927093033802) with 22 years of record located at Centerville. This low is very unusual as water levels in this aquifer are highest over the winter months. The St. Paul Water Department has several flowing artesian wells along Centerville Lake that are used to maintain lake levels. These wells are valved- in most of the time and are used only occasionally. Of eight Prairie du Chien-Jordan wells equipped with continuous water level recorders, the lowest monthly low levels in 6 of them occurred from June 7 to June 13 instead of during the usual lowest-water level months of July or August. This further indicates that July through September was unusually cool and wet.

Franconia-Ironton-Galesville Aquifer

New monthly high levels occurred in March and August in two wells (45230509314501 and 451938093223101) in Anoka County with 13 and 16 years of record respectively. Climatological records show that 13 inches of above normal precipitation occurred near these wells. These records also show that for July and August temperatures were 5 to 7 degrees Fahrenheit below normal. Record monthly high levels in May through September were observed in well (445618093211801) which has 13 years of record. Water levels from May through September were 6 to 9 feet higher than in the previous water year. This well is in an area of large withdrawals from the overlying Prairie du Chien-Jordan aquifer. Considerably less ground water was withdrawn from Franconia-Ironton-Galesville aquifer due to cooler summer temperatures and probably accounts for these unusually high water levels during the main pumping season. In a recorder-equipped well (444427093353902) in Scott County, south of Shakopee, water levels fluctuated 16 feet during the year; the highest level occurred in March and the lowest occurred in June. Two rock quarry operations near this well may influence water levels. In another recorder-equipped well (440050094102801) near Mankato, in a rural setting far removed from pumping influences, only 2 feet of water level fluctuation occurred during the year. Water levels in well 435746092034202 in Winona County remained in the average range from October through February, but rose above average during March to May (fig. 7d).

Mount Simon-Hinckley-Fond du Lac Aquifer

Continued reversal of water level declines from 1989 within the Twin Cities Metropolitan Area are still being observed in three wells. Monthly water levels were from 1-5 feet higher in St. Paul in well (445751093072301) and 1-7 feet higher in Minneapolis in well (445829093162901) than levels of the previous year (fig. 7e). Water levels were, however, 9 feet below average in St. Paul and 17 feet below average in Minneapolis at the end of the year. In the third well, (445646093395301) located at Lake Minnetonka, new high levels were recorded in March, and also in May through September. In recorder-equipped well (444427093353903) in Scott County, water levels are still declining from the previous water year. New water level lows were recorded for January, February, and June in this well which has 8 years of record. Water levels in ten out of twelve months were lower than the previous water year in this well. Water levels were also below the monthly average for the entire water year. In another well (450403093544501) in a rural setting in central Minnesota, a steady monthly water-level rise of 1 foot occurred over levels in the previous water year.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic Bench-Mark Network is a network of 57 sites in small drainage basins around the country whose purpose is to provide consistent data on the hydrology, including water quality, and related factors in representative undeveloped watersheds nationwide, and to provide analyses on a continuing basis to compare and contrast conditions observed in basins more obviously affected by the activities of man.

National Stream Quality Accounting Network (NASQAN) is a national data-collection network designed by the U.S. Geological Survey to meet many of the information needs of government agencies and other groups involved in natural or regional water-quality planning and management. The 500 or so sites in NASQAN are generally located at the downstream ends of the hydrologic accounting units designated by the U.S. Geological Survey Office of Water Data Coordination in consultation with the Water Resources Council. The objectives of NASQAN are (1) to obtain information on the quality and quantity of water moving within and from the United States through a systematic and uniform process of data collection, summarization, analysis, and reporting such that the data may be used for, (2) description of the areal variability of water quality in the Nation's rivers through analysis of data from this and other programs, (3) detection of changes or trends with time in the pattern of occurrence of water-quality characteristics, and (4) providing a nationally consistent data base useful for water quality assessment and hydrologic research.

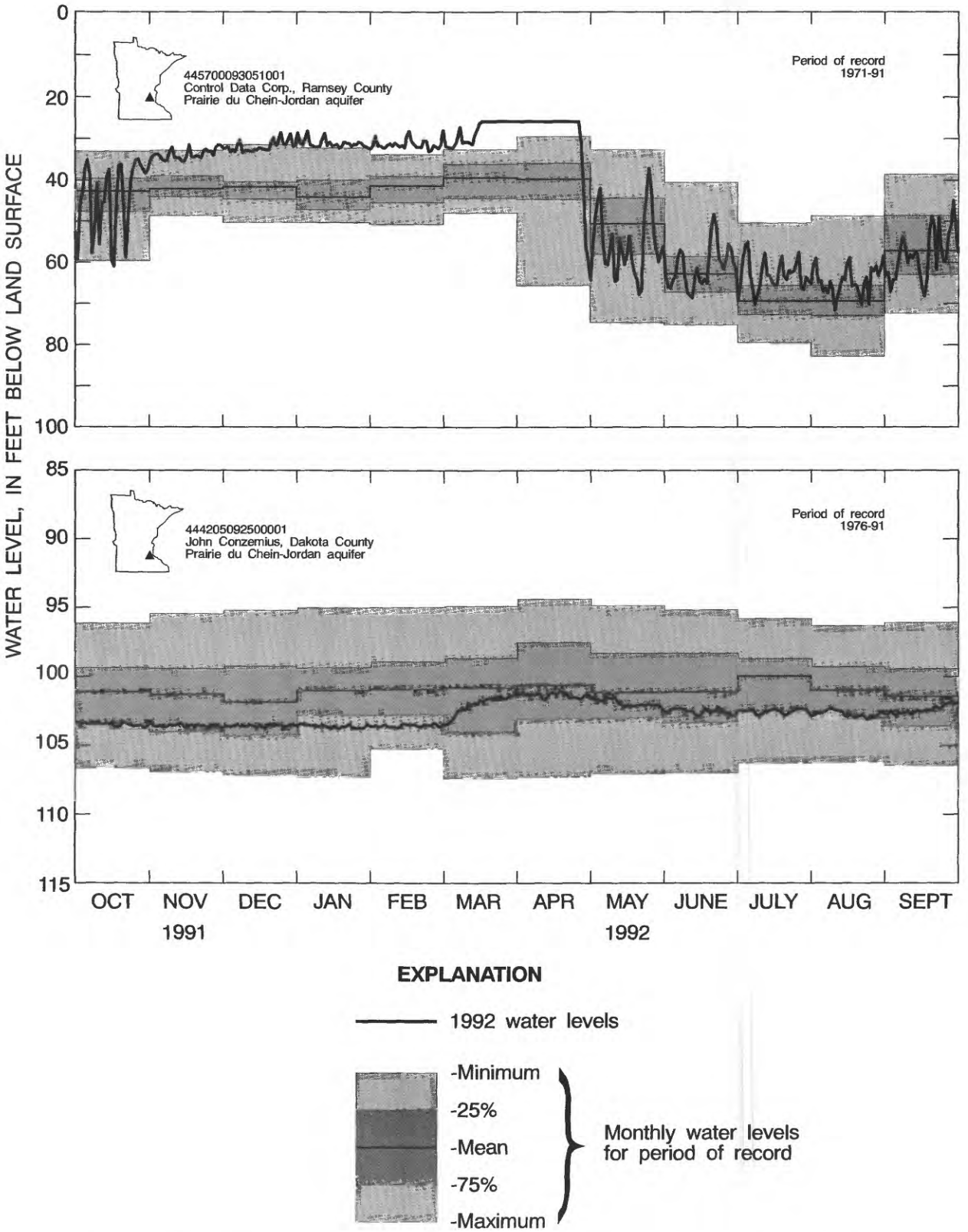


Figure 7c.--Comparison of water levels during 1992 to long-term levels in two representative bedrock wells in the Prairie du Chien-Jordan aquifer.

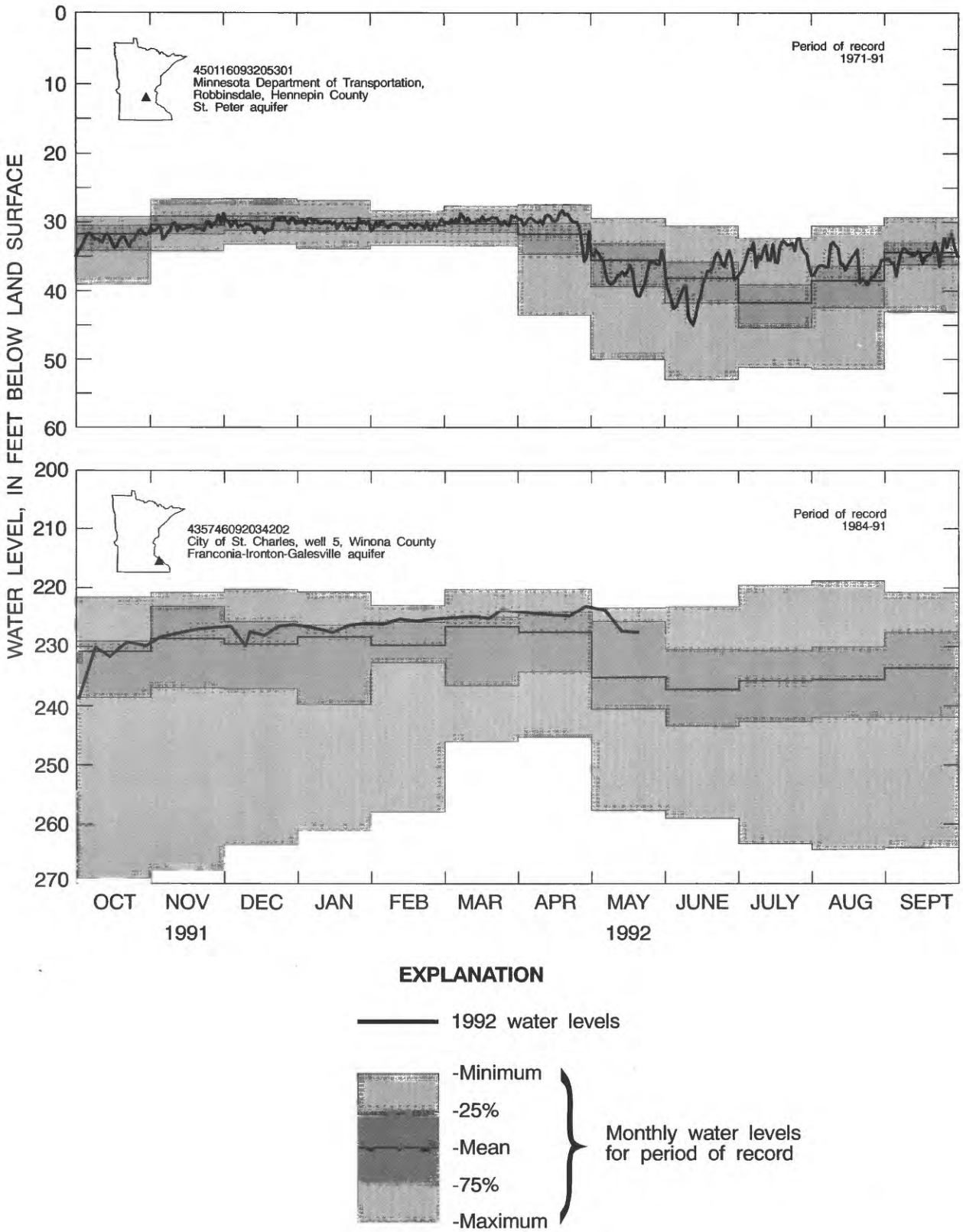


Figure 7d.--Comparison of water levels during 1992 to long-term levels in representative bedrock wells in the St. Peter and Franconia-Ironton-Galesville aquifers.

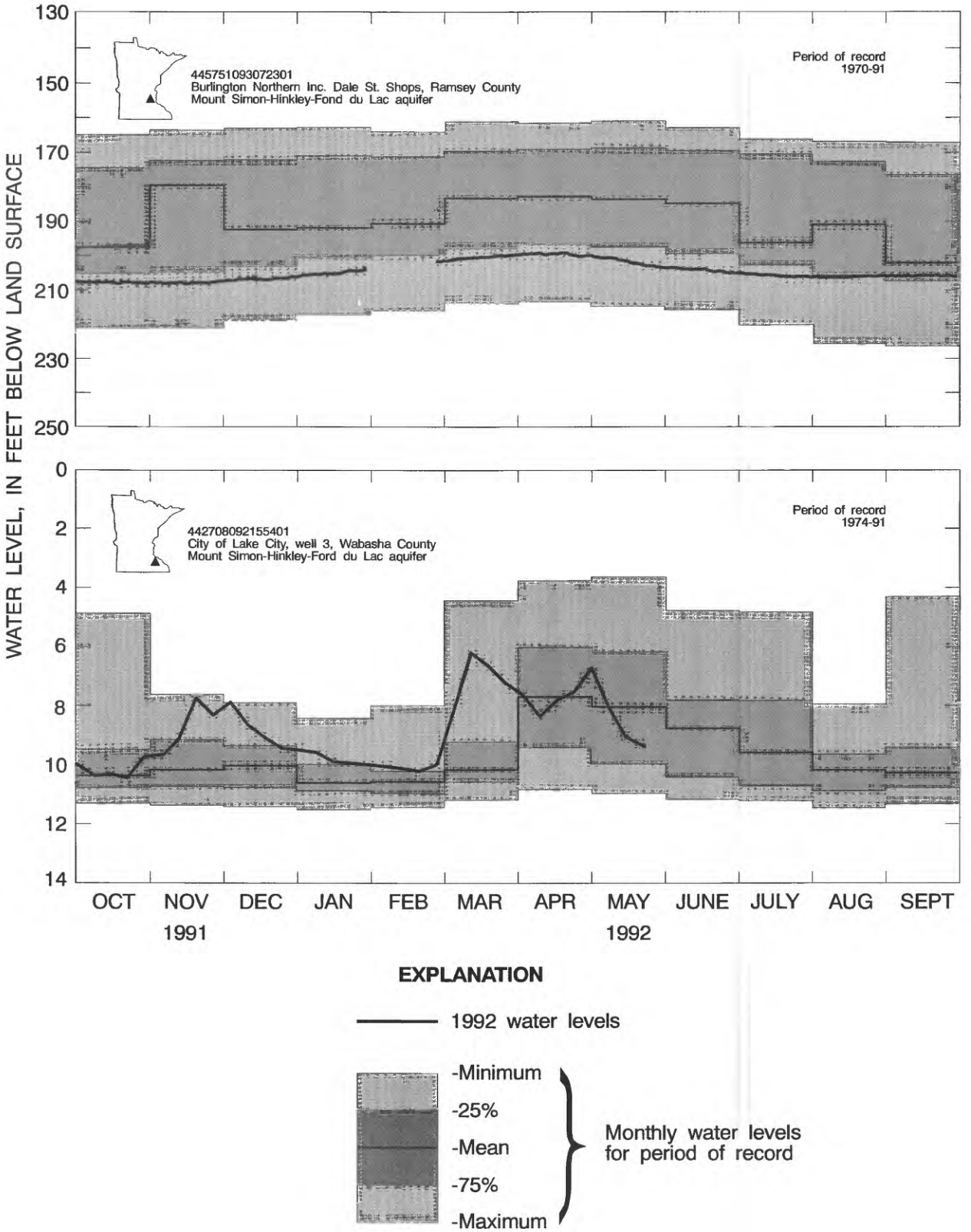


Figure 7e.--Comparison of water levels during 1992 to long-term levels in two representative bedrock wells in the Mount Simon-Hinckley-Fond du Lac aquifer.

The National Trends Network (NTN) is a 150-station network for sampling atmospheric deposition in the United States. The purpose of the network is to determine the variability, both in location and in time, of the composition of atmospheric deposition, which includes snow, rain, dust particles, and aerosols, and gases. The core from which the NTN was built was the already-existing deposition-monitoring network of the National Atmospheric Deposition Program (NADP).

The National Water-Quality Assessment (NAWQA) Program of the U.S. Geological Survey is a long-term program with goals to describe the status and trends of water-quality conditions for a large, diverse, and geographically distributed part of the Nation's ground- and surface-water resources, and to identify, describe, and explain the major natural and human factors that affect these observed conditions and trends.

Assessment activities have begun in more than one-third of the study units and ultimately will be conducted in 60 study units (major watersheds and aquifer systems) that represent a wide range of environmental settings nationwide and that account for a large percentage of the Nation's water use. A wide array of chemical constituents will be measured in ground water, surface water, streambed sediments, and fish tissues. The coordinated application of comparative hydrologic studies at a wide range of spatial and temporal scales will provide information for decision making by water-resources managers and a foundation for aggregation and comparison of findings to address water-quality issues of regional and national interest.

Radiochemical program is a network of regularly sampled water-quality stations where samples are collected to be analyzed for radioisotopes. The streams that are sampled represent major drainage basins in the conterminous United States.

Tritium network is a network of stations which has been established to provide baseline information on the occurrence of tritium in the Nation's surface waters. In addition to the surface-water stations in the network, tritium data are also obtained at a number of precipitation stations. The purpose of the precipitation stations is to provide an estimate sufficient for hydrologic studies of the tritium input to the United States.

EXPLANATION OF THE RECORDS

The surface-water and ground-water records published in this report are for the 1991 water year that began October 1, 1990, and ended September 30, 1991. A calendar of the water year is provided on the inside of the front cover. The records contain streamflow-data, stage and content data for lakes and reservoirs, water-quality data for the surface and ground water, and ground-water-level data. The locations of the stations and wells where the data were collected are shown in figures 9, 10, 11, and 12. The following sections of the introductory text are presented to provide users with a more detailed explanation of how the hydrologic data published in this report were collected, analyzed, computed, and arranged for presentation.

STATION IDENTIFICATION NUMBERS

Each data station, whether streamsite or well, in this report is assigned a unique identification number. This number is unique in that it applies specifically to a given station and to no other. The number usually is assigned when a station is first established and is retained for that station indefinitely. The system used by the U.S. Geological Survey to assign identification numbers for surface-water stations and for ground-water well sites differ, but both are based on geographic location. The "downstream order" system is used for regular surface-water stations and the "latitude-longitude" system is used for wells and, in Minnesota, for surface-water stations where only miscellaneous measurements are made.

Downstream Order System and Station Number

Since October 1, 1950, the order of listing hydrologic-station records in Survey reports is in a downstream direction along the main stream. All stations on a tributary entering upstream from a main-stream station are listed before that station. A station on a tributary that enters between two main-stream sections is listed between them. A similar order is followed by listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary on which a station is situated with respect to the stream to which it is immediately tributary is indicated by an indentation in a list of stations in front of the report. Each indention represents one rank. This downstream order and system of indention show which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

As an added means of identification, each hydrologic station and partial-record station has been assigned a station number. These are in the same downstream order in this report. In assigning station numbers, no distinction is made between partial-record stations and other stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete 8-digit number for each station such as 05041000, which appears just to the left of the station name, includes the 2-digit part number "05" plus the 6-digit downstream order number "041000."

Latitude-Longitude System for Wells and Miscellaneous Sites

The 8-digit downstream order station numbers are not assigned to wells and miscellaneous sites where only random water-quality samples or discharge measurements are taken. The well and miscellaneous site numbering system of the U.S. Geological Survey is based on the grid system of latitude and longitude. The system provides the geographic location of the well or miscellaneous site and a unique number for each site. The number consists of 15 digits. The first 6 digits denote the degrees, minutes, and seconds of latitude, the next 7 digits denote degrees, minutes, and seconds of longitude, and the last 2 digits (assigned sequentially) identify the wells or other sites within a 1-second grid. See figure 8. Each well site is also identified by a local well number which consists of township, range, and section numbers, three letters designating 1/4, 1/4, 1/4 section location, and a two-digit sequential number.

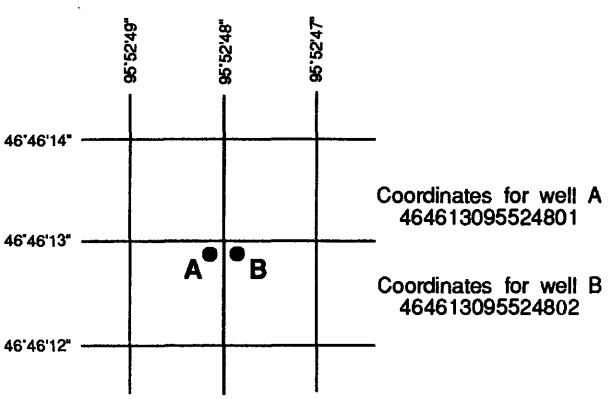


Figure 8. Example of system for numbering wells and miscellaneous sites.

RECORDS OF STAGE AND WATER DISCHARGE

Records of stage and water discharge may be complete or partial. Complete records of discharge are those obtained using a continuous stage-recording device through which either instantaneous or mean daily discharge may be computed for any-time, or any period of time, during the period of record. Complete records of lake or reservoir content, similarly, are those for which stage or content may be computed or estimated with reasonable accuracy for any time, or period of time. They may be obtained using a continuous stage-recording device, but need not be. Because daily mean discharges and end-of-day contents commonly are published for such stations, they are referred to as "daily stations".

By contrast, partial records are obtained through discrete measurements without using a continuous stage-recording device and pertain only to a few flow characteristics, or perhaps only one. The nature of the partial record is indicated by table titles such as "High-flow partial records," or "Low-flow partial records." Records of miscellaneous discharge measurements or of measurements from special studies, such as low-flow seepage studies, may be considered as partial records, but they are presented separately in this report. Location of all complete-record and high-flow partial-record stations for which data are given in this report are shown in figures 9 and 11.

Data Collection and Computation

The data obtained at a complete-record gaging station on a stream or canal consist of a continuous record of stage, individual measurements of discharge throughout a range of stages, and notations regarding factors that may affect the relationships between stage and discharge. These data, together with supplemental information, such as weather records, are used to compute daily discharges. The data obtained at a complete-record gaging station on a lake or reservoir consist of a record of stage and of notations regarding factors that may affect the relationship between stage and lake content. These data are used with stage-area and stage-capacity curves or tables to compute water-surface areas and lake storage.

Continuous records of stage are obtained with analog recorders that trace continuous graphs of stage or with digital recorders that punch stage values on paper tapes at selected time intervals. Measurements of discharge are made with current meters using methods adapted by the Geological Survey as a result of experience accumulated since 1880. These methods are described in standard textbooks, in Water-Supply Paper 2175, and in U.S. Geological Survey Techniques of Water-Resources Investigations, Book 3, Chapter A6.

In computing discharge records, results of individual measurements are plotted against the corresponding stages, and stage-discharge relation curves are then constructed. From these curves, rating tables indicating the approximate discharge for any stage within the range of the measurements are prepared. If it is necessary to define extremes of discharge outside the range of current-meter measurements, the curves are extended using: (1) logarithmic-plotting; (2) velocity-area studies; (3) results of indirect measurements of peak discharge, such as slope-area or contracted-opening measurements, and computations of flow-over-dams or weirs; or (4) step-backwater techniques.

Daily mean discharges are computed by applying the daily mean stages (gage heights) to the stage-discharge curves or tables. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is determined by the shifting-control method, in which correction factors based on the individual discharge measurements and notes of the personnel making the measurements are applied to the gage heights before the discharges are determined from the curves or tables. This shifting-control method also is used if the stage-discharge relation is changed temporarily because of aquatic growth or debris on the control. For some stations, formation of ice in the winter may so obscure the stage-discharge relations that daily mean discharges must be estimated from other information such as temperature and precipitation records, notes of observations, and records for other stations in the same or nearby basins for comparable periods.

At some stream-gaging stations the stage-discharge relation is affected by the backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means, of an auxiliary gage set at some distance from the base gage. At some stations the stage-discharge relation is affected by changing stage; at these stations the rate of change in stage is used as a factor in computing discharge.

In computing records of lake or reservoir contents, it is necessary to have available from surveys, curves, or tables defining the relationship of stage and content. The application of stage to the stage-content curves or tables gives the contents from which daily, monthly, or yearly changes then are determined. If the stage-content relationship changes because of deposition of sediment in a lake or reservoir, periodic resurveys may be necessary to redefine the relationship. Even when this is done, the contents computed may become increasingly in error as time since the last survey increases. Discharge over lake or reservoir spillways are computed from stage-discharge relationships much as other stream discharges are computed.

For some gaging stations there are periods when no gage-height record is obtained, or the recorded gage height is so faulty that it cannot be used to compute daily discharge or contents. This happens when the recorder stops or otherwise fails to operate properly, intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods, the daily discharges are estimated from the recorded range in stage, previous or following record, discharge measurements, weather records, and comparison with other station records from the same or nearby basins. Likewise, daily contents may be estimated from operator's logs, previous or following record, inflow-outflow studies, and other information. Information explaining how estimated daily-discharge values are identified in station records is included in the next two sections, "Data Presentation" (REMARKS paragraph) and "Identifying Estimated Daily Discharge."

Data Presentation

Streamflow data in this report are presented in a new format that is considerably different from the format in data reports prior to the 1991 water year. The major changes are that statistical characteristics of discharge now appear in tabular summaries following the water-year data table and less information is provided in the text or station manuscript above the table. These changes represent the results of a pilot program to reformat the annual water-data report to meet current user needs and data preferences.

The records published for each continuous-record surface-water discharge station (gaging station) now consist of four parts, the manuscript or station description; the data table of daily mean values of discharge for the current water year with summary data; a tabular statistical summary of monthly mean flow data for a designated period, by water year; and a summary statistics table that includes statistical data of annual, daily and instantaneous flows as well as

data pertaining to annual runoff, 7-day low-flow minimums, and flow duration.

Station manuscript

The manuscript provides, under various headings, descriptive information, such as station location; period of record; historical extremes outside the period of record; record accuracy; and other remarks pertinent to station operation and regulation. The following information, as appropriate, is provided with each continuous record of discharge or lake content. Comments to follow clarify information presented under the various headings of the station description.

LOCATION.--Information on locations is obtained from the most accurate maps available. The location of the gage with respect to the cultural and physical features in the vicinity and with respect to the reference place mentioned in the station name is given. River mileages, given for only a few stations, were determined by methods given in "River Mileage Measurement," Bulletin 14, Revision of October 1968, prepared by the Water Resources Council or were provided by the U.S. Army Corps of Engineers.

DRAINAGE AREA.--Drainage areas are measured using the most accurate maps available. Because the type of maps available varies from one drainage basin to another, the accuracy of drainage areas likewise varies. Drainage areas are updated as better maps become available.

PERIOD OF RECORD.--This indicates the period for which there are published records for the station or for an equivalent station. An equivalent station is one that was in operation at a time when the present station was not, and whose location was such that records from it can reasonably be considered equivalent with records from the present station.

REVISED RECORDS.--Published records, because of new information, occasionally are found to be incorrect, and revisions are printed in later reports. Listed under this heading are all reports in which revisions have been published for the station and water years to which the revisions apply. If a revision didnot include daily, monthly, or annual figures of discharge, that fact is noted after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" that only the instantaneous minimum was revised; and "(P)" that only peak discharges were revised. If the drainage area has been revised, the report in which the most recently revised figure was first published is given.

GAGE.--The type of gage in current use, the datum of the current gage referred to National Geodetic Vertical Datum of 1929 (see glossary), and a condensed history of the types, locations, and datum of previous gages are given under this heading.

REMARKS.--All periods of estimated daily-discharge record will either be identified by date in this paragraph of the station description for water-discharge stations or flagged in the daily-discharge table. If a remarks statement is used to identify estimated record, the paragraph will begin with this information presented as the first entry. The paragraph is also used to present information relative to the accuracy of the records, to special methods of computation, to conditions that affect natural flow at the station and, possibly, to other pertinent items. For reservoir stations, information is given on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir.

COOPERATION.--Records provided by a cooperating organization or obtained for the Geological Survey by a cooperating organization are identified here.

EXTREMES OUTSIDE PERIOD OF RECORD.--Included here is the information concerning major floods or unusually low flows that occurred outside the stated period of record. The information may or may not have been obtained by the U.S. Geological Survey.

REVISIONS.--If a critical error in published records is discovered, a revision is included in the first report published following discovery of the error.

Although rare, occasionally the records of a discontinued gaging station may need revision. Because, for these stations, there would be no current or, possibly, future station manuscript published to document the revision in a "Revised Records" entry, users of data for these stations who obtained the record from previously published data reports may wish to contact the district office (address given on the back of title page of this report) to determine if the published records were ever revised after the station was discontinued. Of course, if the data were obtained by computer retrieval, the data would be current and there would be no need to check because any published revision of data is always accompanied by revision of the corresponding data in computer storage.

Manuscript information for lake or reservoir stations differs from that for stream stations in the nature of the "Remarks" and to the inclusion of a skeleton stage-capacity table when daily contents are given.

Headings for AVERAGE DISCHARGE, EXTREMES FOR PERIOD OF RECORD, AND EXTREMES FOR CURRENT YEAR have been deleted and the information contained in these paragraphs, except for the listing of secondary instantaneous peak discharges in the EXTREMES FOR CURRENT YEAR paragraph, is now presented in the tabular summaries following the discharge table or in the REMARKS paragraph, as appropriate. No changes have been made to the data presentations of lake contents.

Data table of daily mean values

The daily table of discharge records for stream-gaging stations gives mean discharge for each day of the water year. In the monthly summary for the table, the line headed "TOTAL" gives the sum of the daily figures for each month; the line headed "MEAN" gives the average flow in cubic feet per second for the month; and the lines headed "MAX" and "MIN" give the maximum and minimum daily mean discharges, respectively, for each month. Discharge for the month also is usually expressed in cubic feet per second per square mile (line headed "CFSM"); or in inches (line headed "IN"); or in acre-feet (line headed "AC-FT). Figures for cubic feet per second per square mile and runoff in inches or in acre-feet may be omitted if there is extensive regulation or diversion or if the drainage area includes large noncontributing areas. At some stations monthly and (or) yearly observed discharges are adjusted for reservoir storage or diversion, or diversion data or reservoir contents are given. These figure are identified by a symbol and corresponding footnote.

Statistics of monthly mean data

A tabular summary of the mean (line headed "MEAN"), maximum (line headed "MAX"), and minimum (line headed "MIN") of monthly mean flows for each month for a designated period is provided below the mean values table. The water years of the first occurrence of the maximum and minimum monthly flows are provided immediately below those figures. The designated period will be expressed as "FOR WATER YEARS 19__-19__, BY WATER YEAR (WY)," and will list the first and last water years of the range of years selected from the PERIOD OF RECORD paragraph in the station manuscript. It will consist of all of the station record within the specified water years, inclusive, including complete months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the

statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript.

Summary statistics

A table titled "SUMMARY STATISTICS" follows the statistics of monthly mean data tabulation. This table consists of four columns, with the first column containing the line headings of the statistics being reported. The table provides a statistical summary of yearly, daily, and instantaneous flows, not only for the current water year but also for the previous calendar year and for a designated period, as appropriate. The designated period selected, "WATER YEARS 19__-19__," will consist of all of the station record within the specified water years, inclusive, including complete months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript. All of the calculations for the statistical characteristics designated ANNUAL (see line headings below), except for the ANNUAL 7-DAY MINIMUM" statistic, are calculated for the designated period using complete water years. The other statistical characteristics may be calculated using partial water years.

The date or water year, as appropriate, of the first occurrence of each statistic reporting extreme values of discharge is provided adjacent to the statistic. Repeated occurrences may be noted in the REMARKS paragraph of the manuscript or in footnotes. Because the designated period may not be the same as the station period of record published in the manuscript, occasionally the dates of occurrence listed for the daily and instantaneous extremes in the designated-period column may not be within the selected water years listed in the heading. When this occurs, it will be noted in the REMARKS paragraph or in footnotes. Selected streamflow duration curve statistics and runoff data are also given. Runoff data may be omitted if there is extensive regulation or diversion of flow in the drainage basin.

The following summary statistics data, as appropriate, are provided with each continuous record of discharge. Comments to follow clarify information presented under the various line headings of the summary statistics table.

ANNUAL TOTAL.--The sum of the daily mean values of discharge for the year. At some stations the yearly mean discharge is adjusted for reservoir storage or diversion. The adjusted figures are identified by symbol and corresponding footnotes.

ANNUAL MEAN.--The arithmetic mean of the individual daily mean discharges for the year noted or for the designated period. At some stations the yearly mean discharge is adjusted for reservoir storage or diversion. The adjusted figures are identified by a symbol and corresponding footnotes.

HIGHEST ANNUAL MEAN.--The maximum annual mean discharge occurring for the designated period.

LOWEST ANNUAL MEAN.--The minimum annual mean discharge occurring for the designated period.

HIGHEST DAILY MEAN.--The maximum daily mean discharge for the year or for the designated period.

LOWEST DAILY MEAN.--The minimum daily mean discharge for the year or for the designated period.

ANNUAL 7-DAY MINIMUM.--The lowest mean discharge for 7 consecutive days for a calendar year or a water year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1-March 31). The date shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day 10-year low-flow statistic.)

INSTANTANEOUS PEAK FLOW.--The maximum instantaneous discharge occurring for the water year or for the designated period. Note that secondary instantaneous peak discharges above a selected base discharge are stored in District computer files for stations meeting certain criteria. Those discharge values may be obtained by writing to the District Office. (See address on back of title page of this report.)

INSTANTANEOUS PEAK STAGE.--The maximum instantaneous stage occurring for the water year or for the designated period. If the dates of occurrence for the instantaneous peak flow and instantaneous peak stage differ, the REMARKS paragraph in the manuscript or a footnote may be used to provide further information.

INSTANTANEOUS LOW FLOW.--The minimum instantaneous discharge occurring for the water year or for the designated period.

ANNUAL RUNOFF --Indicates the total quality of water in runoff for a drainage area for the year. Data reports may use any of the following units of measurement in presenting annual runoff data.

Acre-foot (AC-FT) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area.

Inches (INCHES) indicates the depth to which the drainage area would be covered if all of the runoff for a given time period were uniformly distributed on it.

10 PERCENT EXCEEDS.--The discharge that is exceeded by 10 percent of the flow for the designated period.

50 PERCENT EXCEEDS.--The discharge that is exceeded by 50 percent of the flow for the designated period.

90 PERCENT EXCEEDS.--The discharge that is exceeded by 90 percent of the flow for the designated period.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations, and the second is a table of annual maximum stage and discharge at crest-stage stations. The tables of partial-record stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. These measurements are generally made in times of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Identifying Estimated Daily Discharge

Estimated daily-discharge values published in the water-discharge tables of annual State data reports are identified either by flagging individual daily values with the letter symbol "e" and printing a table footnote, "e Estimated", or by listing the dates of the esti-

mated record in the REMARKS paragraph of the station description.

Accuracy of the Records

The accuracy of streamflow records depends primarily on: (1) The stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements; and (2) the accuracy of measurements of stage, measurements of discharge, and interpretation of records.

The accuracy attributed to the records is indicated under "REMARKS." "Excellent" means that about 95 percent of the daily discharges are within 5 percent of the true; "good," within 10 percent; and "fair," within 15 percent. Records that do not meet the criteria mentioned, are rated "poor." Different accuracies may be attributed to different parts of a given record.

Daily mean discharges in this report are given to the nearest hundredth of a cubic foot per second for values less than 1 ft^3/s; to the nearest tenth between 1.0 and 10 ft^3/s; to whole numbers between 10 and 1000 ft^3/s; and to 3 significant figures for more than 1000 ft^3/s. The number of significant figures used is based solely on the magnitude of the discharge value. The same rounding rules apply to discharges listed for partial-record stations and miscellaneous sites.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, figures of cubic feet per second per square mile and of runoff, in inches, are not published unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

Other Records Available

Information of a more detailed nature than that published for most of the gaging stations such as observations of water temperatures, discharge measurements, gage-height records, and rating tables is on file in the district office. Also most gaging-station records are available in computer-usable form and many statistical analyses have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the district office.

The National Water Data Exchange, Water Resources Division, U.S. Geological Survey, National Center, Reston, VA 22092, maintains an index of all discharge measurement sites in the State as well as an index of records of discharge collected by other agencies but not published by the Geological Survey. Information on records available at specific sites can be obtained upon request.

RECORDS OF SURFACE-WATER QUALITY

Records of surface water quality ordinarily are obtained at or near stream-gaging stations because interpretation of records of surface-water quality nearly always requires corresponding discharge data. Records of surface-water quality in this report may involve a variety of types of data and measurement frequencies.

Classification of Records

Water-quality data for surface-water sites are grouped into one of three classifications. A **continuing record station** is a site where data are collected on a regularly scheduled basis. Frequency may be once or more times daily, weekly, monthly, or quarterly. A **partial-record station** is a site where limited water-quality data are collected systematically over a period of years. Frequency of sampling is usually less than quarterly. A **miscellaneous** sampling site is a location other than a continuing or partial-record station, where random samples are collected to give better areal coverage to define water-quality conditions in the river basin.

A careful distinction needs to be made between "continuing records" as used in this report and "continuous recordings," which refers to a continuous graph or a series of discrete values punched at short intervals on a paper tape. Some records of water quality, such as temperature and specific conductance, may be obtained through continuous recordings; however, because of costs, most data are obtained only monthly or less frequently. Locations of stations for which records on the quality of surface water appear in this report are shown in figure 10.

Arrangement of Records

Water-quality records collected at a surface-water daily record station are published immediately following that record, regardless of the frequency of sample collection. Station number and name are the same for both records. Where a surface-water daily record station is not available or where the water quality differs significantly from that at the nearby surface-water station, the continuing water-quality record is published with its own station number and name in the regular downstream-order sequence. Water-quality data for partial-record stations and for miscellaneous sampling sites appear in separate tables following the table of discharge measurements at miscellaneous sites.

Onsite Measurement and Collection

In obtaining water quality data, a major concern needs to be assuring that the data obtained represents the in situ quality of water. To assure this, certain measurements, such as water temperature, pH, and dissolved oxygen need to be made onsite when the samples are taken. To assure that measurements made in the laboratory also represent the in situ water, carefully prescribed procedures need to be followed in collecting the samples, in treating the samples to prevent changes in quality pending analysis, and in shipping the samples to the laboratory. Procedures for onsite measurements and for collecting, treating, and shipping samples are given in publications on "Techniques of Water-Resources Investigations ," Book 1, Chap. D2; Book 3, Chap. C2; Book 5 Chap. A1, A3, and A4. All of these references are listed on p. of this report. Also, detailed information on collecting, treating, and shipping samples may be obtained from the Geological Survey district office.

One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled through several vertical sections to obtain a representative sample needed for an accurate mean concentration and for use in calculating load. All samples obtained for the National Stream Quality Accounting Network (see definitions) are obtained from at least several verticals. Whether samples are obtained from the centroid of

flow or from several verticals, depends on flow conditions and other factors which must be evaluated by the collector.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum, minimum, and mean values for each constituent measured and are based upon hourly punches beginning at 0100 hours and ending at 2400 hours for the day of record. More detailed records (hourly values) may be obtained from the U.S.G.S. district office whose address is given on the back of the title page of this report.

Water Temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at time of discharge measurements for water-discharge stations. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same time each day. Large streams have a small diurnal temperature change; shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharges.

At stations where recording instruments are used, either mean temperatures or maximum and minimum temperatures for each day are published. Water temperatures measured at the time of water-discharge measurements are on file in the district office.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross sections.

During periods of rapidly changing flow or rapidly changing concentration, samples may have been collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided-day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 00027, the reader can assume that the sediment discharge for that day was computed by the subdivided-day method. For periods when no samples were collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

At other stations, suspended-sediment samples were collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observations, such data are useful in establishing seasonal relations between quality and streamflow and in predicting long-term sediment-discharge characteristics of the stream.

In addition to the records of suspended sediment discharge, records of the periodic measurements of the particle-size distribution of the suspended sediment and bed material are included for some stations.

Laboratory Measurements

Samples for indicator bacteria and specific conductance are analyzed locally. All other samples are analyzed in the Geological Survey laboratories in Arvada, Colo., Doraville, Ga., or Iowa City, Ia. Methods used in analyzing sediment samples and computing sediment records are given in TWRI, Book 5, Chap. C1. Methods used by the Geological Survey laboratories are given in TWRI, Book 1, Chap. D2; Book 3, Chap. C2; Book 5, Chap. A1, A3, and A4.

Data Presentation

For continuing-record stations, information pertinent to the history of station operation is provided in descriptive headings preceding the tabular data. These descriptive headings give details regarding location, drainage area, period of record, type of data available, instrumentation, general remarks, cooperation, and extremes for parameters currently measured daily. Tables of chemical, physical, biological, radiochemical data, and so forth, obtained at a frequency less than daily are presented first. Tables of "daily values" of specific conductance, pH, water temperature, dissolved, and suspended sediment then follow in sequence.

In the descriptive headings, if the location is identical to that of the discharge gaging station, neither the LOCATION nor the DRAINAGE AREA statements are repeated. The following information, when appropriate, is provided with each continuous-record station. Comments that follow clarify information presented under the various headings of the station description.

LOCATION.--See Data Presentation under "Records of stage and Water Discharge"; same comments apply.

DRAINAGE AREA.--See Data Presentation under "Records of stage and Water Discharge"; same comments apply.

PERIOD OF RECORD.--This indicates the periods for which there are published water-quality records for the station. The periods are shown separately for records of parameters measured daily or continuously and those measured less than daily. For those measured daily or continuously, periods of record are given for the parameters individually.

INSTRUMENTATION.--Information on instrumentation is given only if a water-quality monitor, temperature recorder, sediment pumping sampler, or other sampling device is in operation at a station.

REMARKS.--Remarks provide added information pertinent to the collection, analysis, or computation of the records.

COOPERATION.--Records provided by a cooperating organization or obtained for the Geological Survey by a cooperating organization are identified here.

EXTREMES.--Maximums and minimums are given only for parameters measured daily or more frequently. None are given for parameters measured weekly or less frequently, because the true maximums or minimums may not have been sampled. Extremes, when given, are provided for both the period of record and for the current water year.

REVISIONS.--If errors in published water-quality records are discovered after publication, appropriate updates are made to the Water-Quality File in the U.S. Geological Survey's computerized data system, WATSTORE, and subsequently by monthly transfer of

update transactions to the U.S. Environmental Protection Agency's STORET system. Because the usual volume of updates makes it impractical to document individual changes in the State data-report series or elsewhere, potential users of U.S. Geological Survey water-quality data are encouraged to obtain all required data from the appropriate computer file to insure the most recent updates.

The surface-water-quality records for partial-record stations and miscellaneous sampling sites are published in separate tables following the table of discharge measurements at miscellaneous sites. No descriptive statements are given for these records. Each station is published with its own station number and name in the regular downstream-order sequence.

Remark Codes

The following remark codes may appear with the water-quality data in this report:

PRINTED OUTPUT	REMARK
E	Estimated value
>	Actual value is known to be greater than the value shown
<	Actual value is known to be less than the value shown
K	Results based on colony count outside the acceptance range (non-ideal colony count)
L	Biological organisms count less than 0.5 percent (organisms may be observed rather than counted
D	Biological organism count equal to or greater than 15 percent (dominant)
&	Biological organism estimated as dominant

Dissolved Trace-Element Concentrations

NOTE.--Traditionally, dissolved trace-element concentrations have been reported at the microgram per liter (µg/L) level. Recent evidence, mostly from large rivers, indicates that actual dissolved-phase concentrations for a number of trace elements are within the range of 10's and 100's of nanograms per liter (ng/L). Present data above the µg/L level should be viwed with caution. Such data may actually represent elevated environmental concentrations from natural or human causes. However, these data could reflect contamination introduced during sampling, processing, or analysis. To confidently produce dissolved trace-element data with insignificant contamination, the U.S. Geological Survey will begin using new trace-element protocols in water year 1994.

RECORDS OF GROUND-WATER LEVELS

Only water-level data from a national network of observation wells are given in this report. These data are intended to provide a sampling and historical record of water-level changes in the Nation's most important aquifers. Locations of the observation wells in this network in Minnesota are shown in figure 12.

Although, in this report, records of water levels are presented for fewer than 200 wells, records are obtained through cooperative efforts of many Federal, State, and local agencies for several hundred observation wells throughout Minnesota and are placed in computer storage. Each spring, the Minnesota Department of Natural Resources, Division of Waters publishes a report for the previous water year entitled "Observation Well Data Summary, Water Year 19__." This report contains hydrographs of recorder wells, detailed maps showing the location of active observation wells, and other useful items. Information about the availability of the data in the water-level file may be obtained from the District Chief, Minnesota District. (See address on back of front page).

Data Collection and Computation

Measurements of water levels are made in many types of wells under varying conditions, but the methods of measurement are standardized to the extent possible. The equipment and measuring techniques used at each observation well assure that measurements at each well are of consistent accuracy and reliability.

Tables of water-level data are presented by counties arranged in alphabetical order. The prime identification number for a given well is the 15-digit number that appears in the upper left corner of the table. The secondary identification number is the local well number, an alphanumeric number, derived from the township-range location of the well.

Water-level records are obtained from direct measurements with a steel tape or from the graph or punched tape of a water-stage recorder. The water-level measurements in this report are given in feet with reference to land-surface datum (lsd). Land-surface datum is a datum plane that is approximately at land surface at each well. If known, the elevation of the land-surface datum is given in the well description. The height of the measuring point (MP) above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported for every fifth day and the end of each month (eom).

All water-level measurements are reported to the nearest hundredth of a foot. The error of water-level measurements is normally only a hundredth or a few hundredth of a foot.

Hydrographs showing water-level fluctuations are included for 28 representative wells; 7 in surficial-sand aquifers, 6 in buried-sand aquifers, and 15 in bedrock aquifers.

Data Presentation

Each well consists of two parts, the station description and the data table of water levels observed during the water year. In addition a graph of water levels for the current year or other selected period is included for several representative wells. The description of the well is presented first through use of descriptive headings preceding the tabular data. The comments to follow clarify information presented under the various headings.

LOCATION.--This paragraph follows the well-identification number and reports the latitude and longitude (given in degrees, minutes and seconds); a landline location designation; the hydrologic-unit number; the distance and direction from a geographic point of reference; and the owner's name.

AQUIFER.-- This entry designates by name (if a name exists) and geologic age the aquifer(s) open to the well.

WELL CHARACTERISTICS.--This entry describes the well in terms of depth, diameter, casing depth and/or screened interval, method of construction, use, and includes additional information such as casing breaks, collapsed screen, and other changes since construction.

INSTRUMENTATION.--This paragraph provides information on both the frequency of measurement and the collection method used, allowing the user to better evaluate the reported water-level

extremes by knowing whether they are based on weekly, monthly, or some other frequency of measurement.

DATUM.--This entry describes both the measuring point and the land-surface elevation at the well. The measuring point is described physically (such as top of collar, notch in the top of casing, plug in pump base and so on), and in relation to land surface (such as 1.3 ft above land-surface datum). The elevation of the land-surface datum is described in feet above (or below) sea level; it is reported with a precision depending on the method of determination.

REMARKS.--This entry describes factors that may influence the water level in a well or the measurement of the water level. It should identify wells that are also water-quality observation wells, and may be used to acknowledge the assistance of local (non-Survey) observers.

PERIOD OF RECORD.--This entry indicates the period for which there are published records for the well. It reports the month and year of the start of the publication of water-level records by the U.S. Geological Survey and the words "to current year" if the records are to be continued into the following year. Periods for which water-level records are available, but are not published by the Geological Survey, may be noted.

EXTREMES FOR THE PERIOD OF RECORD.--This entry contains the highest and lowest water levels of the period of published record, with respect to land-surface datum, and the dates of their occurrence.

A table of water levels follows the station description for each well. Water levels are reported in feet below land-surface datum and all taped measurements of water level are listed. For wells equipped with recorders, abbreviated tables are published; generally, only water-level lows are listed for every fifth day and at the end of the month (eom). The highest and lowest water levels of the water year and their dates of occurrence are shown on a line below the abbreviated table. Because all values are not published for wells with recorders, the extremes may be values that are not listed in the table. Missing records are indicated by dashes in place of the water level. A hydrograph for a selected period of record follows the water-level table for several representative wells.

RECORDS OF GROUND-WATER QUALITY

Records of ground-water quality in this report differ from other types of records in that for most sampling sites they consist of only one set of measurements for the water year. The quality of ground water ordinarily changes only slowly; therefore, for most general purposes one annual sampling, or only a few samples taken at infrequent intervals during the year, is sufficient. Frequent measurement of the same constituents is not necessary unless one is concerned with a particular problem, such as monitoring for trends in nitrate concentration. In the special cases where the quality of ground water may change more rapidly, more frequent measurements are made to identify the nature of the changes.

Data Collection and Computation

The records of ground-water quality in this report were obtained mostly as a part of special studies in specific areas. Consequently, a number of chemical analyses are presented for some counties but none are presented for others. As a result, the records for this year, by themselves, do not provide a balanced view of ground-water quality statewide. Such a view can be attained only by considering records for this year in context with similar records obtained for these and other counties in earlier years.

Most methods for collecting and analyzing water samples are described in the "U.S. Geological Survey Techniques of Water-Resources Investigation" manuals listed on a following page. The values reported in this report represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. All samples were obtained by trained personnel. The wells sampled were pumped long enough to assure that the water collected came directly from the aquifer and had not stood for a long time in the well casing where it would have been exposed to the atmosphere and to the material, possibly metal, comprising the casings.

Data Presentation

The records of ground-water quality are published in a section titled QUALITY OF GROUND WATER immediately following the ground-water-level records. Data for quality of ground water are listed alphabetically by County, and are identified by well number. The prime identification number for wells sampled is the 15-digit number derived from the latitude-longitude locations. No descriptive statements are given for ground-water-quality records; however, the well number, depth of well, date of sampling, and other pertinent data are given in the table containing the chemical analyses of the ground water. The REMARK codes listed for surface-water-quality records are also applicable to ground-water-quality records.

ACCESS TO WATSTORE DATA

The U.S. Geological Survey is the principal Federal water-data agency and, as such, collects and disseminates about 70 percent of the water data currently being used by numerous State, local, private, and other Federal agencies to develop and manage our water resources. As part of the U.S. Geological Survey's program of releasing water data to the public, a large-scale computerized system has been developed for the storage and retrieval of water data collected through its activities. The National Water Data Storage and Retrieval System (WATSTORE) was established in 1972 to provide an effective and efficient means for the processing and maintenance of water data collected through the activities of the U.S. Geological Survey and to facilitate release of the data to the public. A variety of useful products, ranging from data tables to complex statistical analyses such as Log Pearson Type III, can be produced using WATSTORE. The system resides on the central computer facilities of the U.S. Geological Survey at its National Center in Reston, Virginia, and consists of related files and data bases.

- Station Header File - Contains descriptive information on more than 440,000 sites throughout the United States and its territories where the U.S. Geological Survey collects or has collected data.
- Daily Values File - Contains more than 220 million daily values of stream flows, stages, reservoir contents, water temperature, specific conductances, sediment concentrations, sediment discharges, and ground-water levels.
- Peak Flow File - Contains approximately 500,000 maximum (peak) streamflow and gage-height values at surface-water sites.
- Water Quality File - Contains approximately 2 million analyses of water samples that describe the chemical, physical, biological, and radio-chemical characteristics of both surface and ground water.
- Ground-Water Site Inventory Data Base - Contains inventory data for more than 900,000 wells, springs, and other sources of ground water. The data includes site location, geohydrologic characteristics, well-construction history, and one-time field measurements such as water temperature.

In 1976, the U.S. Geological Survey opened WATSTORE to the public for direct access. The signing of a Memorandum of Agreement with the Survey is required to obtain direct access to WATSTORE. The system can be accessed either synchronously or asynchronously. The requester will be expected to pay all computer costs he/she incurs. Direct access may be obtained by contacting:

U.S. Geological Survey
National Water Data Exchange
421 USGS National Center
Reston, Virginia 22092

In addition to providing direct access to WATSTORE, data can be provided in various machine-readable formats on magnetic tape or 5-1/4 inch floppy disk; and, as noted in the introduction, on CD-ROM discs. Beginning with the 1990 water year, all water-data reports will also be available on Compact disc - Read Only Memory (CD-ROM). All data reports published for the current water year for the entire Nation, including Puerto Rico and the Trust Territories, will be reproduced on a single CD-ROM disc. Information about the availability of specific types of data or products, and user charges, can be obtained locally from each of the Water Resources Division's District offices. (See address on the back of the title page.) A limited number of CD-ROM discs will be available for sale by the Books and Open-File Reports Section, U.S. Geological Survey, Federal Center, Box 25425, Denver, Colorado 80225.

DEFINITION OF TERMS

Terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. See also table for converting inch-pound units to International System of units (SI) on the inside of back cover.

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Adenosine triphosphate (ATP) is the primary energy donor in cellular life process. Its central role in living cells makes it an excellent indicator of the presence of living material in water. A measure of ATP, therefore, provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter of the original water sample.

Algae are mostly aquatic single-celled, colonial, or multi-celled plants, containing chlorophyll and lacking roots, stems, and leaves.

Algal growth potential (AGP) is the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter of sample.

Aquifer is a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian means confined and is used to describe a well in which the water level stands above the top of the aquifer tapped by the well. A flowing artesian well is one in which the water level is above the land surface.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. They are characterized as aerobic or facultative anaerobic, gram-negative, nonspore- forming, rod-shaped bacteria which ferment lactose with gas formation within 48 hours at 35°C. In the laboratory these bacteria are defined as the organisms which produce colonies with a golden-green metallic sheen within 24 hours when incubated at 35°C ±1.0°C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal coliform bacteria are bacteria that are present in the intestine or feces of warmblooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory they are defined as all organisms which produce blue colonies within 24 hours when incubated at 44.5° C±0.2°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal streptococcal bacteria are bacteria also found in the intestine of warmblooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, cocci bacteria which are capable of growth in brain-heart infusion broth. In the laboratory they are defined as all the organisms which produce red or pink colonies within 48 hours at 35° C±1.0°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Bed material is the unconsolidated material of which a streambed, lake, pond, reservoir, or estuary bottom is composed.

Biochemical oxygen demand (BOD) is a measure of the quantity of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by microorganisms, such as bacteria.

Biomass is the amount of living matter present at any given time, expressed as the mass per unit area or volume of habitat.

Ash mass is the mass or amount of residue present after the residue from the dry mass determination has been ashed in a muffle furnace at a temperature of 500 °C for 1 hour. The ash mass values of zooplankton and phytoplankton are expressed in grams per cubic meter (g/m^3), and periphyton and benthic organisms in grams per square meter (g/m^2).

Dry mass refers to the weight of residue present after drying in an oven at 60° C for zooplankton and 105° C for periphyton, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry mass values are expressed in the same units as ash mass.

Organic mass or volatile mass of the living substance is the difference between the dry mass and the ash mass, and represents the actual mass of the living matter. The organic mass is expressed in the same units as for ash mass and dry mass.

Wet mass is the mass of living matter plus contained water.

Bottom material: See Bed Material.

Cells/volume refers to the number of cells or any organism which is counted by using a microscope and grid or counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per sample, usually milliliters (mL) or liters (L).

Cfs-day is the volume of water represented by a flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, approximately 1.9835 acre-feet, or about 646,000 gallons or 2,447 cubic meters.

Chemical oxygen demand (COD) is a measure of the chemically oxidizable material in the water, and furnishes an approximation of the amount of organic and reducing material present. The determined value may correlate with natural water color or with carbonaceous organic pollution from sewage or industrial wastes.

Chlorophyll refers to the green pigments of plants. Chlorophyll a and b are the two most common pigments in plants.

Color unit is produced by one milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Control designates a feature downstream from the gage that determines the stage-discharge relation at the gage. This feature may be a natural constriction of the channel, an artificial structure, or a uniform cross section over a long reach of the channel.

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming that the runoff is distributed uniformly in time and area.

Cubic foot per second (FT^3/s, ft^3/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

Discharge is the volume of water (or more broadly, volume of fluid plus suspended sediment), that passes a given point within a given period of time.

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period.

Instantaneous discharge is the discharge at a particular instant of time.

Annual 7-day minimum is the lowest mean discharge for 7 consecutive days for a calender year or a water year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1-March 31). The date shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day 10-year low-flow statistic.)

Dissolved refers to the amount of substance present in true chemical solution. In practice, however, the term includes all forms of substance that will pass through a 0.45-micrometer membrane filter, and thus may include some very small (colloidal) suspended particles. Analyses are performed on filtered samples.

Dissolved-solids concentration of water is determined either analytically by the "residue-on-evaporation" method, or mathematically by totaling the concentrations of individual constituents reported in a comprehensive chemical analysis. During the analytical determination of dissolved solids, the bicarbonate (generally a major dissolved component of water) is converted to carbonate. Therefore, in the mathematical calculation of dissolved-solids concentration, the bicarbonate value, in milligrams per liter, is multiplied by 0.492 to reflect the change.

Diversity index is a numerical expression of evenness of distribution of aquatic organisms. The formula for diversity index is:

$$\bar{d} = -\sum_{i=1}^{s} \frac{n_i}{n} \log_2 \frac{n_i}{n}$$

Where 'n_i' is the number of individuals per taxon, 'n' is the total number of individuals, and 's' is the total number of taxa in the sample of the community. Diversity index values range from zero, when all the organisms in the sample are the same, to some positive number, when some or all of the organisms in the sample are different.

Drainage area of a stream at a specified location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the river above the specified point. Figures of drainage area given herein include all closed basins, or noncontributing areas, within the area unless otherwise noted.

Drainage basin is a part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Gage height (G.H.) is the water-surface elevation referred to some arbitrary gage datum. Gage height is often used interchangeably with the more general term "stage", although gage height is more appropriate when used with a reading on a gage.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is attributable to the presence of alkaline earths (principally calcium and magnesium) and is expressed as equivalent calcium carbonate ($CaCO_3$).

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as delineated by the Office of Water Data Coordination on the State Hydrologic Unit Maps; each hydrologic unit is identified by an 8-digit number.

Metamorphic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with many intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Methylene blue active substance (MBAS) is a measure of apparent detergents. This determination depends on the formation of a blue color when methylene blue dye reacts with synthetic detergent compounds.

Micrograms per gram (UG/G, ug/g) is a unit expressing the concentration of a chemical element as the mass (micrograms) of theelement sorbed per unit mass (gram) of sediment.

Micrograms per kilogram (MG/KG, mg/kg) is a unit expressing the concentration of a chemical element as the mass (micrograms) of the element sorbed per unit mass (kilogram) of sediment.

Micrograms per liter (UG/L, ug/L) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Concentration of suspended sediment also is expressed in mg/L, and is based on the mass of sediment per liter of water-sediment mixture.

National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first order level nets of both the United States and Canada. It was formerly called "Sea Level Datum of 1929" or "mean sea level" in this series of reports. Although the datum was derived from the average sea level over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific Coasts, it does not necessarily represent local mean sea level at any particular place.

National Stream Quality Accounting Network (NASQAN) is a nationwide data-collection network designed by the U.S. Geological Survey to meet many of the information needs of government agencies and other groups involved in natural or regional water-quality planning and management. The 500 or so sites in NASQAN are generally located at the downstream ends of hydrologic accounting units designated by the U.S. Geological Survey Office of Water Data Coordination in consultation with the Water Resources Council. The objectives of NASQAN are (1) to obtain information on the quality and quantity of water moving within and from the United States through a systematic and uniform process of data collection, summarization, analysis, and reporting such that the data may be used for, (2) description of the areal variability of water quality in the Nation's rivers through analysis of data from this and other programs, (3) detection of changes or trends with time in the pattern of occurrence of water-quality characteristics, and (4) providing a nationally consistent data base useful for water-quality assessment and hydrologic research.

The National Trends Network (NTN) is a 150-station network for sampling atmospheric deposition in the United States. The purpose of the network is to determine the variability, both in location and in time, of the composition of atmospheric deposition, which includes snow, rain, dust particles, aerosols, and gases, The core from which the NTN was built was the already-existing deposition-monitoring network of the National Atmospheric Deposition Program (NADP).

Organism is any living entity, such as an insect, phytoplankter, or zooplankter.

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meters (m^2), acres, or hectares. Periphyton, benthic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number of organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliliters (mL) or liters (L). Numbers of planktonic organisms can be expressed in these terms.

Total organism count is the total number of organisms collected and enumerated in any particular sample.

Parameter code numbers are unique five-digit code numbers assigned to each parameter placed into storage. These codes are assigned by the Environmental Protection Agency and are also used to identify data exchanged among agencies.

Partial-record station is a particular site where limited streamflow and (or) water-quality data are collected systematically over a period of years for use in hydrologic analyses.

Particle size is the diameter, in millimeters (mm), of suspended sediment or bed material determined by either sieve or sedimentation methods. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube) determine fall diameter of particles in distilled water (chemically dispersed).

Particle-size classification used in this report agrees with recommendations made by the American Geophysical Union Subcommittee on Sediment Terminology.

The classification is as follows:

Classification	Size (mm)	Method of analysis
Clay	00024- 0.004	Sedimentation
Silt	004 - .062	Sedimentation
Sand	.062 - 2.0	Sedimentation or sieve
Gravel	2.0 -64.0	Sieve

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. Most of the organic material is removed and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water.

Percent composition is a unit for expressing the ratio of a particular part of a sample or population to the total sample or population, in terms of types, numbers, mass or volume.

Periphyton is the assemblage of microorganisms attached to and growing upon solid surfaces. While primarily consisting of algae,they also include bacteria, fungi, protozoa, rotifers, and other small organisms. Periphyton is a useful indicator of water quality.

Pesticides are chemical compounds used to control undesirable plants and animals. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides. Insecticides and herbicides, which control insects and plants respectively, are the two categories reported.

Picocurie (PC, pCi) is one trillionth (1×10^{-12}) of the amount of radioactivity represented by a curie (C1). A curie is the amount of radioactivity that yields 3.7 x 1010 radioactive disintegrations per second. A picocurie yields 2.22 dpm (disintegrations per minute).

Plankton is the community of suspended, floating, or weakly swimming organisms that live in the open water of lakes and rivers.

Phytoplankton is the plant part of the plankton. They are usually microscopic and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of the water. They are the primary food producers in the aquatic environment, and are commonly known as algae.

Blue-green algae are a group of phytoplankton organisms having a blue pigment, in addition to the green pigment called chlorophyll. Blue-green algae often cause nuisance conditions in water.

Diatoms are the unicellular or colonial algae having a siliceous shell. Their concentrations are expressed as number of cells/mL of sample.

Green algae have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algal mats or floating "moss" in lakes. Their concentrations are expressed as number of cells/mL of sample.

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column, and are often large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers.

Polychlorinated biphenyls (PCBs) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photosynthetic and chemosynthetic activity of producer organisms (chiefly green plants). The rate of primary production is estimated by measuring the amount of oxygen released (oxygen method) or the amount of carbon assimilated by the plants (carbon method).

Milligrams of carbon per area or volume per unit time [mg C/(m^2 . time) for periphyton and macrophytes and mg (C/(m^3 . time) for phytoplankton] are units for expressing primary productivity. They define the amount of carbon dioxide consumed as measured by radioactive carbon (carbon 14). The carbon 14 method is of greater sensitivity than the oxygen light and dark bottle method, and is preferred for use in unenriched waters. Unit time may be either the hour or day, depending on the incubation period.

Milligrams of oxygen per area or volume per unit time [mg O_2/(m^2 . time) for periphyton and macrophytes and mg O_2/(m^3 . time) for phytoplankton] are the units for expressing primary productivity. They define production and respiration rates as estimated from changes in the measured dissolved oxygen concentration. The oxygen light and dark bottle method is preferred if the rate of primary production is sufficient for accurate measurements to be made within 24 hours. Unit time may be either the hour or day, depending on the incubation period.

Radiochemical program is a network of regularly sampled water-quality stations where samples are collected to be analyzed for radioisotypes. The streams that are sampled represent major drainage basins in the conterminous United States.

Recoverable from bottom material is the amount of a given constituent that is in solution after a representative sample of bottom material has been digested by a method (usually using an acid or mixture of acids) that results in dissolution of only readily soluble substances. Complete dissolution of all bottom material is not achieved by the digestion treatment and thus the determination represents less than the total amount (that is, less than 95 percent) of the constituent in the sample. To achieve comparability of analytical data, equivalent digestion procedures would be required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Return period is the average time interval between occurrences of a hydrological event of a given or greater magnitude, usually expressed in years. May also be called recurrence interval.

Runoff in inches (IN, in) shows the depth to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Sea level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Sediment is solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and precipitation.

Bed load is the sediment that is transported in a stream by rolling, sliding, or skipping along the bed and very close to it. In this report, bed load is considered to consist of particles in transit within 0.25 ft of the streambed.

Bed load discharge (tons per day) is the quantity of bed load measured by dry weight that moves past a section as bed load in a given time.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 ft above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L).

Mean concentration is the time-weighted concentration of suspended sediment passing a stream section during a 24-hour day.

Suspended-sediment discharge (tons/day) is the rate at which dry weight of sediment passes a section of a stream or is the quantity sediment, as measured by dry weight or volume, that passes a section in a given time. It is computed by multiplying discharge times mg/L times 0.0027.

Suspended-sediment load is quantity of suspended sediment passing a section in a specified period.

Total sediment discharge (tons/day) is the sum of the suspended-sediment discharge and the bed-load discharge. It is the total quantity of sediment, as measured by dry weight or volume, that passes a section during a given time.

Total sediment load or total load is a term which refers to the total sediment (bed load plus suspended-sediment load) that is in transport. It is not synonymous with total-sediment discharge.

7-day 10 year low flow (7 Q_{10}) is the discharge at the 10-year recurrence interval taken from a frequency curve of annual values of the lowest mean discharge for 7 consecutive days (the 7-day low flow).

Sodium-adsorption-ratio (SAR) is the expression of relative activity of sodium ions in exchange reactions within soil and is an

index of sodium or alkali hazard to the soil. Waters range in respect to sodium hazard from those which can be used for irrigation on almost all soils to those which are generally unsatisfactory for irrigation.

Solute is any substance derived from the atmosphere, vegetation, soil, or rocks that is dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current. It is expressed in micromhos per centimeter at 25°C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stage-discharge relation is the relation between gage height (stage) and volume of water per unit of time, flowing in a channel.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as a streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Substrate is the physical surface upon which an organism lived.

Natural substrates refers to any naturally occurring emersed or submersed solid surface, such as a rock or tree, upon which an organism lived.

Artificial substrate is a device which is purposely placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is taken. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multiplet samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection.

Surface area of a lake is that area outlined on the latest USGS topographic map as the boundary of the lake and measured by a planimeter in acres. In localities not covered by topographic maps, the areas are computed from the best maps available at the time planimetered. All areas shown are those for the stage when the planimetered map was made. All areas shown are those for the stage when the planimetered map was made.

Surficial bed material is that part (0.1 to 0.2 ft) of the bed material that is sampled using U.S. Series Bed-Material Samplers.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of the total concentration in a water-sediment mixture. The water-sediment mixture is associated with (or sorbed on) that material retained on a 0.45 micrometer filter.

Suspended, recoverable is the amount of a given constituent that is in solution after the part of a representative water-suspended sediment sample that is retained on a 0.45 micrometer filter has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all the particulate matter is not achieved by the digestion treatment and thus the determination represents something less than the "total" amount (that is, less than 95 percent) of the constituent present in the sample. To achieve comparability of analytical data, equivalent digestion procedures would be required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Determinations of "suspended, recoverable" constituents are made either by analyzing portions of the material collected on the filter or, more commonly, by difference, based on determinations of (1) **dissolved** and (2) **total recoverable** concentrations of the constituent.

Suspended, total is the total amount of a given constituent in the part of a representative water-suspended sediment sample that is retained on a 0.45 um membrane filter. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to determine when the results should be reported as "suspended, total."

Determinations of "suspended, total" constituents are made either by analyzing portions of the material collected on the filter or, more commonly, by difference, based on determinations of (1) **dissolved** and (2) **total** concentrations of the constituent.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchical scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common.

For example, the taxonomy of a particular mayfly, Hexagenia limbata is the following:

Kingdom.....Animal

Phylum.....Arthropoda

Class.....Insects

Order.....Ephemeroptera

Family.....Ephermeridae

Genus.....**Hexageria**

Species.....**Hexagenia lambata**

Thermograph is an instrument that continuously records variations of temperature on a chart. The more general term "temperature recorder" is used in the table headings and refers to any instrument that records temperature whether on a chart, a tape, or any other medium.

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the stream each day for the year.

Tons per acre-foot indicates the dry mass of dissolved solids in 1 acre-foot of water. It is computed by multiplying the concentration in milligrams per liter by 0.00136.

Tons per day is the quantity of substance in solution or suspension that passes a stream section during a 24-hour day.

Total is the total amount of a given constituent in a representative water-suspended sediment sample, regardless of the constituent's physical or chemical form. The term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent present in both the dissolved and suspended

phases of the sample. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as "total." (Note that the word "total" does double duty here, indicating both that the sample consists of a water-suspended sediment mixture and that the analytical method determines all of the constituent in the sample.)

Total in bottom material is the total amount of a given constituent in a representative sample of bottom material. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as "total in bottom material."

Total load (tons) is the total quantity of any individual constituent, as measured by dry mass or volume, that is dissolved in a specific amount of water (discharge) during a given time. It is computed by multiplying the total discharge, times the mg/L of the constituent, times the factor 0.0027, times the number of days.

Total recoverable refers to the amount of a given constituent that is in solution after a representative water-suspended sediment sample has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all particulate matter is not achieved by the digestion treatment, and thus the determination represents something less than the "total" amount (that is, less than 95 percent) of the constituent percent in the dissolved and suspended phases of the sample. To achieve comparability of analytical data, equivalent digestion procedures would be required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Tritium Network is a network of stations which has been established to provide baseline information on the occurrence of tritium in the Nation's surface waters. In addition to the surface-water stations in the network, tritium data are also obtained at a number of precipitation stations. The purpose of the precipitation stations is to provide an estimate sufficient for hydrologic studies of the tritium input to the United States.

Water year in Geological Survey reports dealing with surface-water supply is the 12-month period, October 1 through September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 1992 is called the "1992 water year."

WDR is used as an abbreviation for "Water-Data Report" in reference to published reports beginning in 1975.

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge- weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

WRD is used as an abbreviation for "Water-Resources Data" in the REVISED RECORDS paragraph to refer to State annual basic-data reports published before 1975.

WSP is used as an abbreviation for "Water-Supply Paper" in references to previously published reports.

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS

The U.S. Geological Survey publishes a series of manuals describing procedures for planning and conducting specialized work in water-resource investigations. The material is grouped under major subject headings called books and is further divided into sections and chapters. For example, Section A of Book 3 (Applications to Hydraulics) pertains to surface water. The chapter, the unit of publication, is limited to a narrow field of subject matter. This format permits flexibility in revision and publication as the need arises.

The reports listed below are for sale by the U.S. Geological Survey, Books and Open-File Reports Section, Federal Center, Box 25425, Denver, Colorado 80225 (authorized agent of the Superintendent of Documents, Government Printing Office). Prepayment is required. Remittance should be sent by check or money order payable to the U.S. Geological Survey. Prices are not included because they are subject to change. Current prices can be obtained by writing to the above address. When ordering or inquiring about prices for any of these publications, please give the title, book number, chapter number, and "U.S. Geological Survey Techniques of Water-Resources Investigations".

1-D1. Water temperature--influential factors, field measurement, and data presentation, by H.H. Stevens, Jr., J.F. Ficken, and G.F. Smoot: USGS--TWRI Book 1, Chapter D1. 1975. 65 pages.

1-D2 Guidelines for collection and field analysis of ground-water samples for selected unstable constituents, by W.W. Wood: USGS--TWRI Book 1, Chapter D2. 1976. 24 pages.

2-D1. Application of surface geophysics to ground-water investigations, by A.A.R. Zohdy, G.P. Eaton, and D.R. Mabey: USGS--TWRI Book 2, Chapter D1. 1974. 116 pages.

2-D2. Application of seismic-refraction techniques to hydrologic studies, by F.P. Haeni: USGS--TWRI Book 2, Chapter D2. 1988. 86 pages.

2-E1. Application of borehole geophysics to water-resources investigations, by W. Scott Keys and L.M. McCary: USGS--TWRI Book 2, Chapter E1. 1971. 126 pages.

2-E2. Borehole geophysics applied to ground-water investigations, by W. Scott Keys: USGS--TWRI Book 2, Chapter E2. 1990. 150 pages.

2-F1. Application of drilling, coring, and sampling techniques to test holes and wells, by Eugene Shuter and Warren E. Teasdale: USGS--TWRI Book 2, Chapter F1. 1989. 97 pages.

3-A1. General field and office procedures for indirect discharge measurements, by M.A. Benson and Tate Dalrymple: USGS--TWRI Book 3, Chapter A1. 1967. 30 pages.

3-A2. Measurement of peak discharge by the slope-area method, by Tate Dalrymple and M.A. Benson: USGS--TWRI Book 3, Chapter A2. 1967. 12 pages.

3-A3. Measurement of peak discharge at culverts by indirect methods, by G.L. Bodhaine: USGS--TWRI Book 3, Chapter A3. 1968. 60 pages.

3-A4. Measurement of peak discharge at width contractions by indirect methods, by H.F. Matthai: USGS--TWRI Book 3, Chapter A4. 1967. 44 pages.

3-A5. Measurement of peak discharge at dams by indirect methods, by Harry Hulsing: USGS--TWRI Book 3. Chapter A5. 1967. 29 pages.

3-A6. General procedure for gaging streams, by R.W. Carter and Jacob Davidian: USGS--TWRI Book 3, Chapter A6. 1968. 13 pages.

3-A7. Stage measurements at gaging stations, by T.J. Buchanan and W.P. Somers: USGS--TWRI Book 3, Chapter A7. 1968. 28 pages.

3-A8. Discharge measurements at gaging stations, by T.J. Buchanan and W.P. Somers: USGS--TWRI Book 3, Chapter A8. 1969. 65 pages.

3-A9. Measurement of time of travel in streams by dye tracing, by F.A. Kilpatrick and J.F. Wilson, Jr.: USGS--TWRI Book 3, Chapter A9. 1989. 27 pages.

3-A10. Discharge ratings at gaging stations, by E.J. Kennedy: USGS--TWRI Book 3, Chapter A10. 1984. 59 pages.

3-A11. Measurement of discharge by moving-boat method, by G.F. Smoot and C.E. Novak: USGS--TWRI Book 3, Chapter A11. 1969. 22 pages.

3-A12. Fluorometric procedures for dye tracing, by J.F. Wilson, Jr., E.D. Cobb, and F.A. Kilpatrick: USGS--TWRI Book 3, Chapter A12. 1986. 41 pages.

3-A13. Computation of continuous records of streamflow, by E.J. Kennedy: USGS--TWRI Book 3, Chapter A13. 1983. 53 pages.

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS

3-A14. Use of flumes in measuring discharge, by F.A. Kilpatrick and V.R. Schneider: USGS--TWRI Book 3, Chapter A14. 1983. 46 pages.

3-A15. Computation of water-surface profiles in open channels, by Jacob Davidian: USGS--TWRI Book 3, Chapter A15. 1984. 48 pages.

3-A16. Measurement of discharge using tracers, by F.A. Kilpatrick and E.D. Cobb: USGS--TWRI Book 3, Chapter A16. 1985. 52 pages.

3-A17. Acoustic velocity meter systems, by Anonius Laenen: USGS--TWRI Book 3, Chapter A17. 1985. 38 pages.

3-A18. Determination of stream reaeration coefficients by use of tracers, by F.A. Kilpatrick, R.E. Rathburn, N. Yotsukura, G.W. Parker, and L.L. DeLong: USGS--TWRI Book 3, Chapter A18. 1989. 52 pages.

3-A19. Levels of streamflow gaging stations, by E.J. Kennedy: USGS--TWRI Book 3, Chapter A19. 1990. 27 pages.

3-B1. Aquifer-test design, observation, and data analysis, by R.W. Stallman: USGS--TWRI Book 3, Chapter B1. 1971. 26 pages.

3-B2. Introduction to ground-water hydraulics, a programmed text for self-instruction, by G.D. Bennett: USGS--TWRI Book 3, Chapter B2. 1976. 172 pages.

3-B3. Type curves for selected problems of flow to wells in confined aquifers, by J.E. Reed: USGS--TWRI Book 3, Chapter B3. 1980. 106 pages.

3-B4. Regression modeling of ground-water flow, by Richard L. Cooley and Richard L. Naff: USGS--TWRI Book 3, Chapter B4. 1990. 232 pages.

3-B5. Definition of boundary and initial conditions in the analysis of saturated ground-water flow systems--An introduction, by O.L. Franke, T.E. Reilly, and G.D. Bennett: USGS--TWRI Book 3, Chapter B5. 1987. 15 pages.

3-B6. The principle of superposition and its application in ground-water hydraulics, by T.E. Reilly, O.L. Franke, and G.D. Bennett: USGS--TWRI Book 3, Chapter B6. 1987. 28 pages.

3-B7. Analytical solutions for one-, two-, and three-dimensional solute transport in ground-water systems with uniform flow, by Eliezer J. Wexler: USGS--TWRI Book 3, Chapter B7. 1992. 90 pages.

3-C1. Fluvial sediment concepts, by H.P. Guy: USGS--TWRI Book 3, Chapter C1. 1970. 55 pages.

3-C2. Field methods for measurement of fluvial sediment, by H.P. Guy and V.W. Norman: USGS--TWRI Book 3, Chapter C2. 1970. 59 pages.

3-C3. Computation of fluvial-sediment discharge, by George Porterfield: USGS--TWRI Book 3, Chapter C3. 1972. 66 pages.

4-A1. Some statistical tools in hydrology, by H.C. Riggs: USGS--TWRI Book 4, Chapter A1. 1968. 39 pages.

4-A2. Frequency curves, by H.C. Riggs: USGS--TWRI Book 4, Chapter A2. 1968. 15 pages.

4-B1. Low-flow investigations, by H.C. Riggs: USGS--TWRI Book 4, Chapter B1. 1972. 18 pages.

4-B2. Storage analyses for water supply, by H.C. Riggs and C.H. Hardison: USGS--TWRI Book 4, Chapter B2. 1973. 20 pages.

4-B3. Regional analyses of streamflow characteristics, by H.C. Riggs: USGS--TWRI Book 4, Chapter B3. 1973. 15 pages.

4-D1. Computation of rate and volume of stream depletion by wells, by C.T. Jenkins: USGS--TWRI Book 4, Chapter D1. 1970. 17 pages.

5-A1. Methods for determination of inorganic substances in water and fluvial sediments, by M.J. Fishman and L.C. Friedman: USGS--TWRI Book 5, Chapter A1. 1989. 545 pages.

5-A2. Determination of minor elements in water by emission spectroscopy, by P.R. Barnett and E.C. Mallory, Jr.,: USGS--TWRI Book 5, Chapter A2. 1971. 31 pages.

5-A3. Methods for the determination of organic substances in water and fluvial sediments, edited by R.L. Wershaw, M.J. Fishman, R.R. Grabbe, and L.E. Lowe: USGS--TWRI Book 5, Chapter A3. 1987. 80 pages.

5-A4. Methods for collection and analysis of aquatic biological and microbiological samples, by L.J. Britton and P.E. Greeson, editors: USGS--TWRI Book 5, Chapter A4. 1989. 363 pages.

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS

5-A5. Methods for determination of radioactive substances in water and fluvial sediments, by L.L. Thatcher, V.J. Janzer, and K.W. Edwards: USGS--TWRI Book 5, Chapter A5. 1977. 95 pages.

5-A6. Quality assurance practices for the chemical and biological analyses of water and fluvial sediments, by L.C. Friedman and D.E. Erdmann: USGS--TWRI Book 5, Chapter A6. 1982. 181 pages.

5-C1. Laboratory theory and methods for sediment analysis, by H.P. Guy: USGS--TWRI Book 5, Chapter C1. 1969. 58 pages.

6-A1. A modular three-dimensional finite-difference ground-water flow model, by M.G. McDonald and A.W. Harbaugh: USGS--TWRI Book 6, Chapter A1. 1988. 586 pages.

6-A2. Documentation of a computer program to simulate aquifer-system compaction using the modular finite-difference ground-water flow model, by S.A. Leake and D.E. Prudic: USGS--TWRI Book 6, Chapter A2. 1991. 68 pages.

7-C1. Finite difference model for aquifer simulation in two dimensions with results of numerical experiments, by P.C. Trescott, G.F. Pinder, and S.P. Larson: USGS--TWRI Book 7, Chapter C1. 1976. 116 pages.

7-C2. Computer model of two-dimensional solute transport and dispersion in ground water, by L.F. Konikow and J.D. Bredehoeft: USGS--TWRI Book 7, Chapter C2. 1978. 90 pages.

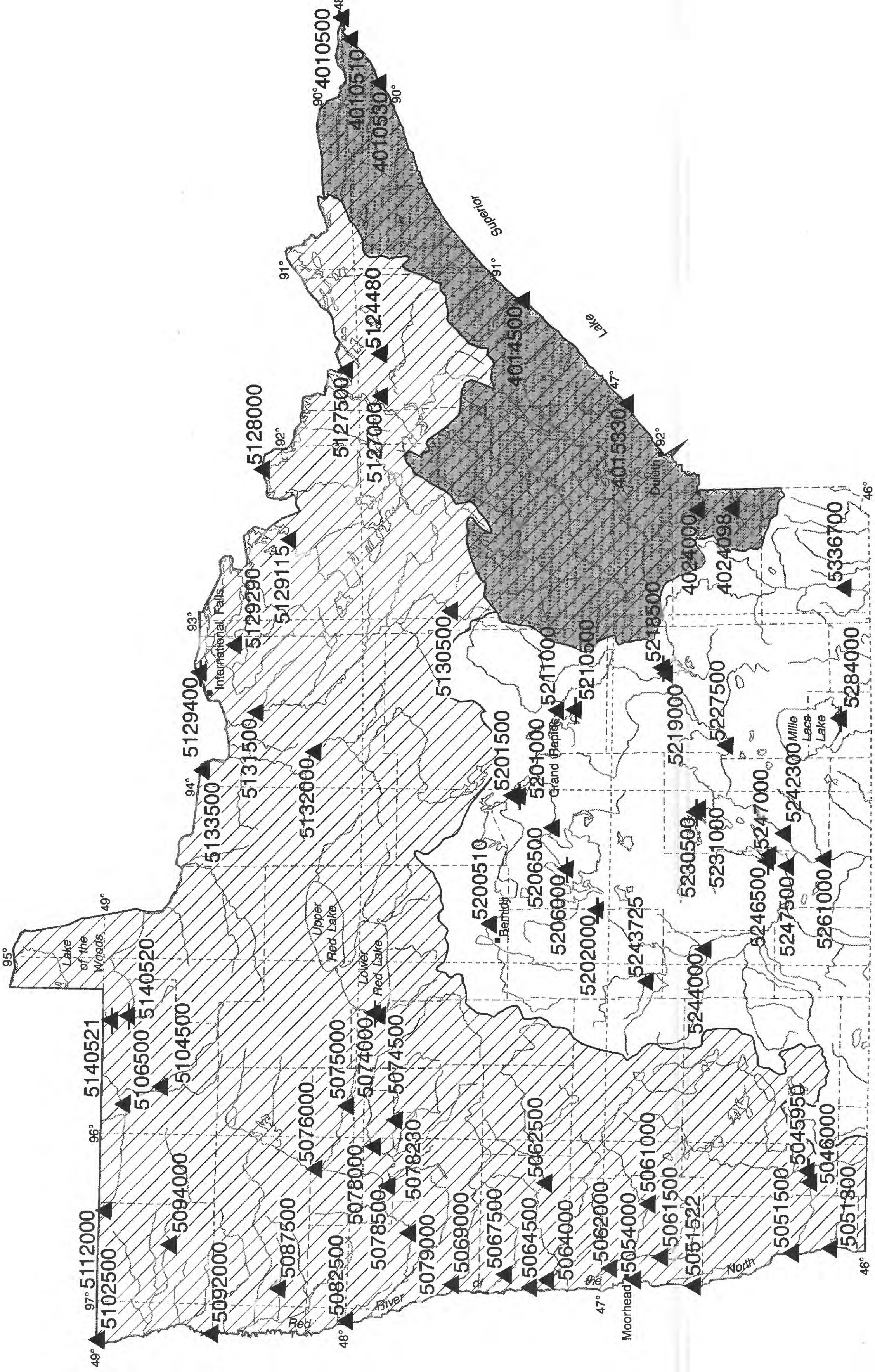
7-C3. A model for simulation of flow in singular and interconnected channels, by R.W. Schaffrannek, R.A. Baltzer, and D.E. Goldberg: USGS--TWRI Book 7, Chapter C3. 1981. 110 pages.

8-A1. Methods of measuring water levels in deep wells, by M.S. Garber and F.C. Koopman: USGS--TWRI Book 8, Chapter A1. 1968. 23 pages.

8-A2. Installation and service manual for U.S. Geological Survey manometers, by J.D. Craig: USGS--TWRI Book 8, Chapter A2. 1983. 57 pages.

8-B2. Calibration and maintenance of vertical-axis type current meters, by G.F. Smoot and C.E. Novak: USGS--TWRI Book 8, Chapter B2. 1968. 15 pages.

Surface-Water Station Records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5336700
4015330
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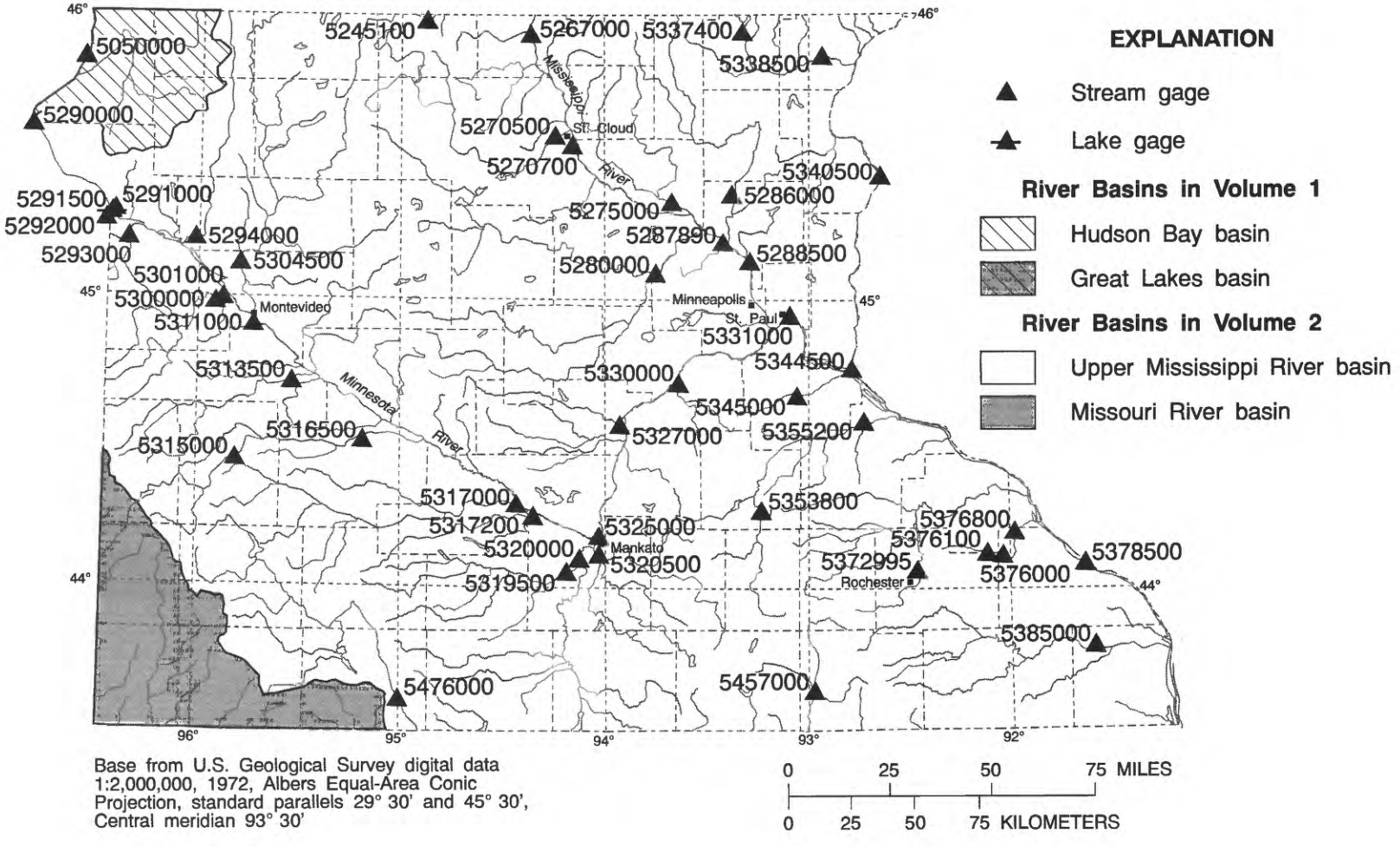
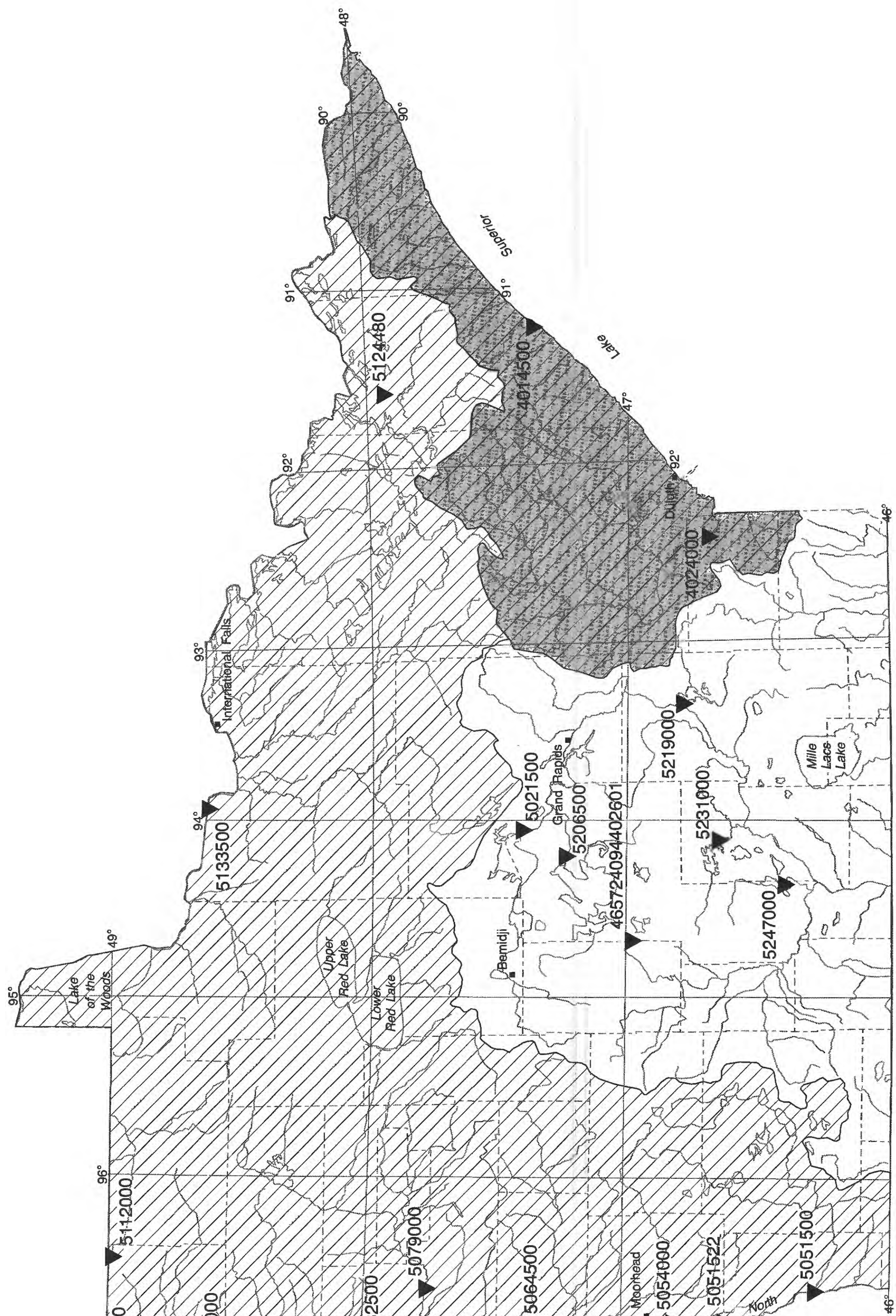
4010510
4010500
Lake of the Woods
Upper Red Lake
Lower Red Lake
Red River of the North
Moorhead
Bemidji
Grand Rapids
International Falls
Duluth
Mille Lacs Lake
Lake Superior
49°
48°
47°
46°
97°
96°
95°
94°
93°
92°
91°
90°



Base from U.S. Geological Survey digital data
1:2,000,000, 1972, Albers Equal-Area Conic
Projection, standard parallels 29° 30' and 45° 30',
Central meridian 93° 30'

Figure 9.--Location of lake and stream-gaging stations.



Lake of the Woods
Upper Red Lake
Lower Red Lake
International Falls
Bemidji
Grand Rapids
Duluth
Moorhead
Mille Lacs Lake
Lake Superior
Red River of the North
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5021500
5206500
465724094402601
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94°
95°
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97°

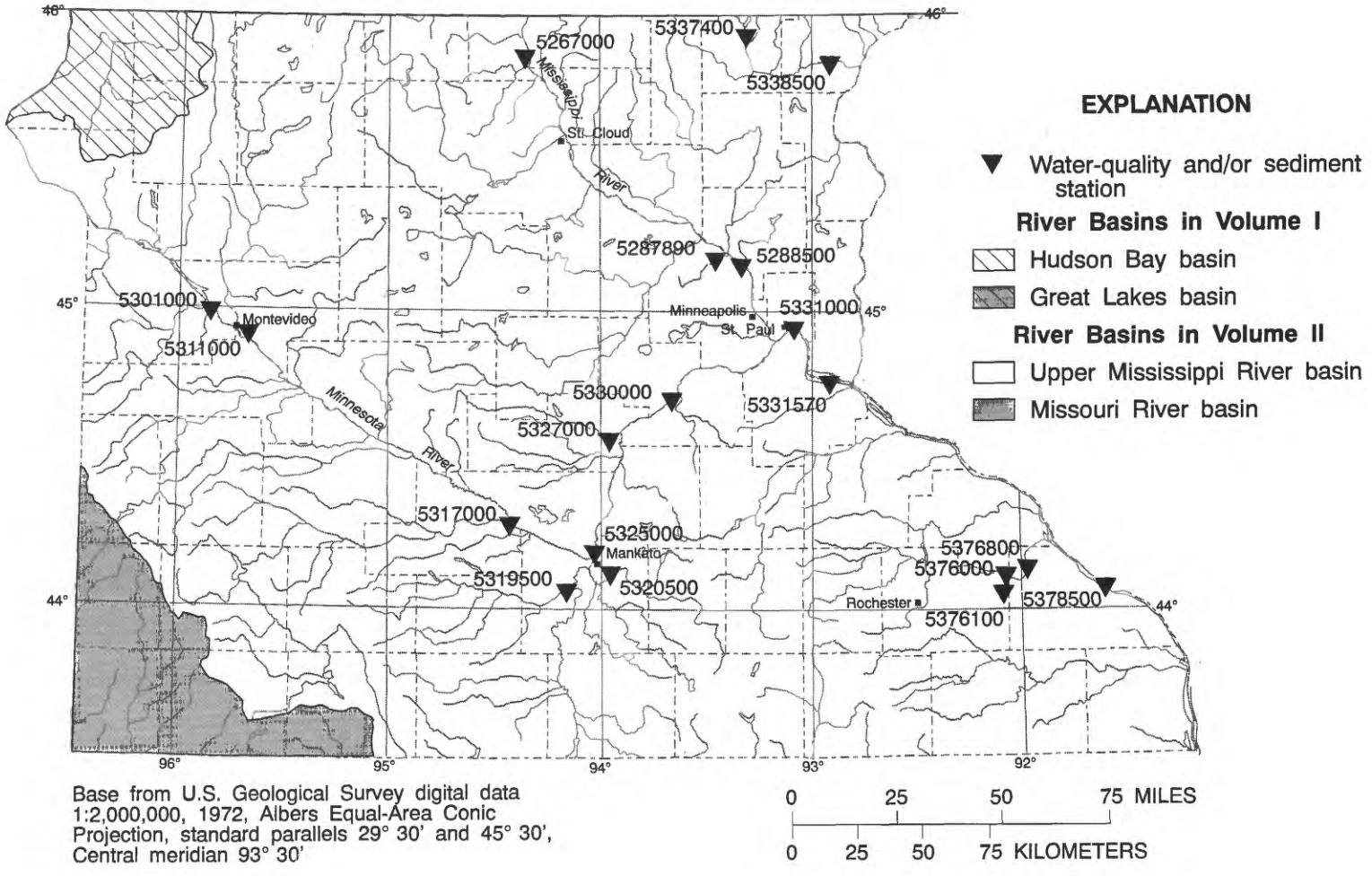


Figure 10.--Location of surface-water quality stations.

MISSISSIPPI RIVER MAIN STEM

05200510 MISSISSIPPI RIVER NEAR BEMIDJI, MN

LOCATION.--Lat 47°29'00", long 94°43'40", in SE¼SW¼ sec.3, T.146 N., R.32 W., Beltrami County, Hydrologic Unit 07010101, 3.5 mi east of Bemidji on right bank 100 ft upstream of County Highway 12 and 400 ft downstream from Stump Lake dam.

DRAINAGE AREA.--610 mi², approximately.

PERIOD OF RECORD.--September 1987 to current year (no winter records).

GAGE.--Water-stage recorder. Elevation of gage is 1,315 ft above sea level from topographic map.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Some regulation by Stump Lake dam upstream from station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	146	---	---	---	---	---	326	182	182	87	183	175
2	141	---	---	---	---	---	326	182	182	91	182	168
3	136	---	---	---	---	---	326	180	154	103	182	172
4	136	---	---	---	---	---	326	178	98	108	182	165
5	140	---	---	---	---	---	326	176	98	106	182	140
6	142	---	---	---	---	---	260	175	97	146	154	142
7	140	---	---	---	---	---	184	176	98	195	99	145
8	136	---	---	---	---	---	185	176	98	194	98	216
9	134	---	---	---	---	---	143	175	96	196	98	288
10	134	---	---	---	---	---	100	172	95	257	135	296
11	135	---	---	---	---	---	100	178	93	334	169	303
12	132	---	---	---	---	---	102	182	92	332	165	303
13	133	---	---	---	---	---	101	180	93	331	165	303
14	137	---	---	---	---	---	88	180	95	385	165	303
15	135	---	---	---	---	---	82	180	90	463	167	303
16	131	---	---	---	---	---	83	182	79	461	166	304
17	134	---	---	---	---	---	83	185	110	424	166	305
18	134	---	---	---	---	---	81	185	121	424	168	333
19	132	---	---	---	---	---	80	184	185	424	171	356
20	130	---	---	---	---	---	80	183	189	422	171	356
21	128	---	---	---	---	---	80	182	187	424	169	354
22	126	---	---	---	---	---	80	184	128	424	169	353
23	127	---	---	---	---	---	82	186	86	421	169	353
24	126	---	---	---	---	---	80	182	85	421	173	353
25	123	---	---	---	---	---	80	182	85	408	175	354
26	124	---	---	---	---	---	80	183	85	420	175	353
27	123	---	---	---	---	329	103	182	85	417	175	352
28	123	---	---	---	---	332	132	182	85	395	175	326
29	127	---	---	---	---	331	158	182	85	349	175	298
30	130	---	---	---	---	329	180	182	85	349	174	300
31	e130	---	---	---	---	329	---	182	---	249	174	---
TOTAL	4105	---	---	---	---	---	4437	5600	3341	9760	5071	8472
MEAN	132	---	---	---	---	---	148	181	111	315	164	282
MAX	146	---	---	---	---	---	326	186	189	463	183	356
MIN	123	---	---	---	---	---	80	172	79	87	98	140
AC-FT	8140	---	---	---	---	---	8800	11110	6630	19360	10060	16800
CFSM	.22	---	---	---	---	---	.24	.30	.18	.52	.27	.46
IN.	.25	---	---	---	---	---	.27	.34	.20	.60	.31	.52

e Estimated.

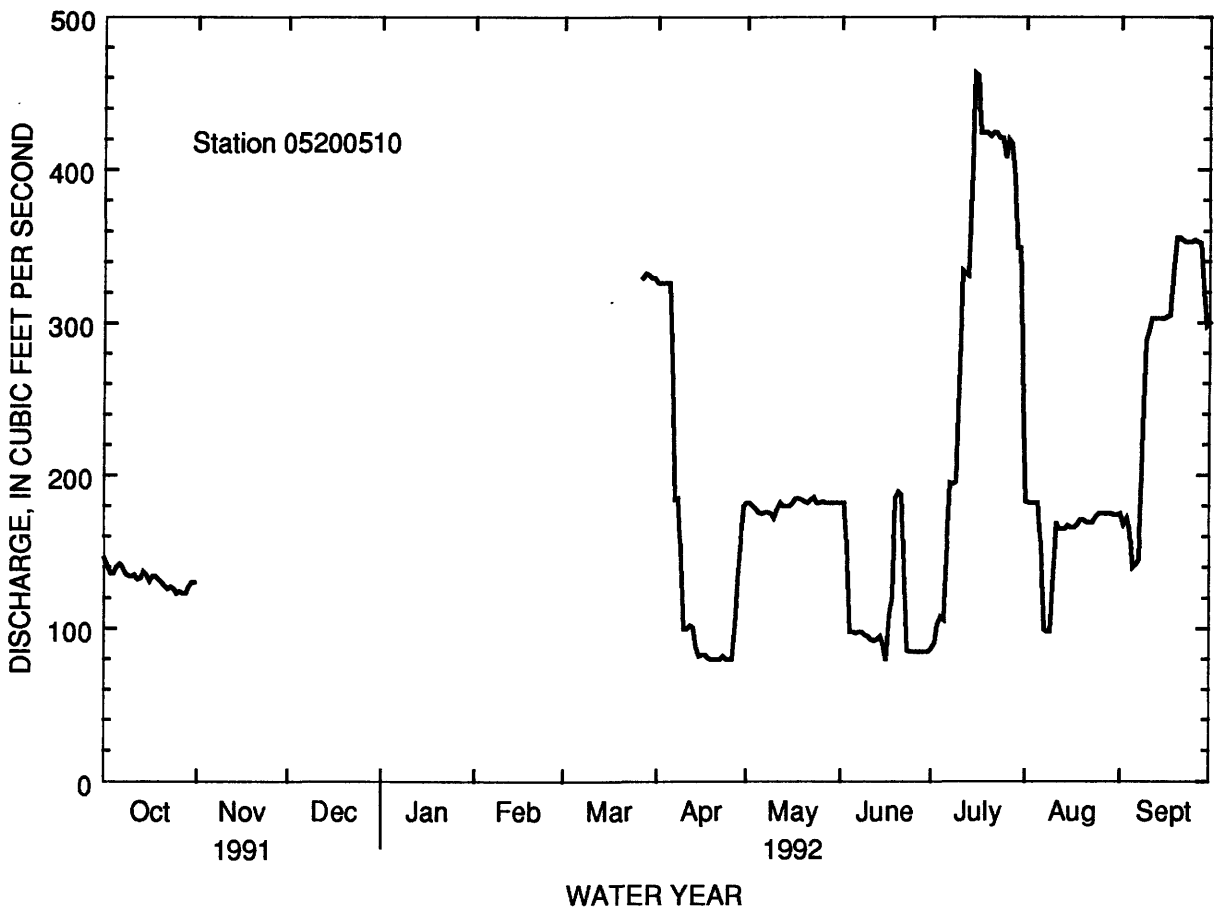
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	152	---	---	---	---	---	251	324	202	163	105	152
MAX	263	---	---	---	---	---	399	479	300	315	164	282
(WY)	1989	---	---	---	---	---	1989	1989	1989	1992	1992	1992
MIN	75.5	---	---	---	---	---	148	181	104	62.2	61.9	62.3
(WY)	1991	---	---	---	---	--	- 1992	1992	1988	1988	1989	1990

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR	FOR 1992 WATER YEAR		WATER YEARS 1987 - 1992	
HIGHEST DAILY MEAN		356	Sep 19, 20	771	Apr 28 1989
LOWEST DAILY MEAN		80a		22	Jul 12 1988
ANNUAL SEVEN-DAY MINIMUM				24	Jul 7 1988
INSTANTANEOUS PEAK FLOW		523b	Jul 15	887	Apr 27 1989
INSTANTANEOUS PEAK STAGE		4.11	Jul 1	4.87	Apr 27 1989
INSTANTANEOUS LOW FLOW		46b	Jul 31	16	Sep 26 1988
10 PERCENT EXCEEDS				366	
50 PERCENT EXCEEDS				168	
90 PERCENT EXCEEDS				72	

a Apr 19-22, 24-26.

b Result of regulation.



UPPER MISSISSIPPI RIVER BASIN

MISSISSIPPI RIVER MAIN STEM

05201000 WINNIBIGOSHISH LAKE NEAR DEER RIVER, MN

LOCATION.--Lat 47°25'42", long 94°03'00", in sec.25, T.146 N., R.27 W., Itasca County, Hydrologic Unit 07010101, on Leech Lake Indian Reservation, at dam on Mississippi River, 1 mi northwest of Little Winnibigoshish Lake, 14 mi northwest of city of Deer River, and at mile 1,248 upstream from Ohio River.

DRAINAGE AREA.--1,442 mi².

PERIOD OF RECORD.--April 1884 to current year. Prior to October 1941 monthend contents only, published in WSP 1308. Published as Winnibigoshish Reservoir near Deer River October 1941 to September 1956.

REVISED RECORDS.--WSP 1308: 1905(M).

GAGE.--Water-stage recorder. Datum of gage is in mean sea level (levels by U.S. Army Corps of Engineers). Prior to July 8, 1949, nonrecording gage at same site, and July 9, 1949, to July 10, 1973, water-stage recorder at same site and at datum of 1,288.94 ft above mean sea level.

REMARKS.--Reservoir is formed by Winnibigoshish Lake and several other natural lakes controlled by a concrete and timber dam, completed in 1884; storage began in 1884. Capacity between elevations 1,294.94 ft and 1,303.14 ft (maximum allowable range) is 668,737 acre-ft of which 439,636 acre-ft is controlled storage between elevations 1,294.94 ft and 1,300.94 ft (normal operating range). Contents shown herein are contents above elevation 1,286.00 ft. Prior to September 1978, published contents as contents above elevation 1,288.94 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

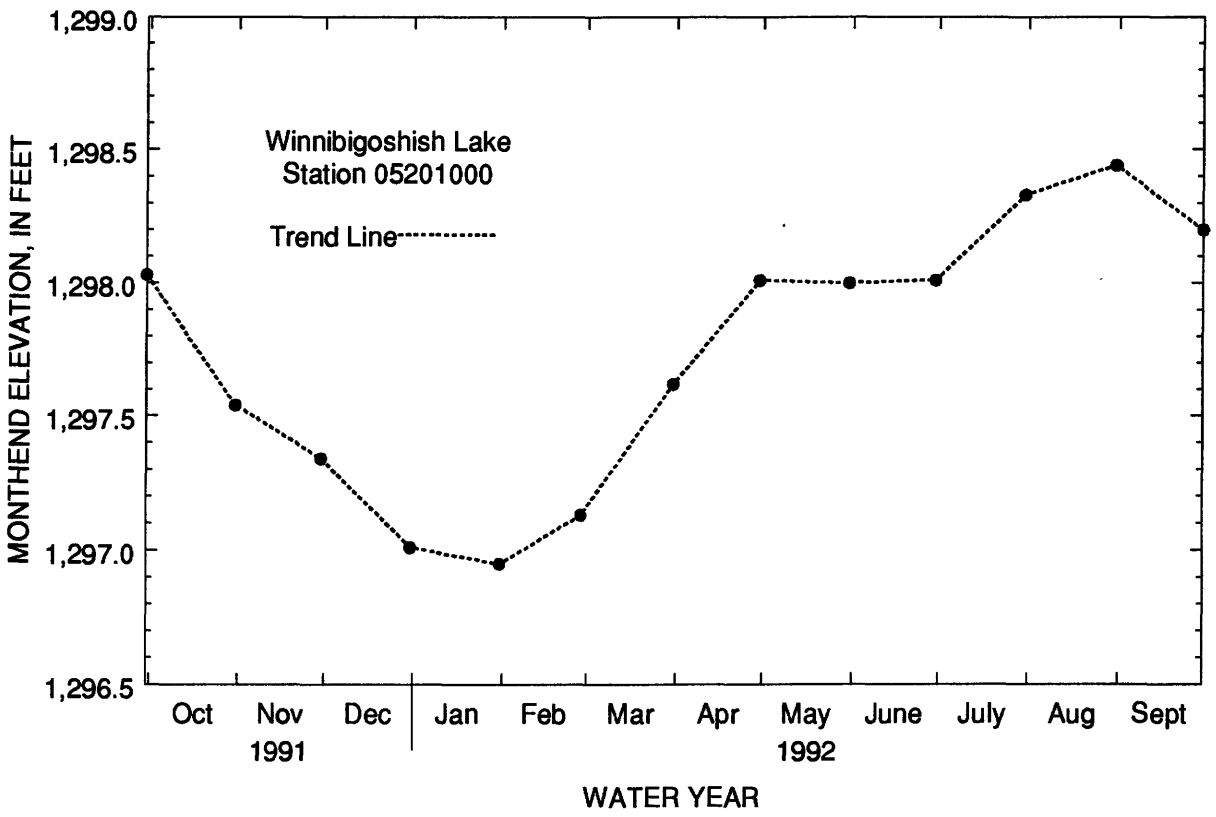
COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents observed, 996,500 acre-ft, capacity table then in use, July 30, 1905, elevation, 1,303.39 ft; minimum observed, 33,680 acre-ft, below zero of capacity table then in use, Oct. 20, 1931, elevation, 1,288.25 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 732,020 acre-ft, Sept. 18, elevation, 1,298.68 ft; minimum, 614,570 acre-ft, Jan. 13, elevation, 1,296.89 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1,298.03	689,360	
Oct. 31	1,297.54	657,180	-32,180
Nov. 30	1,297.34		644,050
Dec. 31	1,297.01	622,400	-21,650
CAL YR 1991			-13,120
Jan. 31	1,296.95	618,470	- 3,930
Feb. 28	1,297.13	630,280	+11,810
Mar. 31	1,297.62	662,430	+32,150
Apr. 30	1,298.01	688,040	+25,610
May 31	1,298.00	687,380	-660
June 30	1,298.01	688,040	+660
July 31	1,298.33	709,050	+21,010
Aug. 31	1,298.44	716,270	+7,220
Sept. 30	1,298.20	700,510	-15,760
WTR YR 1992			+11,150


1,299.0
1,298.5
1,298.0
1,297.5
1,297.0
1,296.5
MONTHEND ELEVATION, IN FEET
Winnibigoshish Lake
Station 05201000
Trend Line
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
1991
1992
WATER YEAR

MISSISSIPPI RIVER MAIN STEM

05201500 MISSISSIPPI RIVER AT WINNIBIGOSHISH DAM NEAR DEER RIVER, MN

LOCATION.--Lat 47°25'42", long 94°03'00", in SW¼ sec.25, T.146 N., R.27 W., Itasca County, Hydrologic Unit 07010101, on Leech Lake Indian Reservation, at dam 1 mi northwest of Little Winnibigoshish Lake, 14 mi northwest of city of Deer River, and at mile 1,248 upstream from Ohio River.

DRAINAGE AREA.--1,442 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1884 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder on headwater and nonrecording gage on tailwater. Datum of gage is above mean sea level (levels by U. S. Army Corps of Engineers). Prior to June 30, 1973, gages at same sites with datum at 1,289.47 ft, adjustment of 1912. Prior to July 8, 1949, nonrecording headwater gage at same site and datum in use.

REMARKS.--Daily discharge is computed on the basis of modified weir formula and corrected to conform with discharge measurements, the head being determined from readings of headwater and tailwater gages. Flow completely regulated by Winnibigoshish Lake (station 05201000).

COOPERATION.--Daily discharge computed by U. S. Army Corps of Engineers.

AVERAGE DISCHARGE (unadjusted).--108 years, 517 ft³/s, 4.87 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 4,370 ft³/s, Aug. 6, 1905; no flow at times in several years.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 847 ft³/s, Nov. 22-27; minimum daily, 100 ft³/s, June 9 to July 2.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

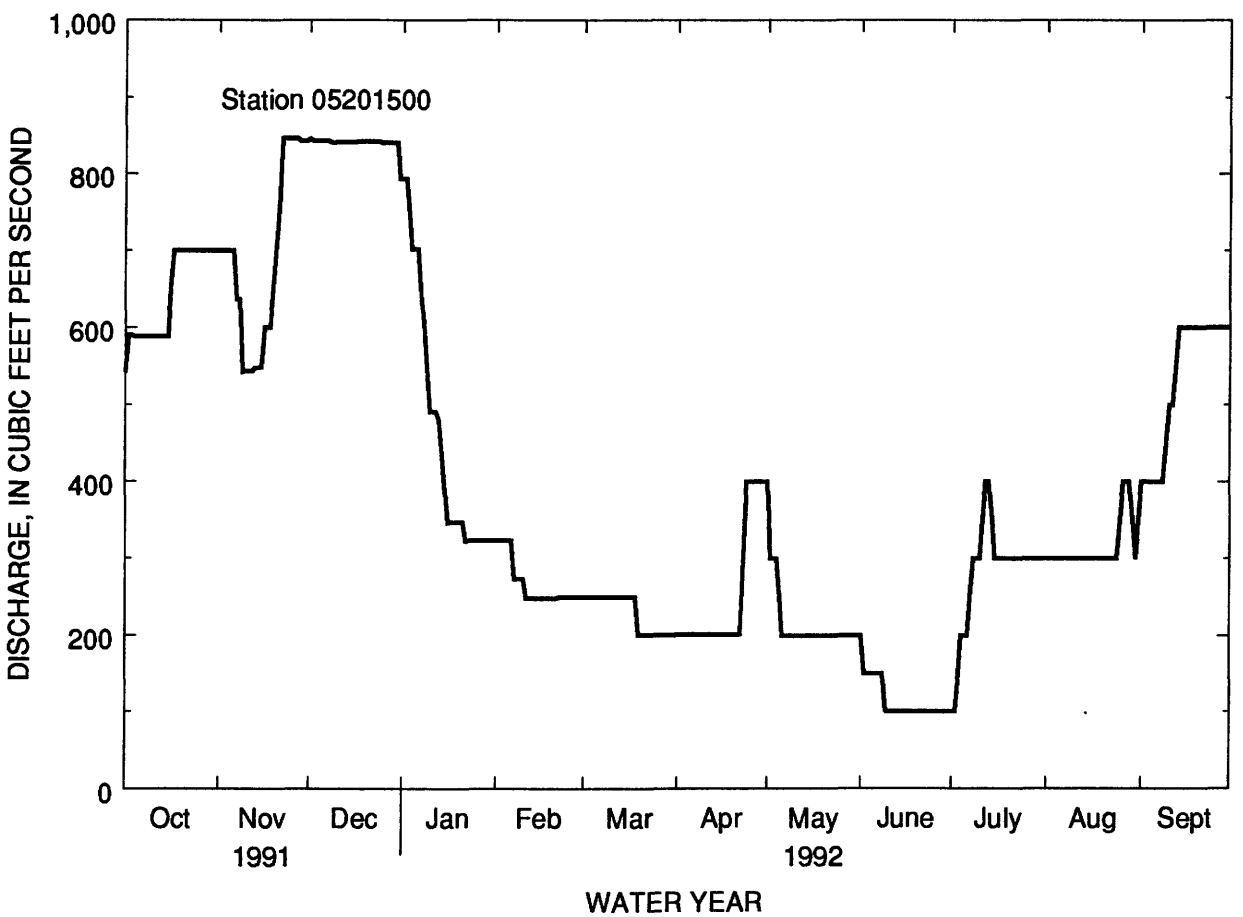
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	542	700	846	794	324	250	202	400	200	100	300	400
2	590	700	844	794	324	250	202	300	150	100	300	400
3	590	700	844	747	324	250	202	300	150	150	300	400
4	589	700	844	702	324	250	202	300	150	200	300	400
5	589	700	844	702	324	250	202	250	150	200	300	400
6	589	700	844	702	324	250	202	200	150	200	300	400
7	589	637	844	653	274	250	202	200	150	250	300	400
8	589	637	842	606	274	250	202	200	150	300	300	400
9	589	543	841	548	274	250	202	200	100	300	300	450
10	589	544	842	491	274	250	202	200	100	300	300	500
11	589	544	842	491	249	250	202	200	100	350	300	500
12	589	544	842	491	249	250	202	200	100	400	300	545
13	589	548	842	480	249	250	202	200	100	400	300	600
14	589	548	842	444	249	250	202	200	100	350	300	600
15	589	549	842	395	249	250	202	200	100	300	300	600
16	651	600	842	346	249	250	202	200	100	300	300	600
17	700	600	843	347	249	250	202	200	100	300	300	600
18	700	600	843	347	249	250	202	200	100	300	300	600
19	700	652	843	347	249	201	202	200	100	300	300	600
20	700	708	843	347	249	201	202	200	100	300	300	600
21	700	755	843	347	249	201	202	200	100	300	300	600
22	700	847	843	323	250	201	203	200	100	300	300	600
23	700	847	843	324	250	201	300	200	100	300	300	600
24	700	847	843	324	250	201	400	200	100	300	300	600
25	700	847	841	324	250	201	400	200	100	300	350	600
26	700	847	841	324	250	201	400	200	100	300	400	600
27	700	847	841	324	250	201	400	200	100	300	400	600
28	700	844	841	324	250	201	400	200	100	300	400	600
29	700	844	841	324	250	201	400	200	100	300	350	600
30	700	844	841	324	---	201	400	200	100	300	300	600
31	700	---	794	324	---	201	---	200	---	300	350	---
TOTAL	19941	20823	26071	14360	7779	7113	7545	6750	3450	8700	9750	15995
MEAN	643	694	841	463	268	229	251	218	115	281	315	533
MAX	700	847	846	794	324	250	400	400	200	400	400	600
MIN	542	543	794	323	249	201	202	200	100	100	300	400
AC-FT	39550	41300	51710	28480	15430	14110	14970	13390	6840	17260	19340	31730
CFSM	.45	.48	.58	.32	.19	.16	.17	.15	.08	.19	.22	.37
IN.	.51	.54	.67	.37	.20	.18	.19	.17	.09	.22	.25	.41

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	602	711	727	733	710	455	155	252	546	644	618	550
MAX	1231	1436	1237	1269	1586	1172	513	1180	1982	2492	2437	1494
(WY)	1986	1954	1951	1945	1945	1971	1945	1945	1962	1950	1950	1950
MIN	53.5	105	105	105	100	13.8	22.3	19.5	22.0	27.5	50.9	56.3
(WY)	1962	1977	1977	1977	1981	1957	1942	1949	1942	1944	1961	1961

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR	
ANNUAL TOTAL	134684		148277	
ANNUAL MEAN	369		405	
HIGHEST ANNUAL MEAN				
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	847	Nov 22	847	Nov 22
LOWEST DAILY MEAN	101	Apr 4	100	Jun 9
ANNUAL SEVEN-DAY MINIMUM	101	Apr 4	100	Jun 9
ANNUAL RUNOFF (AC-FT)	267100		294100	
ANNUAL RUNOFF (CFSM)	.26		.28	
ANNUAL RUNOFF (INCHES)	3.47		3.83	
10 PERCENT EXCEEDS	841		841	
50 PERCENT EXCEEDS	250		300	
90 PERCENT EXCEEDS	101		200	



MISSISSIPPI RIVER MAIN STEM

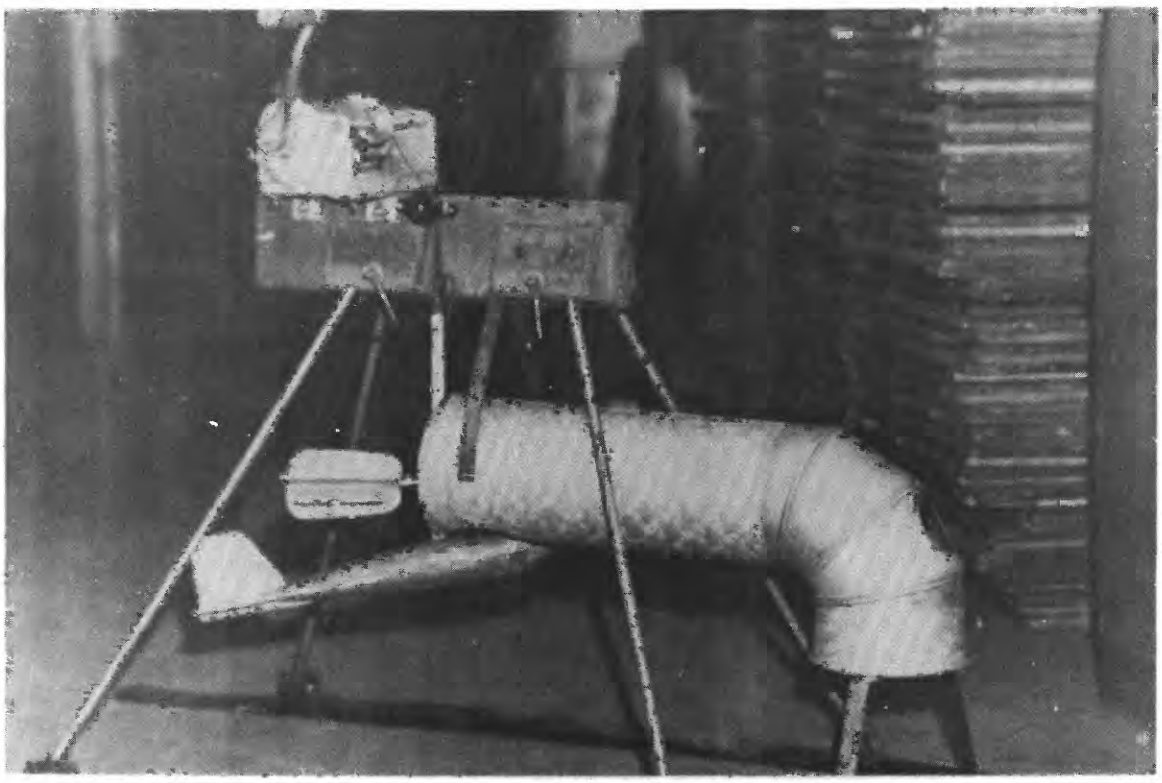
5201500 MISSISSIPPI RIVER AT WINNIBIGOSHISH DAM NEAR DEER RIVER, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1992.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
MAY											
14...	1200	179	310	8.4	15.0	751	1.9	<0.010	<0.050	0.030	<0.010
JUL											
01...	1000	101	280	8.5	17.5	--	2.1	<0.010	<0.050	0.030	<0.010
AUG											
19...	1115	301	273	8.5	20.5	--	5.6	<0.010	<0.050	<0.010	<0.010



Ice rig and heater for keeping meter ice-free during winter discharge measurements

LEECH LAKE RIVER BASIN

05202000 WILLIAMS LAKE NEAR AKELEY, MN

LOCATION.--Lat 46°57'24", long 94°40'26", in SE¼NW¼ sec.12, T.140 N., R.32 W., Hubbard County, Hydrologic Unit 07010102, on northwest shore of Williams lake, 4 mi southeast of Akeley.

DRAINAGE AREA--0.88 mi².

GAGE-HEIGHT RECORDS

PERIOD OF RECORD--October 1988 to current year. August 1977 to September 1988, in files of the U.S. Geological Survey's Hydrology of Lakes Section in Denver, Colorado.

GAGE--Water-stage recorder. Datum of gage is 1,379.09 ft above sea level. Prior to Oct. 1, 1990, at datum 2.00 ft higher.

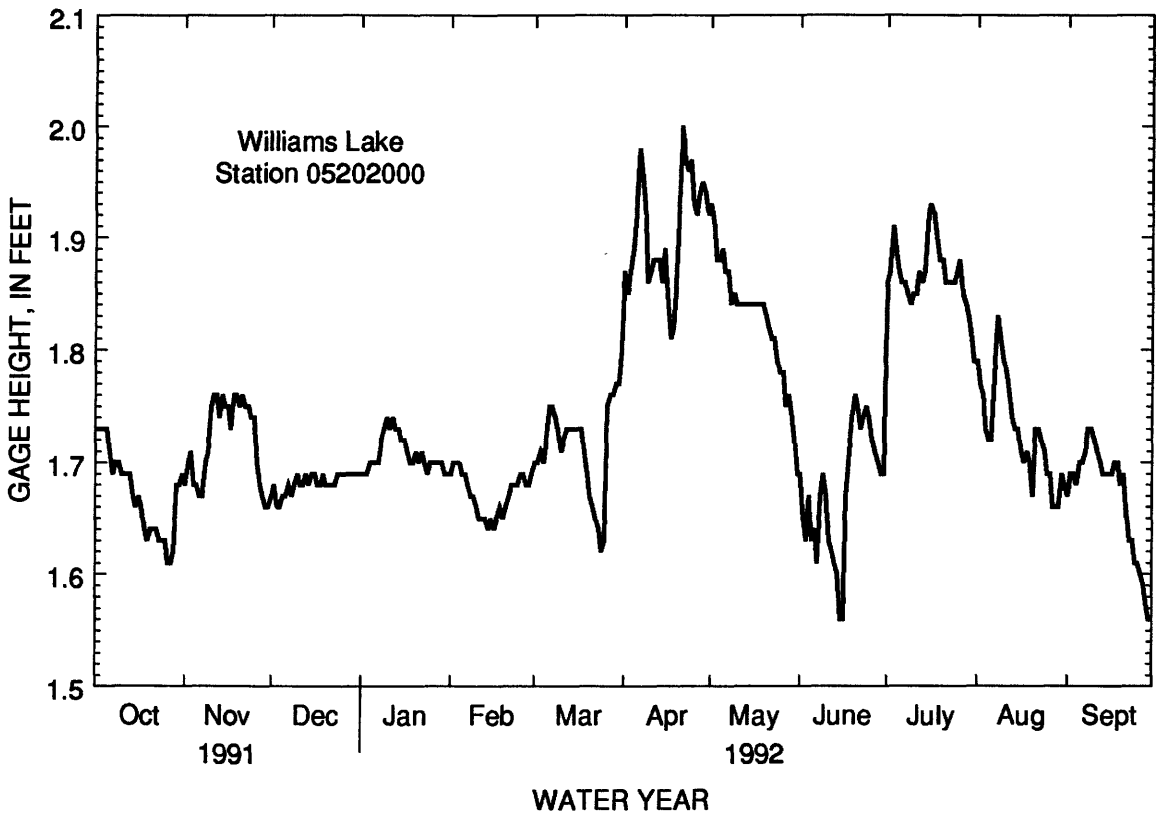
EXTREMES FOR PERIOD OF RECORD--Maximum gage height, 3.33 ft, present datum, June 25, 1989; minimum, 1.54 ft, Sept. 29,1992.

EXTREMES FOR CURRENT YEAR--Maximum gage height, 2.04 ft, Apr. 21; minimum, 1.54 ft, Sept. 29.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.73	1.68	1.67	1.69	1.69	1.70	1.87	1.93	1.69	1.86	1.79	1.67
2	1.73	1.70	1.68	1.69	1.70	1.70	1.85	1.91	1.65	1.87	1.77	1.69
3	1.73	1.71	1.66	1.69	1.70	1.71	1.87	1.88	1.63	1.91	1.76	1.69
4	1.73	1.68	1.66	1.70	1.70	1.70	1.89	1.88	1.67	1.89	1.73	1.68
5	1.73	1.68	1.67	1.70	1.69	1.72	1.92	1.89	1.63	1.87	1.72	1.70
6	1.71	1.67	1.67	1.70	1.69	1.75	1.98	1.87	1.64	1.86	1.72	1.70
7	1.69	1.67	1.68	1.70	1.68	1.75	1.96	1.87	1.61	1.86	1.79	1.71
8	1.70	1.70	1.67	1.72	1.67	1.74	1.93	1.84	1.67	1.85	1.83	1.73
9	1.70	1.71	1.68	1.73	1.67	1.73	1.86	1.85	1.69	1.84	1.81	1.73
10	1.69	1.75	1.69	1.74	1.66	1.71	1.87	1.84	1.67	1.85	1.79	1.72
11	1.69	1.76	1.68	1.73	1.65	1.72	1.88	1.84	1.63	1.85	1.78	1.71
12	1.69	1.76	1.68	1.74	1.65	1.73	1.88	1.84	1.62	1.87	1.76	1.70
13	1.69	1.74	1.69	1.73	1.65	1.73	1.88	1.84	1.61	1.86	1.74	1.69
14	1.67	1.76	1.68	1.73	1.64	1.73	1.86	1.84	1.60	1.87	1.73	1.69
15	1.66	1.75	1.69	1.72	1.65	1.73	1.89	1.84	1.56	1.92	1.73	1.69
16	1.67	1.75	1.69	1.72	1.64	1.73	1.84	1.84	1.56	1.93	1.71	1.69
17	1.66	1.73	1.68	1.71	1.65	1.73	1.81	1.84	1.67	1.92	1.70	1.70
18	1.64	1.76	1.68	1.70	1.66	1.71	1.82	1.84	1.71	1.90	1.71	1.70
19	1.63	1.76	1.69	1.70	1.65	1.69	1.87	1.84	1.74	1.88	1.70	1.68
20	1.64	1.75	1.68	1.71	1.66	1.67	1.93	1.83	1.76	1.88	1.67	1.66
21	1.64	1.76	1.68	1.70	1.67	1.66	2.00	1.82	1.75	1.86	1.73	1.66
22	1.64	1.75	1.68	1.71	1.68	1.65	1.97	1.81	1.73	1.86	1.73	1.63
23	1.63	1.75	1.68	1.70	1.68	1.64	1.96	1.81	1.74	1.86	1.72	1.63
24	1.63	1.74	1.69	1.69	1.68	1.62	1.97	1.79	1.75	1.86	1.71	1.61
25	1.62	1.74	1.69	1.70	1.69	1.63	1.93	1.78	1.74	1.87	1.69	1.61
26	1.61	1.70	1.69	1.70	1.69	1.75	1.92	1.78	1.72	1.88	1.69	1.60
27	1.61	1.68	1.69	1.70	1.68	1.76	1.94	1.75	1.71	1.85	1.66	1.59
28	1.62	1.67	1.69	1.70	1.68	1.76	1.95	1.76	1.70	1.84	1.66	1.57
29	1.68	1.66	1.69	1.70	1.69	1.77	1.94	1.74	1.69	1.83	1.66	1.56
30	1.68	1.66	1.69	1.69	---	1.77	1.92	1.72	1.69	1.81	1.69	1.56
31	1.69	---	1.69	1.69	---	1.80	---	1.69	---	1.79	1.68	---
MEAN	1.67	1.72	1.68	1.71	1.67	1.72	1.91	1.83	1.67	1.87	1.73	1.66
MAX	1.73	1.76	1.69	1.74	1.70	1.80	2.00	1.93	1.76	1.93	1.83	1.73
MIN	1.61	1.66	1.66	1.69	1.64	1.62	1.81	1.69	1.56	1.79	1.66	1.56


Williams Lake
Station 05202000
GAGE HEIGHT, IN FEET
2.1
2.0
1.9
1.8
1.7
1.6
1.5
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
1991
1992
WATER YEAR

LEECH LAKE RIVER BASIN

465724094402601 WILLIAMS LAKE NEAR AKELEY, MN

WATER-QUALITY RECORDS

LOCATION.--Lat46°57'24", long 94°40'26", in SE¼NW¼ sec.12, T.140 N., R.32 W., Hubbard County, Hydrologic Unit 07010102. Samples are collected near the center of the lake at the deepest point.

DRAINAGE AREA.--0.875 mi².

PERIOD OF RECORD.--Water years 1977 to current year.

REMARKS.--Additional data are available by contacting the district office.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
OCT												
10...	8.0	177	24	7.8	1.6	0.80	<0.10	0.40	95	1.4	6	3
10...	7.9	177	24	7.6	1.6	0.80	<0.10	0.50	95	0.60	8	5
24...	7.9	181	24	7.7	1.4	0.80	1.3	0.30	95	0.20	4	2
24...	8.1	181	25	7.9	1.5	0.90	1.1	0.30	98	0.40	9	3
DEC												
12...	8.0	192	25	7.8	1.5	1.0	1.7	0.30	104	0.20	5	3
12...	7.7	203	27	8.0	1.5	1.0	1.8	0.30	109	0.50	34	26
JAN												
08...	7.9	198	28	8.2	1.8	1.0	0.70	0.80	105	0.70	12	37
08...	7.6	207	29	8.1	1.5	1.0	0.70	0.50	109	0.80	33	80
FEB												
20...	7.7	209	29	8.3	1.5	1.0	0.50	0.60	110	0.50	3	11
20...	7.9	212	30	8.3	1.5	1.1	0.50	0.50	111	0.80	80	75
MAR												
19...	7.7	208	29	7.9	1.4	0.90	2.2	0.60	106	0.60	5	7
19...	7.6	214	29	8.1	1.4	1.0	2.4	0.60	109	0.60	12	17
APR												
16...	8.0	196	27	7.8	1.3	1.0	1.7	0.50	98	0.60	5	6
16...	8.0	195	28	8.0	1.3	1.0	1.6	0.70	98	0.50	12	5
29...	8.0	193	28	7.5	1.4	0.80	1.6	0.80	100	0.40	5	2
29...	8.0	193	28	7.7	1.5	0.80	1.8	1.1	100	1.5	<3	2
MAY												
14...	8.5	195	27	7.5	1.4	1.1	<0.10	0.80	100	0.48	9	4
28...	8.1	191	27	7.5	1.3	0.80	<0.10	0.50	101	0.31	10	6
JUN												
10...	8.5	187	27	7.8	1.4	0.80	0.20	0.70	99	0.62	5	21
25...	8.6	181	26	7.6	1.5	0.80	<0.10	0.80	98	0.58	8	2
JUL												
09...	8.3	178	25	7.8	1.4	0.90	1.1	0.80	96	0.78	3	7
23...	8.6	173	24	8.1	1.3	0.80	0.80	0.70	92	0.92	8	32
AUG												
06...	8.4	172	22	7.3	1.3	0.80	1.8	0.60	92	0.88	<3	2
20...	8.7	168	22	7.6	1.4	0.80	--	--	94	0.96	<3	4
SEP												
10...	8.3	177	21	7.0	1.5	0.90	2.0	0.50	94	1.3	16	55
24...	7.9	185	23	7.4	1.4	1.0	0.50	0.60	97	1.1	7	5

LEECH LAKE RIVER BASIN

465724094402601 WILLIAMS LAKE NEAR AKELEY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
OCT								
10...	0.018	--	--	--	--	--	--	--
10...	0.013	--	--	--	--	--	--	--
10...	0.016	--	--	--	--	--	--	--
10...	0.013	--	--	--	--	--	--	--
10...	0.019	<0.001	0.70	0.028	0.050	0.008	3.80	<0.100
24...	0.012	--	--	--	--	--	--	--
24...	0.013	--	--	--	--	--	--	--
24...	0.010	--	--	--	--	--	--	--
24...	0.011	--	--	--	--	--	--	--
24...	0.012	0.018	0.50	0.035	0.038	0.004	4.30	<0.100
DEC								
12...	0.030	--	--	--	--	--	--	--
12...	0.007	--	--	--	--	--	--	--
12...	0.008	--	--	--	--	--	--	--
12...	0.014	0.002	0.60	0.037	0.085	0.009	5.30	<0.400
JAN								
08...	0.008	0.002	0.70	0.295	0.134	0.007	0.300	<0.200
FEB								
20...	0.007	0.001	0.70	0.037	0.207	0.018	1.00	<0.200
MAR								
19...	0.006	0.001	0.60	0.116	0.134	0.010	1.80	<0.100
APR								
16...	0.008	0.003	0.60	0.088	0.151	0.006	3.60	<0.100
29...	0.011	<0.001	0.40	0.043	<0.002	0.004	--	--
MAY								
14...	0.011	<0.001	0.30	0.010	0.014	0.002	3.00	<0.100
28...	0.015	<0.001	0.50	<0.005	0.021	0.002	1.90	0.200
JUN								
10...	0.005	<0.001	0.40	0.056	<0.002	0.035	2.20	<0.100
25...	0.008	<0.001	0.60	0.012	<0.002	0.008	3.20	0.100
JUL								
09...	0.008	0.001	0.40	0.018	0.009	0.006	2.90	<0.100
23...	0.006	<0.001	0.60	0.008	0.012	0.003	2.70	<0.100
AUG								
06...	0.014	0.006	0.70	0.016	0.021	0.006	2.80	<0.100
20...	0.003	<0.001	0.70	<0.005	0.002	<0.001	3.20	<0.100
SEP								
10...	0.005	0.001	0.60	0.011	0.037	0.001	3.00	<0.100
24...	0.005	<0.001	0.50	<0.005	0.020	0.003	6.00	0.100

LEECH LAKE RIVER BASIN

05206000 LEECH LAKE AT FEDERAL DAM, MN

LOCATION (REVISED).--Lat 47°10'14", long 94°17'12", in SE¼SE¼ sec.25, T.143 N., R.28 W., Cass County, Hydrologic Unit 07010102, on Leech Lake Indian Reservation, at head of Leech Lake River on Boy Bay, 6 mi southwest of town of Federal Dam.

DRAINAGE AREA.--1,163 mi².

PERIOD OF RECORD.--April 1884 to current year. Monthend contents only for some periods, published in WSP 1308. Prior to October 1956, published as "Leech Lake Reservoir."

GAGE.--Water-stage recorder. Datum of gage is in mean sea level (levels by U.S. Army Corps of Engineers). Prior to Dec. 31, 1884, nonrecording gage 0.5 mi north of outlet to Leech Lake River at datum 98.47 ft higher. Dec. 31, 1884, to May 24, 1931, nonrecording gage 0.5 mi north of outlet to Leech Lake River and May 25, 1931, to July 10, 1973, water-stage recorder at same site and at datum 92.70 ft higher.

REMARKS.--Reservoir is formed by Leech Lake and several other natural lakes controlled by concrete and timber dam; storage began in 1884; original timber structure completed in 1884, replaced by present dam in 1902. Capacity between elevation 1,292.70 ft and 1,297.94 ft (maximum allowable range) is 688,985 acre-ft of which 352,637 acre-ft is controlled storage between elevations 1,292.70 ft and 1,295.70 ft (normal operating range). Contents shown herein are contents above elevation 1,290.00 ft. Prior to September 1978, published contents as contents above elevation 1,292.20 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

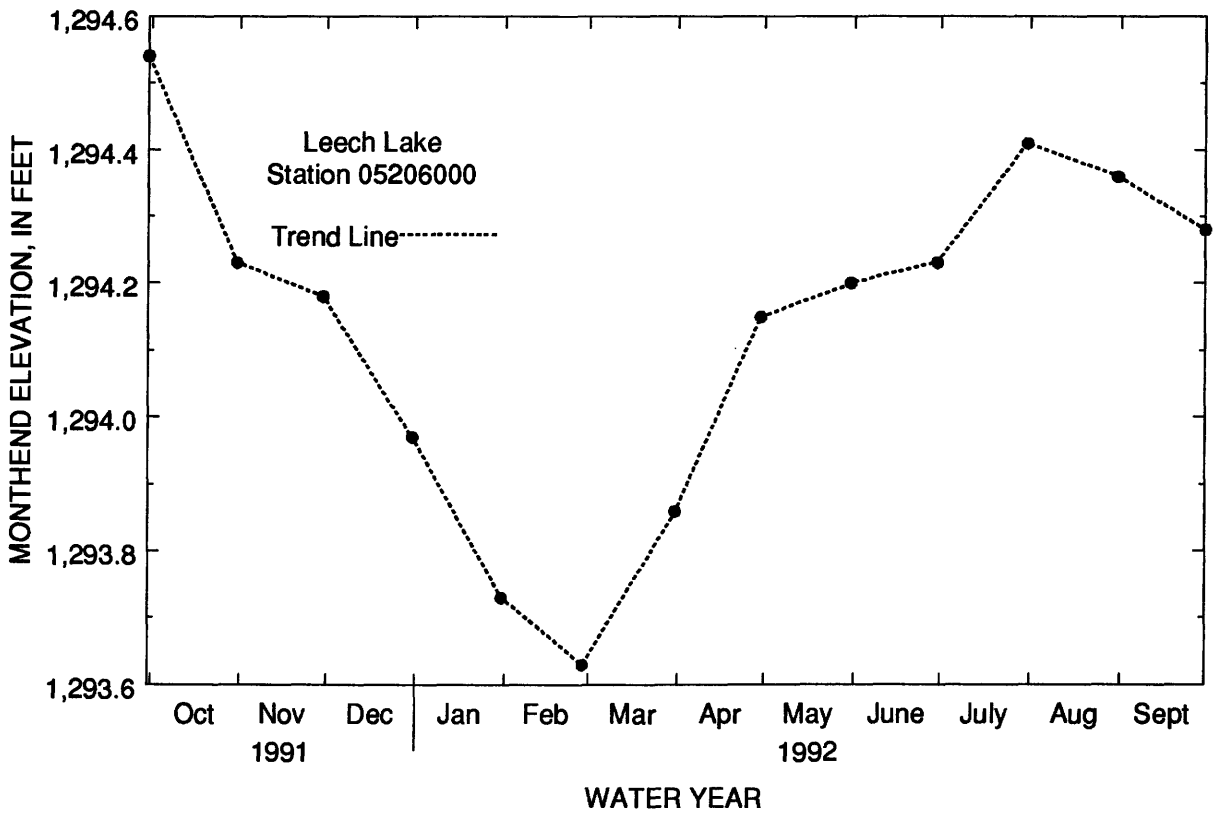
COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents observed, 734,300 acre-ft, capacity table then in use, June 30, 1916, elevation, 1,297.88 ft; minimum, 51,380 acre-ft, capacity table then in use, Dec. 8, 24, 1976, elevation, 1,292.69 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 568,610 acre-ft, July 15, elevation, 1,294.58 ft; minimum, 453,940 acre-ft, Feb. 12, elevation, 1,293.63 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1,294.54	563,560	
Oct. 31	1,294.23	524,360	-39,200
Nov. 30	1,294.18	518,040	-6,320
Dec. 31	1,293.97	491,680	-26,360
CAL YR 1991			+18,160
Jan. 31	1,293.73	464,810	-26,870
Feb. 28	1,293.63	453,940	-10,870
Mar. 31	1,293.86	478,960	+25,020
Apr. 30	1,294.15	514,240	+35,280
May 31	1,294.20	520,560	+6,320
June 30	1,294.23	524,360	+3,800
July 31	1,294.41	547,110	+22,750
Aug. 31	1,294.36	540,790	-6,320
Sept. 30	1,294.28	530,680	-10,110
WTR YR 1992			-32,880


1,294.6
1,294.4
1,294.2
1,294.0
1,293.8
1,293.6
MONTHEND ELEVATION, IN FEET
Leech Lake
Station 05206000
Trend Line----------
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
1991
1992
WATER YEAR

LEECH LAKE RIVER BASIN

05206500 LEECH LAKE RIVER AT FEDERAL DAM, MN

LOCATION.--Lat 47°14'45", long 94°13'12", in sec.34, T.144 N., R.28 W., Cass County, Hydrologic Unit 07010102, on Leech Lake Indian Reservation, on right bank at dam on Leech Lake River at city of Federal Dam, 2 mi downstream from natural outlet of Leech Lake.

DRAINAGE AREA.--1,163 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1884 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder, headwater gage, and nonrecording tailwater gage. Datum of gage is in mean sea level (levels by U. S. Army Corps of Engineers). Prior to June 30, 1973, gages (nonrecording headwater gage prior to July 3, 1948) at same sites with datum at 1,293.23 ft, adjustment of 1912. May 27 to Nov. 30, 1929, nonrecording gage at site 600 ft downstream at different datum.

REMARKS.--Discharge computed on basis of modified weir formula, the head being obtained from readings on tailwater gage and mean gage height from recording headwater gage. Flow completely regulated by Leech Lake (station 05206000).

COOPERATION.--Computations of daily discharge were provided by U.S. Army Corps of Engineers.

AVERAGE DISCHARGE (unadjusted).--108 years, 369 ft³/s, 4.31 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 2,520 ft³/s, June 7, 1957 (result of dam failure); no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 800 ft³/s, Nov. 27-30, Dec. 1, 11-14, 21-31, Jan. 1-14; minimum daily, 100 ft³/s, Mar. 28-31, Apr. 1-14, June 15, 16.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

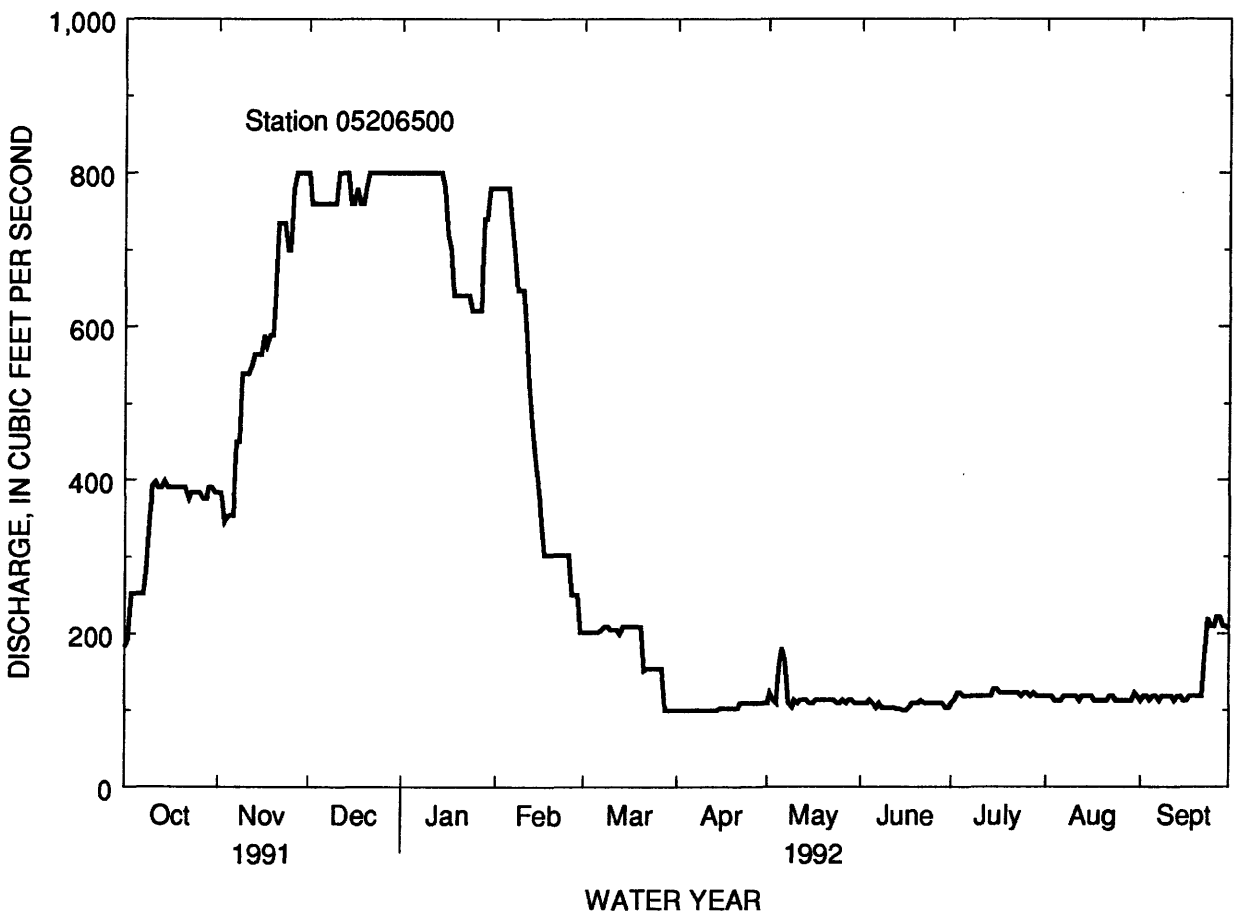
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	183	383	800	800	780	201	100	109	109	109	118	112
2	192	383	760	800	780	201	100	122	109	113	118	118
3	251	345	760	800	780	201	100	113	109	122	118	118
4	251	352	760	800	780	201	100	109	113	122	112	113
5	251	353	760	800	780	201	100	162	109	118	112	118
6	251	353	760	800	740	201	100	181	103	118	112	118
7	251	450	760	800	700	205	100	162	109	118	118	112
8	280	450	760	800	646	209	100	109	103	118	118	118
9	344	538	760	800	646	209	100	104	103	118	118	118
10	392	538	760	800	646	205	100	113	103	118	118	118
11	397	538	800	800	588	205	100	109	103	118	118	118
12	390	550	800	800	525	205	100	113	103	118	112	112
13	390	563	800	800	473	200	100	113	101	118	118	118
14	398	563	800	800	429	209	100	113	101	118	118	118
15	390	563	760	780	394	209	102	109	100	127	118	112
16	390	588	760	720	345	209	102	109	100	127	118	112
17	390	575	780	700	301	209	102	113	104	122	112	118
18	390	588	760	640	301	209	102	113	109	122	112	118
19	390	588	760	640	301	209	102	113	109	122	112	118
20	390	660	780	640	301	209	102	113	109	122	112	118
21	390	735	800	640	301	151	102	113	112	122	112	118
22	375	735	800	640	301	154	109	113	109	122	118	170
23	383	735	800	640	301	154	109	113	109	122	118	220
24	383	700	800	620	301	154	109	109	109	118	112	210
25	383	700	800	620	301	154	109	109	109	122	112	210
26	383	780	800	620	250	154	109	113	109	122	112	221
27	375	800	800	620	250	154	109	109	109	118	112	221
28	375	800	800	740	250	100	109	113	109	122	112	210
29	390	800	800	740	201	100	109	113	103	118	112	210
30	390	800	800	780	---	100	109	109	103	118	122	206
31	383	---	800	780	---	100	---	109	---	118	118	---
TOTAL	10771	17506	24240	22760	13692	5582	3095	3625	3190	3710	3572	4321
MEAN	347	584	782	734	472	180	103	117	106	120	115	144
MAX	398	800	800	800	780	209	109	181	113	127	122	221
MIN	183	345	760	620	201	100	100	104	100	109	112	112
AC-FT	21360	34720	48080	45140	27160	11070	6140	7190	6330	7360	7090	8570
CFSM	.30	.50	.67	.63	.41	.15	.09	.10	.09	.10	.10	.12
IN.	.34	.56	.78	.73	.44	.18	.10	.12	.10	.12	.11	.14

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1951 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	485	654	669	650	627	453	176	297	422	385	299	323
MAX	1190	1100	1042	986	1001	859	674	935	1000	920	954	885
(WY)	1979	1983	1983	1983	1980	1969	1974	1974	1985	1985	1975	1975
MIN	50.8	88.9	88.1	89.9	90.3	93.4	41.7	77.1	99.2	62.7	48.5	52.3
(WY)	1962	1977	1977	1977	1977	1977	1951	1965	1963	1961	1961	1961

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR	
ANNUAL TOTAL	102742		116064	
ANNUAL MEAN	281		317	
HIGHEST ANNUAL MEAN				
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	800	Nov 27	800	Nov 27
LOWEST DAILY MEAN	96	Apr 27	100	Mar 28
ANNUAL SEVEN-DAY MINIMUM	100	Jan 12	100	Mar 28
ANNUAL RUNOFF (AC-FT)	203800		230200	
ANNUAL RUNOFF (CFSM)	.24		.27	
ANNUAL RUNOFF (INCHES)	3.29		3.71	
10 PERCENT EXCEEDS	745		780	
50 PERCENT EXCEEDS	207		162	
90 PERCENT EXCEEDS	104		103	



LEECH LAKE RIVER BASIN

05206500 LEECH LAKE RIVER AT FEDERAL DAM, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1992.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
MAY										
14...	0930	98	168	8.1	15.0	5.7	<0.010	<0.050	0.030	<0.010
JUL										
01...	0900	109	260	8.1	16.5	7.4	<0.010	<0.050	0.050	<0.010
AUG										
19...	1000	112	260	7.9	20.5	8.4	<0.010	<0.050	<0.010	<0.010

Camp on the Vermilion River
1911

MISSISSIPPI RIVER MAIN STEM

05210500 POKEGAMA LAKE NEAR GRAND RAPIDS, MN

LOCATION.--Lat 47°10'00", long 93°33'20", in NW¼ sec.17, T.54 N., R.25 W., Itasca County, Hydrologic Unit 07010101, at narrows on U.S. Highway 169, 4 mi south of Grand Rapids and at mile 1,184 upstream from Ohio River.

DRAINAGE AREA.--3,265 mi².

PERIOD OF RECORD.--April 1884 to current year. Prior to October 1941 monthend contents only, published in WSP 1308. Published as Pokegama Reservoir near Grand Rapids, October 1941 to September 1956.

REVISED RECORDS.--WSP 1914: 1897(M).

GAGE.--Water-stage recorder. Datum of gage is in mean sea level (levels by U.S. Army Corps of Engineers). Prior to May 30, 1949, nonrecording gage at Pooles Arm of Pokegama Lake 5 mi northwest, and May 31, 1949, to July 12, 1973, water-stage recorder at same site and at datum 64.42 ft higher.

REMARKS.--Reservoir is formed by Pokegama Lake and several other natural lakes controlled by concrete dam; storage began in 1884; original timber dam completed in 1884, replaced by present structure in 1888-89. Capacity between elevation 1,270.42 ft and 1,276.42 ft (maximum allowable range) is 80,126 acre-ft of which 52,483 acre-ft is controlled storage between elevations 1,270.42 ft and 1,274.42 ft (normal operating range). Contents shown herein are contents above elevation 1,267.00 ft. Prior to September 1978, published contents as contents above elevation 1,268.92 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

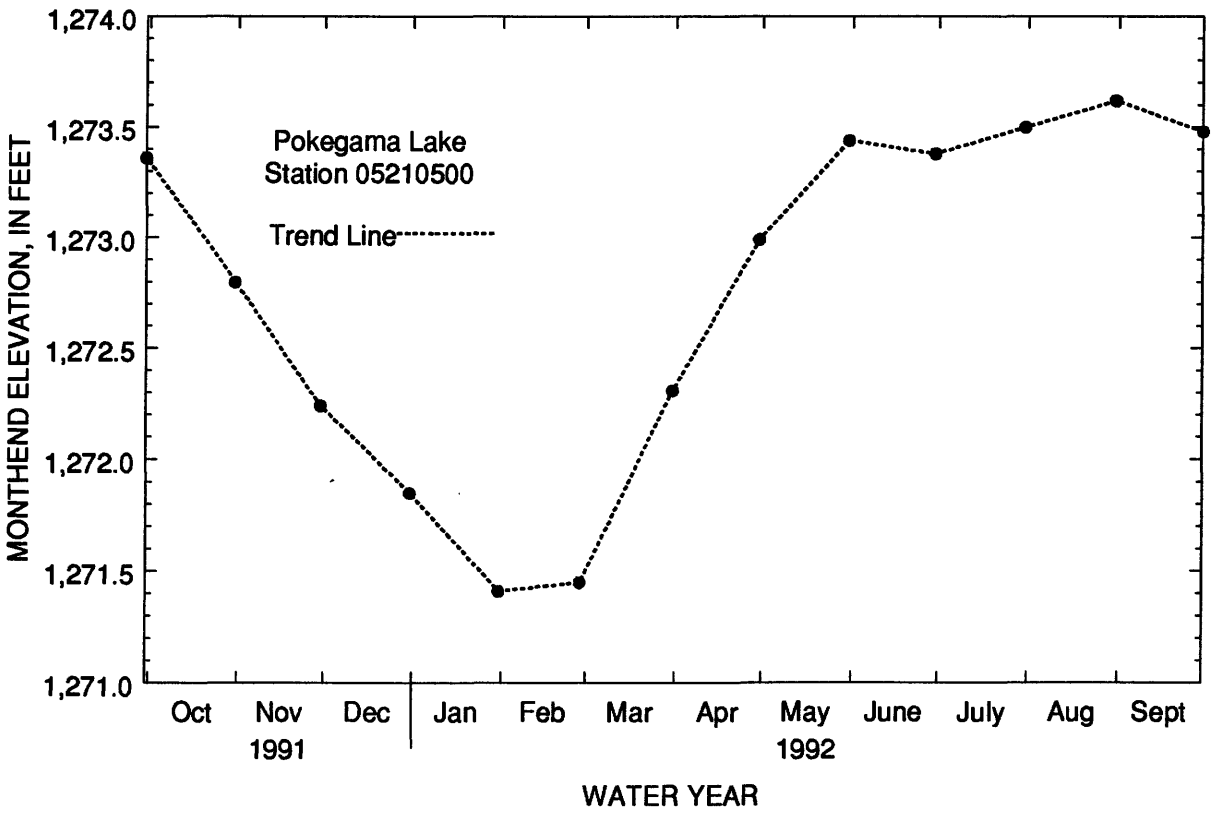
COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 132,160 acre-ft, May 23, 1986, elevation, 1,275.28 ft; maximum elevation, 1,277.92 ft, May 8, 1897; minimum contents observed, 4,520 acre-ft, below zero of capacity table then in use, Sept. 30, 1934, elevation, 1,268.54 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 103,050 acre-ft, Sept. 8, elevation, 1,273.73 ft; minimum, 66,830 acre-ft, Feb. 6, elevation, 1,271.28 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1,273.36	96,960	
Oct. 31	1,272.80	88,610	-8,350
Nov. 30	1,272.24	80,360	-8,250
Dec. 31	1,271.85	74,810	-5,550
CAL YR 1991			+2,000
Jan. 31	1,271.41	68,560	-6,250
Feb. 28	1,271.45	69,120	+560
Mar. 31	1,272.31	81,360	+12,240
Apr. 30	1,272.99	91,440	+10,080
May 31	1,273.44	98,210	+6,770
June 30	1,273.38	97,250	-960
July 31	1,273.50	99,200	+1,950
Aug. 31	1,273.62	101,210	+2,010
Sept. 30	1,273.48	98,870	-2,340
WTR YR 1992			+1,910


1,274.0
1,273.5
1,273.0
1,272.5
1,272.0
1,271.5
1,271.0
MONTHEND ELEVATION, IN FEET
Pokegama Lake
Station 05210500
Trend Line
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
1991
1992
WATER YEAR

MISSISSIPPI RIVER MAIN STEM

05211000 MISSISSIPPI RIVER AT GRAND RAPIDS, MN

LOCATION.--Lat 47°13'56", long 93°31'48", in SW¼NW¼ sec.21, T.55 N., R.25 W., Itasca County, Hydrologic Unit 07010103, on left bank, in super-calendar room of Blandin Paper Mill in Grand Rapids, 400 ft downstream from Blandin Dam, 400 ft upstream from bridge on U.S. Highway 169, 2.5 mi upstream from Prairie River, and at mile 1,182 upstream from Ohio River.

DRAINAGE AREA.--3,370 mi², approximately.

PERIOD OF RECORD.--October 1883 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as "at Pokegama Dam near Grand Rapids" 1942-44.

GAGE.--Water-stage recorder. Datum of gage is 1,242.03 ft above mean sea level. See WSP 1914 for history of changes prior to Jan. 17, 1951.

REMARKS.--Records fair. Flow regulated by Winnibigoshish Lake (station 05201000), Leech Lake (station 05206000), Pokegama Lake (station 05210500) and occasionally at low flow by powerplant at Blandin Dam. Backwater from Prairie River occurs at times in most years.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	568	1490	e950	e1750	e1300	763	353	565	398	e200	483	720
2	576	1510	e950	e1750	e1300	741	339	526	282	e600	461	759
3	723	1420	e2000	e1750	e1300	775	327	475	315	e750	463	837
4	838	1460	e1700	e1750	e1300	745	314	617	284	e750	457	830
5	826	1410	e1550	e1750	e1300	764	294	717	281	e750	470	843
6	795	e1400	e1550	e1800	e1150	773	304	679	257	e750	462	830
7	873	e1400	e1550	e1900	e1100	810	318	574	228	772	479	843
8	909	e1400	e1550	e2000	e1100	804	291	488	241	997	599	920
9	913	e1400	e1550	e2100	e1100	793	332	427	251	1260	687	1040
10	911	1410	e1550	e1950	e1100	835	489	432	228	1060	585	1030
11	945	1410	e1550	e1900	e1100	770	752	465	184	837	429	1120
12	883	1310	e1550	e1900	e1100	838	681	445	217	864	416	1180
13	944	1190	e1550	e1900	e1100	798	599	430	190	791	430	1170
14	935	1220	e1550	e1700	e1000	802	612	441	211	652	404	1030
15	1010	1180	e1500	e1500	e1000	815	575	439	212	695	428	913
16	1050	1190	e1500	e1450	e1000	789	575	437	223	698	427	965
17	1090	1240	e1500	e1400	1040	826	577	442	276	691	506	1090
18	1020	1260	e1500	e1400	862	676	584	422	239	687	517	1210
19	1110	1390	e1500	e1400	770	636	584	450	334	721	536	1160
20	1060	1340	e1600	e1400	789	543	712	429	442	666	507	1210
21	1180	1600	e1600	e1300	736	489	887	431	e450	681	550	1160
22	1200	1890	e1600	e1200	776	487	1120	425	e450	696	516	1180
23	1220	1850	e1600	e1200	752	457	1120	426	e500	700	536	1150
24	1320	1900	e1600	e1200	778	412	1010	432	e500	519	612	1080
25	1460	1340	e1600	e1200	765	464	912	448	e600	481	775	1020
26	1410	e950	e1700	e1200	762	446	907	413	e600	443	650	1080
27	1450	e950	e1700	e1200	784	429	745	438	e600	458	743	1120
28	1390	e950	e1700	e1300	749	454	637	424	e600	510	683	1160
29	1510	e950	e1700	e1300	757	459	624	430	e600	507	696	1240
30	1500	e950	e1700	e1300	---	398	647	424	e200	501	755	1220
31	1500	---	e1700	e1300	---	328	---	431	---	475	669	---
TOTAL	33119	40360	48400	48150	28670	20119	18221	14622	10393	21162	16931	31110
MEAN	1068	1345	1561	1553	989	649	607	472	346	683	546	1037
MAX	1510	1900	2000	2100	1300	838	1120	717	600	1260	775	1240
MIN	568	950	950	1200	736	328	291	413	184	200	404	720
AC-FT	65690	80050	96000	95510	56870	39910	36140	29000	20610	41970	33580	61710
CFSM	.32	.40	.46	.46	.29	.19	.18	.14	.10	.20	.16	.31
IN.	.37	.45	.53	.53	.32	.22	.20	.16	.11	.23	.19	.34

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1992, BY WATER YEAR (WY)

MEAN	1399	1546	1447	1464	1472	1379	1193	1273	1308	1346	1223	1224
MAX	2865	2496	2375	2410	2729	2762	3442	3026	3271	3363	3711	3542
(WY)	1986	1954	1954	1952	1945	1945	1945	1979	1962	1962	1950	1950
MIN	187	174	186	168	177	198	247	32.5	206	125	98.3	195
(WY)	1977	1977	1977	1977	1977	1977	1959	1949	1988	1961	1961	1976

e Estimated.

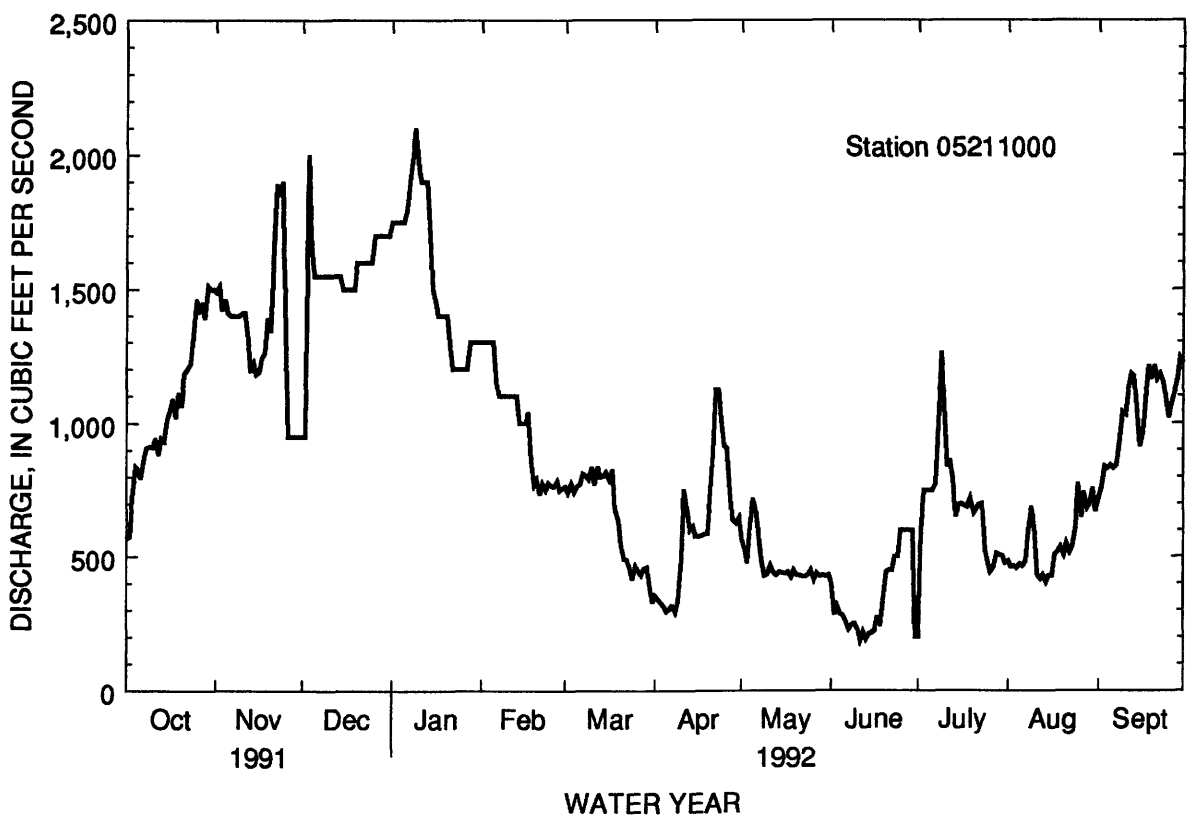
SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1942 - 1992	
ANNUAL TOTAL	274370		331257			
ANNUAL MEAN	752		905		1364a	
HIGHEST ANNUAL MEAN					2265	1950
LOWEST ANNUAL MEAN					277	1977
HIGHEST DAILY MEAN	2000	Dec 3	2100	Jan 9	4610	Apr 17 1969
LOWEST DAILY MEAN	341	Sep 14	184	Jun 11	.00	Oct 2 1948
ANNUAL SEVEN-DAY MINIMUM	373	Jul 29	209	Jun 10	24	May9 1949
INSTANTANEOUS PEAK FLOW			2200	Jan 9	12500b	Sep 3 1948
INSTANTANEOUS PEAK STAGE			7.31c	Jan 15	15.20d	Sep 3 1948
INSTANTANEOUS LOW FLOW			38	May 13		
ANNUAL RUNOFF (AC-FT)	544200		657000		987800	
ANNUAL RUNOFF (CFSM)	.22		.27		.40	
ANNUAL RUNOFF (INCHES)	3.03		3.66		5.50	
10 PERCENT EXCEEDS	1500		1550		2310	
50 PERCENT EXCEEDS	513		800		1350	
90 PERCENT EXCEEDS	409		420		336	

a Average based on 109 years of record is 1,183 ft^3/s; median is 1,060 ft^3/s.

b From rating curve extended above 4,500 ft^3/s.

c Backwater from ice.

d From floodmark, caused by dam failure.



SANDY RIVER BASIN

05218500 SANDY LAKE AT LIBBY, MN

LOCATION.--Lat 46°47'20", long 93°19'10", in sec.25, T.50 N., R.24 W., Aitkin County, Hydrologic Unit 07010103, on dam on Sandy River at Libby, 1.2 mi upstream from mouth, and 14 mi north of McGregor.

DRAINAGE AREA.--421 mi².

PERIOD OF RECORD.--July to December 1893, October to December 1894, July 1895 to current year. Monthend contents only for some periods, published in WSP 1308. Published as Sandy Lake Reservoir at Libby, October 1941 to September 1956.

GAGE.--Water-stage recorder. Datum of gage is in mean sea level (levels by U.S. Army Corps of Engineers). Prior to Sept. 23, 1949, nonrecording gage and Sept. 24, 1949, to Nov. 28, 1962, water-stage recorder at site 1 mi upstream at datum 1,207.71 ft, adjustment of 1912. Nov. 29, 1962, to June 30, 1973, water-stage recorder at present site at datum 1,207.71 ft, adjustment of 1912.

REMARKS.--Lake is formed by concrete dam which controls Sandy, Flowage, Snake, and Aitkin Lakes. Storage began in 1893; original timber crib dam completed in 1895, replaced by present structure in 1911. Capacity between elevation 1,214.31 ft and 1,221.31 ft (top of structure) is 73,037 acre-ft, of which 37,539 acre-ft is controlled storage between elevations 1,214.31 ft and 1,218.31 ft (normal operating range). Contents shown herein are contents above elevation 1,207.00 ft. Prior to September 1978, published contents as contents above elevation 1,209.03 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

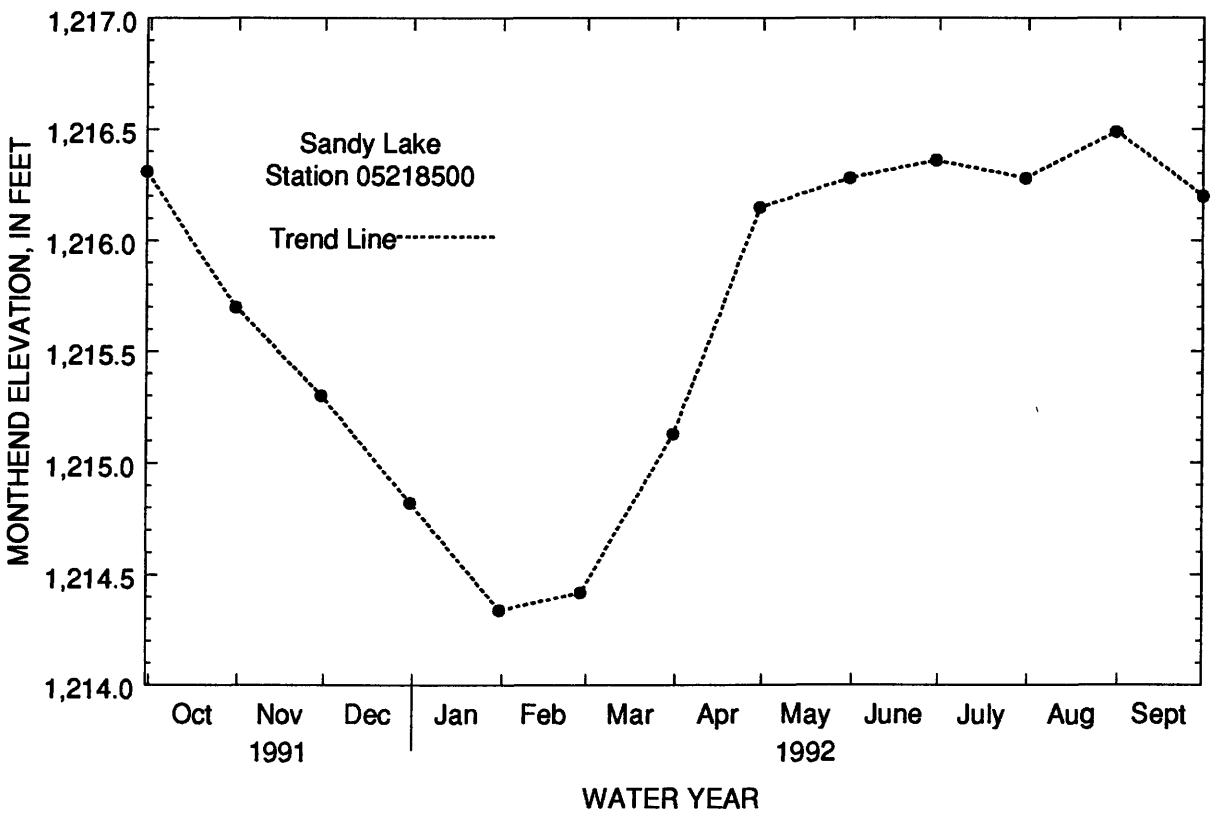
EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 167,200 acre-ft, capacity table then in use, May 19, 1950, elevation, 1,224.82 ft; minimum observed, 5,950 acre-ft, below zero of capacity table then in use, Jan. 20, 1921, elevation, 1,207.96 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 65,150 acre-ft, Apr. 24, elevation, 1,216.65 ft; minimum, 44,360 acre-ft, Feb. 4, elevation, 1,214.31 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1,216.31	61,910	
Oct. 31	1,215.70	56,310	-5,600
Nov. 30	1,215.30	52,740	-3,570
Dec. 31	1,214.82	48,610	-4,130
CAL YR 1991			-780
Jan. 31	1,214.34	44,600	-4,010
Feb. 28	1,214.42	45,270	+670
Mar. 31	1,215.13	51,270	+6,000
Apr. 30	1,216.15	60,430	+9,160
May 31	1,216.28	61,630	+1,200
June 30	1,216.36	62,390	+760
July 31	1,216.28	61,630	-760
Aug. 31	1,216.49	63,630	+2,000
Sept. 30	1,216.20	60,890	-2,740
WTR YR 1992			+1,020

05218500 SANDY LAKE AT LIBBY, MN--Continued



SANDY RIVER BASIN

05219000 SANDY RIVER AT SANDY LAKE DAM, AT LIBBY, MN

LOCATION.--Lat 46°47'20", long 93°19'10", in sec.25, T.50 N., R.24 W., Aitkin County, Hydrologic Unit 07010103, at dam at outlet of Sandy Lake, at Libby, 1.2 mi above mouth, and 14 mi north of McGregor.

DRAINAGE AREA.--421 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1893 to March 1894, July 1894, November 1894 to March 1895, August 1895 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as "below Sandy Lake Reservoir" 1893-1916.

GAGE.--Water-stage recorders on headwater and tailwater. Datum of gages is in sea level (levels by U.S. Army Corps of Engineers). Prior to June 30, 1973, gages (nonrecording gages prior to June 20, 1949) at same site with datum at 1,207.71 ft, adjustment of 1912.

REMARKS.--Discharge computed on basis of head over dam, using modified weir formula, head being obtained from headwater and tailwater recorder records. Flow completely regulated by Sandy Lake (station 05218500).

COOPERATION.--Computations of daily discharge were provided by U.S. Army Corps of Engineers; discharge measurements made and records reviewed by Geological Survey.

AVERAGE DISCHARGE (unadjusted).--97 years (water years 1896-1992), 226 ft³/s, 7.29 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 3,740 ft³/s, July 12, 1897; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 996 ft³/s, Apr. 14-17; minimum daily, 8 ft³/s, Apr. 13.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

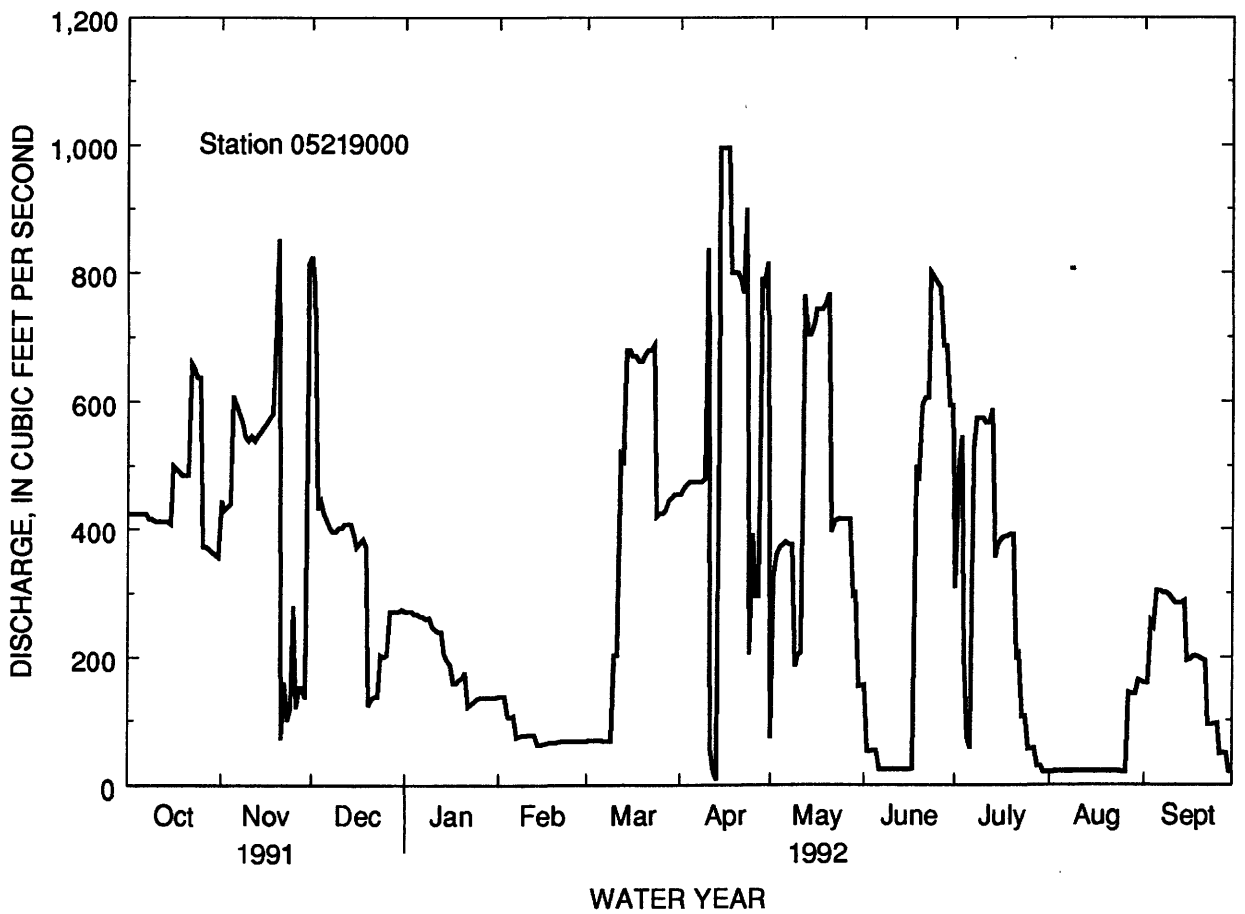
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	424	445	825	272	138	67	455	72	156	309	20	159
2	424	430	781	272	138	68	465	324	52	495	20	159
3	424	435	432	272	138	68	470	360	52	546	21	255
4	424	440	444	268	105	68	475	372	53	200	21	248
5	424	609	426	268	105	68	475	376	53	72	21	304
6	424	595	414	264	107	68	475	380	24	56	21	304
7	424	581	402	264	73	67	475	376	24	525	21	301
8	416	567	396	260	75	67	475	376	24	574	21	301
9	416	546	396	262	76	67	480	186	24	574	21	298
10	412	539	402	248	76	203	837	204	24	574	21	291
11	412	546	402	244	77	203	56	208	24	567	21	285
12	412	539	408	240	77	517	20	765	24	567	21	285
13	412	546	408	240	77	510	8.0	704	24	588	21	285
14	412	553	408	207	62	679	996	704	24	356	21	288
15	408	560	390	196	62	679	996	720	24	376	21	195
16	500	567	372	189	63	670	996	744	24	384	21	197
17	495	574	378	159	64	670	996	744	25	388	21	202
18	490	581	384	159	65	662	800	744	500	388	21	202
19	485	711	372	165	65	662	800	752	477	392	21	200
20	485	852	124	168	65	671	800	768	594	392	21	197
21	485	71	134	177	66	679	789	396	606	202	21	195
22	658	160	138	122	67	679	769	412	606	206	21	93
23	651	100	138	126	67	688	900	416	800	106	21	93
24	637	120	204	130	67	420	206	416	792	107	21	94
25	637	280	201	134	67	425	392	416	784	55	20	95
26	372	120	204	136	67	425	296	416	776	55	20	48
27	372	152	272	136	67	430	296	416	686	56	144	49
28	368	152	272	136	67	445	792	297	686	29	142	48
29	364	136	272	136	67	450	784	300	594	29	142	21
30	360	814	272	136	---	455	816	154	594	20	164	21
31	356	---	275	136	---	455	---	155	---	20	162	---
TOTAL	13983	13321	10946	6122	2310	12285	17590.0	13673	9150	9208	1296	5713
MEAN	451	444	353	197	79.7	396	586	441	305	297	41.8	190
MAX	658	852	825	272	138	688	996	768	800	588	164	304
MIN	356	71	124	122	62	67	8.0	72	24	20	20	21
AC-FT	27740	26420	21710	12140	4580	24370	34890	27120	18150	18260	2570	11330
CFSM	1.07	1.05	.84	.47	.19	.94	1.39	1.05	.72	.71	.10	.45
IN.	1.24	1.18	.97	.54	.20	1.09	1.55	1.21	.81	.81	.11	.50

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	284	264	175	131	87.6	107	438	769	438	198	142	213
MAX	1003	853	444	436	242	396	1013	1659	1070	916	1158	1052
(WY)	1983	1972	1966	1966	1966	1992	1986	1979	1965	1991	1972	1986
MIN	2.00	20.5	20.0	20.0	19.3	14.3	21.4	22.0	23.1	3.00	3.00	3.00
(WY)	1961	1977	1977	1977	1985	1968	1977	1977	1976	1961	1961	1961

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR	
ANNUAL TOTAL	177994		115597.0	
ANNUAL MEAN	488		316	
HIGHEST ANNUAL MEAN				
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	1820	Sep 14	996	Apr 14
LOWEST DAILY MEAN	44	Mar 28	8.0	Apr 13
ANNUAL SEVEN-DAY MINIMUM	46	Mar 22	20	Jul 30
ANNUAL RUNOFF (AC-FT)	353100		229300	
ANNUAL RUNOFF (CFSM)	1.16		.75	
ANNUAL RUNOFF (INCHES)	15.73		10.21	
10 PERCENT EXCEEDS	1150		679	
50 PERCENT EXCEEDS	412		277	
90 PERCENT EXCEEDS	48		24	



SANDY RIVER BASIN

05219000 SANDY RIVER AT SANDY LAKE DAM, AT LIBBY, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1992.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
MAY										
15...	0930	536	112	7.8	14.0	6.9	<0.010	0.092	0.050	<0.010
JUL										
02...	0840	495	110	7.9	16.5	3.8	<0.010	<0.050	0.040	<0.010
AUG										
20...	0815	21	120	7.4	20.0	3.8	<0.010	<0.050	<0.010	<0.010

Boat measuring equipment
November 1938
A. Leppanen

MISSISSIPPI RIVER MAIN STEM

05227500 MISSISSIPPI RIVER AT AITKIN, MN

LOCATION.--Lat 46°32'26", long 93°42'26", in SW¼NW¼ sec.24, T.47 N., R.27 W., Aitkin County, Hydrologic Unit 07010104, on right bank upstream side of highway bridge at north edge of Aitkin, 1 mi downstream from Ripple River and at mile 1,055.9 upstream from Ohio River.

DRAINAGE AREA.--6,140 mi², approximately.

PERIOD OF RECORD.--March 1945 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,182.41 ft above sea level (levels by U.S. Army Corps of Engineers). Mar. 1, 1945, to Mar. 14, 1961, nonrecording gage, and Mar. 15, 1961, to Sept. 30, 1967, water-stage recorder at same site at datum 3.0 ft higher. Diversion channel: Non-recording gage and crest-stage gage. Datum of gage is 1,182.02 ft above sea level. Apr. 9, 1955, to Apr. 10, 1956, nonrecording gage at site 4 mi downstream at different datum. Apr. 11, 1956, to Sept. 30, 1967, non-recording gage at same site at datum 3.0 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow regulated by Winnibigoshish Lake (sta 05201000), Leech Lake (sta 05206000), Pokegama Lake (sta 05210500), and Sandy Lake (sta 05218500). Water diverted at medium and high stages into Aitkin diversion channel 6.5 mi above station, bypasses station and returns to river 15.5 mi below station. Diversion began Apr. 2, 1955. These records include flow in diversion channel. Gage height telemeter and U.S. Army Corps of Engineers satellite telemeter at station.

EXTREMES FOR CURRENT YEAR.--River gage: Maximum discharge, 4,060 ft³/s, Apr. 26, gage height, 10.33 ft. Diversion channel: Maximum discharge, 1,780 ft³/s, Apr. 26, gage height, 9.22 ft., from graph based on gage readings

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1440	2320	e2600	e2300	e2000	e1200	2760	4570	1300	1860	1100	1730
2	1410	2330	e2500	e2300	e2000	e1200	e2800	4190	1230	2090	1080	1860
3	1400	e2100	e2400	e2300	e2000	e1200	e2800	3670	1170	2880	1060	2020
4	1420	e1900	e2350	e2300	e2000	e1250	e2700	3330	1080	3750	1020	2210
5	1450	e1850	e2300	e2300	e2000	e1350	e2700	3080	975	4150	993	2330
6	1510	e1900	e2270	e2300	e2000	e1500	e2800	2910	906	e4200	964	2390
7	1590	e2300	e2300	e2300	e1950	e1700	e3000	2840	878	e4200	955	2410
8	1630	e2600	e2300	e2300	e1900	e1900	3150	2800	843	3890	987	2400
9	1640	e2900	e2300	e2300	e1850	e2200	3260	2650	827	3730	1030	2390
10	1640	e3000	e2300	e2300	e1800	e2400	3330	2420	800	3670	1100	2450
11	1670	e3100	e2300	e2300	e1750	e2500	3500	2340	769	3630	1140	2580
12	1670	e3200	e2300	e2300	e1700	e2500	3630	2590	744	3560	1190	2690
13	1660	e3300	e2300	e2300	e1700	e2500	3740	3220	725	3340	1180	2640
14	1670	e3300	e2300	e2300	e1650	e2500	3790	3450	664	3020	1090	2580
15	1650	e3300	e2300	e2250	e1650	e2500	3770	3400	622	2700	1010	2530
16	1660	e3400	e2300	e2250	e1600	e2500	3710	3260	595	2470	956	2450
17	1700	e3400	e2300	e2200	e1550	e2500	3650	3090	671	2320	919	2330
18	1730	e3400	e2300	e2150	e1550	e2500	3590	2830	908	2240	893	2250
19	1740	e3600	e2300	e2100	e1500	e2450	3540	2650	1510	2220	874	2220
20	1770	e3700	e2300	e2050	e1450	e2450	3630	2490	2030	2160	882	2270
21	1770	e4000	e2300	e2000	e1450	e2400	3980	2290	2350	2060	971	2330
22	1780	e4300	e2300	e1950	e1400	e2400	4500	2090	2410	1940	982	2340
23	1850	e4400	e2300	e1950	e1400	e2400	4950	1950	2350	1800	986	2320
24	1890	e4300	e2300	e1900	e1350	e2400	5320	1850	2270	1680	1080	2250
25	1930	e4000	e2300	e1900	e1330	e2450	5660	1770	2220	1590	1170	2200
26	1910	e3700	e2300	e1900	e1300	e2500	5810	1690	2200	1520	1240	2150
27	1880	e3400	e2300	e1900	e1250	e2600	5770	1640	2160	1420	1320	2060
28	1930	e3100	e2300	e1900	e1250	e2650	5450	1580	2100	1300	1450	2020
29	2050	e2900	e2300	e1900	e1200	2690	5070	1510	2000	1230	1510	2020
30	2140	e2800	e2300	e1900	---	2570	4800	1470	1880	1180	1570	2020
31	2220	---	e2300	e1950	---	2720	---	1380	---	1140	1630	---
TOTAL	53400	93800	71920	66350	47530	68580	117160	81000	41187	78940	34332	68440
MEAN	1723	3127	2320	2140	1639	2212	3905	2613	1373	2546	1107	2281
MAX	2220	4400	2600	2300	2000	2720	5810	4570	2410	4200	1630	2690
MIN	1400	1850	2270	1900	1200	1200	2700	1380	595	1140	874	1730
AC-FT	105900	186100	142700	131600	94280	136000	232400	160700	81690	156600	68100	135800
CFSM	.28	.51	.38	.35	.27	.36	.64	.43	.22	.41	.18	.37
IN.	.32	.57	.44	.40	.29	.42	.71	.49	.25	.48	.21	.41

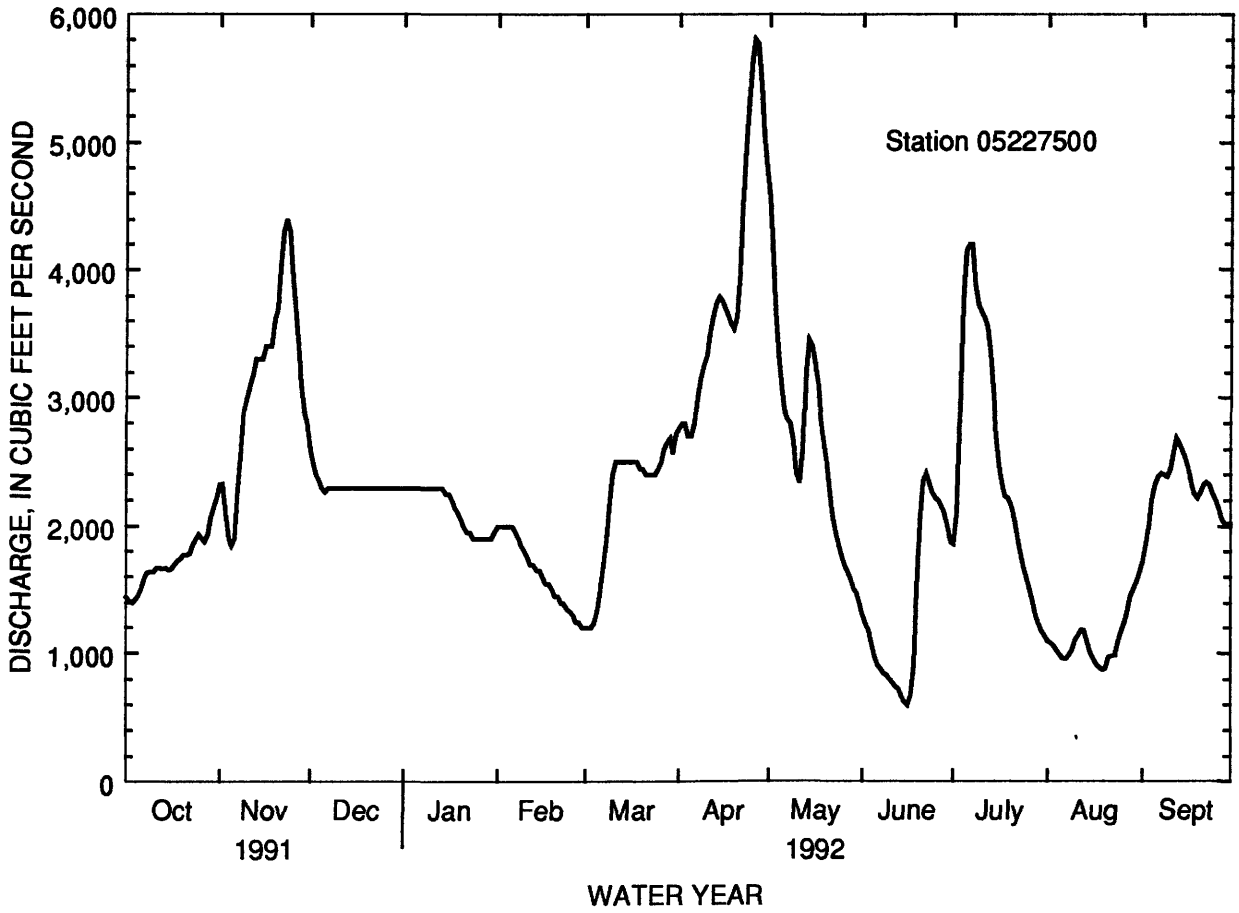
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	2579	2655	2171	1905	1821	2190	5131	5256	3686	2839	2254	2214
MAX	6534	6756	3762	3525	3196	5415	10830	15510	8072	7134	8270	6689
(WY)	1966	1972	1972	1966	1966	1945	1966	1950	1965	1975	1953	1986
MIN	313	328	324	345	398	638	1074	669	539	346	273	321
(WY)	1977	1977	1977	1977	1977	1977	1977	1958	1988	1961	1961	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1945 - 1992	
ANNUAL TOTAL	822456		822639			
ANNUAL MEAN	2253		2248		2881	
HIGHEST ANNUAL MEAN					4985	1966
LOWEST ANNUAL MEAN					796	1977
HIGHEST DAILY MEAN	7430	May 12	5810	Apr 26	19900	May 20 1950
LOWEST DAILY MEAN	780	Feb 6	595	Jun 16	153	Sep 1 1961
ANNUAL SEVEN-DAY MINIMUM	780	Feb 6	684	Jun 11	195	Aug 26 1961
INSTANTANEOUS PEAK FLOW			5840	Apr 26	20000	May 20 1950
INSTANTANEOUS PEAK STAGE			10.33	Apr 26	22.49a	May 20 1950
INSTANTANEOUS LOW FLOW			593	Jun 16	151	Sep 1 1961
ANNUAL RUNOFF (AC-FT)	1631000		1632000		2087000	
ANNUAL RUNOFF (CFSM)	.37		.37		.47	
ANNUAL RUNOFF (INCHES)	4.98		4.98		6.38	
10 PERCENT EXCEEDS	3890		3590		5780	
50 PERCENT EXCEEDS	2140		2250		2280	
90 PERCENT EXCEEDS	780		1130		927	

a Present datum.



PINE RIVER BASIN

05230500 PINE RIVER RESERVOIR AT CROSS LAKE, MN

LOCATION.--Lat 46°40'09", long 94°06'44", in SW¼NW¼ sec.21, T.137 N., R.27 W., Crow Wing County, Hydrologic Unit 07010105, at dam on Pine River, at outlet of Cross Lake at city of Cross Lake.

DRAINAGE AREA.--562 mi².

PERIOD OF RECORD.--March 1886 to current year. Monthend contents only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is in mean sea level (levels by U.S. Army Corps of Engineers). Prior to May 3, 1949, nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by Trout, Whitefish, Rush, and Cross Lakes and several other natural lakes controlled by timber crib dams; storage began in 1886; dam completed in 1886. Capacity between elevations 1,226.32 ft and 1,234.82 ft (maximum allowable range) is 118,703 acre-ft of which 53,272 acre-ft is controlled storage between elevations 1,226.32 ft and 1,230.32 ft (normal operating range). Contents shown herein are contents above an elevation 1,216.00 ft. Prior to September 1978, published contents as contents above elevation 1,218.67 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

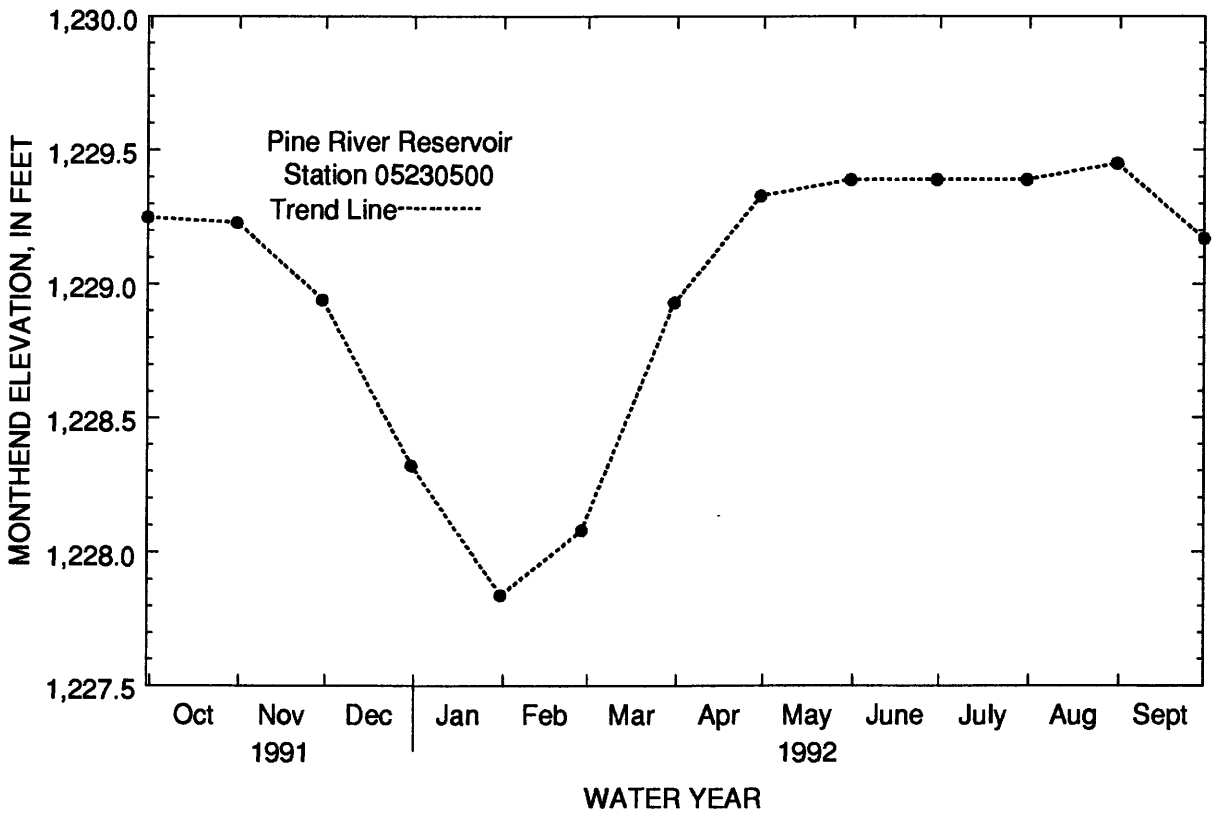
COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents observed, 173,600 acre-ft, capacity table then in use, July 10, 1916, elevation, 1,234.56 ft; minimum observed, 1,310 acre-ft, below zero of capacity table then in use, Aug. 20, 1918, elevation, 1,217.67 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 105,300 acre-ft, July 10, elevation, 1,229.61 ft; minimum, 80,900 acre-ft, Feb. 5, elevation, 1,227.80 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

Date	Elevation (feet)	Contents (acre-feet)	Change in content (acre-feet)
Sept. 30	1,229.25	100,390	
Oct. 31	1,229.23	100,120	-270
Nov. 30	1,228.94	96,200	-3,920
Dec. 31	1,228.32	87,880	-8,320
CAL YR 1991			-6,290
Jan. 31	1,227.84	81,520	-6,360
Feb. 28	1,228.08	84,700	+3,180
Mar. 31	1,228.93	96,070	+11,370
Apr. 30	1,229.33	101,490	+5,420
May 31	1,229.39	102,310	+820
June 30	1,229.39	102,310	0
July 31	1,229.39	102,310	0
Aug. 31	1,229.45	103,120	+810
Sept. 30	1,229.17	99,310	+3,810
WTR YR 1992			+1,080


1,230.0
1,229.5
1,229.0
1,228.5
1,228.0
1,227.5
MONTHEND ELEVATION, IN FEET
Pine River Reservoir
Station 05230500
Trend Line----------
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
1991
1992
WATER YEAR

PINE RIVER BASIN

05231000 PINE RIVER AT CROSS LAKE DAM, AT CROSS LAKE, MN

LOCATION.--Lat 46°40'09", long 94°06'44", in $SW^1/_4NW^1/_4$ sec.21, T.137 N., R.27 W., Crow Wing County, Hydrologic Unit 07010105, at dam at outlet of Cross Lake at city of Cross Lake.

DRAINAGE AREA.--562 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1886 to current year. Monthly discharge only for some periods, published in WSP 1308.Published as "below Pine River Reservoir" 1895-1916, 1929, and as "at Pine River Dam, at Cross Lake" 1941-56.

GAGE.--Water-stage recorder, headwater gage, and nonrecording tailwater gage. Datum of gages is 1,216.32 ft above mean sea level (levels by U.S. Army Corps of Engineers). Mar. 26, 1886, to May 31,1929, nonrecording gages on headwater and tail water at same sites and datum. June 1 to Nov. 30, 1929, non-recording gage in tailwater at datum 1.60 ft lower. Dec. 1, 1929, to May 2, 1949, nonrecording gage on headwater and Dec. 1, 1929, to August 1949, nonrecording gage on tailwater at present sites and datum.

REMARKS.--Discharge computed principally on basis of modified weir formula, the head being obtained from twice-daily readings on tailwater gage and from headwater recorder. Flow completely regulated by Pine River Reservoir (station 05230500).

COOPERATION.--Computations of daily discharge were provided by U. S. Army Corps of Engineers.

AVERAGE DISCHARGE (unadjusted).--106 years, 219 ft^3/s, 5.29 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 2,250 ft^3/s, in June 1896 (does not include flow by passing dam through crevasse); no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 520 ft^3/s, Apr. 23-27; minimum daily, 30 ft^3/s, June 10-16, Aug. 1-10, 13-24, 28-31, Sept. 1.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

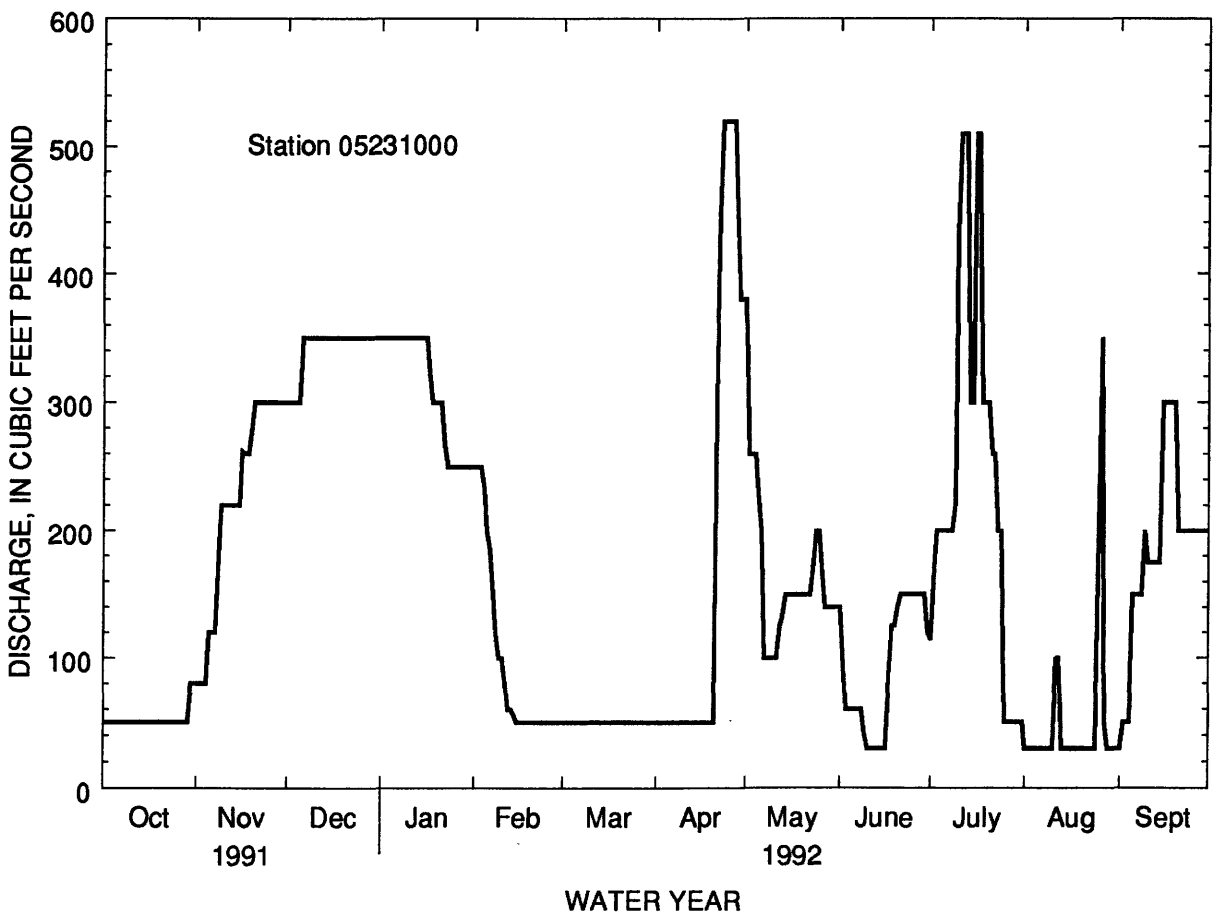
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	50	80	300	350	250	50	50	380	140	114	30	30
2	50	80	300	350	250	50	50	260	93	170	30	50
3	50	80	300	350	250	50	50	260	60	200	30	50
4	50	80	300	350	233	50	50	260	60	200	30	50
5	50	120	300	350	200	50	50	230	60	200	30	150
6	50	120	350	350	185	50	50	200	60	200	30	150
7	50	120	350	350	150	50	50	100	60	200	30	150
8	50	180	350	350	119	50	50	100	60	200	30	150
9	50	220	350	350	100	50	50	100	41	222	30	200
10	50	220	350	350	100	50	50	100	30	431	30	175
11	50	220	350	350	79	50	50	100	30	510	100	175
12	50	220	350	350	60	50	50	125	30	510	100	175
13	50	220	350	350	60	50	50	133	30	510	30	175
14	50	220	350	350	55	50	50	150	30	300	30	175
15	50	220	350	350	50	50	50	150	30	300	30	300
16	50	262	350	350	50	50	50	150	30	510	30	300
17	50	260	350	323	50	50	50	150	85	510	30	300
18	50	260	350	300	50	50	50	150	125	300	30	300
19	50	281	350	300	50	50	50	150	125	300	30	300
20	50	300	350	300	50	50	50	150	140	300	30	200
21	50	300	350	300	50	50	300	150	150	260	30	200
22	50	300	350	267	50	50	446	150	150	260	30	200
23	50	300	350	250	50	50	520	175	150	200	30	200
24	50	300	350	250	50	50	520	200	150	200	30	200
25	50	300	350	250	50	50	520	200	150	50	200	200
26	50	300	350	250	50	50	520	165	150	50	350	200
27	50	300	350	250	50	50	520	140	150	50	50	200
28	50	300	350	250	50	50	450	140	150	50	30	200
29	50	300	350	250	50	50	380	140	150	50	30	200
30	80	300	350	250	---	50	380	140	120	50	30	200
31	80	---	350	250	---	50	---	140	---	50	30	---
TOTAL	1610	6763	10600	9640	2841	1550	5556	5138	2789	7457	1580	5555
MEAN	51.9	225	342	311	98.0	50.0	185	166	93.0	241	51.0	185
MAX	80	300	350	350	250	50	520	380	150	510	350	300
MIN	50	80	300	250	50	50	50	100	30	50	30	30
AC-FT	3190	13410	21030	19120	5640	3070	11020	10190	5530	14790	3130	11020
CFSM.	09	.40	.61	.55	.17	.09	.33	.29	.17	.43	.09	.33
IN.	.11	.45	.70	.64	.19	.10	.37	.34	.18	.49	.10	.37

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	219	231	241	260	222	205	271	403	352	251	166	157
MAX	1126	898	547	499	407	596	907	1213	1316	988	853	581
(WY)	1974	1972	1987	1944	1966	1945	1966	1950	1965	1985	1972	1951
MIN	15.0	19.8	30.0	30.0	30.0	30.0	35.7	30.0	10.7	30.0	30.0	15.7
(WY)	1968	1968	1977	1977	1977	1977	1984	1976	1952	1988	1976	1967

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR	
ANNUAL TOTAL	70024		61079	
ANNUAL MEAN	192		167	
HIGHEST ANNUAL MEAN				
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	900	May 8	520	Apr 23
LOWEST DAILY MEAN	30	Jun 23	30	Jun 10
ANNUAL SEVEN-DAY MINIMUM	30	Aug 7	30	Jun 10
ANNUAL RUNOFF (AC-FT)	138900		121200	
ANNUAL RUNOFF (CFSM)	.34		.30	
ANNUAL RUNOFF (INCHES)	4.64		4.04	
10 PERCENT EXCEEDS	350		350	
50 PERCENT EXCEEDS	120		140	
90 PERCENT EXCEEDS	30		50	



PINE RIVER BASIN

05231000 PINE RIVER AT CROSS LAKE DAM, AT CROSS LAKE, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1992.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
MAY										
13...	1330	105	240	8.4	12.0	7.7	<0.010	<0.050	0.030	<0.010
JUN										
30...	1015	100	228	8.5	19.0	5.2	<0.010	<0.050	0.020	<0.010
AUG										
18...	1200	30	202	8.7	22.0	5.5	<0.010	<0.050	<0.010	<0.010

Boat measuring equipment presently used.

MISSISSIPPI RIVER MAIN STEM

05242300 MISSISSIPPI RIVER AT BRAINERD, MN

LOCATION.--Lat 46°22'40", long 94°10'59", in SE¼/SW¼ sec. 18, T. 145 N., R.30 W., Crow Wing County, Hydrologic Unit 07010104, on left bank in hydro-plant of Potlach Corporation, Northwest Paper Division in Brainerd, 12.7 mi upstream from Crow Wing River, and at mile 1003.7 upstream from Ohio River.

DRAINAGE AREA.--7,320 mi², approximately.

PERIOD OF RECORD.--October 1987 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,146.96 ft above mean sea level.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow regulated by Winnibigoshish Lake (sta. 05201000), Leech Lake (sta. 05206000), Pokegama Lake (sta. 05210500), Sandy Lake (sta. 05218500), and Pine River Reservoir at Cross Lake (sta. 05230500).

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

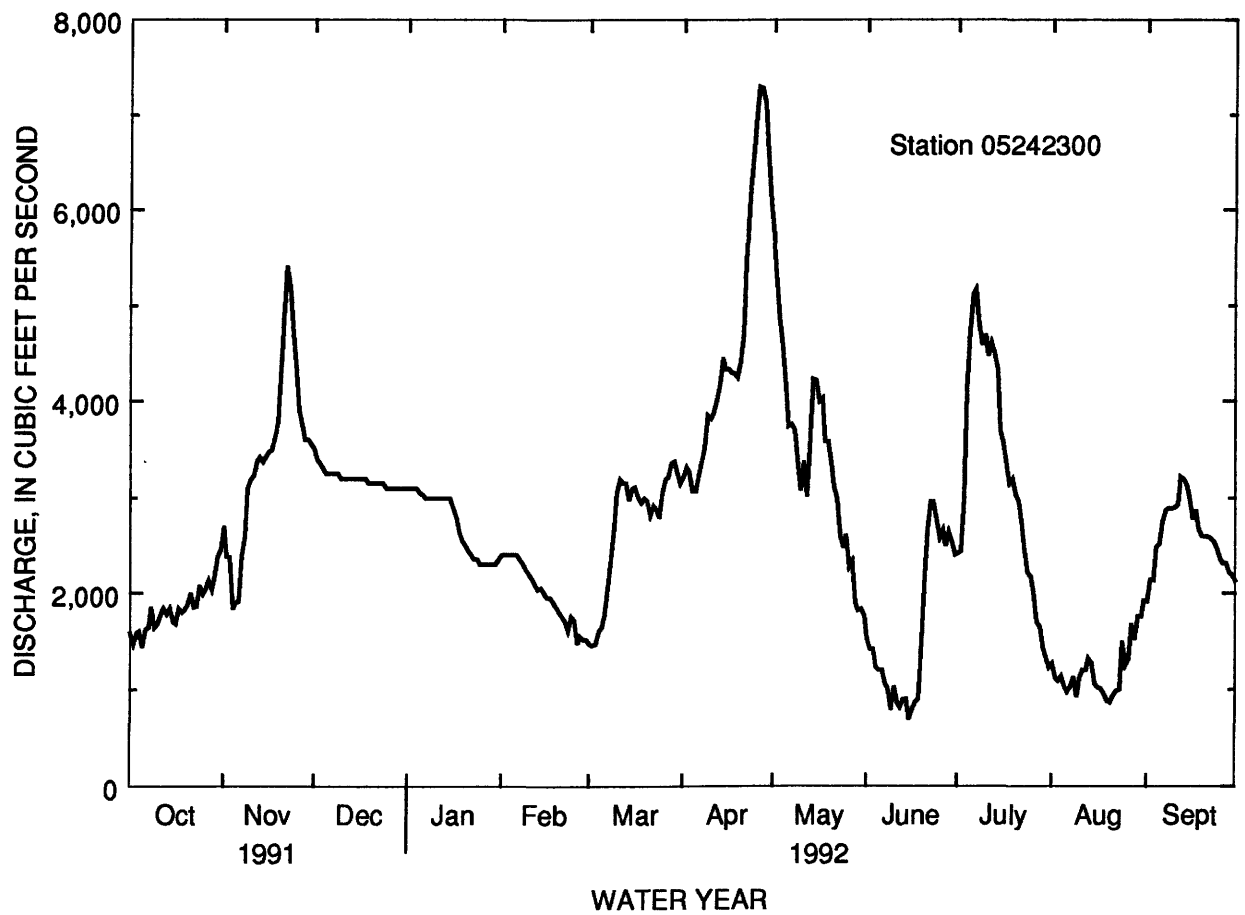
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1580	2700	e3500	e3100	e2400	1470	3220	5730	1520	2410	1270	1910
2	1470	2380	e3400	e3100	e2400	1460	3320	5330	1420	2440	1120	2140
3	1580	2370	e3350	e3100	e2400	1470	3270	4880	1420	3000	1090	2130
4	1600	1830	e3300	e3100	e2400	e1600	3070	4580	1230	4120	1140	2480
5	1440	e1900	e3250	e3050	e2400	e1650	3070	4150	1200	4740	1030	2510
6	1620	1910	e3250	e3030	e2400	e1770	3240	3740	1200	5120	981	2750
7	1640	2400	e3250	e3000	e2350	e2060	3360	3760	1060	5170	1030	2870
8	1850	2590	e3250	e3000	e2300	e2360	3510	3690	1010	4800	1130	2890
9	1640	3100	e3250	e3000	e2250	e2690	3850	3330	793	4590	925	2890
10	1680	3190	e3200	e3000	e2200	e3060	3820	3080	1030	4700	1110	2900
11	1780	3230	e3200	e3000	e2150	3190	3880	3380	856	4480	1200	2930
12	1840	3380	e3200	e3000	e2100	3150	4010	3020	811	4610	1200	3220
13	1780	3420	e3200	e3000	2040	3150	4180	3640	887	4500	1320	3200
14	1840	3370	e3200	e3000	e2050	2980	4460	4230	894	4330	1270	3130
15	1700	3430	e3200	e3000	e2000	3100	4330	4220	686	3690	1060	3010
16	1680	3480	e3200	e2900	e1950	3110	4340	4000	785	3560	1020	2780
17	1840	3490	e3200	e2800	e1950	3010	4300	4030	862	3330	1010	2870
18	1800	3620	e3200	e2650	e1900	2950	4290	3580	898	3150	952	2680
19	1820	3780	e3150	e2550	e1850	3000	4250	3580	1370	3200	878	2600
20	1880	4360	e3150	e2500	e1800	2970	4410	3360	2060	3040	864	2590
21	2000	4870	e3150	e2450	e1750	2820	4710	3120	2660	2960	928	2590
22	1850	5410	e3150	e2400	e1690	2920	5450	2990	2960	2760	982	2570
23	1860	e5200	e3150	e2350	1610	2880	6130	2590	2960	2440	1000	2540
24	2080	e4700	e3150	e2350	1750	2790	6560	2470	2770	2210	1500	2460
25	1990	e4400	e3100	e2300	1710	3060	6990	2610	2580	2170	1250	2350
26	2040	e3900	e3100	e2300	1480	3200	7290	2270	2660	2010	1320	2310
27	2130	e3750	e3100	e2300	1550	3220	7280	2330	2490	1700	1680	2310
28	2040	e3600	e3100	e2300	1520	3360	7120	1890	2640	1650	1520	2210
29	2170	e3600	e3100	e2300	1520	3380	6610	1820	2530	1440	1760	2190
30	2380	e3550	e3100	e2300	---	3270	6090	1830	2400	1340	1750	2130
31	2450	---	e3100	e2350	---	3150	---	1760	---	1230	1920	---
TOTAL	57050	102910	99200	84580	57870	84250	140410	104990	48642	100890	37210	78140
MEAN	1840	3430	3200	2728	1996	2718	4680	3387	1621	3255	1200	2605
MAX	450	5410	3500	3100	2400	3380	7290	5730	2960	5170	1920	3220
MIN1	440	1830	3100	2300	1480	1460	3070	1760	686	1230	864	1910
AC-FT	113200	204100	196800	167800	114800	167100	278500	208200	96480	200100	73810	155000
CFSM	25	.47	.44	.37	.27	.37	.64	.46	.22	.44	.16	.36
IN.	.29	.52	.50	.43	.29	.43	.71	.53	.25	.51	.19	.40

e Estimated.

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	2390	2534	2101	1905	1747	2243	4972	4542	3213	2510	1458	2155
MAX	2635	3430	3200	2728	2250	2732	8601	6923	6193	3416	2260	2952
(WY)1	991	1992	1992	1992	1989	1990	1989	1989	1990	1991	1987	1989
MIN	1840	1970	1362	1140	1040	1435	3400	1928	662	442	935	1166
(WY)	1992	1989	1991	1991	1991	1991	1990	1988	1988	1988	1990	1990

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1987 - 1992	
ANNUAL TOTAL	1016556		996142			
ANNUAL MEAN	2785		2722		2670	
HIGHEST ANNUAL MEAN					3384	1989
LOWEST ANNUAL MEAN					1950	1988
HIGHEST DAILY MEAN	9470	May 11	7290	Apr 26	10700	Apr 23 1989
LOWEST DAILY MEAN	917	Mar 12	686	Jun 15	348	Jul 30 1988
ANNUAL SEVEN-DAY MINIMUM	974	Mar 7	826	Jun 11	357	Jul 29 1988
INSTANTANEOUS PEAK FLOW			7530	Apr 26	10800	Apr 23 1989
INSTANTANEOUS PEAK STAGE			10.03	Apr 26	12.40	Apr 23 1989
INSTANTANEOUS LOW FLOW			540a	Jun 16	273	Jul 12 1988
ANNUAL RUNOFF (AC-FT)	2016000		1976000		1935000	
ANNUAL RUNOFF (CFSM)	.38		.37		.36	
ANNUAL RUNOFF (INCHES)	5.17		5.06		4.96	
10 PERCENT EXCEEDS	4760		4260		4700	
50 PERCENT EXCEEDS	2470		2660		2250	
90 PERCENT EXCEEDS	1060		1240		1050	

a From regulation.



CROW WING RIVER BASIN

05243725 STRAIGHT RIVER NEAR PARK RAPIDS, MN

LOCATION.--Lat 46°52'30", long 95°03'56", in NW¼NE¼ sec. 11, T. 139 N., R. 35 W., Hubbard County, Hydrologic Unit 07010106, upstream from culvert on U.S. Highway 71 3.2 mi south of Park Rapids.

DRAINAGE AREA.--53.2 mi².

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1970-71, 1973, 1975-76. October 1986 to current year (no winter records in 1987, 1990-91). Records of hourly water temperature, available in files of the Geological Survey.

GAGE.--Water-stage recorder. Elevation of gage is 1,400 ft above mean sea level, from topographic map.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 35 ft³/s was measured Aug. 4, 1976.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e41	52	e53	e44	e42	e45	e54	52	37	56	43	45
2	e42	e53	e52	e44	e43	e46	e54	53	37	59	44	48
3	e42	e57	e51	e44	e44	e47	e55	52	36	59	42	48
4	e43	e60	e51	e43	e44	e49	55	51	38	58	41	47
5	e44	e59	e50	e43	e45	e51	55	50	37	56	42	49
6	e45	e56	e49	e43	e45	e54	56	50	38	56	42	49
7	e46	e53	e49	e43	e45	e58	57	49	37	53	48	52
8	e47	e50	e49	e43	e45	e61	57	48	37	52	48	57
9	48	e48	e49	e28	e45	e62	56	48	37	53	49	57
10	48	e46	e49	e42	e45	e61	56	47	37	58	49	57
11	46	e44	e49	e42	e45	e60	56	47	37	58	49	53
12	46	e43	e49	e42	e45	e60	55	48	37	56	48	51
13	45	e43	e49	e42	e45	e59	54	48	37	57	46	49
14	46	e44	e49	e42	e45	e58	54	47	35	56	45	48
15	46	e45	e49	e42	e45	e57	54	46	37	56	43	46
16	46	e47	e49	e42	e45	e55	55	46	39	56	40	49
17	46	e48	e48	e42	e45	e54	55	46	46	55	42	48
18	45	e50	e47	e42	e45	e53	55	46	48	53	42	49
19	44	e52	e47	e42	e45	e52	65	45	52	52	41	47
20	44	e54	e47	e42	e45	52	67	44	50	51	41	45
21	45	e56	e46	e42	e45	52	66	43	49	50	42	44
22	45	e57	e46	e42	e45	52	65	46	52	49	42	46
23	44	e58	e46	e42	e45	53	63	47	49	49	43	43
24	45	e58	e46	e42	e45	53	61	45	48	51	43	41
25	46	e58	e45	e42	e45	54	59	44	48	52	44	42
26	46	e57	e45	e42	e45	53	58	43	45	48	44	41
27	46	e56	e45	e42	e45	54	56	42	44	46	44	42
28	47	e55	e45	e42	e45	54	56	42	44	47	43	43
29	53	e54	e45	e42	e45	e54	54	40	43	48	44	40
30	53	e53	e45	e42	---	e54	53	39	45	47	47	40
31	52	---	e44	e42	---	e54	---	39	---	44	45	---
TOTAL	1422	1566	1483	1299	1298	1681	1716	1433	1256	1641	1366	1416
MEAN	45.9	52.2	47.8	41.9	44.8	54.2	57.2	46.2	41.9	52.9	44.1	47.2
MAX	53	60	53	44	45	62	67	53	52	59	49	57
MIN	41	43	44	28	42	45	53	39	35	44	40	40
AC-FT	2820	3110	2940	2580	2570	3330	3400	2840	2490	3250	2710	2810
CFSM	.86	.98	.90	.79	.84	1.02	1.08	.87	.79	1.00	.83	.89
IN.	.99	1.10	1.04	.91	.91	1.18	1.20	1.00	.88	1.15	.96	.99

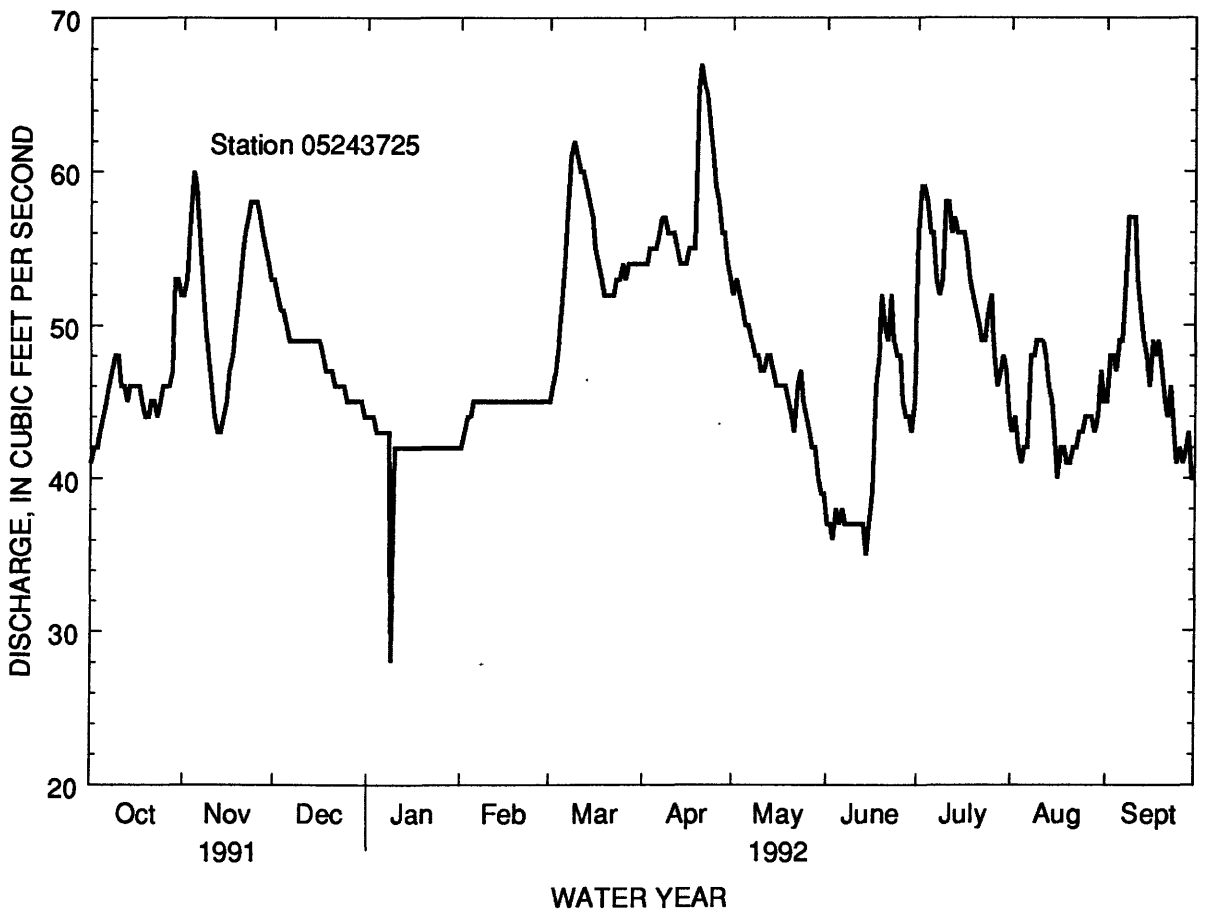
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	53.8	51.5	48.3	43.7	46.6	55.5	62.8	58.8	51.2	47.3	43.6	49.2
MAX	73.6	54.8	51.0	46.0	49.1	61.3	73.0	68.2	59.2	60.2	52.7	57.2
(WY)	1987	1988	1988	1989	1988	1988	1989	1987	1987	1987	1987	1989
MIN	45.9	47.4	46.0	41.9	44.8	50.9	56.1	46.2	41.9	39.5	35.9	38.7
(WY)	1992	1989	1989	1992	1992	1989	1991	1992	1992	1988	1990	1990

SUMMARY STATISTICS	FOR 1992 WATER YEAR		WATER YEARS 1987 - 1992	
ANNUAL TOTAL	17577			
ANNUAL MEAN	48.0		50.1	
HIGHEST ANNUAL MEAN			51.3	1989
LOWEST ANNUAL MEAN			48.0	1992
HIGHEST DAILY MEAN	67	Apr 20	85	May 22 1987
LOWEST DAILY MEAN	28	Jan 9	28	Jan 9 1992
ANNUAL SEVEN-DAY MINIMUM	37	Jun 8	34	Aug 5 1990
INSTANTANEOUS PEAK FLOW	67	Apr 19	89	Aug 31 1989
INSTANTANEOUS PEAK STAGE	2.71a	Nov 4	2.71a	Nov 4 1991
INSTANTANEOUS LOW FLOW	25b	Jan 9	25b	Jan 9 1992
ANNUAL RUNOFF (AC-FT)	34860		36320	
ANNUAL RUNOFF (CFSM)	.90		.94	
ANNUAL RUNOFF (INCHES)	12.29		12.80	
10 PERCENT EXCEEDS	56		67	
50 PERCENT EXCEEDS	47		50	
90 PERCENT EXCEEDS	42		40	

a Backwater from ice.
b Result of freezeup.



CROW WING RIVER BASIN

05244000 CROW WING RIVER AT NIMROD, MN

LOCATION.--Lat 46°38'25", long 94°52'44", in SE¼NW¼ sec. 32, T. 137 N., R. 33 W., Wadena County, Hydrologic Unit 07010106, on right bank 200 ft upstream from highway bridge, 0.2 mi north of Nimrod, and 0.7 mi upstream from Cat River.

DRAINAGE AREA.--1,010 mi² (2,620 km²), approximately.

PERIOD OF RECORD.--April 1910 to September 1914, July 1930 to September 1981, October 1991 to current year (winter records incomplete prior to 1940). October 1981 to September 1987, annual maximums only.

REVISED RECORDS.--WSP 1508: 1910-11, 1913-14, 1937, 1942(M), 1944(M).

GAGE.--Water-stage recorder. Datum of gage is 1,313.27 ft above sea level (levels by Wadena County Highway Department from Minnesota Department of Transportation bench mark). Apr. 15, 1910, to Sept. 30, 1914, nonrecording gage at same site, at datum 2.2 ft lower. July 28, 1930, to Nov. 4, 1949, nonrecording gages at same site and datum.

REMARKS.--Records good except those for winter period, which are fair. Flow affected by natural storage in many lakes.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	263	327	e275	e240	e230	e330	422	509	279	382	304	296
2	263	253	e270	e240	e240	e350	416	497	258	419	286	329
3	e255	e290	e270	e240	e245	e380	411	479	242	442	276	323
4	248	e240	e265	e240	e250	e420	405	456	227	460	263	317
5	e240	e230	e265	e240	e260	e460	400	439	232	457	246	319
6	e235	e230	e260	e240	e265	e520	410	433	232	449	240	327
7	e230	e225	e260	e240	e270	e560	425	427	232	453	307	350
8	227	e225	e260	e235	e275	e580	423	401	212	428	318	381
9	222	e220	e255	e235	e280	e580	416	374	196	405	309	394
10	212	e220	e255	e235	e275	e570	416	359	193	425	309	405
11	212	e220	e255	e235	e275	e560	416	365	184	422	306	410
12	207	e230	e255	e235	e270	e560	408	375	178	430	326	405
13	202	e235	e255	e235	e270	e550	400	377	178	433	339	396
14	202	e240	e255	e235	e270	e550	395	371	173	447	332	382
15	202	e250	e255	e230	e270	e540	393	354	168	468	305	371
16	198	e260	e255	e230	e270	e530	384	349	188	e480	278	367
17	193	e270	e255	e230	e270	e520	374	354	253	491	262	375
18	189	e275	e250	e230	e270	e510	374	343	267	477	258	371
19	189	e280	e250	e225	e270	e500	468	332	286	458	240	366
20	189	e290	e250	e225	e270	e500	531	327	305	437	229	366
21	193	e300	e250	e225	e275	e500	573	316	284	434	239	361
22	198	e310	e250	e225	e280	e490	583	316	308	437	232	350
23	202	e310	e250	e225	e280	e490	594	322	325	423	229	356
24	207	e310	e250	e220	e285	482	602	322	314	401	238	341
25	217	e310	e250	e220	e290	480	595	343	290	398	255	345
26	227	e310	e250	e220	e295	467	590	343	290	388	282	328
27	237	e300	e250	e220	e300	456	576	332	278	365	298	326
28	253	e290	e245	e220	e310	462	558	311	261	345	287	293
29	306	e290	e245	e220	e315	468	538	295	246	332	313	275
30	311	e280	e245	e220	---	450	526	290	260	333	331	265
31	316	---	e245	e220	---	433	---	290	---	331	310	---
TOTAL	7045	8020	7900	7130	7925	15248	14022	11401	7339	13050	8747	10490
MEAN	227	267	255	230	273	492	467	368	245	421	282	350
MAX	316	327	275	240	315	580	602	509	325	491	339	410
MIN	189	220	245	220	230	330	374	290	168	331	229	265
AC-FT	13970	15910	15670	14140	15720	30240	27810	22610	14560	25880	17350	20810
CFSM	.23	.26	.25	.23	.27	.49	.46	.36	.24	.42	.28	.35

e Estimated.

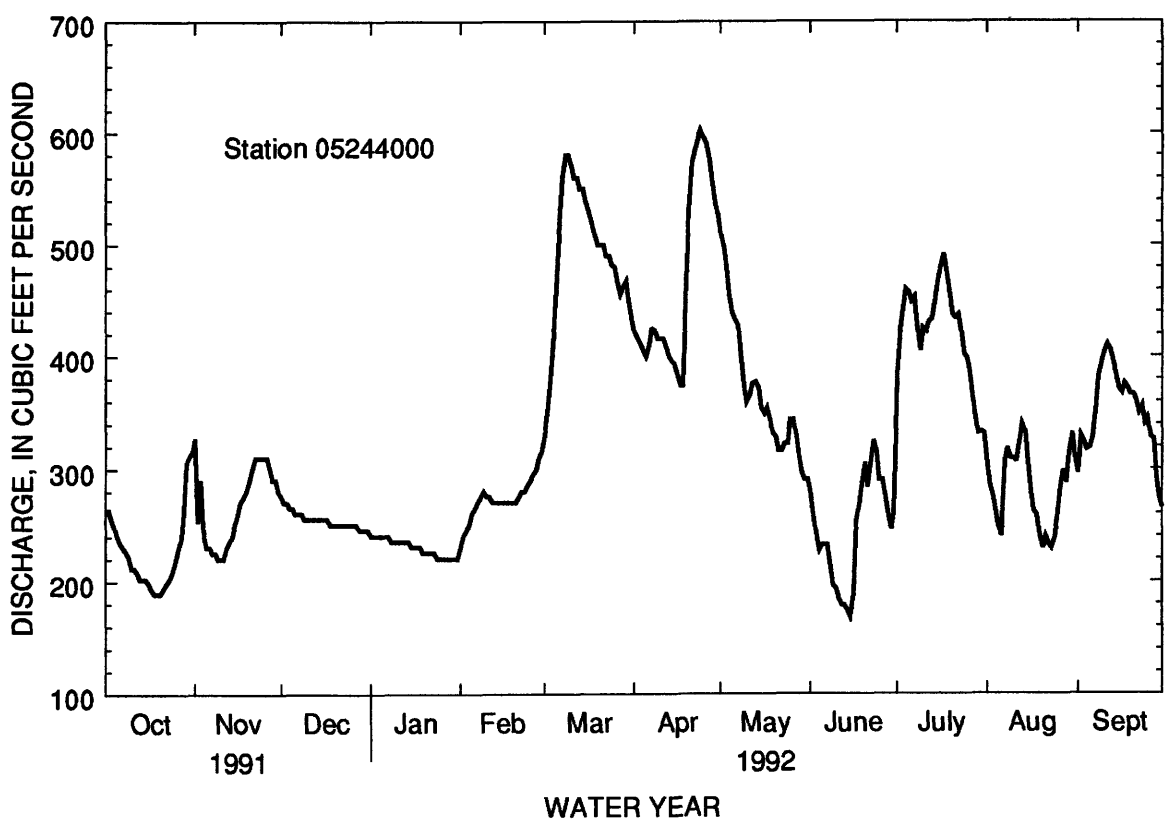
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	401	391	329	290	293	388	742	659	570	423	364	377
MAX	1463	871	596	462	456	768	1624	1615	1354	956	1452	929
(WY)	1974	1972	1952	1966	1966	1945	1966	1950	1965	1949	1944	1944
MIN	137	146	131	125	170	171	202	181	149	84.0	74.3	131
(WY)	1937	1937	1940	1940	1940	1940	1911	1911	1934	1936	1936	1934

SUMMARY STATISTICS	FOR 1992 WATER YEAR		WATER YEARS 1910 - 1992	
ANNUAL TOTAL	118317			
ANNUAL MEAN	323		468	
HIGHEST ANNUAL MEAN			719	1966
LOWEST ANNUAL MEAN			230	1940
HIGHEST DAILY MEAN	602	Apr 24	3580	Oct 10 1973
LOWEST DAILY MEAN	168	Jun 15	45	Aug 7 1936
ANNUAL SEVEN-DAY MINIMUM	180	Jun 10	55	Aug 3 1936
INSTANTANEOUS PEAK FLOW	605	Apr 23, 24	3700	Oct 10 1973
INSTANTANEOUS PEAK STAGE	4.94a	Mar 8	7.64a	Apr 20 1950
INSTANTANEOUS LOW FLOW	140b	Nov 3	45	Aug 7 1936
ANNUAL RUNOFF (AC-FT)	234700		339000	
ANNUAL RUNOFF (CFSM)	.32		.46	
10 PERCENT EXCEEDS	478		781	
50 PERCENT EXCEEDS	290		367	
90 PERCENT EXCEEDS	221		190	

a Backwater from ice.

b Result of freezeup.



CROW WING RIVER BASIN

05245100 LONG PRAIRIE RIVER AT LONG PRAIRIE, MN

LOCATION.--Lat 45°58'30", long 94°51'56", in NE¼NW¼ sec. 20, T. 129 N., R. 33 W., Todd County, Hydrologic Unit 07010108, on right bank 90 ft upstream from bridge on First Avenue at Long Prairie and 400 ft downstream from Venewitz Creek.

DRAINAGE AREA.--432 mi².

PERIOD OF RECORD.--October 1971 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,281.74 ft above mean sea level.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

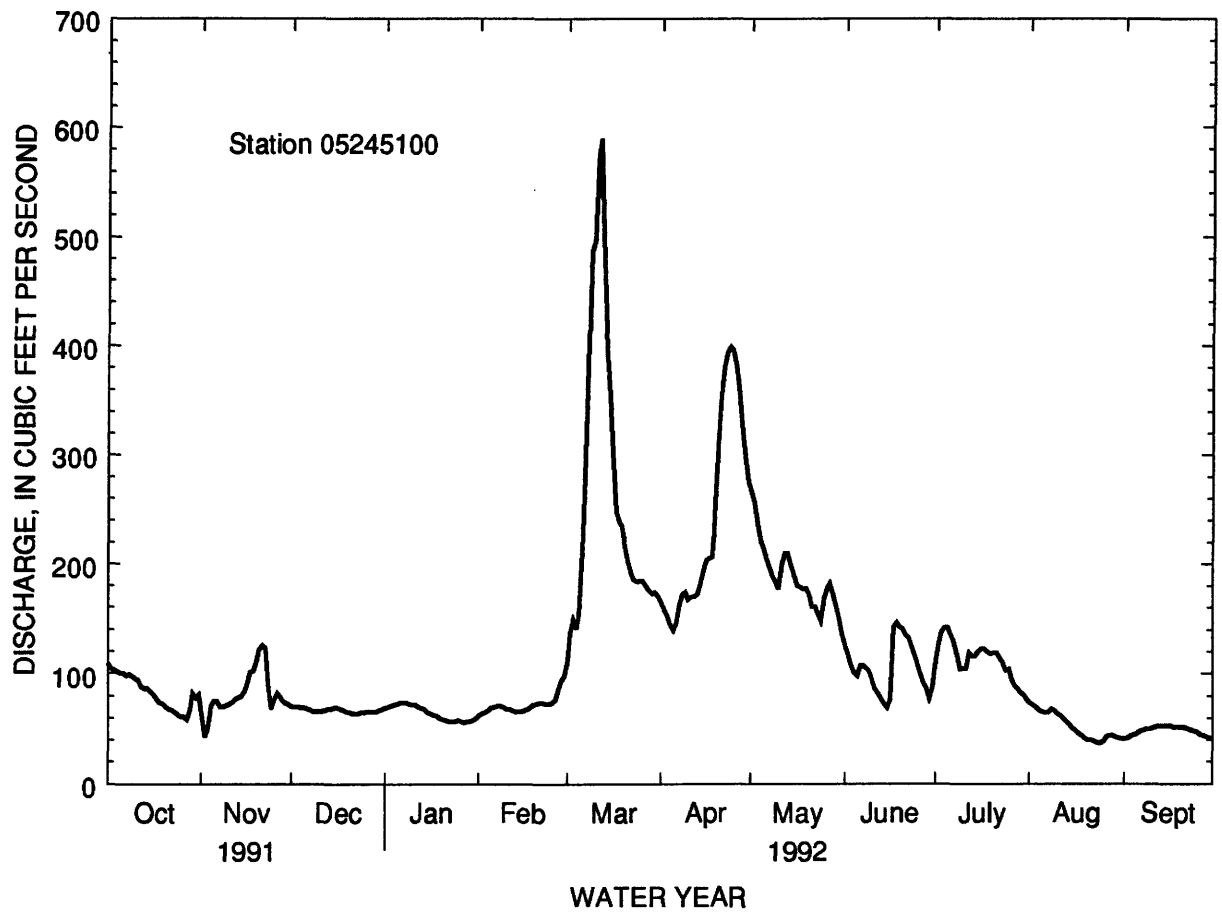
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	109	64	e70	e69	e62	112	165	268	125	111	74	e41
2	104	43	e70	e70	e64	137	158	257	116	128	72	e42
3	103	51	e70	e71	e65	149	153	237	108	138	70	e44
4	102	71	e69	e72	e67	141	145	221	101	142	67	e45
5	100	75	e69	e73	e69	154	140	216	98	142	66	e46
6	100	75	e68	e74	e70	211	147	205	107	136	65	e48
7	98	70	e67	e74	e71	299	161	197	107	129	e65	e49
8	99	70	e66	e74	e71	383	172	189	105	117	e68	e50
9	97	71	e66	e73	e70	487	174	183	102	104	e67	e50
10	95	72	e66	e72	e68	498	168	177	93	105	e64	e51
11	94	74	e66	e72	e68	575	170	199	86	105	e62	e52
12	88	77	e67	e70	e67	589	170	210	82	119	e60	e53
13	86	78	e68	e69	e66	480	173	210	77	116	e57	e53
14	87	79	e68	e68	e66	399	182	199	72	116	e54	e53
15	84	83	e69	e65	e66	355	194	190	69	120	e51	e53
16	81	89	e69	e64	e67	303	204	180	77	123	e49	e53
17	77	101	e68	e63	e68	249	206	179	142	123	e46	e52
18	74	102	e67	e62	e70	239	207	177	146	120	e44	e52
19	73	111	e66	e60	e72	235	268	178	143	118	e42	e52
20	70	122	e65	e59	e73	216	319	171	141	119	e40	e52
21	68	125	e64	e58	e74	202	355	161	135	119	e40	e51
22	67	e123	e64	e57	e74	192	381	161	132	115	e39	e50
23	65	e90	e64	e57	e73	186	395	153	125	110	e38	e49
24	63	e68	e65	e57	e73	184	399	148	117	103	e37	e48
25	61	e76	e65	e58	e74	185	396	168	108	104	e39	e47
26	61	e82	e66	e57	e77	185	382	178	100	95	e43	e45
27	59	e79	e66	e56	e85	180	356	182	92	89	e44	e44
28	67	e75	e66	e57	94	176	328	172	86	86	e44	e43
29	82	73	e66	e57	98	173	299	160	78	83	e43	e42
30	78	e72	e67	e58	---	174	276	148	88	81	e42	e41
31	81	---	e68	e60	---	171	---	136	---	77	e41	---
TOTAL	2573	2441	2075	2006	2082	8219	7243	5810	3158	3493	1633	1451
MEAN	83.0	81.4	66.9	64.7	71.8	265	241	187	105	113	52.7	48.4
MAX	109	125	70	74	98	589	399	268	146	142	74	53
MIN	59	43	64	56	62	112	140	136	69	77	37	41
AC-FT	5100	4840	4120	3980	4130	16300	14370	11520	6260	6930	3240	2880
CFSM.	19	.19	.15	.15	.17	.61	.56	.43	.24	.26	.12	.11
IN.	.22	.21	.18	.17	.18	.71	.62	.50	.27	.30	.14	.12

e Estimated

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1972 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	126	116	72.6	58.0	57.5	168	343	242	201	176	129	117
MAX	512	425	270	217	208	441	748	653	422	777	715	607
(WY)	1987	1972	1987	1987	1987	1985	1986	1986	1985	1972	1972	1986
MIN	13.4	8.69	3.19	1.05	1.62	19.8	71.8	45.5	27.5	4.73	10.0	5.32
(WY)	1977	1977	1977	1977	1977	1989	1977	1977	1988	1988	1989	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1972 - 1992	
ANNUAL TOTAL	48719		42184			
ANNUAL MEAN	133		115		151	
HIGHEST ANNUAL MEAN					366	1972
LOWEST ANNUAL MEAN					25.2	1977
HIGHEST DAILY MEAN	426	Apr 20	589	Mar 12	2900	Jul 22 1972
LOWEST DAILY MEAN	12	Jan 3	37	Aug 24	.84	Jan 12 1977
ANNUAL SEVEN-DAY MINIMUM	12	Jan 3	39	Aug 19	.84	Jan 12 1977
INSTANTANEOUS PEAK FLOW			721	Mar 12	3270	Jul 22 1972
INSTANTANEOUS PEAK STAGE			5.68	Mar 12	9.37	Jul 22 1972
ANNUAL RUNOFF (AC-FT)	96630		83670		109200	
ANNUAL RUNOFF (CFSM)	.31		.27		.35	
ANNUAL RUNOFF (INCHES)	4.20		3.63		4.74	
10 PERCENT EXCEEDS	287		205		356	
50 PERCENT EXCEEDS	115		77		89	
90 PERCENT EXCEEDS	17		51		19	



CROW WING RIVER BASIN

05246500 GULL LAKE NEAR BRAINERD, MN

LOCATION.--Lat 46°24'40", long 94°21'26", in NF sec. 20, T. 134 N., R. 29 W., Cass County, Hydrologic Unit 07010106, in pool of dam on Gull River, 800 ft south of outlet of Gull Lake, 0.2 mi upstream from Gull Lake Dam, and 8 mi northwest of Brainerd.

DRAINAGE AREA.--287 mi².

PERIOD OF RECORD.--August 1911 to current year. Prior to October 1941 monthend contents only, published in WSP 1308. Published as Gull Lake Reservoir October 1941 to September 1956.

GAGE.--Water-stage recorder. Datum of gage is in mean sea level (levels by U.S. Army Corps of Engineers). Prior to Aug. 10, 1949, nonrecording gage 800 ft north of present site at same datum. Aug. 11, 1949, to June 30, 1973, water-stage recorder at present site and at datum 1,188.14 ft, adjustment of 1912.

REMARKS.--Reservoir is formed by Gull Lake and several other natural lakes controlled by concrete dam completed in 1913; storage began in 1912. Capacity between elevation 1,192.75 ft and 1,194.75 ft (maximum allowable range and normal operating range) is 26,008 acre-ft. Contents shown herein are contents above elevation 1,188.00 ft. Prior to September 1978, published contents as contents above elevation 1,188.75 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

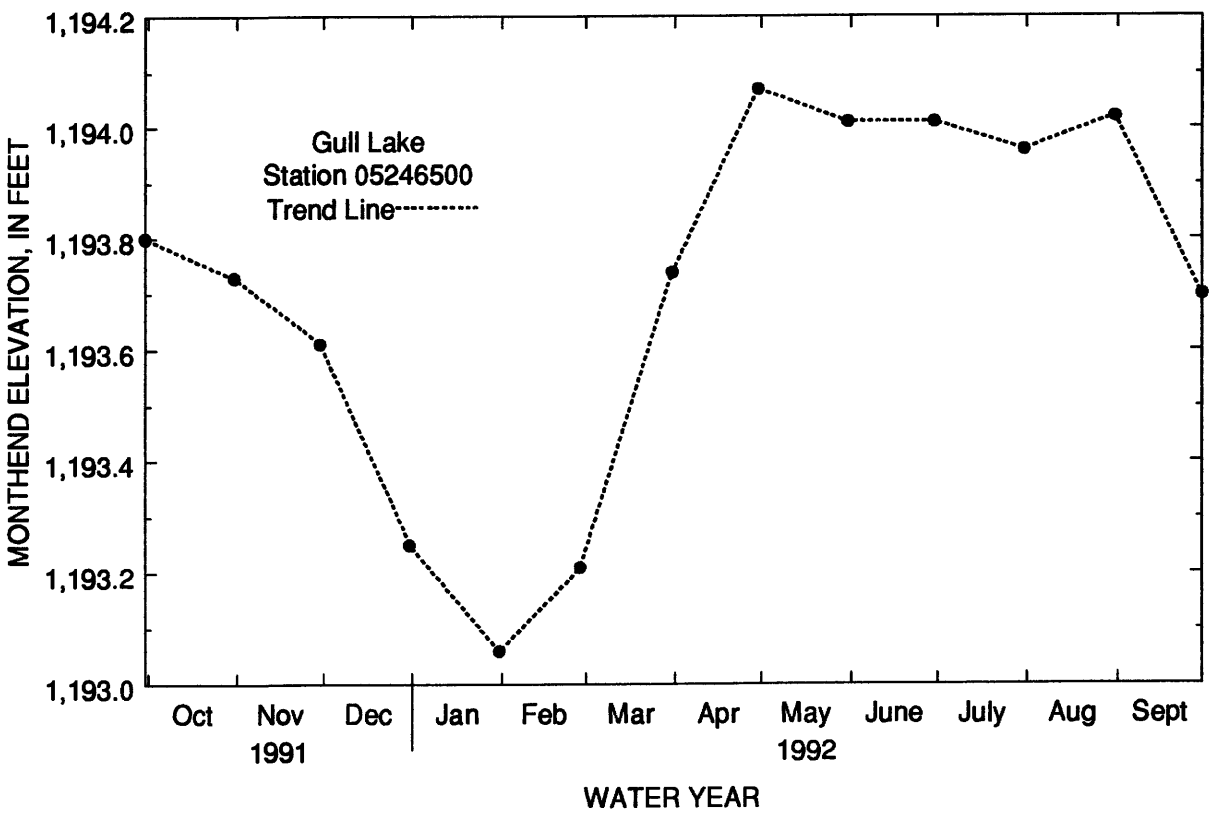
COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 74,800 acre-ft, capacity table then in use, June 30, 1914, elevation, 1,195.05 ft; minimum observed, 22,250 acre-ft, capacity table then in use, Mar. 20, 1924, elevation. 1,190.75 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 63,770 acre-ft, June 19, elevation, 1,194.21 ft; minimum, 48,950 acre-ft, Feb. 2, elevation, 1,193.07.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1,193.80	58,420	
Oct. 31	1,193.73	57,500	-920
Nov. 30	1,193.61	55,940	-1,560
Dec. 31	1,193.25	51,290	-4,650
CAL YR 1991			-3,870
Jan. 31	1,193.08	49,080	-2,210
Feb. 28	1,193.21	50,770	+1,690
Mar. 31	1,193.74	57,630	+6,860
Apr. 30	1,194.07	61,940	+4,310
May 31	1,194.01	61,150	-790
June 30	1,194.01	61,150	0
July 31	1,193.96	60,500	-650
Aug. 31	1,194.02	61,280	+780
Sept. 30	1,193.70	57,110	-4,170
WTR YR 1992			-1,310


1,194.2
1,194.0
1,193.8
1,193.6
1,193.4
1,193.2
1,193.0
MONTHEND ELEVATION, IN FEET
Gull Lake
Station 05246500
Trend Line
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
1991
1992
WATER YEAR

CROW WING RIVER BASIN

05247000 GULL RIVER AT GULL LAKE DAM, NEAR BRAINERD, MN

LOCATION.--Lat 46°24'40", long 94°21'12", in sec. 20, T. 134 N., R. 29 W., Cass County, Hydrologic Unit 07010106, in headwater and tailwater of dam at outlet of Gull Lake, 8 mi. northwest of Brainerd.

DRAINAGE AREA.--287 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1911 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as "Gull Lake Reservoir" 1929.

GAGE.--Water-stage recorder on headwater and nonrecording gage on tailwater. Datum of gages is in sea level (levels by U.S. Army Corps of Engineers). August 1911 to May 23, 1929, and Dec. 1, 1929, to Aug. 1, 1949, both gages were nonrecording gages at same site and datum in use. May 24 to Nov. 30, 1929, non-recording gage 500 ft downstream at different datum. Aug. 2, 1949, to June 30, 1973, at present sites with datum of gage at 1,188.14 ft, adjustment of 1912.

REMARKS.--Discharge computed at dam on basis of modified weir formulas, the head being obtained from twice-daily readings on tailwater gage and from headwater recorder. Flow completely regulated by Gull Lake (station 05246500).

COOPERATION.--Computations of daily discharge were provided by U.S. Army Corps of Engineers.

AVERAGE DISCHARGE.--(unadjusted).--80 years, 108 ft³/s, 5.11 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,120 ft³/s, May 15, 1938; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 400 ft³/s, June 20; minimum daily, 18 ft³/s, Oct. 16-31, Aug. 13, 14.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

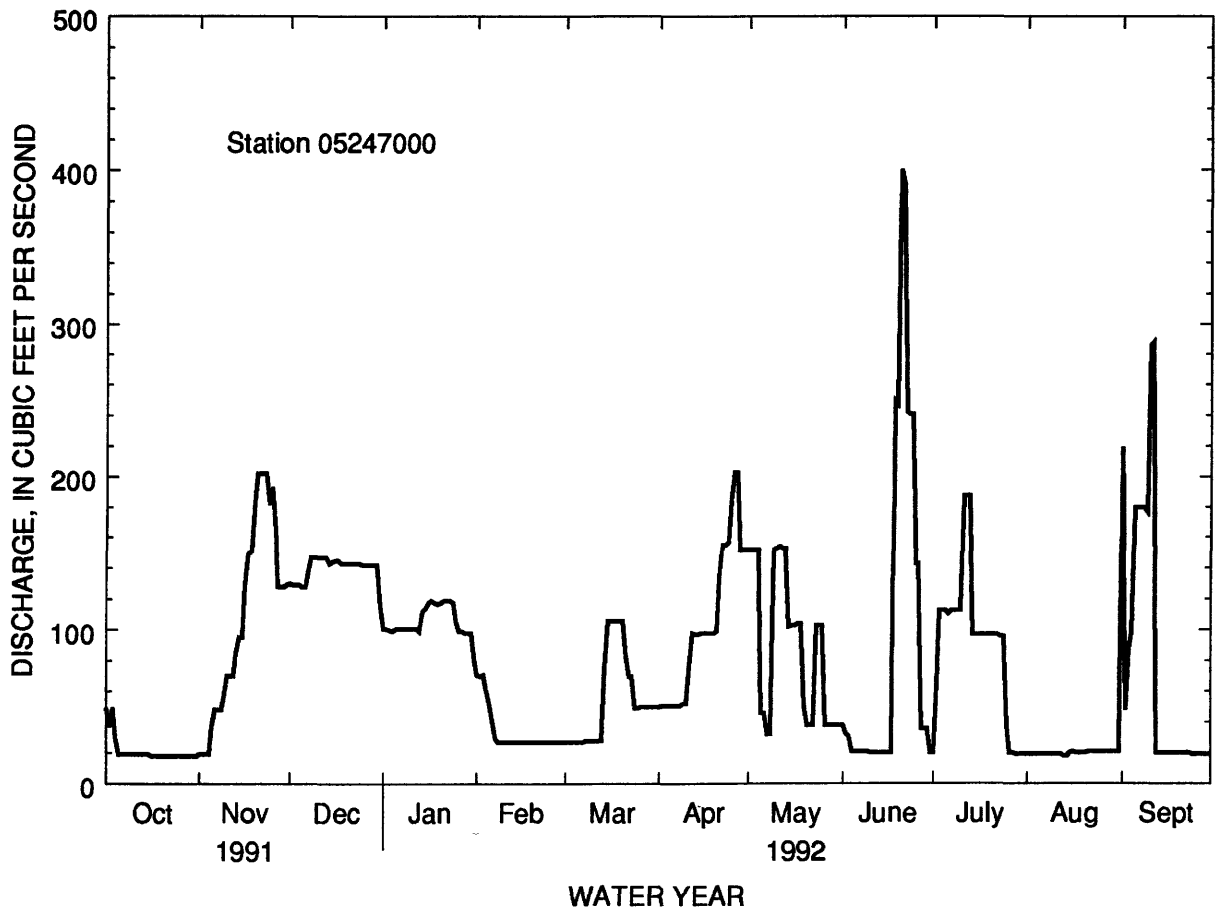
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	49	19	130	101	71	27	50	152	38	20	19	219
2	37	19	129	101	70	27	51	152	32	65	19	48
3	49	19	129	100	71	27	51	152	31	113	19	88
4	30	19	129	99	60	27	51	152	21	113	19	98
5	19	37	128	101	53	27	51	46	21	113	19	180
6	19	48	128	101	41	27	51	46	21	111	19	180
7	19	48	139	101	29	27	51	32	21	113	19	180
8	19	48	147	101	27	28	51	32	21	113	19	180
9	19	56	147	101	27	28	52	152	21	113	19	177
10	19	70	147	101	27	28	52	153	20	113	19	286
11	19	70	147	101	27	28	77	154	20	188	19	288
12	19	70	147	101	27	28	98	153	20	188	19	20
13	19	85	147	99	27	28	97	153	20	188	18	20
14	19	95	143	112	27	76	97	102	20	97	18	20
15	19	95	144	114	27	106	98	103	20	97	20	20
16	18	129	145	118	27	106	98	103	20	97	21	20
17	18	149	145	119	27	106	98	104	20	97	20	20
18	18	151	143	118	27	106	98	104	249	97	20	20
19	18	184	143	117	27	106	98	50	247	97	20	20
20	18	202	143	118	27	106	99	38	400	97	20	20
21	18	202	143	119	27	83	134	38	390	97	21	20
22	18	202	143	119	27	70	155	38	242	97	21	20
23	18	202	143	119	27	70	155	103	241	96	21	20
24	18	182	143	118	27	49	157	103	241	96	21	19
25	18	193	142	106	27	49	185	103	143	38	21	19
26	18	165	142	99	27	50	203	38	143	20	21	19
27	18	128	142	99	27	50	203	38	36	20	21	19
28	18	128	142	98	27	50	152	38	36	19	21	19
29	18	128	142	98	27	50	152	38	36	19	21	19
30	18	129	142	98	---	50	152	38	20	19	21	19
31	18	---	116	81	---	50	---	38	---	19	21	---
TOTAL	662	3272	4340	3278	989	1690	3117	2746	2811	2770	616	2297
MEAN	21.4	109	140	106	34.1	54.5	104	88.6	93.7	89.4	19.9	76.6
MAX	49	202	147	119	71	106	203	154	400	188	21	288
MIN	18	19	116	81	27	27	50	32	20	19	18	19
AC-FT	1310	6490	8610	6500	1960	3350	6180	5450	5580	5490	1220	4560
CFSM	.07	.38	.49	.37	.12	.19	.36	.31	.33	.31	.07	.27
IN.	.09	.42	.56	.42	.13	.22	.40	.36	.36	.36	.08	.30

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1912 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	89.9	105	105	103	99.7	102	161	153	145	96.2	65.5	70.9
MAX	340	534	329	281	350	355	575	602	655	484	382	380
(WY)	1974	1972	1952	1944	1945	1945	1966	1950	1944	1946	1952	1986
MIN	5.00	5.00	5.00	5.00	5.00	5.00	7.00	9.13	8.73	9.06	7.97	6.70
(WY)	1933	1933	1933	1933	1933	1933	1933	1931	1931	1940	1940	1932

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1912 - 1992	
ANNUAL TOTAL	32419		28588			
ANNUAL MEAN	88.8		78.1		109	
HIGHEST ANNUAL MEAN					228	1972
LOWEST ANNUAL MEAN					20.3	1931
HIGHEST DAILY MEAN	400	May 8	400	Jun 20	995	Jun 7 1943
LOWEST DAILY MEAN	18	Oct 16	18	Oct 16	.00	Jul 2 1914
ANNUAL SEVEN-DAY MINIMUM	18	Oct 16	18	Oct 16	.00	May 10 1915
ANNUAL RUNOFF (AC-FT)	64300		56700		78700	
ANNUAL RUNOFF (CFSM)	.31		.27		.38	
ANNUAL RUNOFF (INCHES)	4.20		3.71		5.14	
10 PERCENT EXCEEDS	190		152		231	
50 PERCENT EXCEEDS	70		51		72	
90 PERCENT EXCEEDS	20		19		12	



CROW WIING RIVER BASIN

05247000 GULL RIVER AT GULL LAKE DAM, NEAR BRAINERD, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1992.

WATER QUALITY DATA, WATER YEARS OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
MAY										
13...	1045	146	238	8.3	11.0	2.1	<0.010	0.062	0.030	<0.010
JUN										
30...	0930	20	210	8.5	20.0	2.8	<0.010	<0.050	0.030	<0.010
AUG										
18...	1030	20	208	8.1	20.5	3.3	<0.010	<0.050	<0.010	<0.010

Water-quality sampling with bridge crane and D-77 sampler

CROW WING RIVER BASIN

05247500 CROW WING RIVER NEAR PILLAGER, MN

LOCATION.--Lat 46°18'18", long 94°22'38", in SW¼NE¼ sec. 30, T. 133 N., R. 29 W., Cass County, Hydrologic Unit 07010106, at Sylvan dam powerplant of Minnesota Power Co., 3.6 mi above mouth and 4.9 mi southeast of Pillager.

DRAINAGE AREA.--3,520 mi², approximately,

PERIOD OF RECORD.--October 1968 to September 1986, October 1987 to current year. Records for August 1924 to September 1968 available in files of the Minnesota District Office.

GAGE.--Water stage recorder. Datum of gage is 1,151.00 ft, adjustment of 1912. Prior to January 16, 1991, staff gage attached to retaining wall approximately 20 ft below the turbine outlet bays. Datum of staff gage is 1,150.00 ft, adjustment of 1912.

REMARKS.--No estimated daily discharges. Records good.

Discharge computed on the basis of powerplant records prior to January 16, 1991. Records for Oct. 1, 1968 to Sept. 30, 1975, were adjusted for storage change in the Sylvan dam reservoir. Flow partly regulated by powerplants and Gull Lake (station 05246500).

COOPERATION.--Records collected by Minnesota Power Co. under general supervision of Geological Survey prior to February 1991, in connection with a Federal Power Commision project.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum daily discharge since 1924, 18,300 ft³/s, Apr. 14, 1965.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

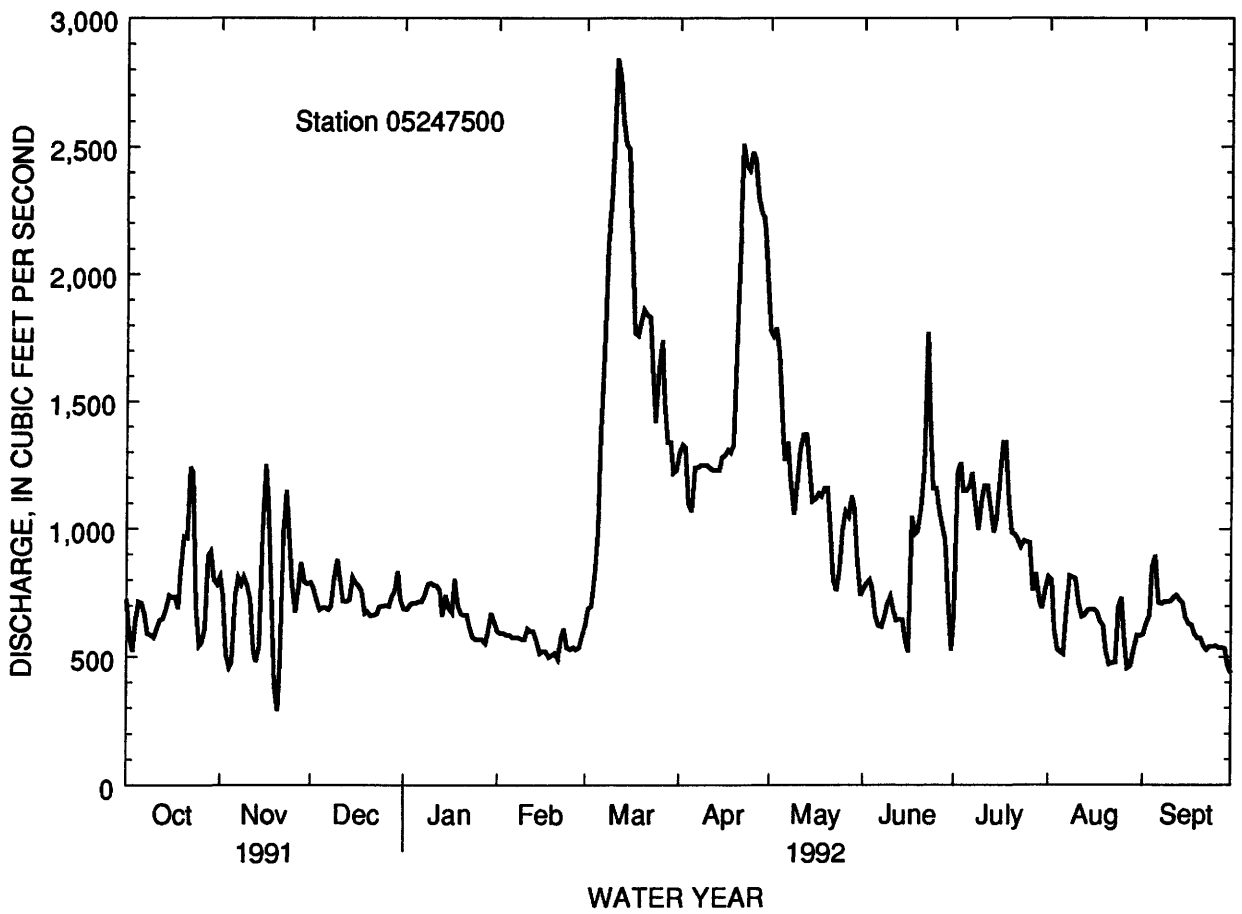
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	727	817	792	691	604	630	1300	1780	765	669	817	591
2	576	741	774	689	596	691	1330	1760	789	1220	803	635
3	522	510	723	706	596	700	1320	1790	803	1260	612	663
4	637	461	689	713	588	812	1100	1690	771	1150	532	854
5	715	481	696	714	588	985	1070	1440	660	1150	521	897
6	710	733	696	719	579	1380	1240	1270	625	1170	514	716
7	662	812	687	719	579	1690	1240	1340	621	1220	688	712
8	594	787	704	743	579	2120	1250	1170	653	1100	819	719
9	587	816	815	787	571	2260	1250	1060	709	1000	812	717
10	579	782	882	791	571	2480	1250	1170	739	1120	807	721
11	614	728	791	783	613	2840	1240	1310	680	1170	711	735
12	643	530	720	781	604	2770	1230	1370	646	1170	661	744
13	650	484	718	763	604	2610	1230	1370	647	1080	666	725
14	687	546	725	664	563	2510	1230	1250	648	990	685	714
15	740	991	814	744	515	2490	1280	1110	571	1040	689	658
16	734	1250	793	694	523	2120	1290	1120	520	1200	688	632
17	736	1110	780	676	523	1770	1310	1140	1050	1340	679	628
18	690	760	761	806	500	1760	1300	1130	983	1340	644	595
19	841	389	674	704	508	1820	1330	1160	992	1110	624	576
20	970	290	680	671	515	1860	1770	1160	1080	987	522	575
21	965	480	664	665	492	1840	2160	1010	1230	980	473	542
22	1240	987	667	665	579	1830	2510	804	1770	962	478	532
23	1220	1150	670	613	613	1590	2430	761	1450	932	481	542
24	702	944	698	579	539	1420	2410	847	1160	956	695	544
25	545	783	701	571	531	1630	2480	993	1160	952	732	547
26	557	678	704	571	539	1740	2450	1070	1070	949	554	538
27	614	776	701	571	531	1500	2300	1050	1020	763	458	537
28	895	870	735	555	539	1340	2240	1130	960	829	469	533
29	913	795	760	596	588	1340	2220	1080	729	722	534	468
30	803	789	835	673	---	1220	1990	869	527	692	589	440
31	787	---	729	638	---	1230	---	743	---	763	585	---
TOTAL	22855	22270	22778	21255	16270	52978	48750	36947	26028	31986	19542	19030
MEAN	737	742	735	686	561	1709	1625	1192	868	1032	630	634
MAX	1240	1250	882	806	613	2840	2510	1790	1770	1340	819	897
MIN	522	290	664	555	492	630	1070	743	520	669	458	440
AC-FT	45330	44170	45180	42160	32270	105100	96700	73280	51630	63440	38760	37750
CFSM	.22	.22	.22	.21	.17	.52	.49	.36	.26	.31	.19	.19
IN.	.26	.25	.26	.24	.18	.60	.55	.42	.29	.36	.22	.21

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1969 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1159	1154	765	632	634	1273	3057	2214	1552	1260	851	849
MAX	3771	3674	1544	1188	1125	2996	7429	5671	3483	3295	3520	3309
(WY)	1974	1972	1972	1986	1986	1972	1969	1986	1985	1972	1972	1986
MIN	215	215	199	218	255	548	882	545	447	206	120	161
(WY)	1977	1977	1977	1977	1977	1981	1981	1977	1988	1988	1976	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1969 - 1992	
ANNUAL TOTAL	392398		340689			
ANNUAL MEAN	1075		931		1284	
HIGHEST ANNUAL MEAN					2564	1972
LOWEST ANNUAL MEAN					446	1977
HIGHEST DAILY MEAN	3290	May 6	2840	Mar 11	16600	Apr 12 1969
LOWEST DAILY MEAN	290	Nov 20	290	Nov 20	60	Aug 10 1976
ANNUAL SEVEN-DAY MINIMUM	485	Aug 28	511	Feb 15	68	Aug 9 1976
INSTANTANEOUS PEAK FLOW			2880	Mar 11		
INSTANTANEOUS PEAK STAGE			5.20	Mar 11		
INSTANTANEOUS LOW FLOW			260	Nov 20		
ANNUAL RUNOFF (AC-FT)	778300		675800		930400	
ANNUAL RUNOFF (CFSM)	.33		.28		.39	
ANNUAL RUNOFF (INCHES)	4.42		3.84		5.29	
10 PERCENT EXCEEDS	2190		1460		2670	
50 PERCENT EXCEEDS	774		744		838	
90 PERCENT EXCEEDS	549		539		402	



MISSISSIPPI RIVER MAIN STEM

05261000 MISSISSIPPI RIVER NEAR FORT RIPLEY, MN

LOCATION.--Lat 46°10'50", long 94°21'56", in SE¼NW¼ sec. 27, T. 43 N., R. 32 W., Crow Wing County, Hydrologic Unit 07010104, on left bank 600 ft upstream from Nokasippi River, 1.0 mile north of Fort Ripley, and a mile 982.1 upstream from Ohio River.

DRAINAGE AREA.--11,010 mi², approximately.

PERIOD OF RECORD.--June 1987 to current year. Operated as high-flow partial-record station October 1971 to June 1987. Prior to Oct. 1971 stage records collected by U.S. Weather Service.

GAGE.--Water-stage recorder. Datum of gage is 1,133.84 above sea level. Aug. 1904 to June 1987 nonrecording gages at different datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow partly regulated by powerplants and Winnibigoshish, Leech, Pokegama, Sandy, and Gull Lakes and by Pine River Reservoir (see stations 05201000, 05206000, 05210500, 05218500, 05230500, 05246500).

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

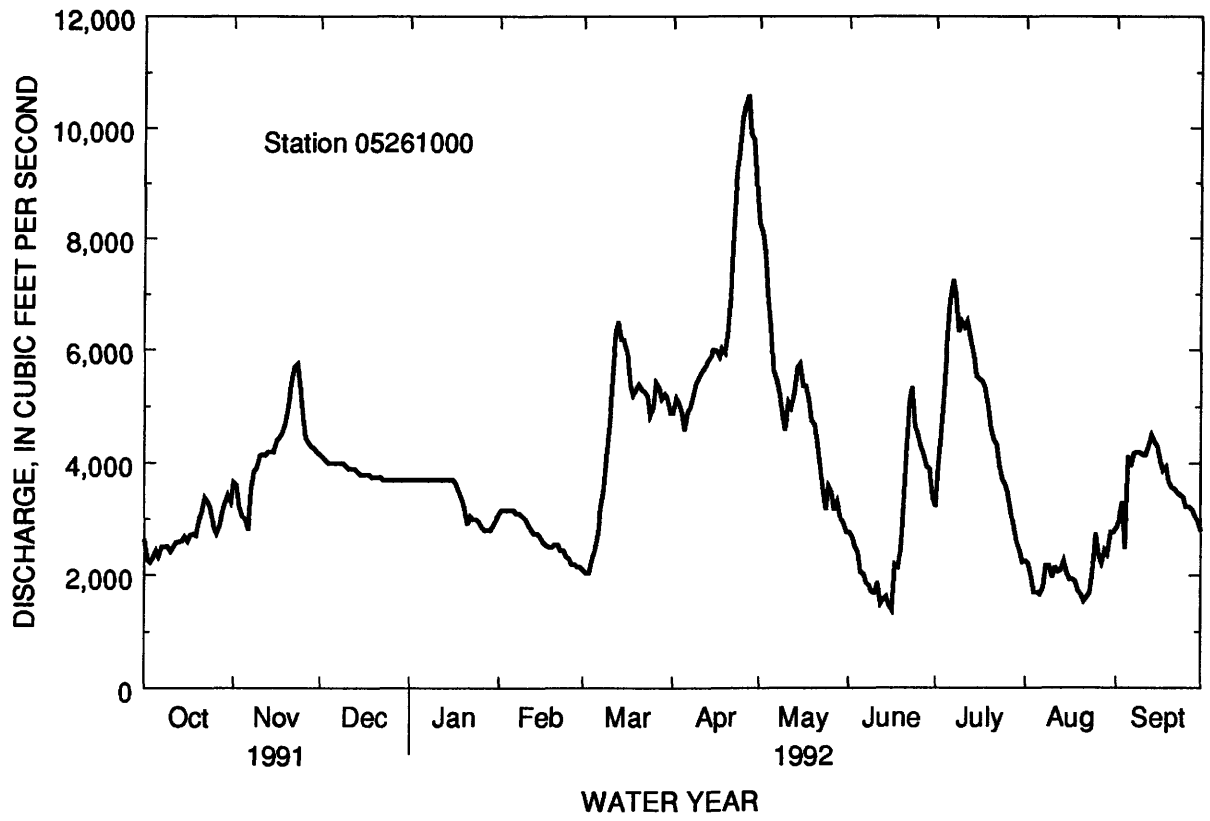
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2640	3660	e4150	e3700	e3100	e2100	4890	8270	2770	3220	2270	2850
2	2280	3600	e4100	e3700	e3150	e2050	5160	8110	2690	3970	2220	2970
3	2230	3230	e4050	e3700	e3150	e2050	5070	7750	2520	4620	1960	3300
4	2340	3040	e4000	e3700	e3150	e2300	4890	7010	2400	5270	1700	3480
5	2430	3000	e4000	e3700	e3150	e2450	4580	6400	2060	6260	1700	4130
6	2330	2800	e4000	e3700	e3150	e2750	4900	5640	2020	6890	1670	3950
7	2500	3510	e4000	e3700	e3100	e3200	4990	5480	1880	7260	1800	4170
8	2510	3850	e4000	e3700	e3100	e3550	5210	5270	1820	6990	2170	4200
9	2520	3910	e4000	e3700	e3050	e4100	5410	4870	1700	6330	2170	4200
10	2420	4130	e3950	e3700	e3000	e4700	5520	4580	1690	6520	1970	4150
11	2490	4150	e3900	e3700	e2900	e5500	5610	5070	1880	6420	2150	4150
12	2590	4140	e3900	e3700	e2800	e6300	5700	4980	1500	6520	2070	4330
13	2600	e4200	e3900	e3700	e2750	6520	5790	5230	1570	6220	2090	4510
14	2610	e4200	e3850	e3700	e2750	6200	5880	5680	1630	5990	2260	4380
15	2690	e4200	e3800	e3700	e2700	6180	6000	5750	1480	5540	2070	4310
16	2610	e4400	e3800	e3700	e2600	5980	5990	5360	1390	5500	1930	4040
17	2710	e4450	e3800	e3650	e2550	5380	5880	5360	2190	5460	1930	3880
18	2730	e4550	e3800	e3500	e2500	5210	6020	5120	2150	5360	1900	3950
19	2710	e4700	e3750	e3400	e2500	5320	5950	4760	2450	5050	1740	3680
20	3000	e5000	e3750	e3200	e2550	5400	6240	4690	3260	4620	1660	3570
21	3100	e5400	e3750	e2900	e2550	5300	6960	4400	4130	4440	1550	3550
22	3380	e5700	e3750	e3050	e2450	5270	8090	3950	5120	4330	1630	3480
23	3300	e5750	e3700	e3000	e2450	5190	9180	3570	5340	3970	1690	3430
24	3190	e5400	e3700	e3000	e2350	4850	9530	3170	4640	3720	2170	3390
25	2850	e4800	e3700	e2950	e2300	4980	10200	3590	4530	3640	2750	3220
26	2740	e4450	e3700	e2850	e2200	5430	10400	3480	4290	3480	2360	3220
27	2880	e4350	e3700	e2800	e2200	5340	10600	3150	4170	3130	2220	3170
28	3100	e4300	e3700	e2800	e2150	5140	9900	3320	3950	2810	2450	3070
29	3300	e4250	e3700	e2800	e2150	5230	9790	3010	3900	2600	2380	2970
30	3430	e4200	e3700	e2900	---	5160	8850	2930	3390	2430	2770	2790
31	3310	---	e3700	e3000	---	4890	---	2770	---	2240	2770	---
TOTAL	85520	127320	119300	105000	78500	144020	203180	152720	84510	150800	64170	110490
MEAN	2759	4244	3848	3387	2707	4646	6773	4926	2817	4865	2070	3683
MAX	3430	5750	4150	3700	3150	6520	10600	8270	5340	7260	2770	4510
MIN	2230	2800	3700	2800	2150	2050	4580	2770	1390	2240	1550	2790
AC-FT	169600	252500	236600	208300	155700	285700	403000	302900	167600	299100	127300	219200
CFSM	.25	.39	.35	.31	.25	.42	.62	.45	.26	.44	.19	.33

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1992, BY WATER YEAR (WY)

MEAN	3162	3309	2628	2325	2224	3933	7429	6708	4348	3471	2170	2974
MAX	3343	4244	3848	3387	2707	6042	12210	9403	8021	5319	3360	3897
(WY)	1989	1992	1992	1992	1992	1990	1989	1991	1990	1991	1987	1989
MIN	2759	2680	1827	1518	1508	2671	5510	3025	1196	729	1517	1769
(WY)	1992	1989	1991	1991	1991	1991	1990	1988	1988	1988	1989	1990

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1987 - 1992	
ANNUAL TOTAL	1455090		1425530			
ANNUAL MEAN	3987	3895	3724			
HIGHEST ANNUAL MEAN	4380	1989				
LOWEST ANNUAL MEAN	2813	1988				
HIGHEST DAILY MEAN	13400	May 10	10600	Apr 27	15000	Apr 15 1989
LOWEST DAILY MEAN	1400	Jan 16	1390	Jun 16	558	Jul 30 1988
ANNUAL SEVEN-DAY MINIMUM	1470	Jan 11	1590	Jun 10	626	Jul 24 1988
INSTANTANEOUS PEAK FLOW	10800	Apr 27	15300	Apr 15 1989		
INSTANTANEOUS PEAK STAGE	8.60	Dec	5	10.30	Mar 18 1990	
INSTANTANEOUS LOW FLOW	1340	Jun 17	528	Jul 30 1988		
ANNUAL RUNOFF (AC-FT)	2886000	2828000	2698000			
ANNUAL RUNOFF (CFSM)	.36	.35	.34			
10 PERCENT EXCEEDS	7070	5880	6580			
50 PERCENT EXCEEDS	3600	3700	3000			
90 PERCENT EXCEEDS	1500	2160	1500			

e Estimated



MISSISSIPPI RIVER MAIN STEM

05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN

LOCATION.--Lat 45°51'41", long 94°21'33", in lot 2, sec. 20, T. 39 N., R. 32 W., Morrison County, Hydrologic Unit 07010104, at plant of Minnesota Power Co., 4 mi northwest of Royalton, 4.5 mi downstream from Swan River, and at mile 956 upstream from Ohio River.

DRAINAGE AREA.--11,600 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1924 to current year.

REMARKS.--No estimated daily discharges. Records fair. Discharge computed based on powerplant records adjusted by correction factors based on current-meter measurements. Flow partly regulated by powerplants and Winnibigoshish, Leech, Pokegma, Sandy, and Gull Lakes and by Pine River Reservoir (see stations 05201000, 05206000, 05210500, 05218500, 05230500, 05246500).

COOPERATION.--Records collected by Minnesota Power Co. under general supervision of Geological Survey, in connection with a Federal Power Commission project.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

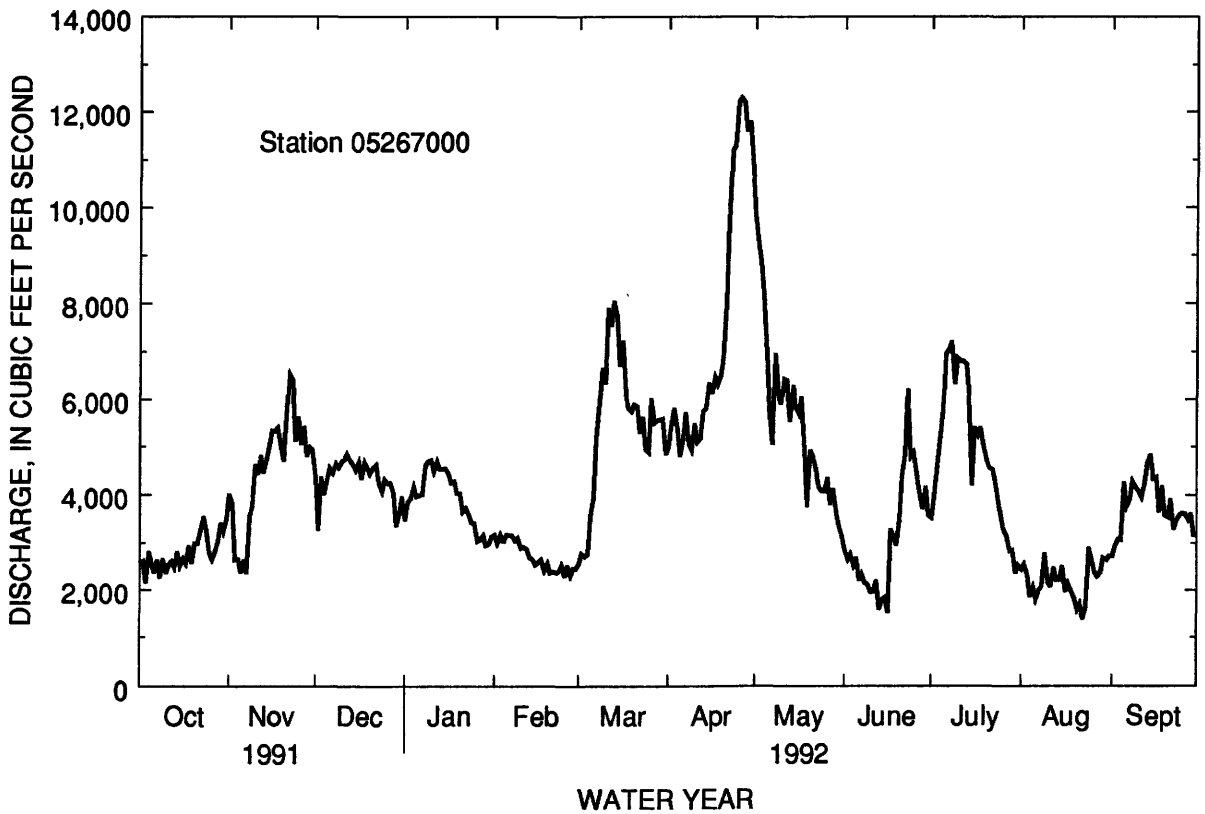
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2570	4010	4360	3480	3170	2570	4990	9860	2870	3540	2450	2730
2	2610	3830	3280	3860	3000	2780	5510	9240	2670	3980	2560	2950
3	2160	2640	4370	3940	3180	2720	5820	8870	2770	4620	2350	3090
4	2810	2660	4010	4180	3020	2770	5380	8210	2550	5120	1870	3080
5	2570	2380	4310	3970	3170	3560	4800	6960	2710	5780	2070	4270
6	2370	2640	4560	4000	3160	3950	5160	5820	2210	6960	1810	3780
7	2640	2360	4450	4020	3160	5160	5720	5060	2350	7060	2020	3920
8	2270	3560	4650	4620	3060	5920	5050	6960	2160	7220	2080	4300
9	2670	3760	4570	4690	3110	6660	4930	6120	2130	6330	2790	4180
10	2360	4630	4690	4720	2890	6330	5480	5910	1960	6870	2180	4070
11	2540	4430	4740	4500	2920	7900	5090	6430	1980	6800	2080	3960
12	2610	4820	4860	4700	2870	7530	5170	6400	2210	6800	2490	4250
13	2490	4450	4720	4540	2710	8040	5750	5550	1590	6730	2230	4670
14	2810	4730	4650	4540	2660	7750	5820	6290	1800	6060	2230	4840
15	2520	4980	4520	4550	2550	6710	6350	5840	1840	4210	2520	4350
16	2670	5340	4680	4440	2600	7220	6120	5710	1520	5420	1980	4380
17	2570	5320	4330	4250	2650	6110	6470	6060	3290	5250	2150	3660
18	2930	5400	4680	4280	2430	5810	6320	4920	3150	5420	1980	4190
19	2570	5060	4570	4040	2570	5750	6490	3780	2960	5020	1860	3590
20	2990	4710	4440	4030	2380	5900	6870	4930	3490	4720	1590	3550
21	2990	5650	4560	3650	2400	5850	7990	4810	4390	4560	1710	3920
22	3270	6520	4630	3740	2380	5290	9690	4530	4840	4540	1390	3300
23	3550	6390	4260	3610	2420	5630	11200	4170	6220	4290	1650	3490
24	3270	5120	4080	3430	2530	4950	11300	4080	4800	3850	2910	3590
25	2780	5630	4320	3410	2300	4880	12200	4080	4880	3570	2680	3630
26	2650	5050	4240	3040	2530	6020	12300	4360	4440	3300	2390	3610
27	2820	5430	4260	3070	2320	5510	12200	3810	4070	3150	2310	3490
28	3020	4800	4040	3160	2470	5550	11600	4130	3720	2840	2390	3630
29	3420	4990	3360	2950	2460	5570	11800	3610	4180	2850	2690	3170
30	3240	4940	3620	2990	---	5590	10800	3370	3590	2370	2660	3160
31	3500	---	3970	3140	---	4840	---	3140	---	2540	2730	---
TOTAL	86240	136230	134780	121540	79070	170820	224370	173010	93340	151770	68800	112800
MEAN	2782	4541	4348	3921	2727	5510	7479	5581	3111	4896	2219	3760
MAX	3550	6520	4860	4720	3180	8040	12300	9860	6220	7220	2910	4840
MIN	2160	2360	3280	2950	2300	2570	4800	3140	1520	2370	1390	2730
AC-FT	171100	270200	267300	241100	156800	338800	445000	343200	185100	301000	136500	223700
CFSM	.24	.39	.37	.34	.24	.48	.64	.48	.27	.42	.19	.32
IN.	.28	.44	.43	.39	.25	.55	.72	.55	.30	.49	.22	.36

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1924 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3969	3749	2921	2597	2493	3639	8869	8427	6363	4513	3520	3481
MAX	12930	14640	6456	5713	5048	12290	22200	24600	18160	12420	15230	12940
(WY)	1966	1972	1952	1966	1984	1966	1966	1950	1965	1975	1953	1986
MIN	632	618	627	534	758	968	1924	1663	1071	648	449	535
(WY)	1937	1937	1935	1935	1937	1940	1931	1977	1988	1988	1934	1934

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1924 - 1992	
ANNUAL TOTAL	1462140		1552770			
ANNUAL MEAN	4006		4243		4572	
HIGHEST ANNUAL MEAN					9555	1966
LOWEST ANNUAL MEAN					1213	1934
HIGHEST DAILY MEAN	13800	May 10	12300	Apr 26	37700	Apr 16 1965
LOWEST DAILY MEAN	1190	Aug 19	1390	Aug 22	254	Nov 25 1936
ANNUAL SEVEN-DAY MINIMUM	1380	Feb 2	1760	Aug 17	358	Sep 3 1936
INSTANTANEOUS PEAK FLOW			12300	Apr 26	37700	Apr 16 1965
INSTANTANEOUS LOW FLOW			1390	Aug 22	254	Nov 25 1936
ANNUAL RUNOFF (AC-FT)	2900000		3080000		3312000	
ANNUAL RUNOFF (CFSM)	.35		.37		.39	
ANNUAL RUNOFF (INCHES)	4.69		4.98		5.36	
10 PERCENT EXCEEDS	7200		6390		9450	
50 PERCENT EXCEEDS	3430		4010		3300	
90 PERCENT EXCEEDS	1430		2370		1260	



MISSISSIPPI RIVER MAIN STEM

05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1963-66, 1975 to current year.
REMARKS.--Letter K indicates non-ideal colony count.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCTANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
NOV												
26...	1215	5030	275	286	7.9	7.8	0.0	3.5	732	13.1	--	--
JAN												
08...	1030	--	303	320	7.8	7.8	0.5	1.9	731	10.0	50	24
MAR												
23...	1300	5620	265	308	8.3	7.9	2.0	3.0	733	12.3	<1	K16
MAY												
20...	1230	4950	251	263	8.2	8.1	19.0	3.4	738	9.5	K15	220
SEP												
08...	1030	4320	285	301	8.4	8.3	18.5	2.3	741	9.8	K8	K10

DATE	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	CAR-BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
NOV												
26...	37	13	6.4	2.0	135	138	0	165	8.7	5.0	0.10	9.2
JAN												
08...	41	14	6.3	1.9	154	158	0	188	7.5	3.5	0.20	9.7
MAR												
23...	40	13	5.7	<0.10	136	140	0	166	12	6.8	0.10	11
MAY												
20...	34	11	5.3	1.6	124	124	0	151	7.1	4.9	0.20	5.1
SEP												
08...	40	14	13	1.5	146	144	11	178	12	6.3	0.20	7.7

MISSISSIPPI RIVER MAIN STEM

05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN--Continued
(National stream-quality accounting network station)

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV 26...	179	0.010	0.290	0.050	0.050	0.80	0.050	0.020	0.010	<0.010	9	81
JAN 08...	177	<0.010	0.260	0.110	0.110	0.60	0.020	0.020	0.010	0.010	4	92
MAR 23...	175	<0.010	0.470	0.110	0.100	0.70	0.040	0.010	<0.010	0.020	11	96
MAY 20...	169	0.010	0.110	0.020	0.020	0.70	0.050	0.020	0.010	<0.010	21	97
SEP 08...	193	<0.010	<0.050	0.020	0.020	0.50	0.030	0.020	0.020	<0.010	9	96

DATE	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	VANA-DIUM, DIS-SOLVED (UG/L AS V) (01085)
NOV 26...	<10	43	<3	240	<4	45	<10	<1	<1	<1.0	76	<6
JAN 08...	--	--	--	--	--	--	--	--	--	--	--	--
MAR 23...	10	46	<3	380	<4	62	<10	<1	<1	<1.0	77	<6
MAY 20...	<10	42	<3	140	<4	38	<10	2	<1	<1.0	74	<6
SEP 08...	10	37	<3	22	5	6	<10	<1	<1	<1.0	90	<6

SAUK RIVER BASIN

05270500 SAUK RIVER NEAR ST. CLOUD, MN

LOCATION.--Lat 45°33'35", long 94°14'00", in SW¼SW¼ sec. 8, T. 124 N., R. 28 W., Stearns County, Hydrologic Unit 07010203, on right bank 0.5 mi northwest of Waite Park, 3 mi west of St. Cloud, and 5 mi upstream from mouth.

DRAINAGE AREA.--925 mi².

PERIOD OF RECORD.--July 1909 to December 1912, April to December 1913, May to November 1929, March 1930 to September 1931, April to November 1932, March to November 1933, March 1934 to September 1981, October 1990 to September 30, 1991. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORD--WSP 895: Drainage area. WSP 1308: 1912(M), 1932 (M). WSP 1508: 1937(m).

GAGE.--Water-stage recorder. Datum of gage is 1,034.63 ft above mean sea level. Prior to Nov. 22, 1934, nonrecording gage on highway bridge 1 mi downstream at datum 6.77 ft lower.

REMARKS:.--Records good except those for estimated daily discharge, which are fair. Flow regulated by powerplants and reservoirs above station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e520	e230	e330	e155	e140	275	618	1060	280	712	301	227
2	e490	e190	e320	e155	e140	302	588	1040	278	860	302	252
3	e470	e230	e310	e155	e140	345	562	974	267	775	285	251
4	e440	e270	e300	e155	e140	392	537	888	258	696	268	236
5	e420	e285	e295	e160	e140	473	522	832	236	642	255	237
6	e400	e280	e285	e160	e140	631	507	807	226	615	243	227
7	e380	e275	e280	e165	e140	752	491	769	214	586	259	213
8	e360	e265	e275	e165	e140	886	475	697	209	568	253	224
9	e350	e260	e270	e160	e140	1070	464	627	208	532	235	207
10	e330	e260	e265	e160	e135	1250	444	571	212	531	221	217
11	e320	e265	e260	e160	e135	1310	501	562	206	513	201	191
12	e310	e265	e255	e160	e135	1290	503	542	202	537	182	187
13	e300	e265	e255	e160	e135	1240	497	510	199	542	165	175
14	e290	e265	e255	e155	e135	1190	502	480	202	556	161	173
15	e280	269	e260	e155	e135	1180	517	467	178	602	155	164
16	e270	271	e255	e150	e140	1160	536	447	203	646	148	171
17	e260	278	e250	e150	e140	1140	560	451	289	670	140	172
18	e250	320	e245	e150	e140	1090	567	420	399	678	136	173
19	e245	340	e235	e145	e140	1050	628	416	567	693	129	163
20	e245	355	e225	e145	e140	1010	686	411	870	673	127	148
21	e240	377	e220	e145	e140	968	773	394	1060	643	126	146
22	e240	403	e210	e140	e145	931	898	391	1190	619	124	143
23	e240	399	e200	e140	e150	883	984	362	1230	586	122	131
24	e235	430	e190	e135	e160	843	1060	325	1210	559	130	133
25	e235	395	e180	e135	e175	816	1110	330	1160	515	162	123
26	e235	361	e175	e135	e195	779	1110	349	1110	463	196	115
27	e240	315	e170	e130	e225	744	1120	345	1040	416	227	111
28	e250	322	e165	e135	e235	723	1140	336	976	384	249	114
29	e290	341	e160	e135	e245	702	1110	331	870	344	254	97
30	e310	e340	e155	e135	---	690	1080	315	796	320	277	93
31	e290	---	e155	e135	---	659	---	299	---	308	241	---
TOTAL	9735	9121	7405	4620	4440	26774	21090	16748	16345	17784	6274	5214
MEAN	314	304	239	149	153	864	703	540	545	574	202	174
MAX	520	430	330	165	245	1310	1140	1060	1230	860	302	252
MIN	235	190	155	130	135	275	444	299	178	308	122	93
AC-FT	19310	18090	14690	9160	8810	53110	41830	33220	32420	35270	12440	10340
CFSM	.34	.33	.26	.16	.17	.93	.76	.58	.59	.62	.22	.19

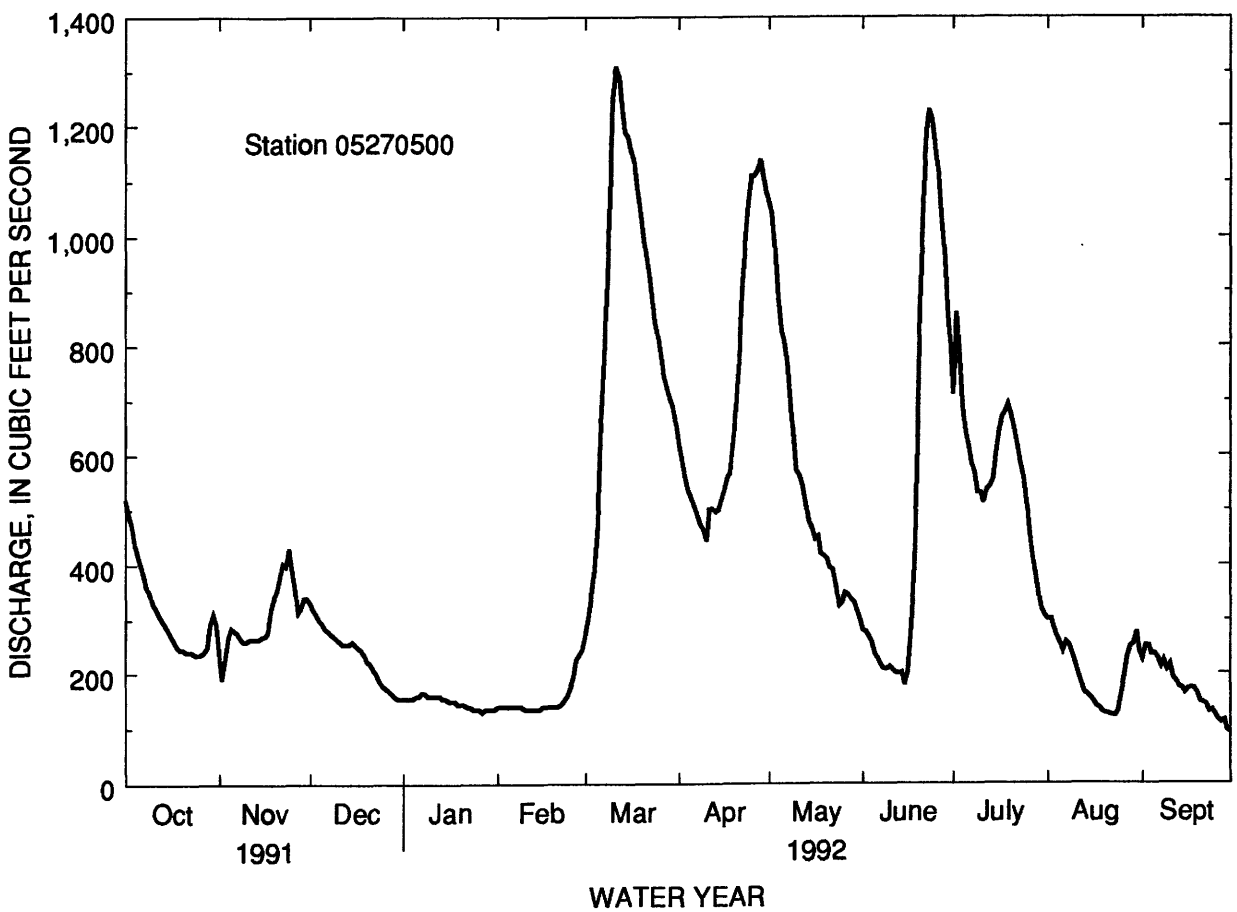
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	146	160	125	90.9	99.6	289	764	466	391	291	193	171
MAX	555	1091	528	336	568	1380	2810	1572	1333	1088	1250	1136
(WY)	1958	1972	1972	1980	1966	1966	1965	1975	1957	1957	1972	1957
MIN	6.22	6.18	5.15	3.25	7.61	28.7	16.5	7.84	15.9	10.6	10.5	10.7
(WY)	1934	1934	1935	1935	1935	1940	1934	1934	1934	1934	1933	1933

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1909 - 1992	
ANNUAL TOTAL	161561		145550			
ANNUAL MEAN	443		398		281a	
HIGHEST ANNUAL MEAN					732	1972
LOWEST ANNUAL MEAN					51.0	1931
HIGHEST DAILY MEAN	1270	May 7	1310	Mar 11	7940	Apr 14 1965
LOWEST DAILY MEAN	82	Jan 15	93	Sep 30	1.3	Jan 6 1935
ANNUAL SEVEN-DAY MINIMUM	83	Jan 9	112	Sep 24	1.5	Jan 2 1935
INSTANTANEOUS PEAK FLOW			1410	Mar 10	9100	Apr 13 1965
INSTANTANEOUS PEAK STAGE			4.35	Mar 10	10.68	Apr 13 1965
INSTANTANEOUS LOW FLOW			90	Sep 29, 30	.30	Nov 25 1936
ANNUAL RUNOFF (AC-FT)	320500		288700		203600	
ANNUAL RUNOFF (CFSM)	.48		.43		.30	
10 PERCENT EXCEEDS	868		884		660	
50 PERCENT EXCEEDS	360		276		123	
90 PERCENT EXCEEDS	86		140		34	

a Median of annual mean discharges is 244 ft³/s.



MISSISSIPPI RIVER MAIN STEM

05270700 MISSISSIPI RIVER AT ST. CLOUD, MN

LOCATION.--Lat 45°32'50", long 94°08'44", in SE¼SW¼ sec. 1, T. 35 N., R. 31 W., Sherburne County, Hydrologic Unit 07010203, on left bank about 250 ft below the left downstream end of the City of St. Cloud hydropower dam and at mile 926.3 upstream from Ohio River.

DRAINAGE AREA.--13,320 mi², approximately.

PERIOD OF RECORD.--October 1988 to current year.

GAGE.--Water-stage recorder. Datum of gage is 958.49 ft above sea level.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow partly regulated by powerplants and Winnibigoshish, Leech, Pokegama, Sandy, and Gull Lakes and by Pine River Reservoir (see stations 05201000, 05206000, 05210500, 05218500, 05230500, 05246500).

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

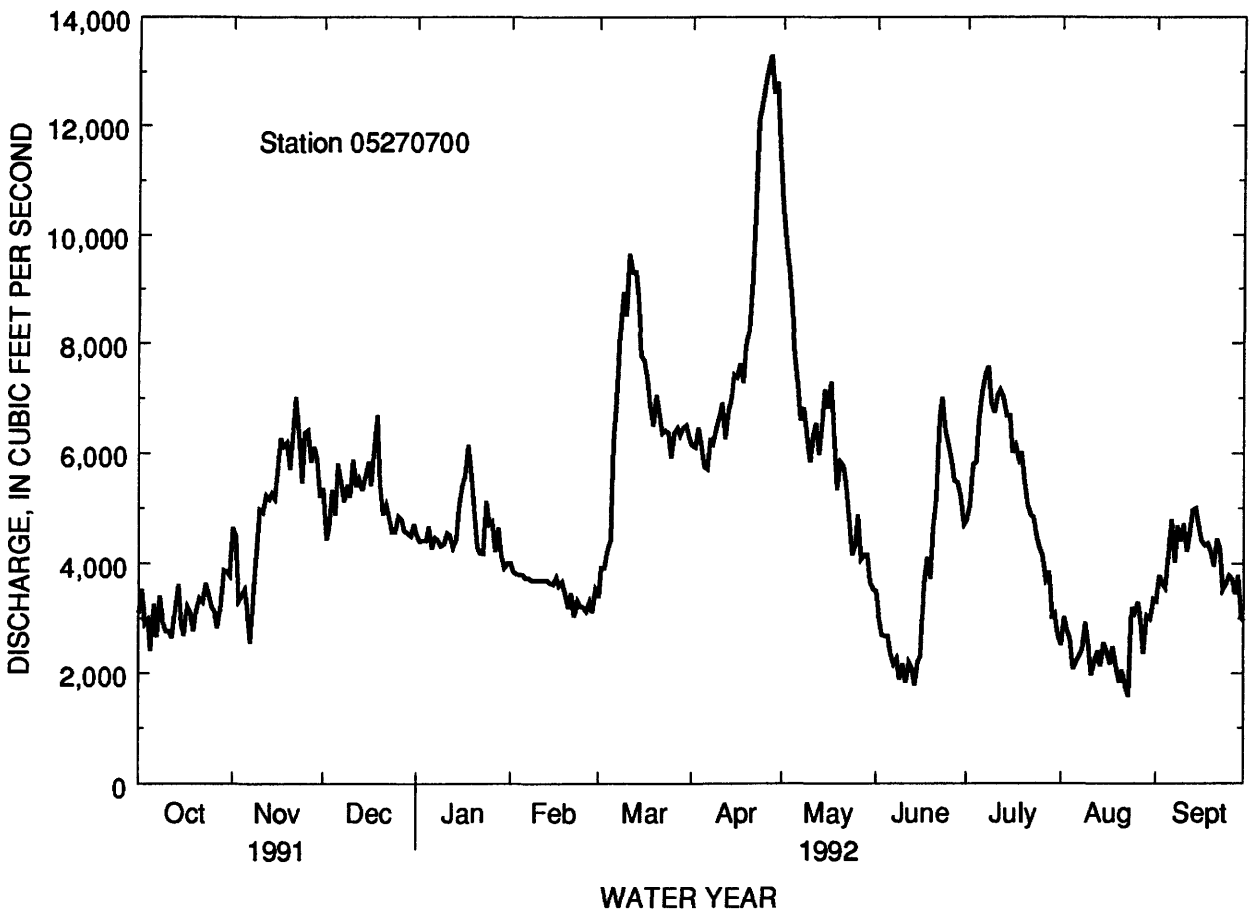
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3100	4650	5370	4540	e4010	3400	6150	10600	3500	4810	2520	3330
2	3520	4500	4440	4410	e3860	3930	6110	9910	3060	5050	3030	3790
3	2890	3330	4660	4420	e3820	3930	6460	9380	2710	5800	2800	3640
4	2970	3430	5330	4420	e3800	4270	6200	8760	2680	5850	2640	3570
5	2410	3540	4900	4680	e3800	4430	5760	7770	2680	6600	2080	4160
6	3260	3030	5810	4280	e3750	6190	5720	7240	2370	7100	2220	4810
7	2670	2550	5480	4480	e3750	6990	6280	6600	2170	7430	2310	4040
8	3410	3570	5130	4440	e3700	8190	6200	6830	2280	7580	2430	4690
9	2940	4340	5430	4330	e3700	8930	6460	6330	1890	6920	2930	4420
10	2770	4980	5220	4360	e3700	8500	6690	5850	2170	6740	2490	4730
11	2770	4940	5880	4560	e3700	9650	6920	6280	1830	7060	1970	4230
12	2650	5240	5400	4530	e3700	9310	6280	6550	2200	7150	2220	4540
13	3190	5170	5530	4310	e3700	9310	6780	5980	2110	7010	2400	4970
14	3620	5270	5330	4440	e3650	8840	7010	6460	1780	6690	2140	5010
15	2890	5180	5590	e5000	3630	7770	7430	7150	2220	6690	2550	4650
16	2700	5780	5840	e5400	3760	7700	7390	6830	2310	6020	2400	4420
17	3220	6280	5420	e5600	3610	7340	7630	7290	3640	6150	2170	4340
18	3100	6130	6110	e6150	3670	6870	7290	6420	4120	5890	2490	4380
19	2780	6200	6680	e5700	3440	6510	7960	5340	3750	6020	2140	4190
20	3150	5720	5430	e5000	3200	7060	8210	5850	4650	5470	1830	3970
21	3370	6280	4900	e4300	3460	6780	9170	5760	5180	5050	2050	4460
22	3300	7010	5070	e4200	3050	6370	10600	5470	6640	4890	1780	4270
23	3640	6370	4820	e4190	3320	6420	12100	4850	7010	4850	1570	3540
24	3470	5470	4580	e5130	3230	6370	12400	4160	6420	4500	3200	3640
25	3220	6370	4590	e4730	3210	5930	12800	4340	6150	4270	3100	3790
26	3110	6420	4870	e4770	3140	6370	13100	4890	5850	4160	3300	3720
27	2830	5850	4810	e4230	3310	6460	13300	4080	5510	3720	2960	3470
28	3250	6110	4610	e4650	3130	6330	12600	4160	5470	3860	2370	3790
29	3890	5890	4560	e4160	3540	6460	12800	4160	5220	3060	3060	3030
30	3860	5220	4510	e3930	---	6510	11700	3680	4730	3100	3000	2960
31	3790	---	4730	e4010	---	6280	---	3540	---	2710	3360	---
TOTAL	97740	154820	161030	143350	103340	209400	255500	192510	112300	172200	77510	122550
MEAN	3153	5161	5195	4624	3563	6755	8517	6210	3743	5555	2500	4085
MAX	3890	7010	6680	6150	4010	9650	13300	10600	7010	7580	3360	5010
MIN	2410	2550	4440	3930	3050	3400	5720	3540	1780	2710	1570	2960
AC-FT	193900	307100	319400	284300	205000	415300	506800	381800	222700	341600	153700	243100
CFSM	.24	.39	.39	.35	.27	.51	.64	.47	.28	.42	.19	.31

e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3650	3801	3177	2832	2574	5551	9988	9544	6617	5365	2376	4493
MAX	4176	5161	5195	4624	3563	7557	15760	12480	10100	7206	3369	7360
(WY)	1991	1992	1992	1992	1992	1990	1989	1991	1990	1991	1991	1988
MIN	3153	2953	2310	1927	1815	3860	6576	6210	3743	3930	1535	2297
(WY)	1992	1989	1991	1991	1990	1989	1990	1992	1992	1989	1989	1990

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1988 - 1992	
ANNUAL TOTAL	1975260		1802250			
ANNUAL MEAN	5412		4924		4943	
HIGHEST ANNUAL MEAN					5154	1991
LOWEST ANNUAL MEAN					4615	1990
HIGHEST DAILY MEAN	17600	May 9	13300	Apr 27	18900	Apr 10 1989
LOWEST DAILY MEAN	1600	Feb 26	1570	Aug 23	1010	Aug 24 1989
ANNUAL SEVEN-DAY MINIMUM	1840	Mar 9	2000	Aug 17	1250	Aug 13 1989
INSTANTANEOUS PEAK FLOW			13700	Apr 27	19700	May 9 1991
INSTANTANEOUS PEAK STAGE			6.80	Apr 27	7.71	May 9 1991
INSTANTANEOUS LOW FLOW			729	Oct 11	729	Oct 11 1991
ANNUAL RUNOFF (AC-FT)	3918000		3575000		3581000	
ANNUAL RUNOFF (CFSM)	.41		.37		.37	
10 PERCENT EXCEEDS	10000		7150		9620	
50 PERCENT EXCEEDS	4910		4550		3930	
90 PERCENT EXCEEDS	1880		2680		1910	



ELK RIVER BASIN

05275000 ELK RIVER NEAR BIG LAKE, MN

LOCATION.--Lat 45°20'02", long 93°40'00", in NE¼SW¼ sec.23, T.22 N., R.27 W., Sherburne County, Hydrologic Unit 07010203, on right bank at upstream side of highway bridge, 4 mi east of Big Lake and 4 mi downstream from St. Francis River.

DRAINAGE AREA.--615 mi².

PERIOD OF RECORD.--April 1911 to September 1917, April to September 1931, April to November 1932, March to November 1933, March 1934 to September 1987, October 1990 to current year.

REVISED RECORDS.--WSP 895: 1939. WSP 1308: 1912(M), 1915-17(M).

GAGE.--Water-stage recorder. Datum of gage is 899.60 ft above mean sea level. April 1911 to Sept. 30, 1917, April 1, 1931, to July 26, 1934, nonrecording gage at same site and datum.

REMARKS.--Records good except those for periods of estimated daily discharge, which are fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	239	318	e225	e200	e210	e265	e370	e695	190	157	115	120
2	239	e242	e225	e200	e205	e300	e365	e640	184	236	117	160
3	239	e275	e220	e200	e205	e370	351	619	176	283	117	172
4	239	e290	e220	e195	e205	e440	352	562	168	264	110	165
5	236	e285	e220	e195	e205	e500	e350	512	168	247	106	170
6	236	e275	e215	e195	e200	e660	344	469	166	238	102	171
7	236	e270	e215	e195	e200	741	342	e400	166	228	146	165
8	232	e270	e215	e195	e200	876	342	367	167	221	182	154
9	229	e270	e215	e195	e200	1350	342	310	166	211	164	145
10	226	e270	e215	e195	e200	1510	353	279	161	226	150	134
11	226	e275	e215	e195	e200	1720	365	312	154	227	140	128
12	226	e280	e215	e195	e200	1410	381	340	148	272	129	121
13	232	e285	e215	e195	e200	1280	382	323	143	290	123	113
14	232	e290	e210	e195	e205	1080	380	307	146	266	117	113
15	236	e300	e210	e195	e210	891	390	286	162	249	111	112
16	242	e305	e205	e195	e210	820	404	277	177	239	106	118
17	236	e310	e200	e195	e215	986	411	272	234	230	102	114
18	232	e315	e200	e195	e215	1160	430	257	234	217	101	106
19	232	e320	e200	e195	e215	1040	478	242	219	212	97	104
20	229	e325	e200	e195	e220	859	518	231	205	202	93	100
21	226	e330	e200	e195	e225	733	583	230	188	189	90	94
22	226	e335	e200	e195	e225	634	611	230	183	179	99	89
23	229	e330	e200	e195	e225	559	622	224	181	177	101	90
24	232	e315	e200	e195	e230	496	655	222	175	168	99	85
25	242	e300	e200	e200	e235	451	750	225	168	162	142	79
26	242	e285	e200	e200	e240	421	810	217	160	158	166	76
27	242	e270	e200	e205	e240	401	815	210	152	152	157	77
28	242	e255	e200	e205	e245	e395	836	201	153	141	148	78
29	284	e240	e200	e210	e255	e390	e800	197	159	132	140	80
30	311	e230	e200	e210	---	e380	e740	197	156	128	131	81
31	314	---	e200	e210	---	e375	---	195	---	120	126	---
TOTAL	7464	8660	6455	6135	6240	23493	14872	10048	5209	6421	3827	3514
MEAN	241	289	208	198	215	758	496	324	174	207	123	117
MAX	314	335	225	210	255	1720	836	695	234	290	182	172
MIN	226	230	200	195	200	265	342	195	143	120	90	76
AC-FT	14800	17180	12800	12170	12380	46600	29500	19930	10330	12740	7590	6970
CFSM	.39	.47	.34	.32	.35	1.23	.81	.53	.28	.34	.20	.19
IN.	.45	.52	.39	.37	.38	1.42	.90	.61	.32	.39	.23	.21

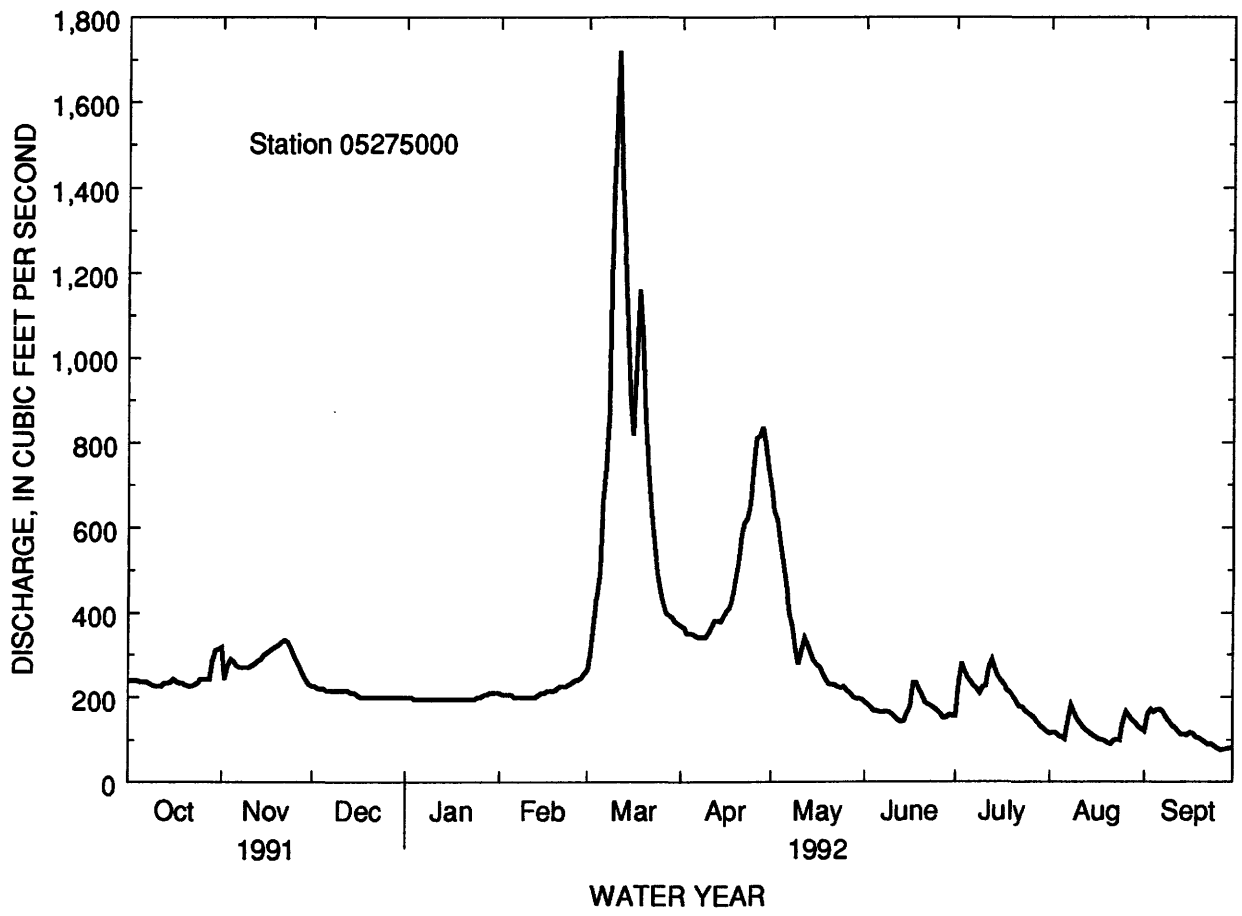
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1911 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	213	212	150	111	117	304	649	441	345	269	177	200
MAX	778	794	410	290	392	1125	1823	1620	1647	1026	926	1050
(WY)	1985	1972	1966	1979	1984	1966	1969	1986	1984	1978	1972	1986
MIN	32.7	56.3	44.1	38.4	29.8	58.8	75.5	37.5	20.5	8.94	8.74	23.4
(WY)	1934	1935	1935	1935	1936	1934	1934	1934	1934	1934	1934	1932

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1911 - 1992	
ANNUAL TOTAL	154704		102338			
ANNUAL MEAN	424		280		277	
HIGHEST ANNUAL MEAN					669	1986
LOWEST ANNUAL MEAN					88.0	1935
HIGHEST DAILY MEAN	2040	May 10	1720	Mar 11	7170	Apr 16 1965
LOWEST DAILY MEAN	128	Jan 22	76	Sep 26	4.0	Aug 1 1934
ANNUAL SEVEN-DAY MINIMUM	129	Jan 19	79	Sep 24	4.5	Jul 27 1934
INSTANTANEOUS PEAK FLOW			1790	Mar 10	7360	Apr 16 1965
INSTANTANEOUS PEAK STAGE			5.05	Mar 10	10.86	Apr 16 1965
INSTANTANEOUS LOW FLOW			76a		3.6	Jul 31 1934
ANNUAL RUNOFF (AC-FT)	306900		203000		200800	
ANNUAL RUNOFF (CFSM)	.69		.45		.45	
ANNUAL RUNOFF (INCHES)	9.36		6.19		6.12	
10 PERCENT EXCEEDS	960		483		560	
50 PERCENT EXCEEDS	290		215		164	
90 PERCENT EXCEEDS	143		120		66	

a Occurred on Sept. 25, 26, 27, 28.



CROW RIVER BASIN

05280000 CROW RIVER AT ROCKFORD, MN

LOCATION.--Lat 45°05'12", long 93°44'02", in sec.29, T.119 N., R.24 W., Hennepin County, Hydrologic Unit 07010204, on right bank at Rockford, 150 ft downstream from bridge on State Highway 55 and 1 mi downstream from confluence of North and South Forks.

DRAINAGE AREA.--2,520 mi², approximately.

PERIOD OF RECORD.--April to July 1906 (published as "near Dayton"), June 1909 to September 1917, April to November 1929, March 1930 to September 1931, April to November 1932, March to November 1933, March 1934 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1115: 1932. WSP 1508: 1933. WDR MN-77-2: 1972 (M)(m).

GAGE.--Water-stage recorder. Datum of gage is 893.08 ft above mean sea level. Apr. 13 to July 21, 1906, nonrecording gage at Berning Mill 14 mi downstream at different datum. June 4, 1909, to Sept. 30, 1917, nonrecording gage at site 600 ft downstream at different datum. Apr. 23, 1929, to Aug. 21, 1934, nonrecording gage at site 600 ft downstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4510	1260	e1790	930	e800	e1300	2560	2620	904	1580	937	657
2	4280	1030	e1770	924	e780	e1620	2510	2510	861	1600	921	674
3	4060	e751	e1700	919	765	e1980	2450	2400	816	1680	1050	691
4	3850	e989	e1620	922	e760	e2350	2380	2300	771	1850	1090	749
5	3660	e1050	e1500	922	e760	e2730	2320	2200	733	1940	1060	819
6	3480	e1050	e1400	924	e750	e3580	2260	2070	704	1980	1010	943
7	3310	e965	e1320	e941	e750	4560	2200	1950	678	2000	1040	1030
8	3160	e934	e1300	e949	e750	5540	2130	1850	659	2030	1070	1080
9	3010	e934	e1300	e949	e740	5860	2060	1760	641	2050	1130	1080
10	2870	937	e1300	e965	e730	5550	2000	1670	621	2050	1140	1060
11	2720	950	e1300	e965	e710	5770	1970	1660	595	1970	1120	1020
12	2580	970	e1300	e965	e700	5800	1930	1660	559	1980	1090	964
13	2440	995	e1290	e965	e690	5810	1890	1630	524	1950	1050	901
14	2320	1040	e1290	e965	e680	5580	1840	1590	497	1920	982	839
15	2210	1100	e1250	e965	e670	5150	1820	1540	496	1900	908	779
16	2070	1160	e1210	e960	e660	4770	1810	1500	527	1890	830	1020
17	1880	e1230	e1140	e960	646	4450	1780	1450	740	1870	760	961
18	1810	1400	e1100	e960	633	4150	1750	1400	1140	1870	711	970
19	1760	1620	e1070	e960	e620	3890	1760	1350	1410	1870	695	949
20	1690	e1850	e1030	e950	e633	3680	1790	1280	1570	1840	686	913
21	1600	2070	e1010	e940	e652	3520	1880	1230	1660	1770	661	871
22	1510	e2250	e1000	e940	e665	3370	1980	1180	1770	1690	634	816
23	1430	e2300	e1000	e930	e678	3260	2080	1120	1950	1610	601	760
24	1360	e2270	e1000	e920	e684	3160	2200	1070	2140	1520	566	707
25	1300	e2250	e980	e910	e704	3070	2320	1020	2230	1430	586	663
26	1220	e2180	e970	e900	e719	2970	2460	1030	2210	1350	616	626
27	1120	e2120	e970	e880	e724	2880	2610	1030	2130	1280	649	590
28	1080	e2080	e970	e870	e822	2790	2710	1020	1990	1210	693	530
29	1110	e2010	e960	e860	e1040	2730	2730	1010	1840	1140	711	488
30	1130	e1880	953	e840	---	2680	2690	986	1700	1080	705	465
31	1190	---	950	e820	---	2630	---	947	---	1010	681	---
TOTAL	71720	43625	37743	28770	20915	117180	64870	48033	35066	52910	26383	24615
MEAN	2314	1454	1218	928	721	3780	2162	1549	1169	1707	851	820
MAX	4510	2300	1790	965	1040	5860	2730	2620	2230	2050	1140	1080
MIN	1080	751	950	820	620	1300	1750	947	496	1010	566	465
AC-FT	142300	86530	74860	57070	41480	232400	128700	95270	69550	104900	52330	48820
CFSM	.92	.58	.48	.37	.29	1.50	.86	.61	.46	.68	.34	.33
IN.	1.06	.64	.56	.42	.31	1.73	.96	.71	.52	.78	.39	.36

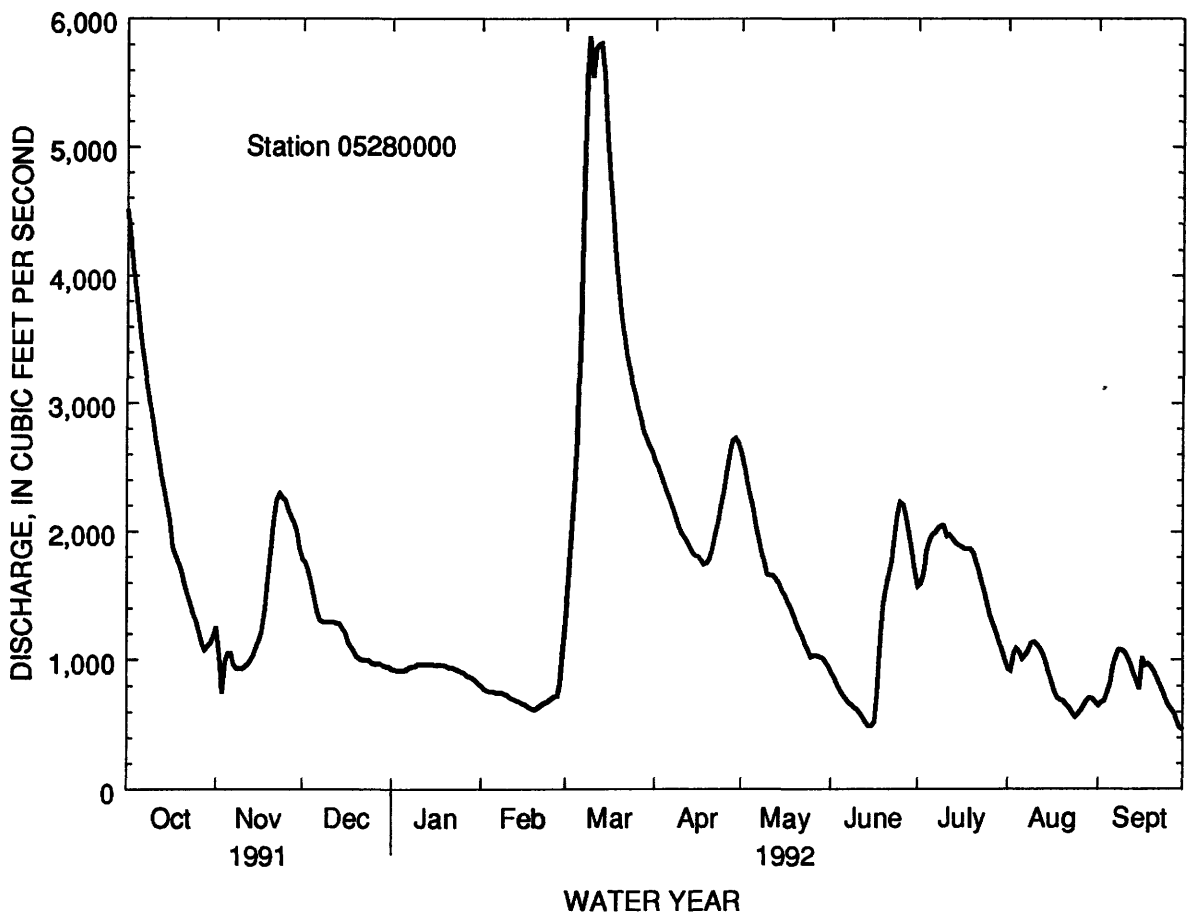
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1906 - 1992, BY WATER YEAR (WY)

MEAN	422	387	271	159	155	818	2048	1343	1208	890	488	460
MAX	3809	1909	1477	928	1115	4085	9026	5992	6166	4359	2511	4941
(WY)	1986	1972	1983	1992	1966	1983	1965	1986	1906	1957	1957	1991
MIN	16.6	28.3	17.3	12.4	12.5	25.1	57.1	26.7	14.8	5.76	5.87	13.0
(WY)	1934	1937	1938	1938	1959	1934	1934	1934	1934	1934	1934	1933

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1906 - 1992	
ANNUAL TOTAL	717045		571830			
ANNUAL MEAN	1965		1562		747a	
HIGHEST ANNUAL MEAN					2754	1986
LOWEST ANNUAL MEAN					64.5	1931
HIGHEST DAILY MEAN	8700	Sep 17	5860	Mar 9	22100	Apr 16 1965
LOWEST DAILY MEAN	72	Jan 1	465	Sep 30	3.8	Aug 4 1934
ANNUAL SEVEN-DAY MINIMUM	72	Jan 1	546	Jun 10	4.0	Jul 31 1934
INSTANTANEOUS PEAK FLOW			5930	Mar 9	22400	Apr 16 1965
INSTANTANEOUS PEAK STAGE			9.70	Mar 9	19.27b	Apr 16 1965
INSTANTANEOUS LOW FLOW			455	Sep 30	1.8c	Nov 15 1936
ANNUAL RUNOFF (AC-FT)	1422000		1134000		543200	
ANNUAL RUNOFF (CFSM)	.78		.62		.30	
ANNUAL RUNOFF (INCHES)	10.58		8.44		4.04	
10 PERCENT EXCEEDS	4060		2720		2050	
50 PERCENT EXCEEDS	1660		1140		235	
90 PERCENT EXCEEDS	88		683		36	

a Median of annual mean discharges is 569 ft³/s.
b From floodmark.
c Caused by ice jam upstream.



RUM RIVER BASIN

05284000 MILLE LACS LAKE AT COVE BAY NEAR ONAMIA, MN

LOCATION.--Lat 46°06'36", long 93°37'08", in NE¼NE¼ sec.21, T.42 N., R.26 W., Mille Lacs County, Hydrologic Unit 07010207, in Minnesota Department of Natural Resources boathouse at Cove Bay boatlanding, 3.6 mi northeast of Onamia.

PERIOD OF RECORD.--June 1931 to current year. Monthend records for the period October 1939 to September 1953 published in WSP 1278 (fragmentary 1940-41). Published as "at Wealthwood" prior to October 1939, and as "at Garrison" October 1939 to September 1987 (gage heights collected at Wealthwood October 1939 to September1941, but converted to gage datum at Garrison for publication).

GAGE.--Water-stage recorder. Datum of gage is 1,240.40 ft above mean sea level (levels by Minnesota Department of Natural Resources). Gage readings have been reduced to elevations above sea level. Prior to Oct. 1, 1941, nonrecording gage at Wealthwood, 17 mi north of present site, at various datums; gage readings have been reduced to elevations, adjustment of 1912. Oct. 1, 1941, to Sept. 30, 1958, water-stage recorder at Garrison, 16 mi northwest of present site at datum 1,240.50 ft, adjustment of 1912. To convert these readings to National Geodetic Vertical Datum of 1929, subtract 0.10 ft. Oct. 1, 1958, to Sept. 30, 1987, water stage recorder at Garrison at present datum.

REMARKS.--Water level affected by fixed-crest spillway constructed in 1953 at outlet of Ogechie Lake, 2.7 mi downstream from outlet of Mille Lacs Lake, with crest at elevation 1,250.50 ft. Water level subject to fluctuation caused by change in direction and velocity of wind and by seiches.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation, 1,253.87 ft, Aug. 14, 1972, affected by wind action and seiche action; maximum daily, 1,253.43 ft, Aug. 22, 1972; minimum observed, 1,245.74 ft, Oct. 16-19, 1936.

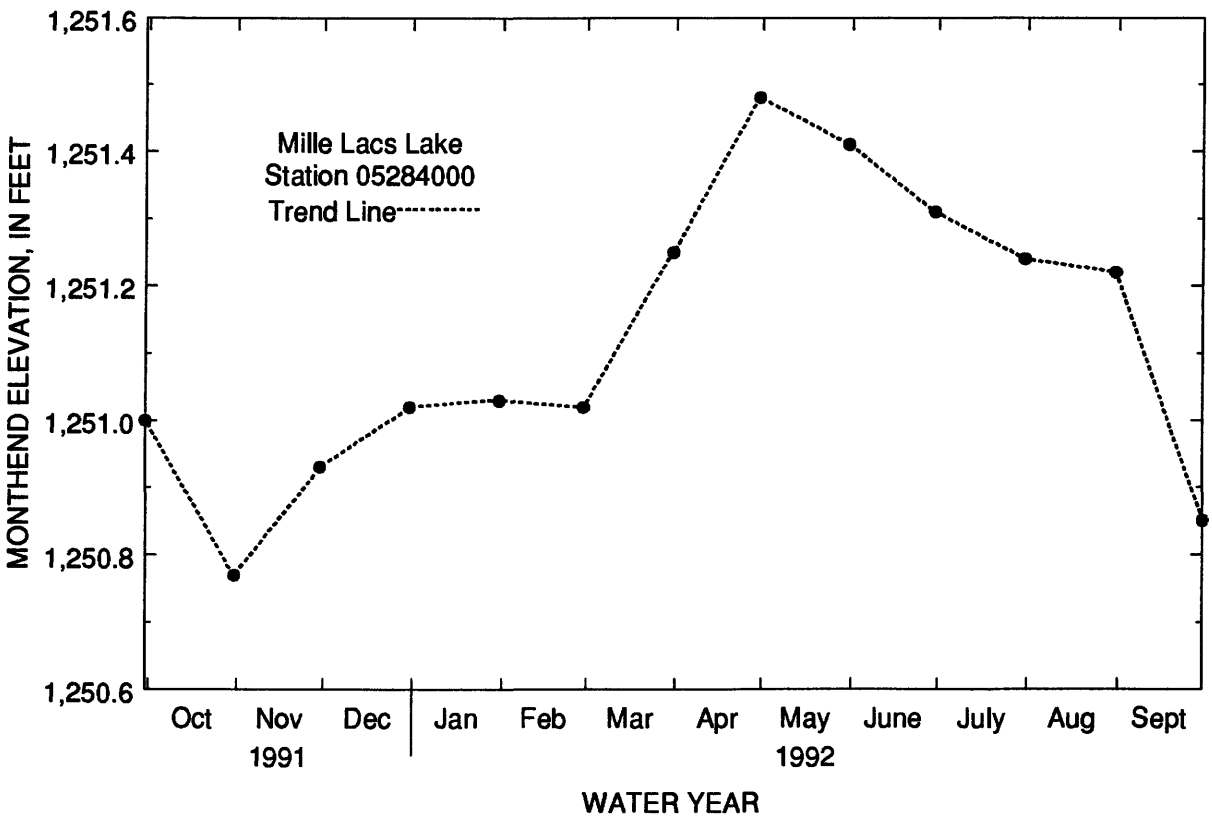
EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,251.90 ft, May 22, affected by wind and seiche action; maximum daily, 1,251.62 ft, May 2; minimum, 1,250.51 ft, Oct. 28, affected by wind and seiche action; minimum daily, 1,250.63ft, Oct. 28.

MONTHEND ELEVATION, IN FEET ABOVE SEA LEVEL, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

Oct. 31.....1,250.77	Feb. 29..... 1,251.02	June 30.....1,251.31
Nov. 30.....1,250.93	Mar. 31 ..... 1,251.25	July 31 .....1,251.24
Dec. 31.....1,251.02	Apr. 30..... 1,251.48	Aug. 31.....1,251.22
Jan. 31 .....1,251.03	May 31..... 1,251.41	Sept. 30.....1,250.85

Note--Elevations other than those shown are available.

05284000 MILLE LACS LAKE AT COVE BAY NEAR ONAMIA, MN--Continued



RUM RIVER BASIN

05286000 RUM RIVER NEAR ST. FRANCIS, MN

LOCATION.--Lat 45°19'40", long 93°22'20", in SE¼ sec.19, T.33 N., R.24 W., Anoka County, Hydrologic Unit 07010207, on left bank at upstream side or highway bridge, 4 mi south of St. Francis and 15.8 mi upstream from mouth.

DRAINAGE AREA.--1,360 mi², approximately.

PERIOD OF RECORD.--May to November 1929, March 1930 to September 1931, April to November 1932, March 1933 to current year.

REVISED RECORDS.--WSP 1308: 1930(M), 1932(M).

GAGE.--Water-stage recorder. Datum of gage is 860.74 ft above mean sea level (levels by Anoka County Highway Department). Prior to Nov. 9, 1933, nonrecording gage at site 50 ft downstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Occasional regulation by Ogechie (also controls Mille Lacs Lake) and Onamia Lakes.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	407	466	e1700	e290	e265	e460	1170	1560	354	281	254	253
2	403	249	e1500	e300	e265	e470	1130	1310	339	356	260	281
3	413	489	e1300	e311	e265	e570	1090	1140	332	405	253	313
4	403	646	e1200	e311	e265	679	1040	1010	320	466	242	325
5	392	632	e1100	e311	e265	788	991	912	308	490	239	333
6	386	658	e1000	e311	e265	1040	948	841	304	505	238	428
7	378	706	e950	e311	e265	1450	919	775	298	489	262	392
8	374	720	e880	e311	e265	1770	888	725	299	458	288	389
9	370	622	e820	e311	e260	1990	827	683	304	423	308	358
10	373	556	e780	e311	e255	2140	804	629	302	427	321	336
11	362	550	e730	e311	e250	2560	803	625	296	397	321	325
12	353	557	e680	e311	e250	2920	818	659	285	437	300	303
13	344	565	e630	e311	e245	3410	828	697	279	459	281	289
14	343	580	e590	e311	e240	3750	841	719	289	468	267	282
15	341	607	e550	e311	e240	3600	858	733	295	480	256	279
16	337	628	e520	e311	e235	3320	889	712	314	475	251	270
17	337	643	e480	e311	e235	2890	936	668	369	453	247	258
18	333	700	e460	e311	e235	2410	1060	621	385	423	247	249
19	325	790	e430	e311	e240	1970	1230	584	379	400	240	242
20	319	888	e400	e311	e245	1700	1420	555	367	379	235	231
21	319	990	e380	e311	e250	1540	1620	524	347	360	227	223
22	321	1070	e350	e311	e280	1430	1750	495	335	347	231	224
23	321	1090	e330	e311	e350	1370	1840	478	330	333	227	218
24	324	1110	e310	e311	e400	1320	1920	461	328	321	228	207
25	326	1320	e300	e305	e430	1290	2080	455	317	312	253	200
26	339	4470	e290	e295	e420	1290	2280	444	307	305	271	198
27	335	4350	e290	e285	e411	1300	2420	434	295	292	274	196
28	342	3630	e290	e275	e410	1320	2420	422	292	287	271	186
29	375	3220	e290	e270	e405	1320	2210	403	280	276	275	181
30	426	2220	e290	e270	---	1280	1890	385	273	270	271	178
31	468	---	e290	e265	---	1230	---	370	---	259	264	---
TOTAL	11189	35722	20110	9397	8406	54577	39920	21029	9522	12033	8102	8147
MEAN	361	1191	649	303	290	1761	1331	678	317	388	261	272
MAX	468	4470	1700	311	430	3750	2420	1560	385	505	321	428
MIN	319	249	290	265	235	460	803	370	273	259	227	178
AC-FT	22190	70850	39890	18640	16670	108300	79180	41710	18890	23870	16070	16160
CFSM	.27	.88	.48	.22	.21	1.29	.98	.50	.23	.29	.19	.20

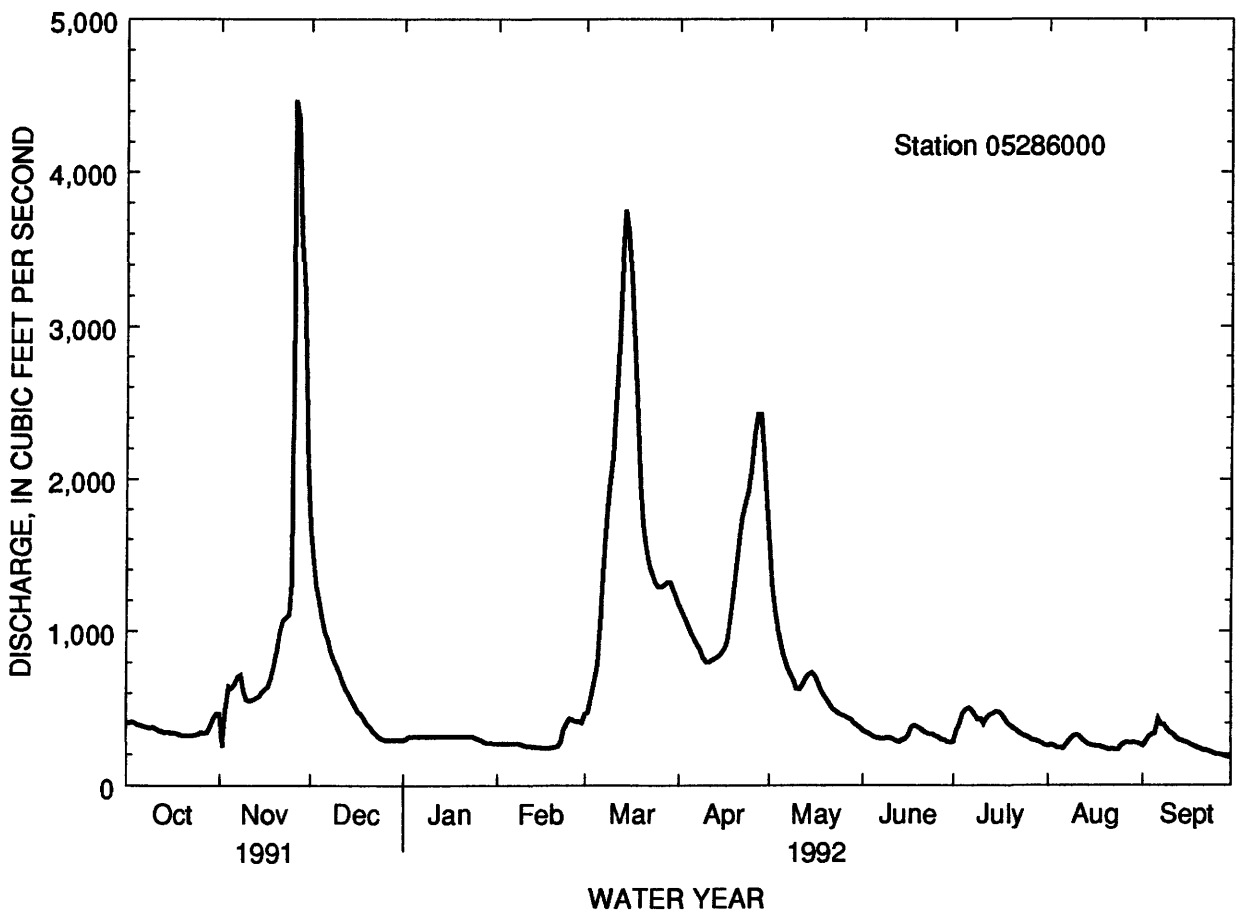
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	463	441	323	241	242	611	1505	1104	891	631	396	424
MAX	2300	1715	1051	660	813	2699	4269	3899	3399	2532	2251	2362
(WY)	1969	1972	1983	1987	1966	1966	1969	1986	1984	1954	1972	1986
MIN	65.4	71.8	55.8	51.5	59.2	75.8	154	73.6	43.7	34.5	37.3	47.1
(WY)	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1934	1933

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1929 - 1992	
ANNUAL TOTAL	332085		238154			
ANNUAL MEAN	910		651		626	
HIGHEST ANNUAL MEAN					1512	1986
LOWEST ANNUAL MEAN					66.1	1934
HIGHEST DAILY MEAN	4470	Nov 26	4470	Nov 26	10000	Apr 13 1969
LOWEST DAILY MEAN	150	Jan 26	178	Sep 30	30	Aug 3 1934
ANNUAL SEVEN-DAY MINIMUM	152	Jan 22	192	Sep 24	31	Aug 1 1934
INSTANTANEOUS PEAK FLOW			5290	Nov 26	10100a	
INSTANTANEOUS PEAK STAGE			7.99	Nov 26	11.63	Apr 13 1969
INSTANTANEOUS LOW FLOW			160	Nov 2	29	Aug 18 1934
ANNUAL RUNOFF (AC-FT)	658700		472400		453600	
ANNUAL RUNOFF (CFSM)	.67		.48		.46	
10 PERCENT EXCEEDS	2220		1330		1360	
50 PERCENT EXCEEDS	646		370		350	
90 PERCENT EXCEEDS	192		251		109	

a Occurred on Apr. 20, 1965, and Apr. 13, 1969.



05287890 ELM CREEK NEAR CHAMPLIN, MN

LOCATION.--Lat 45°09'48", long 93°26'11", in NE¼NW¼ sec.35, T.120 N., R.22 W., Hennepin County, Hydrologic Unit 07010206, on left bank, 33 ft downstream from bridge on Elm Creek Road, 2.5 mi southwest of Champlin.

DRAINAGE AREA.--84.9 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1978 to current year.

GAGE.--Water-stage recorder. Datum of gage is 850.71 ft above mean sea level. Prior to March 15, 1979, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

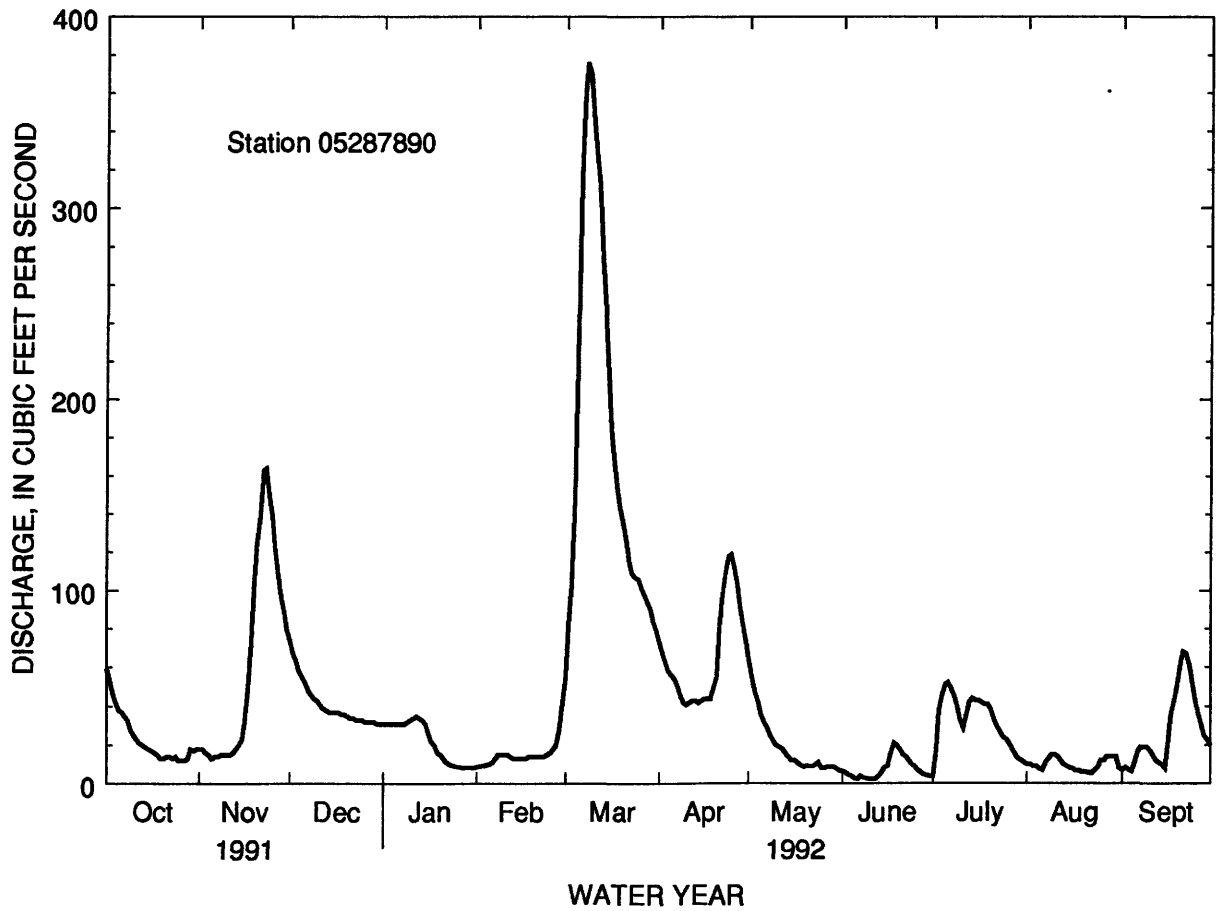
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	59	e18	e74	e31	e8.6	55	73	64	6.1	3.7	10	6.9
2	53	e18	e67	e31	e8.9	82	67	55	5.4	18	10	8.2
3	46	e16	e63	e31	e9.2	103	63	47	4.5	38	9.0	6.8
4	42	e15	e58	e31	e9.6	149	58	42	3.8	46	9.0	6.2
5	38	e13	e55	e31	e9.8	219	56	36	2.7	51	7.6	11
6	37	e14	e52	e31	e11	315	54	32	2.2	52	7.0	17
7	35	e14	e48	e31	e13	360	51	29	3.8	49	11	19
8	33	e15	e46	e31	e15	376	46	25	2.8	45	13	19
9	28	e15	e44	e32	e15	370	42	22	2.5	39	15	19
10	25	e15	e43	e33	e15	345	41	20	2.2	33	15	17
11	23	e15	e41	e34	15	326	42	19	2.3	29	14	15
12	21	e16	e39	e35	14	312	43	18	2.3	36	12	12
13	20	e18	e38	e34	13	274	43	16	3.9	42	10	11
14	19	e20	e37	e33	13	247	42	14	5.8	44	9.0	10
15	18	e23	e37	e31	13	214	43	12	8.2	43	8.1	7.8
16	17	e32	e37	e26	13	185	44	12	9.0	43	7.7	23
17	16	49	e37	e22	13	167	44	11	16	42	6.5	36
18	15	73	e36	e20	14	152	44	9.5	21	41	6.5	43
19	13	106	e36	e16	14	143	50	8.7	20	41	6.0	51
20	13	126	e35	e15	14	135	55	9.2	18	38	5.9	62
21	14	139	e34	e13	14	126	81	9.0	15	33	5.4	68
22	14	163	e34	e11	14	114	98	8.9	14	30	5.2	67
23	13	164	e33	e10	14	109	110	10	12	27	6.7	61
24	14	e150	e33	e9.2	15	107	118	11	10	24	8.3	53
25	12	e139	e33	e8.8	e16	106	119	8.0	8.5	23	12	43
26	12	e120	e32	e8.4	18	102	112	8.0	6.8	21	12	36
27	12	e110	e32	e8.3	20	98	103	8.7	5.5	18	14	30
28	13	e97	e32	e8.2	28	94	92	8.4	4.6	15	14	25
29	18	e89	e32	e8.2	42	90	82	8.6	4.2	13	14	23
30	17	e80	e31	e8.2	---	84	73	7.7	3.6	12	14	20
31	18	---	e31	e8.3	---	79	---	6.4	---	11	7.8	---
TOTAL	728	1882	1280	680.6	432.1	5638	1989	596.1	226.7	1000.7	305.7	826.9
MEAN	23.5	62.7	41.3	22.0	14.9	182	66.3	19.2	7.56	32.3	9.86	27.6
MAX	59	164	74	35	42	376	119	64	21	52	15	68
MIN	12	13	31	8.2	8.6	55	41	6.4	2.2	3.7	5.2	6.2
AC-FT	1440	3730	2540	1350	857	11180	3950	1180	450	1980	606	1640
CFSM	.28	.74	.49	.26	.18	2.14	.78	.23	.09	.38	.12	.32
IN.	.32	.82	.56	.30	.19	2.47	.87	.26	.10	.44	.13	.36

e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1979 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	30.0	15.8	11.0	5.85	11.5	70.5	83.3	51.9	37.7	26.8	20.8	31.0
MAX	229	62.7	41.3	22.0	99.1	182	221	146	140	88.9	69.0	170
(WY)	1986	1992	1992	1992	1984	1992	1986	1991	1991	1991	1990	1991
MIN	1.13	1.03	.92	.74	.91	5.51	5.31	4.95	1.34	.76	1.44	1.08
(WY)	1990	1990	1990	1991	1990	1981	1987	1987	1988	1988	1989	1988

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1979 - 1992	
ANNUAL TOTAL	25567.91		15585.8			
ANNUAL MEAN	70.0		42.6		33.1	
HIGHEST ANNUAL MEAN					75.1	1986
LOWEST ANNUAL MEAN					4.54	1988
HIGHEST DAILY MEAN	366	Jun 1	376	Mar 8	545	Mar 27 1986
LOWEST DAILY MEAN	.43	Mar 3	2.2	Jun 6	.31	Jun 30 1988
ANNUAL SEVEN-DAY MINIMUM	.51	Mar 3	2.6	Jun 6	.35	Jun 26 1988
INSTANTANEOUS PEAK FLOW			380	Mar 8	597	Mar 27 1986
INSTANTANEOUS PEAK STAGE			8.98	Mar 8	9.93	Mar 27 1986
INSTANTANEOUS LOW FLOW			1.3	Jun 6	.29	Jul 9 1989
ANNUAL RUNOFF (AC-FT)	50710		30910		23960	
ANNUAL RUNOFF (CFSM)	.83		.50		.39	
ANNUAL RUNOFF (INCHES)	11.20		6.83		5.29	
10 PERCENT EXCEEDS	174		103		95	
50 PERCENT EXCEEDS	47		22		9.2	
90 PERCENT EXCEEDS	.74		7.8		1.3	



ELM CREEK BASIN

05287890 ELM CREEK NEAR CHAMPLIN, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--February 1988 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L) (00340)
OCT								
10...	1015	25	442	7.8	8.5	744	8.0	37
NOV								
08...	1130	15	512	7.6	0.5	749	7.2	44
25...	1245	139	475	7.3	0.5	749	8.6	39
DEC								
12...	1430	39	552	7.8	0.5	728	8.6	49
JAN								
06...	1430	31	622	8.1	1.0	741	11.8	51
28...	1200	8.2	683	7.5	0.5	746	8.7	45
FEB								
18...	1140	14	661	7.8	1.5	737	13.9	50
MAR								
19...	1100	145	425	8.2	1.0	745	11.3	45
APR								
01...	1100	60	416	8.5	3.5	743	12.1	33
30...	0940	74	517	8.0	15.0	737	7.5	15
MAY								
11...	1130	19	413	7.8	18.5	735	5.8	54
JUN								
09...	1230	2.3	664	7.7	16.0	743	7.9	21
29...	0945	3.8	550	7.8	18.5	740	5.9	29
JUL								
21...	1445	33	464	7.7	19.5	745	7.3	39
AUG								
11...	1200	14	514	7.2	20.5	744	6.4	38
SEP								
04...	1225	6.1	551	7.9	15.0	741	6.4	22
15...	1000	6.8	489	7.7	15.5	741	6.4	29
21...	1310	68	426	7.7	17.5	733	6.0	43

ELM CREEK BASIN

05287890 ELM CREEK NEAR CHAMPLIN, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)(	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) 00630)	NITRO-NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)
OCT							
10...	13	13	0.120	0.040	1.1	0.100	0.100
NOV							
08...	5	3	0.290	0.530	1.9	0.150	0.150
25...	6	5	0.890	0.130	1.4	0.190	0.150
DEC							
12...	8	7	0.260	0.290	1.3	0.190	0.070
JAN							
06...	5	<1	0.270	0.350	1.7	0.270	0.050
28...	14	14	0.250	0.710	1.8	0.200	0.050
FEB							
18...	11	1	0.310	0.610	1.7	0.190	0.030
MAR							
19...	1	1	0.530	0.080	1.3	0.130	0.070
APR							
01...	12	12	0.140	0.040	1.0	0.070	0.030
30...	14	14	<0.050	0.060	1.0	0.060	0.040
MAY							
11...	<1	<1	0.070	0.060	1.0	0.100	0.100
JUN							
09...	<1	<1	0.058	0.080	0.50	0.110	0.070
29...	<1	<1	<0.050	0.070	1.0	0.130	0.070
JUL							
21...	16	8	<0.050	0.030	1.1	0.220	0.140
AUG							
11...	10	<1	<0.050	0.040	1.0	0.180	0.140
SEP							
04...	1	1	<0.050	0.040	0.70	0.110	0.060
15...	<1	<1	<0.050	0.040	0.80	0.140	0.100
21...	1	1	<0.050	0.030	1.0	0.160	0.110

ELM CREEK BASIN

05287890 ELM CREEK NEAR CHAMPLIN, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

SAMPLES COLLECTED BY AUTOMATIC SAMPLER

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
APR				
20...	1047	45	14	0.090
23...	0523	94	30	0.110
25...	2359	104	--	0.070
29...	1114	71	98	0.080
30...	0353	65	28	0.070
30...	2032	59	12	0.070
MAY				
01...	1311	55	16	0.090
02...	0550	50	16	0.080
04...	0747	37	28	0.120
06...	0944	29	26	0.110
09...	0420	22	46	0.090
SEP				
21...	1230	69	13	0.170
22...	0509	70	13	0.170
23...	1427	63	11	0.130
27...	0142	32	14	0.140
29...	2018	23	11	0.110

MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN

LOCATION.--Lat 45°07'36", long 93°17'48", in SW¼ sec.12, T.119 N., R.21 W., Hennepin County, Hydrologic Unit 07010206, on right bank 0.4 mi downstream from Coon Creek, 1.3 mi downstream from Coon Rapids dam at Coon Rapids, 6.5 mi downstream from Anoka, and at mile 864.8 upstream from Ohio River.

DRAINAGE AREA.--19,100 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1931 to current year. Prior to October 1931 published as "at Coon Rapids, near Anoka."

GAGE.--Water-stage recorder. Datum of gage is 804.53 ft above sea level. Prior to June 14, 1932, at site 1.2 mi upstream at different datum.

REMARKS.--No estimated daily discharges. Records good. Discharge during period of backwater from ice, Nov. 5-10, Nov. 25 to Jan. 2, Jan. 14 to Feb. 2, 9, 10 and 12, computed from discharge furnished by Ford Plant Dam downstream from station adjusted for time of travel, leakage through dam, and diversions to St. Paul and Minneapolis waterworks. Flow slightly regulated by six reservoirs on headwaters; total usable capacity, 1,640,600 acre-ft. Diurnal regulation caused by dam above station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

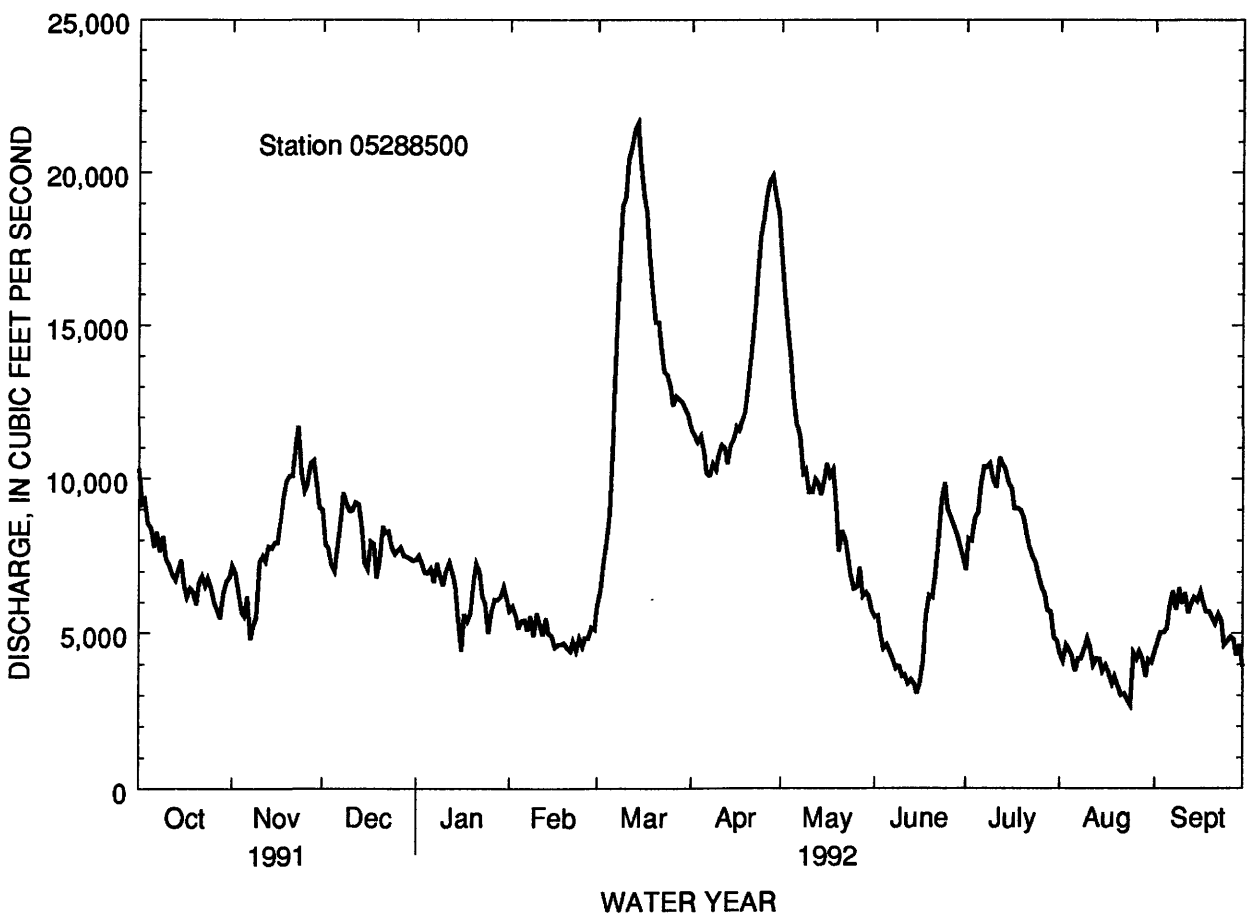
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10300	7200	9020	7390	5730	5920	11600	17400	5520	7080	4350	4430
2	9200	6980	7880	7510	5870	6410	11400	16000	5560	8080	4110	4760
3	9310	6350	7780	7270	5560	7380	11200	14900	4950	8020	4610	5030
4	8540	5680	7250	6970	5150	7930	11400	13900	4490	8740	4490	5040
5	8400	5560	7040	6980	5390	8880	10900	12700	4610	8930	4290	5170
6	7790	6200	7870	7120	5410	11300	10200	11800	4360	9800	3780	5880
7	8260	4800	8540	6690	5090	14300	10100	11400	4180	10400	4180	6400
8	7650	5260	9560	7290	5540	16700	10500	10200	3870	10400	4180	5780
9	8110	5490	9210	6940	4890	18900	10300	10300	3970	10500	4480	6500
10	7420	7320	8980	6580	5640	19200	10800	9590	3620	9980	4830	5970
11	7230	7500	8990	7040	5330	20400	11100	9590	3660	9730	4550	6340
12	6910	7350	9240	7300	4920	20800	11000	10000	3390	10700	3980	5660
13	6740	7800	9180	7030	5470	21400	10500	9870	3520	10500	4190	5940
14	7040	7760	8400	6600	4980	21600	11100	9500	3380	10300	4170	6180
15	7380	7930	7310	5420	4900	20400	11300	10000	3070	9870	3790	6050
16	6530	7940	7100	4440	4540	19300	11700	10500	3460	9690	3980	6370
17	6190	8640	7970	5620	4610	18700	11600	10100	4140	9060	3730	6020
18	6470	9430	7900	5390	4620	17300	11900	10300	5580	9070	3400	5710
19	6350	9900	6840	5640	4670	16100	12200	9150	6240	9000	3620	5710
20	5930	10100	7360	6720	4520	15100	13000	7660	6180	8730	3310	5510
21	6640	10100	8480	7260	4420	15100	14000	8340	7030	8240	3010	5300
22	6870	11100	8260	7020	4720	14300	15200	8030	7950	7780	3060	5620
23	6560	11700	8300	6180	4430	13500	16700	7570	9280	7490	2900	5390
24	6790	10200	7800	6000	4840	13400	17900	6860	9870	7290	2710	4630
25	6500	9630	7590	5000	4570	13000	18500	6460	9070	6900	4380	4740
26	6000	9800	7690	5710	4830	12400	19300	6510	8790	6510	4180	4860
27	5720	10500	7790	6100	4830	12700	19700	7140	8490	6270	4420	4780
28	5480	10600	7510	6090	5190	12600	19900	6210	8220	5750	4180	4280
29	6290	9830	7500	6180	5120	12500	19200	6330	7890	5700	3630	4620
30	6700	9090	7430	6510	---	12300	18700	6200	7510	4850	4170	3940
31	6840	---	7360	6180	---	12100	---	5730	---	4750	4080	---
TOTAL	222140	247740	249130	200170	145780	451920	402900	300240	171850	260110	122740	162610
MEAN	7166	8258	8036	6457	5027	14580	13430	9685	5728	8391	3959	5420
MAX	10300	11700	9560	7510	5870	21600	19900	17400	9870	10700	4830	6500
MIN	5480	4800	6840	4440	4420	5920	10100	5730	3070	4750	2710	3940
AC-FT	440600	491400	494100	397000	289200	896400	799200	595500	340900	515900	243500	322500
CFSM	.38	.43	.42	.34	.26	.76	.70	.51	.30	.44	.21	.28
IN.	.43	.48	.49	.39	.28	.88	.78	.58	.33	.51	.24	.32

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	6219	5996	4624	4097	3995	7047	16990	14550	11360	8131	5768	5716
MAX	21250	22800	10800	8304	9947	23410	42970	39760	29910	21120	22490	23570
(WY)	1987	1972	1972	1986	1966	1966	1969	1986	1943	1952	1972	1986
MIN	1128	1152	1006	935	1079	1602	3575	2796	1646	1022	715	888
(WY)	1937	1937	1935	1935	1933	1940	1959	1934	1934	1934	1934	1934

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1931 - 1992	
ANNUAL TOTAL	3469350		2937330			
ANNUAL MEAN	9505		8025		7906	
HIGHEST ANNUAL MEAN					17750	1986
LOWEST ANNUAL MEAN					1603	1934
HIGHEST DAILY MEAN	28900	May 12	21600	Mar 14	90300	Apr 17 1965
LOWEST DAILY MEAN	2420	Feb 28	2710	Aug 24	602	Sep 10 1934
ANNUAL SEVEN-DAY MINIMUM	2570	Feb 27	3140	Aug 18	646	Aug 26 1934
INSTANTANEOUS PEAK FLOW			21700	Mar 14	91000	Apr 17 1965
INSTANTANEOUS PEAK STAGE			9.75	Dec 8	19.53	Apr 17 1965
INSTANTANEOUS LOW FLOW			2500	Aug 21, 22, 23	529a	Aug 29 1976
ANNUAL RUNOFF (AC-FT)	6881000		5826000		5728000	
ANNUAL RUNOFF (CFSM)	.50		.42		.41	
ANNUAL RUNOFF (INCHES)	6.76		5.72		5.62	
10 PERCENT EXCEEDS	17300		12600		17300	
50 PERCENT EXCEEDS	8400		7130		5410	
90 PERCENT EXCEEDS	2930		4330		2000	

a Result of regulation.



MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

WATER-QUALITY RECORDS

LOCATION.--Sediment samples collected at Camden Avenue bridge, in Minneapolis, 7.0 mi downstream from gage. Tritium samples collected at gage near right bank. Prior to October 1, 1978, sediment samples collected at Lowry Avenue bridge.

DRAINAGE AREA.--19,600 mi^2, approximately.

PERIOD OF RECORD.--Water years 1963-67, 1975 to current year.

PERIOD OF RECORD.--

WATER TEMPERATURES: October 1975 to current year.

SUSPENDED SEDIMENT DISCHARGE: August 1975 to current year.

REMARKS.--Sediment samples were collected approximately daily by an observer during the open-water period. In general, daily concentrations and loads for the open-water period are considered good. During the winter period, daily sediment concentrations and loads are based primarily on concentrations of sediment in samples that were collected monthly and on daily water-discharge records. Sediment records for the winter period are considered fair. Water temperatures were obtained by the observer approximately daily during the open-water period and monthly by U.S. Geological Survey personnel during the winter period. Many temperatures are not published because of questionable values.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES (water years 1976-77, 1979-80, 1982-91): Maximum daily 31.0°C, Aug. 25, 26, 1976, July 19, 1977; minimum daily, 0.0°C several days during winter period, each year.

SEDIMENT CONCENTRATIONS: Maximum daily mean, 210 mg/L Apr. 3, 1982; minimum daily mean, 1 mg/L on several days in 1978, 1980, 1981, 1982, and 1984.

SEDIMENT LOADS: Maximum daily, 17,400 tons Apr. 20, 1982; minimum daily, 3.9 tons Feb. 2, 1981.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum daily, 27.0°C, June 11, 12, 14; minimum daily, 1.0°C Feb. 20.

SEDIMENT CONCENTRATION: Maximum daily mean, 150 mg/L, Mar. 8; minimum daily mean, 4 mg/L, Oct. 21.

SEDIMENT LOADS: Maximum daily, 7,200 tons, Mar. 9; minimum daily, 72 tons, Oct. 21.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.0	---	---	---	---	5.0	5.0	18.0	23.0	---	---	20.0
2	15.0	---	---	---	---	3.0	5.0	15.0	24.0	---	---	20.0
3	14.0	---	---	---	---	3.0	7.0	15.0	24.0	---	23.0	21.0
4	13.0	---	---	---	---	3.0	6.0	15.0	24.0	20.0	24.0	20.0
5	10.0	---	---	---	---	---	9.0	15.0	25.0	22.0	24.0	20.0
6	10.0	---	---	---	---	4.0	10.0	16.0	20.0	22.0	23.0	21.0
7	11.0	---	---	---	---	4.0	10.0	18.0	---	22.0	22.0	20.0
8	10.0	---	---	---	---	3.0	10.0	---	22.0	25.0	---	18.0
9	11.0	---	---	---	---	---	---	---	23.0	25.0	---	18.0
10	---	---	---	---	---	---	6.0	---	25.0	23.0	---	17.0
11	11.0	---	---	---	---	---	6.0	---	27.0	23.0	---	---
12	10.0	---	---	---	---	---	5.0	19.0	27.0	21.0	22.0	---
13	12.0	---	---	---	---	---	5.0	18.0	26.0	21.0	23.0	21.0
14	10.0	2.0	---	---	---	---	6.0	17.0	27.0	22.0	23.0	22.0
15	10.0	2.0	---	---	---	2.0	---	20.0	24.0	22.0	20.0	22.0
16	13.0	2.0	---	---	---	3.0	---	---	22.0	23.0	22.0	22.0
17	13.0	2.0	---	---	---	2.0	7.0	18.0	21.0	22.0	22.0	20.0
18	10.0	3.0	---	---	---	3.0	8.0	20.0	22.0	22.0	24.0	18.0
19	9.0	4.0	---	---	---	3.0	11.0	24.0	19.0	22.0	24.0	16.0
20	9.0	3.0	---	---	1.0	4.0	---	23.0	20.0	22.0	24.0	18.0
21	9.0	3.0	---	---	---	---	8.0	23.0	21.0	22.0	22.0	19.0
22	11.0	---	---	---	---	2.0	8.0	22.0	19.0	20.0	---	18.0
23	12.0	---	---	---	---	5.0	7.0	18.0	20.0	21.0	25.0	17.0
24	9.0	---	---	---	---	7.0	8.0	18.0	22.0	21.0	21.0	17.0
25	9.0	---	---	---	---	5.0	6.0	16.0	22.0	21.0	20.0	18.0
26	9.0	---	---	---	---	5.0	8.0	16.0	20.0	23.0	20.0	17.0
27	9.0	---	---	---	---	5.0	9.0	18.0	19.0	25.0	21.0	17.0
28	9.0	---	---	---	4.0	5.0	11.0	20.0	24.0	25.0	21.0	15.0
29	8.0	---	---	---	3.0	---	14.0	20.0	20.0	24.0	20.0	15.0
30	6.0	---	---	---	---	7.0	15.0	19.0	---	24.0	20.0	17.0
31	4.0	---	---	---	---	5.0	---	22.0	---	---	20.0	---

MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAY	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	15	417	16	311	10	244	11	219	16	248	10	160
2	15	373	20	377	10	213	11	223	17	269	13	225
3	16	402	14	240	10	210	11	216	18	270	15	299
4	18	415	8	123	10	196	11	207	19	264	23	492
5	16	363	11	165	10	190	11	207	20	291	38	911
6	15	315	12	201	10	212	11	211	19	278	58	1770
7	16	357	11	143	10	231	11	199	18	247	120	4630
8	13	269	11	156	10	258	12	236	16	239	150	6760
9	14	307	11	163	10	249	12	225	15	198	141	7200
10	14	280	10	198	10	242	12	213	13	198	133	6890
11	13	254	10	202	10	243	12	228	12	173	119	6550
12	11	205	9	179	10	249	12	237	12	159	106	5950
13	10	182	8	168	11	273	12	228	11	162	92	5320
14	10	190	9	189	11	249	12	214	11	148	77	4490
15	10	199	7	150	11	217	12	176	11	146	65	3580
16	11	194	6	129	11	211	12	144	9	110	63	3280
17	11	184	8	187	11	237	12	182	10	124	52	2630
18	9	157	12	306	11	235	12	175	10	125	35	1630
19	6	103	15	401	11	203	12	183	9	113	26	1130
20	5	80	15	409	11	219	12	218	9	110	21	856
21	4	72	10	273	11	252	12	235	9	107	24	978
22	6	111	10	300	11	245	12	227	9	115	23	888
23	7	124	10	316	11	247	12	200	9	108	22	802
24	12	220	10	275	11	232	12	194	9	118	24	868
25	8	140	10	260	11	225	12	162	9	111	21	737
26	8	130	10	265	11	228	12	185	10	130	19	636
27	10	154	10	283	11	231	12	198	10	130	16	549
28	11	163	10	286	11	223	12	197	10	140	13	442
29	13	221	10	265	11	223	13	217	10	138	15	506
30	11	199	10	245	11	221	14	246	---	---	14	465
31	10	185	---	---	11	219	15	250	---	---	16	523
TOTAL	---	6965	---	7165	---	7127	---	6452	---	4969	---	72147

MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAY	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	14	438	30	1410	15	224	23	440	20	235	15	179
2	13	400	22	950	16	240	54	1180	28	311	13	167
3	15	454	23	925	15	200	54	1170	36	448	12	163
4	15	462	24	901	15	182	37	873	31	376	18	245
5	16	471	23	789	14	174	33	796	18	208	18	251
6	23	633	22	701	15	177	34	900	16	163	16	254
7	22	600	19	585	14	158	34	955	19	214	19	328
8	18	510	20	551	13	136	35	983	21	237	15	234
9	18	501	20	556	14	150	35	992	20	242	17	298
10	18	525	20	518	16	156	36	970	21	274	22	355
11	14	420	19	492	15	148	35	919	20	246	26	445
12	13	386	18	486	15	137	45	1300	19	204	23	351
13	16	454	18	480	13	124	38	1080	18	204	15	241
14	17	509	19	487	14	128	35	973	17	191	13	217
15	19	580	20	540	15	124	30	799	14	143	15	245
16	19	600	23	652	20	187	34	890	15	161	31	533
17	18	564	22	600	20	224	32	783	13	131	20	325
18	17	546	21	584	22	331	24	588	14	129	16	247
19	19	626	19	469	25	421	24	583	16	156	18	278
20	23	807	12	248	19	317	23	542	15	134	14	208
21	23	869	14	315	20	380	19	423	16	130	10	143
22	24	985	18	390	24	515	19	399	15	124	12	182
23	26	1170	21	429	25	626	20	404	18	141	13	189
24	33	1590	15	278	28	746	20	394	15	110	12	150
25	38	1900	18	314	34	833	18	335	26	307	15	192
26	41	2140	21	369	30	712	16	281	20	226	16	210
27	43	2290	18	347	25	573	17	288	18	215	16	206
28	38	2040	14	235	25	555	16	248	21	237	14	162
29	36	1870	15	256	27	575	14	215	16	157	11	137
30	35	1770	16	268	25	507	17	223	18	203	10	106
31	---	---	15	232	---	---	18	231	18	198	---	---
TOTAL	---	27110	---	16357	---	9960	---	21157	---	6455	---	7241
YEAR		193105										

MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	TEMPER-ATURE WATER (DEG C) (00010)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	BED MAT. SIEVE DIAM. % FINER THAN .062 MM (80164)	BED MAT. SIEVE DIAM. % FINER THAN .125 MM (80165)
SEP 1992						
10...	1312	17.5	13	94	--	--
25...	1145	--	10	96	--	--
25...	1149	16.5	--	--	0	1

DATE	BED MAT. SIEVE DIAM. % FINER THAN .250 MM (80166)	BED MAT. SIEVE DIAM. % FINER THAN .500 MM (80167)	BED MAT. SIEVE DIAM. % FINER THAN 1.00 MM (80168)	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM (80169)	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM (80170)	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM (80171)	BED MAT. SIEVE DIAM. % FINER THAN 16.0 MM (80172)	BED MAT. SIEVE DIAM. % FINER THAN 32.0 MM (80173)
SEP 1992								
10...	--	--	--	--	--	--	--	--
25...	--	--	--	--	--	--	--	--
25...	4	33	65	78	87	93	97	100

MINNESOTA RIVER BASIN

05290000 LITTLE MINNESOTA RIVER NEAR PEEVER, SD

LOCATION.--Lat 45°36'05", long 96°52'18", in SW¼ sec.13, T.125 N., R.50 W., Roberts County, Hydrologic Unit 07020001, on Sisseton Indian Reservation, on right bank 2 mi northwest of town of Browns Valley, MN, 5.3 mi northeast of Peever, 7.2 mi downstream from Jorgenson River, and 8 mi upstream from Big Stone Lake.

DRAINAGE AREA.--447 mi².

PERIOD OF RECORD.--October 1939 to September 1981, October 1989 to current year.

REVISED RECORDS.--WSP 1308: 1943(M).

GAGE.--Water-stage recorder. Datum of gage is 1,002.20 ft above sea level. Oct. 1, 1939, to Mar. 20, 1940, nonrecording gage at site 4.5 mi downstream at different datum. Mar. 21 to Apr. 12, 1940, nonrecording gage at site 100 ft downstream at present datum. April 13 to Aug. 27, 1940, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 450 ft³/s and maximum (*):

		Discharge	Gage height			Discharge	Gage height
Date	Time	(ft³/s)	(ft)	Date	Time	(ft³/s)	(ft)
July 13	2200	*271	*4.03	No peak greater than base discharge.			

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	e13	e5.7	e4.2	e4.6	e110	27	43	5.3	68	16	1.8
2	13	e10	e5.4	e4.2	e4.9	e84	24	36	4.6	83	15	2.6
3	12	e9.5	e5.0	e4.2	e5.3	e68	24	31	3.6	86	14	2.1
4	11	e9.0	e4.8	e4.2	e5.6	58	22	28	3.4	76	13	2.8
5	10	e8.5	e4.6	e4.2	e5.8	61	22	25	3.2	64	12	3.8
6	9.7	e8.0	e4.5	e4.2	e6.0	86	21	24	3.1	56	10	2.9
7	9.7	e7.4	e4.6	e4.2	e6.0	129	22	21	3.1	49	9.8	4.3
8	10	e7.2	e4.7	e4.2	e6.0	103	23	19	3.3	45	8.9	4.2
9	9.4	e7.4	e4.8	e4.2	e6.0	76	22	19	3.4	40	8.2	7.3
10	9.1	e7.6	e4.9	e4.2	e6.0	45	24	17	3.4	37	7.2	6.6
11	8.7	e8.0	e5.0	e4.2	e6.0	55	25	16	3.3	33	6.5	4.5
12	8.1	e8.5	e5.1	e4.2	e6.0	46	30	16	3.0	78	5.6	3.5
13	8.0	e9.0	e5.2	e4.2	e6.0	46	29	15	2.5	204	4.9	2.7
14	7.6	e10	e5.1	e4.2	e6.0	43	29	15	2.2	203	4.0	2.2
15	7.4	e11	e4.9	e4.2	e6.0	38	30	14	2.4	131	3.5	1.5
16	7.7	e11	e4.7	e4.2	e6.0	36	33	13	3.6	101	3.3	1.3
17	8.0	e11	e4.5	e4.2	e6.0	34	31	14	17	84	3.0	1.1
18	7.1	e12	e4.3	e4.2	e6.0	32	31	13	115	73	2.6	1.1
19	6.7	e13	e4.2	e4.2	e6.0	30	37	12	178	63	2.1	.93
20	7.0	e13	e4.2	e4.2	e6.0	29	55	10	154	54	1.8	.77
21	7.0	e14	e4.2	e4.2	e6.0	29	49	9.1	164	46	2.4	.76
22	6.9	e14	e4.2	e4.2	e6.0	27	44	9.6	171	41	2.3	.64
23	6.7	e14	e4.2	e4.2	e6.0	28	41	9.1	148	37	1.9	.57
24	7.0	e12	e4.2	e4.2	e6.0	31	64	8.4	119	34	1.9	.56
25	7.1	e11	e4.2	e4.2	e6.4	36	78	9.8	99	31	2.0	.55
26	7.7	e10	e4.2	e4.2	e7.2	39	84	9.0	87	28	1.8	.64
27	8.8	e8.6	e4.2	e4.2	e10	34	73	9.4	87	25	1.9	.66
28	7.9	e7.5	e4.2	e4.2	e25	31	64	9.9	77	22	1.7	.66
29	10	e6.8	e4.2	e4.2	e50	29	55	8.6	68	22	1.7	.62
30	22	e6.2	e4.2	e4.2	---	30	49	7.4	66	19	1.6	.66
31	17	---	e4.2	e4.4	---	28	---	6.1	---	17	1.4	---
TOTAL	292.3	298.2	142.4	130.4	238.8	1551	1162	497.4	1603.4	1950	172.0	64.32
MEAN	9.43	9.94	4.59	4.21	8.23	50.0	38.7	16.0	53.4	62.9	5.55	2.14
MAX	22	14	5.7	4.4	50	129	84	43	178	204	16	7.3
MIN	6.7	6.2	4.2	4.2	4.6	27	21	6.1	2.2	17	1.4	.55
AC-FT	580	591	282	259	474	3080	2300	987	3180	3870	341	128
CFSM	.02	.02	.01	.01	.02	.11	.09	.04	.12	.14	.01	.00
IN.	.02	.02	.01	.01	.02	.13	.10	.04	.13	.16	.01	.01

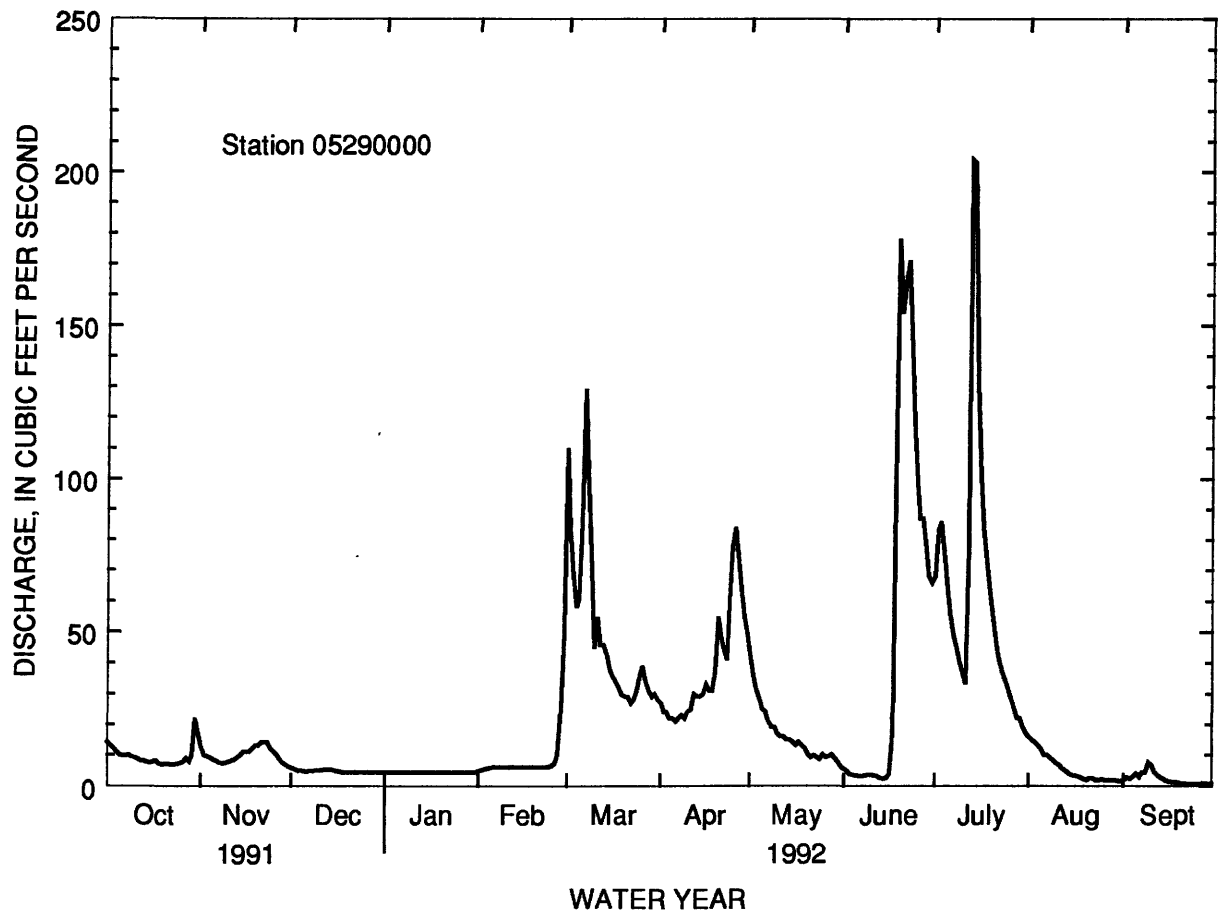
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1992, BY WATER YEAR (WY

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3.60	4.43	2.34	1.11	2.36	94.8	197	82.2	72.7	38.0	8.03	3.56
MAX	40.7	34.7	10.8	4.25	21.8	573	1321	531	355	430	89.5	34.2
(WY)	1943	1958	1958	1947	1976	1943	1952	1962	1942	1962	1991	1942
MIN	.21	.25	.10	.000	.000	.51	2.89	2.20	.41	.041	.059	.074
(WY)	1940	1940	1940	1940	1940	1956	1981	1981	1976	1976	1976	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1940 - 1992	
ANNUAL TOTAL	21252.00		8102.22			
ANNUAL MEAN	58.2		22.1		42.5a	
HIGHEST ANNUAL MEAN					153	1962
LOWEST ANNUAL MEAN					1.37	1981
HIGHEST DAILY MEAN	712	Jun 22	204	Jul 13	4400	Apr 8, 1952
LOWEST DAILY MEAN	.39	Jan 8	.55	Sep 25	.00	Jan 1, 1940
ANNUAL SEVEN-DAY MINIMUM	.45	Jan 2	.61	Sep 23	.00	Jan 1, 1940
INSTANTANEOUS PEAK FLOW			271	Jul 13	4730	Apr 8, 1952
INSTANTANEOUS PEAK STAGE			4.03	Jul 13	13.35b	Mar 25 1943
ANNUAL RUNOFF (AC-FT)	42150		16070		30800	
ANNUAL RUNOFF (CFSM)	.13		050		095	
ANNUAL RUNOFF (INCHES)	1.77		.67		1.29	
10 PERCENT EXCEEDS	204		64		90	
50 PERCENT EXCEEDS	13		8.1		2.6	
90 PERCENT EXCEEDS	.69		2.6		.30	

a Median of annual mean discharges is 30 ft³/s.
b From floodmark (backwater from ice).



MINNESOTA RIVER BASIN

05291000 WHETSTONE RIVER NEAR BIG STONE CITY, SD

LOCATION.--Lat 45°17'32", long 96°29'14", in SE¼NW¼ sec.18, T.121 N., R.46 W., Grant County, Hydrologic Unit 07020001, on right bank 20 ft downstream from former highway bridge site, 1.5 mi west of Big Stone City, and 4.5 mi upstream from Big Stone Lake.

DRAINAGE AREA.--389 mi².

PERIOD OF RECORD.--March 1910 to November 1912 (no winter records), and March 1931 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 895: Drainage area. WSP 1308: 1932(M), 1935(M).

GAGE.--Water-stage recorder. Datum of gage is 996.96 ft in mean sea level, adjustment of 1912. Mar. 8, 1910, to Nov. 30, 1912, nonrecording gage 2 mi downstream at different datum. Mar. 18, 1931, to May 3, 1939, nonrecording gage, at site 20 ft upstream at present datum. May 4, 1939, to Nov. 8, 1952, water-stage recorder at site 80 ft down-stream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, about 26 ft in June 1919, present site and datum, from information by local resident, discharge 29,000 ft³/s, from dam break.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Feb. 29	1000	602	b5.50	June 18	0300	*1,680	*7.97
Mar. 8	0300	225	3.77	July 02	0430	658	5.53

b Backwater from ice.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	24	e15	e20	e51	e282	43	54	11	229	22	7.2
2	21	25	e15	e20	e56	e129	39	48	10	586	20	9.1
3	21	22	e14	e19	e64	90	38	43	9.7	466	19	11
4	19	20	e14	e19	e64	76	38	38	9.6	329	18	13
5	18	18	e14	e19	e64	70	37	36	8.7	195	17	13
6	19	19	e14	e19	e74	87	37	33	9.0	122	15	19
7	19	18	e14	e18	e62	177	38	31	9.1	96	15	15
8	19	18	e14	e18	e55	205	39	29	11	81	14	14
9	17	18	e14	e18	e43	134	40	27	11	69	13	13
10	18	18	e14	e17	e38	82	41	26	10	69	12	12
11	17	18	e15	e17	e33	73	43	24	9.6	74	11	12
12	17	17	e15	e17	e30	61	43	22	8.9	83	11	12
13	16	19	e16	e17	e28	62	43	21	7.8	97	11	12
14	16	21	e16	e16	e27	57	42	20	7.1	95	10	11
15	17	23	e16	e16	e25	54	42	19	7.4	90	8.8	10
16	17	24	e16	e16	e25	51	41	19	45	75	8.9	9.5
17	16	25	e17	e16	e30	51	42	18	477	62	8.0	9.6
18	15	26	e17	e16	e43	48	46	19	1280	55	7.3	9.3
19	15	27	e18	e16	e33	46	51	17	789	48	6.9	8.8
20	15	28	e18	e16	e28	44	60	16	640	42	6.5	7.6
21	15	27	e19	e17	e26	46	71	15	e360	40	7.3	7.5
22	16	24	e19	e17	e25	45	62	15	210	40	7.4	7.5
23	16	e23	e19	e17	e24	44	63	13	133	40	7.1	7.5
24	16	e21	e20	e18	e23	47	73	12	91	39	9.2	7.2
25	16	e20	e20	e18	e23	50	85	15	73	40	11	6.4
26	16	e19	e20	e19	e25	53	92	17	76	39	11	6.0
27	16	18	e20	e20	e35	54	88	16	117	35	10	5.7
28	18	18	e20	e21	e113	53	77	15	74	34	9.1	5.9
29	22	17	e20	e23	e500	50	69	14	55	30	8.2	6.4
30	25	e16	e20	e30	---	48	60	13	56	29	7.6	5.6
31	26	---	e20	e45	---	46	---	12	---	24	7.1	---
TOTAL	555	631	523	595	1667	2415	1583	717	4615.9	3353	349.4	293.8
MEAN	17.9	21.0	16.9	19.2	57.5	77.9	52.8	23.1	154	108	11.3	9.79
MAX	26	28	20	45	500	282	92	54	1280	586	22	19
MIN	15	16	14	16	23	44	37	12	7.1	24	6.5	5.6
AC-FT	1100	1250	1040	1180	3310	4790	3140	1420	9160	6650	693	583
CFSM	.05	.05	.04	.05	.15	.20	.14	.06	.40	.28	.03	.03

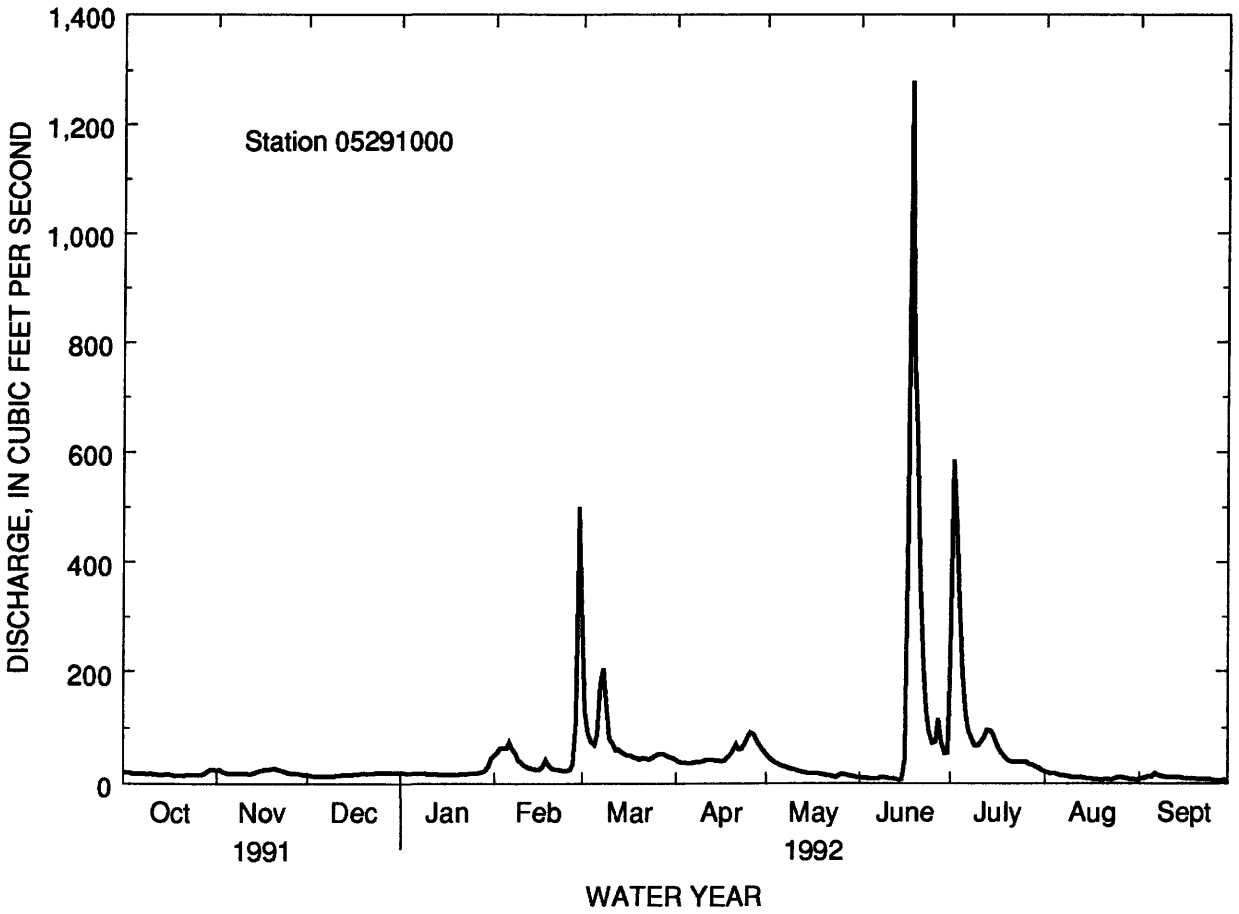
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	8.96	10.5	7.18	4.73	10.8	144	178	79.0	74.8	36.1	15.9	8.13
MAX	70.5	78.3	43.3	20.5	118	612	1386	491	478	454	327	65.7
(WY)	1958	1972	1972	1987	1984	1978	1952	1972	1984	1962	1991	1942
MIN.	60	.40	.20	.000	.000	2.85	3.63	.77	1.42	.035	.000	.36
(WY)	1932	1935	1935	1934	1934	1969	1934	1934	1936	1934	1934	1935

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1910 - 1992	
ANNUAL TOTAL	32484.2		17298.1			
ANNUAL MEAN	89.0		47.3		49.6a	
HIGHEST ANNUAL MEAN					181	1986
LOWEST ANNUAL MEAN					1.52	1934
HIGHEST DAILY MEAN	2720	Aug 3	1280	Jun 18	6090	Apr 8 1969
LOWEST DAILY MEAN	3.8	Jan 1	5.6	Sep 30	.00b	
ANNUAL SEVEN-DAY MINIMUM	3.8	Jan 1	6.2	Sep 24	.00	Jul 31 1933
INSTANTANEOUS PEAK FLOW			1680	Jun 18	6870	Apr 8 1969
INSTANTANEOUS PEAK STAGE			7.97	Jun 18	14.32c	Apr 8 1969
INSTANTANEOUS LOW FLOW			5.2d			
ANNUAL RUNOFF (AC-FT)	64430		34310		35950	
ANNUAL RUNOFF (CFSM)	.23		.12		.13	
10 PERCENT EXCEEDS	278		76		86	
50 PERCENT EXCEEDS	20		20		6.9	
90 PERCENT EXCEEDS	3.9		9.4		1.3	

a Median of annual mean discharges is 35 ft^3/s.
b No flow at times in most years.
c From floodmark.
d Occurred Sept. 25, 27 & 30.



MINNESOTA RIVER BASIN

05291500 BIG STONE LAKE NEAR BIG STONE CITY, SD
(formerly published as Big Stone Lake at Ortonville)

LOCATION.--Lat 45°18'32", long 96°28'04", in NE¼NW¼ sec. 8, T. 121 N., R. 46 W., Grant County, Hydrologic Unit 07020001, at new powerplant intake, 1.2 mi north of Big Stone City, SD, 1.2 mi northwest of concrete dam at outlet, and 1.0 mi west of Ortonville. Prior to January 1989, at old powerplant site at west edge of Ortonville.

PERIOD OF RECORD.--March 1937 to current year.

GAGE.--Nonrecording gage read once a day. Datum of gage is 957.69 ft above mean sea level. Prior to Sept. 17, 1947, nonrecording gage at site 1.2 mi southeast at same datum. Sept. 18, 1947, to June 30, 1963, water-stage recorder at site 1.2 mi southeast at same datum. Sept. 21, 1959, to June 30, 1963, supplementary nonrecording gage read once daily, at site 0.9 mi southeast at same datum. July 1, 1963 to Jan. 1989 nonrecording gage at site 0.9 mi southeast at same datum.

REMARKS.--Natural lake with concrete dam at outlet. Dam was rebuilt and completed in Nov. 1985, with the following changes: Eight 7 ft high by 10 ft wide electrically operated slide gates, one 48 in. by 48 in. gate; and one 18 in. sluice gate; sills of all gates are at 3.0 ft. Silt barrier dam 700 ft upstream in outlet channel of lake completed July 7, 1958; rebuilt and completed Dec. 1986 with the new crest at 7.0 ft (previous crest was at 5.9 ft). Supplementary nonrecording gage readings used for stages below crest of silt barrier to June 30, 1963. Water level subject to fluctuation caused by wind action.

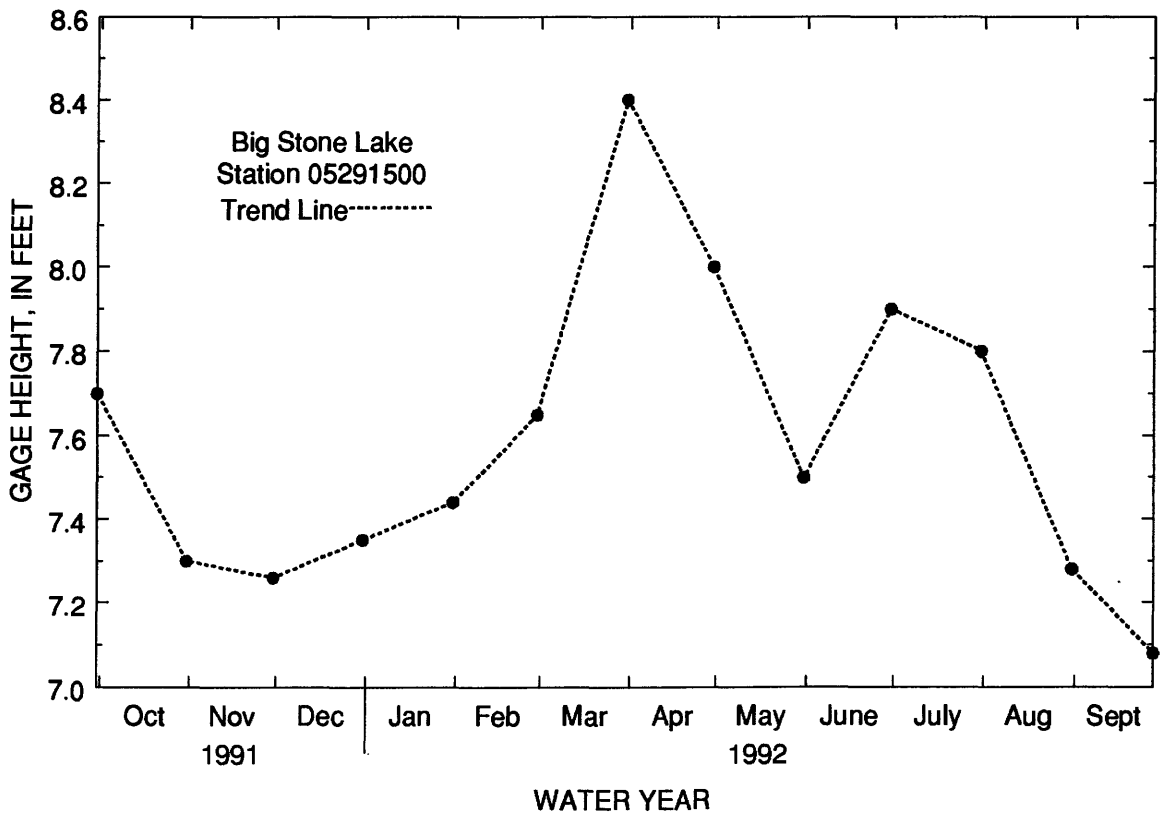
EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 12.73 ft, Apr. 17, 1952; minimum observed, 3.53 ft, Mar. 2, 1957 (strong upstream wind in channel). Minimum observations of 3.10 ft, Mar. 2, 1940, and 2.20 ft, Nov. 20, 1940, at spillway site are the result of blockage of channel to spillway by ice and snow and do not represent lake elevations.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 8.40 ft, Mar. 31; minimum observed, 6.60 ft, Oct. 28.

GAGE HEIGHT, IN FEET, OCTOBER 1991 TO SEPTEMBER 1992

Oct. 31.....7.30	Feb. 29.....7.65	June 30.....7.90
Nov. 30.....7.26	Mar. 31.....8.40	July 31.....7.80
Dec. 31.....7.35	Apr. 30.....8.00	Aug. 31.....7.28
Jan. 31.....7.44	May 31.....7.50	Sept. 28.....7.08

NOTE.--Gage-height record other than that shown above is available in the District Office.


8.6
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0
GAGE HEIGHT, IN FEET
Big Stone Lake
Station 05291500
Trend Line
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
1991
1992
WATER YEAR

MINNESOTA RIVER BASIN

05292000 MINNESOTA RIVER AT ORTONVILLE, MN

LOCATION.--Lat 45°17'44", long 96°26'38", in NE¼NW¼ sec.16, T.121 N., R.46 W., Big Stone County, Hydrologic Unit 07020001, on left bank 400 ft downstream from bridge on U.S. Highway 12 and 1,300 ft downstream from dam at outlet of Big Stone Lake, at Ortonville.

DRAINAGE AREA.--1,160 mi², approximately.

PERIOD OF RECORD.--February 1938 to current year.

REVISED RECORDS.--WSP 895: 1939. WSP 1508: 1942 (yearly mean).

GAGE.--Water-stage recorder. Datum of gage is 956.38 ft above mean sea level. Prior to Mar. 31, 1939, nonrecording gage on downstream side of dam 1,300 ft upstream at datum 1.31 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Some regulation by Big Stone Lake (station 05291500).

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	96	e40	24	29	28	28	104	83	17	486	79	35
2	235	e40	24	29	28	28	94	82	18	716	75	43
3	206	e40	24	29	28	28	93	73	18	704	70	45
4	188	37	24	29	e28	28	87	73	18	674	67	43
5	189	36	24	29	28	28	78	70	18	568	64	44
6	184	37	23	28	28	43	81	69	18	85	62	43
7	144	32	23	29	e28	81	78	68	17	141	57	44
8	132	29	24	e29	e27	98	75	68	18	135	50	54
9	116	32	24	e29	27	97	75	65	18	103	50	78
10	115	36	24	29	27	97	69	67	17	125	50	87
11	142	34	24	29	27	98	73	67	17	146	50	52
12	96	36	25	29	27	98	66	67	17	142	48	39
13	44	39	25	29	27	97	61	85	17	266	51	56
14	53	34	e26	30	27	117	62	100	17	333	50	46
15	68	23	26	31	27	120	63	90	18	337	50	43
16	73	23	26	30	27	114	63	86	51	340	49	48
17	82	24	26	30	27	111	75	73	909	337	50	44
18	64	23	26	30	27	110	101	64	1290	328	49	47
19	40	23	26	30	29	108	98	63	1020	336	48	35
20	39	23	27	30	27	108	103	63	972	268	48	27
21	41	24	27	29	27	109	92	63	640	141	48	35
22	38	24	27	29	27	107	82	68	298	211	41	33
23	e44	e24	27	e29	27	107	79	62	297	302	45	15
24	e47	e24	27	e29	26	107	83	57	270	203	47	7.0
25	e43	24	27	29	26	105	82	59	213	135	62	7.8
26	32	24	28	29	27	103	80	41	73	122	66	11
27	27	24	28	29	27	97	78	18	70	98	64	12
28	e27	24	28	28	27	104	78	18	69	79	57	12
29	e31	25	28	28	28	115	79	17	68	75	42	11
30	e35	24	28	28	---	110	77	18	72	74	40	10
31	e38	---	28	28	---	111	---	18	---	73	38	---
TOTAL	2709	882	798	902	791	2812	2409	1915	6575	8083	1667	1106.8
MEAN	87.4	29.4	25.7	29.1	27.3	90.7	80.3	61.8	219	261	53.8	36.9
MAX	235	40	28	31	29	120	104	100	1290	716	79	87
MIN	27	23	23	28	26	28	61	17	17	73	38	7.0
AC-FT	5370	1750	1580	1790	1570	5580	4780	3800	13040	16030	3310	2200
CFSM	.08	.03	.02	.03	.02	.08	.07	.05	.19	.22	.05	.03
IN.	.09	.03	.03	.03	.03	.09	.08	.06	.21	.26	.05	.04

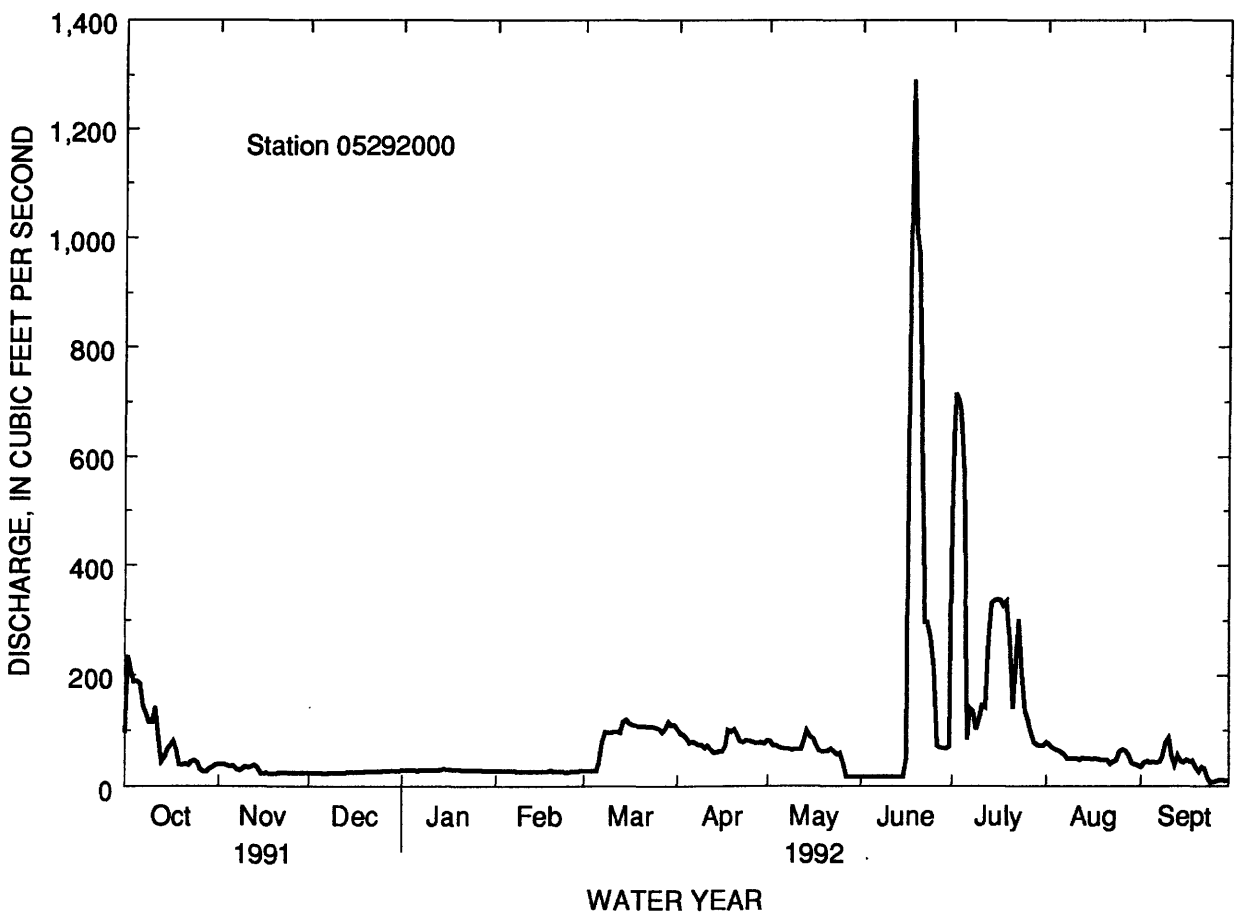
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	20.8	15.8	16.5	17.5	22.0	145	408	232	182	116	51.2	30.3
MAX	186	166	194	164	150	731	2195	887	1034	915	451	250
(WY)	1987	1943	1943	1943	1943	1986	1952	1986	1962	1962	1991	1942
MIN	.20	.20	.20	.17	.16	1.14	1.27	.91	1.30	1.11	.25	.18
(WY)	1939	1939	1939	1940	1940	1941	1941	1941	1977	1977	1959	1988

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1938 - 1992	
ANNUAL TOTAL	56154.8		30649.8			
ANNUAL MEAN	154		83.7		106a	
HIGHEST ANNUAL MEAN					364	1986
LOWEST ANNUAL MEAN					2.39	1977
HIGHEST DAILY MEAN	1790	Jul 2	1290	Jun 18	3050	Apr 13 1952
LOWEST DAILY MEAN	1.7	Feb 14	7.0	Sep 24	.00	Dec 13 1940
ANNUAL SEVEN-DAY MINIMUM	1.9	Feb 14	10	Sep 24	.08	Sep 12 1988
INSTANTANEOUS PEAK FLOW			1760	Jun 18	3060	Apr 13 1952
INSTANTANEOUS PEAK STAGE			7.93	Jun 18	12.92	Apr 13 1952
INSTANTANEOUS LOW FLOW			6.1	Sep 23		
ANNUAL RUNOFF (AC-FT)	111400		60790		76720	
ANNUAL RUNOFF (CFSM)	.13		.072		.091	
ANNUAL RUNOFF (INCHES)	1.80		.98		1.24	
10 PERCENT EXCEEDS	671		137		277	
50 PERCENT EXCEEDS	34		44		14	
90 PERCENT EXCEEDS	2.2		24		1.0	

a Median of annual mean discharges is 82 ft³/s.



MINNESOTA RIVER BASIN

05293000 YELLOW BANK RIVER NEAR ODESSA, MN

LOCATION.--Lat 45°13'35", long 96°21'12", in SE¼SE¼ sec.1, T.120 N., R.46 W., Lac qui Parle County, Hydrologic Unit 07020001, on left bank 150 ft downstream from highway bridge, 2.5 mi southwest of Odessa, and 4.5 mi upstream from mouth.

DRAINAGE AREA.--398 mi².

PERIOD OF RECORD.--October 1939 to current year.

REVISED RECORDS.--WSP 1388: 1947(M), 1950.

GAGE.--Water-stage recorder. Datum of gage is 953.34 ft above mean sea level (U.S. Army Corps of Engineers bench mark). Prior to Aug. 28, 1940, nonrecording gage at site 150 ft upstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 300 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Mar. 2	1615	332	4.90	July 2	1900	875	7.32
June 18	1900	*3,660	*14.09				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	e18	e11	e18	e30	e290	57	67	19	349	68	15
2	10	e15	e11	e18	e32	298	53	58	18	750	63	15
3	9.4	e12	e11	e19	e35	270	49	53	17	798	58	14
4	9.9	e9.8	e11	e18	e38	220	47	49	17	721	54	13
5	9.3	e9.0	e12	e17	e42	173	46	45	16	498	51	14
6	8.3	e8.7	e12	e17	e45	144	42	42	16	358	48	19
7	8.2	e8.6	e12	e16	e48	162	42	38	16	257	47	17
8	9.2	e8.8	e12	e15	e46	237	42	35	18	205	45	18
9	8.4	e8.8	e13	e15	e43	208	42	33	18	173	43	21
10	8.7	e8.5	e13	e16	e40	144	42	30	18	155	40	22
11	9.0	e8.2	e13	e17	e36	125	42	29	19	145	36	21
12	8.6	e8.1	e13	e16	e32	103	42	28	20	172	34	20
13	8.6	e8.3	e13	e17	e29	107	42	27	20	171	31	18
14	8.4	e9.0	e14	e15	e29	95	44	26	19	175	27	17
15	8.5	e10	e14	e16	e30	87	47	25	21	178	24	15
16	9.8	e10	e14	e15	e27	77	46	25	300	153	21	14
17	10	e10	e14	e17	e30	71	45	21	1810	136	19	13
18	10	e10	e15	e19	e36	68	47	21	3360	123	18	13
19	13	e10	e16	e19	e38	63	56	23	3330	111	16	13
20	15	e10	e16	e20	e34	59	62	22	2270	101	14	12
21	15	e10	e16	e21	e30	59	76	22	1540	92	14	12
22	17	e11	e17	e24	e28	58	75	15	1000	89	15	11
23	15	e12	e18	e24	e27	56	74	18	757	94	13	10
24	14	e13	e19	e22	e27	55	74	18	610	107	15	8.5
25	15	e13	e19	e20	e27	57	81	21	475	123	18	7.3
26	15	e12	e18	e19	e40	58	89	22	404	114	20	7.1
27	16	e11	e19	e20	e56	58	91	21	383	105	25	6.8
28	18	e11	e18	e21	e69	58	85	21	318	93	24	6.3
29	22	e10	e19	e21	e207	55	78	21	252	84	22	7.0
30	23	e10	e20	e24	---	54	74	21	218	77	19	7.4
31	21	---	e19	e26	---	66	---	21	---	72	17	---
TOTAL	383.3	313.8	462	582	1231	3635	1732	918	17299	6779	959	407.4
MEAN	12.4	10.5	14.9	18.8	42.4	117	57.7	29.6	577	219	30.9	13.6
MAX	23	18	20	26	207	298	91	67	3360	798	68	22
MIN	8.2	8.1	11	15	27	54	42	15	16	72	13	6.3
AC-FT	760	622	916	1150	2440	7210	3440	1820	34310	13450	1900	808
CFSM	.03	.03	.04	.05	.11	.29	.15	.07	1.45	.55	.08	.03

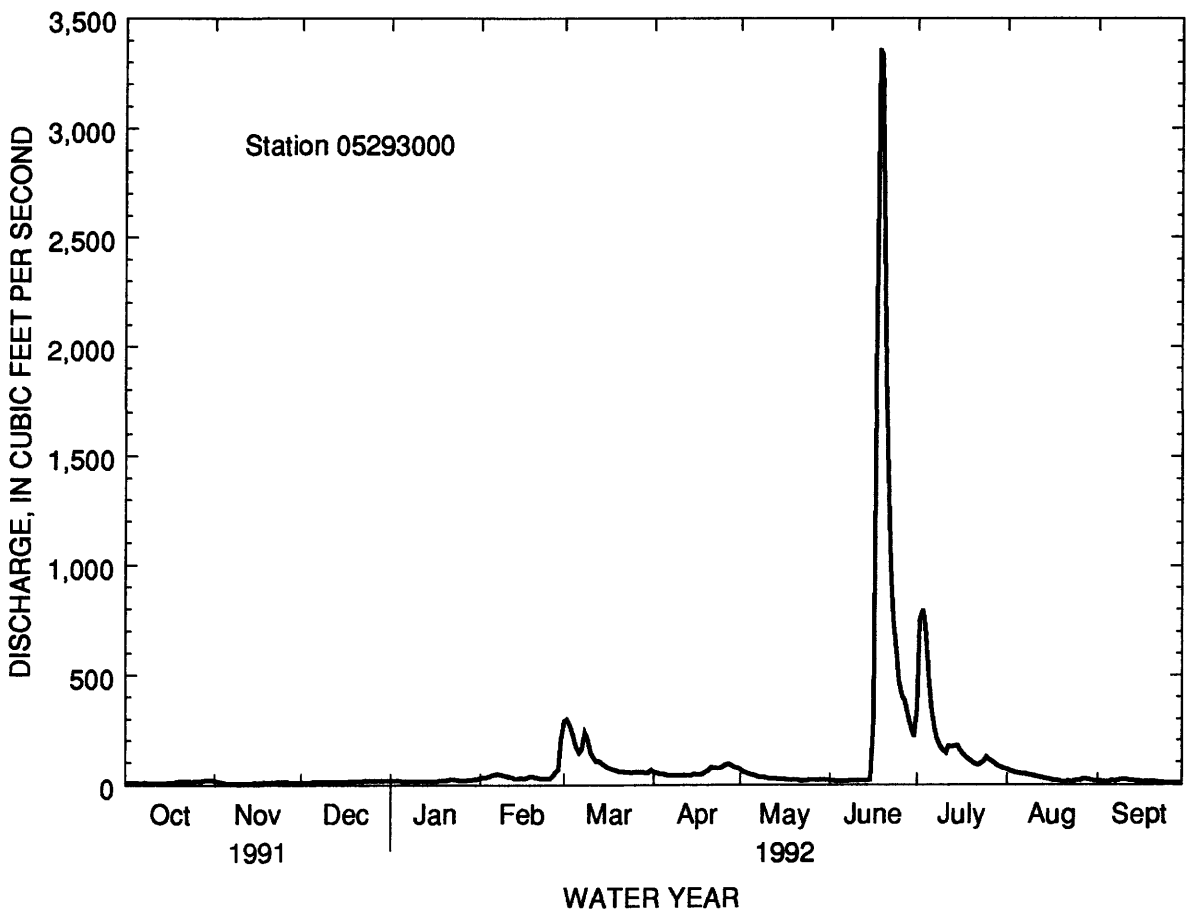
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	12.6	16.2	8.66	4.93	10.7	149	229	93.0	99.9	45.9	25.1	13.8
MAX	104	201	66.8	19.7	117	653	1341	652	577	375	281	273
(WY)	1985	1972	1972	1986	1984	1986	1952	1972	1992	1962	1991	1985
MIN	.31	.44	.32	.090	.001	1.59	9.13	2.94	1.83	.27	.088	.083
(WY)	1941	1977	1977	1977	1977	1965	1981	1981	1976	1976	1976	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1940 - 1992	
ANNUAL TOTAL	29566.38		34701.5			
ANNUAL MEAN	81.0		94.8		59.1a	
HIGHEST ANNUAL MEAN					225	1986
LOWEST ANNUAL MEAN					3.98	1981
HIGHEST DAILY MEAN	1750	Aug 4	3360	Jun 18	6640	Apr 9 1969
LOWEST DAILY MEAN	.15	Jan 25	6.3	Sep 28	.00b	
ANNUAL SEVEN-DAY MINIMUM	.16	Jan 20	7.2	Sep 24	.00	Jan 26 1940
INSTANTANEOUS PEAK FLOW			3660	Jun 18	6970	Apr 9 1969
INSTANTANEOUS PEAK STAGE			14.09	Jun 18	19.07c	Apr 9 1969
INSTANTANEOUS LOW FLOW			6.1	Sep 27, 28		
ANNUAL RUNOFF (AC-FT)	58640		68830		42830	
ANNUAL RUNOFF (CFSM)	.20		.24		.15	
10 PERCENT EXCEEDS	238		165		120	
50 PERCENT EXCEEDS	17		21		8.7	
90 PERCENT EXCEEDS	.20		10		.90	

a Median of annual mean discharges is 47 ft³/s.
b Many days in several years.
c From floodmark.



MINNESOTA RIVER BASIN

05294000 POMME DE TERRE RIVER AT APPLETON, MN

LOCATION.--Lat 45°12'10", long 96°01'20", in SW¼NW¼ sec.14, T.120 N., R.43 W., Swift County, Hydrologic Unit 07020002, on left bank 60 ft upstream from bridge on U.S. Highway 59 and State Highway 119 at Appleton and 8 mi upstream from mouth.

DRAINAGE AREA.--905 mi², approximately.

PERIOD OF RECORD.--March 1931 to September 1935 (no winter records), October 1935 to current year. Prior to October 1953, published as "near Appleton."

REVISED RECORDS.--WSP 1308: 1931(M), 1937(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 978.00 ft above mean sea level. Prior to Dec. 22, 1952, nonrecording gage at site 4 mi upstream at datum 25.17 ft higher.

REMARKS.--Records good. Flow affected by lakes above station. Occasional regulation at low flow by old milldam 500 ft upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Mar. 8	0515	*410	*5.95	June 18	2245	309	5.69
Mar. 12	1630	362	5.83	June 27	0315	214	5.42
July 14	0715	309	5.75				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

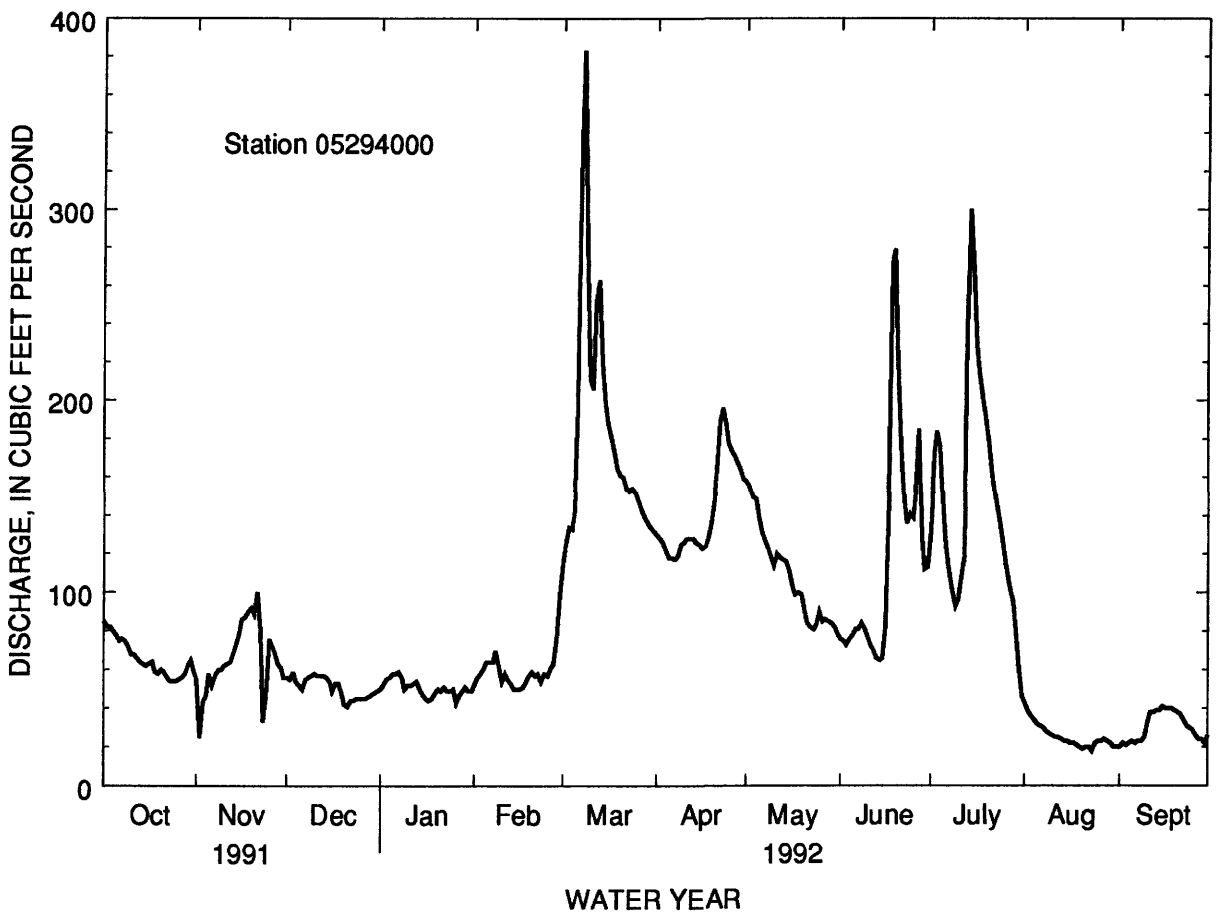
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	85	55	56	50	52	115	130	158	76	132	43	20
2	82	25	55	52	56	125	128	155	75	172	39	22
3	82	43	59	55	58	134	126	150	73	184	36	21
4	80	47	54	56	61	133	122	149	76	176	34	22
5	78	58	52	58	64	143	118	140	78	143	32	23
6	75	52	50	58	64	197	118	132	81	124	31	22
7	76	57	55	59	64	336	117	127	81	111	30	23
8	75	60	56	56	70	383	119	123	84	101	28	23
9	72	60	57	50	62	283	125	118	81	93	27	25
10	68	62	58	e52	54	211	126	114	77	96	26	33
11	68	63	57	e52	58	206	128	120	73	108	25	38
12	66	64	57	e53	55	252	128	118	70	119	25	38
13	64	68	57	e54	53	263	128	117	66	236	24	39
14	63	73	56	e50	50	220	126	116	65	300	23	39
15	62	79	54	47	50	198	125	111	66	269	23	41
16	63	86	49	e45	50	188	123	103	83	229	22	40
17	64	87	53	e44	51	181	124	99	149	215	22	40
18	59	90	53	e45	54	173	128	100	272	202	21	40
19	58	92	49	e48	57	165	136	99	279	191	20	39
20	60	89	42	50	59	161	149	90	220	178	19	38
21	59	100	41	49	57	160	164	84	177	161	20	37
22	56	80	44	51	58	154	189	82	148	152	20	34
23	54	33	44	49	54	153	196	81	136	142	18	31
24	54	46	45	49	58	154	188	83	141	132	22	30
25	54	76	45	50	57	152	178	90	139	120	23	29
26	55	72	45	43	61	148	174	85	153	111	23	26
27	56	69	45	47	63	143	171	86	185	102	24	24
28	58	63	46	49	76	139	168	85	128	95	23	24
29	62	61	47	51	99	136	164	84	112	e80	22	22
30	65	56	48	49	---	134	159	82	113	e60	20	26
31	59	---	49	49	---	132	---	79	---	46	20	---
TOTAL	2032	1966	1578	1570	1725	5672	4275	3360	3557	4580	785	909
MEAN	65.5	65.5	50.9	50.6	59.5	183	142	108	119	148	25.3	30.3
MAX	85	100	59	59	99	383	196	158	279	300	43	41
MIN	54	25	41	43	50	115	117	79	65	46	18	20
AC-FT	4030	3900	3130	3110	3420	11250	8480	6660	7060	9080	1560	1800
CFSM	.07	.07	.06	.06	.07	.20	.16	.12	.13	.16	.03	.03
IN.	.08	.08	.06	.06	.07	.23	.18	.14	.15	.19	.03	.04

e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	56.9	55.1	38.0	24.5	23.0	141	342	182	155	111	60.4	49.3
MAX	508	339	182	141	147	673	1587	846	516	726	338	331
(WY)	1985	1985	1987	1987	1987	1985	1969	1969	1965	1962	1986	1986
MIN	.000	3.52	1.00	.000	.000	2.04	20.9	8.09	2.17	.45	.095	.047
(WY)	1989	1989	1937	1937	1936	1969	1934	1934	1933	1988	1988	1988

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1931 - 1992	
ANNUAL TOTAL	34844.6		32009			
ANNUAL MEAN	95.5		87.5		110	
HIGHEST ANNUAL MEAN					363	1986
LOWEST ANNUAL MEAN					21.1	1977
HIGHEST DAILY MEAN	309	Aug 3	383	Mar 8	5210	Apr 11 1969
LOWEST DAILY MEAN	4.5	Jan 8	18	Aug 23	.00	Aug 3 1934
ANNUAL SEVEN-DAY MINIMUM	4.7	Jan 5	20	Aug 17	.00	Feb 1 1936
INSTANTANEOUS PEAK FLOW			410	Mar 8	5520	Apr 11 1969
INSTANTANEOUS PEAK STAGE			5.95	Mar 8	14.58	Apr 9 1969
INSTANTANEOUS LOW FLOW			18	Aug 23		
ANNUAL RUNOFF (AC-FT)	69110		63490		79780	
ANNUAL RUNOFF (CFSM)	.11		.097		.12	
ANNUAL RUNOFF (INCHES)	1.43		1.32		1.65	
10 PERCENT EXCEEDS	176		166		249	
50 PERCENT EXCEEDS	86		64		44	
90 PERCENT EXCEEDS	15		26		6.0	



MINNESOTA RIVER BASIN

05300000 LAC QUI PARLE RIVER NEAR LAC QUI PARLE, MN

LOCATION.--Lat 44°59'42", long 95°55'09" in SW¼SW¼ sec.27, T.118 N., R.42 W., Lac qui Parle County, Hydrologic Unit 07020003, on right bank 40 ft downstream from highway bridge and 0.5 mi southwest of city of Lac qui Parle.

DRAINAGE AREA.--983 mi².

PERIOD OF RECORD.--April 1910 to November 1914; March 1931 to current year (winter records incomplete prior to 1934). Published as "at Lac qui Parle," 1910-14.

REVISED RECORDS.--WSP 1308: 1912(M), 1935(M).

GAGE.--Water-stage recorder. Datum of gage is 951.98 ft above mean sea level (Minnesota Department of Transportation benchmark). Apr. 27, 1910, to Nov. 15, 1914, nonrecording gage at site 2 mi downstream at different datum. Mar. 17, 1931, to Mar. 9, 1937, non recording gage at site 40 ft upstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	e31	e63	e39	e38	e140	164	178	36	960	e250	180
2	34	e28	e62	e39	e39	e200	158	164	32	e1200	e240	169
3	29	e27	e61	e39	e40	e295	153	150	28	e1400	e230	161
4	30	e28	e59	e38	e41	e430	149	137	27	e1200	185	162
5	32	e29	e57	e38	e42	e500	143	125	25	e1000	174	162
6	28	e30	e55	e38	e44	e516	138	118	25	e880	163	153
7	28	e30	e52	e38	e45	e607	133	111	25	e780	157	152
8	28	32	e50	e37	e46	722	132	104	27	e700	e180	160
9	31	33	e48	e36	e47	698	133	98	29	e610	e175	165
10	28	33	e45	e36	e47	555	135	94	29	e530	165	165
11	33	34	e43	e36	e48	432	136	94	33	e460	154	164
12	39	35	e42	e35	e50	377	139	88	34	e530	e140	154
13	40	39	e41	e35	e51	362	140	82	32	e590	e130	144
14	36	43	e40	e35	e52	356	137	86	29	e540	e120	132
15	32	51	e39	e34	e54	323	138	80	25	e500	e115	123
16	28	79	e39	e34	e57	304	138	74	120	e460	e108	115
17	30	108	e38	e34	e59	283	142	69	1490	440	e100	106
18	28	108	e38	e34	e62	273	151	64	2840	e420	95	101
19	27	111	e38	e34	e64	257	159	61	5920	e410	86	98
20	26	122	e38	e34	e65	241	173	55	6140	e400	83	98
21	23	125	e38	e35	e66	230	207	49	5130	e400	76	94
22	19	e120	e38	e35	e68	221	211	44	4020	e390	74	87
23	16	e95	e38	e35	e69	216	213	39	3150	e370	67	83
24	15	e88	e38	e35	e78	203	216	35	2550	e350	88	77
25	15	e86	e38	e35	e98	209	221	39	2130	e330	101	68
26	16	e84	e39	e35	e110	205	233	41	1840	e320	134	61
27	18	e78	e39	e36	e120	199	239	40	1650	e310	216	55
28	25	e71	e39	e36	e122	192	224	42	1490	e305	251	53
29	34	e68	e39	e36	e125	183	211	43	1300	e290	246	49
30	38	e65	e39	e37	---	176	193	42	1140	284	223	45
31	33	---	e39	e37	---	170	---	40	---	e270	201	---
TOTAL	877	1911	1372	1115	1847	10075	5059	2486	41346	17629	4727	3536
MEAN	28.3	63.7	44.3	36.0	63.7	325	169	80.2	1378	569	152	118
MAX	40	125	63	39	125	722	239	178	6140	1400	251	180
MIN	15	27	38	34	38	140	132	35	25	270	67	45
AC-FT	1740	3790	2720	2210	3660	19980	10030	4930	82010	34970	9380	7010
CFSM	.03	.06	.05	.04	.06	.33	.17	.08	1.40	.58	.16	.12
IN.	.03	.07	.05	.04	.07	.38	.19	.09	1.56	.67	.18	.13

e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1992, BY WATER YEAR (WY)

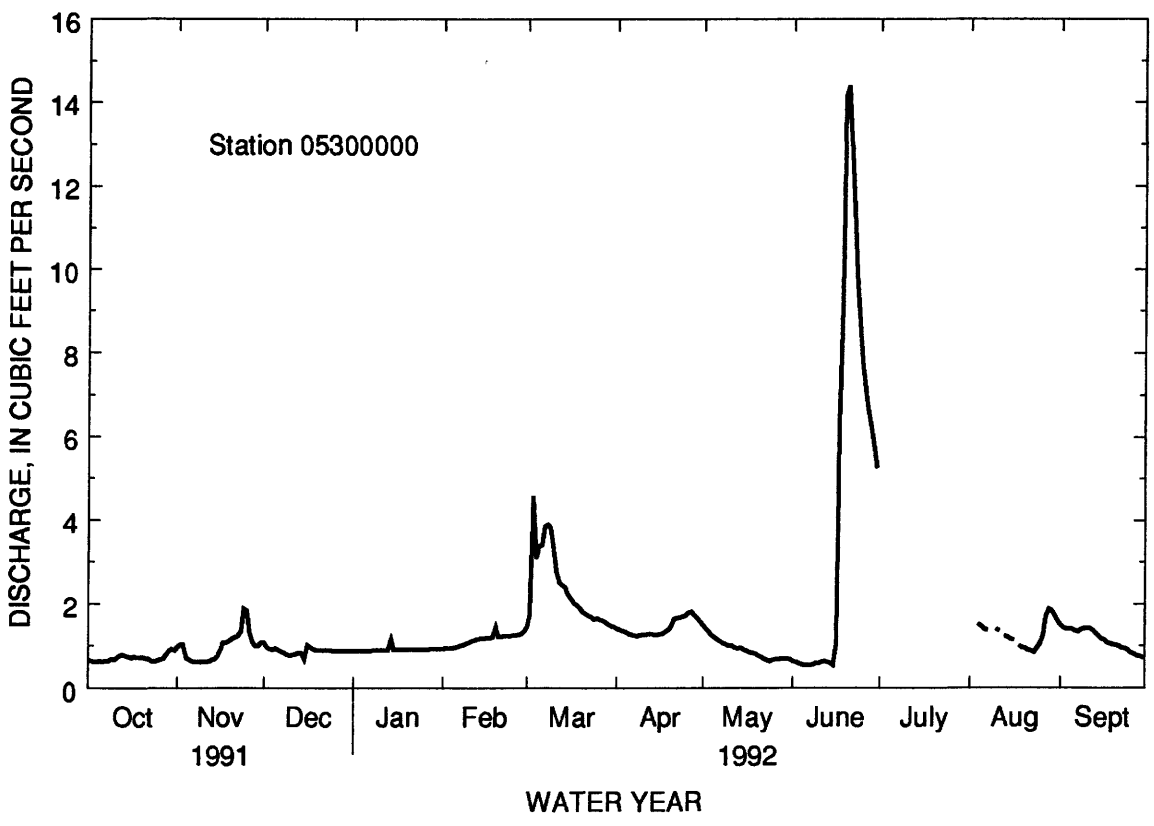
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	28.8	35.9	18.4	8.20	16.8	279	500	197	235	109	60.7	32.1
MAX	482	345	112	43.9	140	1634	3578	1028	1762	771	765	535
(WY)	1985	1971	1972	1987	1984	1985	1969	1944	1984	1962	1953	1985
MIN	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
(WY)	1932	1932	1932	1932	1934	1934	1934	1934	1934	1934	1931	1931

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1910 - 1992	
ANNUAL TOTAL	92749.9		91980			
ANNUAL MEAN	254		251		134a	
HIGHEST ANNUAL MEAN					465	1986
LOWEST ANNUAL MEAN					.000	1934
HIGHEST DAILY MEAN	2510	Jun 7	6140	Jun 20	16000	Apr 10 1969
LOWEST DAILY MEAN	5.4	Jan 11	15	Oct 24	.00b	
ANNUAL SEVEN-DAY MINIMUM	5.4	Jan 9	17	Oct 21	.00	Jul 15 1931
INSTANTANEOUS PEAK FLOW			6540	Jun 19	17100	Apr 10 1969
INSTANTANEOUS PEAK STAGE			14.83	Jun 19	19.37c	Apr 9 1965
INSTANTANEOUS LOW FLOW			14	Oct 23, 24, 25		
ANNUAL RUNOFF (AC-FT)	184000		182400		97040	
ANNUAL RUNOFF (CFSM)	.26		.26		.14	
ANNUAL RUNOFF (INCHES)	3.51		3.48		1.85	
10 PERCENT EXCEEDS	802		446		277	
50 PERCENT EXCEEDS	68		85		17	
90 PERCENT EXCEEDS	5.8		31		.30	

a Median of annual mean discharge is 108 ft^3/s.

b Many days in several years.

c From floodmark (backwater from ice).



MINNESOTA RIVER BASIN

05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN

LOCATION.--Lat 45°01'17", long 95°52'05", in NW¼NE¼ sec.24, T.118 N., R.42 W., Chippewa County, Hydrologic Unit 07020004, on left bank 200 ft downstream from dam at Lac qui Parle Outlet, 2.4 mi northeast of city of Lac qui Parle, and 3.5 mi west of Watson.

DRAINAGE AREA.--4,050 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1942 to current year.

REVISED RECORDS.--WDR MN-91-2: 1979.

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft above mean sea level (levels by U.S. Army Corps of Engineers). Prior to Nov. 10, 1944, at datum 0.20 ft lower.

REMARKS.--Records good. Part of flow from 2,050 mi², of Chippewa River basin at times diverted into Minnesota River above station. Some regulation by Big Stone Lake since Apr. 17, 1937, Lac qui Parle since January 1938, Marsh Lake since Nov. 1, 1939, and Odessa Dam since May 1974.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

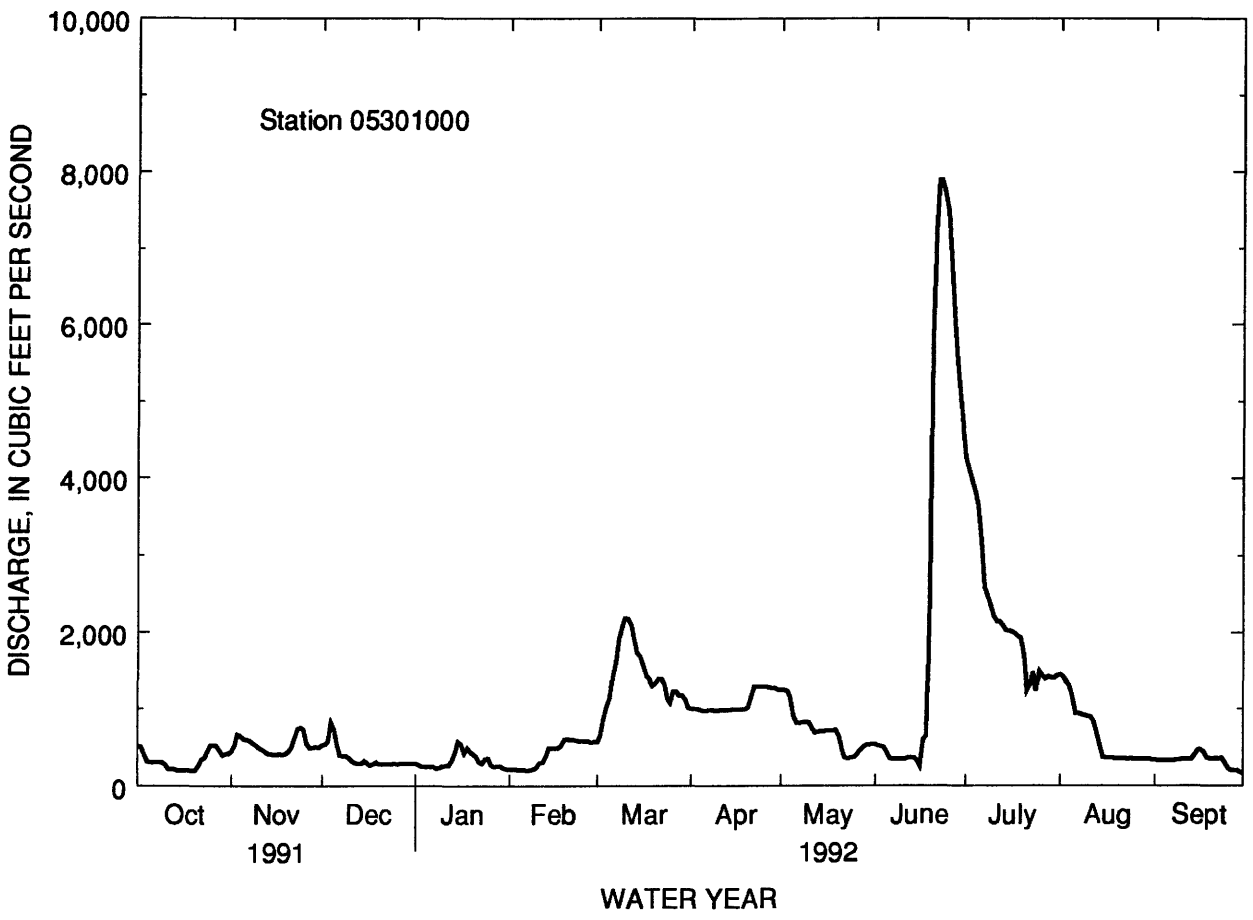
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	509	450	527	287	216	568	1000	1240	536	4270	1440	334
2	506	530	538	269	216	642	996	1240	525	4110	1400	332
3	409	666	573	249	209	864	992	1220	509	3960	1350	327
4	311	646	822	251	207	1030	990	1150	495	3810	1300	330
5	307	605	733	248	208	1140	975	907	420	3650	1140	331
6	306	595	553	243	207	1400	975	815	354	3200	935	331
7	308	584	398	246	201	1600	977	816	346	2590	934	333
8	306	558	384	226	207	1920	977	820	347	2470	922	335
9	306	527	385	232	210	2090	974	821	349	2370	912	339
10	267	492	366	253	240	2190	972	820	351	2220	901	342
11	210	471	324	266	300	2180	980	759	351	2150	893	345
12	212	446	299	261	304	2100	981	691	359	2150	820	346
13	210	416	290	328	384	1890	981	698	363	2100	666	345
14	199	410	284	440	490	1730	980	703	364	2030	530	407
15	200	406	320	571	489	1680	985	705	322	2020	369	464
16	199	408	290	537	489	1550	986	711	256	2010	364	468
17	197	410	261	424	488	1420	987	714	598	1990	363	434
18	194	408	278	487	517	1390	984	712	645	1950	360	361
19	195	414	305	444	592	1300	991	720	2500	1930	358	358
20	195	451	282	413	605	1330	1010	641	5770	1700	357	356
21	257	492	278	383	600	1390	1140	453	7220	1230	354	356
22	336	613	277	314	594	1390	1280	364	7890	1310	353	357
23	360	741	281	286	591	1330	1280	358	7890	1470	351	362
24	435	754	283	345	583	1130	1280	365	7730	1230	353	293
25	522	727	286	355	583	1080	1280	368	7490	1480	350	221
26	524	550	283	268	579	1220	1280	404	6770	1430	349	192
27	524	488	288	248	578	1220	1270	458	6150	1390	351	194
28	454	501	290	254	566	1170	1260	498	5510	1410	350	195
29	394	503	289	252	568	1170	1260	532	5040	1400	348	167
30	414	500	290	230	---	1120	1240	533	4620	1400	342	157
31	416	---	287	214	---	1010	---	535	---	1430	337	---
TOTAL	10182	15762	11344	9824	12021	43244	32263	21771	82070	67860	20152	9712
MEAN	328	525	366	317	415	1395	1075	702	2736	2189	650	324
MAX	524	754	822	571	605	2190	1280	1240	7890	4270	1440	468
MIN	194	406	261	214	201	568	972	358	256	1230	337	157
AC-FT	20200	31260	22500	19490	23840	85770	63990	43180	162800	134600	39970	19260
CFSM	.08	.13	.09	.08	.10	.34	.27	.17	.68	.54	.16	.08
IN.	.09	.14	.10	.09	.11	.40	.30	.20	.75	.62	.19	.09

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	254	260	200	142	169	775	2527	1273	1092	835	408	241
MAX	2924	2327	1204	574	634	4108	10750	5771	4229	3309	2415	2402
(WY)	1987	1985	1985	1987	1987	1985	1986	1986	1984	1953	1986	1986
MIN	4.16	.46	.17	.19	.094	46.5	151	122	29.5	14.7	11.8	5.59
(WY)	1977	1977	1977	1977	1977	1956	1961	1959	1988	1988	1974	1967

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1943 - 1992	
ANNUAL TOTAL	349221		336205			
ANNUAL MEAN	957		919		681	
HIGHEST ANNUAL MEAN					2507	1986
LOWEST ANNUAL MEAN					75.7	1959
HIGHEST DAILY MEAN	4960	Jun 23	7890	Jun 22	28700	Apr 12 1969
LOWEST DAILY MEAN	23	Feb 14	157	Sep 30	.00a	
ANNUAL SEVEN-DAY MINIMUM	24	Jan 29	197	Oct 14	.00	Oct 19 1951
INSTANTANEOUS PEAK FLOW			8010	Jun 22	29400	Apr 12 1969
INSTANTANEOUS PEAK STAGE			35.21	Jun 22	39.75	Apr 12 1969
INSTANTANEOUS LOW FLOW			78	Sep 29		
ANNUAL RUNOFF (AC-FT)	692700		666900		493600	
ANNUAL RUNOFF (CFSM)	.24		.23		.17	
ANNUAL RUNOFF (INCHES)	3.21		3.09		2.29	
10 PERCENT EXCEEDS	2690		1900		1680	
50 PERCENT EXCEEDS	538		507		199	
90 PERCENT EXCEEDS	61		252		25	

a Many days in several years.



MINNESOTA RIVER BASIN

05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1963, 1967, 1989 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	RESIDUE TOTAL AT 105, DEG. C, SUS-PENDED (MG/L) (00530))
MAY									
06...	1030	800	904	8.4	14.0	11.0	744	--	----
JUN									
18...	1330	644	384	7.5	20.5	8.3	738	--	---
30...	0845	--	758	8.0	20.0	10.0	736	4.8	41
AUG									
20...	1230	606	930	8.2	23.0	8.1	740	--	--

DATE	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN. NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, N02+N03 TOTAL (MG/L AS N) (00630)	NITRO-GEN, N02+N03 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
MAY									
06...	--	0.020	--	0.800	--	0.010	--	--	--
JUN									
18...	--	0.060	--	2.10	--	0.150	--	--	--
30...	4	0.050	1.00	1.00	0.080	0.080	1.5	0.90	0.160
AUG									
20...	--	0.020	--	0.140	--	0.160	--	--	--

DATE	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS PHORUS ORTHO TOTAL (MG/L AS P) (70507)'	CHLOR-A PHYTO-ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	PLANK-PLANK-TON CHROMO PENDED (UG/L) (70954)	SEDI-, MENT, SUS-PENDED (MG/L) (80154)
MAY						
06...	--	--	<0.010	--	--	--
JUN						
18...	--	--	0.140	--	--	--
30...	0.070	0.050	0.040	23.0	0.400	46
AUG						
20...	--	--	0.050	--	--	--

Minnesota River near Blakeley at flood stage.

Minnesota River near Jordan June 9, 1976.

MINNESOTA RIVER BASIN

05304500 CHIPPEWA RIVER NEAR MILAN, MN

LOCATION.--Lat 45°06'39", long 95°47'57", in SE¼SE¼ sec.16, T.119 N., R.41 W., Chippewa County, Hydrologic Unit 07020005, on right bank 800 ft upstream from bridge on State Highway 40, 2.0 mi upstream from small tributary, and 5.5 mi east of Milan.

DRAINAGE AREA.--1,870 mi², approximately.

PERIOD OF RECORD.--March 1937 to current year.

REVISED RECORDS.--WSP 1145: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 959.69 ft above mean sea level. Prior to June 15, 1942, nonrecording gage on bridge 800 ft downstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow regulated by several small lakes upstream from gage.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 400 ft³/s, and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Sept. 10	0930	1,470	4.80	(This peak was inadvertently omitted in the 1991 Annual Report.)			
Mar. 7	1800	3,010	7.26	June 18	0515	*4,680	*9.43
Apr. 22	0800	1,150	4.20	July 3	0630	1,330	4.47
July 13	1115	1,060	3.94				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	508	341	e325	e220	e230	e240	672	781	379	728	328	257
2	496	e202	e315	e220	e230	e245	660	728	359	974	313	261
3	484	e246	e310	e220	e230	e250	650	698	340	1300	296	266
4	469	e252	e305	e215	e230	e265	641	668	327	1110	284	259
5	452	e255	e300	e215	e230	e291	628	645	315	957	276	251
6	439	e255	e300	e215	e230	e610	623	627	313	871	265	247
7	432	e255	e295	e215	e230	e1920	621	608	307	808	263	241
8	425	e260	e290	e215	e230	1860	621	592	313	763	260	239
9	421	e265	e285	e215	e230	1470	619	570	311	702	250	239
10	412	e270	e280	e215	e230	1180	624	537	312	711	238	232
11	399	e275	e275	e215	e230	1190	633	549	294	787	228	223
12	389	e280	e275	e215	e230	1090	633	539	279	809	218	213
13	379	e290	e270	e215	e230	1020	628	515	267	1040	214	209
14	372	e300	e265	e213	e230	942	622	500	255	1010	207	204
15	367	e310	e260	e213	e230	875	626	493	246	947	200	199
16	366	e320	e255	e215	e230	857	637	490	437	874	195	196
17	365	e330	e255	e215	e230	839	640	488	4040	802	187	193
18	356	e340	e250	e215	e230	817	653	483	4600	738	189	190
19	350	e355	e245	e215	e230	787	779	472	4130	686	181	185
20	350	e365	e240	e215	e230	763	902	470	3400	631	176	180
21	349	e370	e235	e215	e230	747	986	465	2640	578	172	178
22	351	e375	e235	e215	e230	720	1140	458	2090	550	171	172
23	349	e370	e230	e215	e230	715	1090	453	1750	532	168	166
24	344	e368	e225	e215	e230	717	1040	445	1500	500	208	161
25	337	e360	e220	e215	e230	728	997	445	1310	478	259	158
26	335	e350	e220	e215	e230	721	961	467	1150	458	295	154
27	334	e345	e220	e215	e230	710	926	476	1010	431	302	152
28	342	e340	e220	e220	e235	709	890	461	870	409	297	145
29	356	e335	e220	e220	e235	703	852	441	748	385	291	138
30	357	e330	e220	e220	---	696	816	423	687	361	284	138
31	353	---	e220	e225	---	689	---	399	---	342	273	---
TOTAL	12038	9309	8060	6701	6680	25366	22810	16386	34979	22272	7488	6046
MEAN	388	310	260	216	230	818	760	529	1166	718	242	202
MAX	508	375	325	225	235	1920	1140	781	4600	1300	328	266
MIN	334	202	220	213	230	240	619	399	246	342	168	138
AC-FT	23880	18460	15990	13290	13250	50310	45240	32500	69380	44180	14850	11990
CFSM	.21	.17	.14	.12	.12	.44	.41	.28	.62	.38	.13	.11
IN.	.24	.19	.16	.13	.13	.50	.45	.33	.70	.44	.15	.12

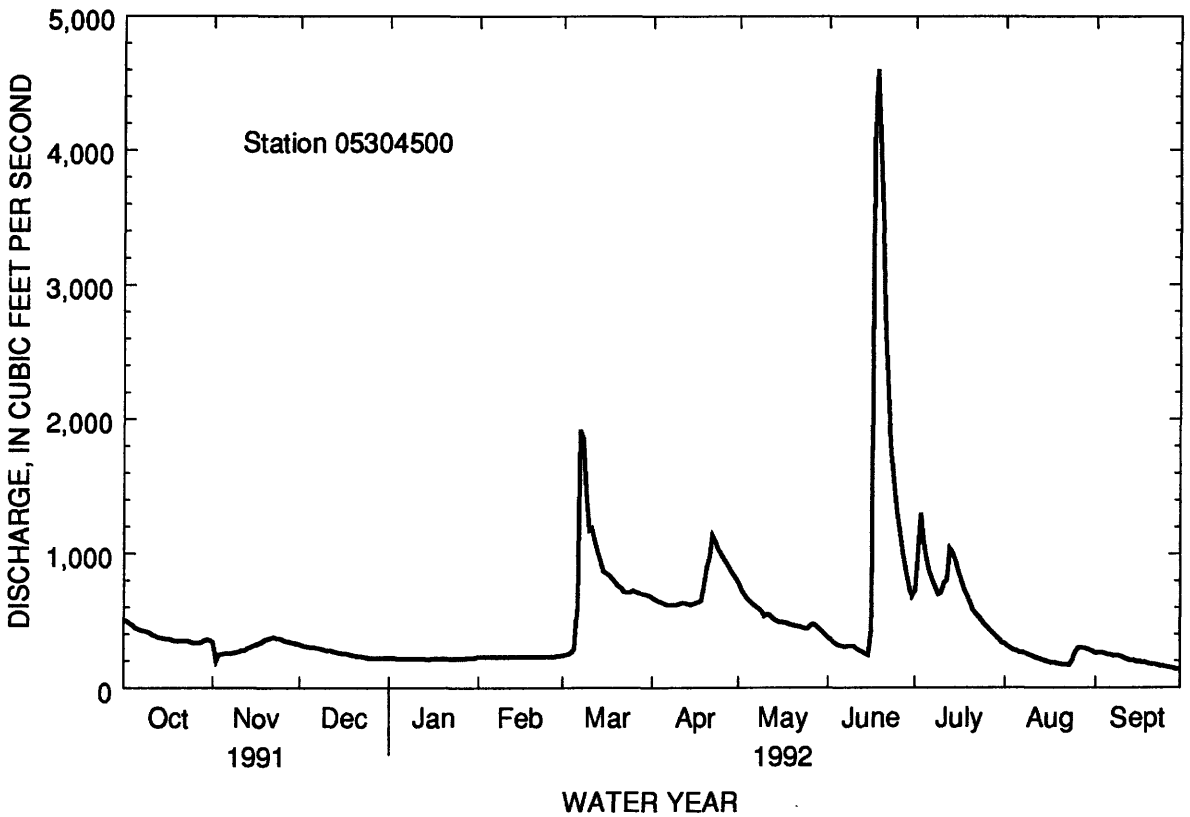
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	193	169	105	58.9	55.6	360	922	587	541	376	210	197
MAX	1996	1318	655	425	404	2141	3661	2462	2248	1822	1662	2273
(WY)	1985	1985	1985	1987	1987	1985	1952	1986	1984	1952	1986	1986
MIN	5.51	8.67	4.77	.094	.000	2.92	90.9	81.6	36.8	15.1	6.19	3.50
(WY)	1977	1977	1977	1940	1940	1965	1959	1939	1940	1940	1976	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1938 - 1992	
ANNUAL TOTAL	164385		178135			
ANNUAL MEAN	450		487		315a	
HIGHEST ANNUAL MEAN					1307	1986
LOWEST ANNUAL MEAN					45.4	1940
HIGHEST DAILY MEAN	2460	Jun 22	4600	Jun 18	10100	Apr 10 1969
LOWEST DAILY MEAN	26	Jan 23	138	Sep 29	.00b	
ANNUAL SEVEN-DAY MINIMUM	29	Jan 21	149	Sep 24	.00	Jan 4 1940
INSTANTANEOUS PEAK FLOW			4680	Jun 18	11400	Apr 9 1969
INSTANTANEOUS PEAK STAGE			9.43	Jun 18	15.45	Apr 9 1969
INSTANTANEOUS LOW FLOW			71	Nov 2		
ANNUAL RUNOFF (AC-FT)	326100		353300		228100	
ANNUAL RUNOFF (CFSM)	.24		.26		.17	
ANNUAL RUNOFF (INCHES)	3.27		3.54		2.29	
10 PERCENT EXCEEDS	932		874		842	
50 PERCENT EXCEEDS	365		327		110	
90 PERCENT EXCEEDS	29		215		14	

a Median of annual mean discharges if 233 ft³/s.
b Many days during 1940.



MINNESOTA RIVER BASIN

05311000 MINNESOTA RIVER AT MONTEVIDEO, MN

LOCATION.--Lat 44°56'00", long 95°44'00", in NW¼NW¼ sec.19, T.117 N., R.40 W., Yellow Medicine County, Hydrologic Unit 07020004, on right bank 100 ft upstream from bridge on U.S. Highway 212, at Montevideo, and 400 ft downstream from Chippewa River.

DRAINAGE AREA.--6,180 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1909 to September 1917, October 1917 to September 1929 (no winter records), October 1929 to current year. Prior to October 1939, published as "near Montevideo." Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1035: 1919(M). WSP 1085: 1935-36. WSP 1508: 1912, 1925(M), 1929(M).

GAGE.--Water-stage recorder. Datum of gage is 909.12 ft above mean sea level. July 22, 1909, to Feb. 4, 1932, nonrecording gage at bridge 600 ft downstream at present datum. Feb. 5, 1932, to Nov. 26, 1934, nonrecording gage at bridge 100 ft downstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow regulated by Big Stone Lake since Apr. 17, 1937, Lac qui Parle since Jan. 1938, and Marsh Lake since Nov. 1, 1939.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1030	528	e770	e360	e350	710	1280	1690	e610	6100	1820	473
2	1000	599	e790	e360	e345	725	1280	1670	e619	5950	1800	483
3	944	855	e830	e360	e340	898	1220	1660	e620	5730	1740	468
4	851	771	e840	e360	e340	1120	1200	1600	e620	5470	1640	473
5	746	712	e840	e360	339	1210	1190	1160	e610	5130	1540	470
6	710	666	e830	e360	335	1650	1170	956	e560	4860	1230	470
7	705	654	e800	e370	325	2000	1180	930	e510	4190	1160	475
8	702	663	e760	370	365	2530	1170	923	e470	3570	1140	478
9	697	661	e710	406	415	2770	1190	924	e450	3280	1130	483
10	695	653	e660	467	420	2870	1120	917	e450	3450	1110	488
11	624	650	e620	511	522	2890	1100	905	e450	3560	1100	494
12	593	653	e580	473	583	2880	1100	809	e480	3520	1090	499
13	591	663	e530	481	585	2730	1090	799	e473	3470	920	498
14	581	659	505	647	733	2490	1090	803	e480	3140	826	499
15	575	652	e490	e610	702	2370	1090	804	e488	2610	599	563
16	575	604	e480	e580	660	2250	1090	804	e465	2640	558	576
17	571	553	e470	e555	638	1850	1090	813	e1850	2600	546	588
18	562	543	e455	e520	625	1720	1090	812	e2800	2550	536	548
19	563	534	e440	e500	678	1610	1100	809	e2800	2500	520	538
20	565	549	e430	e475	706	1620	1100	798	e4040	2370	504	535
21	551	584	e410	e455	698	1630	1370	699	e6340	1780	503	509
22	445	631	e405	e435	696	1630	1720	e542	e8180	1740	518	525
23	433	811	e395	e420	694	1630	1780	e530	e8650	1820	504	523
24	475	e1130	e385	e405	687	1630	1790	e540	e8790	1740	539	513
25	584	e1040	e380	e395	681	1630	1800	e550	e8810	1820	525	420
26	610	e980	e370	e385	684	1570	1780	e560	e8310	1850	517	366
27	612	e870	e365	e380	701	1510	1760	e580	e7800	1810	509	352
28	608	786	e365	e375	704	1460	1740	e590	e7220	1790	494	348
29	504	729	e365	e370	700	1440	1720	e610	e6700	1810	483	327
30	508	e740	e360	e360	---	1430	1700	e610	e6550	1780	475	303
31	516	---	e360	e355	---	1300	---	e610	---	1800	470	---
TOTAL	19726	21123	16990	13460	16251	55753	40100	27007	97195	96430	27046	14285
MEAN	636	704	548	434	560	1798	1337	871	3240	3111	872	476
MAX	1030	1130	840	647	733	2890	1800	1690	8810	6100	1820	588
MIN	433	528	360	355	325	710	1090	530	450	1740	470	303
AC-FT	39130	41900	33700	26700	32230	110600	79540	53570	192800	191300	53650	28330
CFSM	.10	.11	.09	.07	.09	.29	.22	.14	.52	.50	.14	.08

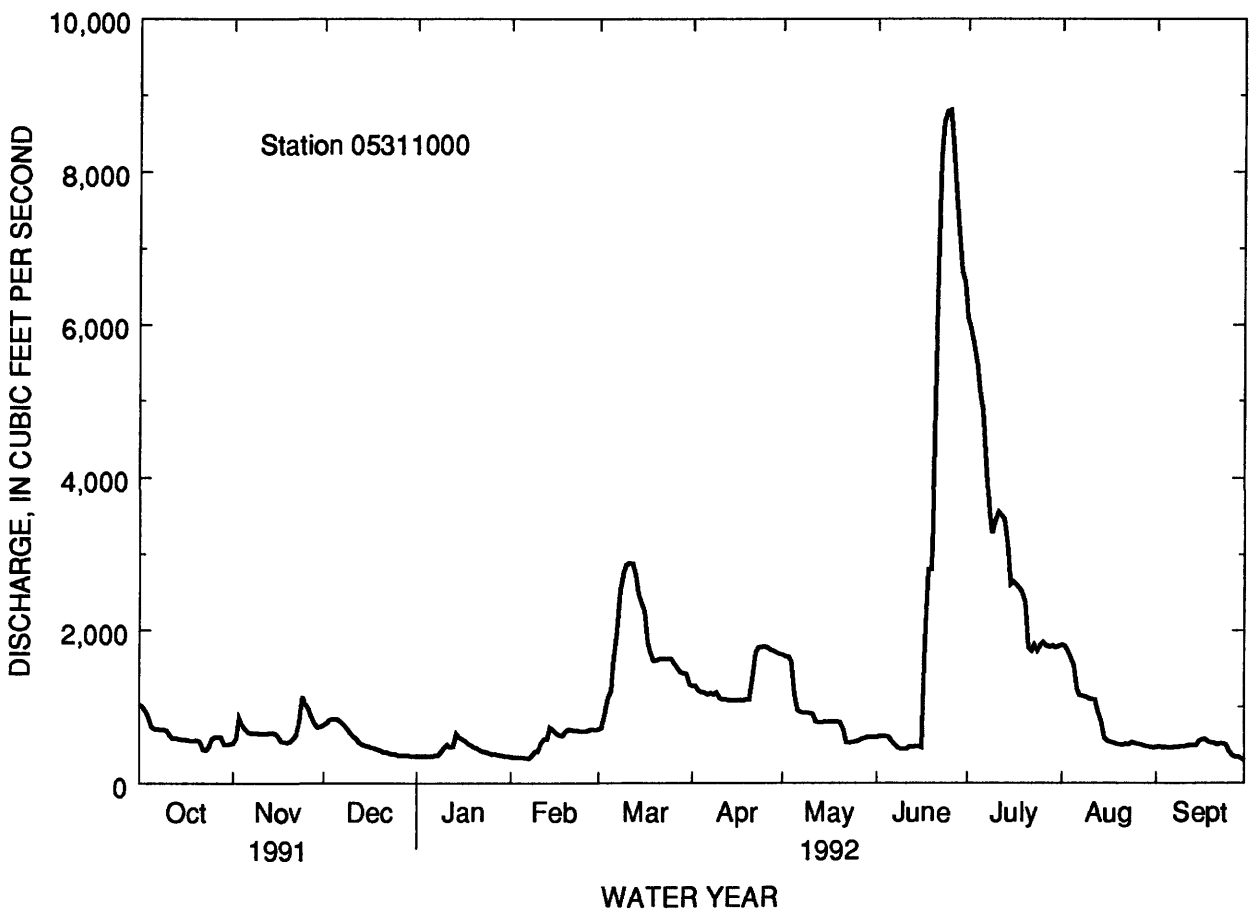
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	297	302	226	153	175	790	2374	1368	1193	957	457	305
MAX	3171	3164	1352	760	740	4893	12550	7315	5088	5718	3165	2613
(WY)	1987	1985	1985	1987	1987	1985	1952	1986	1984	1920	1991	1986
MIN	.76	1.61	2.35	1.57	1.06	5.06	7.82	3.13	1.40	1.89	.60	.57
(WY)	1934	1935	1935	1934	1937	1934	1934	1934	1934	1933	1933	1933

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1909 - 1992	
ANNUAL TOTAL	479665		445366			
ANNUAL MEAN	1314		1217		749a	
HIGHEST ANNUAL MEAN					2961	1986
LOWEST ANNUAL MEAN					4.43	1934
HIGHEST DAILY MEAN	6290	Jun 25	8810	Jun 25	34400	Apr 13 1969
LOWEST DAILY MEAN	42	Jan 30	303	Sep 30	.00b	
ANNUAL SEVEN-DAY MINIMUM	42	Jan 30	339	Feb 1	.00	Jul 5 1934
INSTANTANEOUS PEAK FLOW			8880	Jun 25	35100	Apr 12 1969
INSTANTANEOUS PEAK STAGE			15.70c	Jun 25	21.68c	Apr 12 1969
INSTANTANEOUS LOW FLOW			273	Sep 30		
ANNUAL RUNOFF (AC-FT)	951400		883400		543000	
ANNUAL RUNOFF (CFSM)	.21		.20		.12	
10 PERCENT EXCEEDS	3410		2540		19303	
50 PERCENT EXCEEDS	746		679		225	
90 PERCENT EXCEEDS	78		395		33	

a Median of annual mean discharge is 575 ft³/s.
b Occurred several days in 1933, 1934, 1936.
c From highwater mark.



MINNESOTA RIVER BASIN

05311000 MINNESOTA RIVER AT MONTEVIDEO, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1961-67, 1972-76, 1989 to current year.
REMARKS.--Letter K indicates non-iseal colony count.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L) (00340)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT											
31...	1215	509	865	8.6	2.5	13.5	745	44	4.2	40	K6300
NOV											
26...	1345	800	985	8.3	0.5	13.3	731	32	4.0	--	--
DEC											
19...	1345	367	1070	8.0	0.5	12.2	746	33	3.3	K960	620
JAN											
29...	1315	370	1160	7.8	0.5	10.2	740	31	2.2	K2500	490
MAR											
05...	1145	1180	810	8.4	2.5	--	736	43	6.8	--	670
APR											
08...	1215	1170	800	8.5	8.5	14.4	739	41	5.0	K6	45
MAY											
06...	0815	950	915	8.2	15.0	9.5	745	26	3.7	K7	50
JUN											
02...	1145	640	863	8.6	20.0	11.0	740	44	5.3	60	K21
18...	1320	2910	327	7.8	19.5	7.7	738	62	2.8	--	--
23...	1015	8720	557	7.7	19.0	5.8	731	24	2.0	--	--
30...	1645	6620	736	8.1	19.5	8.5	733	--	4.6	--	--
JUL											
15...	0800	2650	909	7.8	21.0	9.5	733	36	3.8	160	750
AUG											
13...	0830	914	903	7.9	20.5	7.3	744	40	5.0	K27	40
SEP											
22...	1345	509	899	8.1	16.5	8.6	744	18	2.9	86	120

MINNESOTA RIVER BASIN

05311000 MINNESOTA RIVER AT MONTEVIDEO, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)
OCT											
31...	2	<1	<0.010	0.360	0.350	0.050	0.050	1.0	0.90	0.170	0.090
NOV											
26...	11	10	0.020	0.940	0.930	0.100	0.100	1.2	0.80	0.100	0.030
DEC											
19...	10	9	0.030	1.30	1.30	0.290	0.290	1.4	1.2	0.080	0.050
JAN											
29...	5	<1	0.020	1.10	1.10	0.440	0.440	1.4	1.2	0.240	0.200
MAR											
05...	30	<1	0.010	0.770	0.770	0.290	0.280	1.5	1.2	0.200	0.060
APR											
08...	59	25	0.010	0.700	0.690	0.040	0.040	0.90	0.80	0.040	<0.010
MAY											
06...	63	13	0.020	0.900	0.900	<0.010	<0.010	1.3	0.60	0.140	<0.010
JUN											
02...	99	9	0.010	0.160	0.160	0.040	0.040	0.90	0.90	0.060	0.040
18...	372	64	0.070	2.10	2.10	0.130	0.130	1.4	0.50	0.380	0.110
23...	44	15	0.070	1.50	1.50	0.190	0.200	1.1	1.1	0.150	0.140
30...	22	<1	0.050	1.10	1.10	0.060	0.050	1.4	0.80	0.150	0.080
JUL											
15...	55	12	0.040	1.80	1.80	0.050	0.040	1.2	0.70	0.150	0.060
AUG											
13...	62	11	0.030	0.310	0.320	0.130	0.150	1.6	1.1	0.220	0.070
SEP											
22...	49	7	0.030	0.570	0.580	0.080	0.100	1.1	0.90	0.200	0.100

MINNESOTA RIVER BASIN

05311000 MINNESOTA RIVER AT MONTEVIDEO, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343)	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344)	SED. SUSP. FALL DIAM. % FINER THAN .500 MM (70345)
OCT											
31...	0.090	0.070	--	--	15.0	<0.100	36	--	--	--	--
NOV											
26...	0.030	0.010	9.6	1.7	9.90	<0.100	137	--	--	--	--
DEC											
19...	0.040	0.040	9.6	--	0.500	<0.900	28	--	--	--	--
JAN											
29...	0.180	0.180	9.3	0.7	5.00	<0.300	40	--	--	--	--
MAR											
05...	0.050	0.040	10	2.0	17.0	<0.500	100	--	--	--	--
APR											
08...	0.030	0.030	24	3.4	7.80	<0.100	76	--	--	--	--
MAY											
06...	0.020	<0.010	8.5	3.8	14.0	0.700	118	--	--	--	--
JUN											
02...	0.030	<0.010	10	3.6	50.0	3.20	130	--	--	--	--
18...	0.120	0.110	5.6	>5.0	3.10	0.400	393	92	99	99	100
23...	0.140	0.130	7.3	1.2	2.20	<0.100	87	--	--	--	--
30...	0.060	0.050	--	--	11.0	<0.100	29	--	--	--	--
JUL											
15...	0.070	0.050	9.1	2.8	12.0	<0.100	119	--	--	--	--
AUG											
13...	0.080	0.070	9.2	--	15.0	0.900	114	--	--	--	--
SEP											
22...	0.100	0.100	8.7	2.2	11.0	0.700	96	--	--	--	--

Minnesota River at Montevideo
April 13, 1969

MINNESOTA RIVER BASIN

05313500 YELLOW MEDICINE RIVER NEAR GRANITE FALLS, MN

LOCATION.--Lat 44°43'18", long 95°31'07", in SW¼ sec.35, T.115 N., R.39 W., Yellow Medicine County, Hydrologic Unit 07020004, on right bank 50 ft downstream from highway bridge, 6 mi upstream from mouth, and 8 mi south of town of Granite Falls.

DRAINAGE AREA.--653 mi².

PERIOD OF RECORD.--March 1931 to September 1935 (no winter records), October 1935 to September 1938, October 1939 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1508: 1931, 1934(M), 1937(M), 1946(M), 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 960.64 ft above mean sea level. Mar. 16, 1931, to June 13, 1938, nonrecording gage, on bridge 50 ft upstream at present datum. Oct. 12, 1939, to Nov. 30, 1952, nonrecording gage 500 ft downstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1919 reached a stage of 17.5 ft, from information by local residents, discharge, 25,200 ft³/s.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 300 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Mar. 2	1415	586	4.18	July 4	0715	785	4.58
Mar. 8	0245	936	4.79	July 17	1345	369	3.78
June 19	1830	*1,170	*5.13	July 24	2315	307	3.62

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	23	e29	e24	e29	345	135	179	47	200	118	75
2	19	18	e28	e24	e29	544	130	159	45	320	109	69
3	18	15	e27	e24	e30	512	126	144	41	560	106	64
4	18	15	e26	e24	e31	406	122	133	38	759	105	65
5	17	16	e25	e25	e33	359	117	124	36	606	101	66
6	18	17	e25	e26	e33	450	115	113	37	486	96	66
7	18	16	e25	e27	e33	621	106	105	34	406	94	64
8	19	15	e25	e28	e32	850	107	97	34	348	91	61
9	22	14	e25	e29	e31	772	108	90	36	293	96	60
10	17	14	e25	e29	e30	622	108	87	36	250	103	61
11	21	15	e26	e29	e29	522	109	89	37	212	104	57
12	19	17	e27	e29	e28	447	106	84	36	203	97	52
13	17	17	e28	e28	e29	422	104	82	33	216	86	47
14	17	18	e28	e28	e29	397	102	79	30	262	77	41
15	22	20	e27	e27	e30	357	100	77	27	245	69	39
16	18	21	e26	e26	e32	342	100	82	34	259	59	37
17	17	21	e25	e26	e34	316	100	79	108	348	53	33
18	18	31	e25	e25	e36	303	105	72	573	361	50	30
19	17	36	e25	e25	e36	294	118	71	1110	331	45	26
20	17	39	e25	e25	e38	271	125	66	1060	274	42	23
21	18	52	e25	e25	e39	251	171	59	1020	225	39	24
22	30	54	e25	e25	e38	235	225	56	937	208	33	22
23	25	71	e25	e25	e37	216	247	50	767	193	31	20
24	20	47	e25	e25	e36	208	249	45	662	257	35	17
25	20	e43	e25	e25	e40	203	250	53	552	303	44	15
26	20	e40	e25	e25	e48	187	244	57	461	287	45	13
27	20	e38	e25	e25	e66	176	235	61	387	248	71	14
28	22	e35	e24	e25	e90	170	225	64	329	213	98	14
29	24	e32	e24	e26	e110	162	206	61	270	173	107	12
30	24	e31	e24	e27	---	153	191	57	220	145	105	11
31	21	---	e24	e28	---	145	---	52	---	132	86	---
TOTAL	612	841	793	809	1136	11258	4486	2627	9037	9323	2395	1198
MEAN	19.7	28.0	25.6	26.1	39.2	363	150	84.7	301	301	77.3	39.9
MAX	30	71	29	29	110	850	250	179	1110	759	118	75
MIN	17	14	24	24	28	145	100	45	27	132	31	11
AC-FT	1210	1670	1570	1600	2250	22330	8900	5210	17920	18490	4750	2380
CFSM	.03	.04	.04	.04	.06	.56	.23	.13	.46	.46	.12	.06
IN.	.03	.05	.05	.05	.06	.64	.26	.15	.51	.53	.14	.07

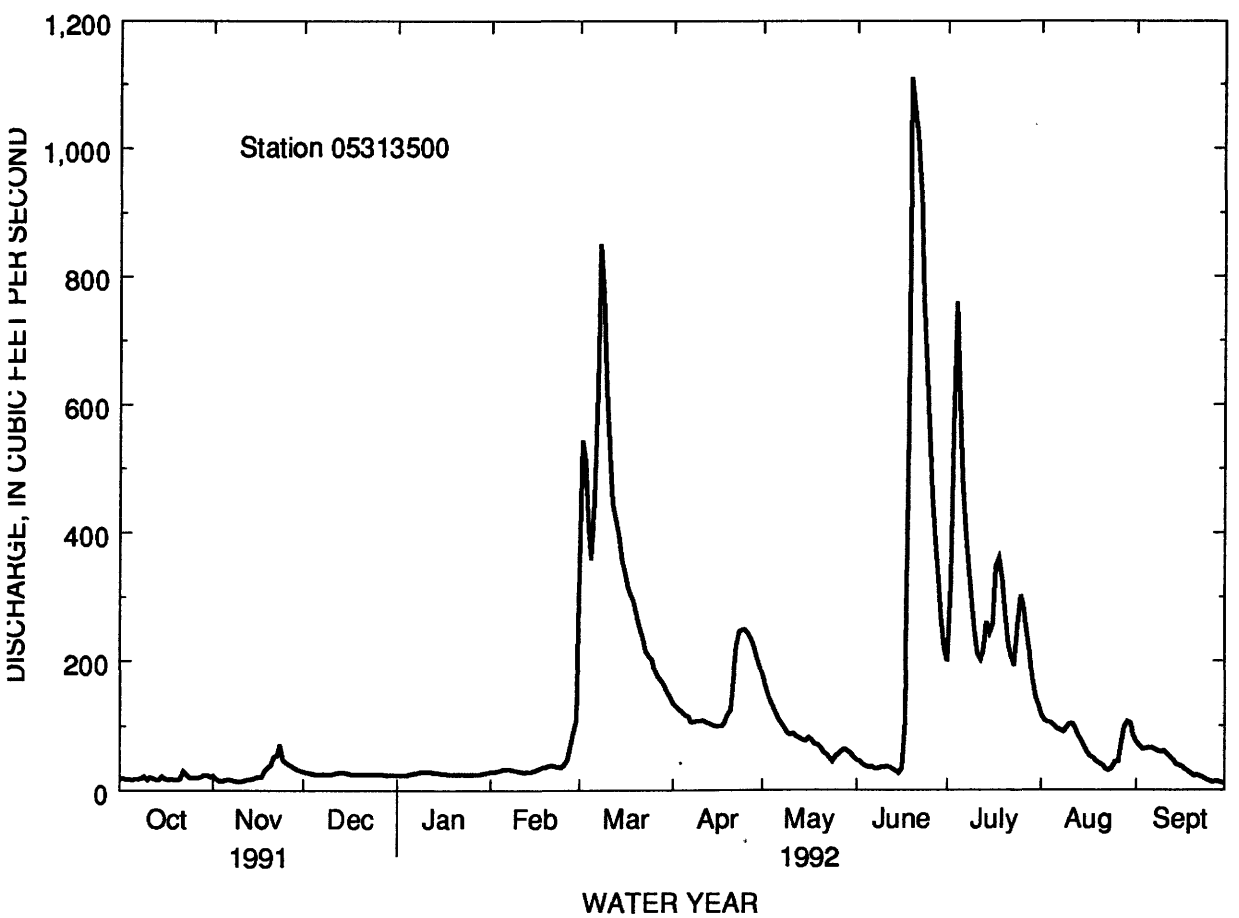
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	31.8	35.5	21.2	11.3	15.3	205	440	168	239	110	55.2	38.5
MAX	409	274	135	75.5	97.1	933	3302	1087	2484	669	510	1005
(WY)	1987	1971	1987	1987	1966	1986	1969	1944	1984	1962	1953	1986
MIN	1.41	1.60	1.39	.90	.12	3.67	2.58	1.18	1.18	.34	.38	.47
(WY)	1937	1938	1936	1948	1959	1975	1934	1934	1934	1933	1934	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1931 - 1992	
ANNUAL TOTAL	77793.2		44515			
ANNUAL MEAN	213		122		123a	
HIGHEST ANNUAL MEAN					480	1984
LOWEST ANNUAL MEAN					8.32	1959
HIGHEST DAILY MEAN	2670	Jun 8	1110	Jun 19	16400	Apr 10 1969
LOWEST DAILY MEAN	4.4	Jan 1	11	Sep 30	.00b	
ANNUAL SEVEN-DAY MINIMUM	4.4	Jan 1	14	Sep 24	.00	Jan 21 1948
INSTANTANEOUS PEAK FLOW			1170	Jun 19	17200	Apr 10 1969
INSTANTANEOUS PEAK STAGE			5.13	Jun 19	14.90	Apr 10 1969
INSTANTANEOUS LOW FLOW			10	Sep 30		
ANNUAL RUNOFF (AC-FT)	154300		88300		88870	
ANNUAL RUNOFF (CFSM)	.33		.19		.19	
ANNUAL RUNOFF (INCHES)	4.43		2.54		2.55	
10 PERCENT EXCEEDS	526		323		254	
50 PERCENT EXCEEDS	30		45		16	
90 PERCENT EXCEEDS	5.0		19		2.2	

a Median of annual mean discharges is 82 ft³/s.
b Many days in several years.



MINNESOTA RIVER BASIN

05315000 REDWOOD RIVER NEAR MARSHALL, MN

LOCATION.--Lat 44°25'49", long 95°50'43", in SE¼SW¼ sec.12, T.111 N., R.42 W., Lyon County, Hydrologic Unit 07020006, on right bank 2.0 mi upstream from Redwood River diversion structure on southwest edge of town of Marshall, MN. Prior to Apr. 10, 1980, at site 5 mi downstream.

DRAINAGE AREA.--259 mi².

PERIOD OF RECORD.--March 1940 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WDR MN-89-2: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,188.23 ft above mean sea level. March 1940 to April 9, 1980, nonrecording gage 5.0 mi downstream from present site at datum 43.35 ft lower (crest-stage gage added June 12, 1968). Since March 1964, nonrecording gage and crest-stage gage on diversion channel 1.5 mi downstream at datum 1,100.00 ft above sea level.

REMARKS.--Records good except those for estimated daily discharges which are fair. Water diverted at medium and high stages into diversion channel 2.0 mi below station. Diversion began Mar. 18, 1964. Unknown amount of natural diversion into Cottonwood River basin occurs at extremely high stages 0.8 mi below station.

EXTREMES FOR PERIOD OF RECORD.--River only, maximum discharge, 5,370 ft³/s, June 17, 1957, gage height, 10.14 ft; maximum gage height, 11.05 ft, Apr. 6, 1951, from floodmark; no flow at times. Diversion only, maximum discharge, 4,440 ft³/s, Apr. 10, 1969, gage height, 78.45 ft; no flow on many days. Combined flow, maximum discharge, 5,590 ft³/s, Apr. 10, 1969; no flow at times.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	17	e15	e12	e12	250	60	44	21	e45	28	68
2	10	20	e17	e12	e13	177	57	40	23	e66	33	71
3	8.9	12	e16	e12	e13	163	55	38	21	e80	30	76
4	7.7	9.7	e15	e12	e13	154	53	37	21	e74	27	74
5	8.4	9.7	e15	e12	e13	161	52	34	19	e66	25	76
6	8.9	9.0	e15	e12	e13	254	49	30	19	e56	26	75
7	8.6	9.9	e15	e12	e13	316	49	30	19	e50	114	77
8	9.6	12	e15	e12	e12	260	48	30	20	e46	135	76
9	8.7	12	e15	e12	e11	219	51	e30	20	e40	139	74
10	8.6	11	e15	e12	e11	153	55	e28	20	e36	121	69
11	9.3	10	e14	e12	e11	170	55	e29	21	e35	110	66
12	13	10	e14	e12	e11	167	54	e30	19	e34	109	60
13	11	12	e14	e12	e11	142	55	e27	19	e34	103	57
14	11	13	e14	e11	e11	146	54	e23	20	e33	96	53
15	11	14	e14	e11	e11	130	53	e23	20	e33	88	50
16	13	14	e14	e11	e12	131	50	e23	20	e44	81	49
17	12	18	e14	e11	e12	135	53	e23	e340	44	75	46
18	11	26	e14	e11	e13	130	59	e24	e400	41	70	45
19	9.3	31	e14	e11	e14	121	62	e26	e250	39	64	42
20	9.6	32	e14	e11	e14	116	70	e26	e150	36	60	40
21	11	33	e14	e11	e14	109	71	e24	e100	33	55	39
22	11	e22	e13	e11	e14	90	75	e22	80	40	51	35
23	11	e17	e13	e11	e14	97	76	e21	62	44	47	33
24	11	e25	e13	e11	e14	90	74	e20	e56	45	55	31
25	10	e35	e13	e11	e15	90	71	e18	e50	47	76	29
26	12	e26	e13	e11	e20	88	68	e19	e42	43	94	29
27	16	e23	e13	e11	e70	79	73	e21	e38	40	98	28
28	17	e18	e13	e11	149	75	e70	e22	e34	36	96	25
29	17	e16	e13	e11	251	72	e60	e22	e32	32	87	24
30	15	e16	e13	e11	---	68	e50	e22	e28	29	74	23
31	12	---	e13	e12	---	64	---	e21	---	27	65	---
TOTAL	342.6	533.3	437	355	805	4417	1782	827	1984	1348	2332	1540
MEAN	11.1	17.8	14.1	11.5	27.8	142	59.4	26.7	66.1	43.5	75.2	51.3
MAX	17	35	17	12	251	316	76	44	400	80	139	77
MIN	7.7	9.0	13	11	11	64	48	18	19	27	25	23
AC-FT	680	1060	867	704	1600	8760	3530	1640	3940	2670	4630	3050
CFSM	.04	.07	.05	.04	.11	.55	.23	.10	.26	.17	.29	.20

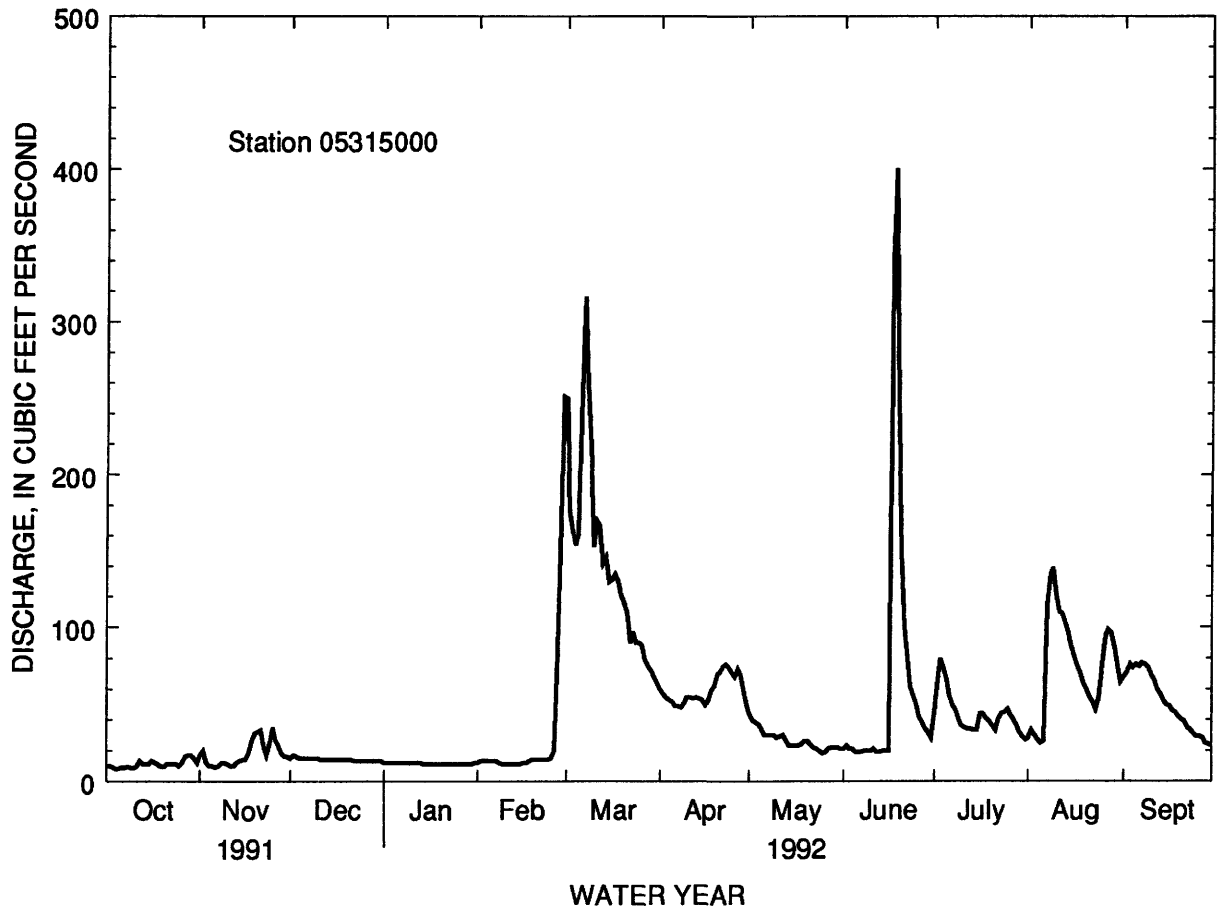
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	19.8	19.3	11.4	6.60	11.8	112	205	89.6	93.0	45.3	19.2	20.1
MAX	222	153	81.7	42.2	101	571	1152	596	752	306	184	292
(WY)	1969	1980	1983	1987	1983	1983	1969	1983	1957	1962	1963	1986
MIN	.029	.58	.87	.000	.090	2.70	7.36	3.90	.83	.058	.042	.007
(WY)	1977	1977	1977	1977	1979	1965	1990	1981	1976	1976	1941	1941

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1940 - 1992	
ANNUAL TOTAL	13905		16702.9			
ANNUAL MEAN	38.1		45.6		54.8a	
HIGHEST ANNUAL MEAN					219	1983
LOWEST ANNUAL MEAN	450	Jun 5	400	Jun 18	4760	Apr 9 1969
LOWEST DAILY MEAN	3.6	Jan 7	7.7	Oct 4	.00b	
ANNUAL SEVEN-DAY MINIMUM	3.9	Jan 2	8.6	Oct 4	.00	Jul 28 1940
INSTANTANEOUS PEAK FLOW					5590	Apr 10 1969
INSTANTANEOUS PEAK STAGE					11.05c	Apr 6 1951
INSTANTANEOUS LOW FLOW			6.6	Oct 4		
ANNUAL RUNOFF (AC-FT)	27580				33130	39730
ANNUAL RUNOFF (CFSM)	.15		.18			.21
10 PERCENT EXCEEDS	96		97			123
50 PERCENT EXCEEDS	15		26			9.7
90 PERCENT EXCEED	5.0		11			1.7

a Median of annual mean discharges is 39 ft^3/s.
b Many days in several years.
c Site and datum then in use.



MINNESOTA RIVER BASIN

05316500 REDWOOD RIVER NEAR REDWOOD FALLS, MN

LOCATION.--Lat 44°31'25", long 95°10'20", in SE¼NE¼ sec.9, T.112 N., R.36 W., Redwood County, Hydrologic Unit 07020006, on right bank 4 ft upstream from highway bridge, 3 mi west of town of Redwood Falls, and 8.5 mi upstream from mouth.

DRAINAGE AREA.--629 mi².

PERIOD OF RECORD.--July 1909 to September 1914 (no winter records except 1911-12). August 1930 to September 1935 (no winter records), October 1935 to current year.

REVISED RECORDS.--WDR MN-89-2: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 972.33 ft above sea level. July 1909 to September 1914, nonrecording gage at bridge 20 ft downstream at datum 0.22 ft lower. August 1930 to Oct. 25, 1949, nonrecording gage, at bridge 20 ft downstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Natural discharge affected by unknown amount of interbasin flow between Yellow Medicine, Redwood, and Cottonwood River basins during extreme floods.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 400 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Mar. 3	0500	736	3.77	Apr. 22	0030	448	3.20
Mar. 6	2115	957	4.18	June 17	1630	*1750	*5.64

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	112	50	e80	e61	e60	492	222	225	83	150	97	134
2	110	24	e79	e61	e62	601	212	196	78	216	94	311
3	105	28	e78	e61	e63	682	201	181	74	350	102	334
4	99	37	e76	e60	e64	514	e190	169	72	315	97	260
5	97	38	e75	e60	e64	424	e185	159	67	281	94	225
6	93	40	e74	e60	e63	840	e182	149	67	253	88	222
7	89	57	e72	e60	e62	930	e181	143	65	230	165	213
8	91	59	e72	e59	e60	868	e182	142	64	207	284	218
9	91	60	e72	e59	e56	834	e185	138	64	180	273	207
10	85	62	e72	e59	e56	714	e200	135	66	164	251	186
11	83	60	e71	e58	e56	575	e210	133	65	156	230	163
12	81	60	e71	e58	e56	491	e230	134	62	149	203	154
13	78	67	e70	e58	e56	453	e234	129	57	142	187	144
14	79	74	e70	e58	e56	423	e240	127	56	136	174	133
15	78	83	e69	e58	e56	401	235	125	48	136	161	129
16	78	95	e68	e57	e56	394	235	128	177	157	150	139
17	78	107	e67	e57	e57	407	232	137	1400	168	138	136
18	72	133	e66	e56	e57	405	235	136	1400	157	130	127
19	69	183	e66	e56	e58	389	296	130	920	149	122	119
20	70	201	e66	e55	e58	371	e320	122	679	134	115	115
21	70	210	e65	e54	e60	358	366	110	521	123	108	107
22	70	196	e65	e54	e61	338	436	105	428	115	102	98
23	70	110	e64	e53	e62	318	384	97	384	129	97	94
24	69	e100	e64	e53	e66	312	349	91	334	151	96	90
25	67	e95	e64	e53	e90	304	329	93	286	147	122	83
26	67	e91	e63	e53	130	288	306	103	250	146	181	79
27	65	e87	e63	e53	215	269	286	110	217	142	193	78
28	67	e84	e62	e54	338	256	270	107	194	135	183	75
29	72	e83	e62	e55	462	252	259	103	171	126	168	71
30	72	e82	e62	e56	---	249	241	96	157	114	162	69
31	69	---	e61	e57	---	242	---	89	---	105	146	---
TOTAL	2496	2656	2129	1766	2660	14394	7633	4042	8506	5263	4713	4513
MEAN	80.5	88.5	68.7	57.0	91.7	464	254	130	284	170	152	150
MAX	112	210	80	61	462	930	436	225	1400	350	284	334
MIN	65	24	61	53	56	242	181	89	48	105	88	69
AC-FT	4950	5270	4220	3500	5280	28550	15140	8020	16870	10440	9350	8950
CFSM	.13	.14	.11	.09	.15	.74	.40	.21	.45	.27	.24	.24
IN.	.15	.16	.13	.10	.16	.85	.45	.24	.50	.31	.28	.27

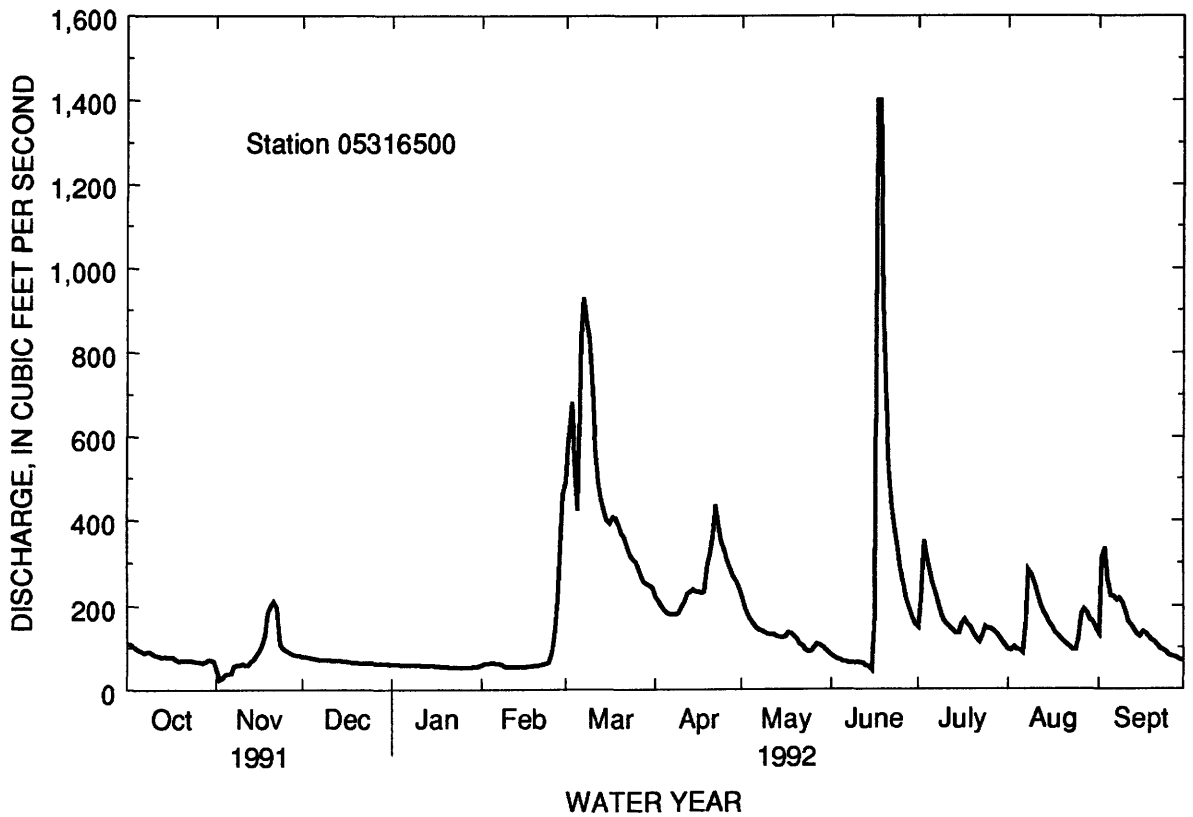
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	42.8	48.3	26.6	12.4	17.0	222	382	178	209	115	57.0	43.3
MAX	395	541	245	75.9	167	1289	2880	1234	1898	621	640	673
(WY)	1987	1980	1983	1987	1983	1983	1969	1983	1957	1962	1979	1986
MIN	.84	.96	.46	.19	.20	1.54	14.6	2.75	1.01	.44	.51	.31
(WY)	1937	1936	1936	1940	1937	1965	1934	1934	1934	1934	1934	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1909 - 1992	
ANNUAL TOTAL	83280.3		60771			
ANNUAL MEAN	228		166		125a	
HIGHEST ANNUAL MEAN					473	1983
LOWEST ANNUAL MEAN					10.8	1959
HIGHEST DAILY MEAN	2290	Jun 22	1400	Jun 17	13200	Apr 9 1969
LOWEST DAILY MEAN	5.0	Jan 11b	24	Nov 2	.00c	
ANNUAL SEVEN-DAY MINIMUM	5.0	Jan 11	39	Nov 1	.01	Jan 25 1940
INSTANTANEOUS PEAK FLOW			1750	Jun 17	19700	Jun 18 1957
INSTANTANEOUS PEAK STAGE			5.64	Jun 17	15.92d	Jun 18 1957
INSTANTANEOUS LOW FLOW			16	Nov 2		
ANNUAL RUNOFF (AC-FT)	165200		120500		90730	
ANNUAL RUNOFF (CFSM)	.36		.26		.20	
ANNUAL RUNOFF (INCHES)	4.93		3.59		2.71	
10 PERCENT EXCEEDS	621		335		259	
50 PERCENT EXCEEDS	92		107		22	
90 PERCENT EXCEEDS	6.5		58		2.0	

a Median of annual mean discharges is 84 ft³/s.
b Occurred Jan. 11 to Feb. 1.
c Occurred several days in 1940 and 1959.
d From floodmark.



MINNESOTA RIVER BASIN

05317000 COTTONWOOD RIVER NEAR NEW ULM, MN

LOCATION.--Lat 44°17'29", long 94°26'24", in SW¼NE¼ sec.33, T.110 N., R.30 W., Brown County, Hydrologic Unit 07020008, on left bank 600 ft upstream from highway bridge, 1.8 mi south of New Ulm, and 3.2 mi upstream from mouth.

DRAINAGE AREA.--1,280 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1909 to December 1913, March 1931 to March 1938, August 1938 to current year (winter records incomplete prior to 1936).

REVISED RECORDS.--WSP 355: 1912.

GAGE.--Water-stage recorder. Datum of gage is 796.83 ft above mean sea level. July 1, 1909, to Dec. 13, 1913, nonrecording gage at site 2.7 mi upstream at different datum. Mar. 15, 1931, to Mar. 31, 1938, nonrecording gage 2.2 mi upstream at datum 11.41 ft higher. Aug. 23, 1938, to June 25, 1948, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,300 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Mar. 4	1300	*3820	*10.13	Jul 4	1400	2790	8.48
Mar. 7	2000	2830	8.55	Aug. 9	1600	1990	7.04
Apr. 22	1700	2420	7.84	Sep 5	1500	1380	5.69
Jun 19	0500	2570	8.10				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	293	138	312	e265	e190	e1690	879	973	377	414	369	543
2	276	77	e320	e256	e200	e2040	817	900	357	943	360	506
3	261	91	e340	e259	e264	e2310	770	824	334	2160	332	697
4	247	136	e360	e268	e304	2260	738	758	318	2720	302	1180
5	234	111	e380	e280	e425	1780	695	710	303	2350	277	1290
6	223	112	e380	e286	e498	2030	661	667	285	1880	256	1140
7	214	118	e375	e292	e501	2710	637	636	273	1510	360	957
8	208	111	e370	e313	e488	2700	613	609	263	1260	1310	867
9	200	99	e365	e332	e453	2530	603	583	263	1080	1930	833
10	197	97	e360	e354	e398	2440	592	552	263	963	1860	814
11	196	97	e359	e377	e354	2130	599	558	253	874	1570	761
12	191	103	e352	e397	e304	1870	596	542	246	801	1330	671
13	186	109	e350	e370	e248	1620	569	519	231	742	1120	604
14	179	123	e352	e360	e240	1440	546	508	215	688	977	546
15	173	151	e356	e355	e230	1310	549	508	197	654	858	496
16	166	188	e360	e360	e230	1230	570	505	228	645	751	453
17	163	236	e360	e355	e240	1320	587	502	671	707	668	551
18	159	394	e360	e340	e250	1530	605	502	1960	803	593	593
19	154	682	e360	e300	e250	1610	816	503	2460	767	515	511
20	149	849	e355	e270	e240	1570	1380	500	1990	661	451	446
21	146	1020	e352	e260	e230	1520	1810	482	1650	572	405	400
22	145	1140	e338	e250	e230	1420	2360	457	1370	546	362	373
23	145	979	e333	e240	e230	1310	2220	433	1110	515	333	340
24	145	665	e327	e230	e220	1240	1900	400	923	547	310	308
25	143	407	e323	e220	e210	1210	1660	392	810	643	351	280
26	140	e380	e318	e210	e220	1150	1500	414	722	659	416	261
27	140	e360	e311	e200	e258	1060	1340	442	622	623	619	249
28	142	e340	e300	e195	e524	1000	1220	460	541	573	812	232
29	190	e330	e296	e188	1150	989	1140	447	482	516	819	220
30	186	e320	e283	e178	---	969	1050	425	447	456	719	214
31	173	---	e271	e182	---	934	---	401	---	404	626	---
TOTAL	5764	9963	10578	8742	9579	50922	30022	17112	20164	28676	21961	17336
MEAN	186	332	341	282	330	1643	1001	552	672	925	708	578
MAX	293	1140	380	397	1150	2710	2360	973	2460	2720	1930	1290
MIN	140	77	271	178	190	934	546	392	197	404	256	214
AC-FT	11430	19760	20980	17340	19000	101000	59550	33940	40000	56880	43560	34390
CFSM	.15	.26	.27	.22	.26	1.28	.78	.43	.53	.72	.55	.45

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1992, BY WATER YEAR (WY)

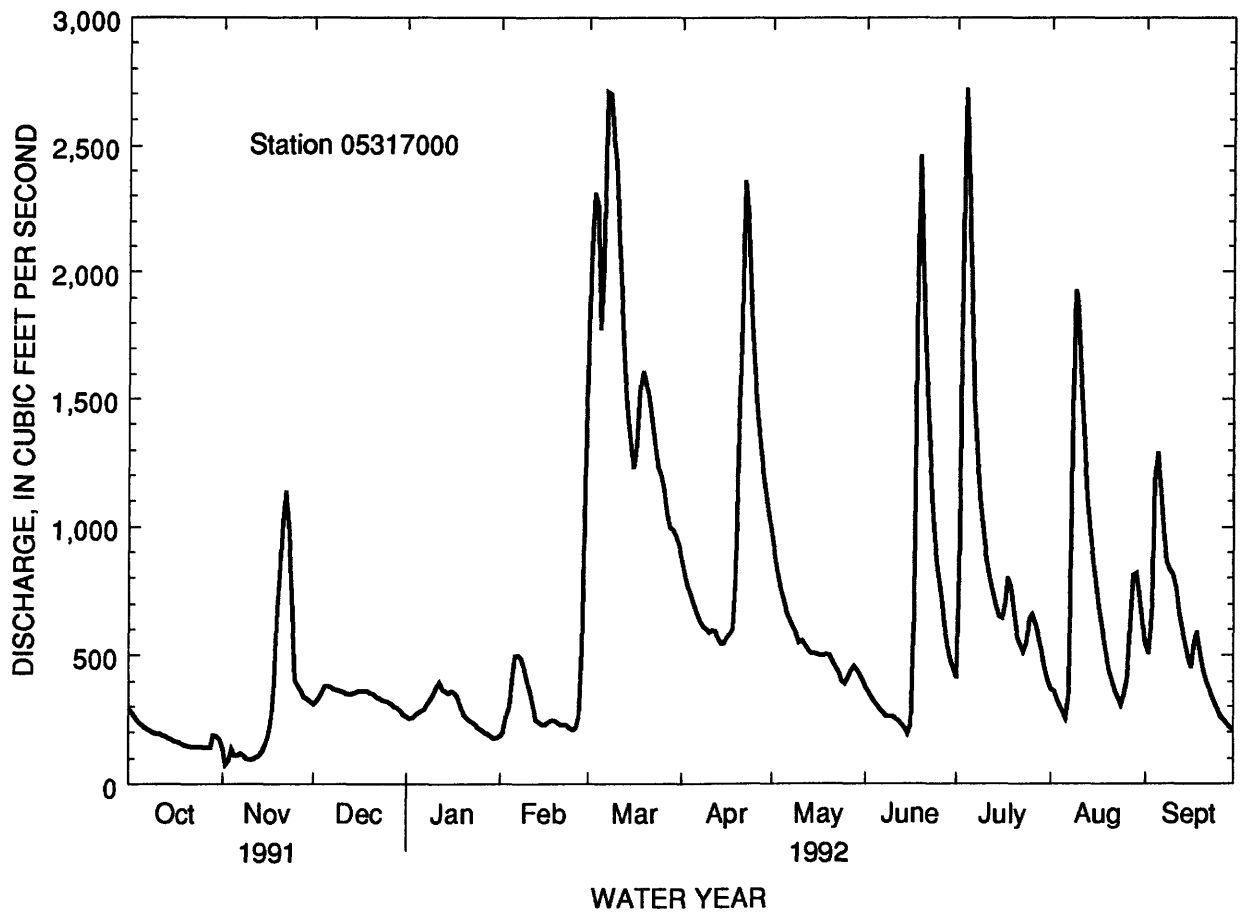
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	152	129	83.8	47.8	87.4	605	917	488	492	278	151	140
MAX	3208	1099	572	282	628	2236	7075	2727	3355	1305	1003	2438
(WY)	1969	1980	1980	1992	1983	1983	1969	1983	1984	1947	1979	1986
MIN	4.57	7.97	5.77	1.61	1.47	13.9	40.0	7.57	8.58	4.37	1.05	3.28
(WY)	1934	1940	1936	1940	1940	1965	1959	1934	1911	1934	1934	1933

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1909 - 1992	
ANNUAL TOTAL	208198		230819			
ANNUAL MEAN	570		631		322a	
HIGHEST ANNUAL MEAN					1190	1969
LOWEST ANNUAL MEAN					41.1	1940
HIGHEST DAILY MEAN	5330	Jun 23	2720	Jul 4	27100	Apr 9 1969
LOWEST DAILY MEAN	16	Jan 18	77	Nov 2	.60	Aug 1 1934
ANNUAL SEVEN-DAY MINIMUM	16	Jan 18	105	Nov 7	.64	Feb 1 1940
INSTANTANEOUS PEAK FLOW			3880	Mar 4	28700	Apr 10 1969
INSTANTANEOUS PEAK STAGE			10.13	Mar 4	20.86b	Apr 8 1965
INSTANTANEOUS LOW FLOW			60	Nov 2	.50	Nov 27 1952
ANNUAL RUNOFF (AC-FT)	413000		457800		233400	
ANNUAL RUNOFF (CFSM)	.45		.49		.25	
10 PERCENT EXCEEDS	1450		1430		712	
50 PERCENT EXCEEDS	308		415		68	
90 PERCENT EXCEEDS	20		188		11	

a Median of annual mean discharges is 227 ft^3/s.

b From floodmark (backwater from ice).

e Estimated.



MINNESOTA RIVER BASIN

05317000 COTTONWOOD RIVER NEAR NEW ULM, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1960-68, 1970-76, 1989 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L) (00340)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)
APR									
21...	1230	1790	1030	8.5	7.5	11.1	728	56	3.2

DATE	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)
APR									
21...	338	60	0.040	13.0	13.0	0.060	0.060	1.7	0.80

DATE	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
APR								
21...	0.510	0.090	0.160	0.090	5.9	>5.0	624	64

Cottonwood River near Lamberton
April 6, 1969
Photo by U.S. Army Crops of Engineers
St. Paul District

MINNESOTA RIVER BASIN

05317200 LITTLE COTTONWOOD RIVER NEAR COURTLAND, MN

LOCATION.--Lat 44°14'47", long 94°20'19", in SW¼NE¼ sec.17, T.109 N., R.29 W., Blue Earth County, Hydrologic Unit 07020007, on right bank 30 ft downstream from bridge on State Highway 68, 0.7 mi above mouth, 1.5 mi south of Courtland.

DRAINAGE AREA.--230 mi², approximately.

PERIOD OF RECORD.--October 1973 to current year. September 1969 to September 1973, operated as a low-flow station only.

GAGE.--Water-stage recorder. Datum of gage is 788.25 ft above mean sea level.

REMARKS.--Records fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 180 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Nov. 19	2000	340	4.91	Jun. 18	0000	384	4.92
Mar. 06	0600	*555	*5.80	Jul. 08	1030	417	5.08
Apr. 25	0600	415	5.12				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

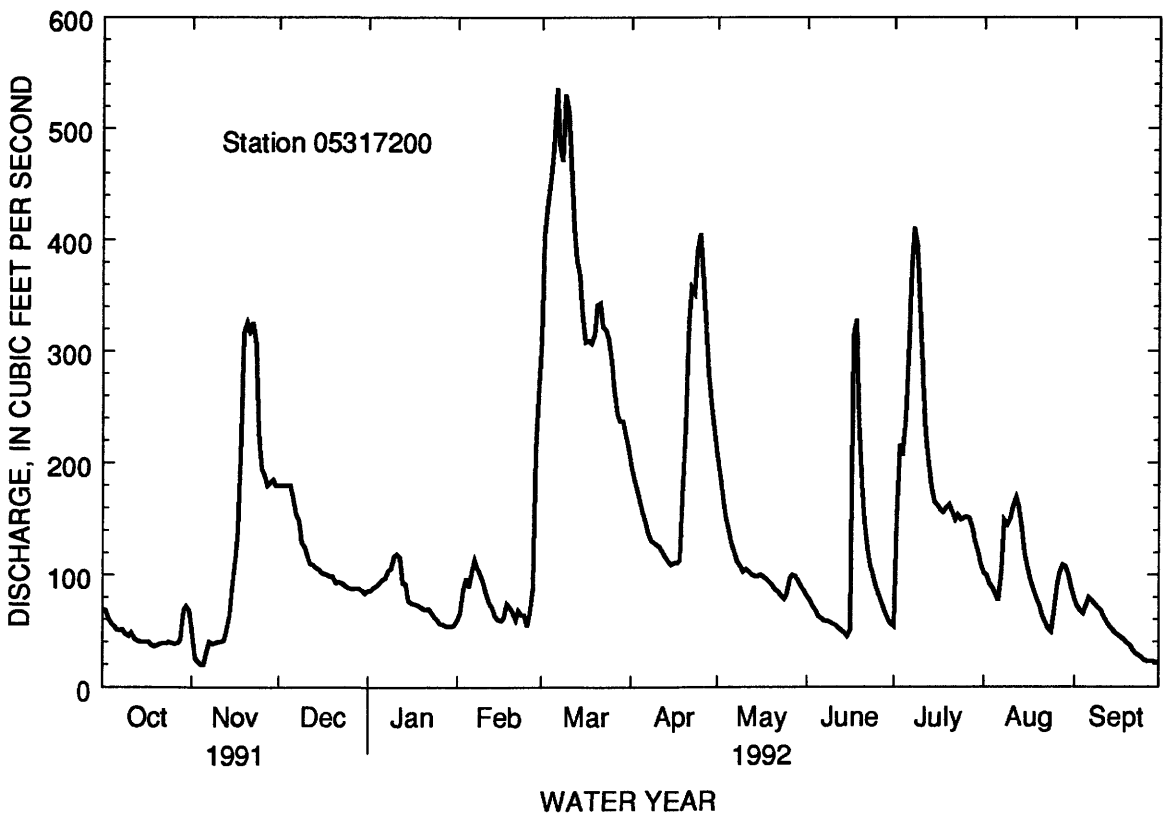
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	69	50	e180	86	60	311	199	207	81	54	102	79
2	68	26	e180	86	66	404	186	187	77	151	100	72
3	61	23	e180	89	87	433	177	169	72	216	92	68
4	56	20	e180	91	97	457	166	153	68	206	89	66
5	54	20	e180	93	89	482	156	140	63	240	83	73
6	51	32	e170	96	104	536	146	129	61	293	77	80
7	50	40	e155	97	114	486	137	120	59	373	103	77
8	51	38	148	104	e105	471	131	112	59	410	149	74
9	47	39	129	106	e100	530	129	108	58	394	145	71
10	45	40	125	117	e92	515	127	103	56	341	151	68
11	48	40	117	119	83	468	125	105	55	272	161	63
12	43	41	e110	116	75	410	120	103	52	226	169	58
13	41	50	e109	93	71	383	116	100	50	199	161	54
14	40	64	e107	92	63	368	112	99	48	179	141	51
15	40	88	e105	77	60	334	109	99	45	165	120	48
16	40	113	e102	e75	59	308	111	100	51	163	106	46
17	40	140	e101	e74	61	309	111	98	313	158	96	44
18	37	223	e100	e73	74	307	113	96	328	156	87	42
19	36	316	99	e72	71	314	182	94	236	160	80	39
20	37	325	99	e70	67	341	231	91	181	163	73	37
21	38	318	93	69	60	343	327	87	148	157	64	33
22	39	325	94	70	68	322	357	85	124	150	58	30
23	39	305	93	67	64	319	352	82	109	154	52	28
24	40	227	91	62	64	311	389	79	99	150	49	26
25	39	194	e89	60	54	291	405	83	90	151	65	24
26	38	e190	e88	56	66	265	371	97	82	152	90	23
27	39	e180	e88	56	88	244	321	100	75	151	102	23
28	42	e182	88	54	211	237	280	99	67	143	109	23
29	68	e185	88	54	259	237	250	94	60	131	108	22
30	72	e180	86	54	---	226	226	90	56	121	100	21
31	68	---	84	55	---	213	---	85	---	110	89	---
TOTAL	1476	4014	3658	2483	2532	11175	6162	3394	2923	6089	3171	1463
MEAN	47.6	134	118	80.1	87.3	360	205	109	97.4	196	102	48.8
MAX	72	325	180	119	259	536	405	207	328	410	169	80
MIN	36	20	84	54	54	213	109	79	45	54	49	21
AC-FT	2930	7960	7260	4930	5020	22170	12220	6730	5800	12080	6290	2900
CFSM	.21	.58	.51	.35	.38	1.57	.89	.48	.42	.85	.44	.21
IN.	.24	.65	.59	.40	.41	1.81	1.00	.55	.47	.98	.51	.24

e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	31.4	37.6	23.1	12.7	18.4	115	146	97.0	100	63.1	41.1	37.7
MAX	163	134	118	80.1	105	360	463	285	350	287	217	262
(WY)	1987	1983	1992	1992	1983	1992	1983	1986	1984	1983	1979	1986
MIN	.75	.70	.21	.15	.38	5.79	9.64	4.17	2.39	.63	.81	.54
(WY)	1976	1977	1977	1977	1977	1975	1990	1981	1976	1988	1976	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1974 - 1992	
ANNUAL TOTAL	40034.5		48540			
ANNUAL MEAN	110		133		60.4	
HIGHEST ANNUAL MEAN					160	1983
LOWEST ANNUAL MEAN					9.18	1989
HIGHEST DAILY MEAN	505	Jun 5	536	Mar 6	1110	Mar 16 1985
LOWEST DAILY MEAN	3.2	Jan 7	20	Nov 4	.02	Sep 12 1977
ANNUAL SEVEN-DAY MINIMUM	3.2	Jan 24	23	Sep 24	.08	Sep 11 1977
INSTANTANEOUS PEAK FLOW			555	Mar 6	1340	Mar 16 1985
INSTANTANEOUS PEAK STAGE			5.80	Mar 6	8.96	Mar 16 1985
INSTANTANEOUS LOW FLOW			17	Sep 30	.01	Sep 17 1977
ANNUAL RUNOFF (AC-FT)	79410		96280		43760	
ANNUAL RUNOFF (CFSM)	.48		.58		.26	
ANNUAL RUNOFF (INCHES)	6.48		7.85		3.57	
10 PERCENT EXCEEDS	256		312		169	
50 PERCENT EXCEEDS	72		96		18	
90 PERCENT EXCEEDS	4.0		41		1.0	



MINNESOTA RIVER BASIN

05319500 WATONWAN RIVER NEAR GARDEN CITY, MN

LOCATION.--Lat 44°02'47", long 94°11'43", in SW¼NE¼ sec.28, T.107 N., R.28 W., Blue Earth County, Hydrologic Unit 07020010, on left bank 25 ft downstream from bridge on County Highway 13, 1.5 miles west of Garden City, 7.3 mi upstream from mouth, and 9.2 mi downstream from Perch Creek.

DRAINAGE AREA.--812 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1940 to September 1945, September 1976 to current year. 1953, 1960, 1961, and 1969 (one or more discharge measurements each year).

REVISED RECORDS.--WDR MN-78-2: 1977.

GAGE.--Water-stage recorder. Datum of gage is 905.05 ft above mean sea level. Prior to September 30, 1945, nonrecording gage at site 200 ft upstream and at datum 0.17 ft higher.

REMARKS.--Records good except those for the periods of estimated daily discharge, which are fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1965, reached a stage of 18.89 ft at datum 0.17 ft higher, from floodmarks, discharge, 19,000 ft³/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 900 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Nov. 21	1800	2,020	5.97	Jul. 5	1400	1,600	5.17
Mar. 09	0330	*3,150	*7.82	Jul. 24	1930	1,120	4.17
Apr. 24	1230	2,510	6.81	Aug. 10	0830	1,120	4.18
June 19	1100	1,830	5.61				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	321	221	440	e325	e290	2380	1240	1040	479	343	509	357
2	305	112	554	e320	e310	2760	1120	945	457	582	470	317
3	283	146	e620	e320	e330	2940	1040	859	443	1190	426	301
4	266	117	e600	e315	e360	2890	976	782	416	1490	383	321
5	236	117	e600	e310	e390	2820	901	723	391	1580	346	342
6	213	121	e620	e315	e450	2800	832	676	369	1540	312	557
7	206	131	e660	e320	e470	2920	795	636	351	1320	365	713
8	227	138	e690	e330	e460	3050	755	605	331	1030	714	651
9	212	159	e700	e340	e430	3090	745	582	324	897	1030	568
10	197	186	e700	e350	e420	2930	740	551	314	828	1110	497
11	191	192	e700	e360	e400	2810	736	531	301	796	967	427
12	177	199	e690	e350	e380	2600	710	535	284	744	811	368
13	169	217	e680	e340	e370	2290	664	531	265	742	691	328
14	167	266	e670	e347	e360	2000	647	523	249	793	592	313
15	155	321	e640	e350	e355	1730	632	513	231	765	517	302
16	158	395	e600	e350	e350	1540	653	524	281	774	452	309
17	155	484	e550	e355	e365	1430	675	543	889	828	395	309
18	143	830	e520	e355	e390	1430	694	545	1620	766	350	286
19	137	1380	e500	e355	e380	1500	815	536	1800	723	313	264
20	143	1810	e470	e345	e370	1550	1340	518	1580	613	278	240
21	140	1990	e450	e325	e375	1680	1710	496	1270	525	245	223
22	145	1990	e440	e305	e370	1750	2010	476	1050	528	220	197
23	139	1820	e420	e290	e365	1710	2310	461	912	847	194	177
24	137	1400	e410	e290	e360	1740	2470	431	795	1090	175	160
25	129	1150	e390	e285	e340	1790	2280	423	687	1090	221	149
26	127	1150	e380	e280	e470	1770	1990	509	598	1030	378	141
27	128	1120	e370	e270	e740	1660	1690	621	525	971	530	134
28	127	1080	e360	e270	1230	1500	1450	637	464	861	567	127
29	146	987	e350	e270	1850	1440	1280	602	415	748	526	120
30	204	658	e340	e270	---	1400	1150	562	374	648	470	118
31	198	---	e330	e280	---	1340	---	520	---	572	412	---
TOTAL	5681	20887	16444	9887	13730	65240	35050	18436	18465	27254	14969	9316
MEAN	183	696	530	319	473	2105	1168	595	615	879	483	311
MAX	321	1990	700	360	1850	3090	2470	1040	1800	1580	1110	713
MIN	127	112	330	270	290	1340	632	423	231	343	175	118
AC-FT	11270	41430	32620	19610	27230	129400	69520	36570	36630	54060	29690	18480
CFSM	.23	.86	.65	.39	.58	2.59	1.44	.73	.76	1.08	.59	.38
IN.	.26	.96	.75	.45	.63	2.99	1.61	.84	.85	1.25	.69	.43

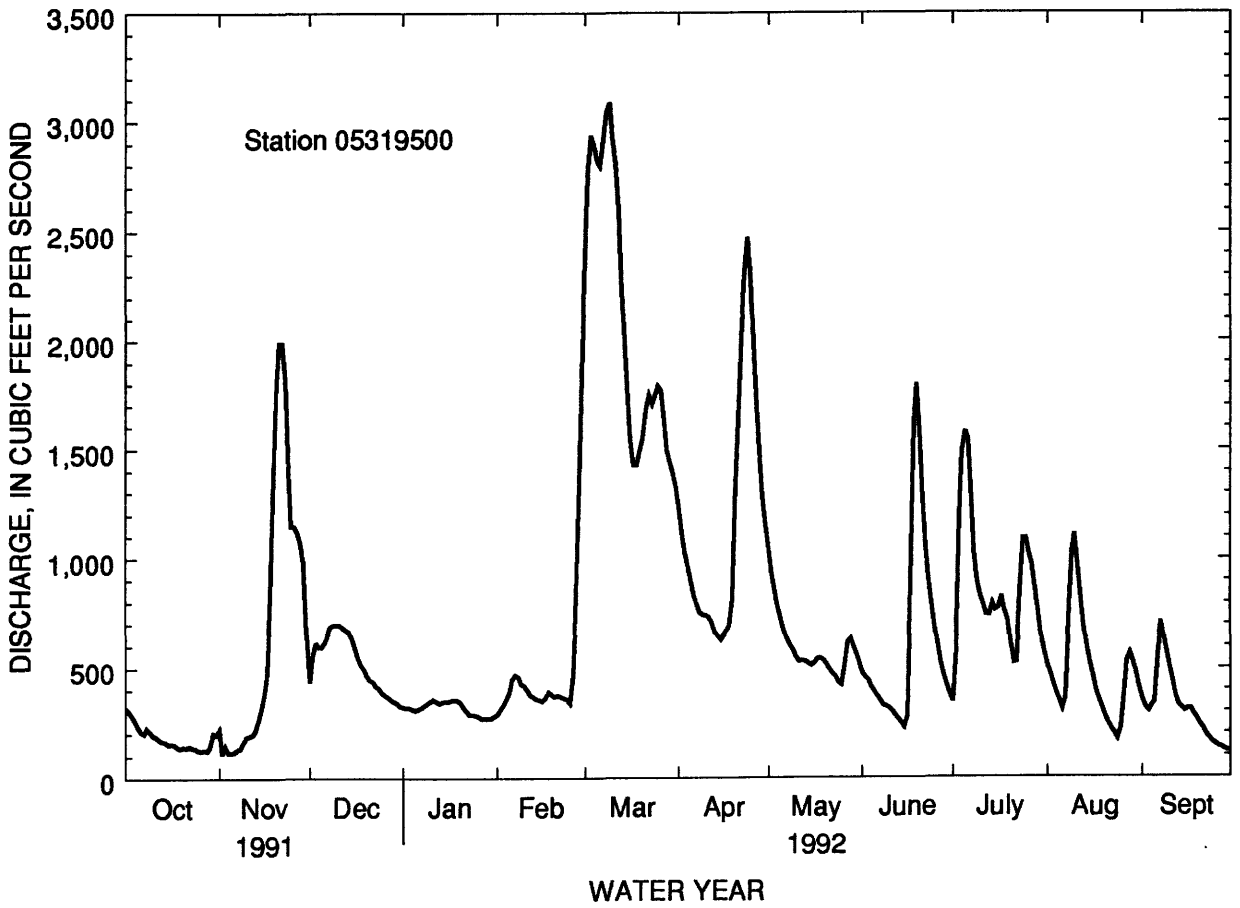
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	158	198	126	62.1	94.4	559	750	518	696	336	188	193
MAX	614	813	530	319	626	2105	2570	2023	1905	1098	1095	799
(WY)	1986	1980	1992	1992	1983	1992	1983	1944	1991	1983	1979	1942
MIN	5.37	7.69	3.76	2.70	2.39	19.3	33.7	16.1	17.3	8.27	6.56	3.63
(WY)	1990	1977	1990	1977	1977	1940	1990	1940	1989	1940	1989	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1940 - 1992	
ANNUAL TOTAL	249248		255359			
ANNUAL MEAN	683		698		336	
HIGHEST ANNUAL MEAN					827	1983
LOWEST ANNUAL MEAN					43.7	1989
HIGHEST DAILY MEAN	3350	Jun 7	3090	Mar 9	5620	May 21 1944
LOWEST DAILY MEAN	14	Jan 7	112	Nov 2	1.8	Dec 24 1989
ANNUAL SEVEN-DAY MINIMUM	14	Jan 7	126	Nov 2	1.9	Jan 20 1977
INSTANTANEOUS PEAK FLOW			3150	Mar. 9	5620	May 21 1944
INSTANTANEOUS PEAK STAGE			7.82	Mar. 9	9.84a	May 21 1944
INSTANTANEOUS LOW FLOW			57	Nov. 2		
ANNUAL RUNOFF (AC-FT)	494400		506500		243700	
ANNUAL RUNOFF (CFSM)	.84		.86		.41	
ANNUAL RUNOFF (INCHES)	11.42		11.70		5.63	
10 PERCENT EXCEEDS	1800		1590		895	
50 PERCENT EXCEEDS	400		473		105	
90 PERCENT EXCEEDS	16		189		9.2	

a Datum then in use.



MINNESOTA RIVER BASIN

05319500 WATONWAN RIVER NEAR GARDEN CITY, MN--Continued

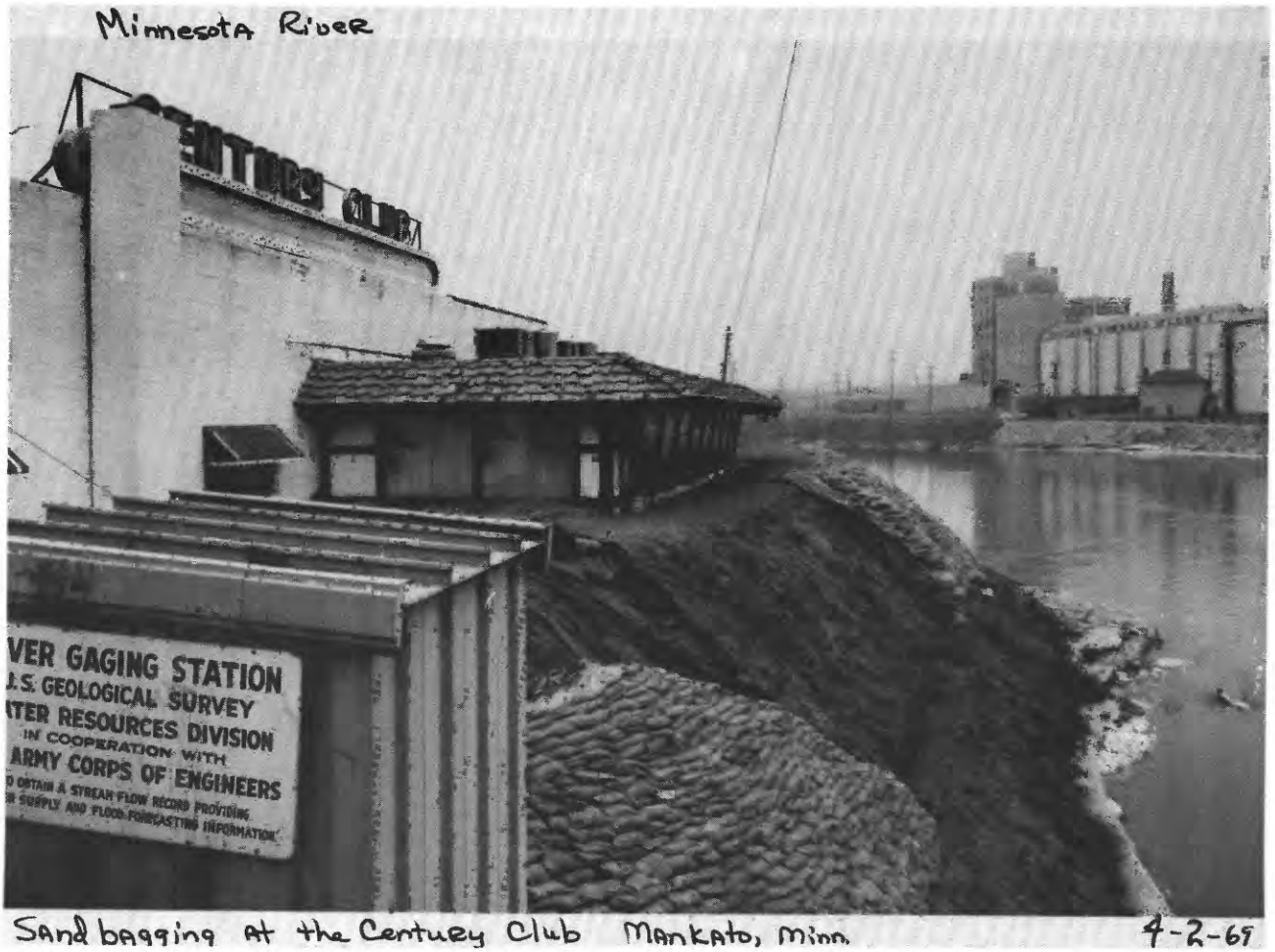
WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1960-61, 1969, 1977-78, 1908-81, 1989 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)
APR												
23...	1530	2360	729	8.0	5.5	11.4	739	2.0	98	29	0.040	13.0

DATE	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS PHORUS ORTHO TOTAL (MG/L AS P) (70507)	ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
APR											
23...	13.0	0.060	0.060	0.90	0.70	0.210	0.110	0.160	0.100	239	52



Minnesota River at Mankato
April 2, 1969
Photo by U.S. Army Corps of Engineers
St. Paul District

MINNESOTA RIVER BASIN

05320000 BLUE EARTH RIVER NEAR RAPIDAN, MN

LOCATION.--Lat 44°05'44", long 94°06'33", in SE¼SE¼ sec.6, T.107 N., R.27 W., Blue Earth County, Hydrologic Unit 07020009, on left bank 0.2 mi downstream from powerplant (reactivated in 1984) operated by Rapidan Redevelopment Limited Partnership, 2 mi west of Rapidan, 3.5 mi downstream from Watonwan River, and 7.8 mi upstream from Le Sueur River.

DRAINAGE AREA.--2,430 mi², approximately.

PERIOD OF RECORD.--July 1909 to November 1910 (published as "at Rapidan Mills," no winter records), October 1939 to September 1945, July 1949 to current year.

REVISED RECORDS.--WSP 895: Drainage area. WSP 1508: 1910.

GAGE.--Water-stage recorder. Datum of gage is 807.83 ft above mean sea level. July 20, 1909, to Apr. 28, 1910, nonrecording gage at site 0.2 mi upstream at different datum. Apr. 29 to Nov. 12, 1910, nonrecording gage at site 800 ft upstream at different datum. Oct. 4 to Nov. 14, 1939, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	647	439	1750	1150	751	5230	3820	3350	1580	1180	2420	1290
2	591	412	e1800	1100	939	6440	3550	3080	1490	1660	2210	1160
3	590	275	e1820	1110	1150	8380	3320	2860	1430	3180	2040	1150
4	572	212	e1820	1170	1480	7730	3120	2710	1420	3630	1890	1000
5	545	239	e1830	1160	1900	7190	2950	2470	1380	3340	1610	1110
6	480	269	1830	1120	2210	7250	2690	2330	1240	3220	1700	1220
7	386	243	2090	1120	2150	7500	2610	2150	1200	2910	1730	1530
8	386	230	2320	1140	2050	7880	2500	2090	1010	2580	2560	1390
9	386	209	2130	1310	1880	8320	2290	2070	1120	3230	3990	1330
10	408	236	2000	1340	1670	8350	2420	1900	991	3850	3900	1070
11	417	328	2030	1360	1520	8250	2400	1680	960	3920	3630	1060
12	400	366	1910	e1720	1370	8120	2370	1830	992	3890	2930	965
13	393	412	1930	e1600	1280	7960	2170	1650	812	3680	2690	844
14	355	417	e1920	e1230	1190	7240	2230	1630	825	3750	2310	880
15	344	446	e1900	e960	1100	6280	2020	1600	915	3940	2070	918
16	280	607	e1880	e644	1010	5310	2090	1600	878	4240	1950	1080
17	322	842	e1840	e617	978	5010	2190	1630	1680	4380	1690	1160
18	330	1600	e1750	e1140	1120	4840	2200	1560	3030	3950	1540	994
19	299	3230	e1610	e1310	1400	5180	2390	1590	3480	3560	1480	997
20	287	3970	1530	1310	1530	5210	3060	1600	3320	3160	1160	976
21	271	4630	1610	1140	1510	5380	3800	1530	2740	2740	1150	776
22	300	4280	1610	1050	1330	5350	4770	1470	2550	2580	1060	786
23	352	3990	1840	1050	1230	5060	5490	1570	2330	2860	917	756
24	323	3170	1570	1050	1190	4860	5930	1430	2190	3670	846	739
25	304	2110	1500	1040	1150	4850	5890	1420	2060	3970	822	545
26	270	1980	1420	888	963	4750	5260	1440	1830	3910	1170	664
27	270	2340	1260	836	1070	4450	4670	1870	1660	3790	1600	513
28	275	2580	1310	e825	2410	4140	4270	1920	1480	3490	1780	488
29	325	2280	1260	819	3930	3830	3860	1890	1450	3180	1730	494
30	360	2080	1180	812	---	3940	3690	1860	1300	2910	1450	515
31	412	---	1180	763	---	3940	---	1670	---	2610	1300	---
TOTAL	11880	44422	53430	33884	43461	188220	100020	59450	49343	102960	59325	28400
MEAN	383	1481	1724	1093	1499	6072	3334	1918	1645	3321	1914	947
MAX	647	4630	2320	1720	3930	8380	5930	3350	3480	4380	3990	1530
MIN	270	209	1180	617	751	3830	2020	1420	812	1180	822	488
AC-FT	23560	88110	106000	67210	86200	373300	198400	117900	97870	204200	117700	56330
CFSM	.16	.61	.71	.45	.62	2.50	1.37	.79	.68	1.37	.79	.39
IN.	.18	.68	.82	.52	.67	2.88	1.53	.91	.76	1.58	.91	.43

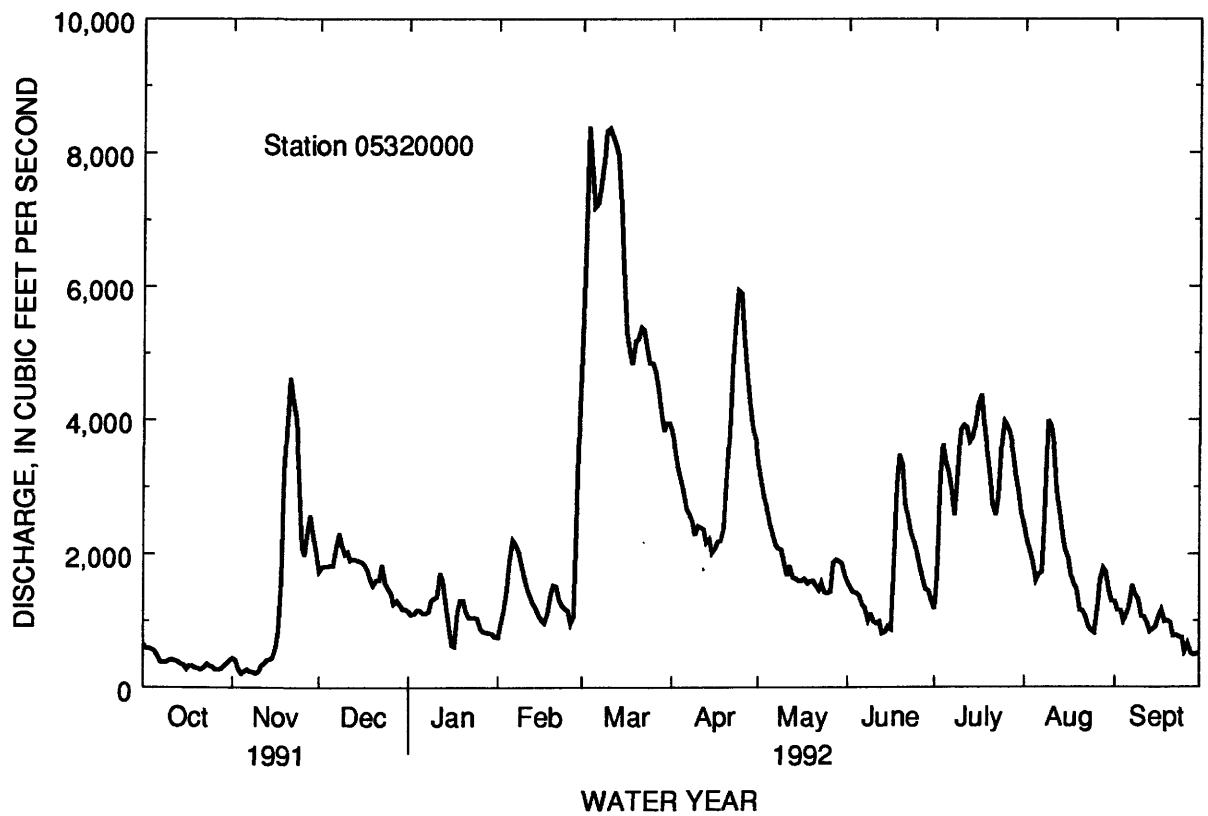
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	484	470	306	184	234	1354	2477	1585	1843	1113	578	469
MAX	5121	2643	1724	1093	1793	6277	13230	5775	7504	3725	5541	3547
(WY)	1969	1983	1992	1992	1983	1983	1965	1991	1991	1963	1979	1979
MIN	22.5	26.7	16.0	14.8	14.2	92.4	142	53.4	110	30.9	37.7	22.1
(WY)	1940	1940	1956	1977	1959	1968	1977	1940	1976	1940	1976	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1909 - 1992	
ANNUAL TOTAL	814313		774795			
ANNUAL MEAN	2231		2117		942	
HIGHEST ANNUAL MEAN					2877	1983
LOWEST ANNUAL MEAN					105	1940
HIGHEST DAILY MEAN	12300	Jun 8	8380	Mar 3	42500	Apr 9 1965
LOWEST DAILY MEAN	39	Jan 4	209	Nov 9	7.4	Oct 28 1955
ANNUAL SEVEN-DAY MINIMUM	47	Jan 4	234	Nov 4	8.1	Oct 24 1955
INSTANTANEOUS PEAK FLOW			10500	Mar 3	43100	Apr 9 1965
INSTANTANEOUS PEAK STAGE			9.12a	Mar 3	21.36a	Apr 9 1965
INSTANTANEOUS LOW FLOW			192	Nov 4, 5	6.9	Oct 12 1955
ANNUAL RUNOFF (AC-FT)	1615000		1537000		682300	
ANNUAL RUNOFF (CFSM)	.92		.87		.39	
ANNUAL RUNOFF (INCHES)	12.47		11.86		5.27	
10 PERCENT EXCEEDS	5870		4270		2440	
50 PERCENT EXCEEDS	1560		1610		302	
90 PERCENT EXCEEDS	65		415		36	

a From floodmark.



MINNESOTA RIVER BASIN

05320500 LE SUEUR RIVER NEAR RAPIDAN, MN

LOCATION.--Lat 44°06'40", long 94°02'28", in SW sec.35, T.108 N., R.27 W., Blue Earth County, Hydrologic Unit 07020011, on right bank 600 ft downstream from highway bridge, 1.8 mi northeast of Rapidan, and 2.3 mi upstream from mouth.

DRAINAGE AREA.--1,100 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1939 to September 1945, July 1949 to current year.

GAGE.--Water-stage recorder. Datum of gage is 775.76 ft above mean sea level. Prior to Nov. 15, 1939, nonrecording gage at same site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,300 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Nov. 20	0630	2,940	5.76	June 18	2330	2,770	5.57
Feb. 28	--	*12,600	*14.18a	July 2	2300	3,310	6.14
Mar. 9	2200	4,280	7.06	July 11	0130	2,490	5.26
Apr. 23	1900	2,850	5.66	July 26	1600	1,600	4.21
				Aug. 9	1300	2,980	5.80

a Affected by backwater from ice.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	207	151	e835	e500	e375	3600	1810	1350	872	504	684	452
2	185	164	e820	e490	e400	3930	1700	1240	813	1950	774	411
3	167	201	e810	e490	e440	3880	1590	1120	755	3090	774	382
4	159	199	e800	e500	e500	3640	1490	1030	704	2520	696	e365
5	149	195	e790	e500	e570	3670	1360	958	647	1910	630	e450
6	140	222	e800	e490	e610	4110	1240	890	603	1510	561	e620
7	128	221	e1000	e510	e560	4070	1160	841	551	1220	1350	e810
8	124	225	e1200	e540	e520	4030	1080	791	524	1180	2800	e770
9	125	223	e1000	e650	e480	4150	1040	748	492	1750	2910	e690
10	119	230	e900	e800	e450	4110	1010	699	455	2180	2780	e630
11	116	246	e800	e870	e410	4000	983	655	436	2370	2460	e580
12	113	233	e720	e1100	e380	3560	916	630	414	2270	2170	e540
13	109	233	e700	e700	e370	3190	870	609	394	2140	1860	e500
14	104	235	e670	e418	e357	2880	839	576	382	1960	1540	e570
15	106	367	e655	e410	e357	2390	829	577	361	1850	1250	e700
16	98	768	e645	e400	e357	2130	859	620	404	1970	1020	e900
17	100	1100	e635	e410	e357	2060	953	675	1490	1820	860	e1000
18	96	1780	e625	e445	e450	2140	1050	764	2570	1580	776	e909
19	99	2450	e610	e430	e600	2280	1180	735	2590	1390	702	e790
20	95	2640	e600	e410	e700	2410	1450	687	2100	1210	673	e750
21	102	2420	e590	e400	e600	2500	2080	652	1690	1050	631	e710
22	101	2470	e580	e395	e500	2370	2620	623	1410	1000	566	e590
23	101	1720	e570	e390	e430	2250	2790	581	1210	1300	500	e448
24	102	1170	e560	e387	e370	2270	2690	539	1040	1390	437	e414
25	118	1050	e555	e383	e360	2290	2460	554	938	1450	492	375
26	166	e905	e545	e380	e480	2110	2210	769	833	1530	671	343
27	160	e890	e540	e378	e630	1980	1980	1020	730	1370	696	333
28	152	e875	e530	e377	e4700	1820	1760	1170	657	1190	684	297
29	168	e860	e520	e375	e3580	1800	1620	1130	588	1020	641	271
30	163	e850	e515	e372	---	1860	1480	1040	543	892	570	255
31	164	---	e510	e370	---	1890	---	951	---	773	499	---
TOTAL	4036	25293	21630	15270	20893	89370	45099	25224	27196	49339	33657	16855
MEAN	130	843	698	493	720	2883	1503	814	907	1592	1086	562
MAX	207	2640	1200	1100	4700	4150	2790	1350	2590	3090	2910	1000
MIN	95	151	510	370	357	1800	829	539	361	504	437	255
AC-FT	8010	50170	42900	30290	41440	177300	89450	50030	53940	97860	66760	33430
CFSM	.12	.76	.63	.44	.65	2.60	1.35	.73	.82	1.43	.98	.51

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	267	232	133	74.3	120	804	1249	868	862	545	314	223
MAX	3300	1430	698	493	1299	3465	6563	3706	2742	2355	2602	1436
(WY)	1969	1971	1992	1992	1984	1983	1965	1960	1975	1968	1968	1968
MIN	7.41	11.1	5.04	2.96	1.68	33.0	48.3	18.8	40.4	20.6	8.20	7.55
(WY	1990	1956	1959	1957	1959	1964	1957	1940	1950	1988	1989	1976

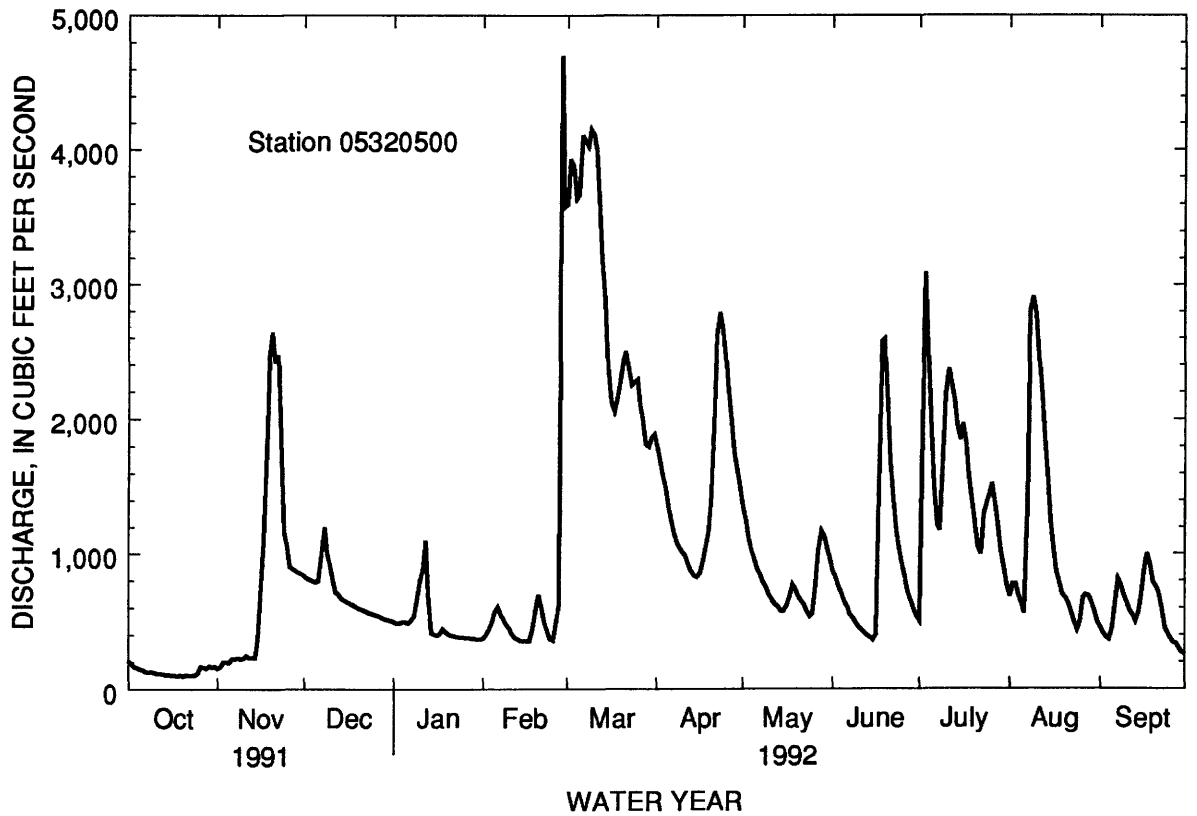
SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1940 - 1992	
ANNUAL TOTAL	363707		373862			
ANNUAL MEAN	996		1021		476	
HIGHEST ANNUAL MEAN					1339	1983
LOWEST ANNUAL MEAN					51.4	1977
HIGHEST DAILY MEAN	6640	May 8	4700	Feb 28	23400	Apr 8 1965
LOWEST DAILY MEAN	20	Jan 12	95	Oct 20	1.6a	
ANNUAL SEVEN-DAY MINIMUM	20	Jan 24	99	Oct 16	1.6	Feb9 1959
INSTANTANEOUS PEAK FLOW			12600	Feb 28	24700	Apr 8 1965
INSTANTANEOUS PEAK STAGE			14.18b	Feb 28	22.72c	May 22 1960
INSTANTANEOUS LOW FLOW			91	Oct 20		
ANNUAL RUNOFF (AC-FT)	721400		741600		344700	
ANNUAL RUNOFF (CFSM)	.90		.92		.43	
10 PERCENT EXCEEDS	2650		2370		1300	
50 PERCENT EXCEEDS	552		697		125	
90 PERCENT EXCEEDS	23		217		15	

a Occurred Feb. 9-25, 1959.

b Backwater from ice.

c From floodmark.

e Estimated.



MINNESOTA RIVER BASIN

05320500 LE SUEUR RIVER NEAR RAPIDAN, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967-69, 1989 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)
NOV												
20...	1100	2860	--	--	2.0	--	--	--	--	--	--	--
APR												
15...	1130	839	664	8.4	7.5	11.4	741	2.4	5	5	0.030	12.0
20...	1200	1460	728	8.2	9.5	10.6	730	2.6	145	33	0.030	13.0
21...	0815	1920	665	8.3	7.5	11.5	726	1.9	310	56	0.040	14.0
22...	0800	2580	660	8.5	6.5	12.1	737	1.8	--	--	0.040	16.0
23...	1200	2780	680	8.3	6.0	11.2	743	2.1	263	40	0.040	16.0
24...	0830	2720	653	7.3	5.5	13.5	745	1.3	165	27	0.030	16.0
27...	1145	1960	696	8.0	7.5	11.5	751	1.8	87	18	0.030	14.0
30...	0845	1500	694	8.1	12.5	10.1	737	3.5	68	19	0.020	13.0
AUG												
08...	1400	2880	451	7.9	22.5	7.1	738	5.1	542	22	0.020	7.70

DATE	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV											
20...	--	--	--	--	--	--	--	--	--	612	--
APR											
15...	12.0	0.030	0.010	0.70	0.50	0.080	0.020	0.020	0.020	103	--
20...	13.0	0.020	0.010	1.0	0.60	0.230	0.050	0.080	0.040	360	--
21...	14.0	0.030	0.030	1.4	0.70	0.320	0.060	0.070	0.060	763	70
22...	15.0	0.070	0.050	1.3	0.80	0.340	0.110	0.170	0.090	736	--
23...	16.0	0.070	0.070	1.2	0.90	0.220	0.080	0.170	0.080	641	--
24...	16.0	0.040	0.040	1.0	0.70	0.210	0.090	0.120	0.070	481	--
27...	14.0	0.040	0.030	0.70	0.60	0.070	0.040	0.070	0.040	427	--
30...	13.0	0.030	0.020	0.70	0.80	0.050	0.020	0.030	0.030	197	--
AUG											
08...	7.70	0.040	0.050	1.9	1.1	0.530	0.270	0.230	0.220	873	55

Blue Earth River near Rapidan
May 25, 1910

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN

LOCATION.--Lat 44°09'58", long 94°00'57", in NW¼NE¼ sec.13, T.108 N., R.27 W., Nicollet County, Hydrologic Unit 07020007, on left bank 12 ft downstream from bridge on U.S. Highway 169 in North Mankato, 1.1 mi downstream from Blue Earth River and at mile 107.1 upstream from Mississippi River.

DRAINAGE AREA.--14,900 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1903 to current year (no winter records 1904, 1906-10, 1918-29). Monthly discharge only for some periods, published in WSP 1308. Published as "near Mankato": 1903-21.

REVISED RECORDS.--WSP 875: 1917. WSP 955: Drainage area. WSP 1085: 1929. WSP 1238: 1903, 1908, 1919. WSP 1508: 1916(M), 1918(M), 1926(M), 1928, 1930, 1932(M), 1938(M). WDR-MN-76-1: 1881(M).

GAGE.--Water-stage recorder. Datum of gage is 747.92 ft above sea level. Prior to Oct. 19, 1921, nonrecording gage, at site 1.1 mi upstream at datum 6.4 ft higher. Mar. 15, 1922, to Nov. 30, 1924, nonrecording gage, and Dec. 1, 1924 to May 24, 1971, recorder at site 0.5 mi downstream at present datum. May 25, 1971 to Aug. 14, 1977, recorder at site 0.2 mi downstream at present datum. Aug. 14, 1977 to July 27, 1978, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, 29.9 ft, Apr. 26, 1881, present site and datum, from floodmark (discharge, 110,000 ft³/s).

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4020	2330	e5900	e3150	e2200	13100	10700	10900	4890	12000	6940	3960
2	3790	2070	e5600	e3100	e2250	16500	10100	10100	4720	14200	6830	3600
3	3670	1710	e5300	e3050	e2400	19400	9550	9450	4500	17700	6520	3700
4	3480	1330	e5100	e3000	e2600	18700	9060	8860	4370	18800	6150	3860
5	3360	1560	e5000	e3000	e2750	18300	8630	8300	4190	18400	5800	4600
6	3220	1540	e4900	e3050	e3000	19300	8070	7880	3960	17600	5560	5140
7	2930	1450	e4850	e3050	e3200	20300	7840	7470	3780	16800	6220	5170
8	2790	1580	e4800	e3100	e3150	21100	7520	7030	3580	16000	8610	4710
9	2670	1670	e4750	e3200	e3100	22500	7310	6670	3500	16500	11100	4430
10	2600	1660	e4700	e3500	e3050	23200	7260	6240	3360	17100	11600	4130
11	2570	1740	e4650	e3900	e3000	23700	7210	5880	3230	16900	10800	3920
12	2510	1810	e4550	e4350	e2950	23500	7060	5870	3160	15800	9350	3730
13	2420	1930	e4450	e4320	e2900	22900	6740	5650	2950	14600	8350	3350
14	2370	2020	e4350	e3700	e2850	21400	6740	5480	2900	13500	7310	3300
15	2270	2220	e4250	e3200	e2800	19100	6490	5360	2870	12900	6670	3300
16	2170	2700	e4150	e2700	e2750	16900	6620	5320	2930	12900	5940	3490
17	2140	3440	e4050	e2750	e2900	15900	6790	5300	5880	12800	5430	4010
18	2150	5070	e3950	e2800	e3100	15400	6910	5290	9860	12000	4960	4510
19	2090	8230	e3850	e3000	e3350	15700	7370	5240	12500	11200	4550	4340
20	2000	9890	e3800	e3150	e3420	15800	8820	5120	12700	10400	4100	3920
21	1970	11100	e3800	e3050	e3500	15800	11300	5040	12000	9570	3810	3560
22	1940	10800	e3800	e3000	e3450	15200	13800	4850	12300	9110	3600	3160
23	2000	10300	e3750	e2850	e3350	14400	15800	4840	13100	9250	3270	2970
24	2000	8620	e3650	e2750	e3300	13900	16600	4550	13800	9930	3100	2780
25	1950	5910	e3600	e2650	e3250	13700	16400	4470	13800	10000	3210	2570
26	1900	5160	e3550	e2550	e4000	13200	15500	4630	13400	10100	3710	2480
27	1850	5870	e3500	e2450	4490	12300	14500	5170	12800	9760	4140	2390
28	1860	6190	e3400	e2300	7040	11500	13500	5510	12400	9150	4780	2200
29	2080	6270	e3300	e2250	11600	11000	12600	5570	12200	8560	4890	2140
30	2210	6010	e3250	e2200	---	11100	11700	5390	12100	7900	4530	2030
31	2250	---	e3200	e2150	---	11000	---	5180	---	7360	4170	---
TOTAL	77230	132180	131750	93270	101700	525800	298490	192610	227730	398790	186000	107450
MEAN	2491	4406	4250	3009	3507	16960	9950	6213	7591	12860	6000	3582
MAX	4020	11100	5900	4350	11600	23700	16600	10900	13800	18800	11600	5170
MIN1	850	1330	3200	2150	2200	11000	6490	4470	2870	7360	3100	2030
AC-FT	153200	262200	261300	185000	201700	1043000	592100	382000	451700	791000	368900	213100
CFSM	.17	.30	.29	.20	.24	1.14	.67	.42	.51	.86	.40	.24

e Estimated.

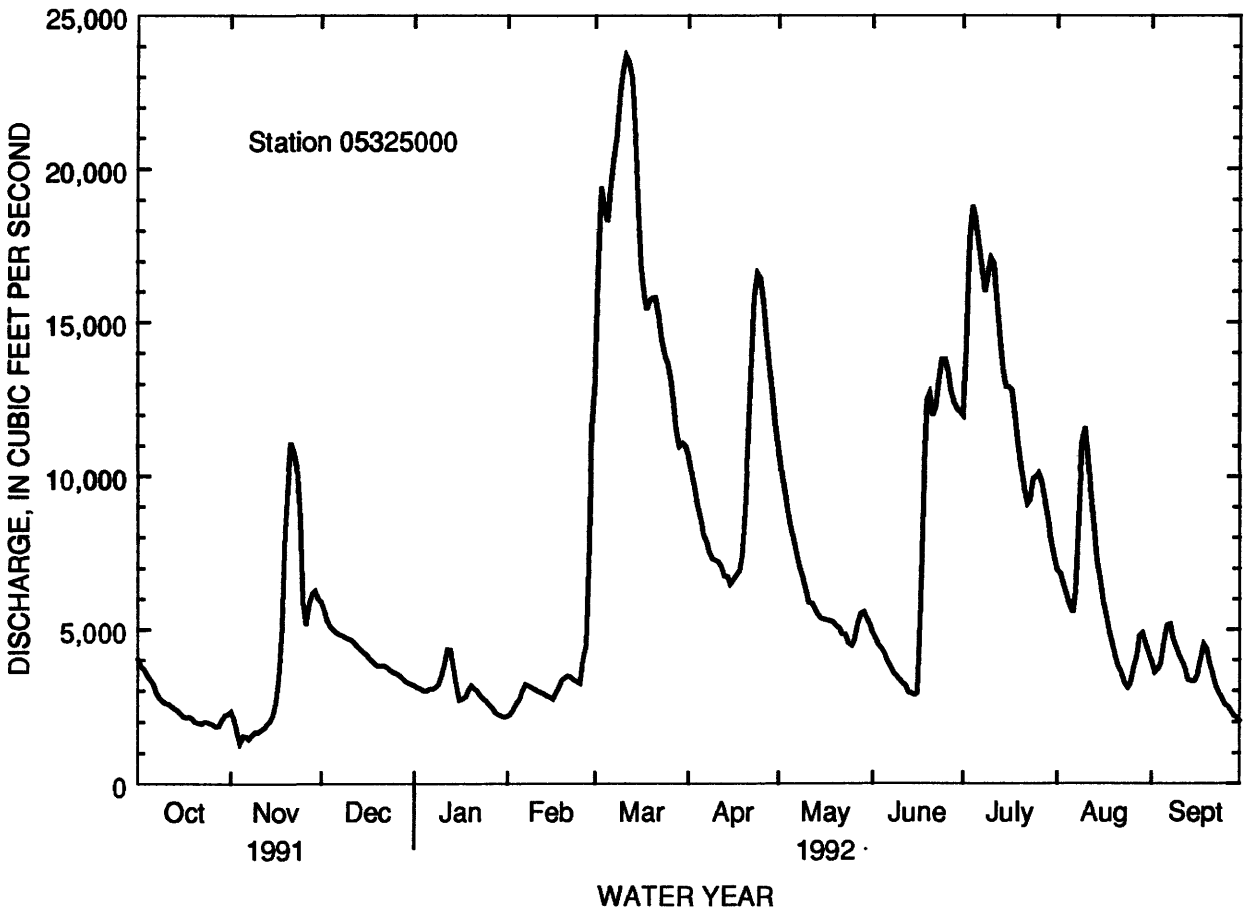
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1903 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1430	1346	870	549	704	4268	8443	5174	5514	3990	1980	1515
MAX	14600	6675	4770	3009	4505	18230	44780	19570	24760	16510	13040	10170
(WY)	1969	1971	1983	1992	1983	1983	1969	1986	1991	1908	1979	1903
MIN	66.1	83.5	80.9	61.5	58.4	132	609	101	194	58.3	37.4	56.6
(WY)	1934	1934	1934	1940	1940	1934	1931	1934	1934	1934	1934	1934

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1903 - 1992	
ANNUAL TOTAL	2731730		2473000			
ANNUAL MEAN	7484		6757		3066a	
HIGHEST ANNUAL MEAN					9260	1986
LOWEST ANNUAL MEAN					136	1934
HIGHEST DAILY MEAN	32800	Jun 9	23700	Mar 11	92700	Apr 10 1965
LOWEST DAILY MEAN	267	Jan 25	1330	Nov 4	31	Aug 3 1934
ANNUAL SEVEN-DAY MINIMUM	268	Jan 23	1540	Nov 4	33	Jul 29 1934
INSTANTANEOUS PEAK FLOW			23900	Mar 11	94100	Apr 10 196
INSTANTANEOUS PEAK STAGE			17.96	Mar 11	29.09	Apr 10 1965
INSTANTANEOUS LOW FLOW			1160	Nov 4	26b	Aug 4 1934
ANNUAL RUNOFF (AC-FT)	5418000		4905000		2221000	
ANNUAL RUNOFF (CFSM)	.50		.45		.21	
10 PERCENT EXCEEDS	18300		14500		8040	
50 PERCENT EXCEEDS	5160		4700		1100	
90 PERCENT EXCEEDS	300		2250		180	

a Median of annual mean discharges is 2,560 ft³/s.

b Minimum observed.



MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1963-66, 1968 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: October 1967 to September 30, 1981 October 1982 to current year (fragmentary records).

SUSPENDED-SEDIMENT DISCHARGE: October 1967 to current year.

REMARKS.--Sediment samples were collected approximately daily by an observer during the open-water period. In general, daily concentrations and loads for the open-water period are considered good. During the winter period, daily sediment concentrations and loads are based primarily on concentrations of sediment in samples that were collected monthly and on daily water-discharge records. Sediment records for the winter period are considered fair. Water temperatures were obtained by the observer approximately daily during the open-water period and monthly by U.S. Geological Survey personnel during the winter period. Some temperatures are not published because of questionable values.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURES: Maximum daily, 31.0°C, July 4-9, 1989; minimum daily, 0.0°C on many days each year.

SEDIMENT CONCENTRATIONS: Maximum daily mean, 2,850 mg/L, Aug. 7, 1968; minimum daily mean, 9 mg/L, Jan. 15-19, 1991.

SEDIMENT LOADS: Maximum daily, 247,000 tons, Apr. 9, 1969; minimum daily, 5.2 tons, Nov. 6, 1976.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum daily observed, 24.5°C, June 15; minimum daily observed, 0.0°C, Jan. 13.

SEDIMENT CONCENTRATIONS: Maximum daily mean, 1,120 mg/L, Mar. 3; minimum daily mean, 20 mg/L, Feb. 13-16.

SEDIMENT LOADS: Maximum daily, 58,700 tons, Mar. 3; minimum daily, 148 tons, Feb. 16.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16.0	---	---	---	1.0	1.0	6.0	15.0	17.0	---	---	---
2	15.5	---	---	---	1.0	2.0	6.0	15.5	20.5	---	---	---
3	14.0	---	---	---	.5	2.0	7.0	16.0	23.0	---	---	---
4	12.5	---	---	---	1.0	---	7.0	15.0	22.0	---	---	---
5	10.5	---	---	---	---	---	7.5	15.5	21.5	---	---	---
6	10.0	2.0	---	---	1.0	2.5	8.5	15.5	22.0	---	---	---
7	10.5	---	---	---	---	3.0	9.5	16.0	20.0	---	---	---
8	12.0	---	---	---	---	3.0	9.0	16.0	21.5	---	---	---
9	11.0	---	---	---	---	---	9.5	18.0	21.0	22.0	---	18.0
10	11.5	---	---	---	1.0	---	---	19.0	22.0	---	---	---
11	12.0	---	---	---	1.0	---	8.0	---	23.0	20.5	---	---
12	11.5	---	---	---	1.0	---	8.0	17.0	23.0	---	---	---
13	13.0	---	---	.0	1.0	---	7.5	17.0	23.5	20.5	---	---
14	---	---	---	---	---	3.0	7.0	---	---	20.0	---	---
15	---	---	---	---	---	3.5	---	18.0	24.5	---	---	---
16	13.0	---	---	---	1.0	4.0	7.0	18.0	23.0	---	---	---
17	12.0	---	---	---	1.0	---	7.0	17.0	21.0	20.5	---	---
18	---	---	---	---	1.0	---	9.0	19.0	21.0	---	---	---
19	6.5	---	---	---	1.5	---	7.0	20.0	19.0	18.0	---	---
20	8.5	---	---	---	.5	4.5	---	21.0	18.0	20.0	---	---
21	10.5	---	---	---	1.0	4.0	8.0	21.0	17.0	---	---	---
22	11.0	---	---	---	1.0	5.0	6.5	---	18.0	---	---	---
23	---	---	---	---	.5	4.5	6.0	16.0	20.0	---	---	---
24	10.5	---	---	---	1.0	6.0	6.5	15.0	21.0	18.0	---	---
25	9.5	---	---	---	1.5	---	6.5	---	20.0	---	---	---
26	9.0	---	---	---	1.5	---	---	17.0	21.0	---	---	---
27	9.5	---	---	---	1.5	4.0	8.5	---	---	---	---	---
28	12.0	---	---	---	2.0	4.0	9.5	15.0	---	---	---	---
29	---	---	---	---	---	4.0	10.5	17.0	19.0	---	---	---
30	---	---	---	---	---	5.0	11.0	18.0	---	---	---	---
31	---	---	---	1.5	---	4.0	---	18.0	---	19.0	---	---

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAY	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS/ DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	106	1150	91	572	116	1850	48	408	40	238	930	32900
2	105	1070	88	492	115	1740	47	393	40	243	1020	45400
3	101	1000	85	392	114	1630	46	379	40	259	1120	58700
4	93	874	84	302	112	1540	45	364	41	288	802	40500
5	85	771	80	337	110	1480	45	364	45	334	671	33200
6	74	643	80	333	107	1420	45	371	45	364	604	31500
7	61	483	79	309	103	1350	45	371	34	294	520	28500
8	58	437	79	337	100	1300	45	377	34	289	438	25000
9	68	490	79	356	94	1210	45	389	34	285	370	22500
10	79	555	80	359	82	1040	49	463	32	264	333	20900
11	76	527	80	376	82	1030	52	548	30	243	320	20500
12	87	590	87	425	82	1010	69	810	25	199	314	19900
13	95	621	100	521	82	985	70	816	20	157	290	17900
14	114	729	107	584	81	951	69	689	20	154	269	15500
15	112	686	117	701	79	907	68	588	20	151	248	12800
16	102	598	138	1010	78	874	67	488	20	148	238	10900
17	89	514	175	1630	75	820	65	483	24	188	224	9620
18	71	412	248	3390	72	768	65	491	30	251	210	8730
19	58	327	367	8160	68	707	62	502	30	271	201	8520
20	52	281	380	10100	65	667	57	485	28	259	199	8490
21	50	266	334	10000	60	616	55	453	25	236	191	8150
22	47	246	287	8370	58	595	51	413	30	279	179	7350
23	45	243	235	6540	55	557	50	385	40	362	164	6380
24	45	243	192	4470	54	532	48	356	49	437	160	6000
25	46	242	157	2510	53	515	47	336	62	544	160	5920
26	52	267	137	1910	53	508	45	310	82	886	160	5700
27	82	410	125	1980	53	501	44	291	196	2380	160	5310
28	126	633	121	2020	52	477	42	261	756	22800	139	4320
29	141	792	118	2000	51	454	41	249	1020	31900	119	3530
30	127	758	117	1900	50	439	40	238	---	---	123	3690
31	102	620	---	---	49	423	40	232	---	---	126	3740
TOTAL	---	17478	---	72386	---	28896	---	13303	---	64703	---	532050

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAY	APRIL MEAN CONCEN-TRATION (MG/L)	APRIL LOAD (TONS/ DAY)	MAY MEAN CONCEN-TRATION (MG/L)	MAY LOAD (TONS/ DAY)	JUNE MEAN CONCEN-TRATION (MG/L)	JUNE LOAD (TONS/ DAY)	JULY MEAN CONCEN-TRATION (MG/L)	JULY LOAD (TONS/ DAY)	AUGUST MEAN CONCEN-TRATION (MG/L)	AUGUST LOAD (TONS/ DAY)	SEPTEMBER MEAN CONCEN-TRATION (MG/L)	SEPTEMBER LOAD (TONS/ DAY)
1	125	3610	128	3770	105	1390	185	5990	214	4010	155	1660
2	123	3350	116	3160	109	1390	311	11900	190	3500	155	1510
3	121	3120	117	2990	129	1570	425	20300	164	2890	165	1650
4	121	2960	120	2870	125	1470	330	16800	135	2240	162	1690
5	118	2750	123	2760	124	1400	232	11500	110	1720	182	2260
6	121	2640	127	2700	128	1370	198	9410	84	1260	196	2720
7	127	2690	127	2560	122	1250	195	8850	107	1800	182	2540
8	125	2540	119	2260	118	1140	192	8290	246	5720	151	1920
9	108	2130	112	2020	117	1110	238	10600	388	11600	138	1650
10	100	1960	110	1850	111	1010	276	12700	375	11700	141	1570
11	100	1950	111	1760	115	1000	266	12100	316	9210	147	1560
12	100	1910	128	2030	123	1050	263	11200	238	6010	157	1580
13	102	1860	121	1850	126	1000	304	12000	200	4510	156	1410
14	108	1970	120	1780	132	1030	334	12200	163	3220	146	1300
15	110	1930	118	1710	133	1030	358	12500	137	2470	140	1250
16	112	2000	111	1590	164	1300	371	12900	127	2040	141	1330
17	111	2030	111	1590	664	11300	368	12700	117	1720	153	1660
18	111	2070	112	1600	680	18100	367	11900	134	1790	157	1910
19	143	2850	113	1600	516	17400	360	10900	136	1670	143	1680
20	223	5310	122	1690	365	12500	343	9630	133	1470	144	1520
21	318	9700	108	1470	282	9140	314	8110	134	1380	133	1280
22	396	14800	96	1260	239	7940	287	7060	133	1290	115	981
23	422	18000	94	1230	230	8140	298	7440	134	1180	125	1000
24	406	18200	102	1250	264	9840	239	6410	124	1040	131	983
25	307	13600	107	1290	271	10100	340	9180	123	1070	137	951
26	215	9000	109	1360	218	7890	343	9350	119	1190	140	937
27	175	6850	133	1860	193	6670	329	8670	134	1500	128	826
28	158	5760	133	1980	190	6360	298	7360	172	2220	112	665
29	147	5000	108	1620	195	6420	267	6170	182	2400	106	612
30	146	4610	105	1530	198	6470	244	5200	171	2090	93	510
31	---	---	105	1470	---	---	226	4490	155	1750	---	---
TOTAL-	--	157150	---	60460	---	157780	---	313810	---	97660	---	43115
YEAR		1558791										

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343)	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344)	SED. SUSP. FALL DIAM. % FINER THAN .500 MM (70345)
OCT												
04...	2050	3450	0.100	0.020	8.30	0.090	7.1	--	--	--	--	--
08...	2215	2780	0.060	0.020	7.00	0.040	6.9	--	--	--	--	--
MAY												
29...	1619	5280	--	--	--	--	--	--	--	--	--	--
SEP												
09...	1400	4230	--	--	--	--	--	0	0	0	3	31

DATE	SED. SUSP. FALL DIAM. % FINER THAN 1.00 MM (70346)	SED. SUSP. FALL DIAM. % FINER THAN 2.00 MM (70347)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	BED MAT. SIEVE DIAM. % FINER THAN .062 MM (80164)	BED MAT. SIEVE DIAM. % FINER THAN .125 MM (80165)	BED MAT. SIEVE DIAM. % FINER THAN .250 MM (80166)	BED MAT. SIEVE DIAM. % FINER THAN .500 MM (80167)	BED MAT. SIEVE DIAM. % FINER THAN 1.00 MM (80168)	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM (80169)	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM (80170)	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM (80171)	BED MAT. SIEVE DIAM. % FINER THAN 16.0 MM (80172)
OCT												
04...	--	--	--	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--	--	--	--
MAY												
29...	--	--	--	0	1	2	17	57	81	91	97	100
SEP												
09...	63	83	145	0	0	3	31	63	83	94	100	--

MINNESOTA RIVER BASIN

05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN

LOCATION.--Lat 44°34'19", long 93°55'18", in NE¼NW¼ sec.26, T.113 N., R.26 W., Sibley County, Hydrologic Unit 07020012, on left bank 20 ft downstream from bridge on County Road 6, 1.6 mi upstream from mouth, and 3.1 mi north of Henderson.

DRAINAGE AREA.--237 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1973 to current year. May 1970 to September 1973, operated as a low-flow station only.

REVISED RECORDS.--WDR-MN-80-2: 1974-75, 1977-79.

GAGE.--Water-stage recorder. Datum of gage is 728.56 ft above mean sea level.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 300 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Oct. 1	0000	539	4.28	Apr. 25	-	e360	(mean daily)
(stage falling, peak occurred Sept. 14, 1991)				June 17	0630	1,040	5.88
Nov. 21	-	e340	(mean daily)	July 2	0500	597	3.96
Mar. 5	1900	1400	7.11	Sept. 15	2400	*1,770	*8.32

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	519	89	e167	e74	63	293	221	e220	e95	106	62	70
2	e480	53	e175	e74	63	491	209	e200	85	458	186	69
3	e455	48	e180	e75	63	535	202	e180	81	411	156	68
4	e400	44	e190	e76	63	637	190	e160	77	347	115	69
5	e365	e45	e180	e77	e56	1060	179	e150	74	321	97	80
6	e325	e50	e160	e79	67	1280	164	e140	74	315	86	129
7	e290	e52	e145	e80	e65	1020	156	e130	73	305	133	140
8	e260	e51	e135	e81	e68	887	148	e120	73	280	175	139
9	e240	e51	e125	e82	e68	923	139	e115	70	235	144	132
10	e215	e52	e115	e83	e66	791	133	e110	71	191	120	121
11	e195	e50	e105	e86	e61	763	129	e105	69	154	107	106
12	171	e56	e100	e83	e57	750	e128	e103	67	135	98	100
13	157	e60	e95	e80	e54	728	e127	e101	67	121	90	93
14	147	e70	e93	e77	e54	667	e128	e100	83	109	82	89
15	127	89	e91	e75	e54	586	e128	e100	67	103	76	217
16	131	93	e88	e74	e56	517	e128	e100	139	102	71	1350
17	123	105	e86	e73	e60	504	116	e100	761	98	70	821
18	115	e223	e84	e71	e62	473	112	e99	605	93	71	579
19	109	322	e83	e70	e64	433	130	e98	474	86	68	463
20	102	331	e82	e68	e65	411	140	e98	404	81	66	399
21	99	e340	e80	e67	e66	383	188	e97	379	77	63	341
22	95	e320	e79	e66	e66	349	221	e96	371	78	60	286
23	83	e270	e78	e65	e66	336	e300	e95	350	76	56	238
24	82	e220	e76	e62	e63	320	e330	e94	311	74	54	201
25	79	e195	e75	e65	e60	301	e360	e93	253	72	71	170
26	83	e185	e74	69	e70	279	e330	e98	202	71	80	145
27	84	e178	e73	66	93	253	e300	e117	160	69	81	128
28	85	e175	e72	e57	125	248	e270	e120	139	65	79	109
29	92	e170	e72	64	197	245	e250	e117	125	63	77	100
30	92	e167	e73	63	---	245	e235	e112	112	61	77	98
31	96	---	e73	64	---	236	---	e105	---	60	73	---
TOTAL	5896	4154	3304	2246	2035	16944	5791	3673	5911	4817	2844	7050
MEAN	190	138	107	72.5	70.2	547	193	118	197	155	91.7	235
MAX	519	340	190	86	197	1280	360	220	761	458	186	1350
MIN	79	44	72	57	54	236	112	93	67	60	54	68
AC-FT	11690	8240	6550	4450	4040	33610	11490	7290	11720	9550	5640	13980
CFSM	.80	.58	.45	.31	.30	2.31	.81	.50	.83	.66	.39	.99
IN.	.93	.65	.52	.35	.32	2.66	.91	.58	.93	.76	.45	1.11

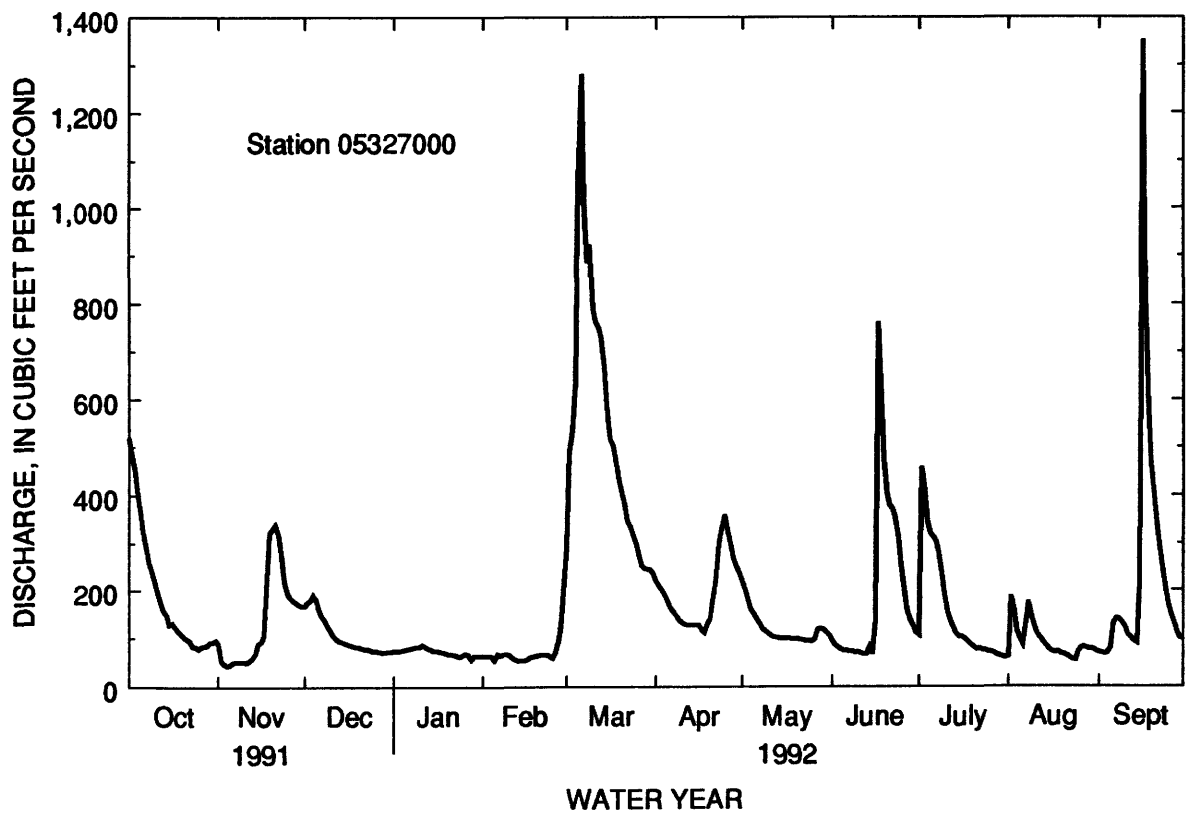
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	67.9	53.5	34.3	14.5	20.0	158	223	130	130	77.6	60.8	96.1
MAX	98	199	111	72.5	121	547	593	381	370	333	342	592
(WY)	1986	1980	1983	1992	1984	1992	1983	1986	1986	1986	1979	1991
MIN	1.51	2.11	1.37	.98	1.28	6.27	6.69	3.32	1.58	.80	1.16	1.18
(WY)	1990	1990	1976	1977	1989	1975	1990	1976	1976	1976	1976	1974

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1974 - 1992	
ANNUAL TOTAL	57792.8		64665			
ANNUAL MEAN	158		177		88.9	
HIGHEST ANNUAL MEAN					236	1986
LOWEST ANNUAL MEAN					9.23	1976
HIGHEST DAILY MEAN	1220	Sep 15	1350	Sep 16	1580	Jun 22 1986
LOWEST DAILY MEAN	1.6	Jan 26	44	Nov 4	.46	Oct 3 1976
ANNUAL SEVEN-DAY MINIMUM	1.7	Jan 26	49	Nov 3	.59	Jul 10 1976
INSTANTANEOUS PEAK FLOW			1770	Sep 15	1770	Sep 15 1992
INSTANTANEOUS PEAK STAGE			8.32	Sep 15	9.09	Aug 25 1981
INSTANTANEOUS LOW FLOW			40	Nov 4	.20a	Jan 4 1981
ANNUAL RUNOFF (AC-FT)	114600		128300		64390	
ANNUAL RUNOFF (CFSM)	.67		.75		.38	
ANNUAL RUNOFF (INCHES)	9.07		10.15		5.10	
10 PERCENT EXCEEDS	383		373		255	
50 PERCENT EXCEEDS	89		102		21	
90 PERCENT EXCEEDS	2.3		63		1.6	

a Result of freezeup.



MINNESOTA RIVER BASIN

05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969, 1989 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)
NOV									
18...	1121	243	--	--	20.0	--	--	--	--
JUL									
02...	1600	473	490	8.1	17.5	9.0	736	4.2	651

DATE	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)
NOV								
18...	--	--	--	--	--	--	--	--
JUL								
02...	48	0.040	7.50	7.40	0.200	0.160	1.7	1.0

DATE	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV								
18...	--	--	--	--	--	--	1060	--
JUL								
02...	0.520	0.270	0.330	0.240	7.50	0.800	936	63

Dikes protecting Henderson
April 13, 1969
Photo by U.S. Army Corps of Engineers
St. Paul District

MINNESOTA RIVER BASIN

05330000 MINNESOTA RIVER NEAR JORDAN, MN

LOCATION.--Lat 44°41'35", long 93°38'30", in NW¼SW¼ sec.7, T.114 N., R.23 W., Carver County, Hydrologic Unit 07020012, on pier at center downstream side of bridge, 1.5 mi northwest of Jordan, and at mile 39.4 uptream from Mississippi River.

DRAINAGE AREA.--16,200 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1934 to current year. Prior to Oct. 1, 1966, published as "near Carver, Minn".

REVISED RECORDS.--WSP 955: Drainage area. WSP 1508: 1935. WDR MN-87-2: 1976 (cal. yr. summary).

GAGE.--Water-stage recorder. Datum of gage is 690.00 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1966, water-stage recorder 2.8 mi downstream with auxiliary nonrecording gage at present site and present datum.

REMARKS.--Records good except for those for estimated daily discharges, which are fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5450	2920	e6200	e3600	e2350	e9780	13100	14700	5560	13300	7630	4320
2	5170	2820	e6160	e3550	e2350	e13100	12700	13400	5260	14700	7880	4080
3	4880	2400	e5800	e3450	e2350	e15900	12200	12100	5090	16600	7850	3780
4	4650	e2200	e5500	e3400	e2400	e19100	11500	11000	4840	18000	7310	3730
5	4430	e2130	e5300	e3400	e2600	e23900	10800	10000	4680	19200	6720	3740
6	4230	e1980	e5300	e3400	e2750	25800	10200	9310	4540	20100	6240	4390
7	4030	e2000	e5400	e3500	e2950	26100	9540	8680	4340	20500	6080	5090
8	3800	e2000	e5400	e3550	e3100	26000	9070	8190	4150	20400	7180	5220
9	3570	e2160	e5400	e3600	e3300	26100	8720	7680	4000	19900	9000	4970
10	3410	2420	e5300	e3700	e3250	26100	8460	7220	3790	19300	10600	4660
11	3290	2440	e5200	e3850	e3200	26100	8240	6790	3720	18800	11600	4400
12	3200	2400	e5100	e4100	e3150	26100	8170	6430	3520	18500	11600	4060
13	3120	2470	e5000	e4300	e3100	25900	8010	6210	3400	18300	10600	3880
14	3030	2550	e4900	e4500	e3100	25700	7740	6050	3330	18000	9210	3610
15	2960	2650	e4800	e4200	e3150	25100	7610	5800	3190	17300	7960	3520
16	2870	2840	e4600	e3700	e3200	23900	7650	5730	3200	16400	7060	7200
17	2770	3220	e4450	e3300	e3300	22500	7860	5630	5200	15400	6270	8150
18	2660	4480	e4250	e3150	e3400	21100	7940	5540	9830	14600	5810	7620
19	2630	6980	e4200	e3100	e3600	20000	8090	5530	12500	13900	5210	7180
20	2570	9920	e4150	e3150	e3700	19300	8660	5440	13800	13000	4800	6560
21	2500	11800	e4200	e3200	e4000	18900	9940	5290	14400	11900	4390	5770
22	2460	13000	e4200	e3200	e4100	18700	12100	5260	14600	10900	3980	5020
23	2420	13700	e4150	e3100	e4050	18500	13700	5090	14400	10100	3760	4470
24	2420	13600	e4050	e3050	e3900	18100	14800	5000	14200	9740	3450	e3950
25	2450	12300	e4000	e3000	e3700	17600	15800	4910	14300	10000	3390	e3520
26	2410	9180	e3900	e2850	e3730	17000	16500	4950	14400	10200	3570	e3150
27	2350	e6850	e3850	e2750	e3810	16400	17000	5110	14500	10300	3880	e2880
28	2300	e6620	e3800	e2650	e4180	15800	17100	5430	14300	10100	4270	e2660
29	2370	e6420	e3700	e2500	e6120	15000	16700	5830	14000	9560	4730	e2440
30	2520	e6220	e3700	e2450	---	14100	15800	5930	13600	8930	4870	e2270
31	2710	---	e3650	e2400	---	13500	---	5750	---	8200	4660	---
TOTAL	99630	162670	145610	103650	97890	631180	335700	219980	250640	456130	201560	136290
MEAN	3214	5422	4697	3344	3376	20360	11190	7096	8355	14710	6502	4543
MAX	5450	13700	6200	4500	6120	26100	17100	14700	14600	20500	11600	8150
MIN	2300	1980	3650	2400	2350	9780	7610	4910	3190	8200	3390	2270
AC-FT	197600	322700	288800	205600	194200	1252000	665900	436300	497100	904700	399800	270300
CFSM	.20	.33	.29	.21	.21	1.26	.69	.44	.52	.91	.40	.28
IN.	.23	.37	.33	.24	.22	1.45	.77	.51	.58	1.05	.46	.31

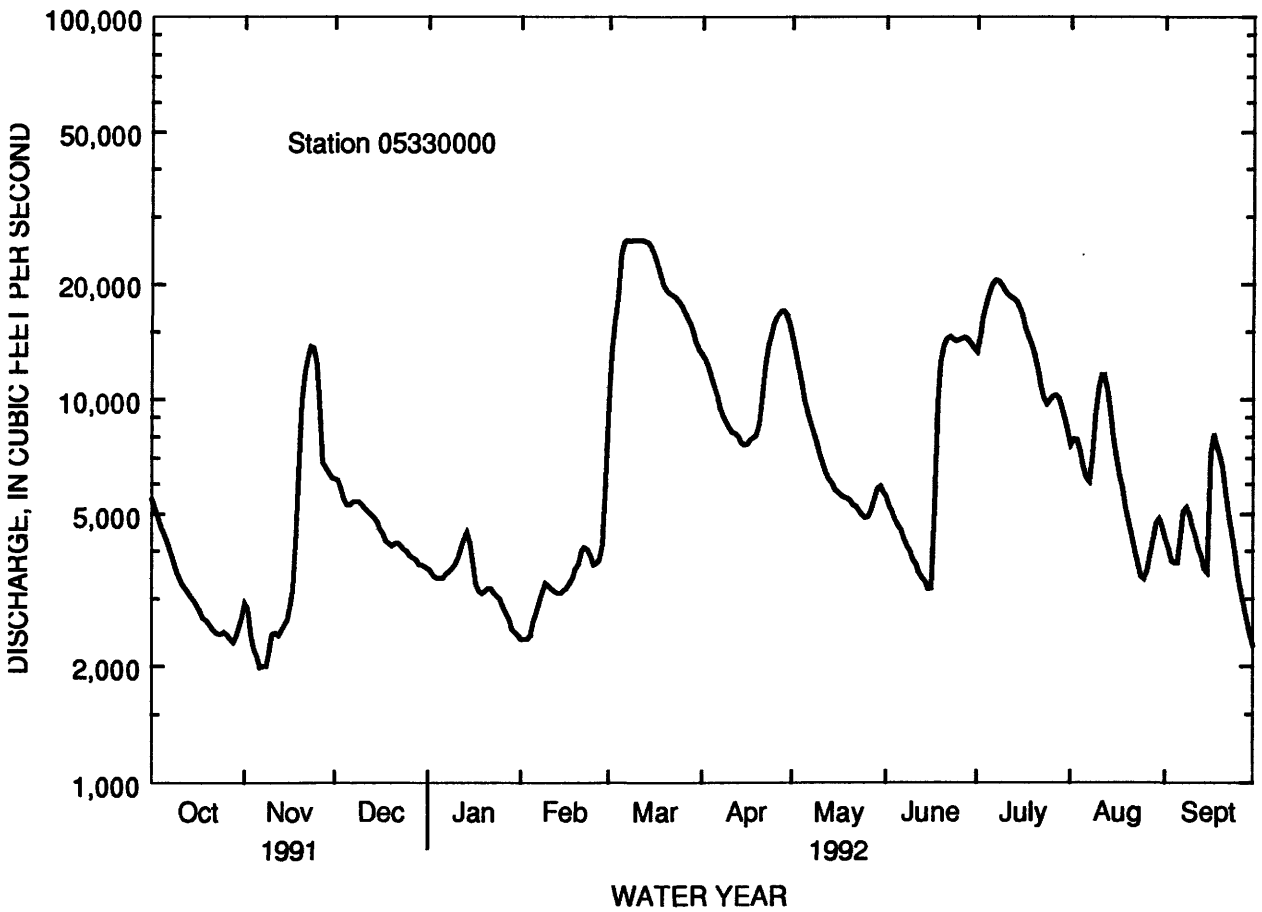
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1935 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1905	1815	1287	792	885	4904	11040	7027	6657	4955	2683	2014
MAX	16030	7643	5216	3344	3992	21170	48210	23030	23830	15250	13910	11020
(WY)	1969	1969	1983	1992	1983	1983	1969	1986	1991	1984	1979	1979
MIN	167	178	158	111	130	322	926	923	633	279	178	183
(WY)	1935	1935	1977	1940	1940	1940	1959	1959	1976	1936	1936	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1935 - 1992	
ANNUAL TOTAL	2925100		2840930			
ANNUAL MEAN	8014		7762		3836a	
HIGHEST ANNUAL MEAN					10670	1986
LOWEST ANNUAL MEAN					687	1940
HIGHEST DAILY MEAN	33000	Jun 11	26100	Mar 7	112000	Apr 11 1965
LOWEST DAILY MEAN	375	Jan 23	1980	Nov 6	85	Jan 21 1940
ANNUAL SEVEN-DAY MINIMUM	382	Jan 22	2120	Nov 3	89	Jan 20 1940
INSTANTANEOUS PEAK FLOW			26200	Mar 10	117000	Apr 11 1965
INSTANTANEOUS PEAK STAGE			24.11	Mar 10	35.07	Apr 12 1965
INSTANTANEOUS LOW FLOW			1890	Nov 6	79	Nov 17 1955
ANNUAL RUNOFF (AC-FT)	5802000		5635000		2779000	
ANNUAL RUNOFF (CFSM)	.49		.48		.24	
ANNUAL RUNOFF (INCHES)	6.72		6.52		3.22	
10 PERCENT EXCEEDS	18500		17000		10000	
50 PERCENT EXCEEDS	6100		5200		1520	
90 PERCENT EXCEEDS	423		2660		292	

a Median of annual discharges is 3,300 ft³/sec.



MINNESOTA RIVER BASIN

05330000 MINNESOTA RIVER NEAR JORDAN, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1952, 1963-69, 1972 to current year.
REMARKS.--Letter K indicates non-ideal colony count.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
NOV												
27...	1200	6560	917	934	8.1	7.9	0.5	12	742	12.8	96	520
FEB												
25...	1345	3740	838	869	8.2	8.0	1.0	5.6	750	12.1	32	210
MAY												
21...	1030	5280	828	841	8.2	7.9	20.5	16	747	11.8	K10	--
AUG												
31...	1600	4910	845	868	8.2	8.4	19.5	30	750	9.3	120	K17

DATE	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	CAR-BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
NOV											
27...	120	43	17	4.3	280	297	0	342	130	36	0.40
FEB											
25...	110	42	21	4.4	280	284	0	342	130	33	0.20
MAY											
21...	86	46	23	3.8	209	189	0	245	150	36	0.40
AUG											
31...	110	44	20	4.6	275	276	0	336	150	31	<0.10

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
NOV											
27...	23	594	0.060	16.0	0.150	0.150	1.2	0.220	0.130	0.120	0.110
FEB											
25...	19	633	0.050	7.30	0.210	0.210	1.2	0.190	0.130	0.140	0.120
MAY											
21...	3.8	540	0.030	7.50	0.020	0.020	1.6	0.130	0.010	0.020	<0.010
AUG											
31...	22	583	0.010	5.50	0.020	0.020	0.70	0.110	0.070	0.080	0.070

MINNESOTA RIVER BASIN

05330000 MINNESOTA RIVER NEAR JORDAN, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	SEDIMENT, SUSPENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	COBALT, DISSOLVED (UG/L AS CO) (01035)	IRON, DISSOLVED (UG/L AS FE) (01046)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)
NOV 27...	180	43	10	83	<3	9	35	34	<10	2	6
FEB 25...	43	60	<10	73	<3	9	35	28	<10	2	2
MAY 21...	122	86	<10	73	<3	<3	39	<1	<10	<1	4
AUG 31...	174	92	30	81	<3	4	36	3	<10	3	3

DATE	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90) (80060)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)
NOV 27...	<1.0	350	<6	21	<0.6	10	5.0	7.6	4.7	0.12	16
FEB 25...	<1.0	350	<6	--	--	--	--	--	--	--	--
MAY 21...	<1.0	370	<6	--	--	--	--	--	--	--	--
AUG 31...	<1.0	390	<6	11	1.8	8.2	5.3	6.2	4.9	0.13	11

MISSISSIPPI RIVER MAIN STEM

05331000 MISSISSIPPI RIVER AT ST. PAUL, MN

LOCATION.--Lat 44°56'40", long 93°05'20", in SE¼NE¼ sec.6, T.28 N., R.22 W., Ramsey County, Hydrologic Unit 07010206, on left bank in St. Paul, 300 ft upstream from Robert Street Bridge, 6 mi downstream from Minnesota River, and at mile 839.3 upstream from Ohio River.

DRAINAGE AREA.--36,800 mi², approximately.

PERIOD OF RECORD.--Water year 1867-69, 1872-92 (annual maximums), March 1892 to current year (prior to 1901,fragmentary during some winters). Records prior to March 1892, published in the 19th Annual Report, Part 4,have been found to be unreliable and should not be used. Monthly discharge only for some periods, published in WSP 1308. Gage-height records (winter records incomplete) collected at same site since 1866 are contained in reports of U.S. Weather Bureau, War Department and Mississippi River Commission.

REVISED RECORDS.--WSP 285: 1892-96. WSP 715: Drainage area. WSP 875: 1938. WSP 895: 1939. WSP 1308: 1867(M). WSP 1508: 1897, 1898(M), 1903(M), 1917-18(M), 1928(M), 1929. WRD MN-74: 1973.

GAGE.--Water-stage recorder. Datum of gage is 683.62 ft above mean sea level. Prior to Mar. 18, 1925, nonrecording gage at several sites within 300 ft of present site at present datum. Mar. 18,1925, to Mar. 10, 1933, water-stage recorder and Mar. 11, 1933, to Sept. 14, 1939, nonrecording gage, at present site and datum. Since September 1938, auxiliary water-stage recorder 5.6 mi downstream.

REMARKS.--Records good. Slight regulation except during extreme floods by reservoirs on headwaters and by power plants. Beginning July 20, 1938, sewage from Minneapolis and St. Paul, which formerly entered above station, was diverted to a sewage-disposal plant, thence to river below station. Figures of daily discharge do not include this diversion.

COOPERATION.--Records of Mississippi River at Twin City lock and dam computed and furnished by Ford Motor Co. Diversion through sewage disposal plant furnished by Metropolitan Waste Control Commission.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15800	9330	15500	11200	8570	11400	26200	35100	11500	21600	13100	8790
2	15900	9890	15400	11100	8090	16000	25300	32600	11100	20800	12100	8780
3	14500	9890	14200	11200	8170	20000	24600	29800	10900	23300	12200	8870
4	14300	9210	13700	10800	7840	24000	23900	27400	10000	25300	12700	8990
5	13300	8090	12900	10400	7430	27900	23400	25300	9320	27600	12000	8830
6	12900	7790	12400	10400	7740	33900	22200	23000	9250	29000	11200	8880
7	12100	8380	13300	10500	8030	38300	20800	21400	8910	30700	10200	9950
8	12300	6940	14100	10100	7850	41600	20000	20300	8500	31800	10400	11600
9	11600	7190	15100	10800	8550	43900	19900	18600	7990	31600	11500	11100
10	11900	7470	14700	10500	8060	46200	19300	18100	8040	31200	13700	11600
11	11000	9400	14400	10300	8950	46500	19500	16900	7550	30000	15900	10700
12	10700	9930	14300	10800	8640	47700	19600	16500	7350	29300	16500	10800
13	10200	9820	14400	11300	8190	48100	19400	16600	7040	29900	16000	9710
14	9960	10200	14300	11400	8600	48500	18700	16200	6940	29500	15100	9890
15	10200	10300	13400	11200	8060	48500	19000	15600	6680	29000	13600	10100
16	10400	10500	12200	9710	7990	46700	19100	15800	6350	27800	11900	9660
17	9480	10600	11800	8420	7680	44300	19500	16300	6580	26700	11200	11800
18	9040	11500	12500	9330	7800	42200	19700	15800	8340	25000	10100	14500
19	9210	13400	12300	8680	7920	39300	20100	15900	15700	24200	9300	13600
20	9010	17100	11200	8780	8040	36900	20600	14700	19200	23400	8880	13200
21	8530	20400	11600	9790	8130	35200	21900	13200	20500	22200	8130	12300
22	9170	22300	12800	10400	8130	34800	24300	13700	21900	20600	7400	11300
23	9330	24600	12600	10200	8820	33800	27700	13400	23100	19100	7210	10800
24	8980	25900	12600	9350	8520	32700	30900	12700	24200	17900	6830	9970
25	9170	24400	12000	9090	8840	32200	33300	11900	24500	17400	6460	8950
26	8880	22400	11700	8070	8490	31300	34900	11500	23900	17300	7830	8710
27	8430	19300	11800	8750	8540	30100	36500	11500	23700	17100	7560	8350
28	8080	17500	11800	8920	8580	29700	37400	12300	23500	16900	8000	7900
29	7780	17400	11500	8800	9220	29000	37700	11700	23000	16200	8270	7190
30	8540	16400	11400	8780	---	28100	36500	12200	22400	15600	8380	7350
31	9030	---	11200	8970	---	26900	---	12200	---	14100	9090	---
TOTAL	329720	407530	403100	308040	239470	1095700	741900	548200	417940	742100	332740	304170
MEAN	10640	13580	13000	9937	8258	35350	24730	17680	13930	23940	10730	10140
MAX	15900	25900	15500	11400	9220	48500	37700	35100	2500	31800	16500	14500
MIN	7780	6940	11200	8070	7430	11400	18700	11500	6350	14100	6460	7190
AC-FT	654000	808300	799500	611000	475000	2173000	1472000	1087000	829000	1472000	660000	603300
CFSM	.29	.37	.35	.27	.22	.96	.67	.48	.38	.65	.29	.28
IN.	.33	.41	.41	.31	.24	1.11	.75	.55	.42	.75	.34	.31
+	366	378	355	360	347	400	392	386	392	417	383	392
‡	11,006	13,958	13,555	10,297	8,605	35,750	25,122	18,066	14,322	24,357	11,113	10,532
CFSM ‡	.30	.38	.36	.28	.23	.97	.68	.49	.39	.66	.30	.29
IN. ‡	.34	.42	.42	.32	.25	1.12	.76	.57	.43	.76	.35	.32

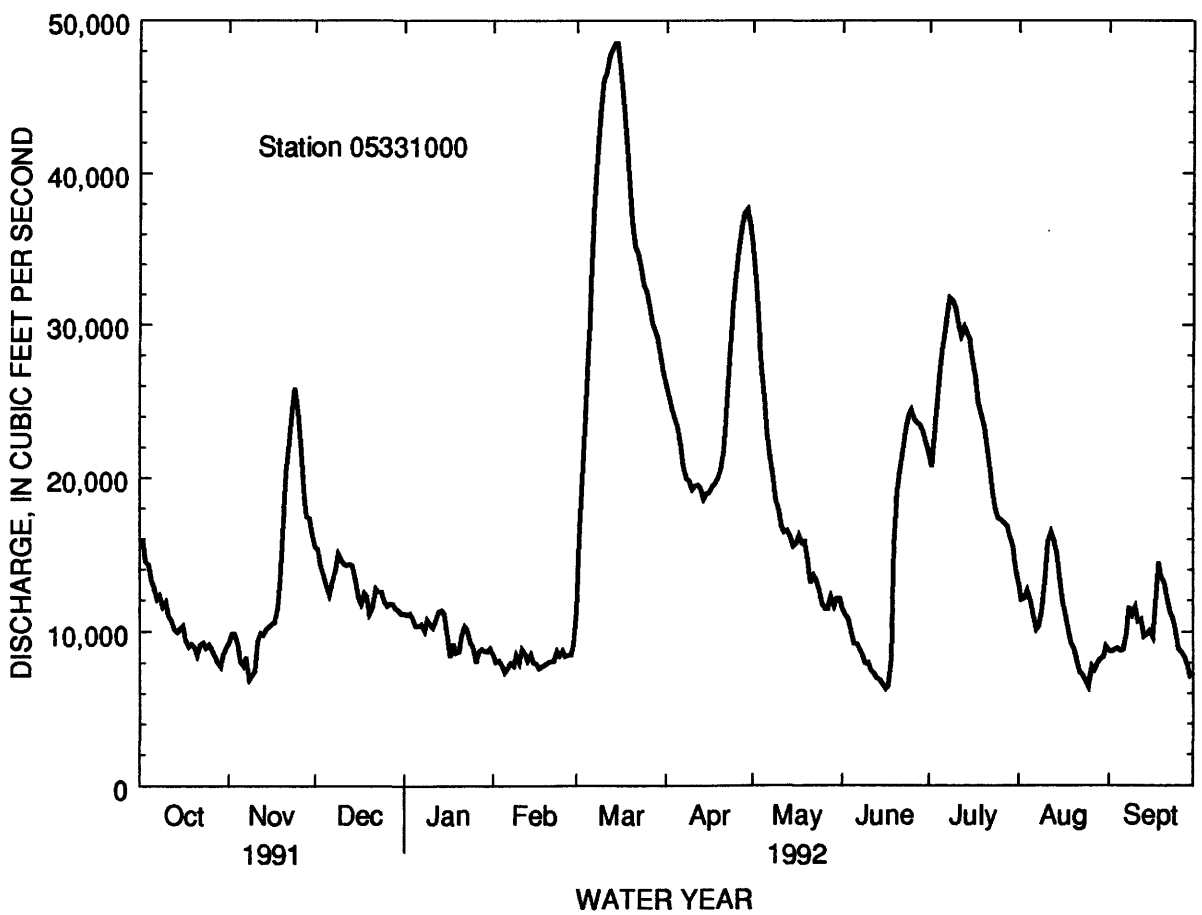
1991 CAL YR MEAN ‡ 18,119 IN ‡ 6.69 CFSM 0.49
1992 WY MEAN ‡ 16,421 IN ‡ 6.06 CFSM 0.45
+ Diversion equivalent in cubic feet per second through sewage disposal plant.
‡ Adjusted for diversion.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1892 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	8239	7413	5317	4360	4335	10730	24590	19860	17460	13360	8284	7831
MAX	38210	27660	16080	11500	14700	43240	91610	66470	56530	43290	33380	34380
(WY)	1987	1972	1983	1983	1966	1983	1969	1986	1908	1905	1953	1986
MIN	1289	1348	1277	1097	1300	1757	3421	3085	1980	1272	864	1143
(WY)	1937	1937	1935	1935	1895	1940	1895	1934	1934	1934	1934	1934

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1892 - 1992	
ANNUAL TOTAL		6474170		5870610		
ANNUAL MEAN		17740		16040	11010 a b	
HIGHEST ANNUAL MEAN					29580	1986
LOWEST ANNUAL MEAN					1935	1934
HIGHEST DAILY MEAN	52000	May 13	48500	Mar 14	171000	Apr 16 1965
LOWEST DAILY MEAN	2820	Feb 9	6350	Jun 16	632	Aug 26 1934
ANNUAL SEVEN-DAY MINIMUM	2950	Feb 7	6930	Jun 11	741	Aug 26 1934
INSTANTANEOUS PEAK FLOW					71000	Apr 16 1965
INSTANTANEOUS PEAK STAGE					26.01	Apr 16 1965
ANNUAL RUNOFF (AC-FT)	12840000		11640000		7977000	
ANNUAL RUNOFF (CFSM)	.48		.44		30	
ANNUAL RUNOFF (INCHES)	6.54		5.93		4.07	
10 PERCENT EXCEEDS	35300		29900		25800	
50 PERCENT EXCEEDS	15100		12100		6790	
90 PERCENT EXCEEDS	3320		8070		2630	

a Unadjusted.
b Adjusted mean is 11,243 ft³/s. Unadjusted median is 10,050 ft³/s.



MISSISSIPPI RIVER MAIN STEM

05331570 MISSISSIPPI RIVER AT NININGER, MN
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

LOCATION.--Lat 44°46'22", long 92°54'07", NE¼NE¼ sec.18, T.115 N., R.17 W., Dakota County, Hydrologic Unit 07010206, on right bank at the end of Jason Avenue, and at mile 817.8 upstream from Ohio River.

DRAINAGE AREA.--37,000 mi² (95,000 km²), approximately.

PERIOD OF RECORD.--January 1977 to current year.

REMARKS.--Water-discharge computed on the basis of discharge for Mississippi River at St. Paul (station 05331000) adjusted for inflow and travel time. Letter K indicates non-ideal colony count.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
NOV												
26...	1045	25300	647	704	8.1	7.9	2.0	7.9	750	12.6	210	260
FEB												
26...	1350	9350	680	713	8.3	7.9	3.0	2.6	740	13.2	38	22
MAY												
19...	1200	16500	580	592	8.5	8.2	20.0	15	748	12.0	K27	K4
AUG												
31...	1140	8900	645	652	8.3	8.7	19.0	20	750	8.3	60	K38

DATE	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	CAR-BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
NOV												
26...	86	30	16	4.1	232	234	0	283	75	30	0.30	18
FEB												
26...	84	30	28	3.9	233	238	0	284	70	43	0.20	15
MAY												
19...	65	28	16	3.1	184	191	12	224	73	28	0.30	2.5
AUG												
31...	74	30	23	3.9	210	227	4	256	85	34	0.30	14

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV												
26...	456	0.040	10.0	0.260	0.250	1.3	0.200	0.180	0.120	0.110	65	83
FEB												
26...	494	0.080	4.40	0.260	0.270	1.2	0.230	0.180	0.200	0.170	24	57
MAY												
19...	359	0.030	3.00	0.020	0.030	0.80	0.110	0.040	0.050	0.020	66	98
AUG												
31...	411	0.030	2.10	0.030	0.020	0.70	0.160	0.120	0.130	0.090	104	98

MISSISSIPPI RIVER MAIN STEM

05331570 MISSISSIPPI RIVER AT NININGER, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	COBALT, DISSOLVED (UG/L AS CO) (01035)	IRON, DISSOLVED (UG/L AS FE) (01046)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)
NOV 26...	<10	66	<3	16	20	24	<10	2	2	<1.0	230	<6
FEB 26...	<10	63	<3	12	21	75	<10	2	1	<1.0	220	<6
MAY 19...	<10	64	<3	5	18	14	<10	1	1	<1.0	200	<6
AUG 31...	30	69	<3	6	20	11	<10	3	1	<1.0	230	<6

ST. CROIX RIVER BASIN

05336700 KETTLE RIVER BELOW SANDSTONE, MN

LOCATION.--Lat 46°06'20", long 92°51'50", in NW¼SW¼ sec.22, T.42 N., R.20 W., Pine County, Hydrologic Unit 07030003, on Sandstone Federal Correctional Institution property, on left bank about 900 ft downstream from abandoned powerplant dam, 1.8 mi south of Sandstone.

DRAINAGE AREA.--863 mi².

PERIOD OF RECORD.--October 1967 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 931.50 ft above mean sea level. (Minnesota Department of Transportation bench mark).

REMARKS.--Records good except those for estimated daily discharge, which are fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in April 1965 reached a stage of 12.96 ft, from flood marks, discharge, 13,400 ft³/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 3,600 ft³/s and maximum (*)

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Nov. 20	2200	4,320	8.04	Apr. 23	0100	4,750	8.31

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	510	965	e1000	e295	e270	299	2010	1330	263	577	250	292
2	508	610	e950	e300	e290	310	1850	1160	244	1020	250	342
3	495	759	e890	e310	e295	319	1780	1030	230	2020	242	400
4	474	947	e820	e310	e290	319	1750	911	224	2020	222	458
5	458	1040	e750	e312	e280	402	1770	807	213	1790	215	492
6	445	965	e700	e312	e275	748	1830	721	214	1600	207	558
7	461	961	e680	e313	e270	1430	1930	654	220	1490	222	534
8	464	1000	e720	e314	e270	1940	1930	601	217	1160	258	498
9	444	1000	e680	e315	e260	2550	1840	561	200	934	279	475
10	413	1020	e640	e316	e260	2500	1710	522	196	916	292	458
11	391	1010	e600	e316	e255	2670	1580	641	193	1150	283	415
12	384	988	e540	e316	e250	2110	1430	1140	186	1260	258	380
13	364	982	e480	e316	e250	1820	1320	1250	193	1140	254	346
14	358	988	e450	e316	e248	1580	1240	1270	176	989	246	328
15	356	1050	e420	e316	e242	1310	1220	1210	187	862	234	301
16	360	1090	e380	e316	e238	1240	1280	1100	196	800	222	292
17	360	1100	e360	e316	e238	1150	1260	988	315	736	211	315
18	351	1420	e350	e316	e238	1070	1210	885	527	656	211	360
19	346	2460	e330	e316	e240	1040	1510	776	751	590	196	360
20	343	3800	e310	e316	e245	1020	2600	686	1200	522	189	342
21	336	4230	e290	e316	e250	968	3500	616	1380	475	254	333
22	331	3960	e290	e316	e255	915	4580	561	1270	447	274	310
23	332	3250	e290	e316	260	936	4660	511	1160	410	254	288
24	331	2430	e280	e315	258	1160	4270	495	1200	380	250	266
25	326	2050	e280	e305	258	1950	3680	453	1280	360	296	250
26	328	1720	e280	e295	258	2390	3080	414	1120	337	355	242
27	333	1620	e280	e285	265	2310	2520	381	989	319	390	222
28	340	1400	e280	e280	273	2280	2090	355	826	296	370	215
29	515	1210	e280	e270	275	2170	1780	337	691	270	342	207
30	798	1050	e280	e270	---	1990	1530	313	583	256	319	204
31	1040	---	e280	e265	---	2100	---	286	---	254	306	---
TOTAL	13295	47075	15160	9490	7556	44996	64740	22965	16644	26036	8151	10483
MEAN	429	1569	489	306	261	1451	2158	741	555	840	263	349
MAX	1040	4230	1000	316	295	2670	4660	1330	1380	2020	390	558
MIN	326	610	280	265	238	299	1210	286	176	254	189	204
AC-FT	26370	93370	30070	18820	14990	89250	128400	45550	33010	51640	16170	20790
CFSM	.50	1.82	.57	.35	.30	1.68	2.50	.86	.64	.97	.30	.40
IN.	.57	2.03	.65	.41	.33	1.94	2.79	.99	.72	1.12	.35	.45

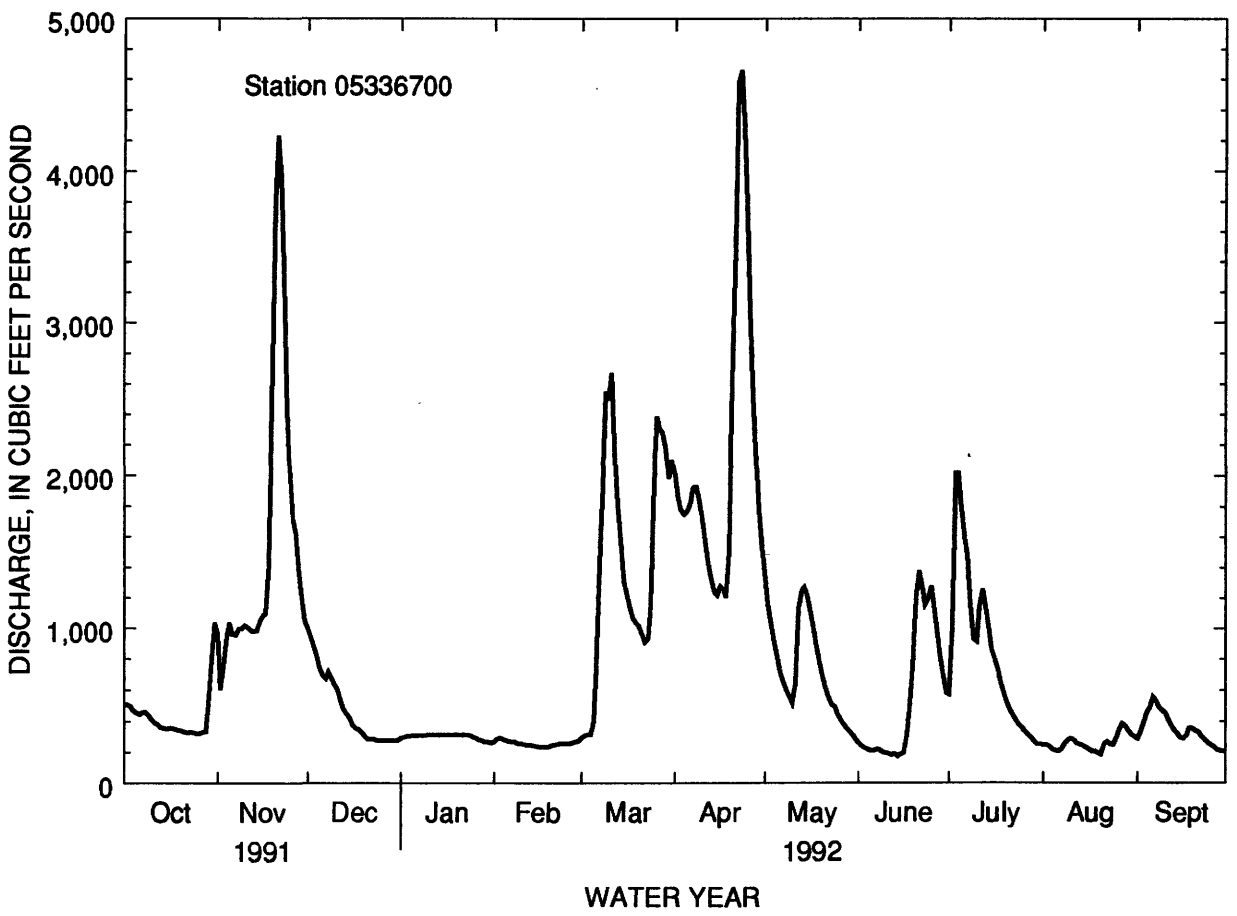
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	791	615	279	175	170	522	2335	1289	851	627	379	596
MAX	2652	2414	652	411	417	1742	4653	3168	2297	2869	2094	3065
(WY)	1969	1972	1984	1984	1984	1973	1969	1986	1968	1972	1972	1986
MIN	80.6	85.8	98.3	77.3	98.5	141	435	222	131	110	86.4	71.3
(WY)	1977	1977	1977	1971	1977	1980	1977	1980	1988	1988	1976	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1968 - 1992	
ANNUAL TOTAL	369676		286591			
ANNUAL MEAN	1013		783		719	
HIGHEST ANNUAL MEAN					1390	1972
LOWEST ANNUAL MEAN					254	1977
HIGHEST DAILY MEAN	6260	May 7	4660	Apr 23	16400	Jul 23 1972
LOWEST DAILY MEAN	142	Mar 10	176	Jun 14	43	Nov 12 1976
ANNUAL SEVEN-DAY MINIMUM	145	Mar 5	190	Jun 10	62	Jan 14 1971
INSTANTANEOUS PEAK FLOW			4750	Apr 23	17200	Jul 23 1972
INSTANTANEOUS PEAK STAGE			8.31	Apr 23	15.38	Jul 23 1972
INSTANTANEOUS LOW FLOW			172	Jun 15, 16	25a	
ANNUAL RUNOFF (AC-FT)	733300		568500		520900	
ANNUAL RUNOFF (CFSM)	1.17		.91		.83	
ANNUAL RUNOFF (INCHES)	15.94		12.35		11.32	
10 PERCENT EXCEEDS	2410		1820		1770	
50 PERCENT EXCEEDS	712		411		281	
90 PERCENT EXCEEDS	152		245		123	

a Occurred Nov. 11, 12, 1977, result of freezeup.



ST. CROIX RIVER BASIN

05337400 KNIFE RIVER NEAR MORA, MN

LOCATION.--Lat 45°55'12", long 93°18'26", in SW¼SW¼ sec.26, T.40 N., R.24 W., Kanabec County, Hydrologic Unit 07030004, on left bank 400 ft upstream from bridge on County Highway 77, 1.1 mi upstream from mouth and 2.5 mi north of Mora.

DRAINAGE AREA.--102 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1969-74; July 1974 to current year.

GAGE.--Water-stage recorder. Datum of gage is 991.20 ft above mean sea level (Kanabec County bench mark).

REMARKS.--Records good except those for periods of estimated daily discharges, which are fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of July 26, 1972, reached a stage of 14.0 ft, from information by local resident (discharge not determined). Result of dam failure and backwater from collapsed bridge.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 500 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)		Date	Time	Discharge (ft³/s)	Gage height (ft)
Apr. 22	0630	*653	*4.53	No other peak above base discharge.				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.7	42	e61	e19	e18	e16	122	123	13	17	4.4	9.0
2	9.7	39	e59	e18	e17	e17	108	105	10	40	4.8	11
3	9.4	e37	e58	e18	e17	e19	99	90	9.2	35	4.6	16
4	8.4	e38	e57	e18	e16	e24	90	79	8.2	38	4.1	13
5	8.8	e40	e55	e19	17	e40	79	67	7.3	39	3.2	12
6	11	e43	e53	e19	17	119	75	53	9.8	35	2.8	17
7	9.9	e45	55	22	e15	238	72	45	9.9	31	12	15
8	9.4	e46	51	e21	e15	346	66	44	9.1	28	19	14
9	9.7	e46	43	e25	e15	411	64	41	8.6	26	19	11
10	9.7	e46	33	e27	e15	376	71	32	7.9	24	20	8.8
11	10	46	40	e26	e16	330	73	64	6.8	21	18	8.6
12	13	43	29	27	e16	258	64	75	6.7	23	21	6.0
13	11	e40	e38	e26	e16	215	60	73	8.1	20	16	5.8
14	11	e38	e37	e27	e16	186	59	60	9.5	18	14	6.6
15	11	e38	37	e27	e15	154	70	53	7.1	15	12	7.0
16	9.8	43	34	e28	e15	135	91	47	5.8	14	10	5.9
17	9.4	49	34	e28	e14	122	103	48	21	14	9.0	7.5
18	9.5	79	34	e28	e14	112	106	42	25	14	9.0	7.4
19	7.8	121	e32	e28	e14	105	147	34	30	12	8.1	6.2
20	7.4	140	e32	e28	e14	102	227	31	28	11	6.1	4.3
21	7.7	149	e32	e27	e14	99	490	27	27	8.5	5.4	4.3
22	9.1	143	e31	e27	e14	91	632	28	27	7.9	6.6	5.1
23	9.4	128	e30	e27	e14	92	521	33	25	7.0	5.0	4.7
24	9.4	115	e29	e26	e14	99	407	24	24	5.5	5.0	3.6
25	9.4	96	e28	e26	e14	123	319	21	22	4.2	15	3.0
26	9.4	91	e27	e25	e14	149	256	17	19	4.6	23	2.6
27	9.4	74	28	e23	e14	158	207	16	14	4.5	14	2.7
28	37	70	25	e22	e14	155	167	15	12	3.4	11	2.9
29	27	67	22	e21	e15	151	158	13	13	3.3	9.7	2.7
30	30	66	22	e20	---	142	136	12	10	2.8	8.9	2.6
31	34	---	e19	e19	---	131	---	13	---	2.8	14	---
TOTAL	387.4	2058	1165	742	439	4715	5139	1425	434.0	529.5	334.7	226.3
MEAN	12.5	68.6	37.6	23.9	15.1	152	171	46.0	14.5	17.1	10.8	7.54
MAX	37	149	61	28	18	411	632	123	30	40	23	17
MIN	7.4	37	19	18	14	16	59	12	5.8	2.8	2.8	2.6
AC-FT	768	4080	2310	1470	871	9350	10190	2830	861	1050	664	449
CFSM	.12	.67	.37	.23	.15	1.49	1.68	.45	.14	.17	.11	.07
IN.	.14	.75	.42	.27	.16	1.72	1.87	.52	.16	.19	.12	.08

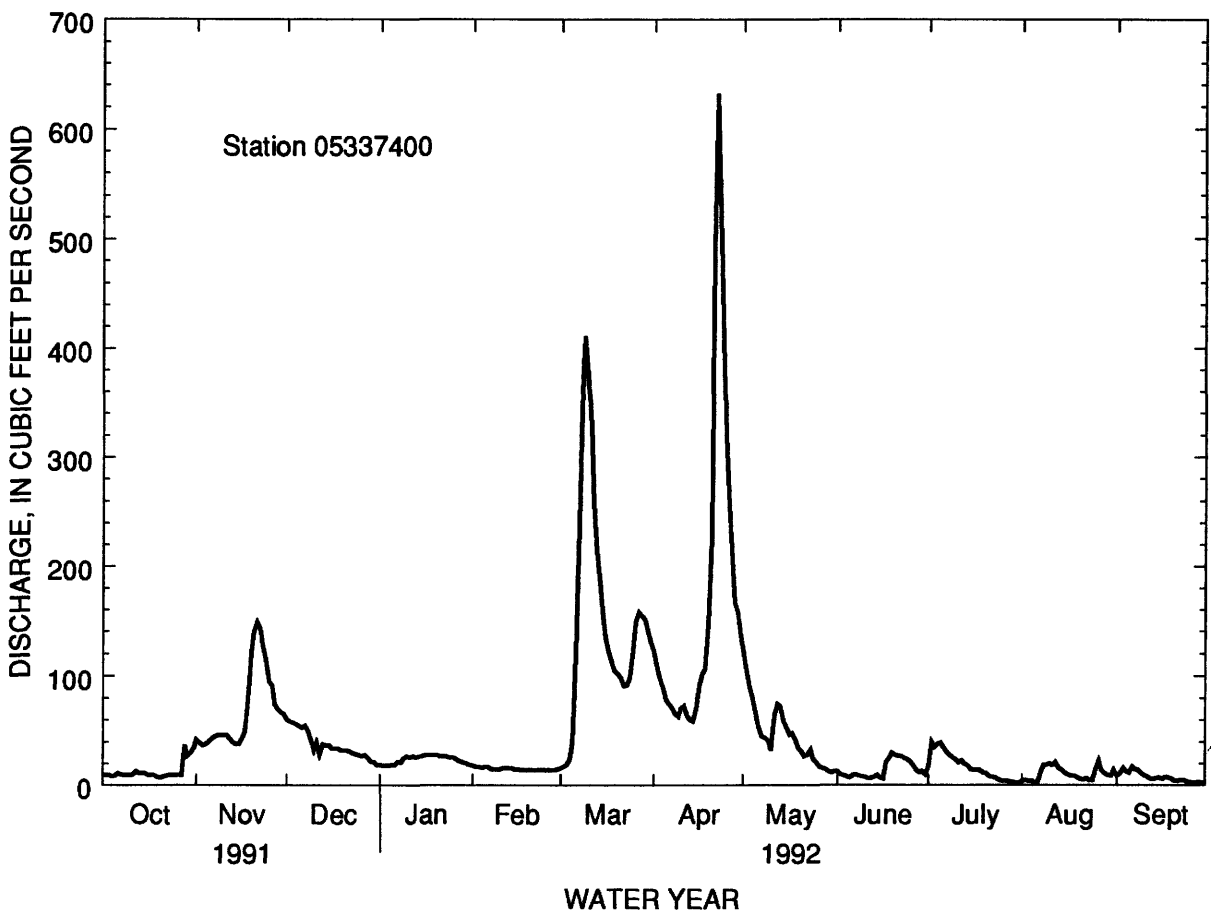
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	55.5	42.6	26.0	12.9	13.6	68.6	220	107	62.5	58.3	24.7	41.7
MAX	242	206	109	28.8	48.9	238	472	338	233	171	120	257
(WY)	1985	1978	1978	1984	1984	1983	1986	1986	1984	1975	1986	1986
MIN	1.84	1.38	1.17	1.14	1.16	14.3	30.5	12.5	3.06	.98	1.86	2.15
(WY)	1977	1990	1990	1977	1990	1975	1977	1980	1988	1988	1976	1987

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1974 - 1992	
ANNUAL TOTAL	31102.9		17594.9			
ANNUAL MEAN	85.2		48.1		61.4	
HIGHEST ANNUAL MEAN					135	1986
LOWEST ANNUAL MEAN					16.8	1988
HIGHEST DAILY MEAN	948	May 7	632	Apr 22	1610	Apr 1 1986
LOWEST DAILY MEAN	3.9	Sep 2	2.6	Sep 26	.76	Jul 7 1988
ANNUAL SEVEN-DAY MINIMUM	5.0	Jan 27	2.9	Sep 24	.86	Jul 23 1988
INSTANTANEOUS PEAK FLOW			653	Apr 22	1840	May 10 1979
INSTANTANEOUS PEAK STAGE			4.53	Apr 22	6.69	Nov 24 1977
INSTANTANEOUS LOW FLOW			2.4	Jul 31	.74a	
ANNUAL RUNOFF (AC-FT)	61690		34900		44470	
ANNUAL RUNOFF (CFSM)	.84		.47		.60	
ANNUAL RUNOFF (INCHES)	11.34		6.42		8.18	
10 PERCENT EXCEEDS	245		121		144	
50 PERCENT EXCEEDS	33		22		21	
90 PERCENT EXCEEDS	5.5		6.7		3.9	

a Occurred July 6, 7, 28, 29, 1988.



ST. CROIX RIVER BASIN

05337400 KNIFE RIVER NEAR MORA, MN

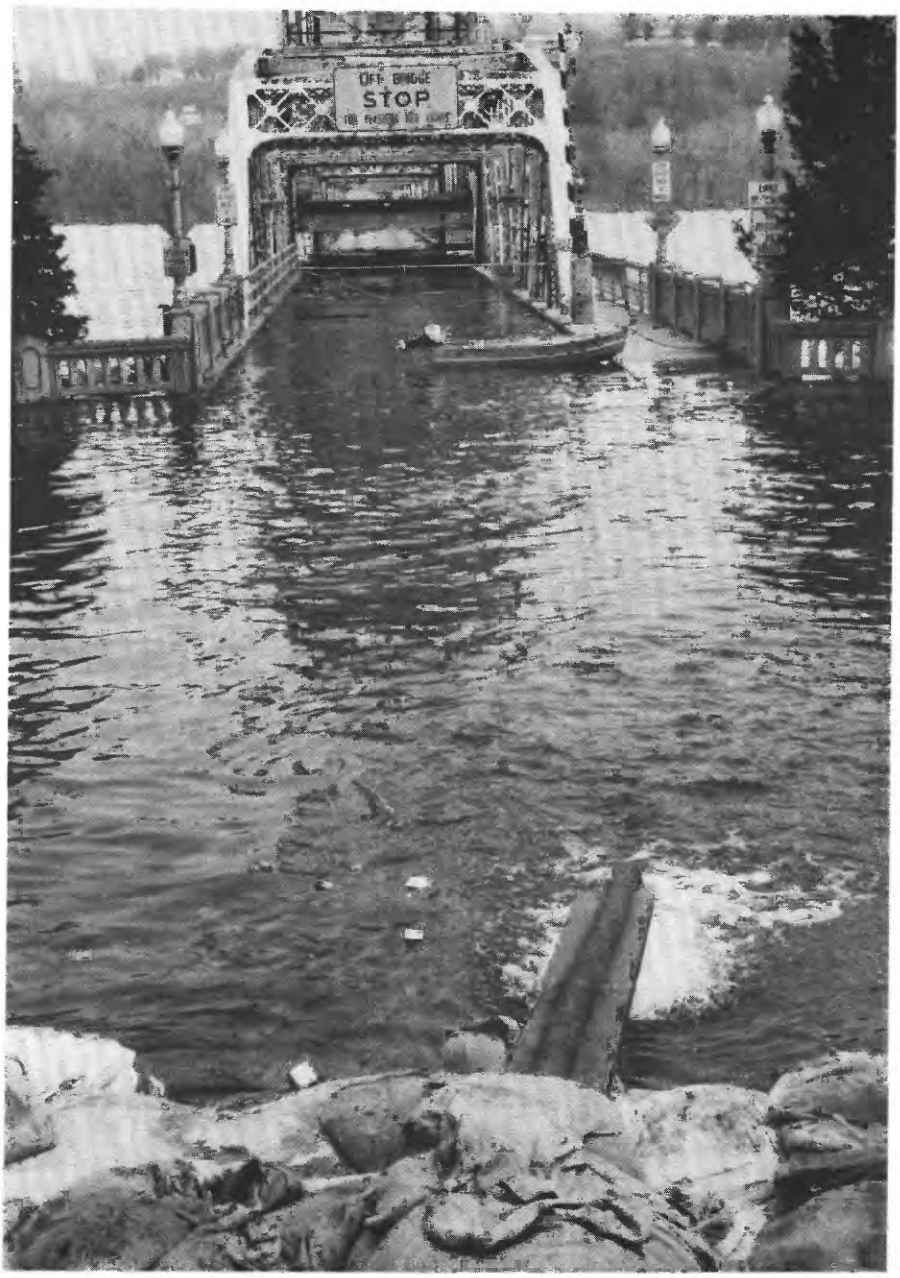
WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1992.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)
AUG 13...	1120	17	175	8.1	19.5	750	9.3

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)
AUG 13...	300	490	0.096	0.020	0.090	<0.010



St. Croix River at Stillwater

ST. CROIX RIVER BASIN

05338500 SNAKE RIVER NEAR PINE CITY, MN

LOCATION.--Lat 45°50'30", long 92°56'00", in SE¼NW¼ sec. 26, T. 39 N., R. 21 W., Pine County, Hydrologic Unit 07030004, on left bank at site of former powerplant and dam, 0.5 mi downstream from Cross Lake and 1.5 mi northeast of Pine City.

DRAINAGE AREA.--958 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1913 to September 1917, July 1951 to Sept. 1981, 1992.

GAGE.--Water-stage recorder. Datum of gage is 919.00 ft above mean sea level. June 25, 1913, to Sept. 30, 1917, nonrecording gage at site 500 ft downstream at different datum. July 1 to Oct. 28, 1951, nonrecording gage at present site and datum.

REMARKS.--Records good except those for winter period, which are fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge measurement of 12,500 ft³/s was made May 9, 1950.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e188	260	708	260	202	252	1380	1860	201	158	116	107
2	e175	310	682	260	200	265	1330	1580	197	245	112	183
3	166	445	656	253	210	279	1270	1280	177	306	104	176
4	158	340	571	266	209	314	1190	1060	168	337	95	165
5	180	325	537	273	205	403	1120	911	145	384	89	190
6	174	373	520	273	201	723	1070	798	153	407	80	210
7	147	445	503	295	217	1190	1010	697	133	398	122	215
8	158	453	495	302	e220	1790	955	610	120	386	154	207
9	162	470	478	e300	e210	2350	912	534	114	330	166	198
10	149	486	470	e285	204	2730	892	473	117	297	176	187
11	149	486	e450	273	e202	3020	925	536	109	274	160	159
12	159	486	e430	280	e200	3200	864	581	103	351	163	152
13	141	495	e415	e278	194	3170	830	588	96	424	155	155
14	159	503	e400	e278	188	2980	814	615	90	453	145	157
15	164	516	e390	e278	179	2710	852	630	78	433	133	141
16	135	528	e370	e278	171	2410	960	600	100	417	121	150
17	135	537	e360	e278	166	2130	1070	568	193	364	114	141
18	149	597	e350	e278	164	1900	1130	510	206	317	110	153
19	135	725	340	e278	160	1710	1300	468	206	306	101	114
20	122	869	333	e278	163	1590	1480	430	261	249	93	114
21	123	1040	317	e278	169	1480	1940	392	320	221	93	128
22	126	1280	295	e278	180	1370	2450	389	384	194	89	111
23	114	1540	295	e278	190	1260	2830	333	395	176	88	91
24	135	1570	280	e270	210	1220	3150	288	361	161	98	87
25	141	1280	260	254	221	1230	3330	274	327	152	138	84
26	144	1120	260	245	225	1250	3340	271	265	149	135	102
27	133	1060	261	254	235	1320	3170	256	230	125	138	105
28	140	963	260	224	240	1380	2880	242	207	125	133	99
29	135	852	260	214	246	1430	2540	225	176	105	140	79
30	169	750	260	207	---	1450	2160	221	152	97	152	79
31	273	---	260	207	---	1440	---	217	---	103	117	---
TOTAL	4738	21104	12466	8253	5781	49946	49144	18437	5784	8444	3830	4239
MEAN	153	703	402	266	199	1611	1638	595	193	272	124	141
MAX	273	1570	708	302	246	3200	3340	1860	395	453	176	215
MIN	114	260	260	207	160	252	814	217	78	97	80	79
AC-FT	9400	41860	24730	16370	11470	99070	97480	36570	11470	16750	7600	8410
CFSM	.16	.73	.42	.28	.21	1.68	1.71	.62	.20	.28	.13	.15
IN.	.18	.82	.48	.32	.22	1.94	1.91	.72	.22	.33	.15	.16

e Estimated.

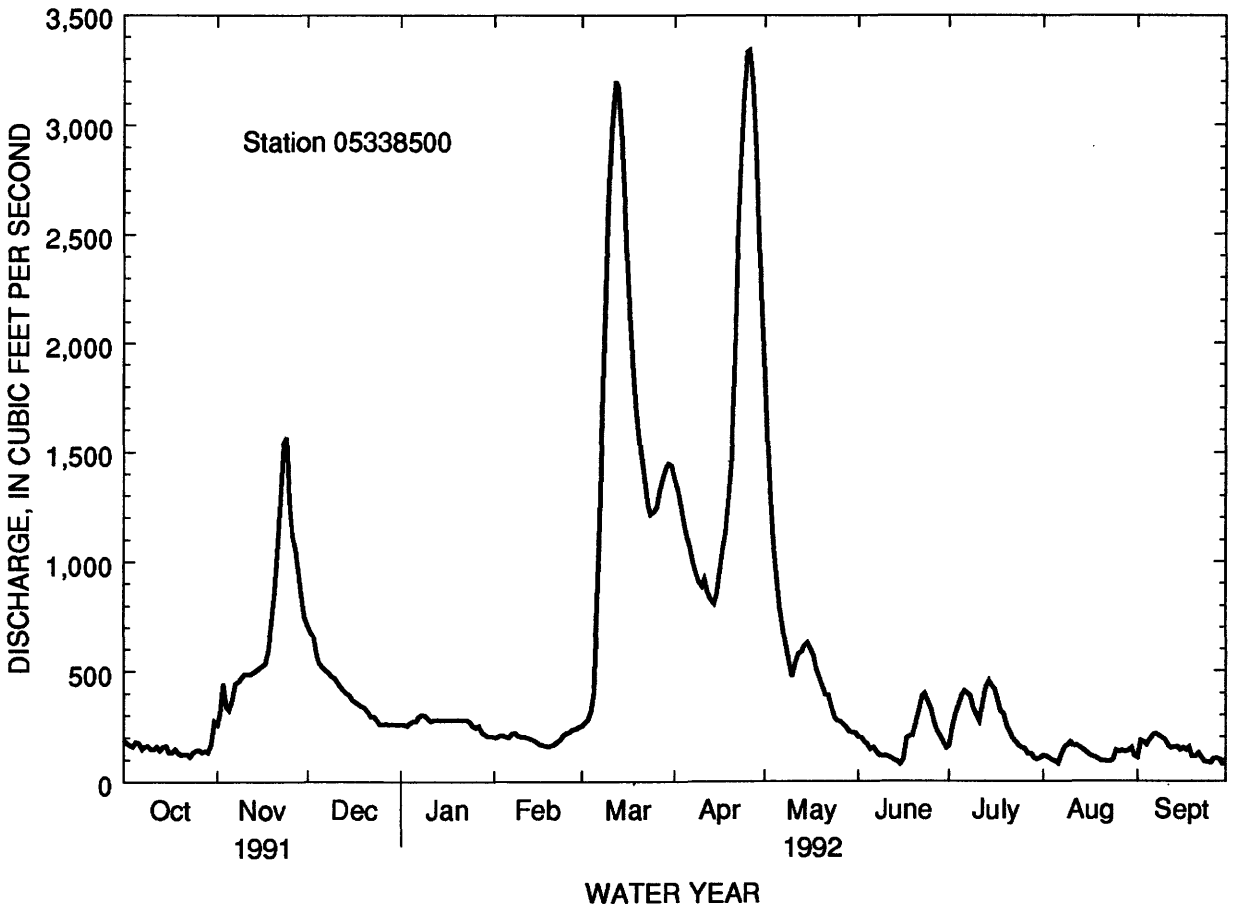
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	419	407	209	126	125	447	1996	1171	861	741	325	302
MAX	3130	2310	837	343	549	2658	4975	2726	2775	3400	2018	1201
(WY)	1969	1972	1978	1966	1966	1966	1965	1979	1967	1952	1972	1951
MIN	47.1	59.9	36.1	29.3	33.4	61.5	172	206	193	100	34.9	37.8
(WY)	1977	1977	1977	1977	1977	1965	1959	1977	1992	1961	1976	1976

SUMMARY STATISTICS	FOR 1992 WATER YEAR		WATER YEARS 1913 - 1992	
ANNUAL TOTAL	192166			
ANNUAL MEAN	525		589a	
HIGHEST ANNUAL MEAN			1223	1972
LOWEST ANNUAL MEAN			177	1959
HIGHEST DAILY MEAN	3340	Apr 26	14200	Jul 27 1972
LOWEST DAILY MEAN	78	Jun 15	26	Aug 29 1976
ANNUAL SEVEN-DAY MINIMUM	91	Sep 24	28	Jan 21 1977
INSTANTANEOUS PEAK FLOW	3380	Apr 26	14300	Jul 27 1972
INSTANTANEOUS PEAK STAGE	6.09	Apr 26	10.38	Jul 27 1972
INSTANTANEOUS LOW FLOW	71	Jun 15	5.5b	Oct 1 1964
ANNUAL RUNOFF (AC-FT)	381200		426800	
ANNUAL RUNOFF (CFSM)	.55		.61	
ANNUAL RUNOFF (INCHES)	7.46		8.35	
10 PERCENT EXCEEDS	1320		1440	
50 PERCENT EXCEEDS	265		213	
90 PERCENT EXCEEDS	115		71	

a Median of yearly mean discharges is 528 ft^3/s.

b Result of dam rehabilitation.



ST. CROIX RIVER BASIN

05338500 SNAKE RIVER NEAR PINE CITY, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1963, 1965, 1967-68, 1975-83, 1985, 1992.
REMARKS.--Letter K indicates non-ideal colony count.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	COLI-FORM, FECAL, OXYGEN, DIS-SOLVED (MG/L) (00300)	0.7 UM-MF (COLS./ 100 ML) (31625)
MAY								
05...	1025	920	143	7.7	17.0	--	--	--
JUN								
19...	1130	164	215	8.4	18.0	740	8.2	--
AUG								
19...	1300	90	214	8.6	23.5	745	9.5	--
19...	1305	90	214	8.6	23.5	745	9.5	K5

DATE	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 00 ML) (31673)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
MAY								
05...	--	<0.010	0.050	0.020	--	--	<0.010	5.5
JUN								
19...	--	<0.010	0.061	0.140	--	--	0.030	4.7
AUG								
19...	--	<0.010	<0.050	0.020	--	--	<0.010	6.6
19...	K220	--	<0.050	0.030	0.080	<0.010	--	--

Remains of power plant on Snake River near Pine City
1912

ST. CROIX RIVER BASIN

05340500 ST. CROIX RIVER AT ST. CROIX FALLS, WI

LOCATION.--Lat 45°24'25", long 92°38'49", in SW¼NW¼ sec.30, T.34 N., R.18 W., Polk County, Hydrologic Unit 07030005, St. Croix National Scenic Riverway, on left bank, 1,500 ft downstream from powerplant of Northern States Power Co., in St. Croix Falls, and at mile 52.2.

DRAINAGE AREA.--6,240 mi².

PERIOD OF RECORD.--January 1902 to current year. Prior to January 1910, monthly discharge only, published in WSP 1308. Prior to October 1939, published as "near St. Croix Falls."

REVISED RECORDS.--WSP 1115: 1929. WDR WI-82-1: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 689.94 ft above mean sea level. Prior to July 1905, gage heights and discharge measurements were used by Loweth and Wolff, consulting engineers of St. Paul, Minn., to determine the flow. July 1905 to February 1940, records were computed from power generation at the St. Croix Falls Powerplant. February 1940 to Sept. 30, 1979, water- stage recorder at site 300 ft downstream at same datum.

REMARKS.--Estimated daily discharges: Ice-affected period, Jan. 15-21. Records good. Diurnal fluctuation caused by St. Croix Falls Powerplant 1,500 ft upstream. Data-collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

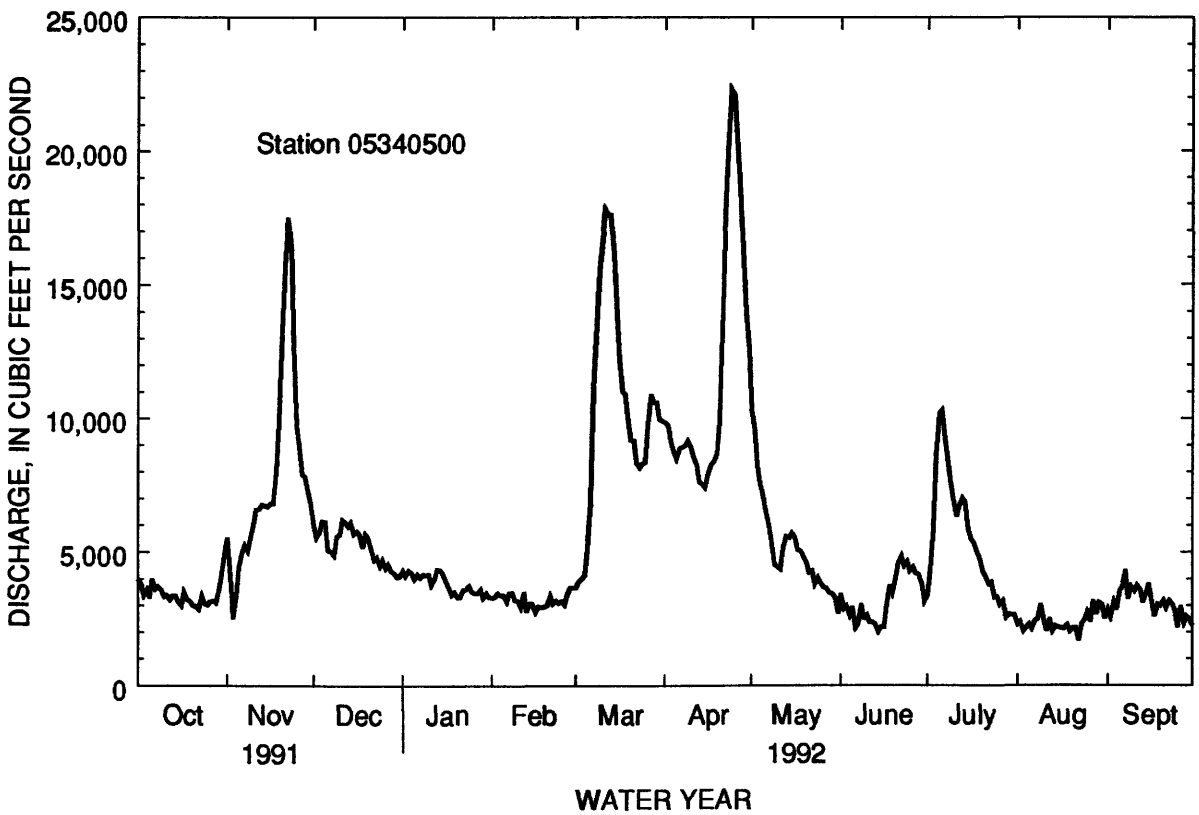
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3980	5520	5970	4300	3280	3660	9860	10300	3430	3400	2320	2860
2	3820	4100	5560	4120	3320	3880	9740	9600	2880	4360	2400	2610
3	3390	2520	5740	4300	3450	3990	9160	8240	2970	5890	2060	3140
4	3600	3360	6150	4210	3350	4140	8730	7590	2650	8640	2160	2860
5	3290	4450	6120	4000	3370	5130	8490	7100	2960	10200	2320	3550
6	3990	4990	5070	4160	3150	6850	8880	6540	2170	10300	2140	3720
7	3620	5260	5030	4050	3460	11100	8920	6020	2300	9240	2420	4330
8	3720	5050	4890	4170	3470	13500	9010	5420	3040	8490	2500	3260
9	3590	5500	5580	4140	3200	15500	9160	4540	2510	7560	3050	3710
10	3340	6010	5650	4160	3160	16700	8930	4470	2640	6970	2430	3540
11	3390	6570	6200	3790	2960	17800	8550	4380	2370	6330	2040	3770
12	3220	6590	6130	4000	3490	17600	8280	5140	2380	6750	2530	3590
13	3360	6770	5940	4360	2770	17600	7650	5590	2300	7020	2060	3120
14	3360	6740	6090	4340	3080	16100	7560	5560	2020	6880	2250	3480
15	3140	6690	5660	4200	3060	14300	7430	5710	2190	5860	2190	3840
16	2990	6800	5760	3900	2760	12200	7940	5550	2190	5520	2170	3120
17	3500	6800	5650	3700	2960	11000	8290	5100	3060	5340	2150	2630
18	3210	7980	5170	3400	2920	10900	8410	5050	3760	5060	2280	3060
19	3160	9800	5680	3500	2960	9890	8680	4850	3480	4770	2060	3010
20	3000	13200	5550	3300	3000	9200	9900	4620	4060	4270	2160	3190
21	2970	15700	5150	3300	3350	9180	14100	4250	4620	4100	2160	2930
22	2860	17500	4710	3610	3080	8360	17600	4300	4860	3820	1700	3200
23	3360	16400	4820	3600	3170	8180	20500	3820	4490	3870	2300	3060
24	3080	12700	4510	3750	3090	8320	22300	4040	4670	3310	2480	2800
25	3030	9700	4710	3520	3180	8350	22100	3860	4300	3340	2760	2200
26	3140	8960	4400	3440	3060	9790	20500	3700	4460	3050	2410	2980
27	3170	7880	4550	3450	3440	10900	18600	3680	4210	3190	3200	2350
28	3090	7800	4290	3600	3670	10600	16300	3470	4180	2570	2690	2600
29	3630	7240	4250	3290	3670	10600	14000	3430	3800	2690	3130	2500
30	4190	6800	4080	3440	---	9980	12600	3280	3170	2680	3040	2270
31	5030	---	4100	3300	---	9910	---	2710	---	2670	2520	---
TOTAL	106220	235380	163160	118400	92880	325210	352170	161910	98120	16814	74080	93280
MEAN	3426	7846	5263	3819	3203	10490	11740	5223	3271	5424	2390	3109
MAX	5030	17500	6200	4360	3670	17800	22300	10300	4860	10300	3200	4330
MIN	2860	2520	4080	3290	2760	3660	7430	2710	2020	2570	1700	2200
CFSM	.55	1.26	.84	.61	.51	1.68	1.88	.84	.52	.87	.38	.50
IN.	.63	1.40	.97	.71	.55	1.94	2.10	.97	.58	1.00	.44	.56

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1902 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3745	3403	2539	2152	2107	4169	9958	7514	5758	4080	2824	3486
MAX	14270	11910	5821	4279	6021	14420	22320	21840	19510	17260	9777	14590
(WY)	1969	1972	1984	1984	1984	1945	1952	1950	1944	1952	1955	1941
MIN	1380	1342	1287	1157	1257	1538	2212	2430	1481	1014	839	1152
(WY)	1933	1911	1911	1911	1913	1912	1902	1934	1934	1934	1934	1933

SUMMARY STATISTICS FOR	1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1902 - 1992	
ANNUAL TOTAL	2227430		1988950			
ANNUAL MEAN	6103		5434		4324	
HIGHEST ANNUAL MEAN					8569	1986
LOWEST ANNUAL MEAN					1754	1934
HIGHEST DAILY MEAN	24800	May 9	22300	Apr 24	53900	May 8 1950
LOWEST DAILY MEAN	1570	Feb 6	1700	Aug 22	75	Jul 17 1910
ANNUAL SEVEN-DAY MINIMUM	1790	Feb 2	2100	Aug 16	754	Jul 29 1934
INSTANTANEOUS PEAK FLOW			22600	Apr 24	54900	May 8 1950
INSTANTANEOUS PEAK STAGE			10.85	Apr 24	25.19	May 8 1950
ANNUAL RUNOFF (CFSM)	.98		.87		.69	
ANNUAL RUNOFF (INCHES)	13.28		11.86		9.41	
10 PERCENT EXCEEDS	11700		9890		8990	
50 PERCENT EXCEEDS	5340		4040		2700	
90 PERCENT EXCEEDS	1910		2520		1540	



MISSISSIPPI RIVER MAIN STEM

05344500 MISSISSIPPI RIVER AT PRESCOTT, WI

LOCATION.--Lat 44°44'45", long 92°48'00", in sec.9, T.26 N., R.20 W., Pierce County, Hydrologic Unit 07040001,on left bank at Prescott, 200 ft downstream from St. Croix River, 300 ft south of Chicago, Burlington & Quincy Railroad bridge, 800 ft south of bridge on U.S. Highway 10, and at mile 811.4 upstream from Ohio River.

DRAINAGE AREA.--44,800 mi², approximately.

PERIOD OF RECORD.--June 1928 to current year.

REVISED RECORDS.--WSP 1508: 1941. WRD MN-74: 1973.

GAGE.--Water-stage recorder. Datum of gage is 649.50 ft above sea level. Prior to Aug. 2, 1932, nonrecording gage at railroad bridge 300 ft upstream at following datums: June 3, 1928, to Sept. 30, 1929, 19.27 ft higher; Oct. 1, 1929, to Sept. 30, 1930, 17.68 ft higher; Oct. 1, 1930, to Aug. 1, 1932, 19.28 ft higher. Aug. 2, 1932, to Oct. 30, 1938, water-stage recorder at present site at datum 19.28 ft higher; Nov. 1, 1938, to Sept. 7, 1971, water-stage recorder at present site at datum 50.00 ft lower.

REMARKS.--Records good. Some regulation by reservoirs, navigation dams, and powerplants at low and medium stages. Flood flow not materially affected by artificial storage.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

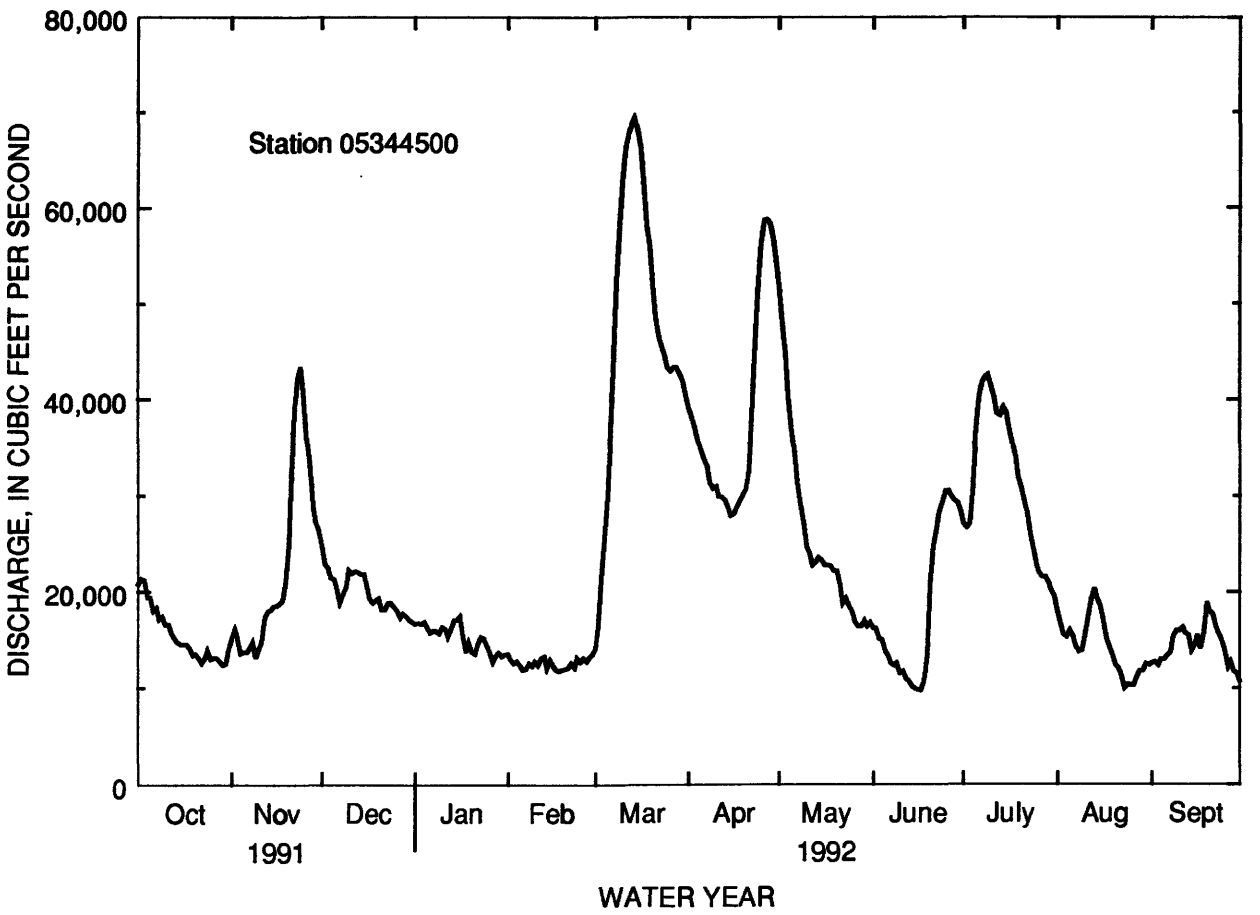
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20800	15100	24900	16700	13600	14100	39100	51800	16200	27100	17900	12600
2	21300	16100	22900	16800	13000	16300	38200	48000	16200	26700	16600	12700
3	21200	15200	22600	16700	12600	21400	37000	44800	15100	27100	15600	12400
4	19400	13600	21500	16900	12800	25600	35900	40300	15000	31200	15300	13000
5	19400	13700	21400	16400	12400	29900	34700	37000	13800	36100	16000	13000
6	18000	13700	20500	15800	11900	35100	33800	34300	13400	40100	15400	13400
7	18300	14100	18900	16000	12000	43100	33000	31400	12500	41700	14400	13700
8	17100	14800	19800	16000	12600	52200	31400	29100	12300	42400	13800	15400
9	17400	13100	20600	15700	12300	58300	30800	27300	12600	42600	13900	16000
10	16500	13900	22300	16400	12800	62700	31000	24700	11500	41400	15700	16000
11	16600	14800	22000	16200	12400	66400	30000	24100	11700	40200	17400	16300
12	15700	17400	22200	15400	13100	67900	29900	22800	10900	38500	19200	15700
13	15100	18000	22100	16200	13300	68800	29600	23100	10700	38300	20400	15500
14	14700	18100	21900	17100	12100	69400	28800	23600	10200	39200	19300	13900
15	14500	18500	21900	17100	12900	68100	28000	23300	9890	38600	18600	14500
16	14500	18600	20500	17500	12300	66100	28200	22800	9780	37000	16900	15500
17	14500	18800	19300	15400	11900	62000	28900	22800	9740	35500	15100	14100
18	14100	19100	18900	13800	11800	58200	29600	22700	10800	34000	14400	15800
19	13400	21100	19200	14800	11900	56000	30100	22200	13300	31900	13500	18900
20	13500	24900	19400	13800	12000	51900	30700	22200	20700	30800	12400	18000
21	13100	32400	18200	13600	12100	48700	32600	20700	24800	29400	12100	17700
22	12600	38400	18200	14600	12600	46800	38300	18800	26600	28000	11300	16400
23	13100	42200	18900	15300	12200	45600	44500	19300	28400	26100	10000	15700
24	13900	43400	18900	15200	13100	44500	51200	18500	29300	24500	10400	15000
25	13000	40800	18500	14400	12700	43400	56300	17900	30500	22800	10300	13900
26	13100	36100	18100	13800	13100	43000	58700	16900	30500	22000	10300	12200
27	13100	33400	17400	12700	12800	43400	58800	16400	30000	21600	11200	12700
28	12800	29100	17800	13400	13200	43400	58400	16400	29500	21600	11800	11700
29	12400	27300	17500	13700	13500	42700	56800	17000	29300	20900	11800	11500
30	12500	26500	17100	13300	---	42000	54600	16400	28400	20200	12500	10700
31	13900	---	16900	13500	---	40400	---	16800	---	19500	12400	---
TOTAL	479500	682200	620300	474200	365000	1477400	1148900	793400	543610	977000	445900	433900
MEAN	15470	22740	20010	15300	12590	47660	38300	25590	18120	31520	14380	14460
MAX	21300	43400	24900	17500	13600	69400	58800	51800	30500	42600	20400	18900
MIN	12400	13100	16900	12700	11800	14100	28000	16400	9740	19500	10000	10700
AC-FT	951100	1353000	1230000	940600	724000	2930000	2279000	1574000	1078000	1938000	884400	860600
CFSM	.35	.51	.45	.34	.28	1.06	.85	.57	.40	.70	.32	.32
IN.	.40	.57	.52	.39	.30	1.23	.95	.66	.45	.81	.37	.36

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	13020	12610	9476	7955	7880	16760	39520	30980	24940	18900	12370	12430
MAX	49740	40360	21460	16060	21390	55010	117600	90100	69720	48970	43840	45950
(WY)	1987	1972	1983	1983	1966	1983	1965	1986	1944	1952	1953	1986
MIN	3526	3874	3379	3153	3519	4369	7215	6304	4185	3197	2366	3002
(WY)	1933	1977	1934	1935	1934	1934	1931	1931	1934	1934	1934	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1928 - 1992	
ANNUAL TOTAL	9293000		8441310			
ANNUAL MEAN	25460		23060		17270a	
HIGHEST ANNUAL MEAN					38540	1986
LOWEST ANNUAL MEAN					4367	1934
HIGHEST DAILY MEAN	74300	May 12	69400	Mar 14	226000	Apr 18 1965
LOWEST DAILY MEAN	5360	Feb 9	9740	Jun 17	1380	Jul 13 1940
ANNUAL SEVEN-DAY MINIMUM	5650	Feb 9	10300	Jun 12	2190	Aug 11 1936
INSTANTANEOUS PEAK FLOW					228000	Apr 18 1965
INSTANTANEOUS PEAK STAGE					43.11	Apr 18 1965
ANNUAL RUNOFF (AC-FT)	18430000		16740000		12510000	
ANNUAL RUNOFF (CFSM)	.57		.51		.39	
ANNUAL RUNOFF (INCHES)	7.72		7.01		5.24	
10 PERCENT EXCEEDS	47700		42500		37700	
50 PERCENT EXCEEDS	22100		17900		11200	
90 PERCENT EXCEEDS	5890		12400		4920	

a Median of annual mean discharges is 16,500 ft³/s.



VERMILLION RIVER BASIN

05345000 VERMILLION RIVER NEAR EMPIRE, MN

LOCATION.--Lat 44°40'00", long 93°03'17", in SW¼NW¼ sec.24, T.114 N., R.19 W., Dakota County, Hydrologic Unit 07040001, on right bank and just downstream from County Road 79, 2 mi west of Empire and 4 mi northeast of Farmington.

DRAINAGE AREA.--110 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1942 to June 1945 (no record during July, August, and September 1944), September 1969 to September 1973 (discharge measurements only), October 1973 to current year. Prior to October 1975 published as "near Empire City".

GAGE.--Water-stage recorder. Datum of gage is 851.99 ft above mean sea level (levels by U.S. Army Corps of Engineers). April 12, 1942, to June 30, 1944, and October 1, 1944, to July 7, 1945, nonrecording gage at same site and present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Some regulation at low-flow by sewage plant upstream.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in April 1965, reached a stage of 7.5 ft, from information by local resident, discharge 6,200 ft³/s, from rating extended above 2,100 ft³/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Mar. 7	0200	343	6.17	July 3	0430	1,330	8.11
June 18	2330	333	6.11	Sept. 16	1330	*6,570	*10.00

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

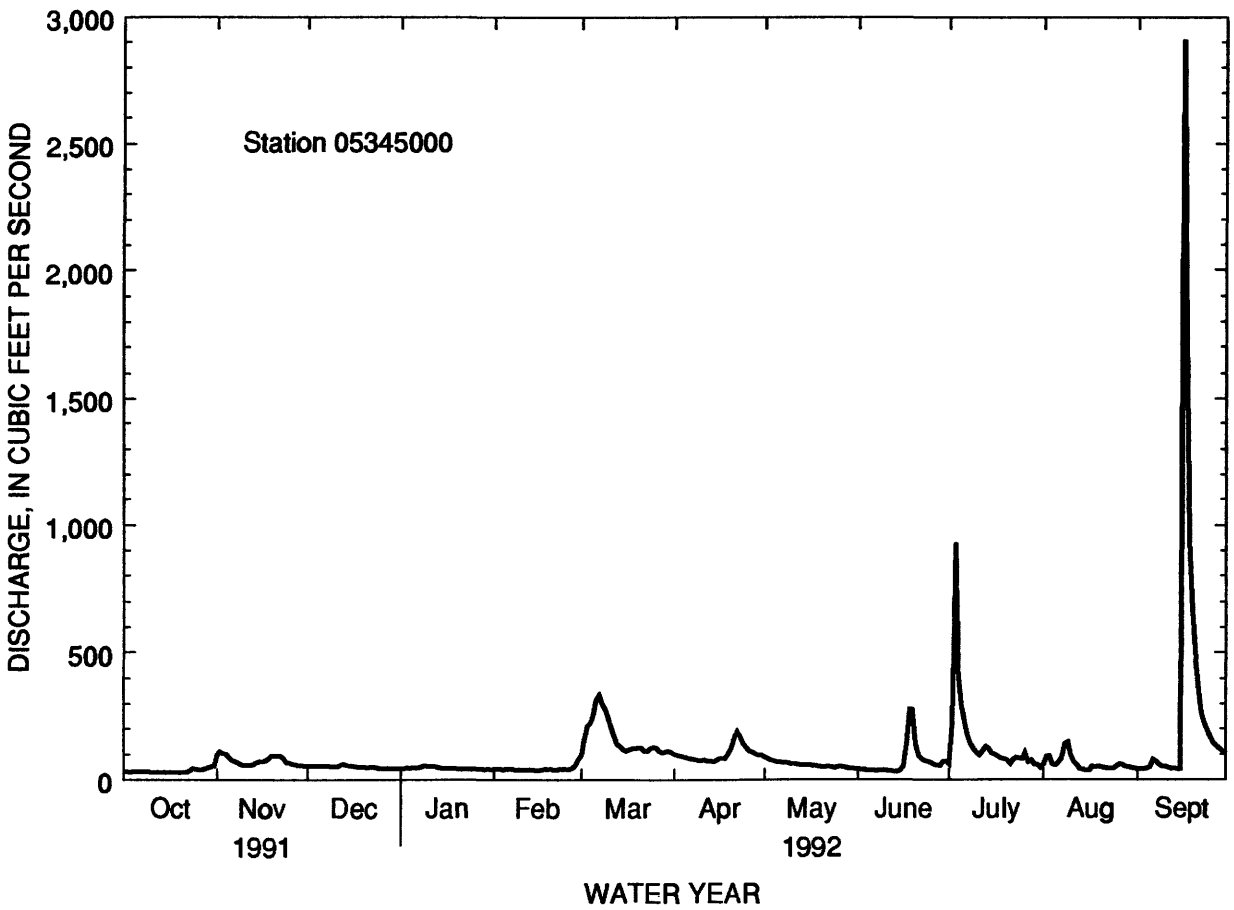
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	e100	e54	45	41	96	102	90	e41	62	60	42
2	31	e110	e54	45	41	156	97	83	40	222	91	42
3	30	e104	e53	46	41	211	94	77	39	929	94	42
4	31	e102	e53	45	40	225	91	75	37	433	59	44
5	31	e90	e53	46	41	262	87	70	36	300	57	49
6	32	e76	e53	47	41	314	84	69	35	231	66	79
7	32	e71	53	46	42	334	81	67	34	182	85	72
8	32	e65	53	50	40	300	78	65	e35	144	141	60
9	32	e60	52	54	40	277	77	63	37	121	150	52
10	30	e56	51	51	40	245	77	61	36	106	96	50
11	e29	e56	50	51	38	205	78	61	e34	97	69	47
12	e28	e57	56	50	38	168	74	60	33	113	57	45
13	e28	e60	61	49	38	140	74	57	32	132	41	43
14	e28	e66	57	47	38	131	72	57	32	121	39	42
15	e28	71	54	e45	37	118	76	56	37	104	35	41
16	e28	72	53	e44	37	115	85	56	51	100	35	2910
17	e28	74	52	44	39	120	84	55	140	92	52	1760
18	e28	80	48	e43	42	124	84	53	279	85	49	e941
19	e28	94	48	43	41	124	104	51	280	80	51	e663
20	e28	93	48	41	41	125	130	49	140	76	49	e474
21	e28	94	47	41	40	125	171	48	94	62	47	e349
22	e29	94	48	42	40	115	192	52	80	76	45	e265
23	e35	83	48	42	41	115	170	49	74	87	44	221
24	e45	65	47	e42	42	123	142	47	71	83	43	191
25	e41	65	45	42	42	130	125	49	65	81	50	164
26	e39	61	45	41	42	126	115	52	60	106	62	143
27	e38	59	44	41	44	113	109	48	57	70	58	131
28	e43	57	44	41	55	107	102	47	54	77	52	122
29	e47	e56	45	40	79	111	96	45	71	60	49	111
30	e50	e55	45	41	---	113	97	44	72	59	46	105
31	e55	---	44	40	---	109	---	42	---	46	44	---
TOTAL	1044	2246	1558	1385	1221	5077	3048	1798	2126	4537	1916	9300
MEAN	33.7	74.9	50.3	44.7	42.1	164	102	58.0	70.9	146	61.8	310
MAX	55	110	61	54	79	334	192	90	280	929	150	2910
MIN	28	55	44	40	37	96	72	42	32	46	35	41
AC-FT	2070	4450	3090	2750	2420	10070	6050	3570	4220	9000	3800	18450

e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	41.9	38.9	32.6	26.8	31.5	96.2	92.8	83.4	72.6	51.2	42.2	60.3
MAX	135	74.9	71.5	47.4	85.2	199	244	223	159	146	105	310
(WY)	1987	1992	1983	1983	1984	1983	1983	1986	1945	1992	1984	1992
MIN	14.9	15.6	12.4	11.0	13.1	25.4	35.2	29.3	23.0	16.0	14.3	14.6
(WY)	1977	1977	1977	1977	1977	1975	1977	1977	1988	1988	1976	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1943 - 1992	
ANNUAL TOTAL	16696		35256			
ANNUAL MEAN	45.7		96.3		55.2	
HIGHEST ANNUAL MEAN					111	1986
LOWEST ANNUAL MEAN					23.6	1977
HIGHEST DAILY MEAN	244	May 7	2910	Sep 16	2910	Sep 16 1992
LOWEST DAILY MEAN	19	Aug 31	28	Oct 12	8.4	Jan 15 1975
ANNUAL SEVEN-DAY MINIMUM	20	Jan 3	28	Oct 12	9.0	Jan 13 1975
INSTANTANEOUS PEAK FLOW			6570	Sep 16	6570	Sep 16 1992
INSTANTANEOUS PEAK STAGE			10.00	Sep 16	10.00	Sep 16 1992
INSTANTANEOUS LOW FLOW			6.8	Aug 15	6.8	Aug 15 1992
ANNUAL RUNOFF (AC-FT)	33120		69930		39980	
10 PERCENT EXCEEDS	75		141		106	
50 PERCENT EXCEEDS	37		56		36	
90 PERCENT EXCEEDS	21		37		19	



CANNON RIVER BASIN

05353800 STRAIGHT RIVER NEAR FARIBAULT, MN

LOCATION.--Lat 44°15'29", long 93°13'51", in W1/4SE1/4 sec.9, T.109 N., R.20 W., Rice County, Hydrologic Unit 07040002, on right bank 15 ft downstream from highway bridge, 2.8 mi upstream from Falls Creek and 3.2 mi southeast of Faribault.

DRAINAGE AREA.--442 mi².

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,034.58 ft above mean sea level.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 1,500 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)		Date	Time	Discharge (ft³/s)	Gage height (ft)	
Apr. 21	2300	*1,740	*7.31	No other peak greater than base discharge.					

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	101	179	e680	e190	e130	e1320	e950	e480	221	185	144	87
2	100	197	e620	e188	e140	e1300	e750	e450	215	364	148	81
3	99	356	e540	e187	e150	e1280	652	428	204	609	143	81
4	96	340	e475	e189	e190	e1270	580	399	192	686	150	145
5	96	342	e450	e190	e215	1230	521	375	181	530	133	279
6	93	291	e410	e191	e210	1430	481	349	167	375	125	458
7	94	240	e375	e192	e185	1480	457	331	163	310	183	451
8	94	251	e350	e195	e175	1440	433	314	162	288	233	337
9	93	244	e335	e200	e170	1420	426	303	163	327	281	271
10	92	232	e325	e205	e155	1400	415	291	156	456	238	228
11	92	224	e315	e220	e150	1370	408	279	148	426	200	197
12	88	221	e350	e210	e135	1170	380	272	140	443	173	172
13	86	228	e400	e190	e132	901	360	255	139	390	155	157
14	86	279	e470	e178	e131	747	350	257	134	355	145	197
15	86	e400	e410	e175	e130	628	372	279	127	e390	133	438
16	85	e600	e370	e170	e129	587	642	276	232	e360	123	572
17	86	e800	e320	e165	202	635	806	254	694	345	117	591
18	84	e1000	e290	e160	465	707	782	239	933	296	149	460
19	81	e1150	e270	e159	494	721	880	233	748	258	134	349
20	78	e1170	e250	e155	e439	724	1210	226	554	233	124	288
21	79	e1000	e230	e150	e367	752	1630	234	449	211	112	251
22	81	e800	e225	e145	e305	685	1710	206	396	214	104	224
23	83	e620	e220	e140	e358	650	1530	180	371	243	94	195
24	137	e450	e215	e135	197	826	1290	210	334	302	89	172
25	130	e360	e210	e132	154	1070	1060	306	296	300	114	156
26	121	e300	e205	e131	165	939	885	365	262	271	115	142
27	112	e330	e200	e129	428	770	765	337	242	242	111	139
28	111	e380	e198	e125	e1160	e1200	686	301	226	215	108	126
29	135	410	e195	e122	e1400	e1400	e600	275	211	191	101	114
30	141	831	e193	e121	---	e1300	e550	252	197	180	96	108
31	140	---	e192	e125	---	e1150	---	235	---	157	91	---
TOTAL	3080	14225	10288	5164	8661	32502	22561	9191	8657	10152	4366	7466
MEAN	99.4	474	332	167	299	1048	752	296	289	327	141	249
MAX	141	1170	680	220	1400	1480	1710	480	933	686	281	591
MIN	78	179	192	121	129	587	350	180	127	157	89	81
AC-FT	6110	28220	20410	10240	17180	64470	44750	18230	17170	20140	8660	14810
CFSM	.22	1.07	.75	.38	.68	2.37	1.70	.67	.65	.74	.32	.56
IN.	.26	1.20	.87	.43	.73	2.74	1.90	.77	.73	.85	.37	.63

e Estimated.

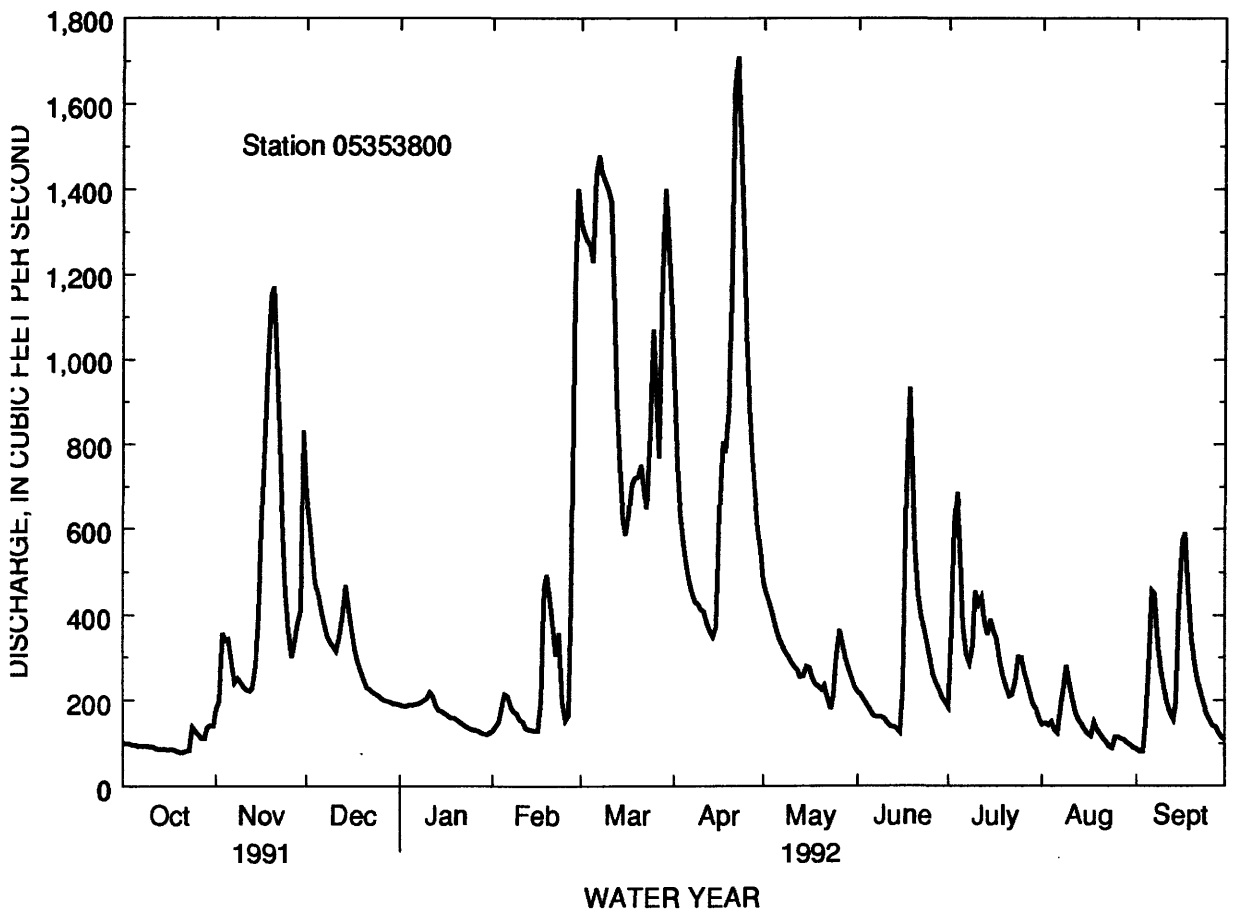
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	206	181	111	66.7	114	535	575	412	330	274	184	156
MAX	831	595	336	167	837	1270	1623	1224	1062	1005	1136	488
(WY)	1969	1971	1983	1992	1984	1973	1983	1973	1967	1983	1979	1986
MIN	17.0	15.1	11.0	11.0	12.9	26.4	70.2	58.1	45.8	26.2	16.2	16.0
(WY)	1977	1977	1977	1977	1968	1968	1977	1976	1976	1988	1976	1976

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1966 - 1992	
ANNUAL TOTAL	154868		136313			
ANNUAL MEAN	424		372		263	
HIGHEST ANNUAL MEAN					605	1983
LOWEST ANNUAL MEAN					43.9	1977
HIGHEST DAILY MEAN	2910	Aug 9	1710	Apr 22	5410	Ma 2 1973
LOWEST DAILY MEAN	31	Jan 28	78	Oct 20	11	Feb 18 1968
ANNUAL SEVEN-DAY MINIMUM	31	Jan 27	82	Oct 17	11	Feb 18 1968
INSTANTANEOUS PEAK FLOW			1740	Apr 21	6030	Jul 7 1990
INSTANTANEOUS PEAK STAGE			7.31	Apr 21	12.74a	Mar 5 1974
INSTANTANEOUS LOW FLOW			77b	Oct 19	10	Oct 27 1976
ANNUAL RUNOFF (AC-FT)	307200		270400		190200	
ANNUAL RUNOFF (CFSM)	.96		.84		.59	
ANNUAL RUNOFF (INCHES)	13.03		11.47		8.07	
10 PERCENT EXCEEDS	969		827		652	
50 PERCENT EXCEEDS	250		241		107	
90 PERCENT EXCEEDS	42		112		28	

a Backwater from ice.

b Occurred Oct.. 19, 20, Sept. 2, 3.



CANNON RIVER BASIN

05355200 CANNON RIVER AT WELCH, MN

LOCATION.--Lat 44°33'50", long 92°43'55", in NW¼SW¼ sec. 27, T. 113 N., R. 16 W., Goodhue County, on right bank 0.3 mile downstream from highway bridge at Welch and 1.8 miles upstream from Belle Creek.

DRAINAGE AREA.--1,320 mi², approximately.

PERIOD OF RECORD.--June 1909 to January 1914 (no winter records 1909-11), November 1930 to September 1971, October 1991 to current year.

REVISED RECORDS.--WSP 1308: 1912(M). WSP 1508: 1933. WSP 1914: 1960.

GAGE.--Water-stage recorder. Datum of gage is 699.16 ft above mean sea level. Prior to Nov. 11, 1930, nonrecording gage on highway bridge at site 0.3 mile upstream at datum 3.00 ft lower. Nov. 11, 1930, to Oct. 11, 1938, water-stage recorder at site 0.3 mile upstream at present datum.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, 17.1 ft, present datum, in April 1988, from floodmark at mill about 2,400 ft upstream.

REMARKS.--Records good except those for winter periods, which are fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

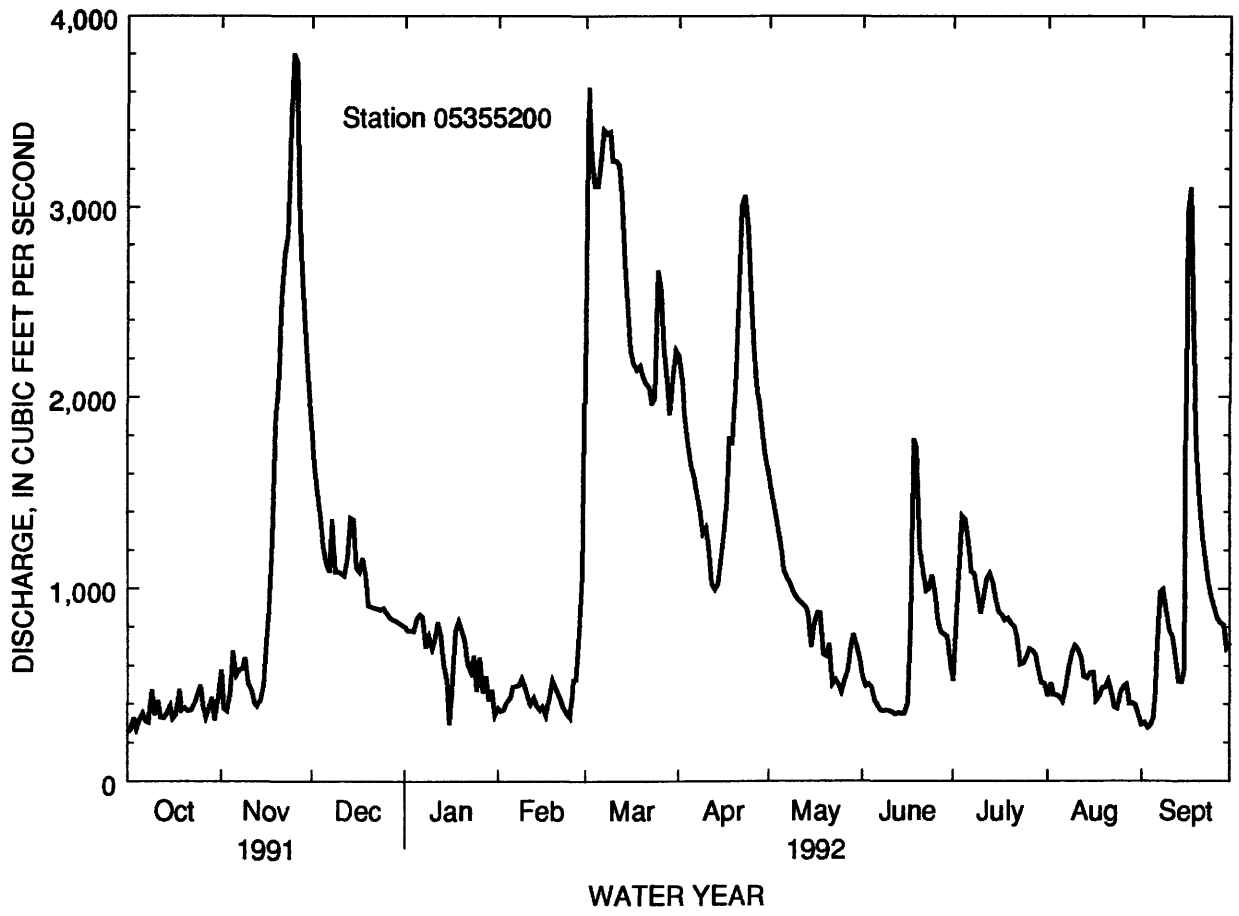
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e253	576	e1850	805	e381	e2350	2210	1600	547	522	445	294
2	e266	378	e1650	785	e363	e3620	2090	1510	494	838	511	305
3	e328	365	e1500	782	e370	e3250	1910	1420	504	1140	451	276
4	e269	472	e1370	779	e412	e3110	1770	1320	491	1380	446	290
5	e318	676	e1220	842	e432	3110	1650	1220	419	1360	437	332
6	e349	549	e1130	867	491	3230	1590	1100	394	1240	417	716
7	e311	580	e1090	854	493	3400	1510	1060	367	1090	493	982
8	e304	588	e1360	698	500	3380	1420	1030	364	1080	604	997
9	e469	644	e1090	753	533	3390	1290	988	367	976	672	886
10	e345	508	1090	693	491	3240	1320	960	363	875	708	785
11	416	474	e1080	737	429	3240	1220	939	357	955	687	750
12	331	407	1070	826	401	3220	1030	923	346	1050	645	652
13	326	390	1160	754	434	3070	1000	908	353	1080	543	519
14	349	420	1370	e615	392	2700	1030	878	350	1030	536	518
15	391	497	1360	e526	369	2440	1140	699	350	950	565	587
16	322	727	1110	e298	388	2240	1280	823	397	879	566	2960
17	345	e892	1090	e586	345	2170	1460	878	835	862	419	3100
18	475	e1250	1160	e785	431	2140	1790	874	1780	838	442	2350
19	367	e1850	1070	e829	525	2160	1750	661	1730	846	486	1740
20	381	e2120	914	e779	e490	2110	2130	650	1210	821	486	1460
21	364	e2520	906	e736	e455	2070	2590	715	1100	802	524	1260
22	367	e2750	900	e615	e415	2050	3000	503	989	754	457	1160
23	393	e2850	898	e571	e380	e1960	3060	527	1000	611	384	1030
24	448	e3420	890	e655	e350	e2000	2890	496	1070	616	376	951
25	496	e3800	899	e469	e330	e2660	2510	463	976	651	463	892
26	399	e3750	875	e644	523	e2550	2250	523	824	690	494	844
27	331	e2900	850	e461	528	e2260	2030	573	778	680	504	823
28	384	e2600	840	e544	e766	e2090	1950	705	762	661	402	811
29	432	e2300	833	e420	e1070	1910	1820	762	754	569	408	693
30	318	e2050	824	e473	---	2090	1680	702	615	515	394	718
31	436	---	812	e342	---	2240	---	637	---	507	347	---
TOTAL	11283	43303	34261	20523	13487	81450	54370	27047	20886	26868	15312	29681
MEAN	364	1443	1105	662	465	2627	1812	872	696	867	494	989
MAX	496	3800	1850	867	1070	3620	3060	1600	1780	1380	708	3100
MIN	253	365	812	298	330	1910	1000	463	346	507	347	276
AC-FT	22380	85890	67960	40710	26750	161600	107800	53650	41430	53290	30370	58870
CFSM	.28	1.09	.84	.50	.35	1.99	1.37	.66	.53	.66	.37	.75
IN.	.32	1.22	.97	.58	.38	2.30	1.53	.76	.59	.76	.43	.84

e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	311	307	243	212	274	954	1218	655	658	466	328	322
MAX	1806	1708	1105	662	1141	2627	8240	2966	2618	1824	1537	1625
(WY)	1969	1971	1992	1992	1966	1992	1965	1944	1944	1951	1951	1942
MIN	65.5	78.8	75.0	76.9	110	149	145	84.9	80.0	71.2	78.1	72.8
(WY)	1934	1934	1938	1938	1913	1911	1911	1934	1934	1934	1936	1933

SUMMARY STATISTICS	FOR 1992 WATER YEAR		WATER YEARS 1909 - 1992	
ANNUAL TOTAL	378471			
ANNUAL MEAN	1034		515	
HIGHEST ANNUAL MEAN			1166	1965
LOWEST ANNUAL MEAN			137	1934
HIGHEST DAILY MEAN	3800	Nov 25	28700	Apr 8 1965
LOWEST DAILY MEAN	253	Oct 1	19	Jan 2 1950
ANNUAL SEVEN-DAY MINIMUM	299	Oct 1	42	Aug 12 1936
INSTANTANEOUS PEAK FLOW	3950	Nov 25	36100	Apr 8 1965
INSTANTANEOUS PEAK STAGE	6.62	Nov 25	14.01	Apr 8 1965
INSTANTANEOUS LOW FLOW	197	Oct 16	2.5	Jan 3 1950
ANNUAL RUNOFF (AC-FT)	750700		373200	
ANNUAL RUNOFF (CFSM)	.78		.39	
ANNUAL RUNOFF (INCHES)	10.67		5.30	
10 PERCENT EXCEEDS	2240		1070	
50 PERCENT EXCEEDS	772		234	
90 PERCENT EXCEEDS	365		95	



ZUMBRO RIVER BASIN

05372995 SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN

LOCATION.--Lat 44°03'42", long 92°27'58", in NW¼NE¼ sec.23, T.107 N., R.14 W., Olmsted County, Hydrologic Unit 07040004, on left bank 50 ft downstream from 37th Street bridge, 0.2 mi upstream from sewer plant, and 2.0 mi downstream from Silver Lake Dam.

DRAINAGE AREA.--303 mi².

PERIOD OF RECORD.--March 1981 to current year.

GAGE.--Water-stage recorder. Datum of gage is 950.00 ft above mean sea level.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Slight regulation at times from Silver Lake.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of July 6, 1978, reached a stage of about 28.0 ft, on upstream side of bridge, discharge 30,500 ft³/s. This is the highest known stage since at least 1908.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,300 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)		Date	Time	Discharge (ft³/s)	Gage height (ft)
Apr. 21	1300	*1,850	*7.22	No other peak above base discharge.				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	69	511	e375	e195	122	e550	520	423	159	99	109	49
2	69	476	e375	e194	125	e750	431	394	158	196	121	53
3	68	276	e370	e193	133	e650	406	353	154	194	105	55
4	68	204	e365	e192	145	e600	380	337	148	160	102	61
5	68	205	e360	e191	158	566	344	323	141	137	96	87
6	67	177	e355	e190	161	622	329	312	137	123	93	77
7	67	97	e350	e189	148	637	330	303	136	120	128	74
8	67	149	e330	188	111	570	320	292	130	133	104	68
9	68	145	e325	198	114	1060	325	286	130	124	100	75
10	67	144	319	177	136	1010	319	270	130	143	93	66
11	68	140	302	205	119	687	315	273	127	132	86	62
12	67	135	442	204	109	478	292	267	121	134	80	60
13	66	143	782	197	117	477	275	252	117	319	79	74
14	62	181	814	144	112	438	271	244	117	368	79	381
15	62	278	e700	84	111	392	521	234	113	401	75	276
16	63	397	e550	79	107	378	908	252	162	273	72	306
17	63	382	e440	156	115	388	777	e350	189	223	75	286
18	64	604	e380	62	165	394	608	301	153	198	75	199
19	63	e754	e350	76	e200	401	759	270	147	173	70	154
20	63	e680	e320	125	e200	400	1330	250	135	156	70	133
21	64	e610	e300	128	e180	400	1720	234	128	147	69	124
22	66	e520	e270	144	e165	371	1300	221	129	189	65	114
23	67	e450	e250	178	e150	360	945	215	131	176	62	103
24	73	e390	e235	134	130	379	803	203	128	179	60	96
25	73	e350	e225	136	127	420	687	195	124	171	58	91
26	69	e325	e220	134	137	408	615	200	119	161	58	85
27	69	e310	e210	133	258	358	542	198	113	148	58	81
28	73	e350	e205	126	e750	e350	515	190	106	137	56	81
29	74	e375	e200	128	e700	e450	485	184	103	126	56	78
30	69	e380	e197	127	---	e500	450	178	103	118	55	78
31	80	---	e196	125	---	e635	---	167	---	115	52	---
TOTAL	2096	10138	11112	4732	5305	16079	17822	8171	3988	5473	2461	3527
MEAN	67.6	338	358	153	183	519	594	264	133	177	79.4	118
MAX	80	754	814	205	750	1060	1720	423	189	401	128	381
MIN	62	97	196	62	107	350	271	167	103	99	52	49
AC-FT	4160	20110	22040	9390	10520	31890	35350	16210	7910	10860	4880	7000
CFSM	.22	1.12	1.18	.50	.60	1.71	1.96	.87	.44	.58	.26	.39

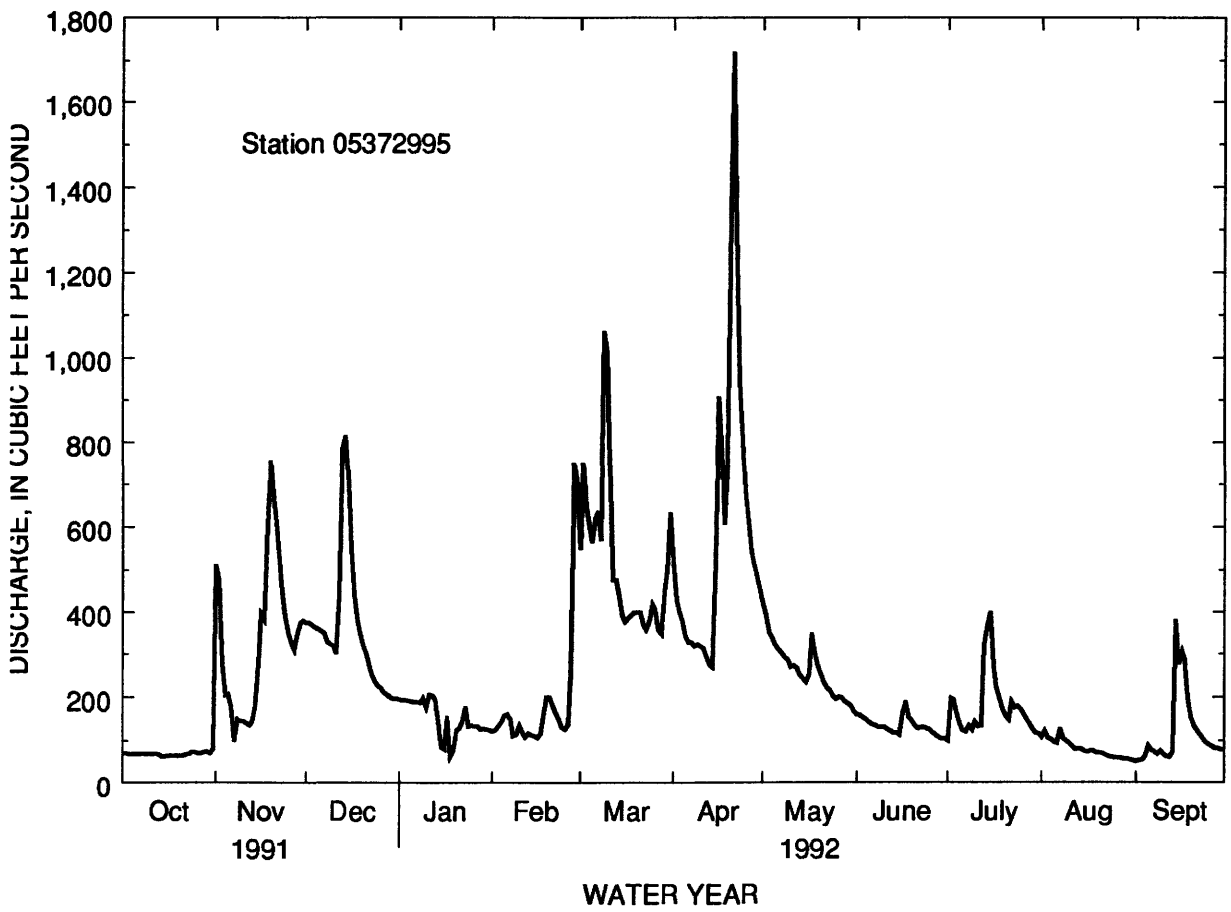
e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1981 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	185	158	137	81.9	130	410	364	312	174	210	145	201
MAX	824	338	358	167	454	760	795	617	384	546	501	1075
(WY)	1987	1992	1992	1983	1984	1983	1983	1991	1990	1981	1990	1986
MIN	20.0	24.5	21.0	22.5	23.8	165	106	88.3	49.0	23.2	24.6	31.5
(WY)	1990	1990	1990	1990	1990	1987	1981	1989	1989	1988	1988	1988

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1981 - 1992	
ANNUAL TOTAL	90952		90904			
ANNUAL MEAN	249		248		210	
HIGHEST ANNUAL MEAN					360	1983
LOWEST ANNUAL MEAN					87.3	1989
HIGHEST DAILY MEAN	2330	May 6	1720	Apr 21	7710	Sep 21 1986
LOWEST DAILY MEAN	34	Feb 1	49	Sep 1	12	Sep 12 1988
ANNUAL SEVEN-DAY MINIMUM	36	Jan 27	54	Aug 28	14	Sep 8 1988
INSTANTANEOUS PEAK FLOW			1850	Apr 21	10000	Sep 21 1986
INSTANTANEOUS PEAK STAGE			7.22	Apr 21	20.77	Sep 21 1986
INSTANTANEOUS LOW FLOW			4.4	Nov 7	10a	Oct 23 1981
ANNUAL RUNOFF (AC-FT)	180400		180300		152100	
ANNUAL RUNOFF (CFSM)	.82		.82		.69	
10 PERCENT EXCEEDS	540		520		470	
50 PERCENT EXCEEDS	160		172		118	
90 PERCENT EXCEEDS	49		68		32	

a Result of regulation.



WHITEWATER RIVER BASIN

05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MN
(Hydrologic bench-mark station)

LOCATION.--Lat 44°05'30", long 92°03'57", in sec.7, T.107 N., R.10 W., Winona County, Hydrologic Unit 07040003, on left bank 2.3 mi upstream from Middle Fork, 2.4 mi west of Elba, and 3.5 mi upstream from confluence with SouthFork.

DRAINAGE AREA.--101 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1939 to September 1941, July 1967 to current year.

REVISED RECORDS.--WRD MN-74: 1967(M), 1969(M), 1971(M), 1972(M), 1973(M). WRD MN-80-2: 1978.

GAGE.--Water-stage recorder. Datum of gage is 769.60 ft above mean sea level. Prior to Oct. 12, 1939, nonrecording gage at site 2 mi downstream at different datum. Oct. 12, 1939, to Sept. 30, 1941 water-stage recorder at site 600 ft downstream at present datum. Prior to July 6, 1978, water-stage recorder at same site and present datum (gage destroyed by flood of July 1978), July 6 to Oct. 30, 1978, nonrecording gage at same site and present datum.

REMARKS.--Records good.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 600 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)		Date	Time	Discharge (ft³/s)	Gage height (ft)
Apr. 21	0830	*326	*5.71	No peak greater than base discharge.				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

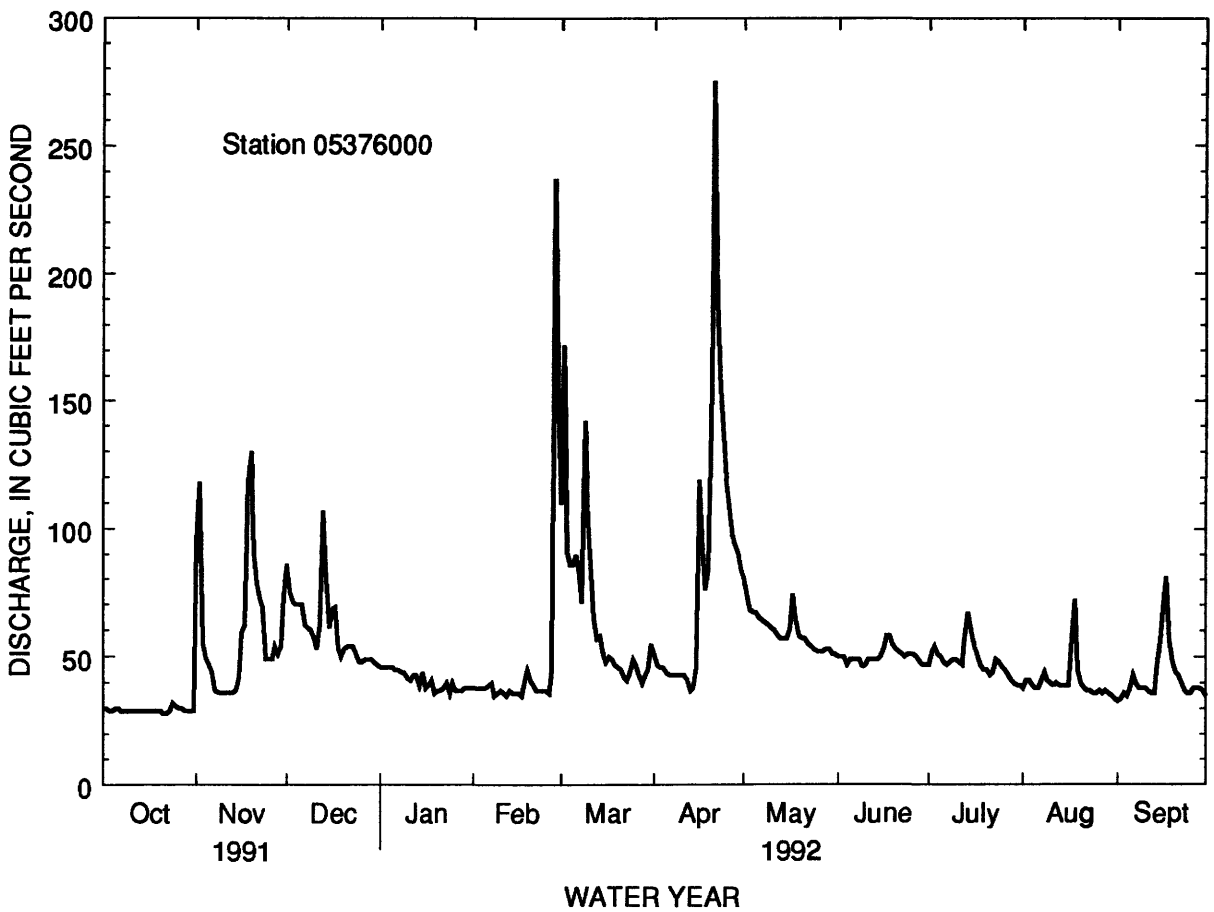
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	95	86	46	38	110	51	81	50	47	38	33
2	30	118	75	46	38	172	47	74	50	52	41	34
3	29	55	71	46	38	91	46	68	50	54	41	36
4	29	49	70	46	38	86	46	67	47	51	39	35
5	30	47	70	46	38	86	44	67	49	50	38	38
6	30	44	70	45	39	90	43	65	49	48	38	43
7	29	37	62	45	40	83	43	64	49	47	41	40
8	29	36	61	44	35	71	43	63	49	48	44	38
9	29	36	60	44	36	142	43	62	46	49	41	38
10	29	36	57	42	37	103	43	61	47	49	40	38
11	29	36	53	41	36	82	43	60	49	48	39	37
12	29	36	62	43	35	65	41	58	49	47	40	36
13	29	36	107	43	37	57	37	57	49	58	39	36
14	29	37	80	39	36	58	38	57	49	67	39	47
15	29	42	61	44	36	51	46	57	50	60	39	56
16	29	59	68	38	36	48	119	61	53	54	39	71
17	29	62	69	39	35	50	92	74	58	51	57	81
18	29	119	53	41	41	49	76	64	58	47	72	56
19	29	130	50	36	45	47	84	58	55	45	45	48
20	29	91	53	37	41	46	156	57	53	45	40	44
21	28	78	54	37	39	45	275	57	52	43	38	43
22	28	72	54	38	37	42	189	55	51	44	37	40
23	29	69	54	40	37	41	155	54	50	49	37	37
24	32	49	51	36	37	44	136	53	51	48	36	36
25	31	49	48	40	37	49	120	52	51	46	36	36
26	30	49	48	37	36	47	109	52	51	45	37	38
27	30	54	49	37	45	43	98	52	50	43	36	38
28	29	51	49	37	237	40	94	53	48	41	37	38
29	29	54	49	38	146	43	91	53	47	40	36	37
30	29	73	48	38	---	45	84	51	47	39	35	35
31	29	---	47	38	---	55	---	51	---	39	34	---
TOTAL	908	1799	1889	1267	1406	2081	2532	1858	1507	1494	1249	1263
MEAN	29.3	60.0	60.9	40.9	48.5	67.1	84.4	59.9	50.2	48.2	40.3	42.1
MAX	32	130	107	46	237	172	275	81	58	67	72	81
MIN	28	36	47	36	35	40	37	51	46	39	34	33
AC-FT	1800	3570	3750	2510	2790	4130	5020	3690	2990	2960	2480	2510
CFSM	.29	.59	.60	.40	.48	.66	.84	.59	.50	.48	.40	.42
IN.	.33	.66	.70	.47	.52	.77	.93	.68	.56	.55	.46	.47

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	35.8	35.4	32.2	30.0	34.1	90.1	60.1	48.8	56.8	58.8	37.4	41.2
MAX	143	71.6	60.9	74.6	97.2	244	177	120	364	317	71.2	184
(WY)	1987	1987	1992	1973	1985	1973	1974	1973	1974	1978	1979	1986
MIN	14.4	14.1	12.9	13.1	14.2	14.5	14.8	15.6	25.8	15.8	15.0	13.5
(WY)	1968	1968	1940	1940	1968	1968	1968	1968	1972	1967	1967	1940

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1939 - 1992	
ANNUAL TOTAL	15691		19253			
ANNUAL MEAN	43.0		52.6		47.1	
HIGHEST ANNUAL MEAN					93.3	1974
LOWEST ANNUAL MEAN					19.4	1968
HIGHEST DAILY MEAN	180	May 6	275	Apr 21	6440	Jun 21 1974
LOWEST DAILY MEAN	17	Mar 4	28	Oct 21	9.6	Dec 24 1990
ANNUAL SEVEN-DAY MINIMUM	18	Feb 27	29	Oct 16	12	Dec 30 1939
INSTANTANEOUS PEAK FLOW			326	Apr 21	16100	Jun 21 1974
INSTANTANEOUS PEAK STAGE			5.71	Apr 21	16.32a	Jun 21 1974
INSTANTANEOUS LOW FLOW			27	Feb 8	7.0b	Dec 26 1990
ANNUAL RUNOFF (AC-FT)	31120		38190		34120	
ANNUAL RUNOFF (CFSM)	.43		.52		.47	
ANNUAL RUNOFF (INCHES)	5.78		7.09		6.34	
10 PERCENT EXCEEDS	71		79		69	
50 PERCENT EXCEEDS	35		46		33	
90 PERCENT EXCEEDS	22		35		17	

a From floodmark.
b Result of freezeup.



WHITEWATER RIVER BASIN

05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MN--Continued
(Hydrologic bench-mark station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967 to current year.
REMARKS.--Letter K indicates non-ideal colony count.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT												
09...	1100	29	--	--	--	--	9.5	--	--	--	--	--
31...	0930	28	553	--	8.1	--	5.5	--	750	11.9	K16	140
DEC												
10...	1115	56	583	601	8.3	8.1	2.5	0.80	735	14.3	K28	54
FEB												
19...	1215	45	498	582	8.2	8.1	4.0	0.90	743	13.2	4	110
APR												
16...	0830	121	555	583	8.1	8.1	6.5	23	741	10.5	K18000	K2000
JUN												
30...	1200	47	520	579	8.2	8.4	20.0	1.7	740	9.5	44	62
AUG												
10...	1330	145	571	571	8.4	8.4	19.0	0.40	750	13.3	48	98

DATE	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	CAR-BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
OCT											
09...	--	--	--	--	--	--	--	--	--	--	--
31...	--	--	--	--	272	--	0	332	--	--	--
DEC											
10...	85	26	6.8	1.6	252	271	0	307	19	20	0.20
FEB											
19...	79	26	6.7	2.0	260	261	0	317	17	19	0.20
APR											
16...	80	24	7.2	<0.10	241	244	0	294	20	22	0.20
JUN											
30...	84	28	6.6	1.2	315	277	0	338	18	17	0.20
AUG											
10...	79	27	6.8	1.4	266	272	0	324	20	20	0.10

WHITEWATER RIVER BASIN

05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
OCT											
09...	--	--	--	--	--	--	--	--	--	--	--
31...	--	--	<0.010	3.40	0.020	0.020	<0.20	0.060	0.060	0.050	0.050
DEC											
10...	15	408	0.020	5.80	<0.010	<0.010	<0.20	0.080	0.070	0.070	0.070
FEB											
19...	12	318	0.020	5.50	0.020	0.020	0.30	0.100	0.080	0.080	0.080
APR											
16...	8.9	344	0.030	6.40	0.080	0.080	0.90	0.270	0.130	0.160	0.120
JUN											
30...	16	345	0.020	4.70	0.030	0.030	0.30	0.110	0.100	0.090	0.090
AUG											
10...	15	342	0.010	4.00	0.010	0.010	<0.20	0.100	0.090	0.080	0.080

DATE	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
OCT											
09...	20	--	--	--	--	--	--	--	--	--	--
31...	25	38	--	--	--	--	--	--	--	--	--
DEC											
10...	39	14	30	72	<3	6	5	4	<10	1	<1
FEB											
19...	21	14	20	69	<3	7	8	7	<10	<1	1
APR											
16...	79	96	130	76	<3	16	8	43	<10	<1	<1
JUN											
30...	73	44	30	76	<3	10	5	8	<10	<1	<1
AUG											
10...	86	59	--	--	--	--	--	--	--	--	--

WHITEWATER RIVER BASIN

05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	VANA-DIUM, DIS-SOLVED (UG/L AS V) (01085)	GROSS ALPHA, DIS-SOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DIS-SOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DIS-SOLVED (PCI/L AS SR/YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90) (80060)	RADIUM 226, DIS-SOLVED, RADON METHOD (PCI/L) (09511)	URANIUM NATURAL DIS-SOLVED (UG/L AS U) (22703)
OCT											
09...	--	--	--	--	--	--	--	--	--	--	--
31...	--	--	--	<0.6	<0.6	2.0	<0.6	1.5	<0.6	0.05	0.53
DEC											
10...	<1.0	87	<6	--	--	--	--	--	--	--	--
FEB											
19...	<1.0	78	<6	--	--	--	--	--	--	--	--
APR											
16...	<1.0	90	<6	--	--	--	--	--	--	--	--
JUN											
30...	<1.0	84	<6	<0.6	<0.6	2.0	<0.6	1.5	<0.6	0.06	0.54
AUG											
10...	--	--	--	--	--	--	--	--	--	--	--

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	TEMPER-ATURE WATER (DEG C) (00010)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)
OCT 1991					
09...	1100	29	9.5	20	1.6
31...	0930	28	5.5	25	1.9
DEC					
10...	1115	56	2.5	39	5.9
FEB 1992					
19...	1215	45	4.0	21	2.6
APR					
16...	0830	121	6.5	79	26
JUN					
30...	1200	47	20.0	73	9.3
AUG					
10...	1330	145	19.0	86	34

Minnesota River near Carver
Spring 1964

WHITEWATER RIVER BASIN

05376100 MIDDLE FORK WHITEWATER RIVER NEAR ST. CHARLES, MN

LOCATION.--Lat 44°02'20", long 92°07'00", in SE¼ sec.26, T.107 N., R.11 W., Olmsted County, Hydrologic Unit 07040003, on left downstream side of bridge on County Road 107, 8.5 mi upstream from confluence with North Fork.

DRAINAGE AREA.--Undetermined.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1987 to June 1988 (discharge measurements only). July 1988 to June 1992 during open-water periods only (discontinued).

GAGE.--Water-stage recorder. Datum of gage is undetermined.

REMARKS.--Records good except those for estimated periods which are fair to poor. Gage operated during open-water period only. Data for years previous to the 1991 water year are questionable and were not published.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

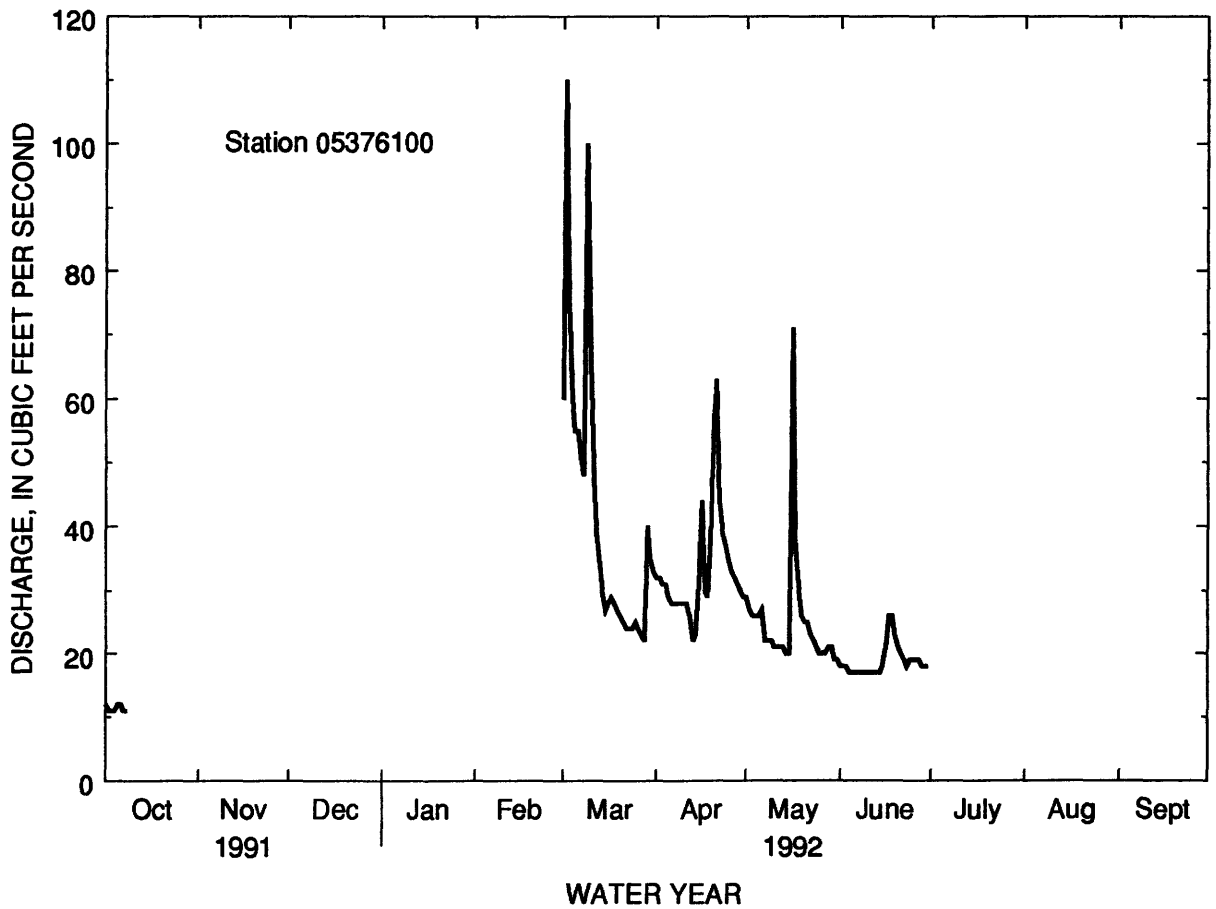
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	---	---	---	---	e60	e32	29	e18	---	---	---
2	11	---	---	---	---	e110	e32	27	e18	---	---	---
3	11	---	---	---	---	e75	e31	26	e18	---	---	---
4	11	---	---	---	---	e60	e31	26	e17	---	---	---
5	12	---	---	---	---	e55	e29	26	e17	---	---	---
6	12	---	---	---	---	e55	e28	27	e17	---	---	---
7	11	---	---	---	---	e50	e28	22	e17	---	---	---
8	11	---	---	---	---	e48	e28	22	e17	---	---	---
9	---	---	---	---	---	e100	e28	22	e17	---	---	---
10	---	---	---	---	---	e70	e28	21	e17	---	---	---
11	---	---	---	---	---	e50	e28	21	e17	---	---	---
12	---	---	---	---	---	e40	e26	21	e17	---	---	---
13	---	---	---	---	---	e35	e22	21	e17	---	---	---
14	---	---	---	---	---	e30	e23	20	e17	---	---	---
15	---	---	---	---	---	e27	e31	20	e18	---	---	---
16	---	---	---	---	---	e28	e44	71	e21	---	---	---
17	---	---	---	---	---	e29	30	38	e26	---	---	---
18	---	---	---	---	---	e28	29	31	e26	---	---	---
19	---	---	---	---	---	e27	38	e26	e23	---	---	---
20	---	---	---	---	---	e26	57	e25	e21	---	---	---
21	---	---	---	---	---	e25	63	e25	e20	---	---	---
22	---	---	---	---	---	e24	44	e23	e19	---	---	---
23	---	---	---	---	---	e24	39	e22	e18	---	---	---
24	---	---	---	---	---	e24	37	e21	e19	---	---	---
25	---	---	---	---	---	e25	35	e20	e19	---	---	---
26	---	---	---	---	---	e24	33	e20	e19	---	---	---
27	---	---	---	---	---	e23	32	e20	e19	---	---	---
28	---	---	---	---	---	e22	31	e21	e18	---	---	---
29	---	---	---	---	---	e40	30	e21	e18	---	---	---
30	---	---	---	---	---	e35	e29	e19	e18	---	---	---
31	---	---	---	---	---	e33	---	e19	---	---	---	---
TOTAL	---	---	---	---	---	1302	996	773	563	---	---	---
MEAN	---	---	---	---	---	42.0	33.2	24.9	18.8	---	---	---
MAX	---	---	---	---	---	110	63	71	26	---	---	---
MIN	---	---	---	---	---	22	22	19	17	---	---	---
AC-FT	---	---	---	---	---	2580	1980	1530	1120	---	---	---
CFSM	---	---	---	---	---	1.67	1.32	.99	.75	---	---	---
IN.	---	---	---	---	---	1.93	1.47	1.14	.83	---	---	---

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1991 - 1992, BY WATER YEAR (WY)

MEAN	---	---	---	---	---	42.0	26.0	25.3	17.7	19.1	17.4	12.3
MAX	---	---	---	---	---	42.0	33.2	25.6	18.8	19.1	17.4	12.3
(WY)	---	---	---	---	---	1992	1992	1991	1992	1991	1991	1991
MIN	---	---	---	---	---	42.0	18.9	24.9	16.6	19.1	17.4	12.3
(WY)	---	---	---	---	---	1992	1991	1992	1991	1991	1991	1991

SUMMARY STATISTICS	FOR 1992 PERIOD		WATER YEARS 1991 - 1992	
HIGHEST DAILY MEAN			110	Mar 2 1992
LOWEST DAILY MEAN			6.7	Mar 15 1991
ANNUAL SEVEN-DAY MINIMUM			9.5	Mar 15 1991
INSTANTANEOUS PEAK FLOW	619	May 16	637	Mar 11 1989
INSTANTANEOUS PEAK STAGE	13.08	May 16	13.42	Mar 11 1989
INSTANTANEOUS LOW FLOW			4.9	Jun 29 1989
10 PERCENT EXCEEDS			35	
50 PERCENT EXCEEDS			19	
90 PERCENT EXCEEDS			12	



WHITEWATER RIVER BASIN

05376100 MIDDLE FORK WHITEWATER RIVER NEAR ST. CHARLES, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--September 1987 to current year during open-water periods only.
INSTRUMENTATION.--Automatic sampler since September 1987 for storm-event sampling during open-water periods.
REMARKS.--Data for years previous to the 1991 water year are questionable and were not published.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE INST. CUBIC FEET PER SECOND (00061)	TEMPER-ATURE WATER (DEG C) (00010)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)
OCT					
09...	0950	11	9.0	25	0.74
APR					
30...	0918	29	10.5	34	2.7
MAY					
16...	1545	35	--	124	12
16...	1600	60	--	226	36
16...	1615	87	--	11500	2690
16...	1630	81	--	10700	2340
16...	1645	368	--	17500	17400
16...	1700	567	--	30600	46900
16...	1715	837	--	26000	58800
17...	1350	31	15.0	546	46
19...	1207	50	14.5	105	14

Removing debris lodged on upstream side of bridge
April 1965

WHITEWATER RIVER BASIN

05376800 WHITEWATER RIVER NEAR BEAVER, MN

LOCATION.--Lat 44°00'19", long 92°00'19", in SW¼SE¼ sec. 15, T. 108 N., R. 10 W., Winona County, Hydrologic Unit 07040003, on left bank at downstream side of bridge on County Road No. 30, 0.5 mi above mouth of Beaver Creek, and 4.7 mi north of Elba.

DRAINAGE.--271 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1975 to September 1985, May 1991 to July 1993 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 692.01 ft above mean sea level. Prior to Oct. 1, 1976, at datum 2.00 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1939, 19,200 ft³/s, June 21, 1974, gage height, 13.00 ft, present datum, determined by contracted-opening measurement.

EXTREMES FOR CURRENT PERIOD.--Oct. 1, 1991 to July 7, 1992: Peak discharge greater than base discharge of 2,000 ft³/s and maximum (*).

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
May 17	0100	*605	*3.12	No peak greater than base discharge.			

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

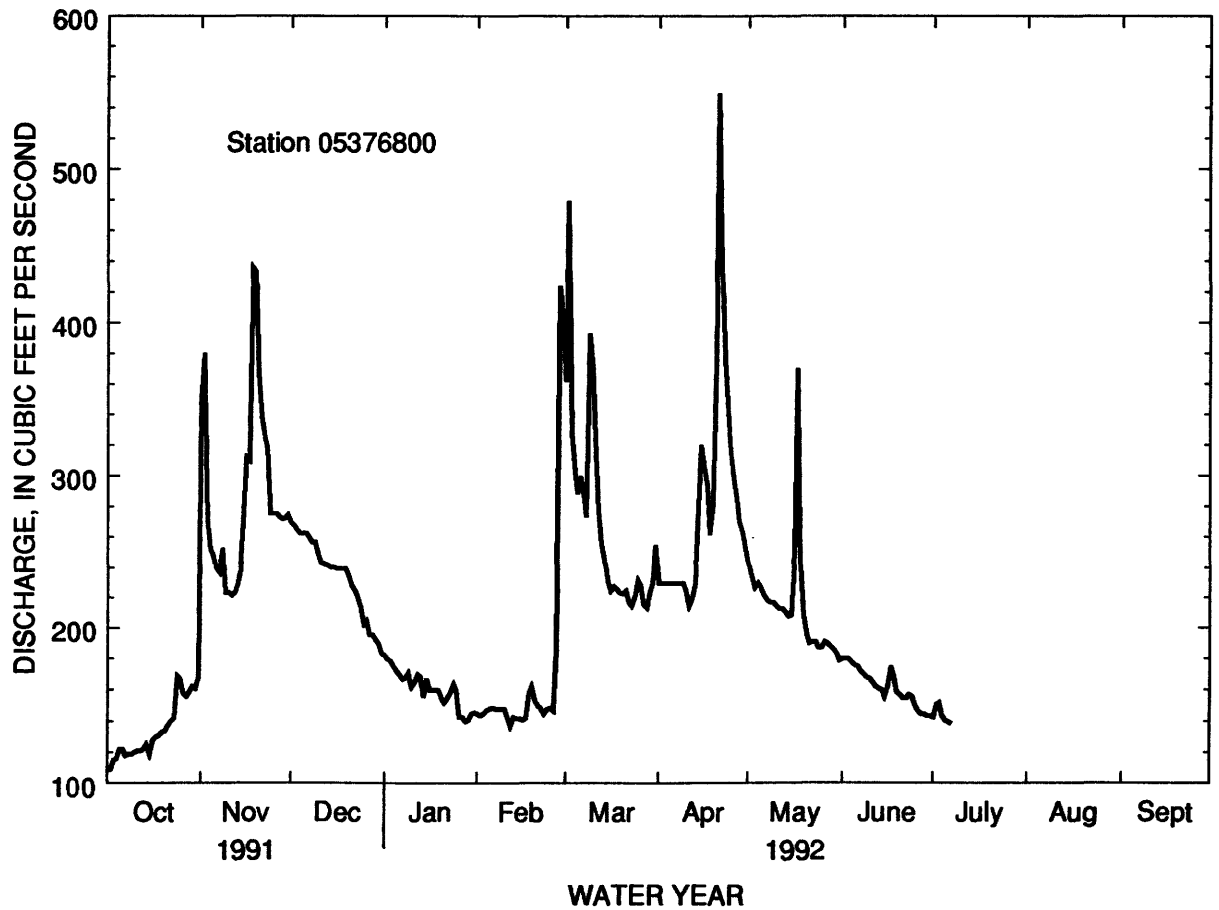
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	109	350	e270	182	145	362	e230	244	180	143	---	---
2	109	380	e268	180	144	479	e230	235	180	151	---	---
3	115	272	e265	179	145	328	e230	227	180	152	---	---
4	116	252	e263	175	147	303	e230	230	178	144	---	---
5	122	249	e263	172	148	289	e230	227	176	141	---	---
6	122	240	e263	170	149	300	e230	222	175	140	---	---
7	118	237	260	167	148	288	e230	219	172	e139	---	---
8	119	253	257	168	148	274	e230	217	170	---	---	---
9	119	224	257	171	e148	393	e230	217	168	---	---	---
10	120	224	249	162	148	371	e225	215	167	---	---	---
11	121	222	244	165	142	314	e215	213	165	---	---	---
12	121	224	e243	170	137	278	e220	213	162	---	---	---
13	122	229	e242	169	143	256	e230	211	161	---	---	---
14	125	239	e241	156	142	245	e270	208	160	---	---	---
15	119	277	e241	167	142	231	e320	209	156	---	---	---
16	128	312	e240	e160	141	225	306	251	162	---	---	---
17	130	310	e240	e160	142	228	294	370	175	---	---	---
18	131	436	e240	e160	158	226	262	241	168	---	---	---
19	133	433	e240	e160	162	224	282	208	159	---	---	---
20	134	367	235	e155	154	223	376	196	157	---	---	---
21	137	339	228	152	150	225	549	190	155	---	---	---
22	140	325	225	155	149	217	438	191	155	---	---	---
23	142	318	221	159	145	215	376	191	157	---	---	---
24	169	276	214	164	148	221	342	187	156	---	---	---
25	167	e276	203	160	149	232	316	187	150	---	---	---
26	158	e276	205	143	147	229	299	191	147	---	---	---
27	156	e274	196	143	186	216	285	190	145	---	---	---
28	159	272	196	140	424	214	270	188	145	---	---	---
29	162	273	192	141	403	225	e264	186	144	---	---	---
30	161	e275	190	145	---	230	252	183	144	---	---	---
31	168	---	184	146	---	e255	---	179	---	---	---	---
TOTAL	4152	8634	7275	4996	4834	8316	8461	6636	4869	---	---	---
MEAN	134	288	235	161	167	268	282	214	162	---	---	---
MAX	169	436	270	182	424	479	549	370	180	---	---	---
MIN	109	222	184	140	137	214	215	179	144	---	---	---
AC-FT	8240	17130	14430	9910	9590	16490	16780	13160	9660	---	---	---
CFSM	.49	1.06	.87	.59	.62	.99	1.04	.79	.60	---	---	---
IN.	.57	1.19	1.00	.69	.66	1.14	1.16	.91	.67	---	---	---

e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	131	152	138	124	143	265	189	178	173	237	147	143
MAX	187	288	235	188	236	512	282	255	240	973	205	230
(WY)	1984	1992	1992	1980	1985	1985	1992	1984	1980	1978	1979	1978
MIN	88.0	84.8	77.0	80.6	59.7	84.2	92.9	89.6	112	92.1	87.1	85.5
(WY)	1978	1978	1977	1978	1978	1978	1977	1977	1976	1977	1977	1977

SUMMARY STATISTICS	FOR 1992 PERIOD		WATER YEARS 1975 - 1992	
ANNUAL MEAN	164	(1976-85)		
HIGHEST ANNUAL MEAN			203	1984
LOWEST ANNUAL MEAN			103	1977
HIGHEST DAILY MEAN			8760	Jul 6 1978
LOWEST DAILY MEAN	109	Oct, 1, 2	53	Feb 20 1978
ANNUAL SEVEN-DAY MINIMUM			53	Feb 20 1978
INSTANTANEOUS PEAK FLOW	605	May 17	15400	Jul 6 1978
INSTANTANEOUS PEAK STAGE	3.12	May 17	12.88	Jul 6 1978
INSTANTANEOUS LOW FLOW	93	Oct. 1		
ANNUAL RUNOFF (AC-FT)			119100	
ANNUAL RUNOFF (CFSM)			.61	
ANNUAL RUNOFF (INCHES)			8.24	
10 PERCENT EXCEEDS			236	
50 PERCENT EXCEEDS			138	
90 PERCENT EXCEEDS			91	



WHITEWATER RIVER BASIN

05376800 WHITEWATER RIVER NEAR BEAVER, MN

WATER-QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SEDI-MENT, SEDI-TEMPER-ATURE WATER (DEG C) (00010)	DIS-MENT, SUS-PENDED (MG/L) (80154)	CHARGE, SUS-PENDED (T/DAY) (80155)
OCT 1991					
09...	1300	118	9.5	17	5.4
JAN 1992					
07...	1424	164	5.0	113	50
APR					
29...	1422	274	12.0	105	78

Flood of April 1965

MISSISSIPPI RIVER MAIN STEM

05378500 MISSISSIPPI RIVER AT WINONA, MN

LOCATION.--Lat 44°03'21", long 91°38'16", in sec.23, T.107 N., R.7 W., Winona County, Hydrologic Unit 07040003, on right bank at Winona pumping station in Winona, 9.5 mi upstream from Trempealeau River, and at mile 725.7 upstream from the Ohio River.

DRAINAGE AREA.--59,200 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1928 to current year. Gage-height records collected in this vicinity since 1878 are contained in reports of Mississippi River Commission.

GAGE.--Water-stage recorder. Datum of gage is 639.64 ft above mean sea level. June 10,1928, to Apr. 15, 1931, nonrecording gage at site 800 ft upstream. Prior to Oct. 1, 1929, at datum 0.20 ft higher and Oct. 1, 1929, to Apr. 15, 1931, at datum 0.12 ft lower. Apr. 16, 1931, to Nov. 12, 1934, nonrecording gage at present site and datum. Since Mar. 31, 1937, auxiliary water-stage recorder 2.7 mi upstream at tailwater of navigation dam 5A.

REMARKS.--No estimated daily discharges. Records good. Some regulation by reservoirs, navigation dams, and powerplants at low and medium stages. Flood flow not materially affected by artificial storage.

EXTREMES FOR PERIOD OF RECORD.--Minimum gage height, -3.38 ft, Aug. 31, 1934 (prior to dam construction in 1936); minimum gage height since 1938, after completion of dam, 1.95 ft, Jan. 27, 1944.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 18, 1880, reached an elevation of 657.14 ft, discharge, 172,000 ft³/s, from information by U.S. Army Corps of Engineers.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33500	25800	53300	33500	24100	29800	63400	79300	26800	34600	27800	17900
2	32300	30700	43700	33600	24200	32000	61900	77000	25900	34400	27300	19400
3	32700	37600	39000	33600	24400	34300	61100	75200	26000	37500	26100	19400
4	32400	44100	35300	33300	24700	39400	60100	71100	25700	39000	24600	20400
5	31500	48700	33500	33000	24500	44500	57900	66700	24400	40500	22800	22300
6	31100	53400	31000	32100	24700	47300	56100	63300	23900	43000	22300	23900
7	27900	57500	31000	31500	24300	52600	55300	59200	23100	47000	21500	25300
8	24100	52200	34500	29700	24100	59200	54400	56600	19200	49300	22300	26600
9	23200	43600	43100	29300	24300	64200	52700	53500	15900	50800	23900	27000
10	23700	39500	48800	29200	24300	69500	51100	47700	15300	51900	23400	26000
11	24300	37600	53300	29100	23800	76900	50700	42400	18300	52900	23600	24000
12	25300	36300	55500	30000	23900	84300	51000	41200	19900	53000	24500	22700
13	24400	35100	54500	31200	23400	88800	50800	40800	19300	53700	26200	20200
14	23500	36100	52000	30700	24500	90600	49400	39000	19500	55400	27300	21000
15	23400	40500	48300	29900	25600	90700	49200	36200	18400	56400	27000	22200
16	21800	41300	44300	25200	25700	89900	49500	34900	17400	56600	26400	27900
17	20200	42100	41400	24800	24500	88900	49900	36600	17800	56000	24200	40400
18	20800	45200	39600	21400	23000	87300	50900	38300	21200	54300	21200	47100
19	24000	46400	38000	22900	22100	83400	55000	38100	28900	51000	18800	50200
20	24100	49600	37100	21700	21500	79700	60600	37800	33100	49900	15600	46800
21	22900	56500	38000	21400	21000	76700	62100	37900	32400	45700	17900	43700
22	21500	63800	38600	21700	21300	74900	63700	37400	32600	44200	18000	38500
23	20400	70200	39000	22000	22800	72800	69700	36200	34000	44300	18100	33400
24	20200	72900	38000	22100	23300	70300	78500	34000	36300	42200	16900	30500
25	21000	72700	37600	22300	22500	68200	86600	31200	35900	39200	15700	28500
26	20900	68400	36500	24800	22100	67700	91500	30400	36500	37200	16000	27100
27	21900	63700	35700	26400	22100	66200	90800	30200	37600	33400	17400	26200
28	21900	60700	34500	26200	24000	65500	87400	30000	37700	30800	19400	23500
29	20800	54500	33500	24200	26000	65600	85100	29500	37400	32100	20000	19600
30	21000	53200	32500	23700	---	65200	83000	28900	36400	30800	20200	17700
31	21800	---	32500	23800	---	64400	---	28100	---	29500	19400	---
TOTAL	758500	1479900	1253600	844300	686700	2090800	1889400	1388700	796800	1376600	675800	839400
MEAN	24470	49330	40440	27240	23680	67450	62980	44800	26560	44410	21800	27980
MAX	33500	72900	55500	33600	26000	90700	91500	79300	37700	56600	27800	50200
MIN	20200	25800	31000	21400	21000	29800	49200	28100	15300	29500	15600	17700
AC-FT	1504000	2935000	2487000	1675000	1362000	4147000	3748000	2754000	1580000	2730000	1340000	1665000
CFSM	.41	.83	.68	.46	.40	1.14	1.06	.76	.45	.75	.37	.47

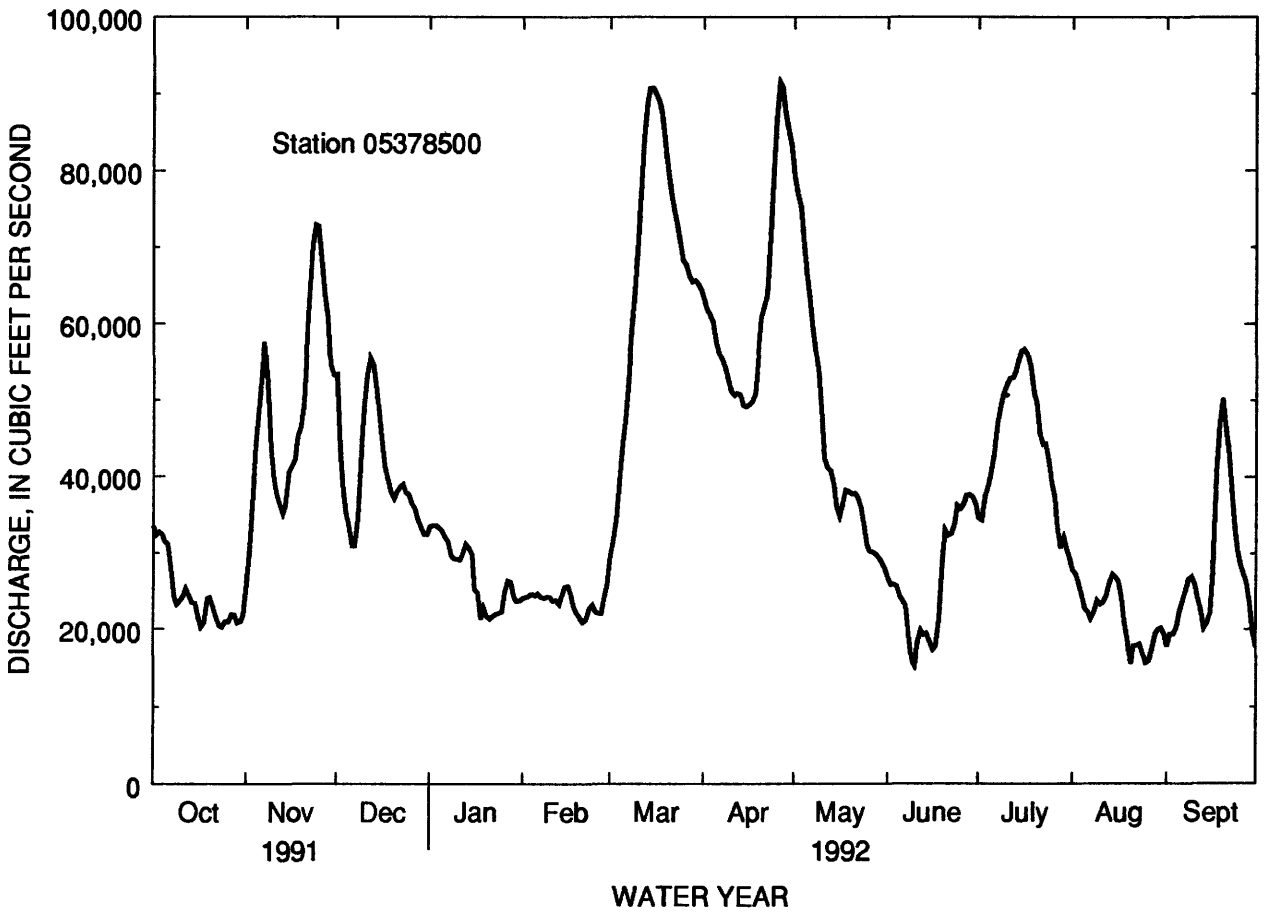
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	21790	21900	17010	14700	14860	29850	59100	46980	38060	29570	19920	21670
MAX	85950	50040	40440	30480	35900	86420	152600	111500	95980	64490	58410	69490
(WY)	1987	1972	1992	1983	1984	1983	1965	1986	1943	1957	1972	1986
MIN	6774	7367	6286	6742	7874	9023	12810	11930	8450	7063	5391	6790
(WY)		1934	1934	1934	1940	1977	1934	1931	1931	1934	1934	19341933

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1928 - 1992	
ANNUAL TOTAL	15025300		14080500			
ANNUAL MEAN	41170		38470		27970	
HIGHEST ANNUAL MEAN					56850	1986
LOWEST ANNUAL MEAN					9742	1934
HIGHEST DAILY MEAN	92800	May 14	91500	Apr 26	264000	Apr 20 1965
LOWEST DAILY MEAN	10200	Jan 26	15300	Jun 10	2250	Dec 29 1933
ANNUAL SEVEN-DAY MINIMUM	10400	Jan 26	16900	Aug 20	3210	Dec 27 1933
INSTANTANEOUS PEAK FLOW			92000	Apr 26	268000	Apr 19 1965
INSTANTANEOUS PEAK STAGE			10.93	Apr 26	20.77a	Apr 19 1965
INSTANTANEOUS LOW FLOW			12300	Jun 10	1940b	Dec 12 1980
ANNUAL RUNOFF (AC-FT)	29800000		27930000		20270000	
ANNUAL RUNOFF (CFSM)	.70		.65		.47	
10 PERCENT EXCEEDS	69800		65500		57700	
50 PERCENT EXCEEDS	39000		33400		19800	
90 PERCENT EXCEEDS	12300		21000		9720	

a From floodmark.

b Result of ice jam.



ROOT RIVER BASIN

05385000 ROOT RIVER NEAR HOUSTON, MN

LOCATION.--43°46'07", long 91°34'11", in SW¼NW¼ sec.33, T.104 N., R.6 W., Houston County, Hydrologic Unit 07040008, on right bank 0.2 mi north of Houston and 1.6 mi upstream from South Fork and 18.2 mi upstream from mouth.

DRAINAGE AREA.--1,270 mi², approximately.

PERIOD OF RECORD.--May 1909 to September 1917, May to November 1929, March 1930 to 1983, 1991 to current year. Operated as high-flow partial-record station October 1983 to September 1990. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 895: Drainage area. WSP 1508: 1911-12. WSP 1628: 1948(P).

GAGE.--Water-stage recorder. Datum of gage is 667.00 ft above mean sea level. May 28, 1909, to Sept. 30, 1917, nonrecording gage at site 1.3 mi downstream at different datum. May 4, 1929, to Sept. 27, 1933, nonrecording gage and Sept. 28, 1933 to June 26, 1980, recording gage at site 0.9 mi upstream at datum 671.86 ft.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Slight diumal fluctuation at low flows caused by powerplants above station.

EXTREME FOR CURRENT YEAR.--Peak discharges above base of 5,000 ft³/s and maximum (*).

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Mar. 10	1500	*5,760	*10.74	Apr. 22	0800	5,300	10.35

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	568	569	1310	967	e600	2480	2270	1670	902	758	699	588
2	615	450	1320	953	e600	3060	1920	1580	889	770	692	590
3	518	426	1490	934	e610	3390	1740	1480	874	764	692	680
4	536	491	1850	926	e620	2970	1650	1410	864	755	686	626
5	545	482	2050	915	e630	2360	1550	1350	915	745	674	598
6	568	465	2150	894	e640	2310	1470	1300	902	742	660	631
7	540	460	2150	873	e630	2460	1430	1260	881	741	672	646
8	558	503	2150	855	e610	2370	1390	1230	857	791	738	646
9	561	590	2100	855	e600	2580	1390	1210	843	842	728	654
10	516	627	2050	859	e600	5100	1380	1180	842	820	702	663
11	540	661	1950	835	e600	3600	1350	1160	828	870	663	643
12	547	778	1850	844	e600	2670	1310	1140	793	864	646	628
13	517	913	1700	898	e600	2240	1250	1120	784	853	643	623
14	518	952	1600	878	e600	1990	1220	1090	796	869	633	749
15	520	1010	1500	799	e600	1810	1220	1070	856	854	625	958
16	519	1160	e1800	e765	e610	1660	1460	1080	869	832	623	1450
17	530	1390	e2000	e760	e610	1570	2190	1240	939	848	623	1520
18	531	1710	e2100	e755	e610	1540	2210	1300	896	808	623	1880
19	472	2560	e2050	e735	e610	1560	2050	1260	879	792	621	1550
20	517	e3100	e1950	e710	e610	1590	2570	1190	848	777	618	1250
21	517	e3500	e1800	e690	e620	1580	4580	1140	837	751	615	1130
22	537	e3800	e1700	e660	e630	1580	4890	1110	828	728	598	1040
23	539	e3350	e1550	e650	e640	1500	3640	1080	832	760	591	960
24	571	e2800	e1450	e630	e660	1420	3000	1060	835	775	591	895
25	628	e2500	e1350	e620	e680	1540	2630	1020	820	768	594	895
26	642	e2000	e1280	e610	e720	1650	2360	1020	806	765	600	836
27	655	e1700	e1210	e610	778	1560	2150	1000	793	765	600	829
28	647	e1500	1200	e600	997	1450	1980	982	779	763	600	821
29	635	e1400	1090	e600	2150	1460	1860	956	770	739	600	798
30	569	e1350	1050	e600	---	1480	1760	935	763	721	600	785
31	515	---	1010	e600	---	1810	---	920	---	713	595	---
TOTAL	17191	43197	51810	23880	20065	66340	61870	36543	25320	24343	19845	26562
MEAN	555	1440	1671	770	692	2140	2062	1179	844	785	640	885
MAX	655	3800	2150	967	2150	5100	4890	1670	939	870	738	1880
MIN	472	426	1010	600	600	1420	1220	920	763	713	591	588
AC-FT	34100	85680	102800	47370	39800	131600	122700	72480	50220	48280	39360	52690
CFSM	.44	1.13	1.32	.61	.54	1.69	1.62	.93	.66	.62	.50	.70

e Estimated.

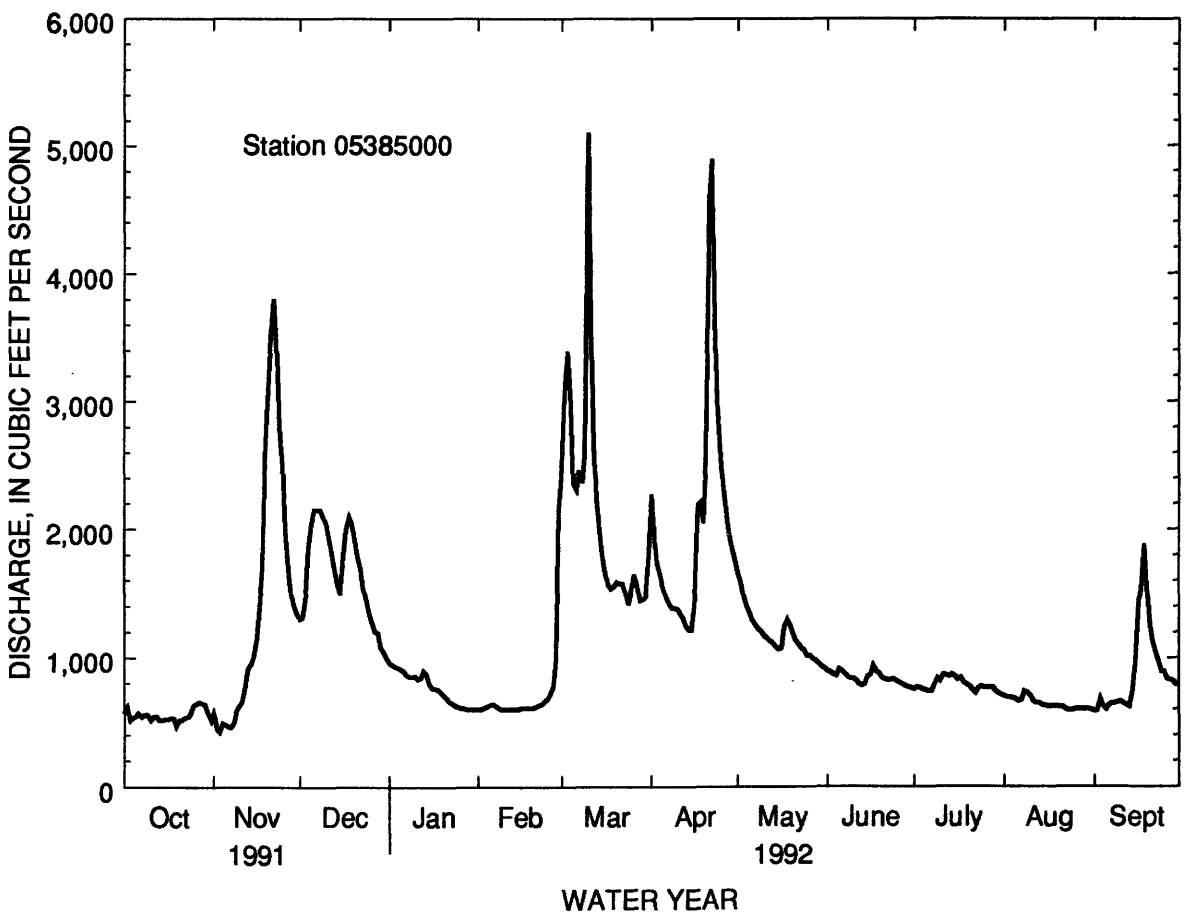
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1992, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	499	496	417	404	476	1405	1132	796	855	757	607	552
MAX	1465	1494	1671	1152	1427	3512	4963	2440	2803	3252	1998	2105
(WY)	1974	1983	1992	1973	1966	1961	1965	1973	1974	1978	1953	1938
MIN	193	218	189	172	168	251	274	234	261	236	231	243
(WY)	1934	1934	1934	1959	1959	1931	1931	1934	1934	1964	1958	1933

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1910 - 1992	
ANNUAL TOTAL	385377		416966			
ANNUAL MEAN	1056		1139		706	
HIGHEST ANNUAL MEAN					1541	1983
LOWEST ANNUAL MEAN					294	1931
HIGHEST DAILY MEAN	4250	May 7	5100	Mar 10	31100	Apr 1 1952
LOWEST DAILY MEAN	361	Jan 1	426	Nov 3	82	Nov 28 1937
ANNUAL SEVEN-DAY MINIMUM	369	Jan 1	468	Nov 2	113	Dec 25 1933
INSTANTANEOUS PEAK FLOW			5760	Mar 10	37000	Apr 1 1952
INSTANTANEOUS PEAK STAGE			10.74	Mar 10	18.32a	Mar 2 1965
INSTANTANEOUS LOW FLOW			356	Nov 7	65b	
ANNUAL RUNOFF (AC-FT)	764400		827100		511100	
ANNUAL RUNOFF (CFSM)	.83		.90		.56	
10 PERCENT EXCEEDS	2070		2100		1240	
50 PERCENT EXCEEDS	802		853		442	
90 PERCENT EXCEEDS	430		591		260	

a Backwater from ice.

b Occurred Dec. 26, 1933 and Feb. 25, 1935.



IOWA RIVER BASIN

05457000 CEDAR RIVER NEAR AUSTIN, MN

LOCATION.--Lat 43°38'11", long 92°58'26", in NE¼SE¼ sec.15, T.102 N., R.18 W., Mower County, Hydrologic Unit 07080201, on left bank 200 ft upstream from abandoned powerhouse, 500 ft downstream from highway bridge, 1.1 mi downstream from Turtle Creek, and 1.1 mi south of Austin.

DRAINAGE AREA.--425 mi².

PERIOD OF RECORD.--May 1909 to September 1914, October 1944 to current year.

REVISED RECORDS.--WSP 1145: 1945, 1948.

GAGE.--Water-stage recorder. Datum of gage is 1,162.10 ft above mean sea level. May 1909 to April 1912, nonrecording gage in tailwater of powerplant 200 ft downstream at datum 3.1 ft lower. May 1912 to September 1914, nonrecording gage on highway bridge 500 ft downstream at datum 1.1 ft lower.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,400 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Nov. 23	-	1,550	Ice jam	Mar. 9	1630	*3,190	*9.19
Mar. 2	0700	2,150	7.35	Apr. 1	1500	2,890	8.68
Mar. 6	2000	1,740	6.57	July 9	0800	1,710	6.50
July 15	0430	1,930	6.94				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	93	279	e620	208	144	e1410	814	423	215	132	207	96
2	93	415	e620	207	146	2000	649	388	212	156	224	109
3	89	311	e620	209	180	1820	555	345	206	512	242	103
4	90	351	610	208	232	1320	498	320	194	384	215	96
5	90	259	629	201	235	1210	432	304	186	263	192	112
6	93	221	602	203	239	1620	408	284	178	212	179	126
7	88	209	467	202	239	1590	395	268	167	191	225	143
8	90	217	424	208	181	1290	381	257	161	689	298	125
9	90	173	401	253	213	2540	385	248	162	1590	280	145
10	88	171	362	208	173	2210	376	235	156	1240	235	129
11	88	170	346	264	150	1420	389	251	148	1050	203	119
12	83	167	472	261	135	950	362	248	142	773	188	110
13	80	173	e630	247	131	747	330	227	137	684	170	102
14	85	186	e660	186	130	630	318	216	131	1510	160	422
15	86	265	e650	196	128	526	376	264	126	1850	150	1060
16	84	508	e610	181	123	495	813	356	175	1300	141	858
17	86	574	e550	185	143	605	933	503	309	861	141	824
18	88	728	443	e180	306	713	737	389	431	622	171	552
19	86	e800	e430	e175	e270	708	905	334	336	488	178	394
20	85	e1000	381	e170	e245	678	1650	301	283	408	154	311
21	87	e1200	336	e165	e218	647	2760	276	252	344	140	274
22	90	e1380	309	160	e190	540	2220	265	245	397	131	242
23	92	e1500	295	e157	e172	519	1480	249	233	555	121	210
24	105	e1300	275	e152	159	549	1110	228	215	565	119	189
25	99	e750	253	e150	140	585	889	234	198	499	116	175
26	94	e600	247	e148	154	574	743	289	179	442	117	167
27	92	e500	240	e145	318	500	637	303	161	381	120	164
28	99	e540	227	e140	e1540	492	555	278	150	324	114	151
29	107	e600	222	135	e1500	751	518	258	145	280	108	141
30	105	e620	220	132	---	1170	459	242	139	245	103	137
31	107	---	215	e139	---	1010	---	226	---	229	99	---
TOTAL	2832	16167	13366	5775	8134	31819	23077	9009	5972	19176	5241	7786
MEAN	91.4	539	431	186	280	1026	769	291	199	619	169	260
MAX	107	1500	660	264	1540	2540	2760	503	431	1850	298	1060
MIN	80	167	215	132	123	492	318	216	126	132	99	96
AC-FT	5620	32070	26510	11450	16130	63110	45770	17870	11850	38040	10400	15440
CFSM.	21	1.27	1.01	.44	.66	2.42	1.81	.68	.47	1.46	.40	.61
IN.	.25	1.42	1.17	.51	.71	2.79	2.02	.79	.52	1.68	.46	.68

e Estimated.

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1992, BY WATER YEAR (WY)

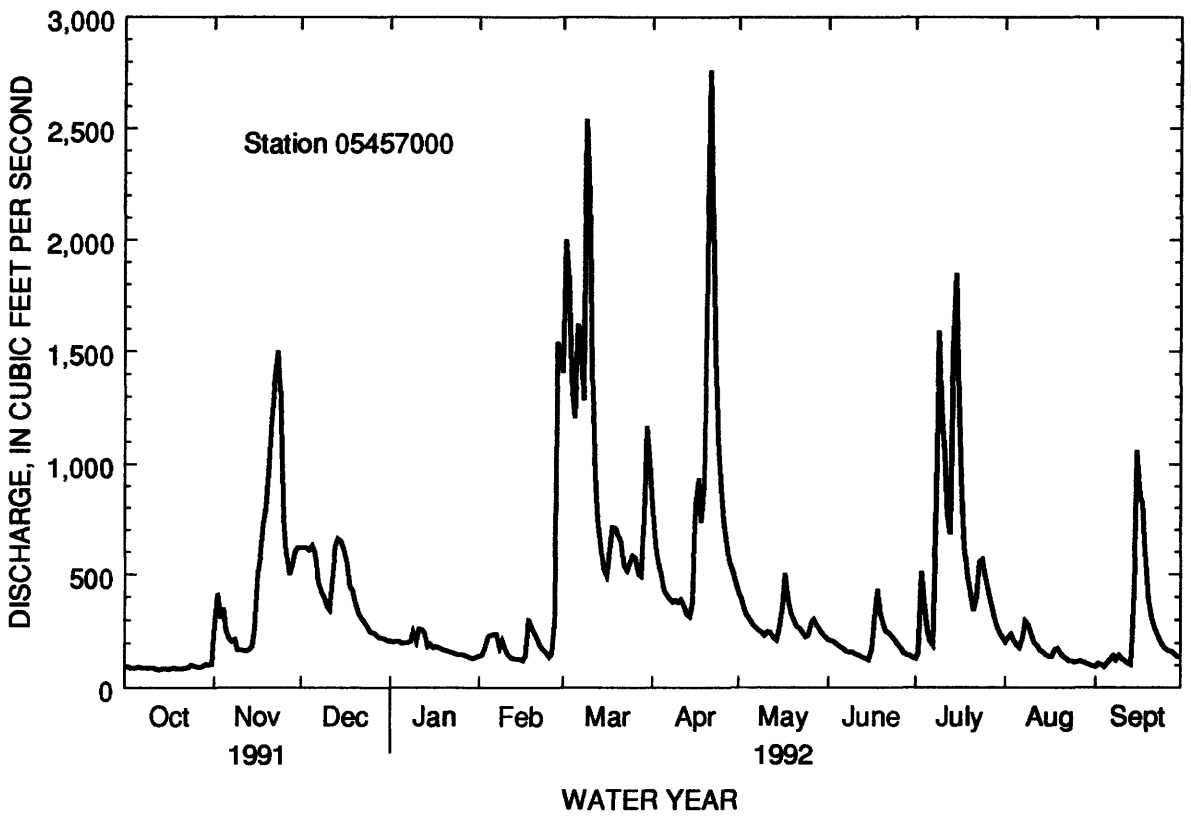
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	158	150	102	71.8	100	473	482	287	252	229	152	140
MAX	884	997	431	261	701	1428	2009	1222	861	1456	646	506
(WY)	1974	1910	1992	1973	1984	1973	1965	1991	1967	1978	1953	1946
MIN	37.3	35.7	26.6	26.5	25.0	53.3	52.9	67.9	48.9	22.6	32.3	30.9
(WY)	1959	1959	1913	1913	1913	1968	1911	1910	1950	1911	1948	1911

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1909 - 1992	
ANNUAL TOTAL	147859		148354			
ANNUAL MEAN	405		405		217a	
HIGHEST ANNUAL MEAN					568	1983
LOWEST ANNUAL MEAN					58.1	1977
HIGHEST DAILY MEAN	4410	May 6	2760	Apr 21	8720	Mar 29 1962
LOWEST DAILY MEAN	55	Jan 30	80	Oct 13	.00b	Jan 15 1911
ANNUAL SEVEN-DAY MINIMUM	56	Jan 26	85	Oct 11	13	Sep1 1912
INSTANTANEOUS PEAK FLOW			3190	Mar 9	12400	Jul 17 1978
INSTANTANEOUS PEAK STAGE			9.19	Mar 9	20.35c	Jul 17 1978
INSTANTANEOUS LOW FLOW			77	Oct 13		
ANNUAL RUNOFF (AC-FT)	293300		294300		157100	
ANNUAL RUNOFF (CFSM)	.95		.95		.51	
ANNUAL RUNOFF (INCHES)	12.94		12.99		6.93	
10 PERCENT EXCEEDS	990		869		442	
50 PERCENT EXCEEDS	213		245		86	
90 PERCENT EXCEEDS	71		107		43	

a Median of annual mean discharges if 199 ft^3/s.

b Occurred on several days in 1911.

c From floodmark in well.



DES MOINES RIVER BASIN

05476000 DES MOINES RIVER AT JACKSON, MN

LOCATION.--Lat 43°37'10", long 94°59'10", in SE¼SW¼ sec.24, T.102 N., R.35 W., Jackson County, Hydrologic Unit 07100001, on right bank in storage room of city powerplant in Jackson.

DRAINAGE AREA.--1,220 mi², approximately.

PERIOD OF RECORD.--May 1909 to December 1913, August 1930 to current year (winter record incomplete prior to 1936). Published as Des Moines River near Jackson, 1930-35, as West Fork Des Moines River near Jackson, 1936-44, and as West Fork Des Moines River at Jackson, 1945-69.

REVISED RECORDS.--WSP 1115: 1942. WSP 1175: Drainage area. WSP 1238: 1950. WSP 1308: 1938(M).

GAGE.--Water-stage recorder. Datum of gage is 1,287.75 ft above mean sea level. May 31, 1909, to Dec. 20, 1913, nonrecording gage at site 0.6 mi downstream at datum 0.99 ft lower. Aug. 22, 1930, to Sept. 30, 1944, nonrecording gage at site 7 mi upstream at datum 17.10 ft higher. Oct. 1, 1944, to Oct. 26, 1949, nonrecording gage at site 600 ft upstream at datum 10.64 ft higher. Oct. 27, 1949, to Dec. 15, 1965, water-stage recorder 200 ft downstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Regulation at times by Yankton, Long, Shetek, and Heron Lakes.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 900 ft³/s and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Mar. 6	0600	2,510	10.36	July 8	0700	*2,710	*10.78
Apr. 22	0800	1,380	7.70	Aug. 14	1900	1,690	8.50
June 17	0200	1,580	8.23	Sept. 8	0600	1,150	7.08

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DAILY MEAN VALUES

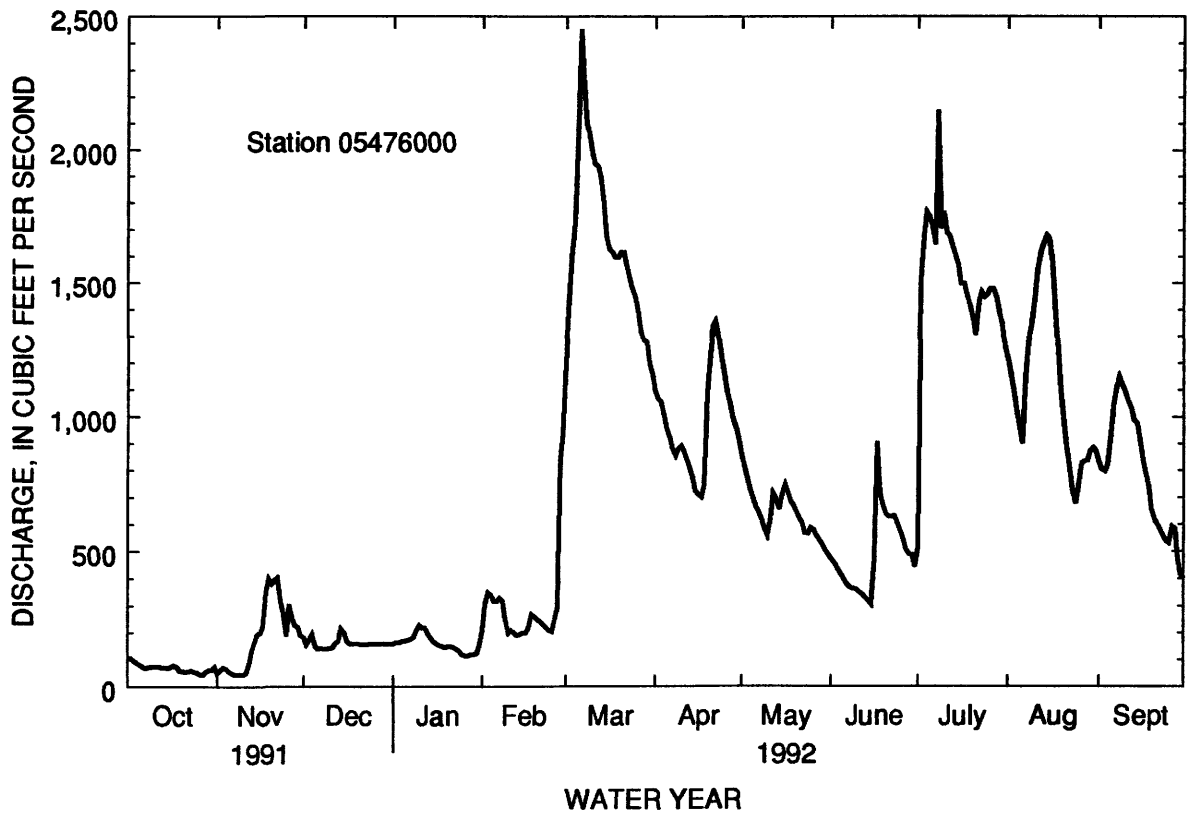
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	107	50	184	e160	e210	e1200	e1100	e860	474	516	1220	831
2	104	63	157	e165	e310	e1400	e1070	e810	460	1510	1170	804
3	97	e72	177	e165	e350	e1600	1060	772	443	1680	1100	796
4	89	e68	194	e170	e340	e1730	1010	734	421	1770	1030	816
5	83	e57	149	e170	e320	2000	959	701	408	1750	963	928
6	77	e49	141	e175	e320	2450	926	670	385	1720	905	1030
7	70	e46	143	176	e330	2280	885	646	375	1650	1150	1110
8	72	e45	141	183	e320	2100	861	622	365	2150	1280	1140
9	75	e44	141	208	e250	2070	884	584	364	1710	1340	1110
10	75	e46	143	228	e200	1990	896	562	359	1770	1440	1080
11	75	e50	145	220	e210	1950	877	624	351	1690	1550	1040
12	75	e84	159	220	e200	1940	840	719	343	1680	1620	1010
13	72	e130	169	e200	e190	1900	814	697	330	1640	1650	971
14	72	167	218	e180	e195	1800	773	660	319	1610	1680	957
15	69	192	203	e170	e200	1680	728	714	307	e1570	1670	892
16	73	199	169	e160	e200	1630	714	751	476	e1500	1580	816
17	78	225	161	e155	e220	1620	705	723	907	1500	1420	769
18	73	355	e160	e150	e270	1600	750	689	717	1460	1250	718
19	59	402	e160	e145	e260	1600	1090	673	676	1420	1100	635
20	58	383	e160	e150	e250	1620	1210	647	640	1370	977	594
21	55	394	e157	e150	e240	1620	1340	627	632	1310	888	578
22	57	405	e157	e145	e230	1570	1360	605	632	1430	806	552
23	60	e320	157	e140	e220	1520	1300	570	634	1470	730	526
24	54	275	e160	e130	e210	1480	1230	568	604	1450	680	508
25	52	190	e160	e120	e205	1450	1160	587	578	1460	742	500
26	45	308	e160	e115	249	1400	1100	581	545	1480	828	561
27	46	257	e160	e115	294	1320	1050	561	511	1480	836	550
28	54	229	e160	e120	e843	e1290	997	542	491	1450	838	437
29	63	222	e160	e120	e940	e1280	e964	524	487	1400	875	383
30	62	190	e160	e123	---	e1200	e915	506	446	e1350	886	365
31	74	---	e160	e150	---	e1160	---	488	---	1270	874	---
TOTAL	2175	5517	5025	4978	8576	51450	29568	20017	14680	47216	35078	23007
MEAN	70.2	184	162	161	296	1660	986	646	489	1523	1132	767
MAX	107	405	218	228	940	2450	1360	860	907	2150	1680	1140
MIN	45	44	141	115	190	1160	705	488	307	516	680	365
AC-FT	4310	10940	9970	9870	17010	102100	58650	39700	29120	93650	69580	45630
CFSM	.06	.15	.13	.13	.24	1.36	.81	.53	.40	1.25	.93	.63
IN.	.07	.17	.15	.15	.26	1.57	.90	.61	.45	1.44	1.07	.70

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1992, BY WATER YEAR (WY)

MEAN	132	136	82.5	40.8	61.5	436	917	520	488	412	173	155
MAX	1724	1833	792	298	504	2250	6045	2374	2843	2453	1408	2243
(WY)	1987	1980	1980	1980	1983	1983	1969	1984	1984	1983	1979	1942
MIN	.000	.000	.000	.000	.000	11.8	9.37	2.59	3.76	1.04	.13	.000
(WY)	1956	1956	1956	1956	1936	1959	1959	1934	1931	1931	1955	1931

SUMMARY STATISTICS	FOR 1991 CALENDAR YEAR		FOR 1992 WATER YEAR		WATER YEARS 1909 - 1992	
ANNUAL TOTAL	169853.05		247287			
ANNUAL MEAN	465		676		326a	
HIGHEST ANNUAL MEAN					1199	1983
LOWEST ANNUAL MEAN					15.1	1956
HIGHEST DAILY MEAN	3310	Jun 23	2450	Mar 6	15500	Apr 11 1969
LOWEST DAILY MEAN	.76	Jan 5	44	Nov 9	.00b	Jul 19 1931
ANNUAL SEVEN-DAY MINIMUM	1.1	Jan 1	48	Nov 5	.00	Jul 19 1931
INSTANTANEOUS PEAK FLOW			2710	Jul 8	15700	Apr 11 1969
INSTANTANEOUS PEAK STAGE			10.78	Jul 8	19.45	Apr 11 1969
INSTANTANEOUS LOW FLOW			30c	Nov 3		
ANNUAL RUNOFF (AC-FT)	336900		490500		236400	
ANNUAL RUNOFF (CFSM)	.38		.55		.27	
ANNUAL RUNOFF (INCHES)	5.18		7.54		3.63	
10 PERCENT EXCEEDS	1510		1570		870	
50 PERCENT EXCEEDS	157		551		67	
90 PERCENT EXCEEDS	5.9		78		2.8	

a Median of annual mean discharges is 245 ft³/s.
b Many days in several years.
c May have been less during period of missing gage height, Nov. 3-11.
e Estimated.

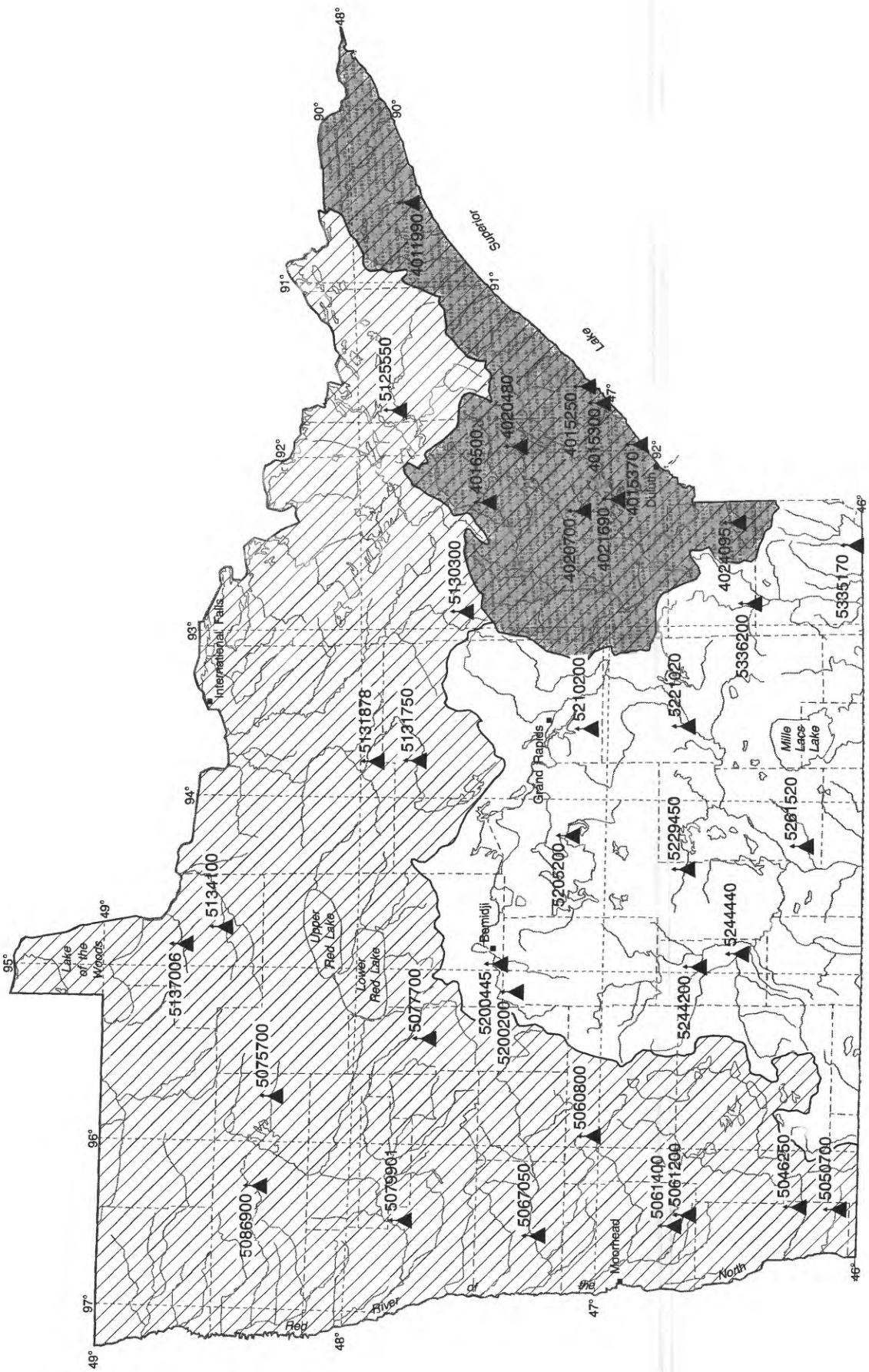


Partial-Record and Miscellaneous Sites

High-flow Partial Record Stations

Sand Creek near New Prague

Foster Creek near Alden


Lake Superior
International Falls
Duluth
Grand Rapids
Bemidji
Moorhead
Lake of the Woods
Upper Red Lake
Lower Red Lake
Mille Lacs Lake
Red River of the North
4011990
4020480
4015250
4015300
4016500
4015370
4020700
4021690
4024095
5125550
5130300
5131878
5131750
5134100
5137006
5075700
5086900
5077700
5079901
5200445
5200200
5060800
5067050
5210200
5206200
5221020
5229450
5244440
5244200
5261520
5336200
5335170
5061400
5061200
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95°
96°
97°
94°
93°
92°
91°
90°
49°
48°
47°
46°

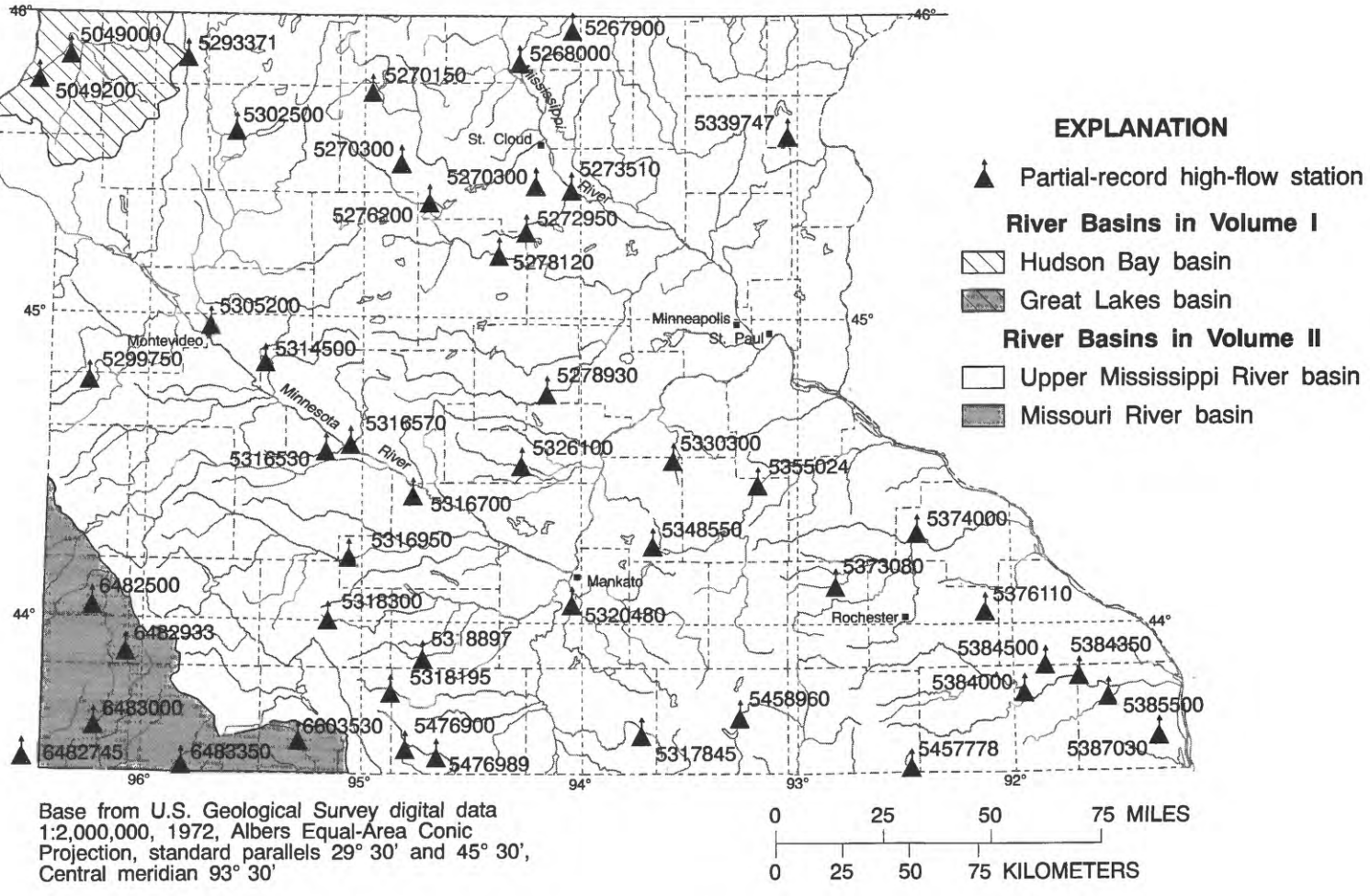


Figure 11.--Location of high-flow partial-record stations.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

As the number of streams on which streamflow information is likely to be desired far exceeds the number of stream-gaging stations feasible to operate at one time, the Geological Survey collects limited streamflow data at sites other than stream-gaging stations. When limited streamflow data are collected on a systematic basis over a period of years for use in hydrologic analyses, the site at which the data are collected is called a partial-record station. Data collected at these partial-record stations are usable in low-flow or flood-flow analyses, depending on the type of data collected. In addition, discharge measurements are made at other sites not included in the partial-record program. These measurements are generally made in times of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Records collected at partial-record stations or miscellaneous sites are presented in two tables. The first is a table of discharge at high-flow partial-record stations and the second is a table of discharge measurements made at miscellaneous sites.

High-flow partial-record stations

The following table contains annual maximum discharge for high-flow stations. A high-flow partial-record stations is equipped with a crest-stage gage, a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain but is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information on some lower floods may have been obtained, and discharge measurements may have been made for purposes of establishing the stage-discharge relation, but these are not published herein. The years given in the period of record represent water years for which the annual maximum has been determined.

Annual maximum discharge at high-flow partial-record stations during water year 1992

Station name and number	Location and drainage area	Period of record	Water year 1992 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft^3/s)	date	gage height (ft)	discharge (ft^3/s)
			Mississippi River main stem					
Hennepin Creek near Becida, MN 05200200	Lat 47°23'52", long 95°05'12", in NW¼NE¼ sec. 11, T.145 N., R.35 W., Hubbard County, Hydrologic Unit 07010101, at culvert on Stumphges Rapids Trail approximately 0.5 mile west of Hubbard County Road 3, 3 miles north of Becida, 1.5 miles upstream from mouth. Drainage area 41.4 mi^2.	1979-92	7-4-92	12.14	78	5-11-85	15.25	375
Mississippi River at Bemidji, MN 05200445	Lat 46°27'04", long 94°54'23", in NW¼NW¼ sec.20, T.146 N., R.33 W., Beltrami County, Hydrologic Unit 07010101, at bridge on County Highway 11, 1.4 miles southwest of intersection of U.S. Highway 2 and County Highway 7 in Bemidji. Drainage area 400 mi^2.	1973-87, 1988-89#, 1990-92	7-10-92	11.05	320	4-23-79	13.04	1,690
			Leech Lake River basin					
Boy River near Remer, MN 05205200	Lat 47°04'51", long 94°05'54", in SE¼SE¼ sec.28 T.142 N., R.27 W., Cass County, Hydrologic Unit 07010102, at bridge on County Highway 53, 1.9 miles upstream from Boy Lake and 9 miles northwest of Remer. Drainage area 310 mi^2.	1986-92	3-9-92	a10.77	170	7-23-87	11.64	660

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at high-flow partial-record stations during water year 1992--Continued

Station name and number	Location and drainage area	Period of record	Water year 1992 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft^3/s)	date	gage height (ft)	discharge (ft^3/s)
			Smith Creek basin					
Smith Creek near Hill City, MN 05210200	Lat 47°04'58", long 93°34'59", in $SE^1/_4NW^1/_4$ sec.13, T.53 N., R.26 W., Itasca County, Hydrologic Unit 07010101, at culvert on U.S. Highway 169, 6.2 miles north of Hill City. Drainage area 8.00 mi^2.	1961-92	6-19-92	b3.60	25	8-5-81	7.95	445
			Willow River basin					
Willow River below Palisade, MN 05221020	Lat 46°42'36", long 93°33'21", in $NW^1/_4NE^1/_4$ sec.30, T.49 N., R.25 W., Aitkin County, Hydrologic Unit 07010103, at bridge on County Highway 3, 3.2 miles west of Palisade. Drainage area 44 mi^2.	1972-92	5-11-92	10.30	838	4-25-79	17.25	3,730
			Pine River basin					
Pine River near Pine River, MN 05229450	Lat 48°41'39", long 94°22'11", in $NE^1/_4SE^1/_4$ sec.8, T.137 N., R.29 W., Cass County, Hydrologic Unit 07010105, at bridge 2.3 miles southeast of Pine River, on U.S. Highway 371, 4.9 miles upstream of upper Whitefish Lake. Drainage area 285 mi^2.	1986-92	6-19-92	b3.36	615	3-28-86	4.35	1,150
			Crow Wing River basin					
Cat River near Nimrod, MN 05244200	Lat 46°37'49", long 94°55'51", in $SW^1/_4SW^1/_4$ sec.36, T.137 N., R.34 W., Wadena County, Hydrologic Unit 07010106, at bridge on State Highway 227, 2.5 miles west of Nimrod, 3.0 miles upstream from mouth. Drainage area 49.2 mi^2.	1961-92	4-22-92	cd5.14	70	10-12-73	9.43	560
Leaf River near Aldrich, MN 05244440	Lat 46°27'25", long 94°50'29", in $SW^1/_4SW^1/_4$ sec.34, T.135 N., R.33 W., Wadena County, Hydrologic Unit 07010107, at bridge on County Highway 29, 3.3 miles upstream from mouth, 7.0 miles northeast of Aldrich. Drainage area 860 mi^2.	1972-92	3-14-92	c10.96	878	4-22-79	16.15	5,170

See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at high-flow partial-record stations during water year 1992--Continued

Station name and number	Location and drainage area	Period of record	Water year 1992 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft^3/s)	date	gage height (ft)	discharge (ft^3/s)
			Crow Wing River basin--Continued					
Sevenmile Creek near Pillager, MN 05245800	Lat 46°20'32", long 94°32'56", in SW¼SE¼ sec.11, T. 133 N., R. 31 W., Cass County, Hydrologic Unit 07010106, at bridge on township road, 3.5 miles northwest of Pillager, 3.2 miles upstream from mouth. Drainage area 18.3 mi^2.	1979-92	5-11-92	c10.98	38	6-14-83	13.08	285
			Nokasippi River basin					
Nokasippi River near Fort Ripley, MN 05261520	Lat 46°12'02", long 94°19'03" on line between secs. 13 and 24, T.43 N., R.32 W., Crow Wing County, Hydrologic Unit 07010104, at bridge on County Highway 2, 3 miles northeast of Fort Ripley. Drainage area 178 mi^2.	1967-70+, 1974+, 1976+, 1986-92	3-7-92	a10.25	173	4-4-86	13.90	828
			Platte River basin					
Hillman Creek near Pierz, 05267900	Lat 45°58'27", long 94°04'21", in NE¼SE¼ sec.9, T.40 N., R.30 W., Morrison County, Hydrologic Unit 07010201, at bridge on county highway, 1.1 miles upstream from mouth, 1.5 miles east of Pierz. Drainage area 46.7 mi^2.	1964-92	3-7-92	b13.49	265	4-9-69	15.48	2,960
Platte River above Royalton, MN 05268000	Lat 45°50'43", long 94°17'40", in SE¼NW¼ sec.26, T.39 N., R.32 W., Morrison County, Hydrologic Unit 07010201, at bridge on County Highway 27, 0.6 mile north of Royalton, 6.6 miles upstream from mouth. Drainage area 335 mi^2.	1929-36, 1972-92	3-9-92	10.20	890	7-26-72	7.84	6,850
			Sauk River basin					
Ashley Creek near Sauk Centre, MN 05270150	Lat 45°46'46", long 94°58'52", in NW¼SE¼ sec.29, T.127 N., R.34 W., Todd County, Hydrologic Unit 07010202, at bridge on County Highway 11, 3 miles north of Sauk Centre. Drainage area 113 mi^2.	1963-70+ 1974+, 1976+, 1986-88, 1989# 1990-92	6-17-92	b14.79	320	9-25-86	16.52	600

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at high-flow partial-record stations during water year 1992--Continued

Station name and number	Location and drainage area	Period of record	Water year 1992 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft^3/s)	date	gage height (ft)	discharge (ft^3/s)
			Sauk River basin--Continued					
Sauk River tributary at Spring Hill, MN 05270300	Lat 45°31'22", long 94°48'31", in SW¼NE¼ sec.27, T.124 N., R.33 W., Stearns County, Hydrologic Unit 07010202, at culvert on State Highway 4, 1.0 mile east of Spring Hill, 2.7 miles upstream from mouth. Drainage area 7.06 mi^2.	1960-92	6-17-92	e	f1,400	7-8-78	22.76	1.440
			Johnson Creek basin					
Johnson Creek near St. Augusta, MN 05272300	Lat 45°27'49", long 94°09'19", in NW¼SW¼ sec.13, T.123 N., R.28 W., Stearns County, Hydrologic Unit 07010203, at bridge on County Highway 7, 1.0 mile south of St. Augusta, 3.3 miles upstream from mouth. Drainage area 46.7 mi^2.	1964-92	11-19-91	13.69	430	9-9-85	16.37	2,350
			Clearwater River basin					
Clearwater River near South Haven, MN 05272950	Lat 45°16'45", long 94°15'04", in NE¼NW¼ sec.19, T.121 N., R.28 W., Wright County, Hydrologic Unit 07010203, at culvert 3.4 miles southeast of Kimball, 0.25 mile downstream of Scott Lake Outlet, 2.0 miles southeast of South Haven. Drainage area -.	1985-92	11-19-91	15.16	315	9-9-85	17.11	1,040
			Mississippi River main stem					
Mississippi River at Clearwater, MN 05273510	Lat 45°25'15", long 94°02'37", in NW¼SW¼ sec.23, T.34 N., R.30 W., Sherburne County, Hydrologic Unit 07010203, on left bank 700 ft upstream from bridge, on State Highway 24 at Clearwater. Drainage area -.	1972-92	4-27-92	bc11.24,	13,500	4-24-79	18.75	33,900
			Crow River basin					
North Fork Crow River at Paynesville, MN 05276200	Lat 45°23'09", long 94°42'41", in SW¼SE¼ sec.9, T. 122 N., R.32 W., Stearns County, Hydrologic Unit 07010204, at bridge on county road at northeast edge of Paynesville city limits. Drainage area 236 mi^2.	1973-92	6-17-92	5.44	990	6-21-83	9.29	2,300

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at high-flow partial-record stations during water year 1992--Continued

Station name and number	Location and drainage area	Period of record	Water year 1992 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft^3/s)	date	gage height (ft)	discharge (ft^3/s)
			Crow River basin--Continued					
North Fork Crow River near Kingston, MN 05278120	Lat 45°12'13", long 94°23'16", in SW¼SE¼ sec.13, T. 120 N., R. 30 W., Meeker County, Hydrologic Unit 07010204, at bridge on State Highway 24, 3.7 miles west of Kingston, 3.9 miles east of Forest City. Drainage area -.	1986-92	3-7-92	13.67	1,450	5-1-86	17.82	4,850
Buffalo Creek near Glencoe, MN 05278930	Lat 44°45'50", long 94°05'27", in SW¼SW¼ sec. 16, T. 115 N., R. 27 W., McLeod County, Hydrologic Unit 07010205, on right bank, 20 ft downstream from bridge on County Highway 1, 2.6 mi east of Glencoe. Drainage area 374 mi^2.	1972 1973-80# 1991-92	9-12-92	7.97	1,430	9-12-91	11.78	4,300
			Minnesota River basin					
Pomme de terre River near Elbow Lake, MN 05293371	Lat 46°57'47", long 95°53'07", in SE¼SW¼ sec. 19, T. 129 N., R. 41 W., Grant County, Hydrologic Unit 07020002, at bridge on County Road 47, 4 miles southeast of Elbow Lake, 2.5 miles south of the outlet of Pomme de Terre Lake. Drainage area 340 mi^2.	1986-92	3-8-92	b3.86	105	4-6-89	e	f200
Florida Creek near Burr, MN 05299750	Lat 44°49'00", long 96°25'10", in SE¼SE¼ sec. 29, T. 115 N., R.46 W., Yellow Medicine County, Hydrologic Unit 07020003, at culvert on County Road 15, 2.2 miles west of Burr, 6 miles northwest of Canby. Drainage area 50 mi^2.	1982 1983-84# 1991-92	6-17-92	20.85	996	6-17-92	20.85	996
Little Chippewa River near Starbuck, MN 05302500	Lat 45°36'52", long 95°37'12", in NW¼NE¼ sec.30, T. 125 N., R.39 W., Pope County, Hydrologic Unit 07020005, at culvert on State Highway 28, 4.4 miles west of Starbuck. Drainage area 69.6 mi^2.	1979-92	3-7-92	b12.50	147	6-30-91	b12.54	178

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at high-flow partial-record stations during water year 1992--Continued

Station name and number	Location and drainage area	Period of record	Water year 1992 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft^3/s)	date	gage height (ft)	discharge (ft^3/s)
			Minnesota River basin--Continued					
Spring Creek near Montevideo, MN 05305200	Lat 44°58'41", long 95°42'57", in NW¼NW¼ sec. 5, T. 117 N., R. 40 W., Chippewa County, Hydrologic Unit 07020005, at culvert on State Highway 29, 1.2 miles upstream from mouth, 2.0 miles north of Montevideo. Drainage area 16.0 mi^2.	1959-92	6-17-92	19.73	660	6-17-92	19.73	660
Hawk Creek near Maynard, MN 05314500	Lat 44°52'10", long 95°28'58", in SW¼NW¼ sec. 7, T. 116 N., R.38 W., at Renville and Chippewa County line, Hydrologic Unit 07020004, at bridge on State Highway 23, 3.0 miles southwest of Maynard. Drainage area 474 mi^2.	1949-54#, 1981-92	6-17-92	17.65	2,000	6-18-57	16.10	6,970
Ramsey Creek near Redwood Falls, MN 05316538	Lat 44°33'08", long 95°10'38", in SE¼NE¼ sec.33, T. 113 N., R.36 W., Redwood County, Hydrologic Unit 07020006 at bridge on township road 2.3 miles northeast of KLGR radio towers, on west side of Redwood Falls. Drainage area -.	1991-92	6-17-92	24.10	665	6-4-91	24.69	755
Beaver Creek at Beaver Falls, MN 05316570	Lat 44°35'03", long 95°02'49", in NE¼NW¼ sec. 22, T. 113 N., R.35 W., Renville County, Hydrologic Unit 07020004, at bridge on County Highway 2 in Beaver Falls, 2.2 miles upstream from mouth, 3.8 miles northwest of Morton. Drainage area 194 mi^2.	1972-92	6-16-92	d11.59	890	4-23-85	d11.33	1,070
Spring Creek near Sleepy Eye, MN 05316700	Lat 44°24'12", long 94°44'41", in NE¼SE¼ sec. 24, T. 111 N., R. 33 W., Brown County, Hydrologic Unit 07020007, at culvert on county highway, 4.3 miles upstream from mouth, 7.5 miles north of Sleepy Eye. Drainage area 31.3 mi^2.	1959-92	4-21-92	11.52	210	4-10-85	17.79	930
Cottonwood River near Springfield, MN 05316950	Lat 44°12'12", long 95°02'53", on line between secs. 33 and 34, T.109 N., R.35 W., Brown County, Hydrologic Unit 07020008, at bridge on County Highway 2, 1.3 miles downstream from Mound Creek, 1.0 mile upstream from Coal Mine Creek, 3.5 miles southwest of Springfield. Drainage area 773 mi^2.	1973-92	3-7-92	b21.52	2,450	6-25-84	29.12	8,500

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at high-flow partial-record stations during water year 1992--Continued

Station name and number	Location and drainage area	Period of record	Water year 1992 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft^3/s)	date	gage height (ft)	discharge (ft^3/s)
			Minnesota River basin--Continued					
East Branch Blue Earth River near Walters, MN 05317845	Lat 43°37'58", long 93°42'28", in SE¼SE¼ sec. 16, T.102 N., R.24 W., Faribault County, Hydrologic Unit 07020009, at culvert on State Highway 22, 2.5 miles northwest of Walters. Drainage area 29.6 mi^2.	1991-92	3-9-92	15.15	222	4-28-81 6-1-91	18.17 17.87	500 500
Elm Creek near Trimont, MN 05318195	Lat 43°45'27", long 94°50'30", in NW¼NW¼ sec. 5, T. 103 N., R. 33 W., Martin County, Hydrologic Unit 07020009, at bridge on County Road 103, 12.5 miles northeast of Jackson, 5 miles west Trimont. Drainage area -.	1991-92	7-2-92	22.26	880	6-4-91	g22.92	2,000
Watonwan River near Delft, MN 05318300	Lat 43°59'55", long 95°07'11", in NE¼SE¼ sec. 11, T. 106 N., R.36 W., Cottonwood County, Hydrologic Unit 07020010, at culvert on U.S. Highway 71, 1.7 miles northwest of Delft. Drainage area 13.0 mi^2.	1960-92	7-2-92	17.35	660	5-30-80	17.82	900
South Fork Watonwan River near Ormsby, MN 05318897	Lat 43°53'08", long 94°41'27", in SE¼NW¼ sec.21, T. 105 N., R.32 W., Watonwan County, Hydrologic Unit 07020010, at bridge on township road, 2.6 miles north of Ormsby, 5.0 miles upstream from Willow Creek. Drainage area 109 mi^2.	1979-92	5-31-80 6-31-83 4-23-85 6-15-91 3-2-92	18.40 14.68 15.47 14.42 15.18	g1,920 g760 g980 g700 880	5-31-80	18.40	g1,920
Maple River near Rapidan, MN 05320480	Lat 44°03'54", long 94°01'32", in SW¼ sec.13, T. 107 N., R.27 W., Blue Earth County, Hydrologic Unit 07020011, at bridge on County Highway 35, 3.0 miles southeast of Rapidan, 3.3 miles upstream from mouth. Drainage area g338 mi^2.	1972-92	2-28-92	10.39	2,000	3-1-83	12.73	4,550
Middle Branch Rush River near Gaylord, MN 05326100	Lat 44°30'27", long 94°15'00", in SW¼NW¼ sec. 18, T. 112 N., on line between R. 28 W. and R. 29 W., Sibley County, Hydrologic Unit 07020012, at bridge on township road, 3.0 miles southwest of Gaylord, 10.5 miles upstream from the main branch of Rush River. Drainage area 68.5 mi^2.	1979-92	3-14-92	a17.41	720	6-30-83	19.78	920

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at high-flow partial-record stations during water year 1992--Continued

Station name and number	Location and drainage area	Period of record	Water year 1992 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft^3/s)	date	gage height (ft)	discharge (ft^3/s)
			St. Croix River basin					
Sand Creek near New Prague, MN 05330300	Lat 44°32'37", long 93°32'16", in NE¼NW¼ sec.1, T.112 N., R.23 W., Le Sueur County, Hydrologic Unit 07020012, at culvert on State Highway 13 and 19, 1.9 miles east of New Prague. Drainage area 62.4 mi^2.	1960-92	9-16-92	11.78	450	5-21-60	14.84	1,100
Crooked Creek near Hinckley, MN 05331570	Lat 46°00'42", long 92°31'45", in NE¼NE¼ sec.30, T.41 N., R.17 W., Pine County, Hydrologic Unit 07030001, at culvert on State Highway 48, 2.7 miles upstream from mouth, 8 miles south of Duxbury, 19 miles east of Hinckley. Drainage area 93 mi^2.	1966-70+, 1974-76+, 1979-80+, 1986-92	11-19-91	12.58	590	5-28-89	15.52	1,630
Glaisby Brook near Kettle River, MN 05336200	Lat 46°27'19", long 92°51'34", in SE¼NW¼ sec.22, T.46 N., R.20 W., Carlton County, Hydrologic Unit 07030003, at bridge on State Highways 27 and 73, 1.0 mile upstream from mouth, 2.4 miles south of Kettle River. Drainage area 27.5 mi^2.	1960-70#, 1971-92	4-22-92	b5.12	270	7-22-72	10.18	1,370
Goose Creek at Harris, MN 05339747	Lat 45°35'11", long 92°58'39", in SW¼SW¼ sec.21, T.36 N., R.21 W., Chisago County, Hydrologic Unit 07030005, at culverts on County Highway 9, 0.15 mile east of County Highway 30 in Harris, 8 miles above mouth. Drainage area h60 mi^2.	1986-92	3-8-92	7.27	255	5-5-91	7.40	286
			Cannon River basin					
Cannon River below Sabre Lake near Kilkenny, MN 05348550	Lat 44°17'50", long 93°37'44", in NE¼NE¼ sec.31, T. 110 N., R.23 W., LeSueur County, Hydrologic Unit 07040002, at bridge on township road, 0.25 mile downstream of Sabre Lake, 3 miles southeast of Kilkenny. Drainage area -.	1985-92	3-5-92	b13.12	305	8-8-91	13.73	480
Cannon River at Northfield, MN 05355024	Lat 44°27'19", long 93°09'46", in NE¼NE¼ sec.1, T.111 N., R.20 W., Rice County, Hydrologic Unit 07040002, at Fifth Street bridge in Northfield. Drainage area 934 mi^2.	1980-92	2-29-92	b903.17	3,420	7-28-90	904.87	7,150

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at high-flow partial-record stations during water year 1992--Continued

Station name and number	Location and drainage area	Period of record	Water year 1992 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft^3/s)	date	gage height (ft)	discharge (ft^3/s)
			Zumbro River basin					
Milliken Creek near Concord, MN 05373080	Lat 44°07'13", long 92°49'08", in NW¼NW¼ sec.36, T. 108 N., R.17 W., Dodge County, Hydrologic Unit 07040004, at bridge on County Road 9, 8.0 miles upstream from mouth, 2.1 miles southeast of Concord. Drainage area 22.2 mi^2.	1979-92	4-22-92	c11.42	149	5-31-82	14.50	580
Zumbro River at Zumbro Falls, MN 05374000	Lat 44°17'12", long 92°25'56", in sec.36, T.110 N., R.14 W., Wabasha County, Hydrologic Unit 07040004, on left bank in Zumbro Falls, 1,000 ft downstream from Cold Creek, 0.7 mi upstream from bridge on U.S. Highway 63, and 6.3 mi downstream from North Fork. Drainage area h1,130 mi^2.	1909-17#, 1929-80#, 1990-92	3-3-92	13.70	7,090	7-21-51	30.80	35,900
			Whitewater River basin					
Middle Fork Whitewater River near State Park Group Camp near St. Charles, MN 05376110	Lat 44°03'21", long 92°03'13", in SW¼ sec.20, T.107 N., R.10 W., Olmsted County, Hydrologic Unit 07040003, at wooden bridge near Group Camp in Whitewater State Park. Drainage area -.	1986-92	5-16-92	63.76	†	4-24-90	67.39	†
			Root River basin					
Root River near Lanesboro, mn 05384000	Lat 43°44'58", long 91°58'43", in sec. 1, T.103 N., R.10 W., Fillmore County, Hydrologic Unit 07040008, on left bank 0.5 mi upstream from highway bridge, 1.2 mi upstream from South Branch, and 2.5 mi northeast of Lanesboro. Drainage area 615 mi^2.	1910-17# 1940-85# 1986 1987-90# 1991-92	4-22-92	5.67	b3,150	3-29-62	16.11	22,100
Root River at Rushford, MN 05384350	Lat 43°48'11", long 91°45'10", in NE¼NE¼ sec.23, T.104 N., R.8 W., Fillmore County, Hydrologic Unit 07040008, at U.S. Highway 16 bridge on south side of Rushford. Drainage area -.	1985-92	4-22-92	20.20	4,700	4-25-90	-	9,000

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at high-flow partial-record stations during water year 1992--Continued

Station name and number	Location and drainage area	Period of record	Water year 1992 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft^3/s)	date	gage height (ft)	discharge (ft^3/s)
			Root River basin--Continued					
Rush Creek near Rushford, MN 05384500	Lat 43°50'00", long 91°46'40", on line between secs. 3 and 10, T.104 N., R.8 W., Fillmore County, Hydrologic Unit 07040008, at bridge, 1.5 miles northwest of Rushford, 3.0 miles upstream from mourth. Drainage area 129 mi^2.	1942-79#, 1980-92	11-19-91	2.41	270	3-26-50	13.54	11,600
South Fork Root River near Houston, MN 05385500	Lat 43°44'19", long 91°33'50", in $NE^1/_4SW^1/_4$ sec.9, T.103 N., R.6 W., Houston County, Hydrologic Unit 07040008, on left bank, 50 feet downstream from State Highway 76 bridge, 0.5 mile upstream from Badger Creek, 1.5 mile south of Houston. Drainage area 275 mi^2.	1953-83#, 1985-92	3-4-92	10.09	2,720	6-21-74	13.81	11,000
			Crooked Creek basin					
Crooked Creek at Freeburg, MN 05387030	Lat 43°36'37", long 91°21'39", in $SW^1/_4NE^1/_4$ sec.30, T.102 N., R.4 W., Houston County, Hydrologic Unit 07060001, at bridge on State Highway 249 at Freeburg. 6.5 miles upstream from mouth. Drainage area 44.2 mi^2.	1979-92	3-4-92	19.02	†	3-4-92	19.02	†
			Iowa River basin					
Little Cedar River near Johnsburg, MN 05457778	Lat 43°30'52", long 92°45'19", in $NW^1/_4NE^1/_4$ sec.33, T.101 N., R.16 W., Mower County, Hydrologic Unit 07080201, at bridge on County Road 6, 1 mile northeast of Johnsburg, 1 mile north Minnesota-Iowa border. Drainage area 46 mi^2.	1986-92	9-9-86 10-12-86 3-25-88 3-24-89 4-24-90 8-8-91 4-21-92	14.66 14.24 12.33 10.87 13.76 14.11 13.04	i2,850 i2,360 i,080 i545 i1,970 i2,250 1,480	9-9-86	14.66	i2,850
Bancroft Creek at Bancroft, MN 05458960	Lat 43°42'09", long 93°21'23", in $SW^1/_4SE^1/_4$ sec.21, T.103 N., R.21 W., Freeborn County, Hydrologic Unit 07080202, at bridge on County Road 14, 1.6 miles northeast of Fountain Lake, 1 mile north of Interstate 90. Drainage area 29.1 mi^2.	1985+, 1986-92	7-10-92	5.36	215	3-23-89	6.96	475

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECRD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at high-flow partial-record stations during water year 1992--Continued

Station name and number	Location and drainage area	Period of record	Water year 1992 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft^3/s)	date	gage height (ft)	discharge (ft^3/s)
			Iowa River basin--Continued					
Fourmile Creek near Dunnell, MN 05476900	Lat 43°34'57", long 94°46'26", in SW¼NW¼ sec.2, T.101 N., R.33 W., Martin County, Hydrologic Unit 07100003, at bridge on State Highway 4, 0.6 mile upstream from mouth, 1.6 miles north of Dunnell. Drainage area 14.0 mi^2.	1960-92	7-2-92	a14.49	320	7-4-62	16.15	2,200
			Des Moines River basin					
East Fork Des Moines River near Ceylon, MN 05476989	Lat 43°33'53", long 94°39'15", in NW¼SW¼ sec.11, T.101 N., R,32 W., Martin County, Hydrologic Unit 07010003, at bridge on County Road 23, 2.4 miles northwest of Ceylon. Drainage area 154 mi^2.	1986-92	7-5-92	19.71	840	6-5-91	21.18	1,100
			Big Sioux River basin					
Pipestone Creek near Pipestone, MN 06482500	Lat 44°04'54", long 96°18'27", in SE¼SE¼ sec.12, T.107 N., R.46 W., Pipestone County, Hydrologic Unit 10170203, at bridge on Trunk Highway 75, 5.5 miles north of Pipestone. Drainage area -.	1991-92	6-22-91 3-9-92	17.50 c15.76	i360 60	6-22-91	17.50	i360
Beaver Creek at Valley Springs, S.D. 06482745	Lat 43°35'10", long 96°28'20", in NW¼NW¼ sec.3, T.101 N., R.47 W., Minnehaha County, South Dakota Hydrologic Unit 10170203, at bridge on County Road 103 (Valley Drive), 1 mile west of South Dakota-Minnesota border, 2.5 miles south of Interstate 90. Drainage area 104 mi^2.	1986-92	7-2-92	24.69	2,200	7-2-92	24.69	2,200
Chanarambi Creek near Edgerton, MN 06482933	Lat 43°53'59", long 96°03'39", in NW¼SW¼ sec.18, T.105 N., R.43 W., near Murray and Pipestone County line, Hydrologic Unit 10170204, at bridge on township road, 3.8 miles northeast of Edgerton, 7.4 miles upstream from mouth. Drainage area 56.1 mi^2.	1979-92	8-7-92	c13.20	b250	9-19-86	18.09	580

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at high-flow partial-record stations during water year 1992--Continued

Station name and number	Location and drainage area	Period of record	Water year 1992 maximum			Period of record maximum		
			date	gage height (ft)	discharge (ft^3/s)	date	gage height (ft)	discharge (ft^3/s)
			Big Sioux River basin					
Rock River at Luverne, MN 06483000	Lat 43°39'15", long 96°12'03", in SW¼NE¼ sec.11, T.102 N., R.45 W., Rock County, Hydrologic Unit 10170204, at bridge on Main Street (County Highway 4) in Luverne. Drainage area 425 mi^2.	1911-14#, 1972-92	7-2-92	c8.37	b2,600	6-13-14	13.20	11,600
Little Rock River near Rushmore, MN 06483350	Lat 43°32'36", long 95°48'58", in NE¼NE¼ sec.24, T.101 N., R.42 W., Nobles County, Hydrologic Unit 10170204, at bridge #4967, on County Road 6, 1.5 miles west of Ransom, 5.1 miles south of Rushmore. Drainage area .	1991-92	7-3-92	24.22	370	6-6-91	24.67	g520
			Little Sioux River basin					
Little Sioux River near Spafford, MN 06603530	Lat 43°36'08", long 95°15'27", in NE¼NE¼ sec.34, T.102 N., R.37 W., Jackson County, Hydrologic Unit 10230003, at bridge on county highway, 1.6 miles downstream from Jackson County ditch No. 11, 5.8 miles east of Spafford. Drainage area 41.1 mi^2.	1962-92	7-10-92	b9.44	470	6-29-69	12.06	4,500

< Less than. peak stage unknown, discharge estimated.
+ Operated as low flow site.
# Operated as a continuous-record gaging station.
† Discharge not determined.
a Backwater from ice.
b Affected by shifting control.
c Not annual maximum gage height.
d Backwater from aquatic growth or debris.
e Peak stage unknown.
f Discharge estimated.
g Revised.
h Approximately.
i Not previously published.

Miscellaneous Sites

St. Francis River near Big Lake
July 9, 1965

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements at miscellaneous sites

Measurements of streamflow at points other than gaging stations are given in the following table. The measurements of base flow are designated by an asterisk (*); measurements of peak flow by a dagger (†).

Discharge measurements made at miscellaneous sites during water year 1992

Stream	Tributary	Location	Drainage area (mi^2)	Period of record	Date	Discharge (ft^3/s)
		Mississippi River main stem				
Mississippi River	Gulf of Mexico	Lat 44°58'46", long 93°14'50", in SE¼SE¼ sec.23, T.29 N., R.24 W., Hennepin County, Hydrologic Unit 07010206, at lower St. Anthony Falls lock and dam in Minneapolis at River Mile 853.3 upstream from Ohio River. (Discharge measurements made between Hennepin Avenue and Franklin Avenue bridges over the Mississippi River are included). (05288920).	a19,700	1912, 1938-39, 1941, 1943, 1953-54, 1957, 1963-85, 1990-92	3-26-92 5-15-92 9-24-92	†12,200 8,370 4,200
		Minnesota River basin				
West Branch Lac Qui Parle River	Lac Qui Parle River	Lat 44°55'36", long 96°03'16", in NE¼SW¼ sec.21, T.117 N., R.43 W., Lac Qui Parle County, Hydrologic Unit 07020003, at bridge #5356, on State Highway 23, at Dawson.	-	1992	6-18-92	†6,550
Chippewa River	Minnesota River	Lat 44°56'53", long 95°43'50", in NE¼SE¼ sec.18, T.117 N., R.40 W., Chippewa County, Hydrologic Unit 07020005, at bridge on State Highway 7, at Montevideo (05305400).	-	1990-92	6-18-92 6-20-92 7-9-92	1,860 †3,090 308
Chippewa River below diversion	Minnesota River	Lat 45°01'10", long 95°47'30", in NW¼ sec.22, T.118 N., R.41 W., Chippewa County, Hydrologic Unit 07020005, 1.4 miles northeast of Watson.	-	1945-92	11-28-91 1-23-92 6-20-92 9-9-92	84 80 †1,280 82
Minnesota River	Mississippi River	Lat 44°43'54", long 95°25'14", in SE¼SE¼ sec.27, T. 115 N., R. 38 W., Renville County, Hydrologic Unit 07020004, at bridge on County Highway 10, 4.5 miles southwest Sacred Heart (05314560).	-	1990-92	6-30-92	†7,190
Redwood River	Minnesota River	Lat 44°30'00", long 95°14'51", in SW¼SW¼ sec.13, T. 112 N., R. 37 W., Redwood County, Hydrologic Unit, 07020006, at bridge on County Road 30, 4 miles northeast of Seaforth (05316470).	-	1992	5-5-92 6-18-92 6-19-92 6-20-92 7-28-92	158 †1,220 743 579 120

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at miscellaneous sites during water year 1992--Continued

Stream	Tributary	Location	Drainage area (mi^2)	Period of record	Date	Discharge (ft^3/s)
		Minnesota River basin--Continued				
Judicial Ditch	Redwood River	Lat 44°30'00", long 95°12'06", in SW¼SE¼ sec.17, T.112 N., R.36 W., Redwood County, Hydrologic Unit 07020006, at bridge on County Road 30, 6.5 miles northeast of Seaforth, 5 miles southwest of Redwood Falls (05316490).	-	1992	5-5-92 6-17-92 6-18-92 6-19-92 6-20-92 7-1-92	*3.08 †134 83 38 30 *2.48
Minnesota River	Mississippi River	Lat 44°32'46", long 94°59'45", in NE¼SE¼ sec.36, T.113 N., R.35 W., Renville County, Hydrologic Unit 07020007, at bridge on State Highway 19 and Trunk Highway 71 at Morton (05316580).	-	1990-92	6-30-92	+8,630
Minnesota River	Mississippi River	Lat 44°21'43", long 94°29'50", in SW¼NE¼ sec.1, T.110 N., R.31 W., Nicollet County, Hydrologic Unit 07020007, at bridge on County Highway 35, 1 mile northwest of New Ulm (05316760).	-	1990-92	6-30-92	†9,580
Blue Earth River	Minnesota River	Lat 43°42'30", long 94°08'35", in NW¼SW¼ sec.24, T.103 N., R.28 W., Faribault County, Hydrologic Unit 07020009, at bridge on township road, above South Creek, 4 miles south of Winnebago, MN (0531835).	-	1992	3-31-92 7-9-92 8-6-92 8-7-92 9-29-92	†1,170 774 443 678 138
South Creek	Blue Earth River	Lat 43°42'33", long 94°10'38", in NW¼SE¼ sec.22, T.103 N., R.28 W., Faribault County, Hydrologic Unit 07020009, at bridge on County Highway 5, 3.5 miles south of Winnebago (05318140).	-	1992	3-23-92 3-31-92 6-16-92 7-9-92 7-10-92 9-30-92	†255 185 38 134 †162 *15
Blue Earth River	Minnesota River	Lat 43°44'09", long 94°09'42", in NE¼SW¼ sec.11, T.103 N., R.28 W., Faribault County, Hydrologic Unit 07020009, at bridge on County Road 5, 2 miles south of Winnebago (05318141).	-	1992	3-31-92 7-9-92 7-22-92 7-28-92 8-7-92 9-30-92	†1,530 1,010 942 †1,320 635 156
Blue Earth River at mouth	Minnesota River	Lat 44°09"48", long 94°02'12", in SW¼NE¼ sec.13, T.108 N., R.27 W., Blue Earth County, Hydrologic Unit 07020009, at confluence with Minnesota River in Sibley Park above dam in Mankato (05322000).	-	1990-92	10-30-91 3-3-92 4-24-92	490 †13,100 8,890

See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at miscellaneous sites during water year 1992--Continued

Stream	Tributary	Location	Drainage area (mi^2)	Period of record	Date	Discharge (ft^3/s)
		Minnesota River basin--Continued				
Minnesota River	Mississippi River	Lat 44°18'26", long 93°57'35", in SE¼NW¼ sec.28, T.110 N., R.26 W., Nicollet County, Hydrologic Unit 07020007, at bridge on State Highway 22 at St. Peter (05325200).	-	1990-92	9-24-92	2,920
					9-25-92	2,950
					9-26-92	3,310
Minnesota River	Mississippi River	Lat 44°31'46", long 93°54'02", in SE¼SW¼ sec.1, T.112 N.., R.26 W., Sibley County, Hydrologic Unit 07020012, at bridge on State Highway 19 at Henderson (05326450).[a]	-	1990-92	3-25-92	†16,160
					3-30-92	13,300
					4-17-92	8,100
					5-12-92	6,490
					5-22-92	5,260
					8-20-92	5,200
					9-14-92	3,950

a Approximately.

Water-Quality Partial-Record Stations

St. Louis River at Scanlon
Mark Have, Wally Larson, and Herman Feltz
processing samples on November 15, 1978

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATONS

Water-quality partial-record stations are particular sites where chemical-quality, biological and (or) sediment data are collected systematically over a period of years for use in hydrologic analyses. Letter E indicates estimated value. Letter K indicates non-ideal colony count.

05305400 CHIPPEWA RIVER AT MONTEVIDEO

WATER-QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)
JUN 18...	1820	1860	293	7.9	20.0	7.9	738	0.7	208

DATE	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
JUN 18...	66	0.080	2.40	2.40	0.110	0.120	1.5	0.70	0.410

DATE	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343)	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344)	SED. SUSP. FALL DIAM. % FINER THAN .500 MM (70345)
JUN 18...	0.160	0.150	0.150	226	92	95	98	100

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

05314560 MINNESOTA RIVER NEAR SACRED HEART

WATER-QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS - PENDED (MG/L) (00535)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)
JUN 30...	1230	7190	733	7.9	19.5	10.1	738	4.6	60	7	0.050	1.70

DATE	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L(AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED MG/L) AS P) (00671)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)	SEDI-MENT, SUS-PENDED (MG/L) (80154)
JUN 30...	1.70	0.050	0.060	1.3	0.80	0.190	0.070	0.080	0.060	8.40	0.300	74

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

05316580 MINNESOTA RIVER AT MORTON

WATER-QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)
JUN 30...	0850	8630	685	8.0	20.0	7.5	737	1.7	59	21	0.040	2.30

DATE	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L(AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED MG/L)FLUOROM (00671)	CHLOR-A PHYTO-PLANK-TON CHROMO (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO (UG/L) (70954)	SEDI-MENT, SUS-PENDED (MG/L) (80154)
JUN 30...	2.30	0.040	0.030	1.1	0.70	0.110	0.090	0.090	0.070	12.0	<0.100	62

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

05316760 MINNESOTA RIVER NEAR NEW ULM

WATER-QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)
JUN 30...	1400	9580	663	8.1	20.5	8.6	737	3.3	40	18	0.060	2.60

DATE	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)	SEDI-MENT, SUS-PENDED (MG/L) (80154)
JUN 30...	2.60	0.020	0.010	1.0	0.60	0.080	0.090	0.080	0.070	21.0	1.20	35

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

05322000 BLUE EARTH RIVER AT MOUTH AT MANKATO

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L) (00340)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
OCT										
30...	1100	489	818	8.4	5.5	14.0	755	27	2.9	120
NOV										
25...	1445	3280	790	7.9	0.5	13.9	751	22	1.3	160
JAN										
14...	1245	1730	871	8.0	0.5	13.2	740	18	1.5	51
FEB										
14...	1030	1630	796	7.3	0.5	14.6	742	26	1.4	K18
MAR										
03...	1400	13100	480	8.7	1.0	13.8	743	79	9.3	--
11...	1115	12600	639	8.3	1.5	13.3	737	32	1.8	--
18...	1145	7210	707	8.1	3.5	15.0	742	34	2.2	--
25...	1130	7370	692	8.0	6.5	12.1	741	27	>8.7	K46
APR										
01...	0830	5820	731	8.7	4.5	12.7	746	18	2.4	--
09...	1030	3460	811	8.4	8.5	14.2	745	25	2.2	--
15...	1400	2960	716	8.4	7.5	11.4	740	22	1.9	20
20...	1445	4670	744	8.1	9.5	11.9	728	--	1.4	--
21...	1000	6080	715	8.2	8.5	10.9	727	--	2.2	--
22...	0945	7630	705	8.5	7.0	11.8	739	40	1.8	--
23...	1200	8540	697	7.9	6.0	11.8	744	--	2.5	--
24...	1015	8890	695	7.4	5.5	14.2	745	--	1.3	--
27...	1115	6870	748	8.1	7.5	12.0	751	--	1.3	--
30...	0845	5350	754	8.3	13.0	10.3	738	--	1.6	--
MAY										
06...	1115	3340	695	8.2	15.5	11.6	749	13	2.1	K8
13...	0850	2360	658	8.3	17.0	11.6	750	37	5.3	--
20...	1100	2390	658	7.9	21.0	13.6	748	35	6.2	--
27...	1145	3000	683	8.4	15.5	12.7	747	25	5.2	--
JUN										
02...	1100	2400	800	7.9	19.5	10.5	745	18	3.5	58
09...	1115	1690	708	8.0	20.0	12.1	746	27	3.0	--
19...	1200	6270	643	8.3	20.0	10.2	743	42	2.9	--
25...	1000	3120	698	8.1	19.5	10.6	739	29	2.0	--
JUL										
01...	1000	1760	754	8.2	20.5	9.6	735	17	7.1	--
07...	1100	4280	786	7.8	19.0	9.1	738	23	2.9	--
14...	1200	5900	657	7.7	19.5	10.8	740	45	1.5	80
22...	1045	3710	721	7.8	19.0	8.6	743	24	3.0	0
29...	1100	4350	777	7.7	20.0	7.4	743	20	1.5	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

05322000 BLUE EARTH RIVER AT MOUTH AT MANKATO--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)
OCT										
30...	720	17	20	0.040	5.20	5.20	0.060	0.050	1.1	0.70
NOV										
25...	390	37	12	0.040	17.0	16.0	0.120	0.120	0.90	0.80
JAN										
14...	180	15	20	0.040	15.0	16.0	0.100	0.090	0.80	0.90
FEB										
14...	31	13	5	0.060	12.0	12.0	0.130	0.130	1.1	0.80
MAR										
03...	--	444	48	0.060	7.40	7.40	0.330	0.320	1.9	1.4
11...	--	170	4	0.050	13.0	13.0	0.090	0.090	0.80	0.80
18...	--	<1	<1	0.050	14.0	13.0	0.070	0.070	0.80	0.70
25...	370	86	26	0.030	15.0	15.0	0.040	0.030	0.70	0.50
APR										
01...	--	37	15	0.030	13.0	13.0	0.030	0.030	0.60	0.50
09...	--	12	12	0.030	12.0	12.0	0.010	<0.010	0.60	0.50
15...	640	28	18	0.030	12.0	12.0	0.030	0.010	0.70	0.40
20...	--	78	24	0.030	13.0	13.0	0.030	0.020	1.2	0.50
21...	--	121	22	0.040	13.0	13.0	0.040	0.020	1.0	0.50
22...	--	189	40	0.040	15.0	15.0	0.050	0.030	1.1	0.70
23...	--	139	26	0.040	15.0	15.0	0.060	0.060	1.0	0.60
24...	--	56	23	0.030	15.0	15.0	0.050	0.050	1.1	0.60
27...	--	66	20	0.020	14.0	14.0	0.080	0.020	0.60	0.60
30...	--	24	10	0.020	14.0	14.0	0.040	0.010	0.60	0.50
MAY										
06...	K9	10	10	0.020	12.0	12.0	0.020	<0.010	0.70	0.40
13...	--	35	<1	0.040	10.0	10.0	0.030	0.030	0.60	0.50
20...	--	8	<1	0.040	11.0	11.0	0.020	0.020	1.0	0.70
27...	--	73	16	0.040	12.0	12.0	0.030	0.030	1.2	0.90
JUN										
02...	K32	100	7	0.030	13.0	13.0	0.030	0.020	0.60	0.60
09...	--	42	8	0.030	12.0	12.0	0.040	0.030	1.0	0.70
19...	--	309	38	0.070	15.0	15.0	0.040	0.020	1.2	1.2
25...	--	392	96	0.030	14.0	14.0	0.020	0.030	1.2	0.60
JUL										
01...	--	52	25	0.020	11.0	11.0	0.030	0.020	1.2	0.80
07...	--	146	19	0.020	12.0	12.0	0.040	0.040	1.0	1.0
14...	450	160	26	0.020	11.0	11.0	0.030	0.020	0.90	0.60
22...	--	138	20	0.020	11.0	11.0	0.030	0.010	0.90	0.80
29...	--	103	14	0.010	13.0	13.0	0.030	0.020	1.1	0.70

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

05322000 BLUE EARTH RIVER AT MOUTH AT MANKATO--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)	SEDI-MENT, SUS-PENDED (MG/L) (80154)
OCT									
30...	0.080	0.020	0.020	0.020	6.5	1.4	20.0	<0.100	132
NOV									
25...	0.200	0.120	0.110	0.100	6.5	1.3	1.00	<0.100	335
JAN									
14...	0.120	0.090	0.090	0.070	5.3	0.6	4.50	<0.900	--
FEB									
14...	0.160	0.110	0.110	0.100	6.1	0.6	1.70	<0.200	130
MAR									
03...	0.370	0.210	0.240	0.190	9.4	>6.3	7.50	<1.00	896
11...	0.140	0.130	0.130	0.120	6.0	2.9	2.70	0.400	369
18...	0.160	0.090	0.110	0.090	5.3	1.9	2.80	<0.100	297
25...	0.140	0.060	0.060	0.060	5.2	2.2	5.10	0.300	209
APR									
01...	0.050	0.040	0.050	0.040	7.8	1.5	4.70	<0.100	306
09...	0.040	<0.010	0.030	0.020	5.4	1.4	21.0	1.30	135
15...	0.070	0.010	0.020	0.020	4.6	1.0	4.00	<0.100	348
20...	0.140	0.040	0.070	0.040	--	--	--	--	436
21...	0.240	0.060	0.120	0.060	--	--	--	--	370
22...	0.250	0.070	0.120	0.070	5.6	3.2	9.80	<0.100	421
23...	0.220	0.080	0.150	0.080	--	--	--	--	377
24...	0.260	0.080	0.140	0.080	--	--	--	--	333
27...	0.070	0.050	0.070	0.040	--	--	--	--	154
30...	0.050	0.040	0.040	0.040	--	--	--	--	135
MAY									
06...	0.050	<0.010	0.020	0.010	4.8	--	14.0	0.500	86
13...	0.010	<0.010	0.010	<0.010	4.7	4.4	11.0	1.20	92
20...	0.060	0.010	0.020	<0.010	5.1	>5.0	39.0	3.20	100
27...	0.180	0.030	0.030	0.010	4.6	4.5	34.0	2.20	256
JUN									
02...	0.070	0.030	0.040	0.020	4.8	--	25.0	1.90	111
09...	0.080	0.070	0.070	0.020	4.7	--	15.0	0.900	96
19...	0.370	0.160	0.150	0.140	6.9	>5.0	11.0	0.900	344
25...	0.190	0.090	0.100	0.080	5.1	2.1	6.40	0.200	160
JUL									
01...	0.150	0.060	0.060	0.040	5.7	2.0	16.0	1.20	122
07...	0.250	0.090	0.120	0.090	5.9	6.0	8.40	0.500	198
14...	0.230	0.100	0.140	0.100	6.0	2.9	9.60	0.500	189
22...	0.150	0.050	0.110	0.080	5.7	3.8	15.0	0.600	224
29...	0.210	0.080	0.130	0.080	68	5.0	--	--	216

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

05322000 BLUE EARTH RIVER AT MOUTH AT MANKATO--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L) (00340)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
AUG										
12...	1130	5270	747	7.7	20.5	8.6	748	34	3.1	--
SEP										
23...	0915	1490	759	8.3	16.5	11.5	749	23	4.2	120

DATE	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)
AUG										
12...	--	103	9	0.030	11.0	11.0	0.020	0.030	1.0	0.90
SEP										
23...	190	13	1	0.010	7.90	7.70	0.020	0.020	1.1	0.70

DATE	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)	SEDI-MENT, SUS-PENDED (MG/L) (80154)
AUG									
12...	0.230	0.130	0.150	0.110	6.7	2.7	5.70	<0.100	243
SEP									
23...	0.100	0.020	0.030	0.010	5.8	2.6	39.0	1.90	125

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

05325200 MINNESOTA RIVER AT ST. PETER

WATER-QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L) (00340)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)
AUG									
24...	1500	2920	884	8.2	23.0	9.2	744	19	6.1
25...	1400	2950	818	8.2	20.5	7.9	745	16	5.9
26...	0900	3310	787	8.2	19.0	8.2	749	25	6.5

DATE	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)
AUG									
24...	86	5	0.010	4.10	4.20	0.020	0.020	0.60	0.60
25...	97	<1	0.020	3.60	3.70	0.070	0.060	0.60	0.50
26...	100	13	0.010	3.50	3.50	0.020	0.020	0.60	0.50

DATE	PHOS-PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)	SEDI-MENT, SUS-PENDED (MG/L) (80154)
AUG									
24...	0.070	0.010	0.040	0.010	6.1	>5.0	70.0	4.30	119
25...	0.090	0.030	0.070	0.020	5.8	4.4	49.0	3.60	131
26...	0.100	0.030	0.070	0.030	5.6	4.6	58.0	4.50	121

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

05326400 RUSH RIVER NEAR HENDERSON, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L) (00340)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)
JUL											
02...	1145	2310	341	7.7	17.5	9.0	734	--	4.9	1540	128
AUG											
25...	1600	63	676	8.3	18.0	9.9	746	27	4.5	27	19
26...	1430	123	710	8.1	19.0	10.1	750	--	4.5	46	11
SEP											
16...	1310	1000	464	7.9	20.5	7.8	742	--	7.4	720	104

DATE	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
JUL											
02...	0.050	7.90	7.70	0.040	0.050	2.7	0.70	0.870	0.290	0.250	0.250
AUG											
25...	0.030	2.70	2.70	0.030	0.020	0.80	0.70	0.170	0.090	0.100	0.070
26...	0.040	3.90	4.00	0.020	0.010	0.90	0.80	0.260	0.210	0.200	0.180
SEP											
16...	0.060	6.90	6.60	0.050	0.050	1.5	0.90	0.570	0.350	0.320	0.330

DATE	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343)	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344)	SED. SUSP. FALL DIAM. % FINER THAN .500 MM (70345)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
JUL										
02...	--	--	5.80	<0.100	1980	--	--	--	--	61
AUG										
25...	7.3	1.7	18.0	1.00	37	--	--	--	--	--
26...	--	--	23.0	0.800	67	--	--	--	--	--
SEP										
16...	--	--	--	--	1620	63	78	91	100	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

05326450 MINNESOTA RIVER AT HENDERSON

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	BARO-METRIC PRES-SURE- (MM OF HG) (00025)	OXYGEN DEMAND, CHEM-ICAL, (HIGH LEVEL) (MG/L) (00340)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)
MAR									
25...	1400	16200	--	--	--	--	--	--	--
30...	1330	13300	--	--	--	--	--	--	--
APR									
17...	1130	8100	--	--	8.5	--	--	--	--
MAY									
12...	1650	6490	--	--	--	--	--	--	--
22...	1515	5260	--	--	--	--	--	--	--
AUG									
20...	1300	5200	--	--	--	--	--	--	--
24...	1100	3920	888	8.1	22.5	8.6	744	23	6.3
25...	0845	3960	841	8.1	21.0	8.0	745	29	5.6
26...	1245	4220	805	8.2	19.5	8.8	749	20	6.1
SEP									
14...	1620	3950	--	--	--	--	--	--	--

DATE	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)
MAR									
25...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
APR									
17...	--	--	--	--	--	--	--	--	--
MAY									
12...	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
AUG									
20...	--	--	--	--	--	--	--	--	--
24...	91	23	0.010	4.30	4.40	<0.010	0.010	0.70	0.60
25...	102	22	0.010	3.90	4.00	0.020	0.020	0.80	0.40
26...	102	19	0.010	3.50	3.50	<0.010	<0.010	0.60	0.60
SEP									
14...	--	--	--	--	--	--	--	--	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

05326450 MINNESOTA RIVER AT HENDERSON--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)	SEDI-MENT, SUS-PENDED (MG/L) (80154)
MAR									
25...	--	--	--	--	--	--	--	--	160
30...	--	--	--	--	--	--	--	--	225
APR									
17...	--	--	--	--	--	--	--	--	106
MAY									
12...	--	--	--	--	--	--	--	--	132
22...	--	--	--	--	--	--	--	--	107
AUG									
20...	--	--	--	--	--	--	--	--	137
24...	0.070	0.020	0.050	0.020	6.2	4.9	60.0	3.30	157
25...	0.070	<0.010	0.080	0.010	5.8	4.4	59.0	3.90	144
26...	0.100	0.030	0.100	0.030	5.9	4.5	52.0	3.50	153
SEP									
14...	--	--	--	--	--	--	--	--	179

Water-Quality Miscellaneous Sites

Minnesota River at Courtland
Collecting water-quality samples, Greg Payne and Mark Brigham
September 1991

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

Samples are collected at sites other than gaging stations and partial-record stations to give better areal coverage in a river basin. Such sites are referred to as miscellaneous sites. Letter K indicates non-ideal colony count.

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

	DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)
05337100			SNAKE RIVER AT PLINY, MN (LAT 46 20 21N LONG 093 15 42W)					
	AUG 1992 12...	0800	0.72	166	7.1	18.5	740	3.8
05337150			SNAKE RIVER NEAR MCGRATH, MN (LAT 46 13 05N LONG 093 14 25W)					
	AUG 1992 12...	1030	9.3	129	8.5	20.0	740	7.6
05337220			SNOWSHOE BROOK NEAR WARMAN, MN (LAT 46 01 29N LONG 093 14 20W)					
	AUG 1992 12...	1650	0.57	240	8.2	18.0	745	9.7
05337300			KNIFE RIVER NEAR WARMAN, MN (LAT 46 02 47N LONG 093 25 57W)					
	AUG 1992 14...	1600	2.8	189	7.7	21.5	740	8.4
05337500			SNAKE RIVER AT MORA, MN (LAT 45 51 50N LONG 093 17 47W)					
	AUG 1992 19...	1830	46	262	8.4	21.0	750	10.6
05337530			LITTLE ANN RIVER NEAR MORA, MN (LAT 45 56 01N LONG 093 25 11W)					
	AUG 1992 13...	1925	2.1	201	7.9	19.5	745	8.5
05337550			ANN RIVER NEAR MORA, MN (LAT 45 50 07N LONG 093 19 54W)					
	AUG 1992 18...	1600	6.4	257	8.1	22.0	750	11.5
05337600			GROUNDHOUSE RIVER NEAR OGILVIE, MN (LAT 45 48 12N LONG 093 23 52W)					
	AUG 1992 15...	1520	2.8	255	7.7	17.5	750	9.9
05337790			MUD CREEK AT QUAMBA, MN (LAT 45 55 10N LONG 093 09 48W)					
	AUG 1992 13...	0915	2.0	270	7.5	17.5	750	5.8
05337900			SNAKE RIVER AT GRASSTON, MN (LAT 45 47 19N LONG 093 08 48W)					
	AUG 1992 16...	1530	104	252	8.5	22.0	745	11.8

ANALYSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

	DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)
454718093122500			RICE CREEK NEAR GRASSTON MN (LAT 45 47 18N LONG 093 12 25W)					
	AUG 1992 17...	1055	3.1	228	9.0	18.5	745	5.8
454722093083000			SNAKE RIVER NEAR GRASSTON MN (LAT 45 47 22N LONG 093 08 30W)					
	AUG 1992 17...	1314	102	253	8.2	24.0	740	8.6
454737093043800			SNAKE RIVER WEST OF POKEGAMA LAKE NR PINE CITY M(LAT 45 47 37N LONG 093 04 38W)					
	AUG 1992 26...	0900	--	254	7.9	16.0	746	7.2

	DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)
05337100			SNAKE RIVER AT PLINY, MN (LAT 46 20 21N LONG 093 15 42W)				
	AUG 1992 12...	220	240	<0.050	0.010	0.060	<0.010
05337150			SNAKE RIVER NEAR MCGRATH, MN (LAT 46 13 05N LONG 093 14 25W)				
	AUG 1992 12...	42	160	<0.050	0.030	0.020	<0.010
05337220			SNOWSHOE BROOK NEAR WARMAN, MN (LAT 46 01 29N LONG 093 14 20W)				
	AUG 1992 12...	180	140	<0.050	<0.010	0.030	<0.010
05337300			KNIFE RIVER NEAR WARMAN, MN (LAT 46 02 47N LONG 093 25 57W)				
	AUG 1992 14...	78	52	<0.050	0.030	0.040	0.020
05337500			SNAKE RIVER AT MORA, MN (LAT 45 51 50N LONG 093 17 47W)				
	AUG 1992 19...	68	46	0.310	0.030	0.040	0.030
05337530			LITTLE ANN RIVER NEAR MORA, MN (LAT 45 56 01N LONG 093 25 11W)				
	AUG 1992 13...	110	180	0.050	0.010	0.050	<0.010

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

	DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)
05337550		ANN RIVER NEAR MORA, MN (LAT 45 50 07N LONG 093 19 54W)					
	AUG 1992 18...	K130	K35	<0.050	0.030	0.040	<0.010
05337600		GROUNDHOUSE RIVER NEAR OGILVIE, MN (LAT 45 48 12N LONG 093 23 52W)					
	AUG 1992 15...	98	42	1.50	0.040	0.030	0.010
05337790		MUD CREEK AT QUAMBA, MN (LAT 45 55 10N LONG 093 09 48W)					
	AUG 1992 13...	K140	K200	<0.050	0.020	0.060	<0.010
05337900		SNAKE RIVER AT GRASSTON, MN (LAT 45 47 19N LONG 093 08 48W)					
	AUG 1992 16...	K30	K120	0.072	0.030	<0.010	<0.010
454718093122500		RICE CREEK NEAR GRASSTON MN (LAT 45 47 18N LONG 093 12 25W)					
	AUG 1992 17...	110	K75	<0.050	0.030	0.080	0.050
454722093083000		SNAKE RIVER NEAR GRASSTON MN (LAT 45 47 22N LONG 093 08 30W)					
	AUG 1992 17...	40	K18	0.062	0.020	<0.010	<0.010
454737093043800		SNAKE RIVER WEST OF POKEGAMA LAKE NR PINE CITY M(LAT 45 47 37N LONG 093 04 38W)					
	AUG 1992 26...	K140	92	0.230	0.060	0.030	0.020

	DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)
454900093011900			SNAKE RIVER EAST OF POKEGAMA LAKE NR PINE CITY M(LAT 45 49 00N LONG 093 01 19W)					
	AUG 1992 27...	1200	84	250	8.0	18.0	744	8.0
454954093091500			MUD CREEK NEAR GRASSTON MN (LAT 45 49 54N LONG 093 09 15W)					
	AUG 1992 16...	1100	4.6	276	7.9	19.0	745	9.4

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)
455020093165700		SNAKE RIVER SOUTH OF MORA MN (LAT 45 50 20N LONG 093 16 57W)					
AUG 1992 18...	0900	34	267	7.8	17.5	740	6.4
455218093023800		POKEGAMA CR ABV POKEGAMA LAKE NR PINE CITY MN (LAT 45 52 18N LONG 093 02 38W)					
AUG 1992 18...	1245	<.02	377	6.9	17.0	743	0.4
455223093282400		GROUNDHOUSE RIVER ABV OGILVIE MN (LAT 45 52 23N LONG 093 28 24W)					
AUG 1992 15...	1210	0.16	246	7.7	19.5	750	10.7
455231092592300		MISSION CREEK NR PINE CITY MN (LAT 45 52 31N LONG 092 59 23W)					
AUG 1992 19...	1615	<.02	297	7.8	19.5	750	5.5
455834093194400		KNIFE RIVER ABV KNIFE LAKE NR MORA MN (LAT 45 58 34N LONG 093 19 44W)					
AUG 1992 14...	0924	8.1	269	7.7	17.5	750	8.3
455945093151900		SNAKE RIVER BLW SNOWSHOE BROOK NR WARMAN MN (LAT 45 59 45N LONG 093 15 19W)					
AUG 1992 13...	1600	36	219	8.0	20.5	750	9.4
460746093110200		CHELSEY BROOK NEAR WOODLAND MN (LAT 46 07 46N LONG 093 11 02W)					
AUG 1992 12...	1300	3.4	163	8.1	18.5	745	8.2

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)
454900093011900	SNAKE RIVER EAST OF POKEGAMA LAKE NR PINE CITY M(LAT 45 49 00N LONG 093 01 19W)					
AUG 1992 27...	K32	40	0.130	0.050	0.030	0.020
454954093091500	MUD CREEK NEAR GRASSTON MN (LAT 45 49 54N LONG 093 09 15W)					
AUG 1992 16...	K220	130	<0.050	0.030	0.070	0.020

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)
455020093165700	SNAKE RIVER SOUTH OF MORA MN (LAT 45 50 20N LONG 093 16 57W)					
AUG 1992 18...	K160	280	0.230	0.040	0.080	0.060
455218093023800	POKEGAMA CR ABV POKEGAMA LAKE NR PINE CITY MN (LAT 45 52 18N LONG 093 02 38W)					
AUG 1992 18...	360	K1100	<0.050	0.020	0.050	<0.010
455223093282400	GROUNDHOUSE RIVER ABV OGILVIE MN (LAT 45 52 23N LONG 093 28 24W)					
AUG 1992 15...	250	160	<0.050	0.020	0.020	<0.010
455231092592300	MISSION CREEK NR PINE CITY MN (LAT 45 52 31N LONG 092 59 23W)					
AUG 1992 19...	100	62	<0.050	0.030	0.140	0.030
455834093194400	KNIFE RIVER ABV KNIFE LAKE NR MORA MN (LAT 45 58 34N LONG 093 19 44W)					
AUG 1992 14...	82	54	<0.050	0.020	0.050	0.030
455945093151900	SNAKE RIVER BLW SNOWSHOE BROOK NR WARMAN MN (LAT 45 59 45N LONG 093 15 19W)					
AUG 1992 13...	330	K20	<0.050	0.010	0.010	<0.010
460746093110200	CHELSEY BROOK NEAR WOODLAND MN (LAT 46 07 46N LONG 093 11 02W)					
AUG 1992 12...	K140	820	<0.050	<0.010	0.040	<0.010

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	RESER-VOIR DEPTH (FEET) (72025)	SAM-PLING DEPTH (FEET) (00003)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)
454956092573400		CROSS LAKE AT PINE CITY MN (LAT 45 49 56N LONG 092 57 34W)					
AUG 1992							
19...	0900	26.3	1.50	247	8.2	21.0	745
19...	0902	--	3.00	246	8.2	21.0	--
19...	0904	--	5.00	245	8.1	21.0	--
19...	0906	--	7.00	245	8.1	21.0	--
19...	0908	--	9.00	742	8.1	21.0	--
19...	0910	--	11.0	242	8.1	21.0	--
19...	0912	--	13.0	239	7.9	21.0	--
19...	0914	--	15.0	240	7.9	21.0	--
19...	0916	--	16.0	243	7.9	21.0	--
19...	0918	--	17.0	245	7.9	21.0	--
19...	0920	--	18.0	246	7.9	21.0	--
19...	0922	--	19.0	245	7.8	20.5	--
19...	0924	--	19.5	250	7.6	20.5	--
19...	0926	--	20.0	254	7.6	20.5	--
19...	0928	--	21.0	261	7.6	20.0	--
19...	0930	--	22.0	269	7.5	20.0	--
19...	0932	--	23.0	281	7.5	19.0	--
19...	0934	--	24.0	298	7.5	18.5	--
19...	0936	--	25.0	308	7.4	18.0	--
19...	0938	--	25.5	318	7.4	18.0	--
19...	1010	--	1.50	247	8.2	21.0	745
19...	1012	--	25.0	308	7.4	18.0	745

DATE	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	OXYGEN, DIS-SOLVED (MG/L) (00300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
454956092573400		CROSS LAKE AT PINE CITY MN (LAT 45 49 56N LONG 092 57 34W)					
AUG 1992							
19...	1.20	7.8	--	--	--	--	--
19...	--	7.8	--	--	--	--	--
19...	--	7.7	--	--	--	--	--
19...	--	7.7	--	--	--	--	--
19...	--	7.0	--	--	--	--	--
19...	--	6.9	--	--	--	--	--
19...	--	5.6	--	--	--	--	--
19...	--	5.5	--	--	--	--	--
19...	--	5.4	--	--	--	--	--
19...	--	6.2	--	--	--	--	--
19...	--	7.2	--	--	--	--	--
19...	--	3.4	--	--	--	--	--
19...	--	1.1	--	--	--	--	--
19...	--	0	--	--	--	--	--
19...	--	0	--	--	--	--	--
19...	--	0	--	--	--	--	--
19...	--	0	--	--	--	--	--
19...	--	0	--	--	--	--	--
19...	--	0.1	--	--	--	--	--
19...	--	0.1	--	--	--	--	--
19...	--	7.8	<0.010	<0.050	0.040	<0.010	7.1
19...	--	0.1	<0.010	<0.050	0.730	<0.010	9.2

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	RESER-VOIR DEPTH (FEET) (72025)	SAM-PLING DEPTH (FEET) (00003)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	OXYGEN, DIS-SOLVED (MG/L) (00300)
454929093195100			FISH LAKE NEAR MORA MN (LAT 45 49 29N LONG 093 19 51W)					
AUG 1992								
25...	1250	8.0	1.50	191	8.8	20.5	0.35	6.4
25...	1252	--	3.00	192	8.8	21.0	--	6.1
25...	1254	--	4.00	192	8.8	21.0	--	6.2
25...	1256	--	5.00	190	8.8	21.0	--	5.9
25...	1258	--	6.00	191	8.7	21.0	--	5.8
25...	1300	--	6.50	191	8.7	20.5	--	5.1
25...	1302	--	7.00	192	8.7	20.5	--	5.0
455009093022100			POKEGAMA LAKE NEAR PINE CITY MN (LAT 45 50 09N LONG 093 02 21W)					
AUG 1992								
26...	1230	22.0	1.50	162	9.1	20.5	0.70	9.0
26...	1232	--	3.00	162	9.1	20.5	--	8.9
26...	1234	--	5.00	162	9.1	20.5	--	8.5
26...	1236	--	7.00	162	9.1	20.5	--	8.5
26...	1238	--	8.00	162	9.0	20.5	--	8.1
26...	1240	--	9.00	162	9.0	20.5	--	7.8
26...	1242	--	10.0	163	9.0	20.5	--	7.3
26...	1244	--	12.0	163	8.9	20.5	--	7.1
26...	1246	--	14.0	163	8.9	20.0	--	6.9
26...	1248	--	16.0	158	8.9	20.0	--	6.8
26...	1250	--	18.0	150	8.9	20.0	--	6.6
26...	1252	--	20.0	152	--	20.0	--	--
26...	1254	--	20.5	150	--	20.0	--	--
455349093103600			MUD LAKE NEAR QUAMBA MN (QUAMBA LAKE) (LAT 45 53 49N LONG 093 10 36W)					
AUG 1992								
25...	1330	8.8	1.50	173	8.0	21.5	0.58	5.6
25...	1332	--	3.00	171	7.9	21.5	--	5.6
25...	1334	--	3.50	174	7.8	22.0	--	5.5
25...	1336	--	4.00	172	7.9	22.0	--	5.5
25...	1338	--	5.00	174	7.7	22.0	--	5.4
25...	1340	--	6.00	175	7.7	22.0	--	5.0
25...	1342	--	7.00	175	7.7	21.5	--	4.8
25...	1344	--	8.00	175	7.7	21.5	--	4.6
455426093253600			ANN LAKE NEAR MORA MN (LAT 45 54 26N LONG 093 25 36W)					
AUG 1992								
25...	1000	15.0	1.50	123	8.0	21.5	0.70	6.4
25...	1002	--	3.00	122	8.0	21.5	--	6.2
25...	1004	--	5.00	121	8.0	21.5	--	6.1
25...	1006	--	7.00	120	8.0	21.5	--	6.2
25...	1008	--	9.00	120	7.9	21.5	--	6.2
25...	1010	--	11.0	120	7.9	21.5	--	6.2
25...	1012	--	12.0	119	7.9	21.5	--	6.1
25...	1014	--	13.0	120	7.9	21.5	--	5.9
25...	1016	--	14.0	119	7.9	21.5	--	5.7
25...	1018	--	14.5	123	7.8	21.5	--	5.0

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	TIME	RESER-VOIR DEPTH (FEET) (72025)	SAM-PLING DEPTH (FEET) (00003)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	OXYGEN, DIS-SOLVED (MG/L) (00300)
455929093172700			KNIFE LAKE NEAR MORA MN (LAT 45 59 29N LONG 093 17 27W)					
AUG 1992								
25...	0730	12.3	1.50	147	8.0	21.0	1.10	4.5
25...	0732	--	3.00	147	7.9	21.5	--	4.3
25...	0734	--	5.00	146	7.9	21.0	--	4.2
25...	0736	--	7.00	146	7.9	21.0	--	4.1
25...	0738	--	9.00	146	7.8	21.0	--	4.0
25...	0740	--	11.5	146	7.8	21.0	--	4.0

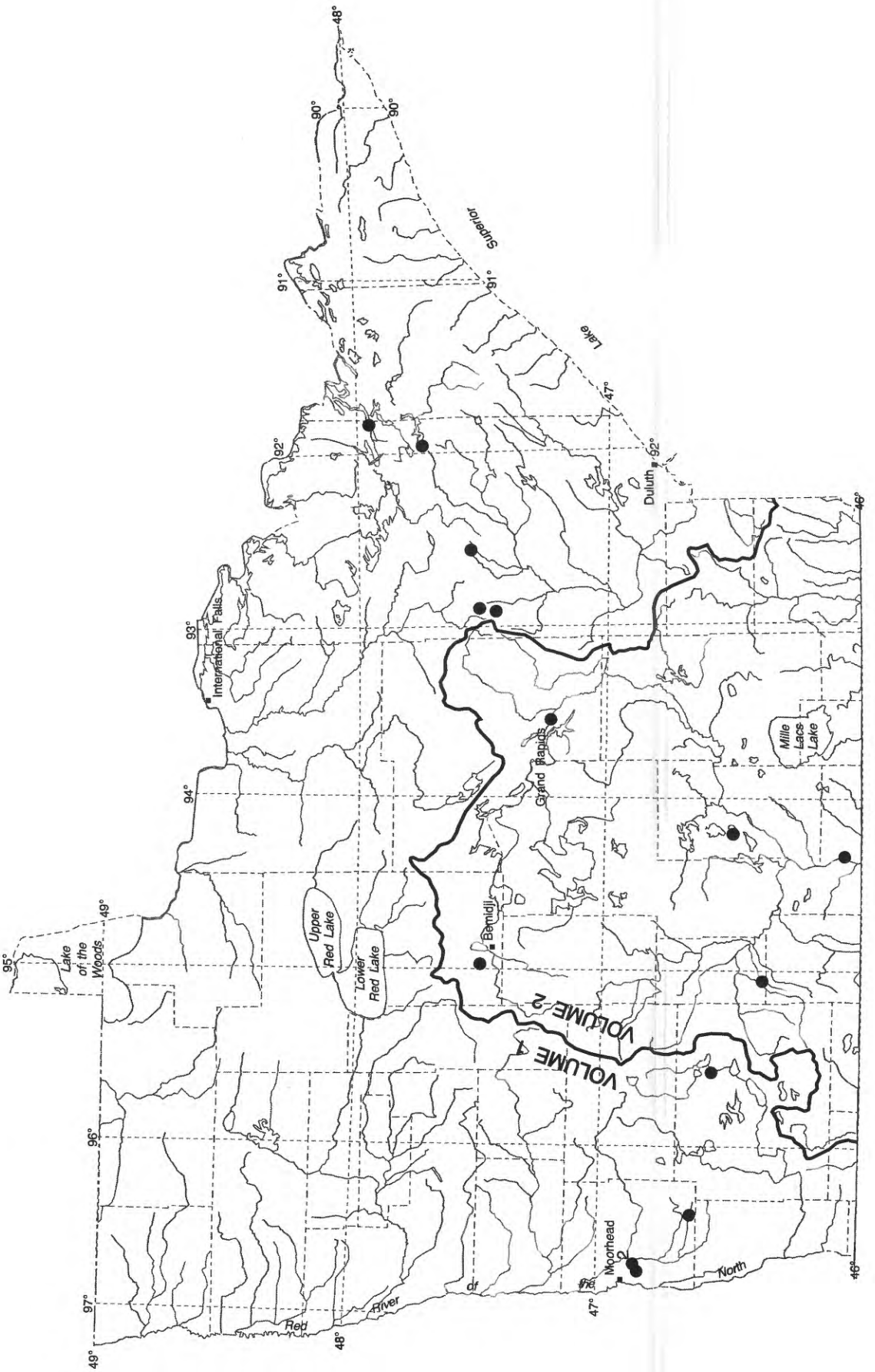
DATE	TIME	RESER-VOIR DEPTH (FEET) (72025)	SAM-PLING DEPTH (FEET) (00003)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)
450226095535800		LAC QUI PARLE RESERVOIR SAMPLE POINT (LAT 45 02 26N LONG 095 53 58W)					
AUG 1992							
20...	1100	11.6	1.50	864	8.1	21.5	740
20...	1105	--	10.0	868	8.1	21.5	740
20...	1107	--	3.00	864	8.1	21.5	--
20...	1109	--	4.00	864	8.1	21.5	--
20...	1111	--	5.00	863	8.1	21.5	--
20...	1113	--	6.00	864	8.1	21.5	--
20...	1115	--	7.00	864	8.1	21.5	--
20...	1117	--	8.00	865	8.1	21.5	--
20...	1119	--	9.00	867	8.1	21.5	--
20...	1121	--	10.0	868	8.1	21.5	--
20...	1123	--	11.0	868	8.1	21.5	--

DATE	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	OXYGEN, DIS-SOLVED (MG/L) (00300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
450226095535800		LAC QUI PARLE RESERVOIR SAMPLE POINT (LAT 45 02 26N LONG 095 53 58W)					
AUG 1992							
20...	0.34	6.0	0.010	0.078	0.430	0.120	29
20...	--	5.2	0.010	0.076	0.410	0.120	29
20...	--	6.0	--	--	--	--	--
20...	--	5.9	--	--	--	--	--
20...	--	5.9	--	--	--	--	--
20...	--	5.9	--	--	--	--	--
20...	--	5.9	--	--	--	--	--
20...	--	5.8	--	--	--	--	--
20...	--	5.7	--	--	--	--	--
20...	--	5.4	--	--	--	--	--
20...	--	5.2	--	--	--	--	--

Ground-Water Levels

Ground-water sampling in Twin Cities Metro Area, 1986
Greg Justin

Demonstration of ground-water sampling using a bladder pump


Lake Superior
International Falls
Duluth
Grand Rapids
Mille Lacs Lake
Bemidji
Upper Red Lake
Lower Red Lake
Lake of the Woods
Moorhead
Red River of the North
VOLUME 2
VOLUME 4
95°
96°
97°
94°
93°
92°
91°
90°
49°
48°
47°
46°

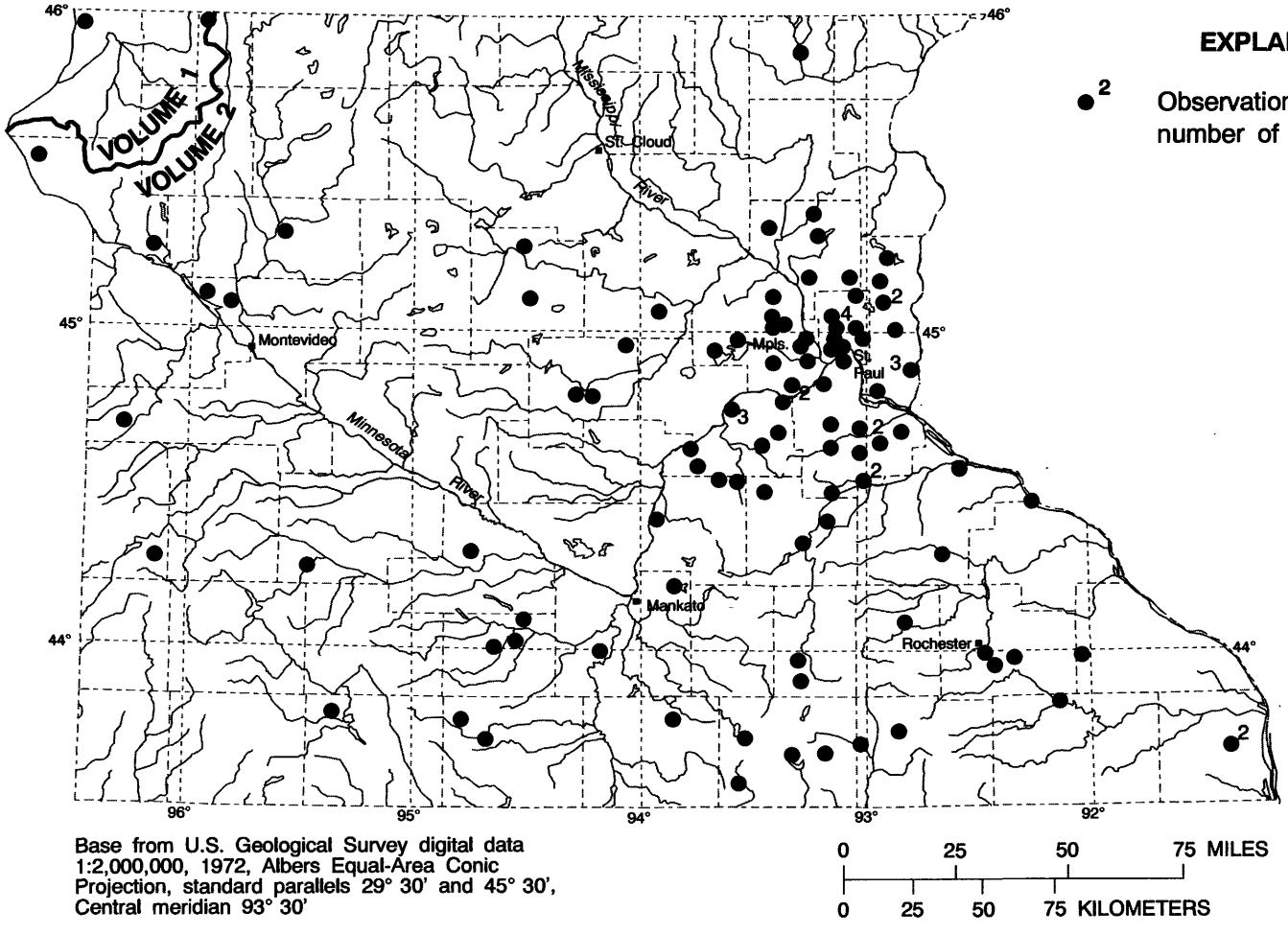


Figure 12.–Location of ground-water wells.

GROUND-WATER LEVELS

ANOKA COUNTY

450927093033802. Local number, 031N22W23CBC02.
LOCATION.--Lat 45°09'27", long 93°03'38", in $SW^1/_4NW^1/_4SW^1/_4$ sec.23, T.31 N., R.22 W., Hydrologic Unit 07010206, at city of Centerville.
Owner: U.S. Geological Survey.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 4 in., depth 277 ft, screened 272 to 277 ft.
DATUM.--Land-surface datum is 901.6 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of recorder platform, 2.20 ft above land-surface datum.
REMARKS.--Water level affected by nearby flowing wells.
PERIOD OF RECORD.--February 1971 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.10 ft below land-surface datum, July 5, 1975; lowest, 18.57 ft below land-surface datum, Oct. 2, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 05	10.98	Dec 05	10.58	Feb 05	14.13	Apr 05	13.89	Jun 05	14.78	Aug 05	12.04
10	10.89	10	10.59	10	14.18	10	13.91	10	14.86	10	11.62
15	10.84	15	10.67	15	14.18	15	13.83	15	15.06	15	11.97
20	10.90	20	10.49	20	14.22	20	13.69	20	14.64	20	12.22
25	11.04	25	10.54	25	14.15	25	13.59	25	14.70	25	12.05
31	10.91	31	10.68	29	14.17	30	13.71	30	15.04	31	12.71
Nov 05	10.70	Jan 05	10.63	Mar 05	13.96	May 05	14.07	Jul 05	14.76	Sep 05	12.18
10	10.74	10	10.51	10	13.57	10	14.23	10	14.65	10	12.09
15	10.80	15	10.68	15	13.81	15	14.11	15	14.60	15	12.12
20	10.62	20	10.59	20	13.86	20	14.42	20	14.56	20	11.87
25	10.50	25	14.03	25	13.88	25	14.20	25	14.65	25	12.26
30	10.49	31	14.18	31	13.82	31	14.57	31	14.78	30	11.96

451210093170201. Local number, 031N24W01CBB01.
LOCATION.--Lat 45°12'10", long 93°17'02", in $NW^1/_4NW^1/_4SW^1/$ sec.1, T.31 N., R.24 W., Hydrologic Unit 07010206, at Golf Course.
Owner: City of Coon Rapids.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in., depth 193 ft, screened 163 to 193 ft.
DATUM.--Altitude of land-surface datum is 897 ft. Measuring point: Top of breather pipe, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--December 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.43 ft below land-surface datum, May 13, 1986; lowest, 41.10 ft below land-surface datum, Sept. 21, 1989.

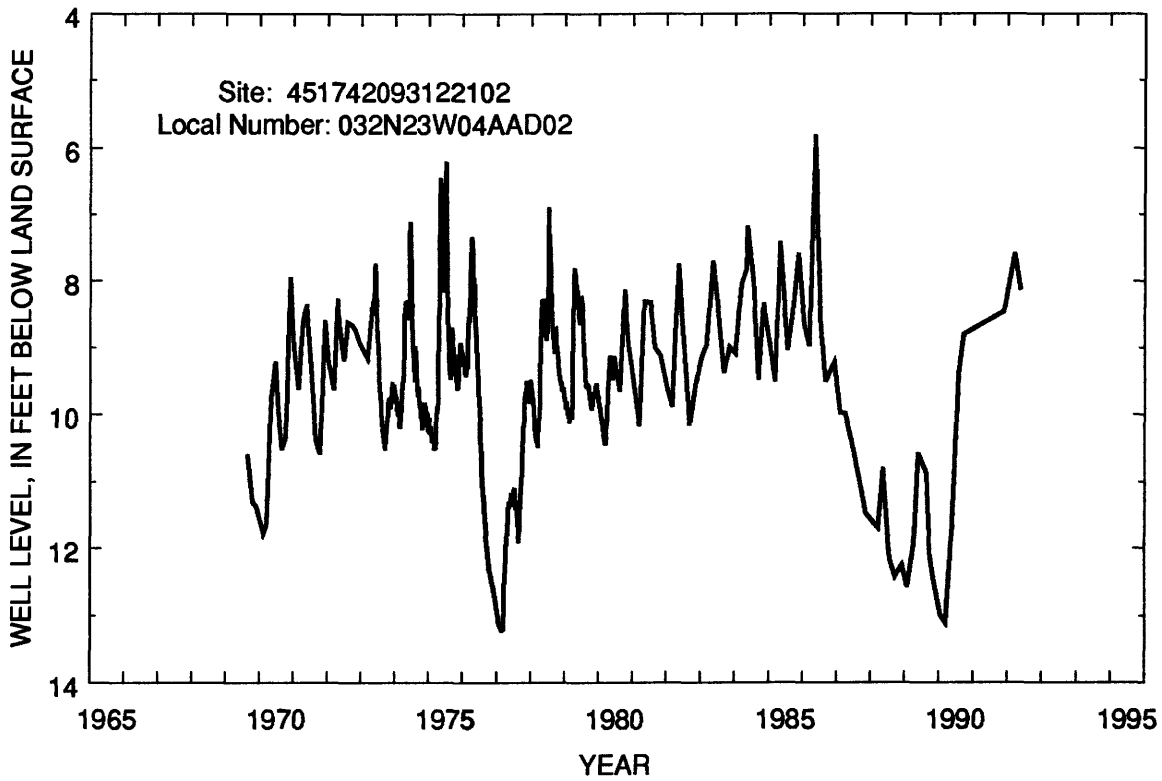
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 18	20.17	Mar 16	20.80	May 15	30.65

451742093122102. Local number, 032N23W04AAD02.
LOCATION.--Lat 45°17'42", long 93°12'21", in $SE^1/_4NE^1/_4NE^1/_4$ sec.4, T.32 N., R.23 W., Hydrologic Unit 07030005, 1.5 mi east of Soderville.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial outwash sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 2 in., depth 21 ft, screened 19 to 21 ft.
DATUM.--Altitude of land-surface datum is 916 ft. Measuring point: Top of casing, 3.50 ft above land-surface datum.
PERIOD OF RECORD.--August 1969 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.82 ft below land-surface datum, May 13, 1986; lowest, 13.22 ft below land-surface datum, Mar. 5-9, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 18	8.45	Mar 16	7.58	May 15	8.12



452305093141501. Local number, 033N23W05BAB01.
LOCATION.--Lat 45°23'05", long 93°14'15", in NW¼NE¼NW¼ sec.5, T.33 N., R.23 W., Hydrologic Unit 07010207, at 1300 229th Ave. NE, Bethel.
Owner: Friendship Baptist Church.
AQUIFER.--Franconian Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 141 ft, cased to 126 ft.
DATUM.--Altitude of land-surface datum is 923 ft. Measuring point: Top of well cap, 0.80 ft above land-surface datum.
PERIOD OF RECORD.--April 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 19.45 ft below land-surface datum, July 10, 1986; lowest, 23.11 ft below land-surface datum, Mar. 13, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 18	19.75	Mar 16	20.13	May 15	20.00	Aug 21	20.49	Sep 21	20.68

GROUND-WATER LEVELS

ANOKA COUNTY--Continued

451938093228101. Local number, 033N24W30ABB01.
LOCATION.--Lat 45°19'38", long 93°22'31", in NW¼/NW¼/NE¼/ sec. 30, T.33 N., R.24 W., Hydrologic Unit 07010207, at 4324 Viking Blvd.
Owner: Northwestern Bell Telephone Co.
AQUIFER.--Ironton-Galesville Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 280 ft, cased to 223 ft.
DATUM.--Altitude of land-surface datum is 900 ft. Measuring point: Top of casing, 1.50 ft above land-surface datum.
PERIOD OF RECORD.--April 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 26.64 ft below land-surface datum, May 13, 1986; lowest, 32.93 ft below land-surface datum, Oct. 31, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

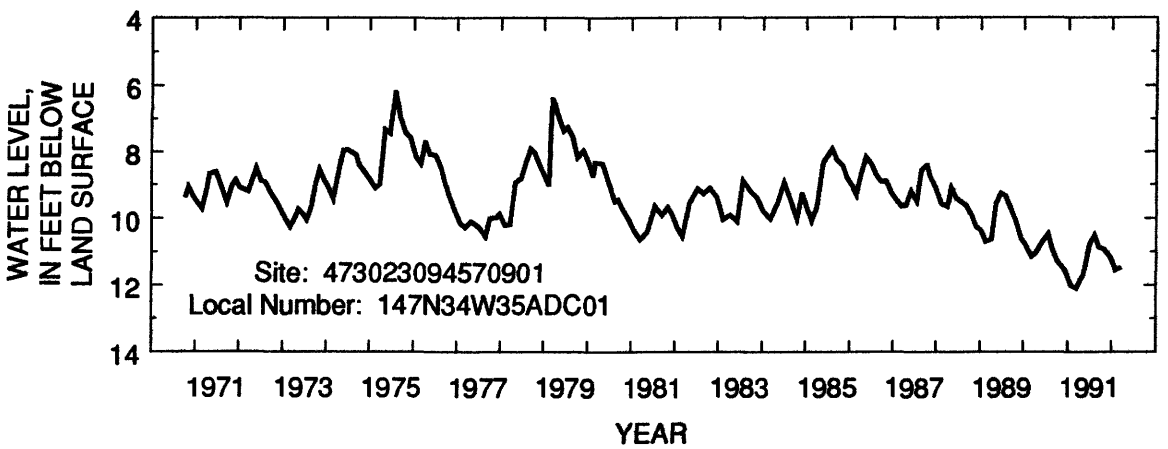
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	29.16	MAR 16	28.25	MAY 15	28.79	AUG 21	30.00	SEP 22	30.10

BELTRAMI COUNTY

473023094570901. Local number, 147N34W35ADC01.
LOCATION.--Lat 47°30'23", long 94°57'09", in SW¼SE¼NE¼ sec.35, T.147 N., R.34 W., Hydrologic Unit 07010101, on Clarence Hart farm.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial outwash sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1 in., depth 20 ft, screened 18 to 20 ft.
DATUM.--Altitude of land-surface datum is 1,383 ftm. Measuring point: Top of casing, 3.00 ft above land-surface datum.
PERIOD OF RECORD.--October 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 6.17 ft below land-surface datum, Aug. 1, 1975; lowest, 12.11 ft below land-surface datum, Mar. 11, 1991.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 30	10.92	Dec 19	11.16	Jan 31	11.55	Mar 13	11.48	Sep 23	10.18



GROUND-WATER LEVELS

BIG STONE COUNTY

451517096104501. Local number, 121N44W27CCC01.
LOCATION.--Lat 45°15'17", long 96°10'45", in SW¼SW¼SW¼ sec.27, T.121 N., R.44 W., Hydrologic Unit 07010001, north of Correll.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1 in., depth 16 ft, screened 14 to 16 ft.
DATUM.--Altitude of land-surface datum is 1,018 ft. Measuring point: Top of casing, 3.10 ft above land-surface datum.
PERIOD OF RECORD.--September 1972 to February 1974, August 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.16 ft below land-surface datum, June 12, 1986; lowest, 8.99 ft below land-surface datum, Feb. 8, 1977.

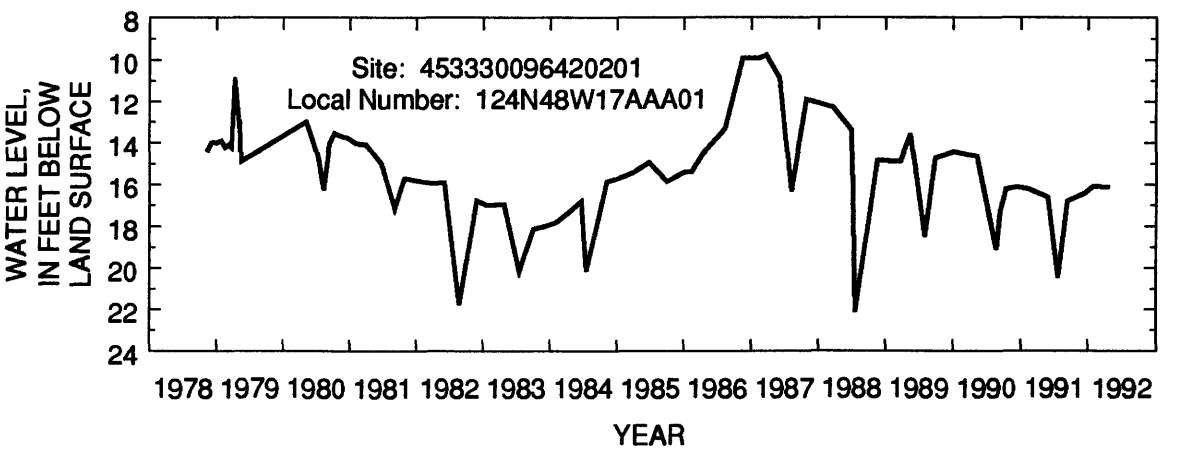
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 07	5.70	Jan 15	9.90	May 12	5.78	May 21	5.78

453330096420201. Local number, 124N48W17AAA01.
LOCATION.--Lat 45°33'30", long 96°42'02", in NE¼NE¼NE¼ sec.17, T.124 N., R.48 W., Hydrologic Unit 07020001, 0.5 mi east of Beardsley.
Owner: U.S. Geological Survey.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in., depth 282 ft, screened 242 to 282 ft.
DATUM.--Altitude of land-surface datum is 1,086.8 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 3.60 ft above land-surface datum.
PERIOD OF RECORD.--November 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.77 ft below land-surface datum, Mar. 23, 1987; lowest, 22.10 ft below land-surface datum, July 21, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Dec 18	16.42	Jan 29	16.10	Apr 22	16.13	Sep 27	18.90



GROUND-WATER LEVELS

BLUE EARTH COUNTY

440050094102801. Local number, 106N28W03DBA01.
LOCATION.--Lat 44°00'50", long 94°10'28", in NE¼NW¼SE¼ sec.3, T.106 N., R.28 W., Hydrologic Unit 07020010, at Farmland Industries Ammonia Plant, 3.2 mi north of Vernon Center.
Owner: Farmland Industries.
AQUIFER.--Ironton-Galesville Sandstones of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 16 in., depth 390 ft, cased to 150 ft.
DATUM.--Altitude of land-surface datum is 1,005 ft. Measuring point: Top of recorder floor, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--October 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 71.81 ft below land-surface datum, Apr. 26, 1983; lowest, 76.73 ft below land-surface datum, Oct. 18, 1989.

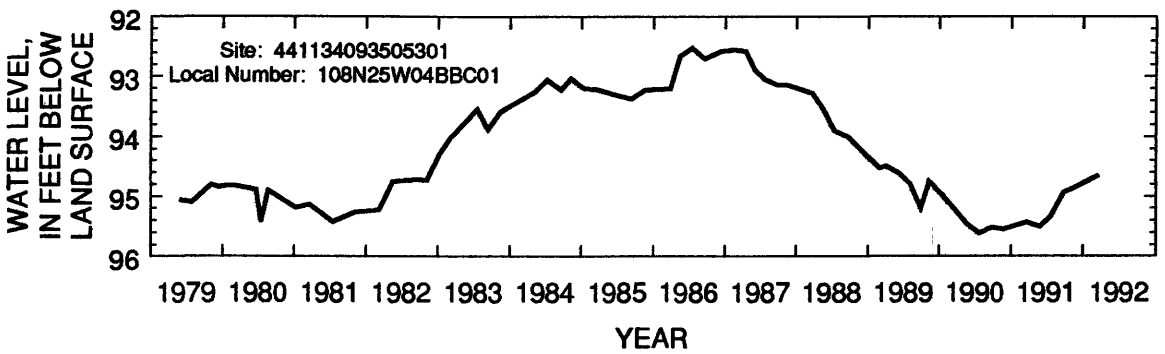
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 05	74.38	Nov 30	74.23	Jan 25	72.92	May 05	73.40	Jun 25	73.47	Aug 15	73.60
10	74.46	Dec 05	74.11	Mar 20	73.27	10	73.23	30	30.54	20	73.58
15	74.35	10	73.87	25	73.11	15	73.30	Jul 05	73.53	25	73.54
20	74.52	15	73.87	31	73.27	20	73.40	10	73.53	31	73.55
25	74.50	20	73.82	Apr 05	73.20	25	73.41	15	73.41	Sep 05	73.42
31	74.66	25	73.55	10	73.20	31	73.51	20	73.51	10	73.59
Nov 05	74.42	31	73.56	15	73.36	Jun 05	73.34	25	73.40	15	73.52
10	74.56	Jan 05	73.30	20	73.03	10	73.57	31	73.48	20	73.46
15	74.51	10	73.14	25	73.25	15	73.60	Aug 05	73.50	25	73.64
20	74.37	15	73.13	30	73.10	20	73.59	10	73.42	30	73.82
25	74.42	20	72.98								

441134093505301. Local number, 108N25W04BBC01.
LOCATION.--Lat 4411'34", long 9350'53", in SWNWNW sec.4, T.108 N., R.25 W., Hydrologic Unit 07020011, at 1.3 mi west of Madison Lake at waste treatment plant.
Owner: City of Madison Lake.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 6 in., depth 313 ft, cased to 296 ft.
DATUM.--Altitude of land-surface datum is 1,036 ft. Measuring point: Top of casing, 1.60 ft above land-surface datum.
PERIOD OF RECORD.--May 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 92.52 ft below land-surface datum, July 17, 1986; lowest, 95.62 ft below land-surface datum, July 25, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 21	94.86	Mar 18	94.66



GROUND-WATER LEVELS

BROWN COUNTY

441800094434301. Local number, 110N32W30DDB01.
LOCATION.--Lat 4418'00", long 9443'43", in NWSESE sec.30, T.110 N., R.32 W., Hydrologic Unit 07020008, in Sleepy Eye at hospital.
Owner: City of Sleepy Eye.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in., depth 176 ft.
DATUM.--Altitude of land-surface datum is 1,030 ft. Measuring point: Top of casing, 1.30 ft above land-surface datum.
REMARKS.--Water level affected by pumping from nearby wells.
PERIOD OF RECORD.--August 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 46.80 ft below land-surface datum, Apr. 1, 1987; lowest, 118.1 ft below land-surface datum, Sept. 15, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 01	60.90	Dec 02	52.70	Feb 03	48.70	Apr 01	47.70	Sep 14	59.17
Nov 05	55.70	Jan 02	49.70	Mar 02	48.10	May 01	47.10		

CHIPPEWA COUNTY

450447095490101. Local number, 119N41W29DDD01.
LOCATION.--Lat 45°04'47", long 95°40'01", in $SE^1/_4SE^1/_4SE^1/_4$ sec.29, T.119 N., R.41 W., Hydrologic Unit 07020005, 5 mi north of Watson.
Owner: U.S. Geological Survey
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1 in., depth 19 ft, screened 17 to 19 ft.
DATUM.--Altitude of land-surface datum is 992 ft. Measuring point: Top of casing, 3/75 gy sbove lsnd-surface datum
PERIOD OF RECORD.--September 1972 to February 1974, January 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.43 ft below land-surface datum, Apr. 10, 1984; lowest, 9.06 ft below land-surface datum, Feb. 8, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Jan 14	5.09	May 12	4.54	May 21	4.60	Sep 28	4.13

450631095562201. Local number, 119N42W17DDD01.
LOCATION.--Lat 45°06'31", long 95°56'22", in $SE^1/_4SE^1/_4SE^1/_4$ sec.17, T.119 N., R.42 W., Hydrologic Unit 07020001, west of Milan.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial silt of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1 in., depth 19 ft, screened 17 to 19 ft.
DATUM.--Altitude of land-surface datum is 1,027 ft. Measuring point: Top of casing, 4.50 ft above land-surface datum.
PERIOD OF RECORD.--September 1972 to October 1973, April 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.50 ft below land-surface datum, May 7, 1973; lowest, 17.46 ft below land-surface datum, Apr.1, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 15	10.40	Jan 14	6.40	May 12	4.98	May 21	5.28	Sep 22	5.85

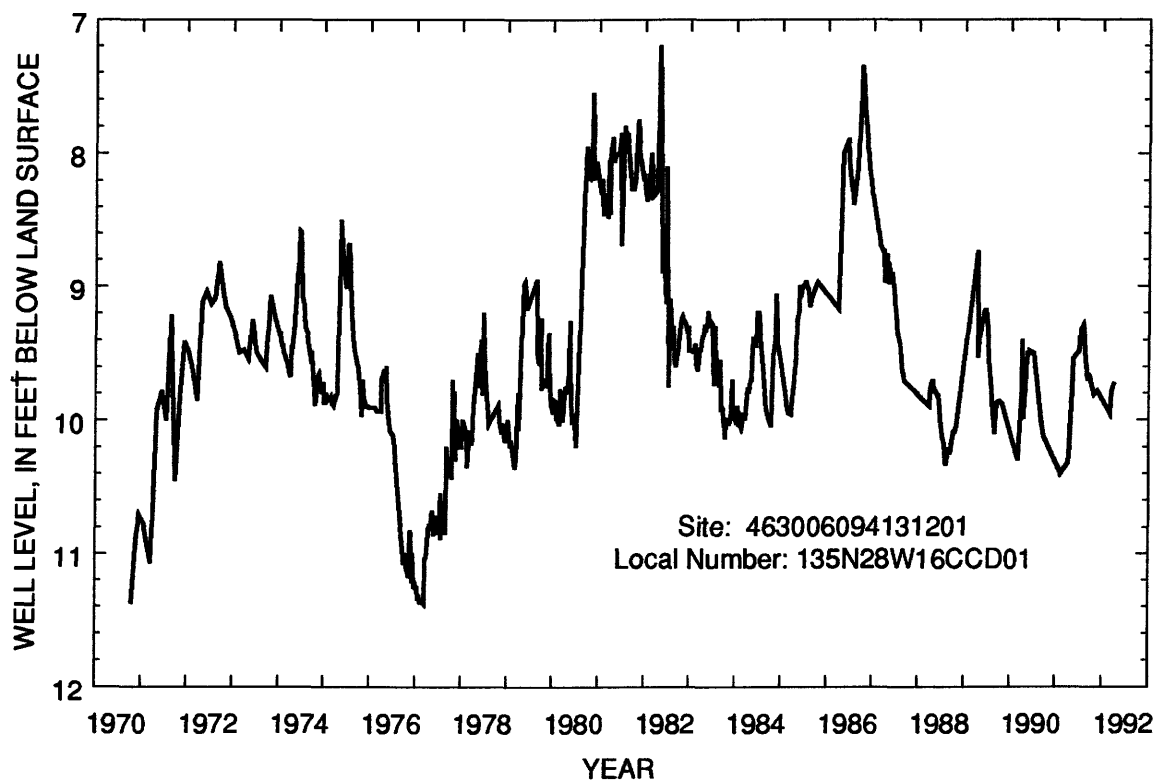
GROUND-WATER LEVELS

CROW WING COUNTY

463006094131201. Local number, 135N28W16CCD01.
LOCATION.--Lat 46°30'06", long 94°13'12", in SE¼SW¼SW¼ sec.16, T.135 N., R.28 W., Hydrologic Unit 07010106, northwest of Merrifield.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1 in., depth 18 ft, screened 16 to 18 ft.
DATUM.--Altitude of land-surface datum is 1,212 ft. Measuring point: Top of casing, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--October 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.20 ft below land-surface datum, May 1, 1982; lowest, 11.38 ft below land-surface datum, Oct.16, 1970, Feb.11, 1977, Mar.11, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 04	9.74	Mar 03	9.95	Mar 26	9.74
17	9.77	11	9.79	Apr 03	9.73
25	9.81	20	9.75	07	9.72
Nov 18	9.78				



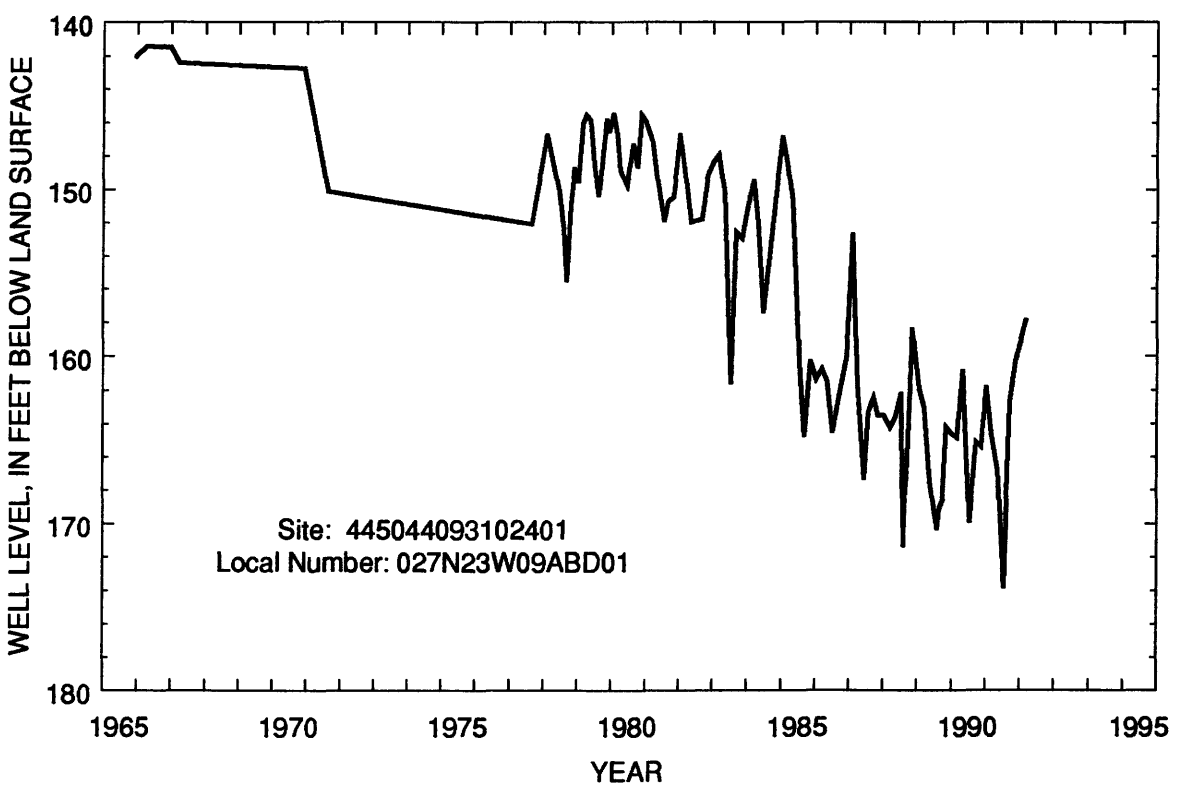
GROUND-WATER LEVELS

DAKOTA COUNTY

445044093102401. Local number, 027N23W09ABD01.
LOCATION.--Lat 44°50'44", long 93°10'24", in SE¼NW¼NE sec.9, T.27 N., R.23 W., Hydrologic Unit 07020012, at Eagan.
Owner: City of Eagan, Timberline Addition.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled public-supply artesian well, diameter 10 in., depth 503 ft, cased to 401 ft.
DATUM.--Altitude of land-surface datum is 900 ft. Measuring point: Hole in well cap, 2.60 ft above land-surface datum.
REMARKS.--Water-level affected by pumping.
PERIOD OF RECORD.--December 1965, April 1966, December 1966, March 1967, December 1970, August 1971, August 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 141.40 ft below land-surface datum, Apr. 5, 1966; lowest, 173.87 ft below land-surface datum, July 17, 1991.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 14	160.32	Mar 09	157.77



GROUND-WATER LEVELS

DAKOTA COUNTY--Continued

445330093054301. Local number, 028N22W19DCC02.
LOCATION.--Lat 44°53'30", long 93°05'43", in SW¼SW¼S¼E sec.19, T.28 N., R.22 W., Hydrologic Unit 07010206, in West St. Paul.
Owner: U.S. Geological Survey, 2-N.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 6 in., depth 539 ft, cased to 407 ft.
DATUM.--Land-surface datum is 1,036 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.60 ft above land-surface datum.
REMARKS.--Water-level affected by regional pumping.
PERIOD OF RECORD.--January 1971 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 308.87 ft below land-surface datum, Mar. 16, 1992; lowest, 328.0 ft below land-surface datum, July 31, 1975.

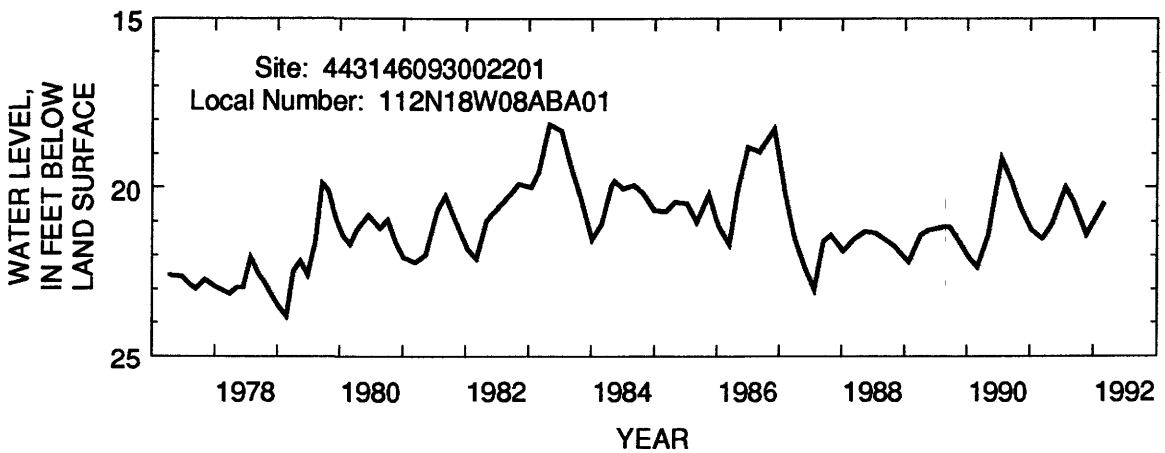
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 05	312.11	Feb 05	310.00	Mar 20	309.66	May 05	313.12	Jun 20	314.39	Aug 05	315.65
10	312.71	10	309.94	25	309.49	10	316.67	25	315.30	10	315.24
15	312.95	15	309.93	31	309.64	15	317.07	30	315.53	15	316.63
20	313.44	20	310.19	Apr 05	310.19	20	318.27	Jul 05	313.18	20	318.44
25	312.29	25	310.01	10	310.24	25	313.42	10	316.18	25	316.64
31	311.61	29	310.52	15	309.92	31	315.87	15	313.95	31	315.75
Nov 05	310.89	Mar 05	310.09	20	309.30	Jun 05	320.06	20	315.21	Sep 05	314.74
10	310.86	10	309.81	25	310.23	10	316.63	25	313.96	10	313.68
Jan 31	310.31	15	309.70	30	310.85	15	317.02	31	317.38	15	314.83

443146093002201. Local number, 112N18W08ABA01.
LOCATION.--Lat 44°31'46", long 93°00'22", in NE¼NW¼NE¼ sec.8, T.112 N., R.18 W., Hydrologic Unit 07040002, northeast of Randolph.
Owner: U.S. Geological Survey
AQUIFER.--Surficial outwash sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1 in., depth 44 ft, screened 42 to 44 ft.
DATUM.--Altitude of land-surface datum is 880 ft. Measuring point: Top of casing, 3.40 ft above land-surface datum.
PERIOD OF RECORD.--April 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.13 ft below land-surface datum, May 3, 1983; lowest, 23.80 ft below land-surface datum, Feb. 21, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 19	21.38	Mar 04	20.46



GROUND-WATER LEVELS

DAKOTA COUNTY--Continued

443134093010601. Local number, 112N18W08BBC01.
LOCATION.--Lat 44°31'34", long 93°01'06", in SW¼NW¼NW¼ sec.8, T.112 N., R.18 W., Hydrologic Unit 07040002, at Randolph Fire Station.
Owner: City of Randolph.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled fire protection artesian well, diameter 10 in., depth 150 ft, cased to 64 ft.
DATUM.--Altitude of land-surface datum is 883 ft. Measuring point: Top of 3/4-inch breather pipe, 2.20 ft above land-surface datum.
PERIOD OF RECORD.--July 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 10.47 ft below land-surface datum, May 3, 1983; lowest, 19.70 ft below land-surface datum, Aug. 11, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 19	14.96	Mar 04	13.65	Sep 29	12.33

442830093085201. Local number, 112N19W30DBD01.
LOCATION.--Lat 44°28'30", long 93°08'52", in SE¼NW¼SE¼ sec.30, T.112 N., R.19 W., Hydrologic Unit 07040002, at Northfield waste treatment plant.
Owner: City of Northfield.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 6 in., depth 275 ft, cased to 212 ft.
DATUM.--Altitude of land-surface datum is 890 ft. Measuring point: Center of pressure guage, 2.05 ft above land-surface datum.
PERIOD OF RECORD.--May 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.54 ft above land-surface datum, July 12, 1983; lowest, 6.66 ft above land-surface datum, Mar. 12, 1991.

WATER LEVEL, IN FEET ABOVE LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 19	+8.73	Mar 04	+8.15

443645093014701. Local number, 113N18W07BAC01.
LOCATION.--Lat 44°36'45", long 93°01'47", in SW¼NE¼NW¼ sec.7, T.113 N., R.18 W., Hydrologic Unit 07040001, west of Hampton.
Owner: Eugene Dohmen.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 16 in., depth 325 ft, cased to 65 ft.
DATUM.--Altitude of land-surface datum is 915 ft. Measuring point: Hole in pump base, 1.60 ft above land-surface datum.
PERIOD OF RECORD.--April 1977 to August 1977, January 1978, June 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.15 ft below land-surface datum, Dec. 4, 1986; lowest, 33.19 ft below land-surface datum, Aug. 12, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 19	31.46	Mar 04	31.06	Sep 30	27.60

GROUND-WATER LEVELS

DAKOTA COUNTY--Continued

444205092500001. Local number, 114N17W10AAA01.
LOCATION.--Lat 44°42'05", long 92°50'00", in NE¼NE¼NE¼ sec.10, T.114 N., R.17 W., Hydrologic Unit 07040001,southeast of Hastings.
Owner: John Conzemius.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 4 in., depth 151 ft, depth of casing unknown.
DATUM.--Altitude of land-surface datum is 827 ft. Measuring point: Top of platform, 2.50 ft above land-surface datum.
PERIOD OF RECORD.--April 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 94.10 ft below land-surface datum, Mar. 31, 1987; lowest, 107.4 ft below land-surface datum, Mar. 12, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 05	103.35	Dec 05	103.55	Feb 05	103.50	Apr 05	101.33	Jun 05	102.30	Aug 05	102.54
10	103.44	10	103.56	10	103.66	10	101.19	10	102.47	10	102.40
15	103.41	15	103.67	15	103.44	15	101.11	15	102.76	15	102.89
20	103.43	20	103.52	20	103.60	20	101.11	20	102.52	20	102.81
25	103.56	25	103.49	25	103.52	25	101.50	25	102.58	25	103.01
31	103.54	31	103.53	29	103.58	30	101.34	30	102.68	31	102.70
Nov 05	103.50	Jan 05	103.46	Mar 05	103.05	May 05	101.72	Jul 05	102.40	Sep 05	102.56
10	103.54	10	103.59	10	102.35	10	101.56	10	102.71	10	102.70
15	103.64	15	103.74	15	101.97	15	102.11	15	102.37	15	102.52
20	103.56	20	103.63	20	101.57	20	102.04	20	102.76	20	102.16
25	103.63	25	103.73	25	101.39	25	101.98	25	102.34	25	101.95
30	103.68	31	103.60	31	101.27	31	102.41	31	102.81	30	101.82

444047092521901. Local number, 114N17W16CBB01.
LOCATION.--Lat 44°40'47", long 92°52'19", in NW¼NW¼SW sec.16, T.114 N., R.17 W., Hyrologic Unit 07040001, Kirby Avenue, 0.5 mi (0.8 km) north of 190th Street.
Owner: Jim Huneke Construction Company.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled domestic water-table well, diameter 4 in., depth 170 ft, screened 164 to 170 ft.
DATUM.--Altitude of land-surface datum is 823 ft. Measuring point: Top of casing, 1.10 ft above land-surface datum.
PERIOD OF RECORD.--March 1976, March 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 73.32 ft below land-surface datum, Mar. 31, 1987; lowest, 87.75 ft below land-surface datum, June 27, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 19	84.45	Mar 04	83.92

443827092521801. Local number, 114N17W33BBC01.
LOCATION.--Lat 44°38'27", long 92°52'18", in SW¼NW¼NW¼ sec.33, T.114 N., R.17 W., Hydrologic Unit 07040001, 39 ft south of irrigation well.
Owner: Rainer Kimmes.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 16 in., depth 290 ft, cased to 25 ft.
DATUM.--Altitude of land-surface datum is 862 ft. Measuring point: Hole in plate over well, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--August 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 46.14 ft below land-surface datum, Dec.1, 1986; lowest, 79.20 ft below land-surface datum, July 11, 1985.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 19	69.89	Mar 04	67.73	Sep 30	54.58

GROUND-WATER LEVELS

DAKOTA COUNTY--Continued

444117092595701. Local number, 114N18W17AAB01.
LOCATION.--Lat 44°41'17", long 92°59'57", in NW¼NE¼NE¼ sec.17, T.114 N., R.18 W., Hydrologic Unit 07040001,180th Street, 0.25 mi west of Emery Avenue.
Owner: Joe Ries.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 16 in., depth 280 ft, cased to 39 ft.
DATUM.--Altitude of land-surface datum is 905 ft. Measuring point: Edge of vent pipe, 1.40 ft above land-surface datum.
PERIOD OF RECORD.--June 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 57.30 ft below land-surface datum, Dec.1, 1986; lowest, 74.15 ft below land-surface datum, Sept.13, 1988.

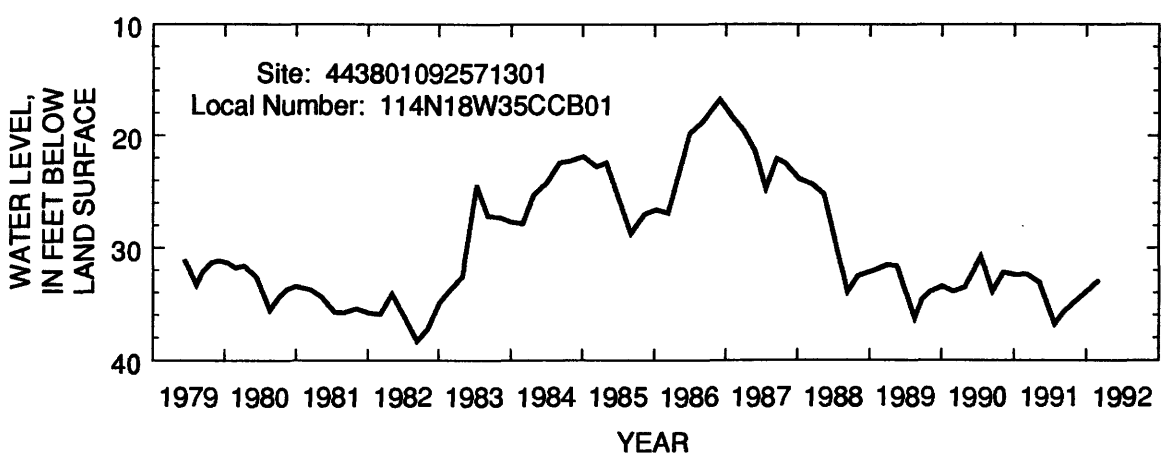
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATEE LEVEL
Nov 19	70.15	Mar 04	69.18	Sep 30	62.80

443801092571301. Local number, 114N18W35CCB01.
LOCATION.--Lat 44°38'01", long 92°57'13", in NW¼SW¼SW¼ sec.35, T.114 N., R.18 W., Hydrologic Unit 07040001,Goodwin Avenue, 1.1 mi south of Northfield Boulevard.
Owner: Al Wagner, Jr.
AQUIFER.--Buried gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Driled irrigation artesian well, diameter 12 in., depth 203 ft, screened 173 to 203 ft.
DATUM.--Altitude of land-surface datum is 898 ft. Measuring point: Hole in pump base, 1.25 ft above land-surface datum.
PERIOD OF RECORD.--June 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 16.83 ft below land-surface datum, Dec.1, 1986; lowest, 38.28 ft below land-surface datum, Sept. 13, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 19	34.57	Mar 04	32.95	Sept 30	24.95



GROUND-WATER LEVELS

DAKOTA COUNTY--Continued

444220093055001. Local number, 114N19W04DAC01.
LOCATION.--Lat 44°42'20", long 93°05'50", in SW¼NE¼SE¼ sec.4, T.114 N., R.19 W., Hydrologic Unit 07040001, 2.1 mi southeast of Rosemount.
Owner: University of Minnesota Agricultural Experiment Station (Plant Pathology).
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 6 in., depth 415 ft, cased to 355 ft.
DATUM.--Altitude of land-surface datum is 947 ft. Measuring point: Top of 1-inch breather pipe, 2.10 ft above land-surface datum.
PERIOD OF RECORD.--August 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 55.36 ft below land-surface datum, Dec.1, 1986; lowest, 67.09 ft below land-surface datum, Sep. 30, 1992.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

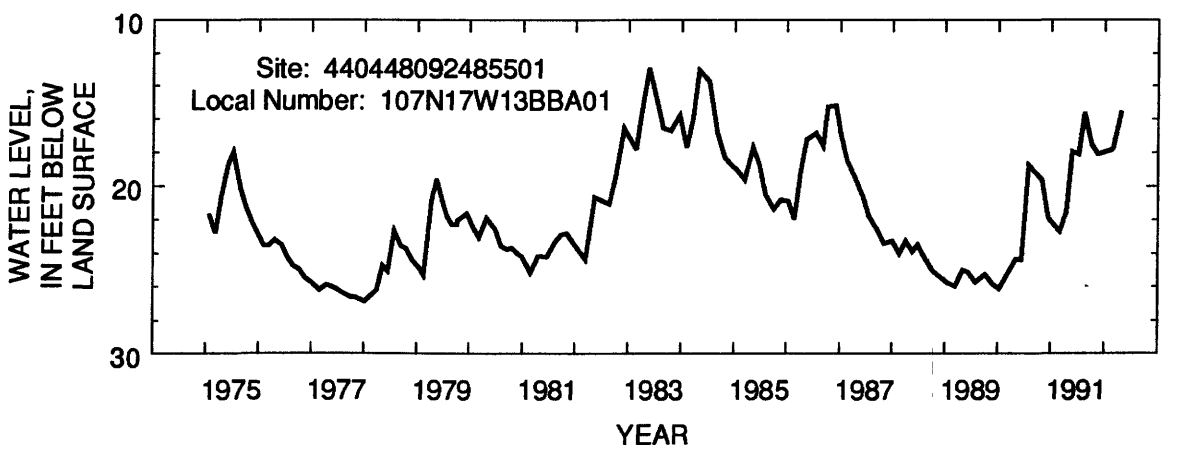
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 15	61.70	Mar 04	61.58	Sep 30	67.09

DODGE COUNTY

440448092485501. Local number, 107N17W13BBA01.
LOCATION.--Lat 44°04'48", long 92°48'55", in NE¼NW¼NW¼ sec.13, T.107 N., R.17 W., Hydrologic Unit 07040004, in city of Wasioja.
Owner: Wasioja Township Garage.
AQUIFER.--Galena Formation of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled maintenance artesian well, diameter 6 in., depth 100 ft, cased to 52 ft.
DATUM.--Altitude of land-surface datum is 1,185 ft. Measuring point: Top of casing, 1.60 ft above land-surface datum.
PERIOD OF RECORD.--January 1975 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 12.94 ft below land-surface datum, May 23, 1983; lowest, 26.88 ft below land-surface datum, Jan.5, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 08	17.55	Nov 18	18.10	Mar 01	17.80	Apr 27	15.56



GROUND-WATER LEVELS

FARIBAULT COUNTY

434558093540001. Local number, 104N26W36CAC01.
LOCATION.--Lat 43°45'58", long 93°54'00", in SW¼NE¼SW¼ sec.36, T.104 N., R.26 W., Hydrologic Unit 07020011, at Easton Creamery.
Owner: City of Easton.
AQUIFER.--Platteville Formation of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled public supply artesian well, diameter 6 in., depth 145 ft, cased to 120 ft.
DATUM.--Altitude of land-surface datum is 1,060 ft. Measuring point: Top of well cap, 1.20 ft above land-surface datum.
PERIOD OF RECORD.--August 1979, April 1980, May 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 29.97 ft below land-surface datum, May 10, 1983; lowest, 36.36 ft below land-surface datum, Aug.2, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 20	31.83	Mar 19	30.98	May 13	30.63

FILLMORE COUNTY

434936092102201. Local number, 104N11W08ADC01.
LOCATION.--Lat 43°49'36", long 92°10'22", in SW¼SE¼NE¼ sec.8, T.104 N., R.11 W., Hydrologic Unit 07040008, 0.8 mi southeast of Chatfield.
Owner: Fillmore County Highway Department.
AQUIFER.--Prairie du Chien group of early Ordovician age and Jordan sandstone of late Cambrian age.
WELL CHARACTERISTICS.--Drilled domestic water table well, diameter 4 in., depth 284 ft, cased to 128 ft.
DATUM.--Altitude of land-surface datum is 981 ft. Measuring point: Top of casing, 0.50 ft above land-surface datum.
PERIOD OF RECORD.--November 1989 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 28.73 ft below land-surface datum, May 7, 1991; lowest, 38.51 ft below land-surface date, Feb. 6, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 25	30.78	Mar 10	30.94	May 14	26.03

FREEBORN COUNTY

433434093331201. Local number, 101N23W02DAC01.
LOCATION.--Lat 43°34'34", long 93°33'12", in SW¼NE¼SE¼ sec.2, T.101 N., R.23 W., Hydrologic Unit 07080203, 3 mi southwest of Conger.
Owner: Richard Steele.
AQUIFER.--Upper Carbonates of Devonian and Ordovician Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 16 in., depth 373 ft (114 m), cased to 156 ft.
DATUM.--Altitude of land-surface datum is 1,280 ft. Measuring point: Vent pipe, 1.50 ft above land-surface datum.
PERIOD OF RECORD.--July 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 65.58 ft below land-surface datum, Mar. 8, 1983; lowest, 75.45 ft below land-surface datum, Aug. 2, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 20	68.28	Mar 19	67.52	May 13	67.56

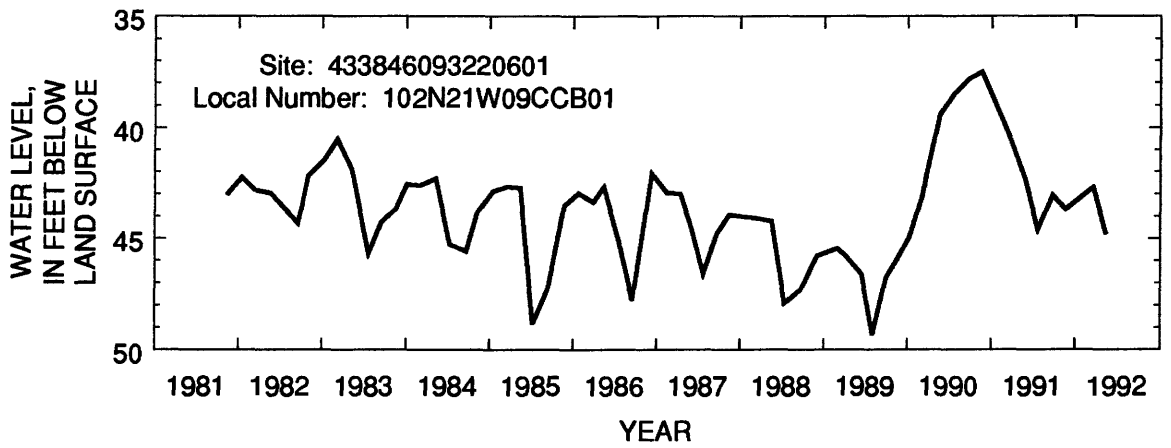
GROUND-WATER LEVELS

FREEBORN COUNTY--Continued

433846093220601. Local number, 102N21W09CCB01.
LOCATION.--Lat 43°38'46", long 93°22'06", in NW¼SW¼SW¼ sec.9, T.102 N., R.21 W., Hydrologic Unit 07080202, at Freeborn County Courthouse.
Owner: Freeborn County.
AQUIFER.--Cedar Valley Formation of Middle Devonian Age.
WELL CHARACTERISTICS.--Drilled public supply artesian well, diameter 5 in., depth 150 ft, cased to 138 ft.
DATUM.--Altitude of land-surface datum is 1,240 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--November 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 37.50 ft below land-surface datum, Nov. 19, 1990; lowest, 49.32 ft below land-surface datum, Aug. 2, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 20	43.68	Mar 19	42.72	May 13	44.79



434032093111801. Local number, 103N20W36CCB01.
LOCATION.--Lat 43°40'32", long 93°11'18", in NE¼SW¼SW¼ sec.36, T.103 N., R.20 W., Hydrologic Unit 07080201, at Pillsbury Grain Station.
Owner: Pillsbury Co.
AQUIFER.--Cedar Valley Formation of Middle Devonian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 5 in., depth 231 ft, cased to 136 ft.
DATUM.--Altitude of land-surface datum is 1,255 ft. Measuring point: Top of casing, 1.80 ft above land-surface datum.
PERIOD OF RECORD.--July 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 48.40 ft below land-surface datum, May 10, 1984; lowest, 55.95 ft below land-surface datum, July 13, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 20	50.50	Mar 19	49.96	May 13	49.60

GROUND-WATER LEVELS

FREEBORN COUNTY--Continued

434308093322001. Local number, 103N23W13CDA01.
LOCATION.--Lat 43°43'08", long 93°32'20", in NE¼SE¼SW¼ sec.13, T.103 N., R.23 W., Hydrologic Unit 07020011, 3.3 mi northeast of Alden.
Owner: Oakview Golf Course.
AQUIFER.--Galena Formation of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 6 in., depth 270 ft, cased to 158 ft.
DATUM.--Altitude of land-surface datum is 1,250 ft. Measuring point: Hole in well cap, 1.90 ft above land-surface datum.
PERIOD OF RECORD.--July 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 42.00 ft below land-surface datum, May 10, 1983; lowest, 48.77 ft below land-surface datum, Aug. 2, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 20	44.30	Mar 19	43.79	May 13	43.90

GOODHUE COUNTY

441737092400501. Local number, 110N15W31BBD01.
LOCATION.--Lat 44°17'37", long 92°40'05", in SE¼NW¼NW¼ sec.31, T.110 N., R.15 W., Hydrologic Unit 07040004, at Zumbrota Fire Station.
Owner: City of Zumbrota, well 3.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 12 in., depth 210 ft, cased to 50 ft.
DATUM.--Altitude of land-surface datum is 1,000 ft. Measuring point: Hole in pump base, 2.20 ft above land-surface datum.
PERIOD OF RECORD.--June 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.38 ft below land-surface datum, Jan 7, 1987; lowest, 27.00 ft below land-surface datum, Jan. 5, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 01	21.93	Nov 12	22.34	Jan 07	21.48

443012092362201. Local number, 113N15W27BAB01.
LOCATION.--Lat 44°30'12", long 92°26'22", in NW¼NE¼NW¼ sec.27, T.113 N., R.15 W., Hydrologic Unit 07040002, at Red Wing.
Owner: City of Red Wing, Anderson Park.
AQUIFER.--Eau Claire-Mount Simon Sandstones of Late Cambrian Age.
WELL CHARACTERISTISC.--Drilled unused artesian well, diameter 12 in., depth 560 ft, cased to 243 ft.
DATUM,--Altitude of land-surface datum is 800 ft. Measuring point: Edge of casing, 2.70 ft above land-surface datum.
PERIOD OF RECORD.--April 1976, June 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 100.50 ft below land-surface datum, Apr. 20, 1983; lowest, 109.62 ft below land-surface datum, Sept. 10, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 12	105.82	Jan 07	104.15	Mar 17	103.27	May 06	103.52
Dec 10	105.56	Feb 11	104.37	Apr 20	102.83		

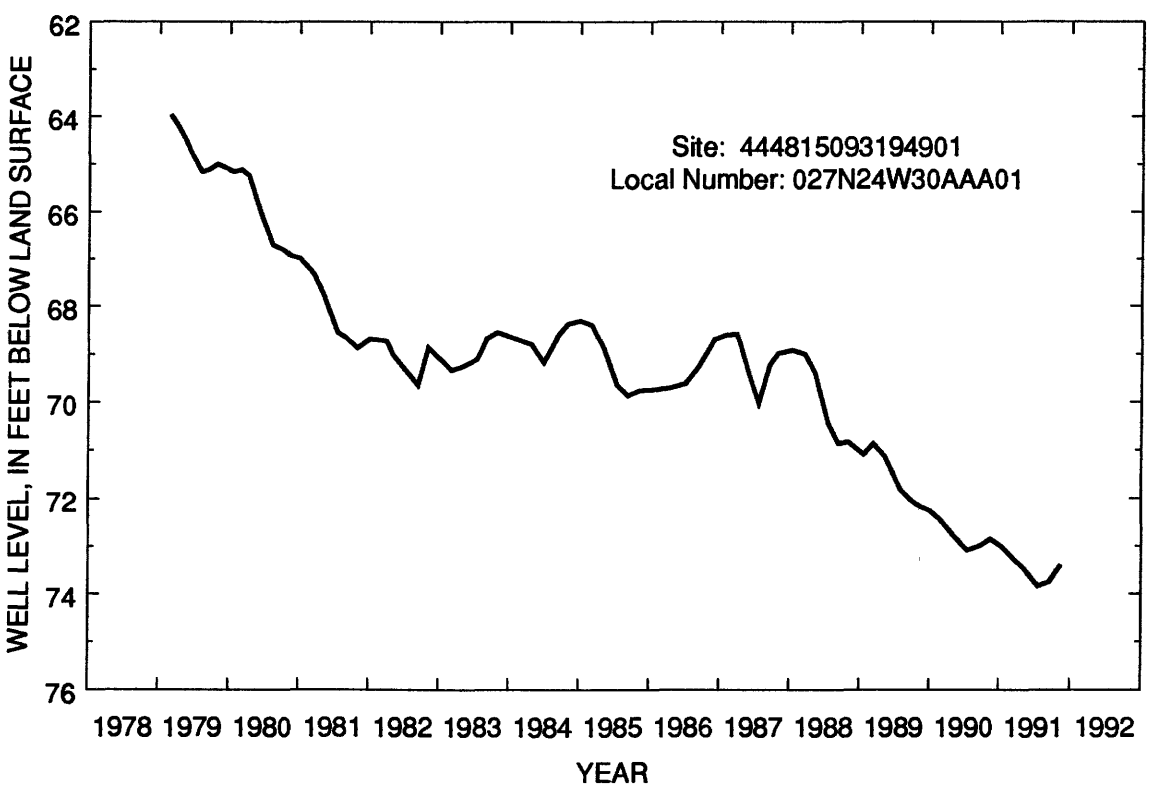
GROUND-WATER LEVELS

HENNEPIN COUNTY

444815093194901. Local number, 027N24W30AAA01.
LOCATION.--Lat 44°48'15", long 93°19'49", in NE¼NE¼NE¼ sec.30, T.27 N., R.24 W., Hydrologic Unit 07020012, at 4001 West 110th Street, Bloomington.
Owner: Transfiguration Church.
AQUIFER.--Buried Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 139 ft, screened 135 to 139 ft.
DATUM.--Altitude of land-surface datum is 832 ft. Measuring point: Top of casing, 0.50 ft above land-surface datum.
PERIOD OF RECORD.--March 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 63.97 ft below land-surface datum, Mar. 2, 1979; lowest, 73.84 ft below land-surface datum, July 19, 1991.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 13	73.40	May 26	73.10	Jun 18	73.30	Jul 17	73.16	Aug 17	73.06	Sep 11	73.00



GROUND-WATER LEVELS

HENNEPIN COUNTY--Continued

444801093202801. Local number, 027N24W30BDA01.
LOCATION.--Lat 44°48'01", long 93°20'28", in NE¼SE¼NW¼ sec.30, T.27 N., R.24 W., Hydrologic Unit 07020012, in Bloomington.
Owner: City of Bloomington, at Southwood Terrace.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 12 in., depth 330 ft, cased to 269 ft.
DATUM.--Altitude of land-surface datum is 815 ft. Measuring point: Top of recorder platform, 2.20 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--March 1969 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 63.05 ft below land-surface datum, Apr. 15, 1969; lowest, 84.86 ft below land-surface datum, July 1, 1988.

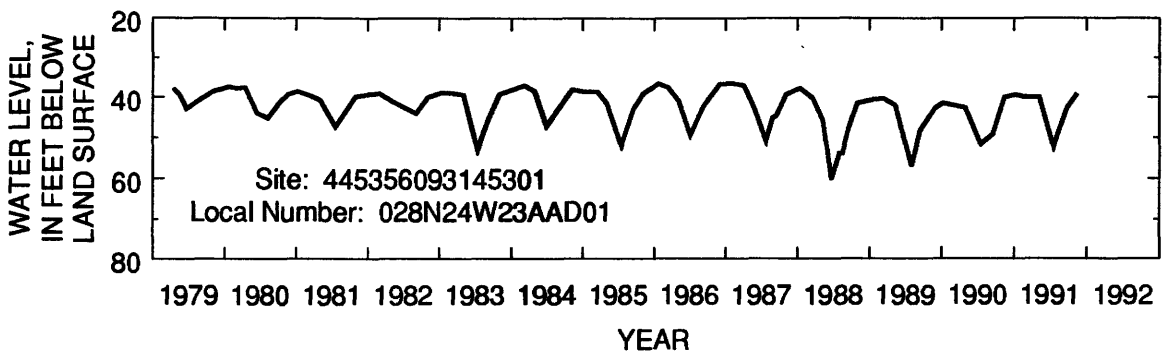
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 05	79.94	Dec 05	78.97	Feb 05	78.92	Apr 05	78.75	Jun 05	83.67	Aug 05	80.68
10	82.90	10	78.99	10	78.94	10	79.04	10	82.84	10	80.33
15	81.61	15	79.08	15	78.85	15	78.64	15	82.29	15	82.89
20	81.27	20	78.96	20	78.97	20	78.47	20	80.05	20	83.67
25	80.10	25	78.99	25	78.92	25	79.80	25	81.08	25	81.20
31	80.48	31	78.96	29	78.96	30	79.78	30	82.24	31	83.15
Nov 05	79.50	Jan 05	78.89	Mar 05	78.66	May 05	81.82	Jul 05	79.69	Sep 05	81.27
10	79.45	10	78.95	10	78.44	10	83.85	10	82.44	10	80.99
15	79.48	15	79.05	15	78.45	15	81.02	15	80.14	15	81.00
20	79.29	20	78.89	20	78.50	20	83.20	20	82.03	20	80.11
25	79.11	25	79.05	25	78.49	25	80.72	25	80.41	25	82.65
30	79.13	31	78.95	31	78.67	31	82.85	31	83.40	30	82.69

445356093145301. Local number, 028N24W23ADD01.
LOCATION.--Lat 44°53'56", long 93°14'53", in SE¼SE¼NE¼ sec.23, T.28 N., R.24 W., Hydrologic Unit 07010206, at 5728 Cedar Avenue, Minneapolis.
Owner: Hope Lutheran Church.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 6 in., depth 245 ft, cased to 172 ft.
DATUM.--Altitude of land-surface datum is 835 ft. Measuring point: Top of casing, 0.30 ft above land-surface datum.
PERIOD OF RECORD.--April 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 36.50 ft below land-surface datum, Jan. 22, 1986; lowest, 60.17 ft below land-surface datum, June 21, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 14	39.14	May 26	45.28	Jun 18	48.26	Jul 17	46.17	Aug 18	46.55	Sep 11	43.75



GROUND-WATER LEVELS

HENNEPIN COUNTY--Continued

450116093205301. Local number, 029N24W06CCC01.
LOCATION.--Lat 45°61'16", long 93°20'53", in $SW^1/_4SW^1/_4SW^1/_4$ sec.6, T.29 N., R.24 W., Hydrologic Unit 07010206, at 3610 Unity Avenue North, Robbinsdale.
Owner: Minnesota Department of Transportation.
AQUIFER.--St. Peter Sandstone of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 5 in., depth 200 ft, cased to 152 ft.
DATUM.--Altitude of land-surface datum is 870 ft. Measuring point: Top of casing, 3.50 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--March 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 24.54 ft below land-surface datum, Dec. 28-29, 1975; lowest, 53.03 ft below land-surface datum, June 15, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 05	32.35	Dec 05	30.23	Feb 05	29.91	Apr 05	29.58	Jun 05	42.32	Aug 05	36.39
10	32.48	10	30.26	10	30.23	10	29.74	10	43.74	10	33.48
15	32.27	15	30.76	15	30.84	15	29.81	15	40.77	15	36.27
20	32.21	20	31.28	20	30.42	20	28.95	20	36.57	20	38.85
25	32.67	25	29.30	25	31.12	25	30.03	25	36.46	25	37.97
31	31.77	31	30.26	29	29.53	30	31.39	30	38.13	31	35.41
Nov 05	30.85	Jan 05	29.49	Mar 05	30.13	May 05	35.24	Jul 05	33.95	Sep 05	35.95
10	30.25	10	30.25	10	29.83	10	38.93	10	35.43	10	34.54
15	31.05	15	30.33	15	29.67	15	37.79	15	33.20	15	36.11
20	31.03	20	30.29	20	29.55	20	40.71	20	32.96	20	33.07
25	29.99	25	30.93	25	30.46	25	35.83	25	32.45	25	33.72
30	30.15	31	31.33	31	29.22	31	35.63	31	37.75	30	35.19

445833093154301. Local number, 029N24W26BAB01.
LOCATION.--Lat 44°58'33", long 93°15'43", in $NW^1/_4NE^1/_4NW$ sec.26, T.29 N., R.24 W., Hydrologic Unit 07010206, at 425 Portland Avenue.
Owner: Minneapolis Star and Tribune.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 16 in., depth 445 ft, cased to 252 ft.
DATUM.--Altitude of land-surface datum is 835 ft. Measuring point: Top of steel cover, 7.60 ft below land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--June 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 56.45 ft below land-surface datum, Jan. 10, 1983; lowest, 149.36 ft below land-surface datum, Aug. 16, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 28	68.20	Dec 26	58.55	Feb 25	60.85	Apr 27	60.48	Jun 24	88.00	Aug 18	99.20
Nov 26	62.06	Jan 28	60.04	Mar 30	59.63	May 26	67.40	Jul 29	97.54	Sep 11	75.19

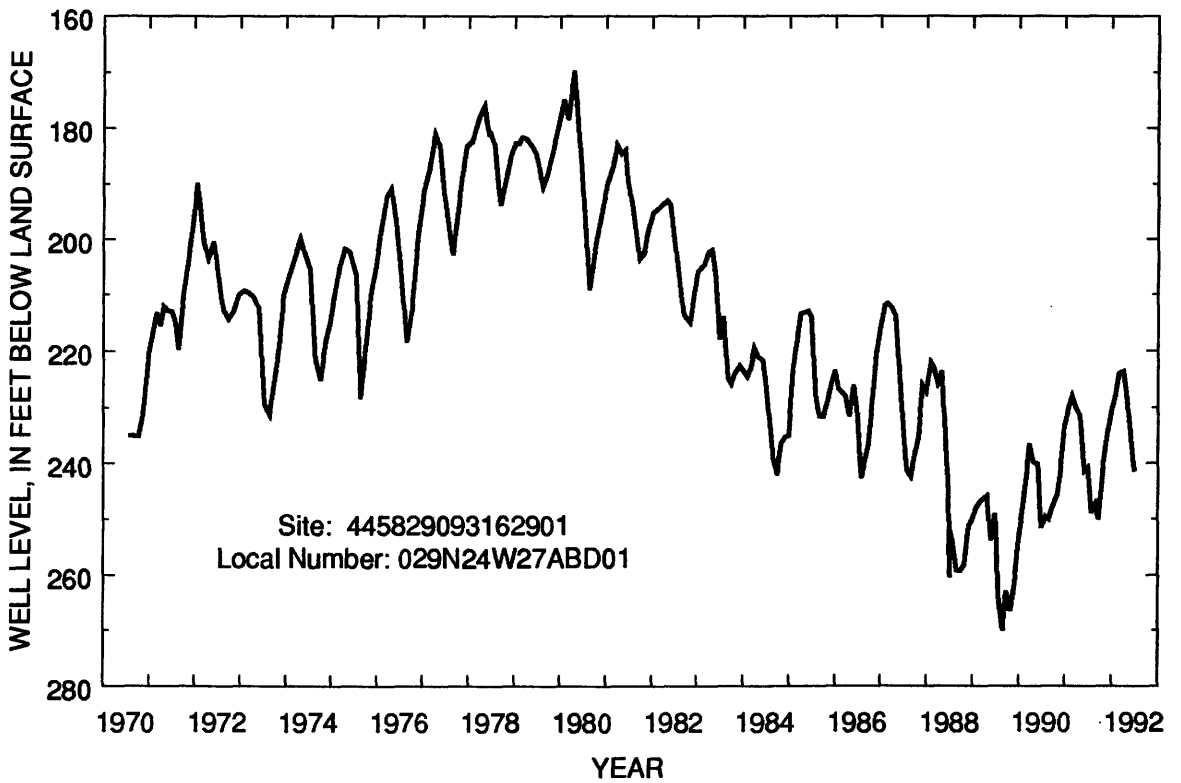
GROUND-WATER LEVELS

HENNEPIN COUNTY--Continued

445829093162901. Local number, 029N24W27ABD01.
LOCATION.--Lat 44°58'29", long 93°16'29", in SE¼NW¼NE¼ sec.27, T.29 N., R.24 W., Hydrologic Unit 07010206, at 911 LaSalle Avenue, Minneapolis.
Owner: American Linen Supply Co.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age and Hinckley Sandstone of Late Precambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 16 in., depth 1,094 ft, cased to 812 ft.
DATUM.--Altitude of land-surface datum is 850 ft. Measuring point: Hole in pump base, 22.00 ft below land-surface datum.
REMARKS.--Water level affected by regional pumping.
PERIOD OF RECORD.--July 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 169.8 ft below land-surface datum, Apr. 15, 1980; lowest, 269.92 ft below land-surface datum, Aug. 28, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 28	240.05	Dec 26	231.05	Feb 25	224.00	Apr 27	227.57	Jun 24	241.32	Aug 18	243.36
Nov 26	234.77	Jan 28	228.32	Mar 30	223.66	May 26	234.38	Jul 17	244.11	Sep 28	244.44



GROUND-WATER LEVELS

HENNEPIN COUNTY--Continued

445618093211801. Local number, 117N21W16CDB01.
LOCATION.--Lat 44°56'18", long 93°21'18", in NW¼SE¼SW¼ sec.16, T.117 N., R.21 W., Hydrologic Unit 07010206, at 2565 Wooddale Avenue South, St. Louis Park.
Owner: D-A Lubricant Co.
AQUIFER.--Ironton-Galesville Sandstones of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 4 in., depth 691 ft, screened 651 to 661 ft.
DATUM.--Altitude of land-surface datum is 917.2 ft, National Geodetic Vertical Datum of 1929. Measuring point: Hole in well seal, 3.60 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--April 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 128.70 ft below land-surface datum, May 29, 1992; lowest, 155.46 ft below land-surface datum, Sept. 20, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 14	141.46	May 29	128.70	Jun 18	131.07	Jul 20	133.90	Aug 18	135.30	Sep 11	136.54

445646093395301. Local number, 117N24W13BBC04.
LOCATION.--Lat 44°45'46", long 93°39'53", in SW¼NW¼NW¼ sec.13, T.117 N., R.24 W., Hydrologic Unit 07010206, at 3-Point Road.
Owner: City of Mound, well 4.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 10 in., depth 729 ft, cased to 600 ft.
DATUM.--Altitude of land-surface datum is 945 ft: Measuring point: Top of breather pipe, 2.35 ft above land-surface datum.
PERIOD OF RECORD.--November 1985 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 65.30 ft below land-surface datum, Mar. 4, 1980; lowest, 72.80 ft below-land surface datum, Nov. 2, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 13	65.78	May 21	65.64	Jul 17	66.08	Sep 11	66.00
Mar 05	65.50	Jun 18	65.82	Aug 17	66.23		

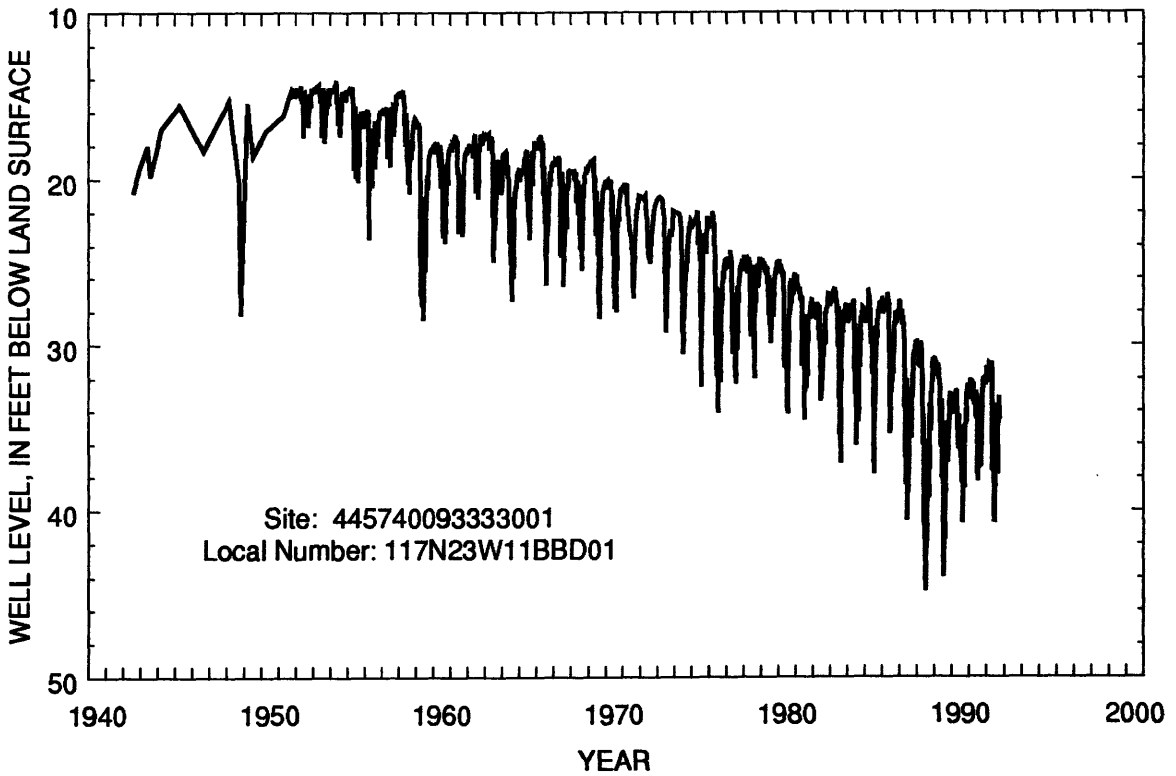
445740093333001. Local number, 117N23W11BBD01.
LOCATION.--Lat 44°57'40", long 93°33'30", in SE¼NW¼NW¼ sec.11, T.117 N., R.23 W., Hydrologic Unit 07010206, 2 mi southwest of Wayzata, at Lake Minnetonka.
Owner: Minnetonka Boat Works, Inc., Orono.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 6 in., depth 437 ft, cased to 270 ft.
DATUM.--Altitude of land-surface datum is 930.8 ft National Geodetic Vertical Datum of 1929. Measuring point: Wood floor of instrument shelter, 3.30 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--August 1942 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 14.05 ft below land-surface datum, Apr. 30, 1954; lowest, 44.77 ft below land-surface datum, June 28, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 15	32.04	Jan 05	31.34	Feb 29	31.77	Apr 25	37.61	Jun 20	36.00	Aug 15	35.95
Nov 15	31.95	10	31.75	Mar 05	31.13	30	32.85	25	36.01	20	37.74
20	32.00	15	32.14	10	31.16	May 05	33.92	30	38.59	25	37.80
25	32.31	20	32.09	15	31.09	10	36.55	Jul 05	35.59	31	35.32
30	32.03	25	32.09	20	31.43	15	35.80	10	37.41	Sep 05	34.18
Dec 05	32.21	31	32.22	25	31.28	20	37.66	15	34.96	10	33.80
10	32.38	Feb 05	31.83	31	31.36	25	37.19	20	33.80	15	34.07
15	32.13	10	31.98	Apr 05	31.13	31	37.58	25	33.62	20	33.08
20	32.26	15	32.12	10	32.22	Jun 05	40.38	31	35.38	25	34.53
25	31.78	20	31.95	15	31.13	10	39.06	Aug 05	35.28	30	34.35
31	31.44	25	31.90	20	31.14	15	40.74	10	34.47		

GROUND-WATER LEVELS

HENNEPIN COUNTY--Continued



450223093231801. Local number, 118N21W07DCB01.
LOCATION.--Lat 45°02'23", long 93°23'18", in NW¼SW¼SE¼ sec.7, T.118 N., R.21 W., Hydrologic Unit 07010206, at 47th Avenue North and Aquila Avenue.
Owner: City of New Hope.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 16 in., depth 422 ft, cased to 339 ft.
DATUM.--Altitude of land-surface datum is 933 ft. Measuring point: Top of wood platform, 3.00 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--October 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 60.46 ft below land-surface datum, Dec. 17, 1967; lowest, 77.56 ft below land-surface datum, July 11, 1985.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 05	69.05	Dec 05	68.35	Feb 05	68.36	Apr 05	67.48	Jun 05	74.64	Aug 05	71.03
10	68.98	10	68.68	10	68.10	10	67.40	10	73.53	10	69.93
15	68.65	15	68.78	15	68.22	15	66.73	15	73.28	15	70.91
20	69.18	20	69.19	20	68.39	20	66.03	20	70.28	20	72.13
25	68.89	25	68.41	25	68.37	25	67.65	25	70.18	25	71.84
31	69.25	31	68.59	29	68.00	30	68.48	30	71.82	31	69.89
Nov 05	68.16	Jan 05	67.79	Mar 05	67.98	May 05	69.68	Jul 05	68.93	Sep 05	69.67
10	68.15	10	67.32	10	68.01	10	71.74	10	70.81	10	69.21
15	68.69	15	67.54	15	67.83	15	70.97	15	69.70	15	69.22
20	68.37	20	68.01	20	67.86	20	71.99	20	69.42	20	68.38
25	68.25	25	67.47	25	67.79	25	71.13	25	69.32	25	69.25
30	67.49	31	68.05	31	67.52	31	71.42	31	71.76	30	69.26

GROUND-WATER LEVELS

HENNEPIN COUNTY--Continued

445905093224401. Local number, 118N21W32CBB01.
LOCATION.--Lat 44°59'05", long 93°22'44", in NW¼NW¼SW¼ sec.32, T.118 N., R.21 W., Hydrologic Unit 07010206, at Winnetka Avenue and Highway 55, Golden Valley.
Owner: Red Owl Store.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 6 in., depth 95 ft, screened 87 to 95 ft.
DATUM.--Altitude of land-surface datum is 895 ft. Measuring point: Top of well cap, 0.80 ft above land-surface datum.
PERIOD OF RECORD.--May 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.72 ft below land-surface datum, May 12, 1986; lowest, 22.43 ft below land-surface datum, Jan. 18, 1990.

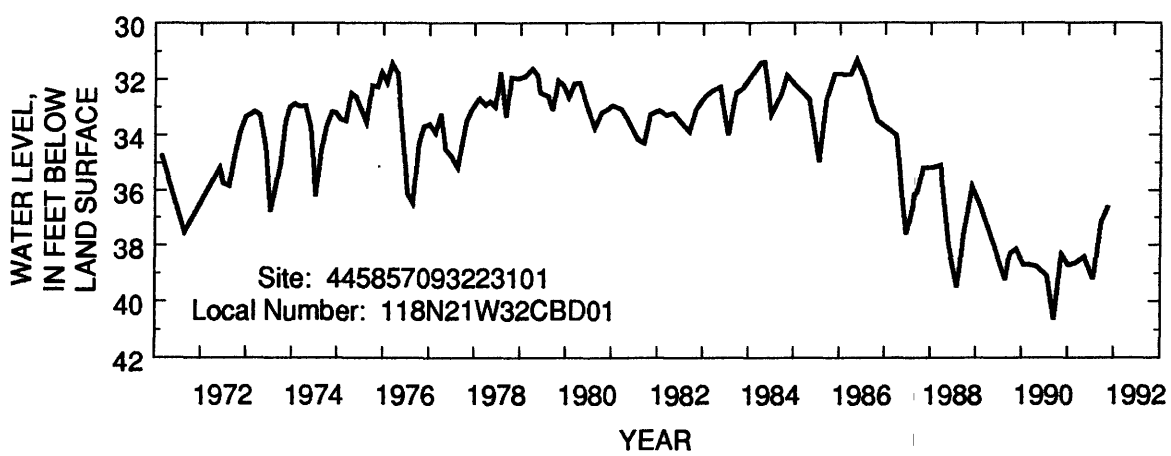
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 14	19.23	May 21	18.93	Jun 18	18.88	Jul 17	18.31	Aug 17	18.25	Sep 11	18.51

445857093223101. Local number, 118N21W32CBD01.
LOCATION.--Lat 44°58'57", long 9322'31", in SE¼NW¼SW¼ sec.32, T.118 N., R.21 W., Hydrologic Unit 07010206, at 760 Harold Avenue, Golden Valley.
Owner: Golden Valley Methodist Church.
AQUIFER.--St. Peter Sandstone of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 6 in., depth 265 ft, cased to 200 ft.
DATUM.--Altitude of land-surface datum is 890 ft. Measuring point: Top of well cap, 0.70 ft above land-surface datum.
PERIOD OF RECORD.--February 1971 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 31.33 ft below land-surface datum, May 12, 1986; lowest, 40.62 ft below land-surface datum, Sept. 14, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 14	36.58	May 21	38.20	Jun 18	37.30	Jul 17	36.61	Aug 17	36.68	Sep 11	36.80



GROUND-WATER LEVELS

HOUSTON COUNTY

433935091251801. Local number, 102N05W03DCC01.
LOCATION.--Lat 43°39'35", long 91°25'18", in SW¼SW¼SE¼ sec.3, T.102 N., R.5 W., Hydrologic Unit 07060001, 3 mi east of Caledonia. Owner: U.S Geological Survey.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 4 in., depth 360 ft, cased to 309 ft.
DATUM.--Altitude of land-surface datum is 1,210 ft. Measuring point: Top of casing, 2.50 ft above land-surface datum.
PERIOD OF RECORD.--June 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 213.76 ft below land-surface datum, July 17, 1985; lowest, 247.54 ft below land-surface datum, Feb. 11-12, 1992.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 05	246.26	Dec 05	246.88	Feb 05	247.14	Apr 05	247.18	Jun 05	245.79	Aug 05	245.10
10	246.47	10	246.78	10	247.23	10	246.98	10	246.01	10	244.88
15	246.33	15	247.13	15	246.93	15	246.97	15	245.83	15	245.04
20	246.57	20	247.04	20	247.27	20	246.47	20	245.91	20	244.78
25	246.59	25	246.95	25	247.25	25	246.87	25	245.56	25	244.63
31	246.80	31	247.14	29	247.31	30	246.65	30	245.47	31	244.66
Nov 05	246.55	Jan 05	246.84	Mar 05	247.16	May 05	246.94	Jul 05	245.46	Sep 05	244.44
10	246.72	10	246.89	10	247.19	10	246.56	10	245.35	10	244.53
15	246.83	15	247.13	15	247.46	15	246.50	15	245.21	15	244.35
20	246.68	20	247.05	20	247.19	20	246.57	20	245.40	20	244.10
25	246.92	25	247.27	25	246.97	25	246.36	25	245.16	25	244.19
30	247.03	31	247.16	31	247.02	31	246.25	31	245.11	30	244.23

433935091252001. Local number, 102N05W03DCC02.
LOCATION.--Lat 43°39'35", long 91°25'20", in SW¼SW¼SE¼ sec.3, T.102 N., R.5 W., Hydrologic Unit 07060001, 3 mi east of Caledonia. Owner: U.S. Geological Survey.
AQUIFER.--Ironton-Galesville Sandstones of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 4 in., depth 650 ft, cased to 614 ft.
DATUM.--Altitude of land-surface datum is 1,210 ft. Measuring point: Top of casing, 2.50 ft above land-surface datum.
PERIOD OF RECORD.--November 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 441.50 ft below land-surface datum, June 4, 1981; lowest, 452.21 ft below land-surface datum, July 31, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Dec 10	450.74	May 06	450.14	Aug 11	449.44

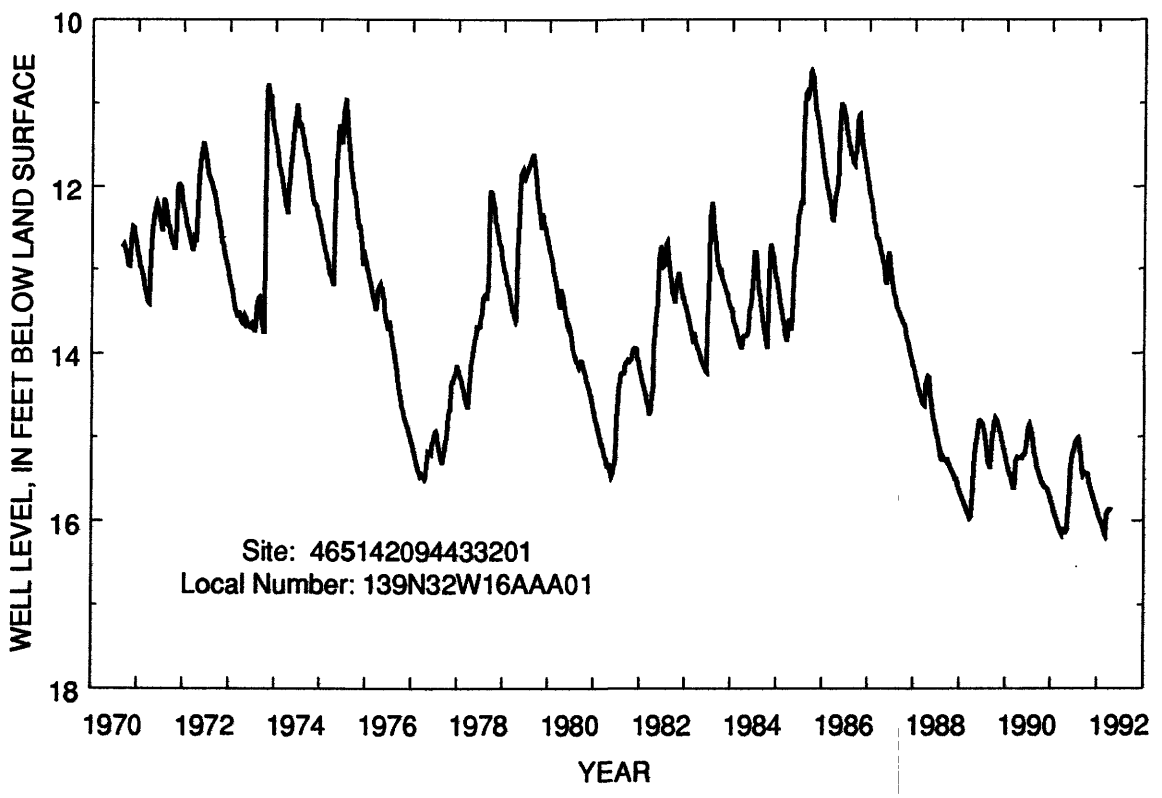
GROUND-WATER LEVELS

HUBBARD COUNTY

465142094433201. Local number, 139N32W16AAA01.
LOCATION.--Lat 46°51'42", long 94°43'32", in NE¼NE¼NE¼ sec.16, T.139 N., R.32 W., Hydrologic Unit 07010106, at Badoura Nursery. Owner: U.S. Geological Survey.
AQUIFER.--Surficial outwash sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1 in., depth 21 ft, screened 19 to 21 ft.
DATUM.--Altitude of land-surface datum is 1,419 ft. Measuring point: Top of casing, 2.00 ft above land-surface datum.
REMARKS.--Measured weekly by Archie Hakala.
PERIOD OF RECORD.--September 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 10.63 ft below land-surface datum, Sept. 24, 1985; lowest, 16.17 ft below land-surface datum, Mar. 3, 1992.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 01	15.44	Nov 12	15.64	Dec 24	15.85	Feb 04	16.03	Mar 17	15.90	Jun 16	15.95
08	15.44	19	15.68	31	15.87	11	16.07	24	15.88	Jul 14	15.64
15	15.45	26	15.71	Jan 07	15.92	18	16.11	Apr 01	15.86	Aug 17	15.45
22	15.55	Dec 03	15.75	14	15.97	25	16.15	14	15.86	Sep 14	15.57
29	15.56	10	15.78	21	15.98	Mar 03	16.17	21	15.87		
Nov 05	15.62	17	15.82	28	16.01	10	15.93	May 13	15.90		



GROUND-WATER LEVELS

ITASCA COUNTY

471448093322001. Local number, 055N25W17ACD01.
LOCATION.--Lat 47°14'48", long 93°32'20", in SE¼SW¼NE¼ sec.17, T.55 N., R.25 W., Hydrologic Unit 07010103, at west end of 13th Street NW, Grand Rapids.
Owner: U.S. Geological Survey.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 4 in., depth 147 ft, screened 143 to 147 ft.
DATUM.--Altitude of land-surface datum is 1,318 ft. Measuring point: Top of platform, 1.60 ft above land-surface datum.
PERIOD OF RECORD.--April 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 29.04 ft below land-surface datum, June 1, 1966; lowest, 33.92 ft below land-surface datum, May 17, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 25	32.55	Dec 02	32.74	Jan 10	32.82	Feb 27	32.93	Apr 10	32.83

JACKSON COUNTY

434742095191501. Local number, 104N37W19DBD01.
LOCATION.--Lat 43°47'42", long 95°19'15", in SE¼NW¼SE¼ sec.19, T.104 N., R.37 W., Hydrologic Unit 07100001, at Heron Lake.
Owner: City of Heron Lake, old railroad well.
AQUIFER.--Sioux Quartzite of Late Precambrian Age.
WELL CHARACTERISTICS.--Drilled public-supply artesian well, diameter 16 in., depth 323 ft, screened 205 to 225 ft.
DATUM.--Altitude of land-surface datum is 1,420 ft. Measuring point: Edge of breather pipe, 2.60 ft above land-surface datum.
PERIOD OF RECORD.--August 1972, July 1973, September 1976, July 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 59.16 ft below land-surface datum, Aug. 11, 1972; lowest, 66.10 ft below land-surface datum, July 14, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

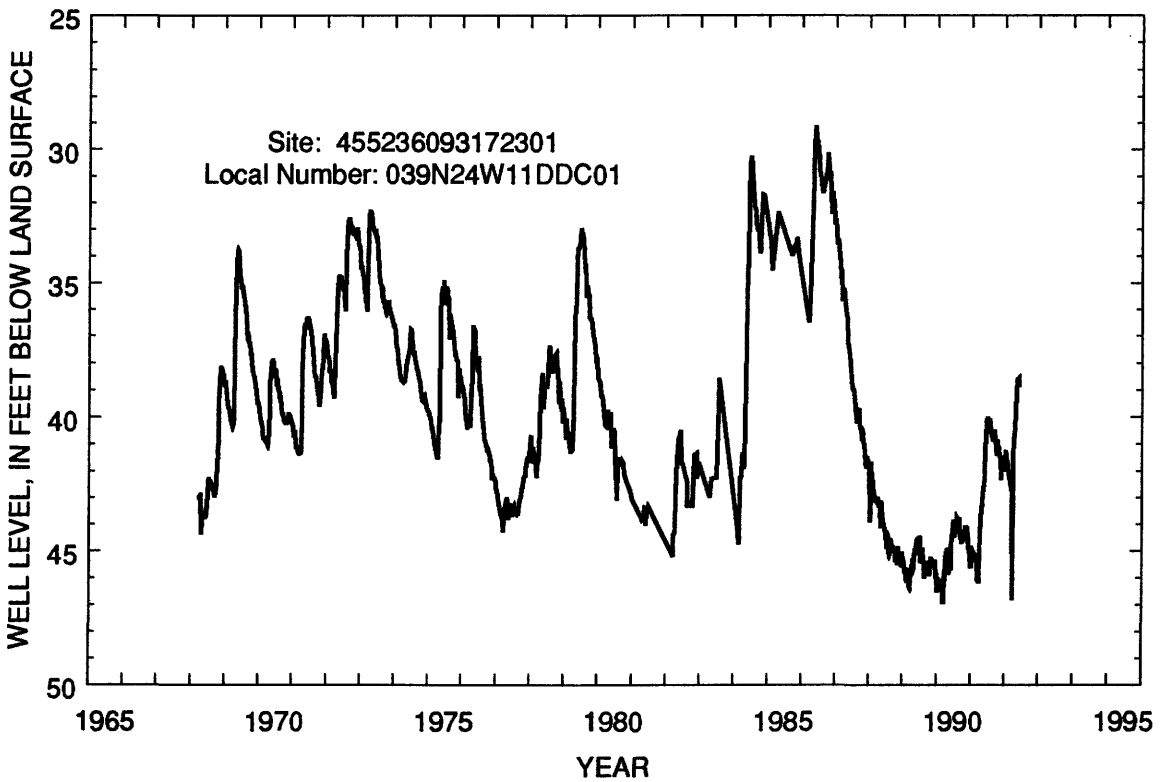
DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 22	61.63	Dec 23	61.20

KANABEC COUNTY

455236093172301. Local number, 039N24W11DDC01.
LOCATION.--Lat 45°52'36", long 93°17'23", in SW¼SE¼SE¼ sec.11, T.39 N., R.24 W., Hydrologic Unit 07030004, intersection of Forest Avenue and U.S. Highway 65.
Owner: City of Mora, well 3.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled public-supply artesian well, diameter 12 in., depth 170 ft, screened 150 to 170 ft.
DATUM.--Altitude of land-surface datum is 1,011 ft. Measuring point: Edge of vent pipe, 2.40 ft above land-surface datum.
PERIOD OF RECORD.--March 1968 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 29.10 ft below land-surface datum, May 27, 1986; lowest, 46.90 ft below land-surface datum, Mar. 5, 12, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 08	40.85	Nov 19	42.30	Dec 31	41.99	Feb 10	42.16	Mar 23	46.80	May 05	39.08
14	40.90	25	41.66	Jan 06	41.23	18	42.21	30	41.45	11	38.64
21	41.02	Dec 03	41.45	13	41.51	24	42.34	Apr 06	40.84	18	38.58
28	41.15	09	41.69	21	41.48	Mar 03	42.58	14	40.65	27	38.53
Nov 05	41.48	17	41.73	27	41.70	09	42.10	20	40.40	Jun 01	38.86
13	41.52	23	41.60	Feb 03	41.74	16	43.40	27	39.79	Sep 28	41.20



LE SUEUR COUNTY

442522093543901. Local number, 111N26W14ADA01.
LOCATION.--Lat 44°25'22", long 93°54'39", in NE¼SE¼NE¼ sec.14, T.111 N., R.26 W., Hydrologic Unit 07020012, 0.85 mi south of Le Sueur.
Owner: Merle Moser.
AQUIFER.--Buried gravel of Pleistocene Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 16 in., depth 242 ft, screened 212 to 242 ft.
DATUM.--Altitude of land-surface datum is 855 ft. Measuring point: Edge of vent pipe, 1.20 ft above land-surface datum.
PERIOD OF RECORD.--January 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 71.82 ft below land-surface datum, Feb. 11, 1987; lowest, 84.55 ft below land-surface datum, Mar. 9, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL
Mar 18	81.07

GROUND-WATER LEVELS

LE SUEUR COUNTY--Continued

443234093333501 Local number, 112N23W02BAB01.
LOCATION.--Lat 44°32'34", long 93°33'35", in NW¼NE¼NW¼ sec.2, T.112 N., R.23 W., Hydrologic Unit 07020012, just east of New Prague.
Owner: Holy Trinity Lutheran Church.
AQUIFER.--St. Lawrence Formation of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 180 ft, cased to 155 ft.
DATUM.--Altitude of land-surface datum is 1,005 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--April 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 93.56 ft below land-surface datum, Feb. 3, 1987; lowest, 99.42 ft below land-surface datum, July 26, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 21	96.40	Mar 11	95.87	May 14	96.12

443147093374501. Local number, 112N23W06DDD01.
LOCATION.--Lat 44°31'47",long 93°37'45", in SE¼SE¼SE¼ sec.6, T.112 N., R.23 W., Hydrologic Unit 07020012, 3 mi southwest of New Prague.
Owner: Friedens Lutheran Church.
AQUIFER.--St. Lawrence Formation of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 5 in., depth 265 ft, cased to 209 ft.
DATUM.--Altitude of land-surface datum is 1,019 ft. Measuring point: Top of casing, 1.70 ft above land-surface datum.
PERIOD OF RECORD.--April 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 150.85 ft below land-surface datum, Mar. 18, 1981; lowest, 153.58 ft below land-surface datum, July 19, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 21	151.77	Mar 11	151.61	May 14	152.32

LINCOLN COUNTY

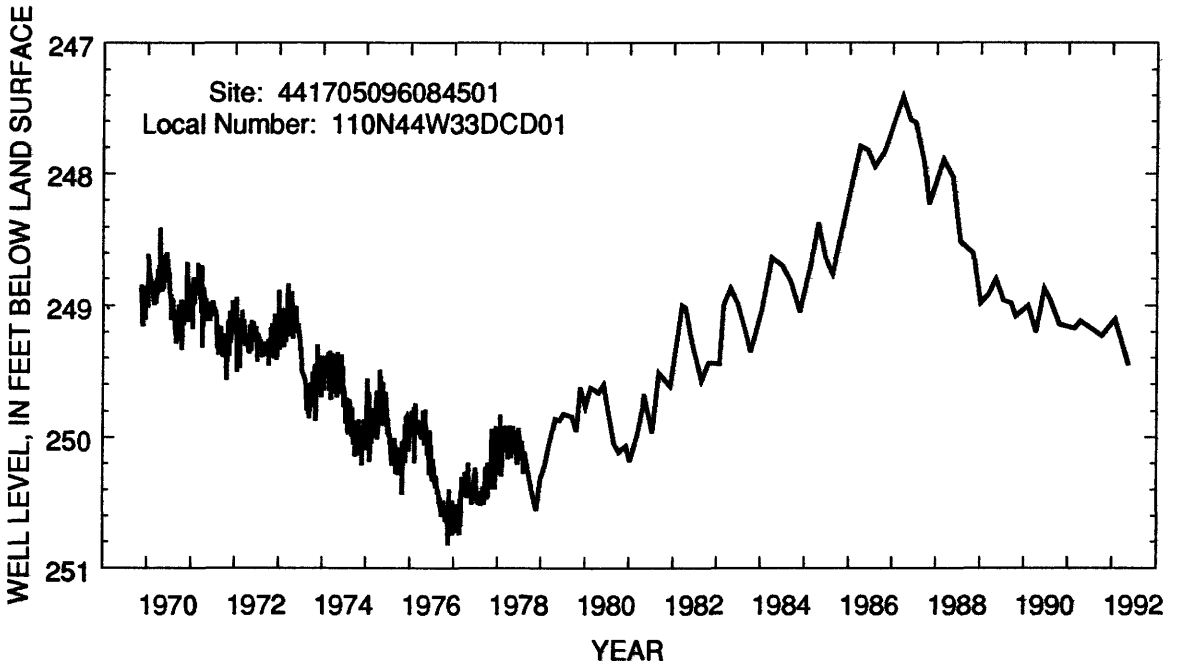
441705096084501. Local number, 110N44W33DCD01.
LOCATION.--Lat 44°17'05", long 96°08'45", in SE¼SW¼SE¼ sec.33, T.110 N., R.44 W., Hydrologic Unit 07020006, at Tyler.
Owner: U.S. Geological Survey.
AQUIFER.--Dakota Sandstone of Early Cretaceous Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 8 in., depth 967 ft, screened 890 to 900 ft.
DATUM.--Altitude of land-surface datum is 1,738 ft. Measuring point: Top of recorder platform, 3.50 ft above land-surface datum.
PERIOD OF RECORD.--November 1969 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 247.41 ft below land-surface datum, Mar. 23, 1987; lowest, 250.82 ft below land-surface datum, Nov. 12, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 02	249.23	Jan 23	249.10	May 13	249.45

GROUND-WATER LEVELS

LINCOLN COUNTY--Continued



MARTIN COUNTY

434359094422201. Local number, 103N32W08CCD01.
LOCATION.--Lat 43°43'59", long 94°42'22", in SE¼SW¼SW¼ sec.8, T.103 N., R.32 W., Hydrologic Unit 07020009, 1.5 mi south of Trimont.
Owner: Robert Olson.
AQUIFER.--Sandstone of Cretaceous Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 16 in., depth 412 ft, screened 372 to 412 ft.
DATUM.--Altitude of land-surface datum is 1,242 ft. Measuring point: Vent pipe, 0.50 ft above land-surface datum.
PERIOD OF RECORD.--July 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 90.50 ft below land-surface datum, Apr. 14, 1987; lowest, 96.22 ft below land-surface datum, July 21, 1987.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 20	91.92	Mar 18	91.45	May 13	91.59

GROUND-WATER LEVELS

MARTIN COUNTY--Continued

434725094483001. Local number, 104N33W28BAB01.
LOCATION.--Lat 43°47'25", long 94°48'30", in NW¼NE¼NW¼ sec.28, T.104 N., R.33 W., Hydrologic Unit 07020009, 6.6 mi northwest of Trimont.
Owner: Kenneth Schafer.
AQUIFER.--Sioux Quartzite of Late Precambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 5 in., depth 178 ft, cased to 121 ft.
DATUM.--Altitude of land-surface datum is 1,290 ft. Measuring point: Top of casing, 1.30 ft above land-surface datum.
PERIOD OF RECORD.--September 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 82.99 ft below land-surface datum, Apr. 14, 1987; lowest, 86.37 ft below land-surface datum, Mar. 25, 1991.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 20	84.99	Mar 18	84.45	May 13	84.63

MC LEOD COUNTY

444758094132101. Local number, 115N28W05ACC01.
LOCATION.--Lat 44°47'58", long 94°13'21", in SW¼SW¼NE¼ sec.5, T.115 N., R.28 W., Hydrologic Unit 07010205, northwest of Glencoe.
Owner: Graupmann Farms, Inc.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in., depth 472 ft, screened 432 to 472 ft.
DATUM.--Altitude of land-surface datum is 1,036 ft. Measuring point: Edge of vent pipe, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--September 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 80.50 ft below land-surface datum, Aug. 20, 1979; lowest, 109.65 ft below land-surface datum, Oct. 1, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL
Mar 12	84.41	May 07	83.75

444819094164701. Local number, 116N29W35DDC01.
LOCATION.--Lat 44°48'19", long 94°16'47", in SW¼SE¼SE¼ sec.35, T.116 N., R.29 W., Hydrologic Unit 07010205, 1.3 mi south of Biscay.
Owner: Charles Johnson.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in., depth 269 ft, screened 229 to 269 ft.
DATUM.--Altitude of land-surface datum is 1,050 ft. Measuring point: Edge of vent pipe, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--September 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 24.21 ft below land-surface datum, Jan. 23, 1986; lowest, 34.80 ft below land-surface datum, Aug. 26, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL
Mar 12	26.13	May 07	25.87

GROUND-WATER LEVELS

MC LEOD COUNTY--Continued

445721094031201. Local number 117N27W10DAA01.
LOCATION.--Lat 44°57'21", long 94°03'12", in NE¼NE¼SE¼ sec.10, T.117 N., R.27 W., Hydrologic Unit 07010205, 0.1 mi south of Winsted.
Owner: Winsted Farmers Coop.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled industrial artesian well, diameter 4 in., depth 129 ft, screened 125 to 129 ft.
DATUM.--Altitude of land-surface datum is 1,015 ft. Measuring point: Top of casing, 1.40 ft above land-surface datum.
PERIOD OF RECORD.--November 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 30.63 ft below land-surface datum, Dec. 10, 1986; lowest, 45.50 ft below land-surface datum, Oct. 7, 1987.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

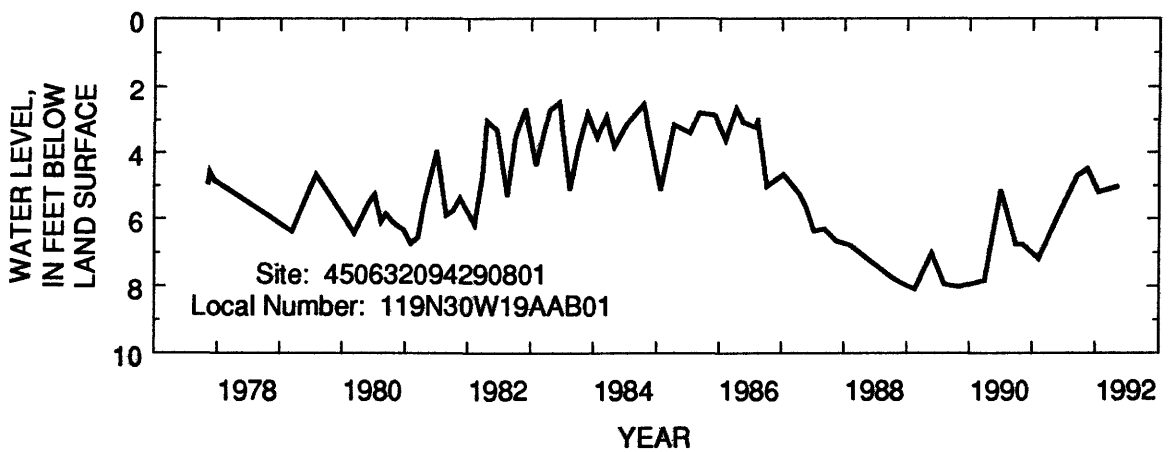
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Dec 11	32.98	Mar 12	32.47	May 07	31.86

MEEKER COUNTY

450632094290801. Local number, 119N30W19AAB01.
LOCATION.--Lat 45°06'32", long 94°29'08", in NW¼NE¼NE¼ sec.19, T.119 N., R.30 W., Hydrologic Unit 07010204, on Ted Carlson farm.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1 in., depth 26 ft, screened 24 to 26 ft.
DATUM.--Altitude of land-surface datum is 1,130 ft. Measuring point: Top of casing, 3.30 ft above land-surface datum.
PERIOD OF RECORD.--November 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.47 ft below land-surface datum, June 14, 1983; lowest 8.09 ft below land-surface datum, Feb. 13, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 18	4.48	Jan 21	5.20	May 12	5.02	Sep 29	5.68



GROUND-WATER LEVELS

MEEKER COUNTY--Continued

451542094322301. Local number, 121N31W26BDC01.
LOCATION.--Lat 45°15'42", long 94°32'23", in SW¼SE¼NW¼ sec.26, T.121 N., R.31 W., Hydrologic Unit 07010204, on Keith Langmo farm. Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1 in., depth 16 ft, screened 14 to 16 ft.
DATUM.--Altitude of land-surface datum is 1,112 ft. Measuring point: Top of casing, 3.00 ft above land-surface datum.
PERIOD OF RECORD.--November 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.70 ft below land-surface datum, Aug. 18, 1986; lowest, 9.19 ft below land-surface datum, Mar. 30, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 18	3.84	Jan 21	4.69	May 12	4.09	Sep 29	6.10

MORRISON COUNTY

460444094212501. Local number, 130N29W08DCC01.
LOCATION.--Lat 46°04'44", long 94°21'25", in SW¼SW¼SE¼ sec.8, T.130 N., R.29 W., Hydrologic Unit 07010104, at Camp Ripley. Owner: U.S. Geological Survey.
AQUIFER.--Surficial outwash sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 59 ft, screened 56 to 59 ft.
DATUM--Land-surface datum is 1,149.0 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.10 ft above land-surface datum.
REMARKS.--Water levels used in monthly Water Resources Review.
PERIOD OF RECORD.--April 1949 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.35 ft below land-surface datum, July 28, 1972; lowest, 19.75 ft below land-surface datum, Aug. 4, 1961.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 04	13.85	Dec 06	14.40	Feb 07	15.20	Apr 11	15.34	Jun 12	15.57	Aug 21	14.69
11	14.02	13	14.66	14	15.19	17	15.57	19	15.31	28	14.96
18	14.07	20	14.71	21	15.51	24	15.60	26	14.90	Sep 04	14.82
25	14.09	27	14.66	28	15.43	May 01	15.71	Jul 02	14.98	11	14.66
Nov 01	14.09	Jan 03	14.72	Mar 06	15.84	08	15.53	10	15.10	18	14.84
08	14.12	10	14.80	13	15.31	15	15.60	24	14.92	25	14.80
15	14.22	17	15.00	20	15.45	22	15.43	31	14.81		
22	14.25	24	15.17	27	15.27	29	15.20	Aug 07	14.75		
29	14.39	31	15.13	Apr 04	15.39	Jun 05	15.28	14	15.08		

MOWER COUNTY

434010093010801. Local number, 102N18W05ACB01.
LOCATION.--Lat 43°40'10", long 93°01'08", in NW¼SW¼NE¼ sec.5, T.102 N., R.18 W., Hydrologic Unit 07080201, in Austin. Owner: Church of Latter Day Saints.
AQUIFER.--Cedar Valley Formation of Middle Devonian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 5 in., depth 100 ft, cased to 77 ft.
DATUM.--Altitude of land-surface datum is 1,230 ft. Measuring point: Top of casing, 0.80 ft above land-surface datum.
PERIOD OF RECORD.--July 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 30.70 ft below land-surface datum, Sep. 10, 1992; lowest, 38.44 ft below land-surface datum, July 10, 1985.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 20	35.57	Mar 19	34.73	May 13	34.84	Sep 10	30.70

GROUND-WATER LEVELS

OLMSTEAD COUNTY

445538092232601. Local number, 105N13W04CAA01.
LOCATION.--Lat 44°55'38", long 92°23'26", in NW¼NW¼SW¼ sec.4, T.105 N., R.13 W., Hydrologic Unit 07040004, 1 mile east of Simpson.
Owner: Robert Sheehan.
AQUIFER.--Galena Formation of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 4 in., depth 75 ft, cased to 23 ft.
DATUM.--Altitude of land-surface datum is 1,270 ft: Measuring point: Top of well cap, 1.20 ft above land-surface datum.
PERIOD OF RECORD.--March 1987 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 15.16 ft below land-surface datum, May 7, 1991; lowest, 33.30 ft below land-surface datum, Feb. 6, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 25	24.90	Mar 10	21.22	May 14	19.28

435757092224201. Local number, 106N13W22CCB01.
LOCATION.--Lat 43°5'57", long 92°22'42", in NW¼SW¼SW¼ sec. 22, T.106 N., R.13 W., Hydrologic Unit 07040004, at Burr Oak School.
Owner: Independent School District 535.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 6 in. depth 510 ft, cased to 430 ft.
DATUM.--Altitude of land-surface datum is 1,090 ft: Measuring point: Top of well cap, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--February 1987 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 25.73 ft below land-surface datum, May 14, 1992; lowest, 32.63 ft below land-surface datum, Feb. 6, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 25	30.12	Mar 10	26.79	May 14	25.73

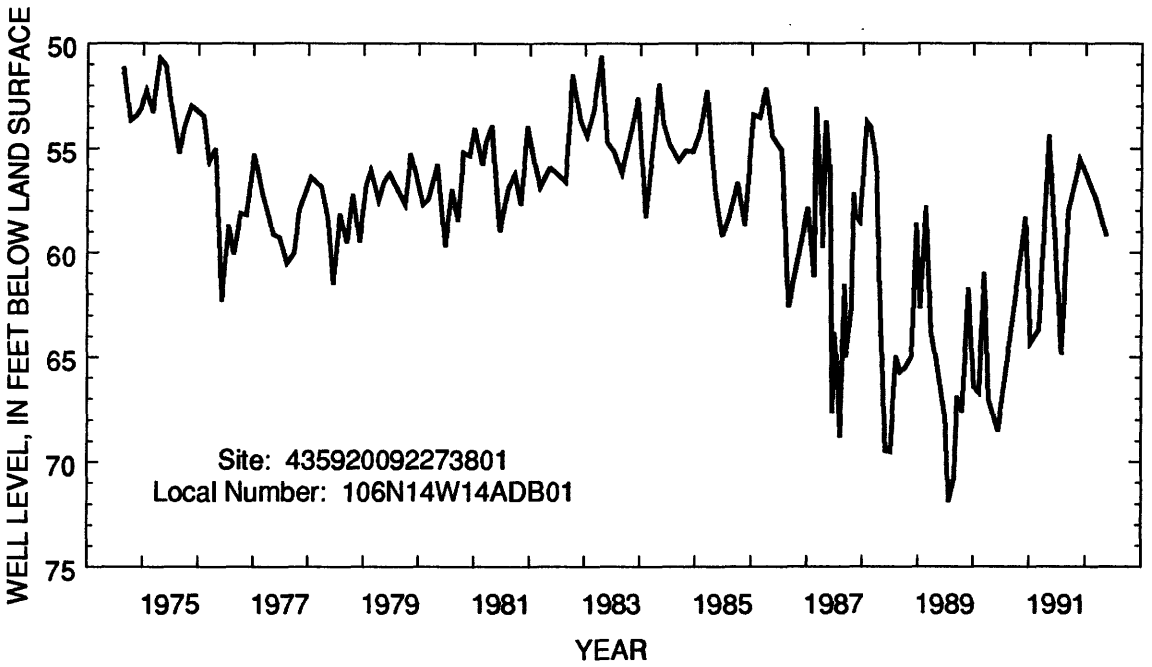
435920092273801. Local number, 106N14W14ADB01.
LOCATION.--Lat 43°59'20", long 92°27'38", in NW¼SE¼NE¼ sec.14, T.106 N., R.14 W., Hydrologic Unit 07040004, in Rochester.
Owner: Golden Hill School Dist. #1371.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 6 in., depth 478 ft, cased to 397 ft.
DATUM.--Altitude of land-surface datum is 1,065 ft. Measuring point: Edge of well cap, 1.80 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--August 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 50.58 ft below land-surface datum, Apr. 12, 1983; lowest, 71.86 ft below land-surface datum, July 26, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 25	55.52	Mar 10	57.42	May 14	59.18

GROUND-WATER LEVELS

OLMSTEAD COUNTY--Continued



RAMSEY COUNTY

445955093011001. Local number, 029N22W14CAB01.
LOCATION.--Lat 44°59'55", long 93°01'10", in NW¼NE¼SW¼ sec.14, T.29 N., R.22 W., Hydrologic Unit 07010206, at Goodrich Golf Course. Owner: Ramsey County.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in., depth 523 ft, cased to 303 ft.
DATUM.--Altitude of land-surface datum is 970 ft. Measuring point: Edge of vent pipe, 2.50 ft above land-surface datum.
PERIOD OF RECORD.--May 1965, April 1966 to August 1966, August 1971, May 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 124.62 ft below land-surface datum, Feb. 6, 1987; lowest, 140.60 ft below land-surface datum, Apr. 6, 1966.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 22	132.01	Jun 20	141.40

GROUND-WATER LEVELS

RAMSEY COUNTY--Continued

445955093011002. Local number, 029N22W14CAB02.
LOCATION.--Lat 44°59'55", long 93°01'10", in NW¼NE¼SW¼ sec.14, T.29 N., R.22 W., Hydrologic Unit 07010206, at Goodrich Golf Course. Owner: U.S. Geological Survey.
AQUIFER.--Buried gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation artesian well, diameter 2 in., depth 81 ft, screened 78 to 81 ft.
DATUM.--Altitude of land-surface datum is 970 ft. Measuring point: Top of casing, 1.30 ft above land-surface datum.
PERIOD OF RECORD.--October 1966 to August 1971, August 1977, June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 30.80 ft below land-surface datum, Oct. 28, 1986; lowest, 45.36 ft below land-surface datum, June 3, 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 22	35.43	Apr 29	33.94	Jun 30	34.15	Aug 21	33.25
Mar 25	34.37	May 27	33.89	Jul 16	33.34	Sep 25	33.00

445955093011003. Local number, 029N22W14CAB03.
LOCATION.--Lat 44°59'55", long 93°01'10", in NW¼NE¼SW¼ sec.14, T.29 N., R.22 W., Hydrologic Unit 07010206, at Goodrich Golf Course. Owner: U.S. Geological Survey.
AQUIFER.--Buried gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 2 in., depth 52 ft, screened 49to 52 ft.
DATUM.--Altitude of land-surface datum is 970 ft. Measuring point: Top of casing, 1.80 ft above land-surface datum.
PERIOD OF RECORD.--October 1966 to August 1971, June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.97 ft below land-surface datum, Oct. 28, 1986; lowest, 25.43 ft below land-surface datum, June 3, 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 22	15.97	Apr 29	14.09	Jun 30	14.00	Aug 21	12.55
Mar 25	11.99	May 27	13.56	Jul 16	12.68	Sep 25	12.37

450001093024701. Local number, 029N22W16ADD01.
LOCATION.--Lat 45°00'01", long 93°02'47", in SE¼SE¼NE¼ sec.16, T.29 N., R.22 W., Hydrologic Unit 07010206, at 1955 English St. Owner: Maplewood Bowl.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 4 in., depth 163 ft, screened 158 to 163 ft.
DATUM.--Altitude of land-surface datum is 900 ft. Measuring point: Top of well cap, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--January 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 65.99 ft below land-surface datum, Feb. 6, 1987; lowest, 73.83 ft below land-surface datum, Apr. 30, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 22	72.35	Apr 29	70.96	Jun 30	71.10	Aug 21	70.95
Mar 25	71.38	May 27	71.09	Jul 16	70.97	Sep 25	71.72

GROUND-WATER LEVELS

RAMSEY COUNTY--Continued

445918092590901. Local number, 029N22W24ADA01.
LOCATION.--Lat 44°59'18", long 92°59'09", in NE¼SE¼NE¼ sec.24, T.29 N., R.22 W., Hydrologic Unit 07010206, at 1555 Century Avenue.
Owner: Northern States Power Co., Maplewood Gas Plant.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled fire protection artesian well, diameter 12 in., depth 523 ft, cased to 420 ft.
DATUM.--Land-surface datum is 996.5 ft National Geodetic Vertical Datum of 1929. Measuring point: Edge of 2 in. breather pipe, 2.40 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--August 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 131.90 ft below land-surface datum, Mar. 9, 1987; lowest, 166.93 ft below land-surface datum, Aug. 21, 1992.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Dec 11	139.36	Apr 29	160.04	Jun 30	150.60	Aug 21	166.93
Mar 25	159.34	May 27	160.13	Jul 16	154.75	Sep 25	157.36

445700093051001. Local number, 029N22W31DDD01.
LOCATION.--Lat 44°57'00", long 93°05'10", in SE¼SE¼SE¼ sec.31, T.29 N., R.22 W., Hydrologic Unit 07010206, at 261 East 5th Street, St. Paul.
Owner: Control Data Corp.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 12 in., depth 298 ft, cased to 151 ft.
DATUM.--Altitude of land-surface datum is 750 ft. Measuring point: Top of recorder platform, 9.00 ft below land-surface datum.
REMARKS.--Water level affected by pumping of nearby wells.
PERIOD OF RECORD.--December 1971 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 25.66 ft below land-surface datum, Mar. 16, 1992; lowest, 83.28 ft below land-surface datum, Aug. 4, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 05	37.46	Dec 05	32.72	Feb 05	32.19	May 15	60.56	Jul 15	64.87	Sep 15	66.23
10	40.88	10	32.94	10	31.08	20	64.06	20	63.44	20	51.11
15	37.55	15	32.83	15	29.59	25	37.25	25	60.14	25	59.21
20	36.34	20	32.76	20	32.08	31	56.13	31	65.18	30	57.85
25	37.14	25	28.60	25	32.88	Jun 05	63.56	Aug 05	66.95		
31	37.80	31	31.58	29	31.44	10	67.47	10	71.57		
Nov 05	34.27	Jan 05	28.27	Mar 05	32.19	15	64.65	15	60.34		
10	32.10	10	31.85	10	30.80	20	50.97	20	67.71		
15	35.58	15	31.78	15	27.80	25	61.63	25	61.31		
20	34.25	20	30.64	Apr 30	59.99	30	61.46	31	63.08		
25	33.12	25	31.47	May 05	42.02	Jul 05	55.02	Sep 05	60.62		
30	31.64	31	32.48	10	53.16	10	65.32	10	58.17		

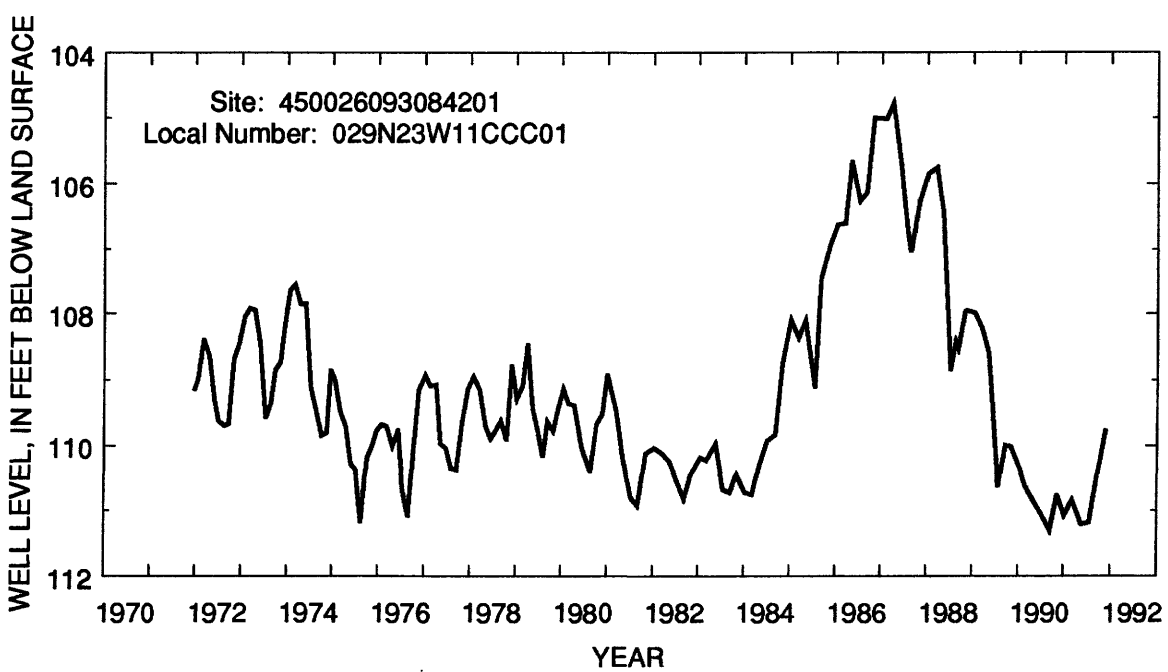
GROUND-WATER LEVELS

RAMSEY COUNTY--Continued

450026093084201. Local number, 029N23W11CCC01.
LOCATION.--Lat 45°00'26", long 93°08'42", in SW¼SW¼SW¼ sec.11, T.29 N., R.23 W., Hydrologic Unit 07010206, at 2204 North Lexington Avenue, Roseville.
Owner: Lexington Court Apartments.
AQUIFER.--St. Peter Sandstone of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 6 in., depth 325 ft, cased to 192 ft.
DATUM.--Altitude of land-surface datum is 945 ft. Measuring point: Top of well cap, 1.40 ft above land-surface datum.
PERIOD OF RECORD.--January 1971 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 104.77 ft below land-surface datum, Mar. 30, 1987; lowest, 114.57 ft below land-surface datum, Mar. 25, 1992.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 22	109.75	Apr 29	113.02	Jun 30	109.49	Aug 21	109.67
Mar 25	114.57	May 27	108.60	Jul 16	109.40	Sep 25	109.47



GROUND-WATER LEVELS

RAMSEY COUNTY--Continued

445751093072301. Local number, 029N23W25CCD01.
LOCATION.--Lat 44°57'51", long 93°07'23", SE¼SW¼SW¼ sec.25, T.29 N., R.23 W., Hydrologic Unit 07010206, at 760 North Dale Street, St. Paul.
Owner: Burlington Northern, Inc., Dale Street Shops.
AQUIFER.--Hinckley Sandstone of Late Precambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 8 in., depth 999 ft, cased to 955 ft.
DATUM.--Land-surface datum is 859.5 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of recorder floor, 4.60 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--December 1970, November 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 161.05 ft below land-surface datum, May 10, 1980; lowest, 226.05 ft below land-surface datum, Sept. 18, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 05	207.73	Dec 05	207.11	Mar 05	201.05	May 05	200.51	Jul 05	205.25	Sep 05	205.77
10	207.88	10	206.66	10	200.66	10	200.64	10	205.55	10	205.92
15	207.76	15	206.90	15	200.47	15	201.42	15	205.60	15	205.77
20	207.95	20	206.82	20	200.26	20	202.18	20	206.01	20	205.59
25	207.87	25	206.46	25	199.76	25	202.83	25	206.00	25	205.70
31	208.03	31	206.07	31	199.59	31	203.42	31	206.20	30	205.79
Nov 05	207.72	Jan 05	205.52	Apr 05	199.36	Jun 05	203.44	Aug 05	206.30		
10	207.96	10	205.39	10	199.14	10	203.82	10	206.18		
15	208.14	15	205.24	15	199.26	15	203.92	15	206.24		
20	207.91	20	204.63	20	199.10	20	204.48	20	205.98		
25	207.87	25	204.31	25	199.91	25	204.69	25	205.94		
30	207.36	Feb 29	201.56	30	199.86	30	204.98	31	205.91		

445739093081201. Local number, 029N23W35BAD01.
LOCATION.--Lat 44°57'39", long 93°08'12", in SE¼NE¼NW¼ sec.35, T.29 N., R.23 W., Hydrologic Unit 07010206, Victoria Street, 0.35 mi north of University Avenue.
Owner: City of St. Paul.
AQUIFER.--St. Peter Sandstone of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 16 in., depth 234 ft, screened 174 to 234 ft.
DATUM.--Altitude of land-surface datum is 888 ft. Measuring point: Top of coupling, 0.50 ft above land-surface datum.
PERIOD OF RECORD.--May 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 118.40 ft below land-surface datum, Apr. 29, 1992; lowest, 133.03 ft below land-surface datum, May 5, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 22	119.64	Apr 29	118.40	Jun 30	119.05	Aug 21	119.20
Mar 25	118.59	May 27	119.31	Jul 16	119.20	Sep 25	119.71

GROUND-WATER LEVELS

RAMSEY COUNTY--Continued

450414093012701. Local number, 030N22W23CBB01.
LOCATION.--Lat 45°04'14", long 93°01'27", in NW¼NW¼SW¼ sec.23, T.30 N., R.22 W., Hydrologic Unit 07010206, Hoffman Road, 0.85 mi southwest of Highway 61.
Owner:: White Bear Town Hall.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 96 ft, screened 91 to 96 ft.
DATUM.--Altitude of land-surface datum is 928 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--April 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.54 ft below land-surface datum, Oct. 28, 1986; lowest, 28.08 ft below land-surface datum, May 15, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 22	24.79	Apr 29	23.59	Jun 30	25.24	Aug 21	25.31
Mar 25	24.06	May 27	24.31	Jul 16	24.72	Sep 25	24.28

450238093082501. Local number, 030N23W35BDC01.
LOCATION.--Lat 45°02'38", long 93°08'25", in SW¼SE¼NW¼ sec.35, T.30 N., R.23 W., Hydrologic Unit 07010206, southeast corner of Arbogast Street and Richmond Avenue.
Owner: City of Shoreview.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 12 in., depth 510 ft, cased to 465 ft.
DATUM.--Altitude of land-surface datum is 960 ft. Measuring point: Hole in shelter floor, 1.50 ft above land-surface datum.
PERIOD OF RECORD.--April 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 129.26 ft below land-surface datum, Mar. 1, 1987; lowest, 146.01 ft below land-surface datum, July 28, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 05	137.77	Dec 05	140.33	Feb 05	135.91	Apr 05	134.53	Jun 05	137.41	Aug 05	137.62
10	137.63	10	140.06	10	135.91	10	134.59	10	137.11	10	140.98
15	137.25	15	140.01	15	135.75	15	134.25	15	141.31	15	140.31
20	137.73	20	137.60	20	135.93	20	133.85	20	141.23	20	137.58
25	137.56	25	136.64	25	135.70	25	134.36	25	140.98	25	139.57
31	139.08	31	136.26	29	135.96	30	134.23	30	141.11	31	140.82
Nov 05	139.68	Jan 05	136.05	Mar 05	135.09	May 05	135.35	Jul 05	140.45	Sep 05	140.03
10	140.51	10	136.19	10	134.84	10	139.56	10	137.83	10	136.97
15	140.76	15	136.28	15	134.88	15	135.77	15	137.45	15	136.52
20	140.45	20	136.04	20	134.89	20	136.45	20	140.90	20	136.30
25	140.43	25	136.38	25	134.66	25	139.90	25	136.98	25	136.24
30	140.28	31	136.14	31	134.55	31	140.06	31	137.40	30	135.92

REDWOOD COUNTY

441323095280701. Local number, 109N38W30BBD01.
LOCATION.--Lat 44°13'23", long 95°28'07", in SE¼NW¼NW¼ sec.30, T.109 N., R.38 W., Hydrologic Unit 07020008, Owner: Plum Creek Cheese Co.
AQUIFER.--Sandstone of Cretaceous Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 5 in., depth 240 ft, casing depth not available.
DATUM.--Altitude of land-surface datum is 1,218 ft. Measuring point: Top of well seal, 0.55 ft above land-surface datum.
PERIOD OF RECORD.--August 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 24.20 ft below land-surface datum, April 3, 1984; lowest, 26.80 ft below land-surface datum, Sept. 26, 1984.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 23	25.88	Dec 23	25.89	Jan 30	25.81	May 13	25.67	May 21	25.62

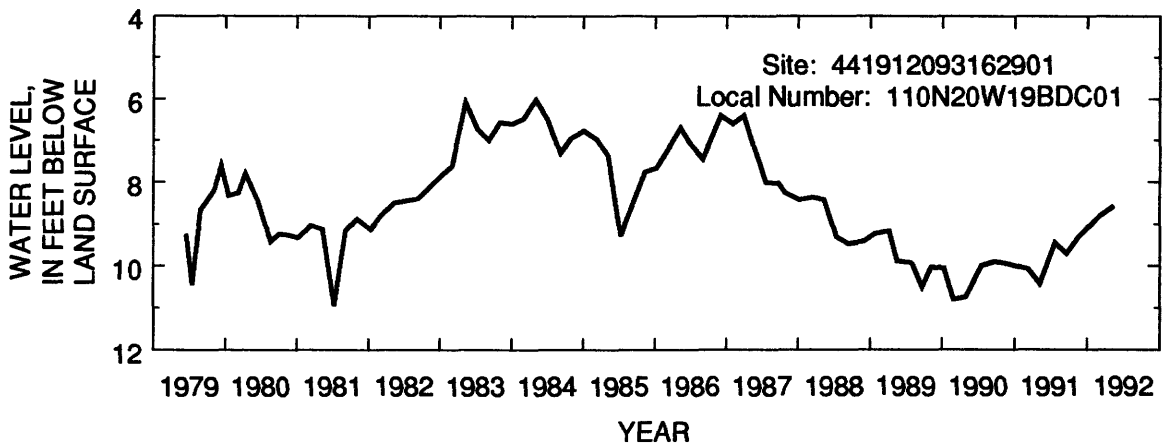
GROUND-WATER LEVELS

RICE COUNTY

441912093162901. Local number, 110N20W19BDC01.
LOCATION.--Lat 44°19'12", long 93°16'29", in SW¼SE¼NW¼ sec.19, T.110 N., R.20 W., Hydrologic Unit 07040002, just north of Faribault. Owner: St. Lawrence Cemetery Assn.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 400 ft, cased to 357 ft.
DATUM.--Altitude of land-surface datum is 985 ft. Measuring point: Top of casing, 1.60 ft above land-surface datum.
PERIOD OF RECORD.--June 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 6.02 ft below land-surface datum, May 2, 1984; lowest: 10.94 ft below land-surface datum, July 10, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 19	9.30	Mar 04	8.82	May 14	8.58	Jul 28	8.79	Aug 26	8.82	Sep 28	8.90



442543093113701. Local number, 111N20W11CDC01.
LOCATION.--Lat 44°25'43", long 93°11'37", in SW¼SE¼SW¼ sec.11, T.111 N., R.20 W., Hydrologic Unit 07040002, Highway 218 at Dundas. Owner: Rollie Green.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled commercial artesian well, diameter 4 in., depth 158 ft, cased to 101 ft.
DATUM.--Altitude of land-surface datum is 950 ft. Measuring point: Top of casing, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--October 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 21.72 ft below land-surface datum, May 14, 1986; lowest, 27.44 ft below land-surface datum, Nov. 9, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 19	25.42	Mar 04	24.82	May 14	24.57	Jul 28	25.04	Aug 26	25.23	Sep 28	25.37

GROUND-WATER LEVELS

RICE COUNTY--Continued

442751093240701. Local number, 112N21W31CBB01.
LOCATION.--Lat 44°27'51", long 93°24'07", in NW¼NW¼SW¼ sec.31, T.112 N., R.21 W., Hydrologic Unit 07040002, 1.0 mi south of Highway 19.
Owner: Trondhiem Church.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 276 ft, cased to 232 ft.
DATUM.--Altitude of land-surface datum is 1,130 ft. Measuring point: Top of casing, 1.10 ft above land-surface datum.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 136.06 ft below land-surface datum, Sept. 21, 1987; lowest, 141.8 ft below land-surface datum, Oct. 30, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 19	140.67	Mar 04	140.56	May 14	140.24	Jul 28	139.99	Aug 26	139.92	Sep 28	139.83

SCOTT COUNTY

443732093460301. Local number, 113N24W06BCB01.
LOCATION.--Lat 44°37'32", long 93°46'03", in NW¼SW¼NW¼ sec.6, T.113 N., R.24 W., Hydrologic Unit 07020012, in Belle Plaine.
Owner: Creative Tool and Engineering. Formerly Belle Plaine Coop Creamery.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 12 in., depth 272 ft, screen information not available.
DATUM.--Altitude of land-surface datum is 840 ft. Measuring point: Top of well cap, 2.30 ft above land-surface datum.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 116.77 ft below land-surface datum, July 11, 1983; lowest, 143.96 ft below land-surface datum, July 9, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 15	119.37	Mar 11	117.16	Sep 16	128.18

443352093423001. Local number, 113N24W28DAA01.
LOCATION.--Lat 44°33'52", long 93°42'30", in NE¼NE¼SE¼ sec.28, T.113 N., R.24 W., Hydrologic Unit 07020012, at Michelle Wildlife Area.
Owner: U.S. Geological Survey.
AQUIFER.--Ironton-Galesville Sandstones of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 6 in., depth 450 ft, cased to 219 ft.
DATUM.--Altitude of land-surface datum is 990 ft. Measuring point: Top of well seal, 2.30 ft above land-surface datum.
PERIOD OF RECORD.--August 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 131.70 ft below land-surface datum, May 2, 1984; lowest, 137.07 ft below land-surface datum, Aug. 15, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Mar 11	134.62	May 14	134.63	Sep 16	134.09

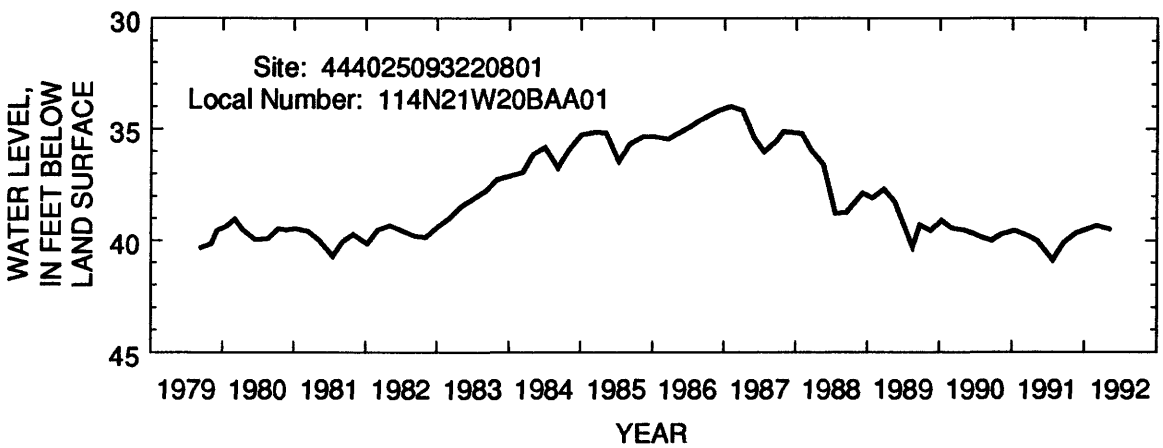
GROUND-WATER LEVELS

SCOTT COUNTY--Continued

444025093220801. Local number, 114N21W20BAA01.
LOCATION.--Lat 44°40'25", long 93°22'08", in NE¼NE¼NW¼ sec.20, T.114 N., R.21 W., Hydrologic Unit 07020012, 0.5 mi east of Credit River.
Owner: Credit River Town Hall.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 98 ft, screened 93 to 98 ft.
DATUM.--Altitude of land-surface datum is 946 ft. Measuring point: Top of casing, 1.10 ft above land-surface datum.
PERIOD OF RECORD.--September 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 34.00 ft below land-surface datum, Feb. 3, 1987; lowest, 40.88 ft below land-surface datum, July 26, 1991.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 19	39.65	Mar 04	39.30	May 14	39.47	Sep 02	38.41



443752093254401. Local number, 114N22W35DCC01.
LOCATION.--Lat 44°37'52", long 93°25'44", in SW¼SW¼SE¼ sec.35, T.114 N., R.22 W., Hydrologic Unit 07020012, southwest of Credit River.
Owner: St. Catherine's Church.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 235 ft, cased to 194 ft.
DATUM.--Altitude of land-surface datum is 1,015 ft. Measuring point: Top of casing, 1.20 ft above land-surface datum.
PERIOD OF RECORD.--September 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 83.27 ft below land-surface datum, Dec. 4, 1986; lowest, 90.30 ft below land-surface datum, Sept. 6, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 19	87.77	Mar 04	87.40	May 14	86.99	Sep 02	86.21

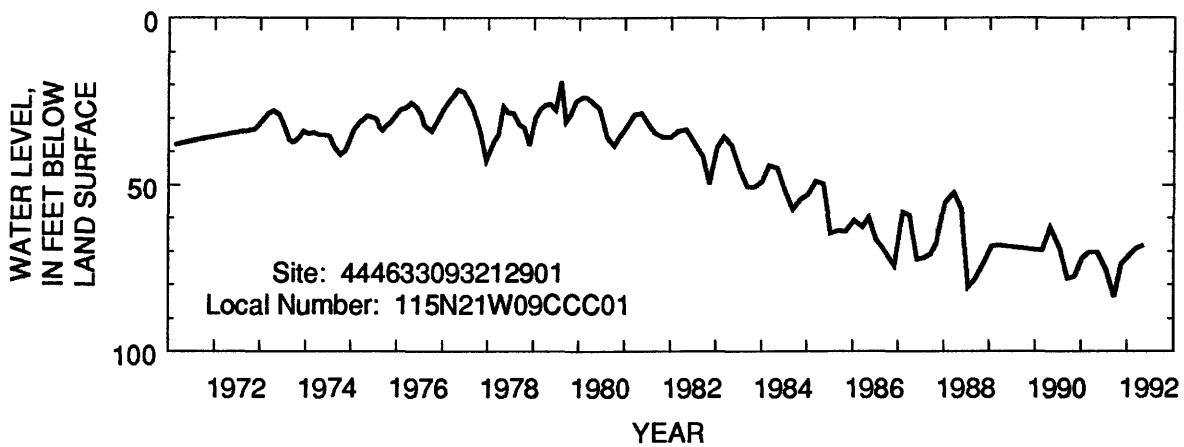
GROUND-WATER LEVELS

SCOTT COUNTY--Continued

444633093212901. Local number, 115N21W09CCC01.
LOCATION.--Lat 44°46'33", long 93°21'29", in SW¼SW¼SW¼ sec.9, T.115 N., R.21 W., Hydrologic Unit 07020012, at Savage waste treatment plant.
Owner: City of Savage, well 2.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age and Hinckley Sandstone of Late Precambrian Age.
WELL CHARACTERISTICS.--Drilled public-supply artesian well, depth 846 ft, 16 in. casing 0 ft to 280 ft, 10 in. casing 250 ft to 660 ft.
DATUM.--Land-surface datum is 730 ft. Measuring point: Edge of vent pipe 0.75 ft above land-surface datum.
PERIOD OF RECORD.--February 1971 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.98 ft below land-surface datum, Aug. 9, 1979; lowest, 83.57 ft below land-surface datum, Sept. 19, 1991.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 15	73.59	Mar 09	69.01	May 07	68.12	Sep 02	80.97



444427093353901. Local number, 115N23W28BDD01.
LOCATION.--Lat 44°44'27", long 93°43'53", in SE¼SE¼NW¼ sec.28, T.115 N., R.23 W., Hydrologic Unit 07020012, Merriam Junction.
Owner: Chicago and Northwestern Transportation Company.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 16 in., depth 140 ft, cased to 75 ft.
DATUM.--Altitude of land-surface datum is 758 ft. Measuring point: Top of casing, 0.90 ft above land-surface datum.
PERIOD OF RECORD.--November 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 25.75 ft below land-surface datum, Mar. 8, 1985; lowest, 43.20 ft below land-surface datum, Feb. 28, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 15	40.10	Mar 11	39.43	May 07	39.23	Jul 14	38.96	Sep 01	38.46

GROUND-WATER LEVELS

SCOTT COUNTY--Continued

444427093353902. Local number, 115N23W28BDD02.
LOCATION.--Lat 44°44'27", long 93°35'39", in SE¼SE¼NW¼ sec.28, T.115 N., R.23 W., Hydrologic Unit 07020012, Merriam Junction.
Owner: Chicago and Northwestern Transportation Company.
AQUIFER.--Ironton-Galesville Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 4 in., depth 355 ft, screened 350 to 355 ft.
DATUM.--Altitude of land-surface datum is 758 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--November 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 20.52 ft below land-surface datum, Mar. 21, 1986; lowest, 45.28 ft below land-surface datum, July 29, 1991.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 05	30.77	Dec 05	23.68	Feb 05	22.24	Apr 05	23.76	Jun 05	37.06	Sep 10	32.79
10	32.54	10	23.22	10	22.25	10	28.44	Jul 15	33.93		
15	32.02	15	23.23	15	22.02	15	28.74	20	33.82		
20	28.63	20	23.02	20	22.07	20	26.14	25	33.57		
25	31.97	25	22.80	25	21.99	25	28.35	31	35.31		
31	31.19	31	22.77	29	21.95	30	28.96	Aug 05	35.56		
Nov 05	26.09	Jan 05	22.54	Mar 05	21.43	May 05	29.11	10	32.38		
10	24.93	10	22.46	10	20.99	10	28.54	15	34.75		
15	30.01	15	22.55	15	21.16	15	31.24	20	35.08		
20	25.93	20	22.37	20	21.41	20	32.06	25	31.89		
25	25.77	25	22.41	25	21.40	25	27.63	31	32.40		
30	24.28	31	22.33	31	22.39	31	30.22	Sep 05	31.35		

444427093353903. Local number, 115N23W28BDD03.
LOCATION.--Lat 44°44'27", long 93°35'39", in SE¼SE¼NW¼ sec.28, T.115 N., R.23 W., Hydrologic Unit 07020012, Merriam Junction.
Owner: Chicago and Northwestern Transportation Company.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 4 in., depth 525 ft, screened 520 to 525 ft.
DATUM.--Altitude of land-surface datum is 758 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--November 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 33.85 ft below land-surface datum, Mar. 8, 1985; lowest, 55.12 ft below land-surface datum, Aug. 1, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 05	50.35	Dec 05	48.58	Feb 05	46.84	Apr 05	44.87	Jun 05	47.48	Aug 05	50.31
10	49.99	10	48.44	10	46.47	10	44.95	10	48.76	10	50.36
15	49.71	15	48.51	15	45.87	15	44.68	15	49.65	15	50.59
20	49.51	20	48.19	20	45.63	20	44.36	20	50.14	20	50.21
25	49.16	25	47.88	25	45.65	25	44.40	25	49.83	25	50.68
31	49.10	31	48.05	29	45.59	30	44.10	30	50.09	31	50.94
Nov 05	48.49	Jan 05	47.86	Mar 05	45.13	May 05	44.66	Jul 05	49.87	Sep 05	50.65
10	48.33	10	47.84	10	44.82	10	45.54	10	49.77	10	50.10
15	48.92	15	47.71	15	44.84	15	46.67	15	50.19	15	49.88
20	48.80	20	47.39	20	44.78	20	46.91	20	50.62	20	49.70
25	49.28	25	47.19	25	44.21	25	47.13	25	50.15	25	49.73
30	49.22	31	46.88	31	44.56	31	46.82	31	49.89	30	49.79

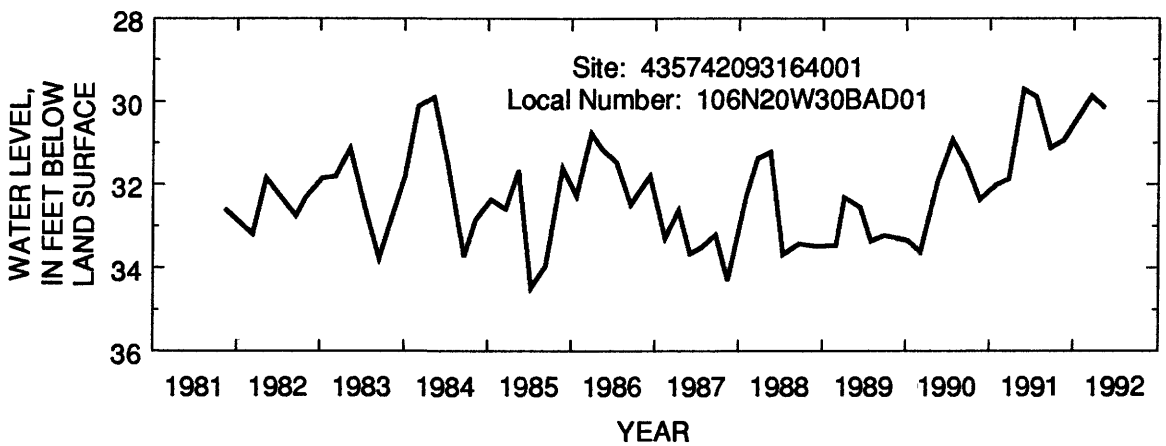
GROUND-WATER LEVELS

STEELE COUNTY

435742093164001. Local number, 106N20W30BAD01.
LOCATION.--Lat 43°57'42", long 93°16'40", in SE¼NE¼NW¼ sec.30, T.106 N., R.20 W., Hydrologic Unit 07040002, at Hope.
Owner: Hope Elevator.
AQUIFER.--Galena Formation of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled commercial artesian well, diameter 5 in., depth 215 ft, cased to 108 ft.
DATUM.--Altitude of land-surface datum is 1,198 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--November 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 29.72 ft below land-surface datum, May 28, 1991; lowest, 34.48 ft below land-surface datum, July 10, 1985.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 20	30.94	Mar 19	29.86	May 14	30.16



435611093163001. Local number 106N20W31DCC01.
LOCATION.--Lat 43°56'11", long 93°16'30", in SW¼SW¼SE¼ sec.31, T.106 N., R.20 W., Hydrologic Unit 07040002, 1.75 mi south of city of Hope.
Owner: Owatonna Gun Club.
AQUIFER.--Galena formation of Middle Ordovician age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 168 ft, cased to 97 ft.
DATUM.--Altitude of land-surface datum is 1,180 ft. Measuring point: Top of casing, 1.40 ft above land-surface datum.
PERIOD OF RECORD.--November 1989 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.66 ft below land-surface datum, May 10, 1984; lowest, 4.97 ft below land-surface datum, Jan. 9, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 20	3.02	Mar 19	2.38	May 14	2.33

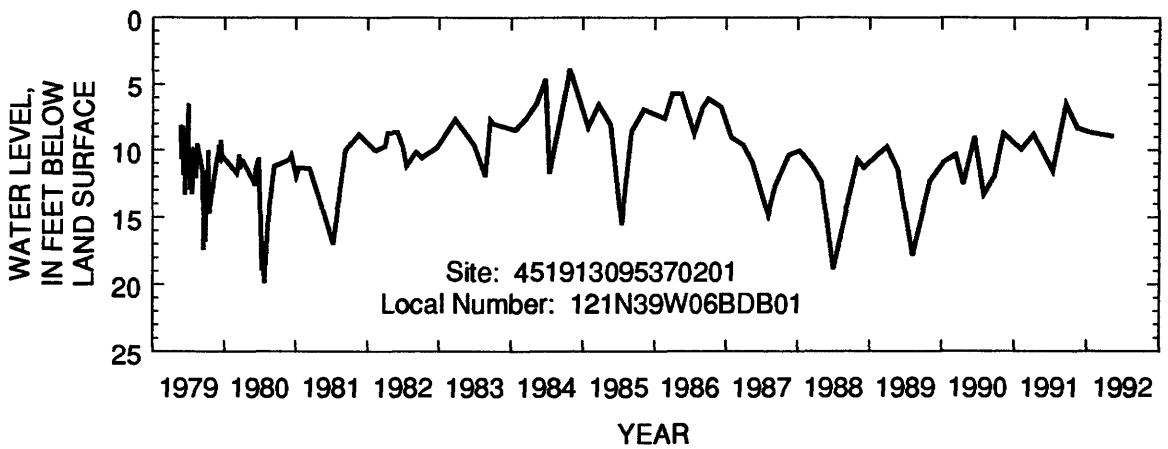
GROUND-WATER LEVELS

SWIFT COUNTY

451913095370201. Local number, 121N39W06BDB01.
LOCATION.--Lat 45°19'13", long 95°37'02", in NW¼SE¼NW ¼sec.6, T.121 N., R.39 W., Hydrologic Unit 07020005, in Ambush Park.
Owner: City of Benson.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 3 in., depth 143 ft, screened 123 to 143 ft.
DATUM.--Altitude of land-surface datum is 1,030 ft. Measuring point: Top of casing 3.00 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--May 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.85 ft below land-surface datum, Oct. 25, 1984; lowest, 19.90 ft below land-surface datum, July 24, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 18	8.34	May 12	8.99	Jul 16	7.84	Sep 11	11.31
Jan 21	8.70	Jun 17	8.55	Aug 18	12.03		



WABASHA COUNTY

442708092155401. Local number, 111N12W04BBD01.
LOCATION.--Lat 44°27'08", long 92°15'54", in SE¼NW¼NW¼ sec.04, T.111 N., R.12 W., Hydrologic Unit 07040001, at Lake City.
Owner: City of Lake City, well 3.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 16 in., depth 430 ft, cased to 258 ft.
DATUM.--Altitude of land-surface datum is 685 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
REMARKS.--Measured weekly by David Finley.
PERIOD OF RECORD.--August 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.63 ft below land-surface datum, May 5, 1975; lowest, 11.50 ft below land-surface datum, Jan. 31, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 07	9.96	Nov 18	9.12	Dec 30	9.44	Feb 24	10.21	Apr 06	7.62	May 18	9.06
15	10.38	25	7.74	Jan 06	9.50	Mar 02	9.99	13	8.36	26	9.40
21	10.31	Dec 02	8.31	13	9.58	09	8.12	20	7.80		
28	10.44	09	7.88	20	9.89	16	6.20	27	7.52		
Nov 04	9.72	16	8.64	Feb 03	9.99	23	6.64	May 04	6.72		
12	9.65	23	9.08	17	10.12	30	7.22	11	8.06		

GROUND-WATER LEVELS

WADENA COUNTY

462415095003001. Local number, 134N34W19ADD01.
LOCATION.--Lat 46°24'21", long 95°00'36", in SE¼SE¼NE¼ sec.19, T.134 N., R.34 W., Hydrologic Unit 07010107, 0.05 mi north of Verndale.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial outwash sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 2 in., depth 37 ft, screened 34 to 37 ft.
DATUM.--Altitude of land-surface datum is 1,342 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--September 1966 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.18 ft below land-surface datum, May 23, 1986; lowest, 15.33 ft below land-surface datum, Mar. 10-11, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 16	13.90	Dec 17	14.15	Feb 17	14.47	Apr 16	13.88
Nov 20	14.07	Jan 17	14.28	Mar 17	13.85	Sep 23	13.55

WASHINGTON COUNTY

445125092464001. Local number, 027N20W02BCC01.
LOCATION.--Lat 44°51'25", long 92°46'40", in SW¼SW¼NW¼ sec.2, T.27 N., R.20 W., Hydrologic Unit 07030005, in Afton State Park by Afton Alps.
Owner: U.S. Geological Survey.
AQUIFER.--St. Lawrence Formation and Franconian Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 6 in., depth 285 ft, cased to 105 ft.
DATUM.--Altitude of land-surface datum is 695 ft. Measuring point: Center of pressure guage, 3.80 ft above land-surface datum.
PERIOD OF RECORD.--March 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 33.94 ft above land-surface datum, May 2, 1980; lowest, 19.67 ft above land-surface datum, Jan.8, 1985.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 13	+26.64				

444751092563101. Local number, 027N21W28BCC01.
LOCATION.--Lat 44°47'51", 92°56'31", in SW¼SW¼NW¼ sec.28, T.27 N., R.21 W., Hydrologic Unit 07010206, 0.1 mi east of Ideal Avenue South.
Owner: Eugene Smallidge.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation water-table well, diameter 16 in., depth 345 ft, cased to 60 ft.
DATUM.--Altitude of land-surface datum is 807 ft. Measuring point: Hole in pump base, 2.10 ft above land-surface datum.
PERIOD OF RECORD.--August 1977, January 1978, December 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 60.32 ft below land-surface datum, Oct. 28, 1986; lowest, 81.87 ft below land-surface datum, Aug. 3, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 19	70.85	Mar 04	71.08		

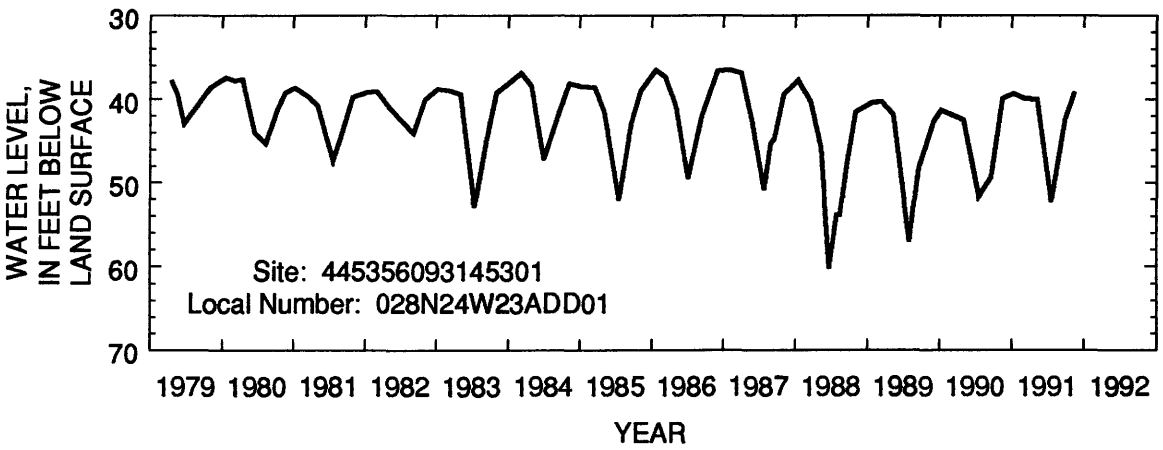
GROUND-WATER LEVELS

WASHINGTON COUNTY--Continued

445536092462401. Local number, 028N20W11CAA01.
LOCATION.--Lat 44°55'36", long 92°46'24", in NE¼NE¼SW¼ sec.11, T.28 N., R.20 W., Hydrologic Unit 07030005, at Lake St. Croix Beach
Owner: Lower St. Croix Valley Fire Department.
AQUIFER.--Franconian Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic water-table well, diameter 4 in., depth 94 ft, cased to 78 ft.
DATUM.--Altitude of land-surface datum is 720 ft. Measuring point: Top of electrical housing, 1.70 ft above land-surface datum.
PERIOD OF RECORD.--June 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 31.27 ft, 5 below land-surface datum, May 1, 1986; lowest, 38.86 ft below land-surface datum, Mar. 11, 1991.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 18	37.54	Mar 10	37.35



450134092583101. Local number, 029N21W06CAD01.
LOCATION.--Lat 45°01'34", long 92°58'31", in SE¼NE¼SW¼ sec.6, T.29 N., R.21 W., Hydrologic Unit 07010206, at 6488 North Highway 36 Boulevard.
Owner: Twenty Nine Pines Trailer Park.
AQUIFER.--St. Peter Sandstone of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 6 in., depth 210 ft, cased to 141 ft.
DATUM.--Altitude of land-surface datum is 980 ft. Measuring point: Hole in pump base, 2.20 ft above land-surface datum.
PERIOD OF RECORD.--April 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 71.07 ft below land-surface datum, Feb. 6, 1987; lowest, 78.40 ft below land-surface datum, Sep. 12, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 18	77.12	Mar 10	76.84

GROUND-WATER LEVELS

WASHINGTON COUNTY--Continued

450858092575001. Local number, 031N21W28ABD01.
LOCATION.--Lat 45°08'58", long 92°57'50", in SE¼NW¼NE¼ sec.28, T.31 N., R.21 W., Hydrologic Unit 07010206, County Road 8A, 1.65 mi east of Highway 61.
Owner: White Bear Gun Club.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 142 ft, cased to 94 ft.
DATUM.--Altitude of land-surface datum is 939 ft. Measuring point: Top of well cap, 1.30 ft above land-surface datum.
PERIOD OF RECORD.--September 1977, February 1978, February 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.57 ft below land-surface datum, Oct. 28, 1986; lowest, 14.17 ft below land-surface datum, Mar. 13, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

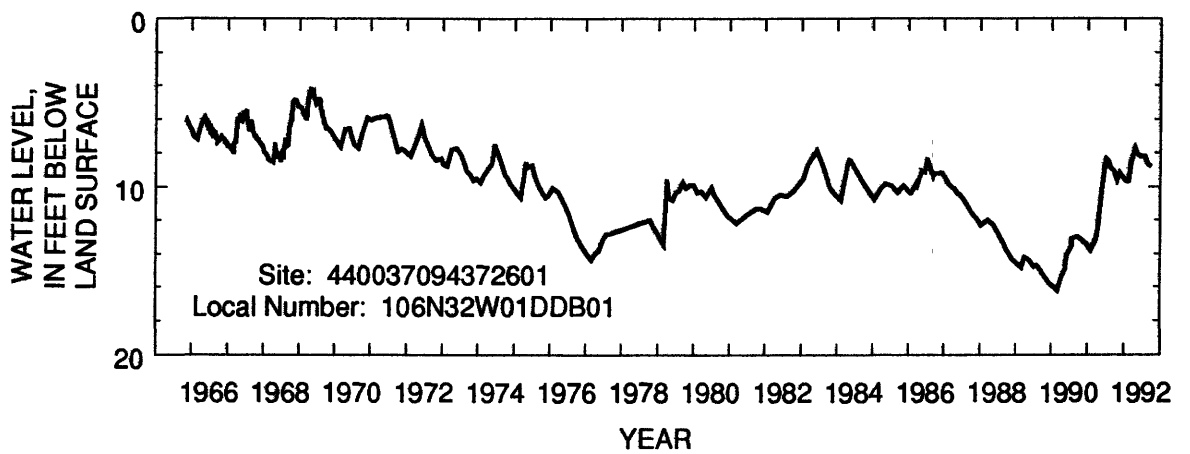
DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 18	10.21	Mar 16	9.46

WATONWAN COUNTY

440037094372601. Local number, 106N32W01DDB01.
LOCATION.--Lat 44°00'37", long 94°37'26", in NW¼SE¼SE¼ sec.1, T.106 N., R.32 W., Hydrologic Unit 07020010, north of St. James.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial outwash sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 2 in., depth 22 ft, screened 19 to 22 ft.
DATUM.--Altitude of land-surface datum is 1,056.2 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 4.80 ft above land-surface datum.
PERIOD OF RECORD.--November 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.11 ft below land-surface datum, Apr. 27, 1969; lowest, 16.22 ft below land-surface datum, Mar. 7, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 23	9.60	Jan 30	9.71	Apr 21	7.74	Jul 28	8.16
Nov 21	9.17	Feb 19	9.64	May 13	8.02	Aug 31	8.67
Dec 24	9.45	Mar 18	8.54	Jun 22	8.22	Sep 24	8.78



GROUND-WATER LEVELS

WATONWAN COUNTY--Continued

440409094304901. Local number, 107N31W14DAC01.
LOCATION.--Lat 44°04'09", long 94°30'49", in SW¼NE¼SE¼ sec.14, T.107 N., R.31 W., Hydrologic Unit 07020010, 2.75 mi east of LaSalle. Owner: William Lassas.
AQUIFER.--Sandstone of Cretaceous Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in., depth 150 ft, screened 100 to 135 ft.
DATUM.--Altitude of land-surface datum is 1,008 ft. Measuring point: Vent pipe, 1.80 ft above land-PERIOD OF RECORD.--September 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 10.39 ft below land-surface datum, Mar. 18, 1992; lowest, 16.29 ft below land-surface datum, July 12, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 21	11.14	Mar 18	10.39	May 13	11.30

440133094312501. Local number, 107N31W35CAC01.
LOCATION.--Lat 44°01'33", long 94°31'25", in SW¼NE¼SW¼ sec.35, T.107 N., R.31 W., Hydrologic Unit 07020010, northeast of St. James. Owner: Al Guyer.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 10 in., depth 350 ft, screened 310 to 350 ft.
DATUM.--Altitude of land-surface datum is 1,055 ft. Measuring point: Vent pipe, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--September 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 29.83 ft below land-surface datum, May 9, 1983; lowest, 41.64 ft below land-surface datum, July 12, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL
Nov 21	31.64	May 13	30.75

WINONA COUNTY

435746092034202. Local number, 106N10W19DDA02.
LOCATION.--Lat 43°57'46", long 92°03'42", in NE¼SE¼SE¼ sec. 19, T.106N., R.10W., Hydrologic Unit 07040003, at St. Charles. Owner: City of St. Charles, Well 5.
AQUIFER.--Ironton-Galesville Sandstones of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled public supply artesian well, diameter 12 in., depth 702 ft, cased to 645 ft.
DATUM.--Altitude of land-surface datum is 1,160 ft; Measuring point: Edge of vent pipe, 1.00 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--May 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 218.80 ft below land-surface datum, Aug. 26, 1987; lowest, 269.10 ft below land-surface datum, Oct. 28, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 02	238.90	Nov 20	227.10	Dec 24	226.55	Feb 05	226.20	Mar 20	225.20	Apr 29	223.20
09	230.16	27	226.80	30	226.30	12	225.36	25	223.80	May 07	223.90
15	231.70	Dec 04	226.60	Jan 07	226.80	19	225.70	Apr 02	224.12	14	227.40
22	229.25	10	229.90	15	227.62	25	225.36	09	224.42	21	227.60
30	229.90	12	227.50	22	226.40	Mar 04	225.10	14	224.58		
Nov 05	228.40	18	228.10	28	226.07	13	224.90	22	224.78		

GROUND-WATER LEVELS

WRIGHT COUNTY

450403093544501. Local number, 119N26W35DDA01.
LOCATION.--Lat 45°04'03", long 93°54'45", in NE¼SE¼SE¼ sec.35, T.119 N., R.26 W., Hydrologic Unit 07010204, at Montrose.
Owner: City of Montrose, well 1.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age and Hinckley Sandstone of Late Precambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 10 in., depth 693 ft, cased to 526 ft.
DATUM.--Altitude of land-surface datum is 1,000 ft. Measuring point: Edge of breather pipe, 1.50 ft above land-surface datum.
PERIOD OF RECORD.--September 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 73.54 ft below land-surface datum, Sept. 28, 1981; lowest, 78.38 ft below land-surface datum, Nov. 3, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Dec 11	76.38	Mar 12	76.24	May 07	76.08	Aug 11	75.77	Sep 10	75.71

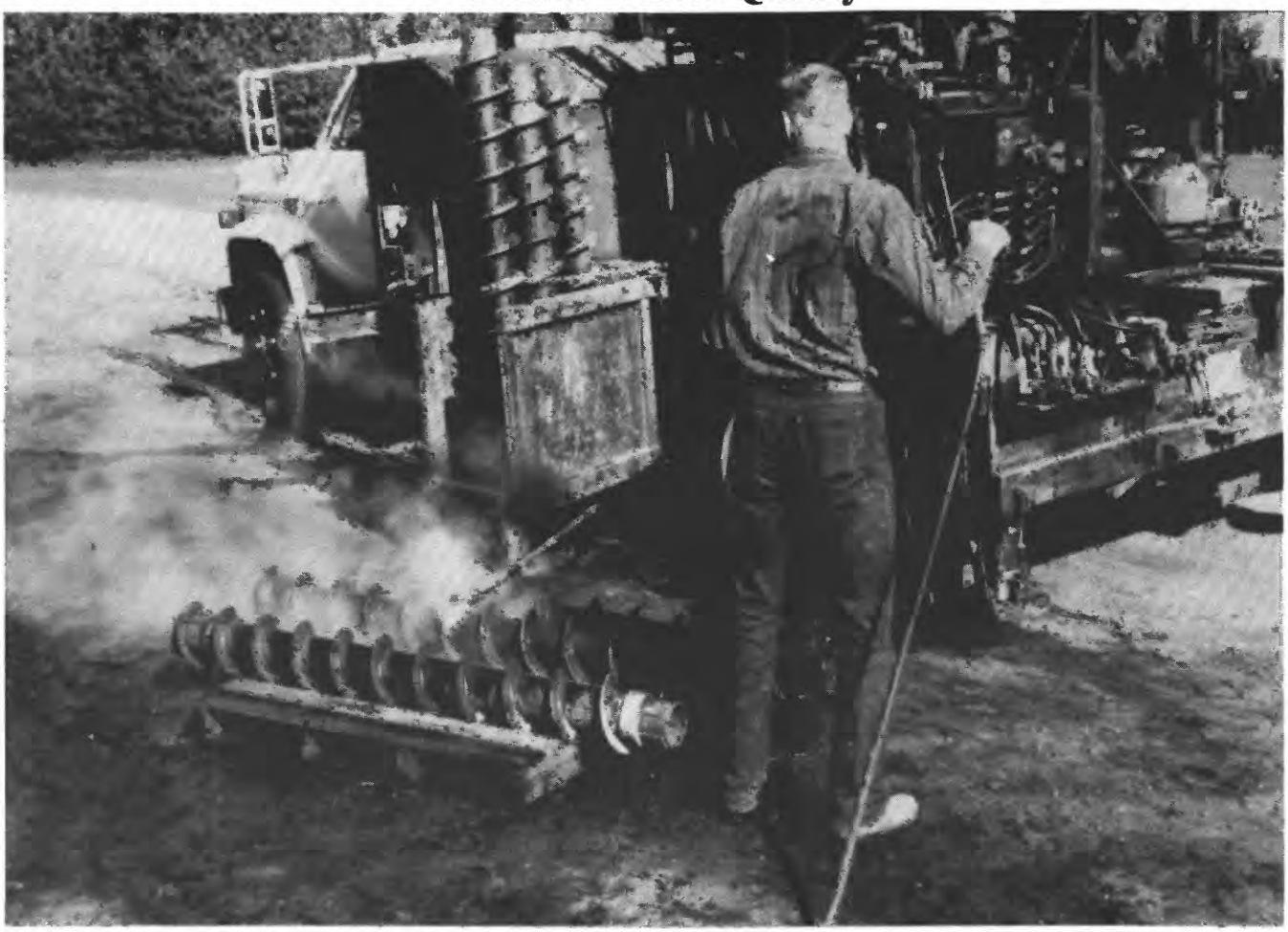
YELLOW MEDICINE COUNTY

444219096165501. Local number, 114N45W04DCD01.
LOCATION.--Lat 44°42'19", long 96°16'55", in SE¼SW¼SE¼ sec.4, T.114 N., R.45 W., Hydrologic Unit 07020003, at Canby City Park.
Owner: City of Canby, well 6.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 12 in., depth 62 ft, screened 44 to 68 ft.
DATUM.--Altitude of land-surface datum is 1,255 ft. Measuring point: Top of casing, 2.90 ft above land-surface datum.
PERIOD OF RECORD.--January 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.67 ft below land-surface datum, June 5, 1965; lowest, 11.32 ft below land-surface datum, Oct. 7, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
Oct 02	8.80	Jan 23	8.28	May 12	8.23	May 21	8.47

Ground-Water Quality



Auger-flight decontamination
Tim Cowdery

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

AITKIN COUNTY

STATION NUMBER	LOCAL IDENT-I-FIER	GEO-LOGIC UNIT	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)
461542093295901	044N25W28DCD01	112PLSC	09-10-92	0930	144.00	1289	582
461637093231801	044N24W21CCC01	112PLSC	09-09-92	1600	56.00	1321	411
461958093250601	044N24W06ABB	112PLSC	09-09-92	1435	62.00	1318	495
462214093360501	045N26W22AAD01	112PLSC	09-09-92	1050	160.00	1257	595
		112PLSC	09-09-92	1051	160.00	1257	593
462346093360401	045N26W10DAA01	112PLSC	09-09-92	1120	55.00	1264	673

DATE	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
09-10-92	7.7	64	37	9.2	2.2	340	<0.10	6.4	0.30
09-09-92	7.5	54	18	6.4	1.1	213	2.3	12	0.20
09-09-92	8.2	41	35	9.9	2.6	240	21	19	0.30
09-09-92	7.7	45	14	67	1.4	297	<0.10	26	0.50
09-09-92	7.8	44	14	66	1.4	294	<0.10	25	0.50
09-09-92	8.2	46	59	20	1.8	405	<0.10	6.3	0.30

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
09-10-92	21	333	<0.010	<0.050	0.290	0.40	0.070	310	150
09-09-92	31	269	<0.010	<0.050	0.130	0.30	0.090	2700	710
09-09-92	18	273	<0.010	<0.050	0.080	<0.20	0.020	44	53
09-09-92	13	349	<0.010	<0.050	1.50	1.6	0.370	950	330
09-09-92	13	347	<0.010	<0.050	1.50	1.7	0.350	950	320
09-09-92	14	417	<0.010	<0.050	0.370	0.90	0.040	160	69

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

BECKER COUNTY

STATION NUMBER	LOCAL IDENTI-I-FIER	GEO-LOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER) LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	PUMP OR FLOW PERIOD PRIOR TO SAM-PLING (MIN) (72004))
465145095094501	139.36.13 AAA USGS 16	--	08-05-92	1400	19.53	21.00	1461	40
465356095121701	140.36.34 ADD USGS 4	--	08-04-92	--	--	29.00	1463	--
		--	08-04-92	1800	--	29.00	1463	20
465455095133001	T140NR36W27BCB	--	08-06-92	1000	22.19	27.00	--	--
465537095163701	T140NR36W20CCC	--	08-03-92	1700	18.90	35.00	--	20
465607095110201	T140NR36W14DDD	--	08-04-92	1630	21.90	62.00	--	20
465657095144801	140N36W016BBB0123S	112WDDF	08-04-92	1400	43.90	49.00	--	20

DATE	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
08-05-92	640	619	7.8	7.6	10.5	--	84	26	6.1	0.60
08-04-92	--	--	--	--	--	--	--	--	--	--
08-04-92	--	505	7.4	8.6	--	0.0	67	21	2.9	1.7
08-06-92	--	391	8.0	7.9	8.0	--	56	14	3.1	0.80
08-03-92	500	534	7.7	8.5	10.5	2.5	64	19	14	1.7
08-04-92	385	416	7.6	8.6	8.5	0.0	57	17	2.3	0.80
08-04-92	E225	465	7.8	8.4	--	0.1	66	19	2.1	0.60

DATE	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)
08-05-92	312	316	2.4	24	0.20	360	0.001	0.107	0.017	<0.20
08-04-92	--	--	--	--	--	--	--	--	--	--
08-04-92	235	234	31	13	0.20	306	0.003	0.011	0.260	0.40
08-06-92	191	188	5.6	6.5	0.10	216	0.002	3.10	0.010	<0.20
08-03-92	238	241	2.7	34	0.10	288	0.001	1.10	0.008	<0.20
08-04-92	199	202	11	11	0.10	250	0.002	4.40	0.010	<0.20
08-04-92	238	245	7.3	0.90	0.10	258	0.002	0.958	0.008	<0.20

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

BELTRAMI COUNTY

STATION NUMBER	LOCAL IDENT-I-FIER	GEO-LOGIC UNIT	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)
472740094512700	146.33.15BACC NYMORE WATE	112DMDF	09-02-92	1450	12.50	1350	810	846
472818094525200	146N33W09CDC PAUL BUNYON	112DMDF	09-02-92	1000	8.00	1342	1000	952
472938094522800	146.33.4 ABB CAMERON PAR1	112DMDF	08-27-92	1200	14.00	1345	1010	1000
472949094531500	146.33.5 29TH AND PARK	112DMDF	09-10-92	1550	14.00	1360	525	534
		112DMDF	09-19-92	1550	14.00	1360	525	--
473049094524200	147.33.28 CDC	112DMDF	09-02-92	1245	21.00	1350	400	400
473236094505400	147.33.15 BCD DNR NORTH	112DMDF	09-11-92	1030	21.50	1355	430	440

DATE	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)
09-02-92	7.0	7.5	14.0	98	19	40	1.5	399	252	19	100
09-02-92	6.8	7.1	--	110	14	61	6.1	337	331	35	96
08-27-92	7.0	7.3	14.0	130	24	28	2.6	379	378	16	110
09-10-92	7.3	7.6	10.0	69	13	20	1.0	--	215	2.7	40
09-19-92	7.3	--	10.0	--	--	--	--	209	--	--	--
09-02-92	7.3	7.7	--	58	16	3.4	1.4	219	221	1.7	3.1
09-11-92	7.3	7.5	8.5	64	13	9.1	1.2	226	202	1.3	2.9

DATE	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)
09-02-92	0.10	21	548	<0.010	7.00	0.140	0.60	0.069	0.065	<10	2
09-02-92	0.20	25	588	0.090	3.10	2.80	3.1	0.015	0.042	10	4
08-27-92	0.10	25	619	<0.010	0.160	4.60	4.8	0.270	<0.001	10	<1
09-10-92	<0.10	15	296	<0.010	1.50	0.030	<0.20	0.032	0.020	30	<1
09-19-92	--	--	--	--	--	--	--	--	--	--	--
09-02-92	0.20	20	234	<0.010	<0.050	0.320	0.40	0.023	0.023	<10	1
09-11-92	<0.10	18	238	<0.010	0.590	0.030	<0.20	0.003	0.003	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

BELTRAMI COUNTY--Continued

DATE	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
09-02-92	58	50	<1.0	<1	17	<1	3	0.2	<1	1.8
09-02-92	190	120	<1.0	1	9600	<1	1400	<0.1	<1	3.9
08-27-92	110	40	<1.0	<1	1500	<1	470	<0.1	<1	9.7
09-10-92	42	30	<1.0	<1	5	<1	<1	<0.1	<1	1.5
09-19-92	--	--	--	--	--	--	--	--	--	--
09-02-92	65	30	<1.0	<1	280	<1	200	<0.1	<1	1.6
09-11-92	--	--	--	--	--	--	--	--	--	4.7

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	ETHANE 1112-TETRA-CHLORO-WAT UNF REC (UG/L) (77562)	1,1,1-TRI-CHLORO-ETHANE TOTAL (UG/L) (34506)	ETHANE, 1,1,2,2 TETRA-CHLORO-WAT UNF REC (UG/L) (34516)	1,1,2-TRI-CHLORO-ETHANE TOTAL (UG/L) (34511)	1,1-DI-CHLORO-ETHANE TOTAL (UG/L) (34496)	1,1-DI-CHLORO-ETHYL-ENE TOTAL (UG/L) (34501)	1,2,3-TRI-CHLORO BENZENE WAT, WH REC (UG/L) (77613)	BENZENE 1,2,4-TRI-CHLORO-WAT UNF REC (UG/L) (34551)
472740094512700	09-02-92	1450	--	--	--	--	--	--	--	--
472818094525200	09-02-92	1000	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
472938094522800	08-27-92	1200	--	--	--	--	--	--	--	--
472949094531500	09-10-92	1550	--	--	--	--	--	--	--	--
473049094524200	09-02-92	1245	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
473236094505400	09-11-92	1030	--	--	--	--	--	--	--	--

DATE	1,2-DIBROMO ETHANE WATER WHOLE TOTAL (UG/L) (77651)	BENZENE O-CHLORO-WATER UNFLTRD REC (UG/L) (34536)	1,2-DI-CHLORO-ETHANE TOTAL (UG/L) (32103)	1,2-DI-CHLORO-PROPANE TOTAL (UG/L) (34541)	1,2-TRANSDI CHLORO-ETHENE TOTAL (UG/L) (34546)	BENZENE 1,3-DI-CHLORO-WATER UNFLTRD REC (UG/L) (34566)	1,3-DI-CHLORO-PROPANE WAT. WH TOTAL (UG/L) (77173)	BENZENE 1,4-DI-CHLORO-WATER UNFLTRD REC (UG/L) (34571)	123-TRI CHLORO-PROPANE WATER WHOLE TOTAL (UG/L) (77443)	2,2-DI CHLORO-PRO-PANE WAT, WH TOTAL (UG/L) (77170)
09-02-92	--	--	--	--	--	--	--	--	--	--
09-02-92	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
08-27-92	--	--	--	--	--	--	--	--	--	--
09-10-92	--	--	--	--	--	--	--	--	--	--
09-02-92	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
09-11-92	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

BELTRAMI COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

DATE	2-CHLORO-ETHYL-VINYL-ETHER TOTAL (UG/L) (34576)	ACRO-LEIN TOTAL (UG/L) (34210)	ACRYLO-NITRILE TOTAL (UG/L) (34215)	BENZENE TOTAL (UG/L) (34030)	BROMO-BENZENE WATER, WHOLE, TOTAL (UG/L) (81555)	BROMO-FORM TOTAL (UG/L) (32104)	CARBON-TETRA-CHLO-RIDE TOTAL (UG/L) (32102)	CHLORO-BENZENE TOTAL (UG/L) (34301)	CHLORO-DI-BROMO-METHANE TOTAL (UG/L) (32105)	CHLORO-ETHANE TOTAL (UG/L) (34311)
09-02-92	--	--	--	--	--	--	--	--	--	--
09-02-92	<3.0	<20	<20	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
08-27-92	--	--	--	--	--	--	--	--	--	--
09-10-92	--	--	--	--	--	--	--	--	--	--
09-02-92	<3.0	<20	<20	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
09-11-92	--	--	--	--	--	--	--	--	--	--

DATE	CHLORO-FORM TOTAL (UG/L) (32106)	CIS 1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34704)	CIS-1,2 -DI-CHLORO-ETHENE WATER TOTAL (UG/L) (77093)	DIBROMO CHLORO-PROPANE WATER WHOLE TOT.REC (UG/L) (82625)	DI-CHLORO-BROMO-METHANE TOTAL (UG/L) (32101)	DI-CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	ETHYL-BENZENE TOTAL (UG/L) (34371)	HEXA-CHLORO-BUT-ADIENE TOTAL (UG/L) (39702)	MESIT-YLENE WATER UNFLTRD REC (UG/L) (77226)	METHYL-BROMIDE TOTAL (UG/L) (34413)
09-02-92	--	--	--	--	--	--	--	--	--	--
09-02-92	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
08-27-92	--	--	--	--	--	--	--	--	--	--
09-10-92	--	--	--	--	--	--	--	--	--	--
09-02-92	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
09-11-92	--	--	--	--	--	--	--	--	--	--

DATE	METHYL-CHLO-RIDE TOTAL (UG/L) (34418)	METHYL-ENE CHLO-RIDE TOTAL (UG/L) (34423)	BENZENE N-BUTYL WATER UNFLTRD REC (UG/L) (77342)	BENZENE N-PROPY WATER UNFLTRD REC (UG/L) (77224)	NAPHTH-ALENE TOTAL (UG/L) (34696)	O-CHLORO-TOLUENE WATER WHOLE TOTAL (UG/L) (77275)	TOLUENE P-CHLOR WATER UNFLTRD REC (UG/L) (77277)	P-ISO-PROPYL-TOLUENE WATER WHOLE REC (UG/L) (77356)	PHENOLS TOTAL (UG/L) (32730)	PSEUDO-CUMENE WATER UNFLTRD REC (UG/L) (77222)
09-02-92	--	--	--	--	--	--	--	--	1	--
09-02-92	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	3	<3.0
08-27-92	--	--	--	--	--	--	--	--	1	--
09-10-92	--	--	--	--	--	--	--	--	<1	--
09-02-92	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	2	<3.0
09-11-92	--	--	--	--	--	--	--	--	<1	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

BELTRAMI COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

DATE	BENZENE SEC BUTYL-WATER UNFLTRD REC (UG/L) (77350)	STYRENE TOTAL (UG/L) (77128)	BENZENE TERT-BUTYL-WATER UNFLTRD REC (UG/L) (77353)	TETRA-CHLORO-ETHYL-ENE TOTAL (UG/L) (34475)	TOLUENE TOTAL (UG/L) (34010)	TRANS-1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34699)	TRI-CHLORO-ETHYL-ENE TOTAL (UG/L) (39180)	TRI-CHLORO-FLUORO-METHANE TOTAL (UG/L) (34488)	VINYL CHLO-RIDE TOTAL (UG/L) (39175)	XYLENE WATER UNFLTRD REC (UG/L) (81551)
09-02-92	--	--	--	--	--	--	--	--	--	--
09-02-92	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0
08-27-92	--	--	--	--	--	--	--	--	--	--
09-10-92	--	--	--	--	--	--	--	--	--	--
09-02-92	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0
09-11-92	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

CASS COUNTY

STATION NUMBER	LOCAL IDENT-I-FIER	GEO-LOGIC UNIT	DATE	TIME
472720095121800	1146.36.24 BBB CHRISTOFFERS	112DMDF	09-01-92	1502

DATE	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)
09-01-92	40.50	1462	500	7.2	8.0	247

QUALITY OF GROUND DATA

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

CHIPPEWA COUNTY

STATION NUMBER	LOCAL IDENTIFIER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
445842095323501	118N39W34DCCCBB	08-18-92	1615	21.00	49.00	1033

DATE	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)
08-18-92	15	913	7.5	10.5	0.1	<0.010	0.120	5.70	0.340

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	2,6-DIETHYL ANALINE WAT FLT 0.7 U GF, REC (UG/L) (82660)	ALACHLOR, WATER, DISS, REC, (UG/L) (46342)	ALPHA BHC DISSOLVED (UG/L) (34253)	HCH ALPHA D6 SRG WAT FLT 0.7 U GF, REC PERCENT (91065)	ATRAZINE, WATER, DISS, REC (UG/L) (39632)	BENFLURALIN WAT FLD 0.7 U GF, REC (UG/L) (82673)	BUTYLATE, WATER, DISS, REC (UG/L) (04028)	CARBARYL WATER FLTRD 0.7 U GF, REC (UG/L) (82680)
445842095323501	08-18-92	1615	<0.00	<0.00	<0.01	91	<0.01	<0.01	<0.00	<0.01

DATE	CARBOFURAN WATER FLTRD 0.7 U GF, REC (UG/L) (82674)	CHLORPYRIFOS DISSOLVED (UG/L) (38933)	CYANAZINE, WATER, DISS, REC (UG/L) (04041)	DCPA WATER FLTRD 0.7 U GF, REC (UG/L) (82682)	DEETHYL ATRAZINE, WATER, DISS, REC (UG/L) (04040)	DIAZINON, DISSOLVED (UG/L) (39572)	DIAZINON D10 SRG WAT FLT 0.7 U GF, REC PERCENT (91063)	DIELDRIN DISSOLVED (UG/L) (39381)	DIMETHOATE WATER FLTRD 0.7 U GG, REC (UG/L) (82662)	DISULFOTON WATER FLTRD 0.7 U GF, REC (UG/L) (82677)
08-18-92	<0.00	<0.00	<0.01	<0.00	<0.02	<0.00	120	<0.02	<0.02	<0.10

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

CHIPPEWA COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

DATE	ETHO-PROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)	LINDANE DIS-SOLVED (UG/L) (39341)	LIN-URON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	MALA-THION, DIS-SOLVED (UG/L) (39532)	METHYL AZIN-PHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)	METHYL PARA-THION WAT FLT 0.7 U GF, REC (UG/L) (82667)	METO-LACHLOR WATER DISSOLV (UG/L) (39415)	METRI-BUZIN SENCOR WATER DISSOLV (UG/L) (82630)	MOL-INATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)
08-18-92	<0.00	<0.00	<0.01	<0.01	<0.01	<0.01	<0.00	<0.00	<0.01	<0.00

DATE	NAPROP-AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	P,P' DDE DISSOLV (UG/L) (34653)	PARA-THION, DIS-SOLVED (UG/L) (39542)	PEB-ULATE WATER FILTRD 0.7 U GF, REC (UG/L) (82669)	PENDI-METH-ALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PER-METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PRON-AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PRO-METON, WATER, DISS, REC (UG/L) (04037)	PROP-CHLOR, WATER, DISS, REC (UG/L) (04024)
08-18-92	<0.00	<0.00	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.00

DATE	PRO-PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	PRO-PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	SI-MAZINE, WATER, DISS, REC (UG/L) (04035)	TEBU-THIURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TER-BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TER-BUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	TERBUTH YLAZINE SURROGT WAT FLT 0.7 U GF, REC PERCENT (91064)	THIO-BENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TRIAL-LATE WATER FLTRD 0.7 U GF, REC (UG/L) (82678)	TRI-FLUR-ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)
08-18-92	<0.00	<0.01	<0.01	<0.01	<0.01	<0.01	100	<0.01	<0.00	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

CROW WING COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)
461852093501301	044N28W11ABA01	112PLSC	09-08-92	1405	156.00	1258	422	421
		112PLSC	09-08-92	1406	156.00	1258	--	419
461922093520001	044N28W03BDC01	112PLSC	09-07-92	1220	81.00	1301	--	297
462049093493001	045N28W25CDB01	112PLSC	09-07-92	0930	75.00	1280	--	292
462309093514801	045N28W15BAD01	--	09-07-92	1430	64.00	1268	--	279

DATE	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	PH WATER WHOLE LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)
09-08-92	8.0	8.1	8.5	727	49	16	17	2.1	234	<0.10	4.0
09-08-92	--	8.1	--	--	49	16	17	2.1	234	<0.10	4.0
09-07-92	--	7.8	--	--	36	12	5.0	1.6	153	2.2	2.8
09-07-92	--	7.9	--	--	42	7.2	3.6	1.7	157	<0.10	2.9
09-07-92	--	7.9	--	--	41	8.7	2.9	1.2	139	12	2.4

DATE	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
09-08-92	0.20	18	233	<0.010	<0.050	0.460	0.60	0.150	450	220
09-08-92	0.20	18	249	<0.010	<0.050	0.460	0.60	0.140	440	220
09-07-92	0.10	19	171	<0.010	<0.050	0.760	0.90	0.110	1200	120
09-07-92	<0.10	17	163	<0.010	<0.050	1.10	1.2	0.100	2300	310
09-07-92	0.10	21	169	<0.010	<0.050	0.070	<0.20	0.030	830	630

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

GOODHUE COUNTY

STATION NUMBER	LOCAL IDENTIFIER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
442003092423501	110N16W14BCCDBA	08-17-92	1345	85.00	200.00	1035

DATE	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)
08-17-92	25	502	7.7	11.0	0.1	<0.010	0.079	0.020	<0.010

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	2,6-DIETHYL ANALINE WAT FLT 0.7 U GF, REC (UG/L) (82660)	ALACHLOR, WATER, DISS, REC, (UG/L) (46342)	ALPHA BHC DISSOLVED (UG/L) (34253)	HCH ALPHA D6 SRG WAT FLT 0.7 U GF, REC PERCENT (91065)	ATRAZINE, WATER, DISS, REC (UG/L) (39632)	BENFLURALIN WAT FLD 0.7 U GF, REC (UG/L) (82673)	BUTYLATE, WATER, DISS, REC (UG/L) (04028)	CARBARYL WATER FLTRD 0.7 U GF, REC (UG/L) (82680)
442003092423501	08-17-92	1345	<0.00	<0.00	<0.01	89	<0.01	<0.01	<0.00	<0.01

DATE	CARBOFURAN WATER FLTRD 0.7 U GF, REC (UG/L) (82674)	CHLORPYRIFOS DISSOLVED (UG/L) (38933)	CYANAZINE, WATER, DISS, REC (UG/L) (04041)	DCPA WATER FLTRD 0.7 U GF, REC (UG/L) (82682)	DEETHYL ATRAZINE, WATER, DISS, REC (UG/L) (04040)	DIAZINON, DISSOLVED (UG/L) (39572)	DIAZINON D10 SRG WAT FLT 0.7 U GF, REC PERCENT (91063)	DIELDRIN DISSOLVED (UG/L) (39381)	DIMETHOATE WATER FLTRD 0.7 U GG, REC (UG/L) (82662)	DISULFOTON WATER FLTRD 0.7 U GF, REC (UG/L) (82677)
08-17-92	<0.00	<0.00	<0.01	<0.00	<0.02	<0.00	110	<0.02	<0.02	<0.10

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

GOODHUE COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

DATE	ETHO-PROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)	LINDANE DIS-SOLVED (UG/L) (39341)	LIN-URON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	MALA-THION, DIS-SOLVED (UG/L) (39532)	METHYL AZIN-PHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)	METHYL PARA-THION WAT FLT 0.7 U GF, REC (UG/L) (82667)	METO-LACHLOR WATER DISSOLV (UG/L) (39415)	METRI-BUZIN SENCOR WATER DISSOLV (UG/L) (82630)	MOL-INATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)
08-17-92	<0.00	<0.00	<0.01	<0.01	<0.01	<0.01	<0.00	<0.00	<0.01	<0.00

DATE	NAPROP-AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	P,P' DDE DISSOLV (UG/L) (34653)	PARA-THION, DIS-SOLVED (UG/L) (39542)	PEB-ULATE WATER FILTRD 0.7 U GF, REC (UG/L) (82669)	PENDI-METH-ALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PER-METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PRON-AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PRO-METON, WATER, DISS, REC (UG/L) (04037)	PROP-CHLOR, WATER, DISS, REC (UG/L) (04024)
08-17-92	<0.00	<0.02	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.00

DATE	PRO-PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	PRO-PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	SI-MAZINE, WATER, DISS, REC (UG/L) (04035)	TEBU-THIURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TER-BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TER-BUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	TERBUTH YLAZINE SURROGT WAT FLT 0.7 U GF, REC PERCENT (91064)	THIO-BENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TRIAL-LATE WATER FLTRD 0.7 U GF, REC (UG/L) (82678)	TRI-FLUR-ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)
08-17-92	<0.00	<0.01	<0.01	<0.01	<0.01	<0.01	110	<0.01	<0.00	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

HUBBARD COUNTY

STATION NUMBER	LOCAL IDENT-I-FIER	DATE	TIME		DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	PUMP OR FLOW PERIOD PRIOR TO SAM-PLING (MIN) (72004)
465228095071201	T139NR35W09BCB	08-26-92	1700		32.68	--	--	--
465230095044501	T139NR35W10AAD	08-27-92	1700		--	27.00	--	20
		08-27-92	1730	--	27.00		--	--
465235095065801	T139NR35W09BBA	08-26-92	1600		27.35	--	--	20
465235095065802		08-26-92	1630		27.48		--	20
465237095094301	139.35.6 CCC USGS 15	08-05-92	1600		25.00	28.00	1459	--
465255095065701	TI39NR35W04DBC	08-26-92	1900		31.00	--	--	20
465255095065702	T139NR35W04DBC	08-26-92	1930		31.08	--	--	20
465303095042201	T139NR35W02BAB	08-05-92	1700		26.10	29.00	--	20
465328095090501	T139NR35W06BAA	08-25-92	1800		38.72	--	--	20
465328095090502		08-25-92	1900	39.56		--	--	20
465330095062201	T139NR35W04ABA	08-27-92	1000		27.47	--	--	20
465330095062202		08-27-92	1030	27.87		--	--	20
465330095070001	T139NR35W04BBA	08-27-92	1200		26.53	--	--	20
465330095070002		08-27-92	1230	--		--	--	--
		08-27-92	1245	27.50	--		--	20
465356095072101	T140NR35W32DAA	08-27-92	1500		25.28	--	--	20
465356095072102		08-27-92	1530	25.57		--	--	20
465442095094001	T140NR35W30CBB	08-26-92	1400		22.90	--	--	--
465442095094002		08-26-92	1430	23.06		--	--	--
465445095071801	T140NR35W28CBB	08-04-92	1130		19.64	67.00	--	20
		08-04-92	1230	19.64	67.00		--	20
465512095080801	T140NR35W30AAA	08-06-92	0800		15.70	49.00	--	20
465540095091701	T140NR35W19CAA	08-26-92	1030		16.84	--	--	20
465540095091702		08-26-92	1100	17.14		--	--	20
465554095094301	T140NR35W19BCB	08-26-92	0930		24.90	--	--	20
465554095094302		08-26-92	0900	24.88		--	--	20

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

HUBBARD COUNTY--Continued

DATE	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
08-26-92	--	--	--	--	--	--	--	--	--	--
08-27-92	--	--	--	--	--	--	--	--	--	--
08-27-92	--	--	--	--	--	--	--	--	--	--
08-26-92	--	--	--	--	--	--	--	--	--	--
08-26-92	--	--	--	--	--	--	--	--	--	--
08-05-92	370	351	7.9	7.9	8.5	--	53	11	4.0	0.80
08-26-92	--	--	--	--	--	--	--	--	--	--
08-26-92	--	--	--	--	--	--	--	--	--	--
08-05-92	490	458	7.8	7.8	9.0	--	64	16	2.5	0.70
08-25-92	--	--	--	--	--	--	--	--	--	--
08-25-92	--	--	--	--	--	--	--	--	--	--
08-27-92	--	--	--	--	--	--	--	--	--	--
08-27-92	--	--	--	--	--	--	--	--	--	--
08-27-92	--	--	--	--	--	--	--	--	--	--
08-27-92	--	--	--	--	--	--	--	--	--	--
08-27-92	--	--	--	--	--	--	--	--	--	--
08-27-92	--	--	--	--	--	--	--	--	--	--
08-27-92	--	--	--	--	--	--	--	--	--	--
08-26-92	--	--	--	--	--	--	--	--	--	--
08-26-92	--	--	--	--	--	--	--	--	--	--
08-04-92	--	361	7.7	7.8	--	0.0	52	13	1.9	0.50
08-04-92	--	362	7.7	7.8	--	0.0	52	13	1.9	0.50
08-06-92	470	504	7.6	7.7	8.0	0.4	70	18	3.4	0.50
08-26-92	--	--	--	--	--	--	--	--	--	--
08-26-92	--	--	--	--	--	--	--	--	--	--
08-26-92	--	--	--	--	--	--	--	--	--	--
08-26-92	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

HUBBARD COUNTY--Continued

DATE	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)
08-26-92	--	--	--	--	--	--	<0.001	0.184	0.122	<0.20
08-27-92	--	--	--	--	--	--	0.018	4.00	0.039	<0.20
08-27-92	--	--	--	--	--	--	0.015	3.90	0.031	<0.20
08-26-92	--	--	--	--	--	--	<0.001	50.0	0.033	0.40
08-26-92	--	--	--	--	--	--	0.023	18.0	0.143	0.30
08-05-92	180	185	2.9	1.9	0.10	188	0.002	1.10	0.006	<0.20
08-26-92	--	--	--	--	--	--	<0.001	0.747	0.031	<0.20
08-26-92	--	--	--	--	--	--	<0.001	9.50	0.035	<0.20
08-05-92	165	169	11	16	0.10	266	0.001	12.0	0.004	<0.20
08-25-92	--	--	--	--	--	--	<0.001	18.0	0.047	0.20
08-25-92	--	--	--	--	--	--	<0.001	14.0	0.036	<0.20
08-27-92	--	--	--	--	--	--	<0.001	12.0	0.010	<0.20
08-27-92	--	--	--	--	--	--	<0.001	7.50	0.019	<0.20
08-27-92	--	--	--	--	--	--	<0.001	11.0	0.019	0.20
08-27-92	--	--	--	--	--	--	0.001	7.70	0.022	<0.20
08-27-92	--	--	--	--	--	--	0.001	7.50	0.024	<0.20
08-27-92	--	--	--	--	--	--	<0.001	8.30	0.034	<0.20
08-27-92	--	--	--	--	--	--	0.006	4.20	0.025	<0.20
08-26-92	--	--	--	--	--	--	<0.001	18.0	0.026	0.20
08-26-92	--	--	--	--	--	--	<0.001	<0.005	0.083	<0.20
08-04-92	185	186	1.9	1.3	<0.10	210	0.002	2.00	0.011	<0.20
08-04-92	185	187	1.9	1.2	<0.10	192	0.002	2.00	0.007	<0.20
08-06-92	193	195	12	11	0.10	330	0.003	13.0	0.010	<0.20
08-26-92	--	--	--	--	--	--	0.008	4.30	0.014	<0.20
08-26-92	--	--	--	--	--	--	<0.001	5.80	0.019	<0.20
08-26-92	--	--	--	--	--	--	<0.001	1.00	0.015	<0.20
08-26-92	--	--	--	--	--	--	<0.001	0.022	0.131	<0.20

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

JACKSON COUNTY

STATION NUMBER	LOCAL IDENT-I-FIER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
434028094590801	103N34W30CDDCAC	08-18-92	1125	45.00	80.00	1421

DATE	PUMP OR FLOW PERIOD PRIOR TO SAM-PLING (MIN) (72004)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
08-18-92	20	2700	6.8	11.5	0.1	<0.010		0.069	2.00<0.010

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	2,6-DI-ETHYL ANALINE WAT FLT 0.7 U GF, REC (UG/L) (82660)	ALA-CHLOR, WATER, DISS, REC, (UG/L) (46342)	ALPHA BHC DIS-SOLVED (UG/L) (34253)	HCH ALPHA D6 SRG WAT FLT 0.7 U GF, REC PERCENT (91065)	ATRA-ZINE, WATER, DISS, REC (UG/L) (39632)	BEN-FLUR-ALIN WAT FLD 0.7 U GF, REC (UG/L) (82673)	CAR-BUTYL-ATE, WATER, DISS, REC (UG/L) (04028)	BARYL WATER FLTRD 0.7 U GF, REC (UG/L) (82680)
434028094590801	08-18-92	1125	<0.00	<0.00	<0.01	90	<0.01	<0.01	<0.00	<0.01

DATE	CARBO-FURAN WATER FLTRD 0.7 U GF, REC (UG/L) (82674)	CHLOR-PYRIFOS DIS-SOLVED (UG/L) (38933)	CYANA-ZINE, WATER, DISS, REC (UG/L) (04041)	DCPA WATER FLTRD 0.7 U GF, REC (UG/L) (82682)	DEETHYL ATRA-ZINE, WATER, DISS, REC (UG/L) (04040)	DI-AZINON, DIS-SOLVED (UG/L) (39572)	DIAZ-INON D10 SRG WAT FLT 0.7 U GF, REC PERCENT (91063)	DI-ELDRIN DIS-SOLVED (UG/L) (39381)	DIMETH-OATE WATER FLTRD 0.7 U GG, REC (UG/L) (82662)	DISUL-FOTON WATER FLTRD 0.7 U GF, REC (UG/L) (82677)
08-18-92	<0.00	<0.00	<0.01	<0.00	<0.02	<0.00	120	<0.02	<0.02	<0.10

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

JACKSON COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

DATE	ETHO-PROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)	LINDANE DIS-SOLVED (UG/L) (39341)	LIN-URON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	MALA-THION, DIS-SOLVED (UG/L) (39532)	METHYL AZIN-PHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)	METHYL PARA-THION WAT FLT 0.7 U GF, REC (UG/L) (82667)	METO-LACHLOR WATER DISSOLV (UG/L) (39415)	METRI-BUZIN SENCOR WATER DISSOLV (UG/L) (82630)	MOL-INATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)
08-18-92	<0.00	<0.00	<0.01	<0.01	<0.01	<0.01	<0.00	<0.00	<0.01	<0.00

DATE	NAPROP-AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	P,P' DDE DISSOLV (UG/L) (34653)	PARA-THION, DIS-SOLVED (UG/L) (39542)	PEB-ULATE WATER FILTRD 0.7 U GF, REC (UG/L) (82669)	PENDI-METH-ALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PER-METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PRON-AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PRO-METON, WATER, DISS, REC (UG/L) (04037)	PROP-CHLOR, WATER, DISS, REC (UG/L) (04024)
08-18-92	<0.00	<0.02	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.00

DATE	PRO-PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	PRO-PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	SI-MAZINE, WATER, DISS, REC (UG/L) (04035)	TEBU-THIURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TER-BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TER-BUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	TERBUTH YLAZINE SURROGT WAT FLT 0.7 U GF, REC PERCENT (91064)	THIO-BENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TRIAL-LATE WATER FLTRD 0.7 U GF, REC (UG/L) (82678)	TRI-FLUR-ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)
08-18-92	<0.00	<0.01	<0.01	<0.01	<0.01	<0.01	100	<0.01	<0.00	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

KANABEC COUNTY

STATION NUMBER	LOCAL IDENT-I-FIER	GEO-LOGIC UNIT	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)
460625093232001	042N24W21CBC01	112PLSC	09-09-92	1520	58.00	1252	401

DATE	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
09-09-92	7.1	50	18	6.0	1.1	204	14	8.6	0.20

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
09-09-92	30	236	<0.010	<0.050	0.090	0.20	0.030	6600	630

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

MILLE LACS COUNTY

STATION NUMBER	LOCAL IDENT-I-FIER	GEO-LOGIC UNIT	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)
460041093402001	041N26W30ABB	112PLSC	09-08-92	0940	39.00	1239	509
460226093351501	041N26W11DCC01	--	09-08-92	1700	141.00	1291	372
460228093255901	041N25W12DDADDC01	112PLSC	09-07-92	1515	71.00	1215	461
460322093441001	041N27W03DCC01	112PLSC	09-08-92	0830	40.00	1275	415
460516093362001	042N26W27DAD01	112PLSC	09-07-92	1720	57.00	1300	470
460551093291801	042N25W22CDC01	--	09-09-92	1340	62.00	1273	533
460555093395901	042N26W19DCD01	112PLSC	09-08-92	1130	107.00	1256	444
460707093330401	042N25W18BCD01	--	09-08-92	1450	52.00	1272	734
460809093432801	042N27W10ADD01	400PCMB	09-08-92	1310	128.00	1291	--
460822093255501	042N25W12AAA01	112PLSC	09-09-92	1625	43.00	1278	396
461046093285401	043N25W27ACB01	--	09-09-92	1805	67.00	1258	520
461054093455501	043N27W28BCB01	112PLSC	09-09-92	1145	100.00	1295	512
461142093482201	043N27W19BCB01	112PLSC	09-08-92	1630	72.00	1275	402
461345093255801	043N25W01DDD01	--	09-10-92	1040	120.00	1315	586
461405093305401	043N25W05DDD01	--	09-10-92	0935	216.00	1285	592
461427093474901	043N27W06ABC01	--	09-07-92	1715	50.00	1263	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

MILLE LACS COUNTY--Continued

DATE	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
09-08-92	7.8	67	22	9.8	1.7	225	36	16	0.20
09-08-92	7.8	43	13	20	1.6	204	0.10	4.0	0.30
09-07-92	8.0	60	22	7.3	1.5	238	19	4.1	0.30
09-08-92	7.7	66	13	4.7	1.4	228	0.30	3.5	0.10
09-07-92	7.8	60	23	6.2	1.6	246	11	4.7	0.20
09-09-92	7.8	63	30	10	1.8	279	21	7.8	0.40
09-08-92	7.9	59	18	11	2.0	244	0.50	1.5	0.30
09-08-92	7.8	85	40	12	3.1	346	7.5	39	0.30
09-08-92	--	--	--	--	--	--	--	--	--
09-09-92	7.8	57	16	3.8	1.8	192	20	9.4	0.10
09-09-92	7.7	66	26	11	1.9	296	<0.10	6.9	0.20
09-09-92	7.3	74	23	5.9	2.0	291	<0.10	4.3	0.10
09-08-92	7.6	59	16	5.3	2.0	224	0.60	3.2	0.10
09-10-92	7.8	51	44	11	2.7	331	16	5.2	0.40
09-10-92	7.7	42	14	74	1.6	313	4.1	12	0.60
09-07-92	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

MILLE LACS COUNTY--Continued

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
09-08-92	18	297	<0.010	<0.050	0.130	0.30	0.070	630	120
09-08-92	17	213	<0.010	<0.050	0.440	0.50	0.110	1500	61
09-07-92	16	264	<0.010	<0.050	0.060	<0.20	0.050	330	140
09-08-92	26	257	<0.010	<0.050	0.180	0.40	0.120	1800	400
09-07-92	18	266	<0.010	0.940	<0.010	<0.20	0.020	17	10
09-09-92	16	292	<0.010	<0.050	0.100	0.20	0.060	18	280
09-08-92	16	261	<0.010	<0.050	0.560	0.60	0.210	220	210
09-08-92	19	438	<0.010	<0.050	0.300	0.30	0.060	860	170
09-08-92	--	--	<0.010	<0.050	0.130	<0.20	0.050	--	--
09-09-92	17	227	<0.010	<0.050	0.020	<0.20	0.020	82	100
09-09-92	21	302	<0.010	<0.050	0.560	0.70	0.090	950	110
09-09-92	26	293	<0.010	<0.050	0.810	0.90	0.020	3300	340
09-08-92	21	225	<0.010	<0.050	0.190	<0.20	0.020	930	160
09-10-92	20	318	<0.010	<0.050	0.080	<0.20	0.020	240	240
09-10-92	16	337	<0.010	<0.050	1.40	1.5	0.290	670	90
09-07-92	--	--	<0.010	<0.050	0.490	0.60	<0.010	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

MORRISON COUNTY

STATION NUMBER	LOCAL IDENT-I-FIER	GEO-LOGIC UNIT	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)
460438093501101	042N28W35DBA01	--	09-09-92	1010	101.00	1333	1220
460701093495101	042N28W13CCB01	--	09-08-92	1050	32.00	1309	343
460836093495201	042N28W02DDD01	112PLSC	09-08-92	1145	52.00	1315	361

DATE	PH WATER WHOLE LAB (STAND-ARD UNITS) (00403)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	CHLO-SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	FLUO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	RIDE, DIS-SOLVED (MG/L AS F) (00950)
09-09-92	7.0	160	53	25	3.7	427	67	120	0.20
09-08-92	7.8	50	12	2.9	1.7	185	2.5	3.1	0.10
09-08-92	8.0	44	17	5.0	1.7	190	9.4	3.3	0.20

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
09-09-92	20	710	<0.010	2.80	0.020	0.50	0.020	7	92
09-08-92	17	184	<0.010	<0.050	0.020	<0.20	0.050	230	220
09-08-92	15	202	<0.010	<0.050	0.020	<0.20	0.010	79	65

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

MURRAY COUNTY

STATION NUMBER	LOCAL IDENTIFIER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
435625095540301	106N42W33CBCCAA	08-18-92	1325	15.00	42.00	1695

DATE	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)
08-18-92	20	1100	7.1	10.5	3.7	<0.010	21.0	0.020	0.040

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	2,6-DIETHYL ANALINE WAT FLT 0.7 U GF, REC (UG/L) (82660)	ALACHLOR, WATER, DISS, REC, (UG/L) (46342)	ALPHA BHC DISSOLVED (UG/L) (34253)	HCH ALPHA D6 SRG WAT FLT 0.7 U GF, REC PERCENT (91065)	ATRAZINE, WATER, DISS, REC (UG/L) (39632)	BENFLURALIN WAT FLD 0.7 U GF, REC (UG/L) (82673)	BUTYLATE, WATER, DISS, REC (UG/L) (04028)	CARBARYL WATER FLTRD 0.7 U GF, REC (UG/L) (82680)
435625095540301	08-18-92	1325	<0.00	<0.00	<0.01	92	0.01	<0.01	<0.00	<0.01

DATE	CARBOFURAN WATER FLTRD 0.7 U GF, REC (UG/L) (82674)	CHLORPYRIFOS DISSOLVED (UG/L) (38933)	CYANAZINE, WATER, DISS, REC (UG/L) (04041)	DCPA WATER FLTRD 0.7 U GF, REC (UG/L) (82682)	DEETHYL ATRAZINE, WATER, DISS, REC (UG/L) (04040)	DIAZINON, DISSOLVED (UG/L) (39572)	DIAZINON D10 SRG WAT FLT 0.7 U GF, REC PERCENT (91063)	DIELDRIN DISSOLVED (UG/L) (39381)	DIMETHOATE WATER FLTRD 0.7 U GG, REC (UG/L) (82662)	DISULFOTON WATER FLTRD 0.7 U GF, REC (UG/L) (82677)
08-18-92	<0.00	<0.00	<0.01	<0.00	<0.02	<0.00	100	<0.02	<0.02	<0.10

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

MURRAY COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

DATE	ETHO-PROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)	LINDANE DIS-SOLVED (UG/L) (39341)	LIN-URON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	MALA-THION, DIS-SOLVED (UG/L) (39532)	METHYL AZIN-PHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)	METHYL PARA-THION WAT FLT 0.7 U GF, REC (UG/L) (82667)	METO-LACHLOR WATER DISSOLV (UG/L) (39415)	METRI-BUZIN SENCOR WATER DISSOLV (UG/L) (82630)	MOL-INATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)
08-18-92	<0.00	<0.00	<0.01	<0.01	<0.01	<0.01	<0.00	0.01	<0.01	<0.00

DATE	NAPROP-AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	P,P' DDE DISSOLV (UG/L) (34653)	PARA-THION, DIS-SOLVED (UG/L) (39542)	PEB-ULATE WATER FILTRD 0.7 U GF, REC (UG/L) (82669)	PENDI-METH-ALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PER-METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PRON-AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PRO-METON, WATER, DISS, REC (UG/L) (04037)	PROP-CHLOR, WATER, DISS, REC (UG/L) (04024)
08-18-92	<0.00	<0.02	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.00

DATE	PRO-PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	PRO-PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	SI-MAZINE, WATER, DISS, REC (UG/L) (04035)	TEBU-THIURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TER-BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TER-BUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	TERBUTH YLAZINE SURROGT WAT FLT 0.7 U GF, REC PERCENT (91064)	THIO-BENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TRIAL-LATE WATER FLTRD 0.7 U GF, REC (UG/L) (82678)	TRI-FLUR-ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)
08-18-92	<0.00	<0.01	<0.01	<0.01	<0.01	<0.01	100	<0.01	<0.00	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

OLMSTED COUNTY

STATION NUMBER	LOCAL IDENT-I-FIER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	ELEV. OF LAND DEPTH OF WELL, TOTAL (FEET) (72008)	SURFACE DATUM (FT. ABOVE NGVD) (72000)
440455092120601	1107N12W12DDBDBB	08-17-92	1805	125.00	520.00	1175

DATE (MIN)	PUMP OR FLOW PERIOD PRIOR TO SAM-PLING (US/CM) (72004)	SPE-CIFIC CON-DUCT-ANCE UNITS) (00095)	PH WATER WHOLE FIELD (STAND-ARD (DEG C) (00400)	TEMPER-ATURE WATER (MG/L) (00010)	OXYGEN, DIS-SOLVED AS N) (00300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS P) (00608)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L (00671)
08-17-92	25	516	7.7	14.5	0.1	<0.010	0.075	0.030	0.010

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

STEVENS COUNTY

STATION NUMBER	LOCAL IDENT-I-FIER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	ELEV. OF LAND DEPTH OF WELL, TOTAL (FEET) (72008)	SURFACE DATUM (FT. ABOVE NGVD) (72000)
452811095582801	123N42W18AAABCC	08-18-92	1815	18.00	40.00	1110

DATE	PUMP OR FLOW PERIOD PRIOR TO SAM-PLING (MIN) (72004)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
08-18-92	20	1920	6.6	10.5	0.2	<0.010	0.066	0.120	<0.010

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

WABASHA COUNTY

STATION NUMBER	LOCAL IDENT-I-FIER	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)
441638092042401	109N11W01AACBAD	0 8-17-92	1550	72.00	98.00

DATE	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
08-17-92	568	7.4	13.5	16.2	<0.010	2.50	<0.010	0.020

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	ETHANE, 1112-TETRA-CHLORO-WAT UNF REC (UG/L) (77562)	ETHANE, 1,1,1-TRI-CHLORO-ETHANE TOTAL (UG/L) (34506)	ETHANE, 1,1,2,2 TETRA-CHLORO-WAT UNF REC (UG/L) (34516)	1,1,2-TRI-CHLORO-ETHANE TOTAL (UG/L) (34511)	1,1-DI-CHLORO-ETHANE TOTAL (UG/L) (34496)	1,1-DI-CHLORO-ETHYL-ENE TOTAL (UG/L) (34501)	1,2,3-TRI-CHLORO BENZENE WAT, WH REC (UG/L) (77613)	BENZENE 1,2,4-TRI-CHLORO-WAT UNF REC (UG/L) (34551)	1,2-DIBROMO ETHANE WATER WHOLE TOTAL (UG/L) (77651)
441638092042401	08-17-92	1550	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.2

DATE	BENZENE O-CHLORO-WATER UNFLTRD REC (UG/L) (34536)	1,2-DI-CHLORO-ETHANE TOTAL (UG/L) (32103)	1,2-DI-CHLORO-PROPANE TOTAL (UG/L) (34541)	1,2-TRANSDI CHLORO-ETHENE TOTAL (UG/L) (34546)	BENZENE 1,3-DI-CHLORO-WATER UNFLTRD REC (UG/L) (34566)	1,3-DI-CHLORO-PROPANE WAT. WH TOTAL (UG/L) (77173)	BENZENE 1,4-DI-CHLORO-WATER UNFLTRD REC (UG/L) (34571)	123-TRI CHLORO-PROPANE WATER WHOLE TOTAL (UG/L) (77443)	2, 4-DP TOTAL (UG/L) (82183)	2,2-DI CHLORO-PRO-PANE WAT, WH TOTAL (UG/L) (77170)	2,4,5-T TOTAL (UG/L) (39740)	2,4-D, TOTAL (UG/L) (39730)
08-17-92	<0.20	<0.2	<0.2	<0.2	<0.20	<0.2	<0.20	<0.2	<0.01	<0.2	<0.01	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

WABASHA COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

DATE	2,6-DIETHYL ANALINE WAT FLT 0.7 U GF, REC (UG/L) (82660)	2-CHLOROETHYL-VINYL-ETHER TOTAL (UG/L) (34576)	ACROLEIN TOTAL (UG/L) (34210)	ACRYLONITRILE TOTAL (UG/L) (34215)	ALACHLOR, WATER, DISS, REC, (UG/L) (46342)	ALPHA BHC DISSOLVED (UG/L) (34253)	HCH ALPHA D6 SRG WAT FLT 0.7 U GF, REC PERCENT (91065)	ATRAZINE, WATER, DISS, REC (UG/L) (39632)	BENFLURALIN WAT FLD 0.7 U GF, REC (UG/L) (82673)	BENZENE TOTAL (UG/L) (34030)	BROMOBENZENE WATER, WHOLE, TOTAL (UG/L) (81555)	BROMOFORM TOTAL (UG/L) (32104)
08-17-92	<0.00	<1.0	<20	<20	<0.00	<0.01	86	0.05	<0.01	<0.2	<0.2	<0.2

DATE	BUTYLATE, WATER, DISS, REC (UG/L) (04028)	CARBARYL WATER FLTRD 0.7 U GF, REC (UG/L) (82680)	CARBOFURAN WATER FLTRD 0.7 U GF, REC (UG/L) (82674)	CARBONTETRACHLORIDE TOTAL (UG/L) (32102)	CHLOROBENZENE TOTAL (UG/L) (34301)	CIS-1,2 CHLORODIBROMOMETHANE TOTAL (UG/L) (32105)	CHLOROETHANE TOTAL (UG/L) (34311)	CHLOROFORM TOTAL (UG/L) (32106)	CHLORPYRIFOS DISSOLVED (UG/L) (38933)	CIS 1,3-DICHLOROPROPENE TOTAL (UG/L) (34704)	-DICHLOROETHENE WATER TOTAL (UG/L) (77093)	CYANAZINE, WATER, DISS, REC (UG/L) (04041)
08-17-92	<0.00	<0.01	<0.00	<0.2	<0.20	<0.2	<0.2	<0.2	<0.00	<0.2	<0.2	<0.01

DATE	DCPA WATER FLTRD 0.7 U GF, REC (UG/L) (82682)	DEETHYLATRAZINE, WATER, DISS, REC (UG/L) (04040)	DIAZINON, DISSOLVED (UG/L) (39572)	DIAZINON D10 SRG WAT FLT 0.7 U GF, REC PERCENT (91063)	DIBROMOCHLOROPROPANE WATER WHOLE TOT.REC (UG/L) (82625)	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L) (82052)	DICHLOROBROMOMETHANE TOTAL (UG/L) (32101)	DICHLORODIFLUOROMETHANE TOTAL (UG/L) (34668)	DIELDRIN DISSOLVED (UG/L) (39381)	DIMETHOATE WATER FLTRD 0.7 U GG, REC (UG/L) (82662)	DISULFOTON WATER FLTRD 0.7 U GF, REC (UG/L) (82677)
08-17-92	<0.00	<0.02	<0.00	110	<1.0	<0.01	<0.2	<0.2	<0.02	<0.02	<0.10

DATE	ETHOPROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	ETHYLBENZENE TOTAL (UG/L) (34371)	FONOFOS WATER DISS REC (UG/L) (04095)	HEXACHLOROBUTADIENE TOTAL (UG/L) (39702)	LINDANE DISSOLVED (UG/L) (39341)	LINURON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	MALATHION, DISSOLVED (UG/L) (39532)	MESITYLENE WATER UNFLTRD REC (UG/L) (77226)	METHYL AZINPHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)	METHYL PARATHION WAT FLT 0.7 U GF, REC (UG/L) (82667)	METHYLBROMIDE TOTAL (UG/L) (34413)
08-17-92	<0.00	<0.2	<0.00	<0.2	<0.01	<0.01	<0.01	<0.20	<0.01	<0.00	<0.2

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

WABASHA COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

DATE	METHYL-CHLORIDE TOTAL (UG/L) (34418)	METHYLENE CHLORIDE TOTAL (UG/L) (34423)	METOLACHLOR WATER DISSOLV (UG/L) (39415)	METRIBUZIN SENCOR WATER DISSOLV (UG/L) (82630)	MOLINATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)	BENZENE N-BUTYL WATER UNFLT REC (UG/L) (77342)	BENZENE N-PROPY WATER UNFLT REC (UG/L) (77224)	NAPHTHALENE TOTAL (UG/L) (34696)	NAPROPAMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	O-CHLOROTOLUENE WATER WHOLE TOTAL (UG/L) (77275)	P,P' DDE DISSOLV (UG/L) (34653)
08-17-92	<0.2	<0.2	<0.00	<0.01	<0.00	<0.20	<0.20	<0.2	<0.00	<0.2	<0.02

DATE	TOLUENE P-CHLOR WATER UNFLTRD REC (UG/L) (77277)	P-ISOPROPYLTOLUENE WATER WHOLE REC (UG/L) (77356)	PARATHION, DISSOLVED (UG/L) (39542)	PEBULATE WATER FILTRD 0.7 U GF, REC (UG/L) (82669)	PENDIMETHALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PERMETHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	PRONAMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PROMETON, WATER, DISS, REC (UG/L) (04037)	PROPCHLOR, WATER, DISS, REC (UG/L) (04024)
08-17-92	<0.20	<0.20	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.00

DATE	PROPANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	PROPARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	PSEUDOCUMENE WATER UNFLTRD REC (UG/L) (77222)	BENZENE SEC BUTYL-WATER UNFLTRD REC (UG/L) (77350)	SILVEX, TOTAL (UG/L) (39760)	SIMAZINE, WATER, DISS, REC (UG/L) (04035)	STYRENE TOTAL (UG/L) (77128)	TEBUTHIURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TERBACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TERBUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	TERBUTHYLAZINE SURROGT WAT FLT 0.7 U GF, REC PERCENT (91064)
08-17-92	<0.00	<0.01	<0.20	<0.20	<0.01	<0.01	<0.2	<0.01	<0.01	<0.01	100

DATE	BENZENE TERT-BUTYL-WATER UNFLTRD REC (UG/L) (77353)	TETRACHLOROETHYLENE TOTAL (UG/L) (34475)	THIOBENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TOLUENE TOTAL (UG/L) (34010)	TRANS-1,3-DICHLOROPROPENE TOTAL (UG/L) (34699)	TRIALLATE WATER FLTRD 0.7 U GF, REC (UG/L) (82678)	TRICHLOROETHYLENE TOTAL (UG/L) (39180)	TRICHLOROFLUOROMETHANE TOTAL (UG/L) (34488)	TRIFLURALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)	VINYL CHLORIDE TOTAL (UG/L) (39175)	XYLENE WATER UNFLTRD REC (UG/L) (81551)
08-17-92	<0.20	<0.2	<0.01	<0.2	<0.2	<0.00	<0.2	<0.2	<0.01	<0.2	<0.20

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

WASHINGTON COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	ELEV. OF LAND DEPTH OF WELL, TOTAL (FEET) (72008)	SURFACE DATUM (FT. ABOVE NGVD) (72000)
451143092525201	031N20W07AAB	112PLSC	08-14-92	1300	18.50	27.00	990

DATE	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)
08-14-92	26	1170	7.7	11.0	6.6	<0.010	3.50	0.020	0.070

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	ETHANE, 1112-TETRACHLORO-WAT UNF REC (UG/L) (77562)	1,1,1-TRICHLOROETHANE TOTAL (UG/L) (34506)	ETHANE, 1,1,2,2-TETRACHLORO-WAT UNF REC (UG/L) (34516)	1,1,2-TRICHLOROETHANE TOTAL (UG/L) (34511)	1,1-DICHLOROETHANE TOTAL (UG/L) (34496)	1,1-DICHLOROETHYLENE TOTAL (UG/L) (34501)	1,2,3-TRICHLORO BENZENE, WAT, WH REC (UG/L) (77613)	BENZENE 1,2,4-TRIBROMO-WAT UNF REC (UG/L) (34551)	1,2-DIBROMOETHANE WATER WHOLE TOTAL (UG/L) (77651)
451143092525201	08-14-92	1300	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<0.20	<0.2

DATE	BENZENE O-CHLORO-WATER UNFLTRD REC (UG/L) (34536)	1,2-DICHLOROETHANE TOTAL (UG/L) (32103)	1,2-DICHLOROPROPANE TOTAL (UG/L) (34541)	1,2-TRANSDICHLOROETHENE TOTAL (UG/L) (34546)	BENZENE 1,3-DICHLORO-WATER UNFLTRD REC (UG/L) (34566)	1,3-DICHLOROPROPANE TOTAL (UG/L) (77173)	BENZENE 1,4-DICHLORO-WATER UNFLTRD REC (UG/L) (34571)	123-TRICHLOROPROPANE WATER WHOLE TOTAL (UG/L) (77443)	2, 4-DP TOTAL (UG/L) (82183)	2,2-DICHLOROPROPANE WAT, WH TOTAL (UG/L) (77170)	2,4,5-T TOTAL (UG/L) (39740)	2,4-D, TOTAL (UG/L) (39730)
08-14-92	<0.20	<0.2	<0.2	<0.2	<0.20	<0.2	<0.20	<0.2	<0.01	<0.2	<0.01	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

WASHINGTON COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

DATE	2,6-DIETHYL ANALINE WAT FLT 0.7 U GF, REC (UG/L) (82660)	2-CHLORO-ETHYL-VINYL-ETHER TOTAL (UG/L) (34576)	ACRO-LEIN TOTAL (UG/L) (34210)	ACRYLO-NITRILE TOTAL (UG/L) (34215)	ALA-CHLOR, WATER, DISS, REC, (UG/L) (46342)	ALPHA BHC DIS-SOLVED (UG/L) (34253)	HCH ALPHA D6 SRG WAT FLT 0.7 U GF, REC PERCENT (91065)	ATRA-ZINE, WATER, DISS, REC (39632)	BEN-FLUR-ALIN WAT FLD 0.7 U GF, REC (82673)	BENZENE TOTAL (UG/L) (34030)	BROMO-BENZENE WATER, WHOLE, TOTAL (UG/L) (81555)	BROMO-FORM TOTAL (UG/L) (32104)
08-14-92	<0.00	<1.0	<20	<20	0.00	<0.01	87	0.03	<0.01	<0.2	<0.2	<0.2

DATE	BUTYL-ATE, WATER, DISS, REC (UG/L) (04028)	CAR-BARYL WATER FLTRD 0.7 U GF, REC (UG/L) (82680)	CARBO-FURAN WATER FLTRD 0.7 U GF, REC (UG/L) (82674)	CARBON-TETRA-CHLO-RIDE TOTAL (UG/L) (32102)	CHLORO-BENZENE TOTAL (UG/L) (34301)	CHLORO-DI-BROMO-METHANE TOTAL (UG/L) (32105)	CHLORO-ETHANE TOTAL (UG/L) (34311)	CHLORO-FORM TOTAL (UG/L) (32106)	CHLOR-PYRIFOS DIS-SOLVED (UG/L) (38933)	CIS 1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34704)	CIS-1,2-DI-CHLORO-ETHENE WATER TOTAL (UG/L) (77093)	CYANA-ZINE, WATER, DISS, REC (UG/L) (04041)
08-14-92	<0.00	<0.01	<0.00	<0.2	<0.20	<0.2	<0.2	<0.2	<0.00	<0.2	<0.2	<0.01

DATE	DCPA WATER FLTRD 0.7 U GF, REC (UG/L) (82682)	DEETHYL ATRA-ZINE, WATER, DISS, REC (UG/L) (04040)	DI-AZINON, DIS-SOLVED (UG/L) (39572)	DIAZ-INON D10 SRG WAT FLT 0.7 U GF, REC PERCENT (91063)	DIBROMO CHLORO-PROPANE WATER WHOLE TOT.REC (UG/L) (82625)	DICAMBA (MED-IBEN) (BAN-VEL D) TOTAL (UG/L) (82052)	DI-CHLORO-BROMO-METHANE TOTAL (UG/L) (32101)	DI-CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	DI-ELDRIN DIS-SOLVED (UG/L) (39381)	DIMETH-OATE WATER FLTRD 0.7 U GG, REC (UG/L) (82662)	DISUL-FOTON WATER FLTRD 0.7 U GF, REC (UG/L) (82677)
08-14-92	<0.00	<0.02	<0.00	110	<1.0	<0.01	<0.2	<0.2	<0.02	<0.02	<0.10

DATE	ETHO-PROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	ETHYL-BENZENE TOTAL (UG/L) (34371)	FONOFOS WATER DISS REC (UG/L) (04095)	HEXA-CHLORO-BUT-ADIENE TOTAL (UG/L) (39702)	LINDANE DIS-SOLVED (UG/L) (39341)	LIN-URON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	MALA-THION, DIS-SOLVED (UG/L) (39532)	MESIT-YLENE WATER UNFLTRD REC (UG/L) (77226)	METHYL AZIN-PHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)	METHYL PARA-THION WAT FLT 0.7 U GF, REC (UG/L) (82667)	METHYL-BROMIDE TOTAL (UG/L) (34413)
08-14-92	<0.00	<0.2	<0.00	<0.2	<0.01	<0.01	<0.01	<0.20	<0.01	<0.00	<0.2

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

WASHINGTON COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

DATE	METHYL-CHLO-RIDE TOTAL (UG/L) (34418)	METHYL-ENE CHLO-RIDE TOTAL (UG/L) (34423)	METO-LACHLOR WATER DISSOLV (UG/L) (39415)	METRI-BUZIN SENCOR WATER DISSOLV (UG/L) (82630)	MOL-INATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)	BENZENE N-BUTYL WATER UNFLT REC (UG/L) (77342)	BENZENE N-PROPY WATER UNFLT REC (UG/L) (77224)	NAPHTH-ALENE TOTAL (UG/L) (34696)	NAPROP-AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	O-CHLORO-TOLUENE WATER WHOLE TOTAL (UG/L) (77275)	P,P' DDE DISSOLV (UG/L) (34653)
08-14-92	<0.2	<0.2	<0.00	<0.01	<0.00	<0.20	<0.20	<0.2	<0.00	<0.2	<0.02

DATE	TOLUENE P-CHLOR WATER UNFLTRD REC (UG/L) (77277)	P-ISO-PROPYL-TOLUENE WATER WHOLE REC (UG/L) (77356)	PARA-THION, DIS-SOLVED (UG/L) (39542)	PEB-ULATE WATER FILTRD 0.7 U GF, REC (UG/L) (82669)	PENDI-METH-ALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PER-METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PICLO-RAM (TOR-DON) (AMDON) TOTAL (UG/L) (39720)	PRON-AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PRO-METON, WATER, DISS, REC (UG/L) (04037)	PROP-CHLOR, WATER, DISS, REC (UG/L) (04024)
08-14-92	<0.20	<0.20	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.00

DATE	PRO-PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	PRO-PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	PSEUDO-CUMENE WATER UNFLTRD REC (UG/L) (77222)	BENZENE SEC BUTYL-WATER UNFLTRD REC (UG/L) (77350)	SILVEX, TOTAL (UG/L) (39760)	SI-MAZINE, WATER, DISS, REC (UG/L) (04035)	STYRENE TOTAL (UG/L) (77128)	TEBU-THIURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TER-BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TER-BUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	TERBUTH YLAZINE SURROGT WAT FLT 0.7 U GF, REC PERCENT (91064)
08-14-92	<0.00	<0.01	<0.20	<0.20	<0.01	<0.01	<0.2	<0.01	<0.01	<0.01	98

DATE	BENZENE TERT-BUTYL-WATER UNFLTRD REC (UG/L) (77353)	TETRA-CHLORO-ETHYL-ENE TOTAL (UG/L) (34475)	THIO-BENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TOLUENE TOTAL (UG/L) (34010)	TRANS-1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34699)	TRIAL-LATE WATER FLTRD 0.7 U GF, REC (UG/L) (82678)	TRI-CHLORO-ETHYL-ENE TOTAL (UG/L) (39180)	TRI-CHLORO-FLUORO-METHANE TOTAL (UG/L) (34488)	TRI-FLUR-ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)	VINYL CHLO-RIDE TOTAL (UG/L) (39175)	XYLENE WATER UNFLTRD REC (UG/L) (81551)
08-14-92	.20	<0.2	<0.01	<0.2	<0.2	<0.00	<0.2	<0.2	<0.01	<0.2	<0.20

Chemical Quality of Precipitation

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN

WATER-QUALITY DATA, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

LOCATION.--Lat 46°14'58", long 94°29'50", in NE¼ sec.18, T.132 N., R.30 W., Morrison County, Hydrologic Unit 07010104, approximately 500 ft southwest of the abandoned Gilgal Church and approximately 5 miles south of the town of Pillager.
PERIOD OF RECORD.--October 1983 to current year (weekly composite).
INSTRUMENTATION.--Samples are collected in a polyethylene bucket by an electrically operated wet/dry collector. A recording rain gage and a standard U.S. Weather Service bulk rain gage measure rainfall quantity.
REMARKS.--An observer collects only the wetfall bucket and services the rain gages every Tuesday around 0900 hours. The observer weighs the bucket and if there is enough wetfall, determines specific conductance and pH. The bucket with its remaining contents is then sent to the Illinois State Water Survey Laboratory for analysis.

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

WEEKLY COMPOSITE

DATE	TIME	TOTAL PRECIP-ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUC-TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	SPEC. CONDUC-TANCE LAB ATM DEP WET TOT (US/CM) (83156)	PH FIELD ATM DEP WET T (UNITS) (83106)	PH LAB ATM DEP WET T (UNITS) (83107)	CALCIUM ATM DEP WET DIS (MG/L) (82932)
OCT 01-08	1930	0.10	11	12	--	6.54	0.680
OCT 08-15	1930	0.05	--	30	--	7.04	1.74
OCT 15-22	1930	0.0	--	2	--	5.83	0.010
OCT 22-29	2030	0.99	1	12	4.60	4.64	0.010
OCT 29-NOV 05	2030	1.52	8	3	5.10	5.25	0.040
NOV 05-12	2100	0.15	--	8	--	--	<0.090
NOV 12-19	2030	0.30	19	17	4.40	4.49	0.020
NOV 19-26	2030	0.0	--	--	--	--	--
NOV 26-DEC 03	2030	0.40	--	--	--	--	--
DEC 03-10	2030	0.15	--	--	--	--	--
DEC 10-17	2030	0.10	--	--	--	--	--
DEC 17-24	1545	0.10	--	1	--	5.75	<0.010
DEC 24-31	1625	0.0	--	--	--	--	--
DEC 31 1991-JAN 07 1992	1500	0.14	25	22	4.80	6.07	0.070
JAN 07-14	2030	0.37	--	38	--	5.66	--
JAN 14-21	2100	0.0	--	--	--	--	--
JAN 21-28	2030	0.06	--	--	--	--	--
JAN 28-FEB 04	2045	0.0	--	--	--	--	--
FEB 04-11	2045	0.0	--	3	--	6.20	<0.010
FEB 11-18	2100	0.06	--	28	--	6.44	0.100
FEB 18-25	2030	0.39	--	--	--	--	--
FEB 25-MAR 03	2100	0.0	--	--	--	--	--
MAR 03-10	2100	1.30	36	23	4.10	4.24	0.080

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN--Continued

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

WEEKLY COMPOSITE

DATE	TIME	TOTAL PRECIP-ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUC-TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	SPEC. CONDUC-TANCE LAB ATM DEP WET TOT (US/CM) (83156)	PH FIELD ATM DEP WET T (UNITS) (83106)	PH LAB ATM DEP WET T (UNITS) (83107)	CALCIUM ATM DEP WET DIS (MG/L) (82932)
MAR 10-17	2030	0.30	--	19	--	6.21	--
MAR 17-24	2030	0.0	--	--	--	--	--
MAR 24-31	2045	0.22	8	8	5.30	6.13	0.340
MAR 31-APR 07	2030	0.30	7	7	5.50	6.31	0.260
APR 07-14	1930	0.55	--	46	--	6.74	0.860
APR 14-21	1930	1.31	18	15	4.80	4.88	0.050
APR 21-28	1930	0.02	--	--	--	--	--
APR 28-MAY 05	1930	0.0	--	--	--	--	--
MAY 05-12	1400	1.50	14	12	5.30	6.35	0.440
MAY 12-19	1930	0.21	9	8	5.50	6.46	0.250
MAY 19-26	2000	0.53	8	6	5.10	5.97	0.090
MAY 26-JUN 02	1930	0.0	--	--	--	--	--

DATE	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)	SODIUM ATM DEP WET DIS (MG/L) (83138)	POTAS-SIUM ATM DEP WET DIS (MG/L) (83120)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	CHLO-RIDE ATM DEP WET DIS (MG/L) (82944)	NI-TROGEN NITRATE ATM DEP WET DIS AS NO3 (MG/L) (83071)	NI-TROGEN AMMON. ATM DEP WET DIS AS NH4 (MG/L) (83047)	PHOS-PHORUS ORTHO ATM DEP WET DIS AS PO4 (MG/L) (83111)
OCT 01-08	0.188	0.072	0.079	0.96	0.12	0.75	0.530	<0.020
OCT 08-15	0.302	0.188	0.113	1.78	0.21	1.65	1.78	<0.070
OCT 15-22	<0.003	0.116	<0.003	<0.03	0.08	0.16	<0.020	<0.020
OCT 22-29	0.004	0.014	<0.003	1.28	0.05	0.64	0.240	<0.020
OCT 29-NOV 05	0.004	0.010	0.006	0.10	0.04	0.29	<0.020	<0.020
NOV 05-12	<0.030	0.258	<0.030	1.39	0.50	1.29	0.300	0.200
NOV 12-19	0.005	0.029	0.006	1.11	0.07	1.81	0.200	<0.020
NOV 19-26	--	--	--	--	--	--	--	--
NOV 26-DEC 03	--	--	--	--	--	--	--	--
DEC 03-10	--	--	--	--	--	--	--	--

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN--Continued

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

WEEKLY COMPOSITE

DATE	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)	SODIUM ATM DEP WET DIS (MG/L) (83138)	POTAS-SIUM ATM DEP WET DIS (MG/L) (83120)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	CHLO-RIDE ATM DEP WET DIS (MG/L) (82944)	NI-TROGEN NITRATE ATM DEP WET DIS AS NO3 (MG/L) (83071)	NI-TROGEN AMMON. ATM DEP WET DIS AS NH4 (MG/L) (83047)	PHOS-PHORUS ORTHO ATM DEP WET DIS AS PO4 (MG/L) (83111)
DEC 10-17	--	--	--	--	--	--	--	--
DEC 17-24	<0.003	0.068	<0.003	<0.03	0.11	0.16	<0.020	<0.020
DEC 24-31	--	--	--	--	--	--	--	--
DEC 31 1991-JAN 07 1992	0.016	0.067	0.008	3.38	0.17	3.83	2.05	<0.020
JAN 07-14	--	--	--	--	--	--	--	--
JAN 14-21	--	--	--	--	--	--	--	--
JAN 21-28	--	--	--	--	--	--	--	--
JAN 28-FEB 04	--	--	--	--	--	--	--	--
FEB 04-11	<0.003	0.017	<0.003	0.05	0.04	0.05	0.090	<0.020
FEB 11-18	<0.022	0.245	<0.022	1.11	0.59	2.82	0.820	<0.150

DATE	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)	SODIUM ATM DEP WET DIS (MG/L) (83138)	POTAS-SIUM ATM DEP WET DIS (MG/L) (83120)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	CHLO-RIDE ATM DEP WET DIS (MG/L) (82944)	NI-TROGEN NITRATE ATM DEP WET DIS AS NO3 (MG/L) (83071)	NI-TROGEN AMMON. ATM DEP WET DIS AS NH4 (MG/L) (83047)	PHOS-PHORUS ORTHO ATM DEP WET DIS AS PO4 (MG/L) (83111)
FEB 18-25	--	--	--	--	--	--	--	--
FEB 25-MAR 03	--	--	--	--	--	--	--	--
MAR 03-10	0.010	0.019	0.013	2.92	0.09	2.63	0.730	<0.020
MAR 10-17	--	--	--	--	--	--	--	--
MAR 17-24	--	--	--	--	--	--	--	--
MAR 24-31	0.047	0.037	0.013	0.86	0.07	1.09	0.480	<0.020
MAR 31-APR 07	0.028	0.064	0.026	0.76	0.05	0.79	0.520	<0.020
APR 07-14	0.220	0.247	0.026	4.67	0.44	4.58	2.11	<0.180
APR 14-21	0.008	0.023	0.009	1.80	0.04	1.81	0.830	<0.020
APR 21-28	--	--	--	--	--	--	--	--
APR 28-MAY 05	--	--	--	--	--	--	--	--
MAY 05-12	0.077	0.056	0.036	1.44	0.10	1.47	0.960	<0.020

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN--Continued

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992

WEEKLY COMPOSITE

DATE	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)	SODIUM ATM DEP WET DIS (MG/L) (83138)	POTAS-SIUM ATM DEP WET DIS (MG/L) (83120)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	CHLO-RIDE ATM DEP WET DIS (MG/L) (82944)	NI-TROGEN NITRATE ATM DEP WET DIS AS NO3 (MG/L) (83071)	NI-TROGEN AMMON. ATM DEP WET DIS AS NH4 (MG/L) (83047)	PHOS-PHORUS ORTHO ATM DEP WET DIS AS PO4 (MG/L) (83111)
MAY 12-19	0.032	0.096	0.045	0.81	0.06	0.75	0.520	<0.020
MAY 19-26	0.023	0.047	0.025	0.76	0.05	0.83	0.490	<0.020
MAY 26-JUN 02	--	--	--	--	--	--	--	--

DATE	TIME	TOTAL PRECIP-ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUC-TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	SPEC. CONDUC-TANCE LAB ATM DEP WET TOT (US/CM) (83156)	PH FIELD ATM DEP WET T (UNITS) (83106)	PH LAB ATM DEP WET T (UNITS) (83107)	CALCIUM ATM DEP WET DIS (MG/L) (82932)
JUN 02-09	1930	0.62	12	9	5.30	6.26	0.210
JUN 09-16	1930	1.21	24	20	5.20	6.31	0.870
JUN 16-23	1930	3.48	12	12	4.80	4.91	0.150
JUN 23-30	1930	0.50	4	4	5.70	5.97	0.130
JUN 30-JUL 07	1930	0.95	8	8	5.30	5.83	0.340
JUL 07-14	1930	1.30	6	6	5.50	5.71	0.170
JUL 14-21	1930	0.32	8	9	5.40	6.18	0.170
JUL 21-28	1930	0.20	13	13	5.80	6.77	0.940
JUL 28-AUG 04	1530	0.0	--	--	--	--	--
AUG 04-11	1930	0.0	--	--	--	--	--
AUG 11-18	1930	0.21	5	6	6.10	6.39	0.220
AUG 18-25	1930	1.72	9	9	5.90	6.12	0.330
AUG 25-SEP 01	1930	0.37	7	7	5.40	6.02	0.100
SEP 01-08	1930	1.20	10	10	5.00	5.23	0.340
SEP 08-15	1930	0.06	--	17	--	6.71	0.590
SEP 15-22	1930	0.24	6	8	5.50	5.92	0.090
SEP 22-29	1930	0.0	--	2	--	5.94	0.020

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN--Continued

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WEEKLY COMPOSITE

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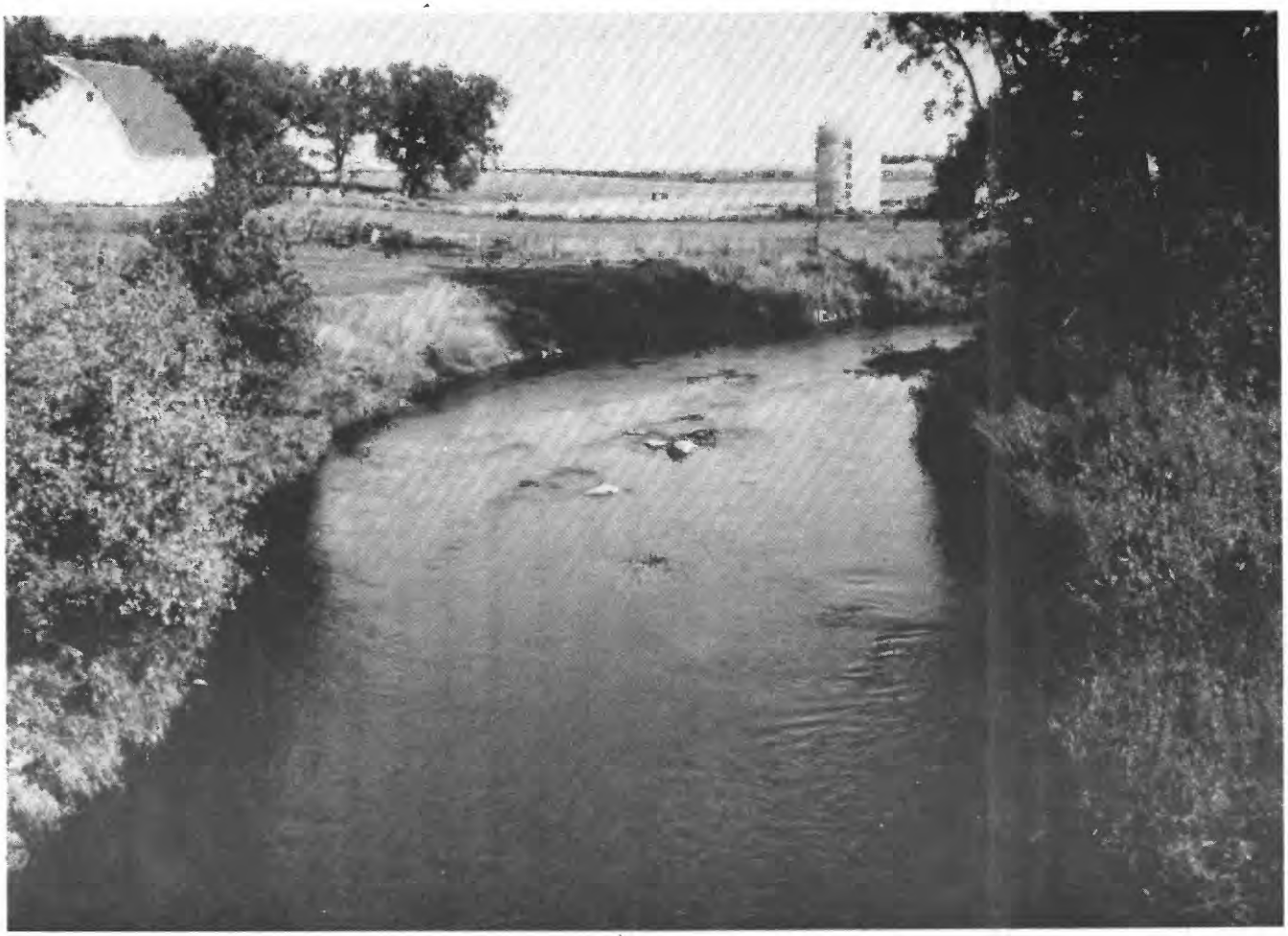
JUN 02-09	0.042	0.039	0.019	0.80	0.05	1.68	0.850	<0.020
JUN 09-16	0.189	0.039	0.040	2.93	0.10	3.80	1.61	<0.020
JUN 16-23	0.021	0.048	0.020	1.59	0.06	1.01	0.470	<0.020
JUN 23-30	0.031	0.053	0.020	0.24	0.04	0.38	0.250	<0.020
JUN 30-JUL 07	0.047	0.024	0.020	1.12	0.05	1.12	0.500	<0.020
JUL 07-14	0.047	0.020	0.014	0.75	<0.03	0.61	0.330	<0.020
JUL 14-21	0.037	0.035	0.030	0.77	0.07	1.22	0.730	<0.020
JUL 21-28	0.196	0.221	0.052	0.81	0.07	1.05	0.560	<0.020
JUL 28-AUG 04	--	--	--	--	--	--	--	--
AUG 04-11	--	--	--	--	--	--	--	--
AUG 11-18	0.062	0.028	0.011	0.45	0.06	0.55	0.310	<0.020
AUG 18-25	0.056	0.019	0.025	1.53	0.04	0.79	0.680	<0.020
AUG 25-SEP 01	0.011	0.028	0.025	0.74	0.05	0.96	0.420	<0.020
SEP 01-08	0.043	0.027	0.021	1.57	0.06	1.25	0.540	<0.020
SEP 08-15	0.065	0.141	0.080	1.05	0.17	1.77	1.00	<0.020
SEP 15-22	0.018	0.099	0.021	0.82	0.03	0.79	0.490	<0.020
SEP 22-29	<0.003	0.098	0.017	<0.03	0.13	0.19	0.080	<0.020



Wild Rice River near Mahnomen

U.S. GOVERNMENT PRINTING OFFICE: 1994 - 556-723

October 1, 1978

FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

The following factors may be used to convert the inch-pound units published herein to the International System of Units (SI).

Multiply inch-pound units	By	To obtain SI units
	Length	
inches (in)	2.54×10^{1}	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet (ft)	3.048×10^{-1}	meters (m)
miles (mi)	1.609×10^{0}	kilometers (km)
	Area	
acres	4.047×10^{3}	square meters (m^2)
	4.047×10^{-1}	square hectometers (hm^2)
	4.047×10^{-3}	square kilometers (km^2)
square miles (mi^2)	2.590×10^{0}	square kilometers (km^2)
	Volume	
gallons (gal)	3.785×10^{0}	liters (L)
	3.785×10^{0}	cubic decimeters (dm^3)
	3.785×10^{-3}	cubic meters (m^3)
million gallons	3.785×10^{3}	cubic meters (m^3)
	3.785×10^{-3}	cubic hectometers (hm^3)
cubic feet (ft^3)	2.832×10^{1}	cubic decimeters (dm^3)
	2.832×10^{-2}	cubic meters (m^3)
cfs-days	2.447×10^{3}	cubic meters (m^3)
	2.447×10^{-3}	cubic hectometers (hm^3)
acre-feet (acre-ft)	1.233×10^{3}	cubic meters (m^3)
	1.233×10^{-3}	cubic hectometers (hm^3)
	1.233×10^{-6}	cubic kilometers (km^3)
	Flow	
cubic feet per second (ft^3/s)	2.832×10^{1}	liters per second (L/s)
	2.832×10^{1}	cubic decimeters per second (dm^3/s)
	2.832×10^{-2}	cubic meters per second (m^3/s)
gallons per minute (gal/min)	6.309×10^{-2}	liters per second (L/s)
	6.309×10^{-2}	cubic decimeters per second (dm^3/s)
	6.309×10^{-5}	cubic meters per second (m^3/s)
million gallons per day	4.381×10^{1}	cubic decimeters per second (dm^3/s)
	4.381×10^{-2}	cubic meters per second (m^3/s)
	Mass	
tons (short)	9.072×10^{-1}	megagrams (Mg) or metric tons

U.S. DEPARTMENT OF THE INTERIOR
U.S. Geological Survey
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Mounds View, MN 55112