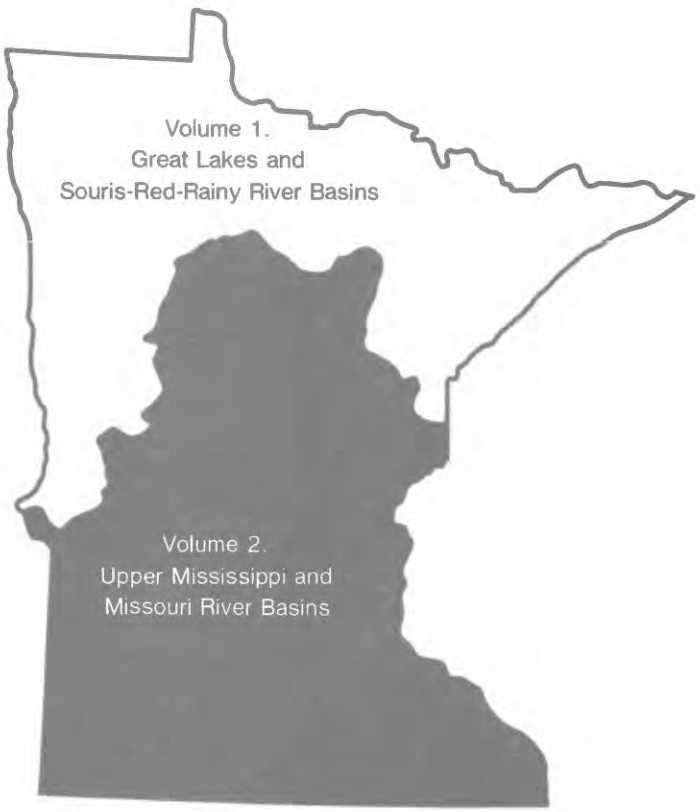
Water Resources Data Minnesota Water Year 1993

Volume 2. Upper Mississippi and Missouri River Basins



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MN-93-2
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 1993

1992

OCTOBER

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1993

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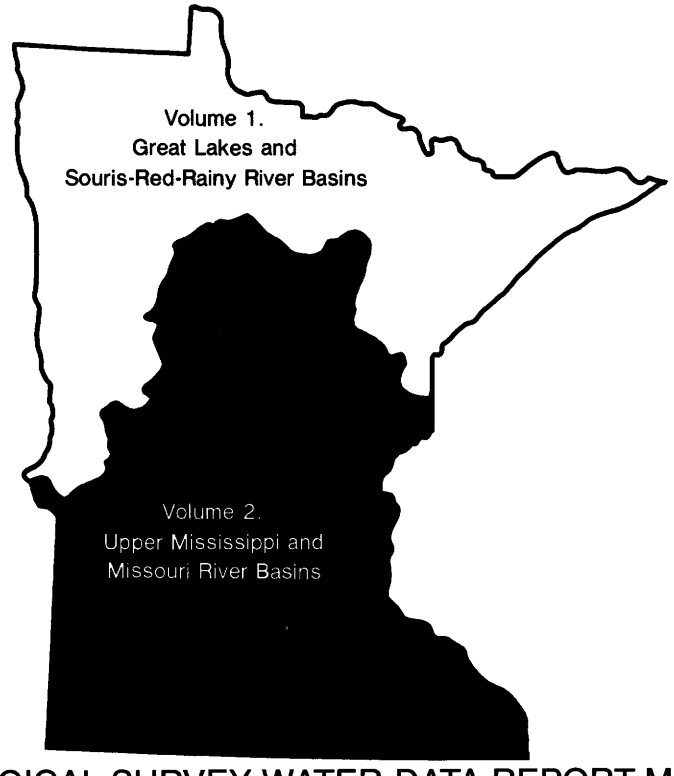
Water Resources Data Minnesota Water Year 1993

Volume 2. Upper Mississippi and Missouri River Basins

by Gregory B. Mitton, Joseph H. Hess, and Kevin G. Guttormson



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MN-93-2
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

Gordon P. Eaton, Director

For additional information write to:

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

1994

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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4. Title and Subtitle Water Resources for Minnesota, Water Year 1993 Volume 2, Upper Mississippi and Missouri River Basin			**5. Report Date** July 1994 **6.**
7. Author(s) Gregory B. Mitton, Joseph H. Hess and Kevin G. Guttormson			**8. Performing Organization Rept. No.** USGS-WDR-93-2
9. Performing Organization Name and Address U.S. Geological Survey, Water Resources Division 2280 Woodale Drive Mounds View, MN 55112			**10. Project/Task/Work Unit. No.** **11. Contract (C) or Grant (G) No.**
12. Sponsoring Organization Name and Address U.S. Geological Survey, Water Resources Division 2280 Woodale Drive Mounds View, MN 55112			**13. Type of Report & Period Covered** Annual 10/01/92 to 09/30/93 **14.**

15. Supplementary Notes

Prepared in cooperation with the State of Minnesota and with other agencies.

16. Abstract (Limit: 200 words)

Water-resources data for the 1993 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 58 gaging stations; stage and contents for 9 lakes and reservoirs; water quality for15 stream stations, 1 lake station, 1 precipitation station, and water levels for 15 observation wells. Also included are 61 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

b. Identifiers/Open-Ended Terms

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CONTENTS

ILLUSTRATIONS

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

QUALITY OF GROUND WATER RECORDS

PRECIPITATION SITES, FOR WHICH CHEMICAL QUALITY RECORDS ARE PUBLISHED

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS

The following continuous-record surface-water discharge (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 high-flow 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.

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

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

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

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

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	05345500	124	1942-44
Vermillion River at Hastings, MN	05346000	195	1942-47, 1990
Mississippi River at Wabasha, MN	05371500	a56,600	1934
South Fork Zumbro River on Belt Line at Rochester, MN	05372800	155	1981
Bear Creek at Rochester, MN	05372930	80.0	1981
Silver Creek at Rochester, MN	05372950	17.3	1981
Cascade Creek at Rochester, MN	05372990	35.8	1981
South Fork Zumbro River near Rochester, MN	05373000	304	1952-81
Zumbro River (South Branch) near Zumbro Falls, MN	05373500	821	1911-17
Zumbro River at Zumbro Falls, MN	05374000	-	1909-17, 1929-80
Zumbro River at Theilman, MN	05374500	a1,320	1938-56
Zumbro River at Kellogg, MN	05374900	1,400	1975-90
Middle Fork Whitewater River near St. Charles, MN	05376100	-	1988-92
South Fork Whitewater River near Altura, MN	05376500	76.8	1939-71
Whitewater River near Beaver, MN	05376800	271	1975-85, 1991-92
Beaver Creek at Beaver, MN	05377000	15.4	1939-40
Whitewater River at Beaver, MN	05377500	288	1936-38, 1939-56
Stockton Valley Creek at Stockton, MN	05378230	-	1982-85
Straight Valley Creek near Rollingstone, MN	05378300	5.16	1970-85
Gilmore Creek at Winona, MN	05379000	8.95	1939-63
Mississippi River at Lamoille, MN	05380500	a60,000	1930-31
Mississippi River at LaCrosse, WI	05383500	-	1929-55
North Branch Root River tributary near Stewartville, MN	05383600	0.73	1959-64
Rush Creek near Rushford, MN	05384500*	129	1942-79

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			
Root River near Lanesboro, MN	05384000	615	1910 1911-17, 1940-85, 1987-90
South Fork Root River near Houston, MN	b05385500	275	1953-83
Root River below South Fork near Houston, MN	05386000	a1,560	1938-61
Turtle Creek near Austin, MN	05456500	144	1947-51
Heron Lake outlet near Heron Lake, MN	05475000	-	1930-43
BIG SIOUX RIVER BASIN			
Rock River at Luverne, MN	06483000*	440	1911-14
Little Sioux River near Lakefield, MN	06603000	17.1	1948-63
Jackson County ditch No. 11 near Lakefield, MN	06603500	7.69	1948-61

† Stage records only.
a Approximately.

DISCONTINUED SURFACE-WATER QUALITY STATIONS

[The following stations were discontinued as continuous-record or periodic-record stations prior to the 1993 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
Snake River near Pine City, MN	05338500	958	C., Bio., pH, S.C.	1963, 65, 67-68
				1975-83, 85, 92
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).

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 1993 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 58 gaging stations; stage and contents for 9 lakes and reservoirs; water quality for 15 stream stations, 1 lake station, 1 precipitation station, 74 wells; and water levels for 15 observation wells. Also included are 61 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-93-2. 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 agencies 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.

Minnesota Department of Transportation.

Minnesota Pollution Control Agency.

Lower Red Lake Watershed Management Board.

Grand Portage Reservation Tribal Council.

Leech Lake Reservation Business Committee.

Mille Lacs Band of Chippewa - Tribal Government.

Beltrami Soil and Water Conservation District.

Elm Creek Conservation Commission.

Lower Red River Watershed Management Board.

Assistance in the form of funds or services was given by the U.S. Army Corps of Engineers and the Department of State. Other organizations that supplied data are acknowledged in station descriptions.

SUMMARY OF HYDROLOGIC CONDITIONS

Precipitation

With some exceptions in the north and northwest, all of Minnesota received greater than normal (based on data from 1961-90) (fig. 1) precipitation during the 1993 water year (fig. 2). Precipitation during the first quarter of the 1993 water year was generally above normal in the southern one-half of Minnesota and below normal in the northern half. The winter season began early when many parts of the State were covered with more than 6 inches of snow that fell November 1-3. The depth of the snow pack was maintained at or above median throughout the, winter by numerous relatively small snowfalls. Notable events during the winter included a January ice storm in southern and eastern Minnesota and an unusual cold spell in the entire State in mid-March.

Spring and early summer was one of the wettest periods in Minnesota's recorded climate history. Thunderstorms on May 7-8 in southern Minnesota left 4.28 inches in Marshall and 4.93 inches in Pipestone. Heavy rains continued during June in the southern one-third of Minnesota. Some locations reported June rainfall totals exceeding 15 inches. In July and August, the wet weather persisted in southern Minnesota and began to extend into parts of the north and west. West central, northwestern, and northeastern Minnesota had downpours that often dropped many inches of rain in just a few hours. By the end of July, virtually the whole State had received from 125-200 percent of normal precipitation since April 1. In September, precipitation was below normal statewide except in the south-central

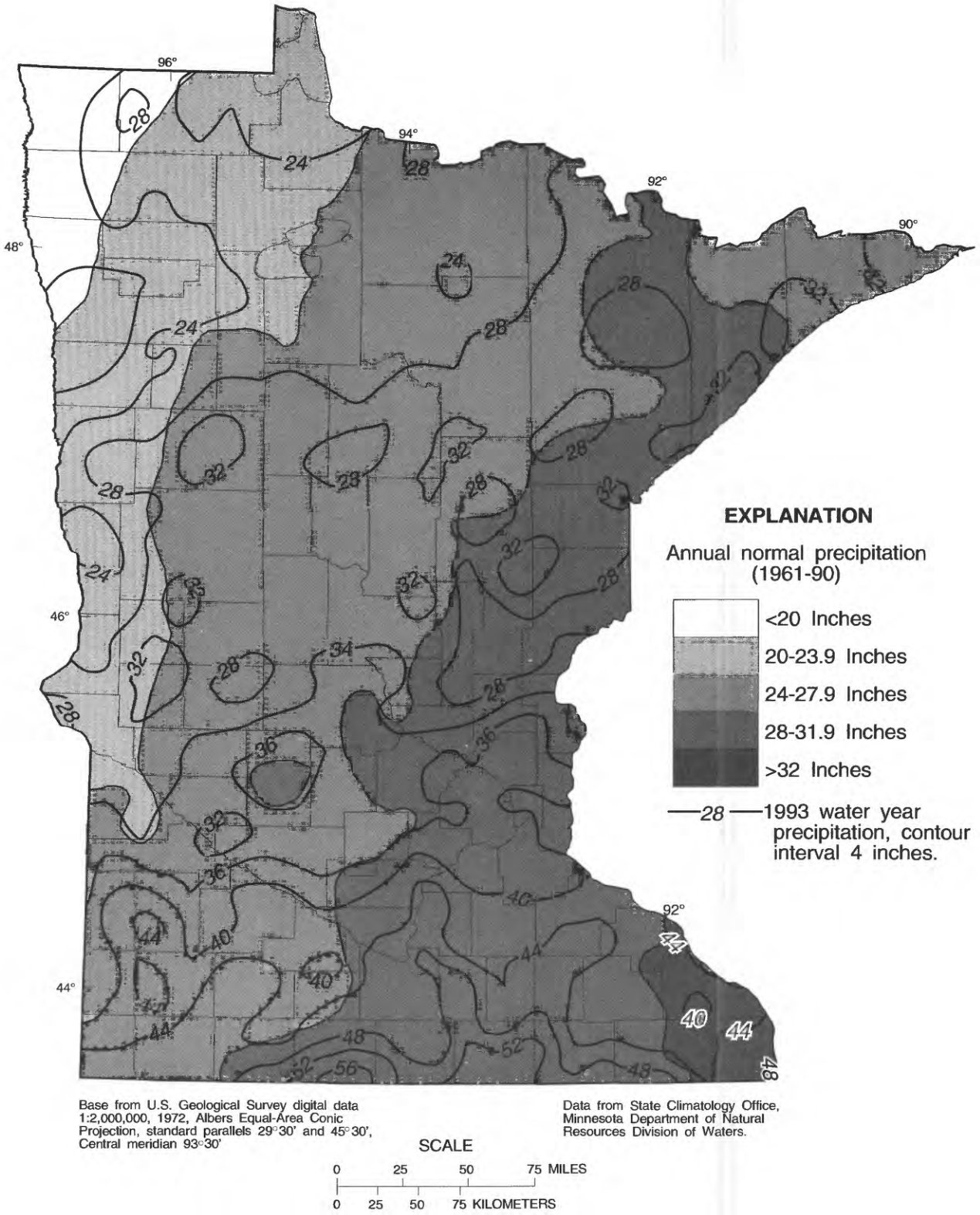


Figure 1.--Precipitation, in inches, during 1993 water year compared to normal annual precipitation in Minnesota.

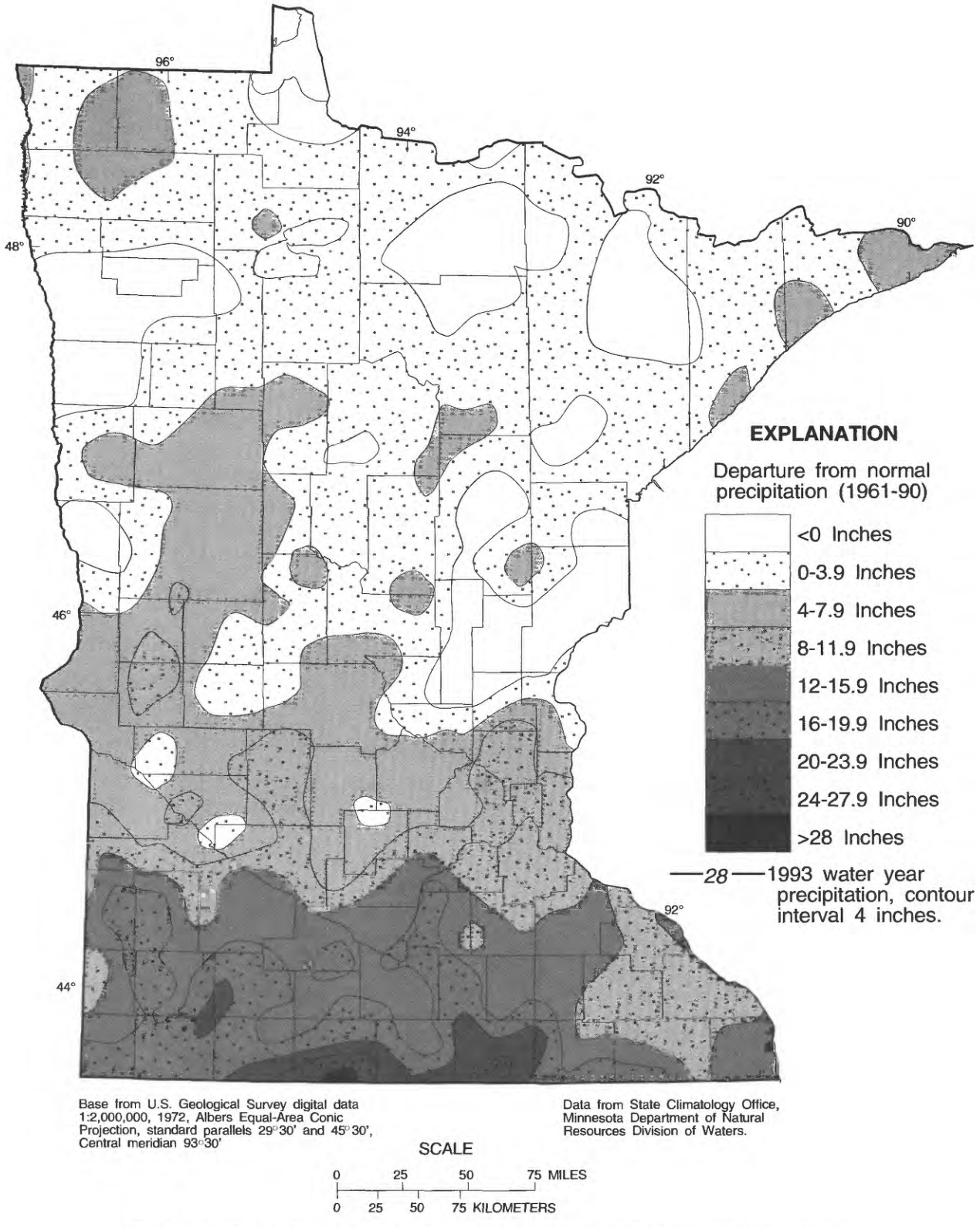


Figure 2.--Precipitation departure from normal, in inches, during 1993 water year in Minnesota.

region where it was above normal. Figure 3 shows total monthly precipitation compared to the normal monthly values.

Streamflow

Streamflow characteristics in the upper Mississippi and Missouri River basins, which extend from north-central Minnesota to the Iowa border, are described in this volume. Figure 4 shows mean monthly and annual discharges for water year 1993 compared to the median of mean discharges for the period 1961-90 for 4 stations, Chippewa River near Milan, Crow River at Rockford, Des Moines River at Jackson, and Mississippi River at Aitkin. The stations are located in the upper Mississippi River basin. The 1993 mean-annual discharge for each station was greater than the median.

Monthly-mean discharges for all the stations shown in figure 4, except Mississippi River at Aitkin, were generally above the monthly medians. Because of the late spring breakup and the heavy rains beginning in May in many parts of the upper Mississippi and Missouri River basins, departures from the monthly medians began to significantly increase in April for most rivers in the southern one-third of the state, and the 1993 water year ended with most annual-mean discharges being greater than the median for the 30-year period, 1961-90.

One factor that distinguishes the flow characteristics in 1993 compared to historical flows is the monthly average. The persistency of the rains during the summer months resulted in many record monthly flows especially at stations in the southern one-half of the state. In the Redwood River in southwest Minnesota, monthly discharges near Marshall and near Redwood Falls were record discharges for May through August. The instantaneous peak flow for 1993 near Marshall was a record 6,380 ft^3/s on May 9th and was 12,600 ft^3/s on June 18th at the station near Redwood Falls. Runoff near Marshall in 1993 was 22.06 inches, which is 18.82 inches above the average for the period of record. There was some cross-flooding in the Marshall area from the Redwood River basin into the Cottonwood River basin in May when the Redwood River was peaking. Runoff near Redwood Falls was 17.02 inches, which is 14.07 inches above the average for the period of record.

In the Chippewa River near Milan (fig. 4), all monthly flows, except April and May, were above the 30-year average, and the flows for July and August were records. The instantaneous peak flow was 4,790 ft^3/s on August 1st. Runoff in 1993 was 6.04 inches, which is 3.69 inches above the average for the period of record.

In the Crow River at Rockford (fig. 4), all monthly flows except June were above the 30-year average, and the flows for July and August were records. The instantaneous peak flow at Rockford was 10,000 ft^3/s on July 8th. Runoff in 1993 was 12.07 inches, which is 7.91 inches above the average for the period of record.

In the Des Moines River at Jackson in southwest Minnesota (fig. 4), all monthly flows were above the 30-year average, and the flows for May through August were records. The 1993 water year ended with a record annual-mean flow of 2,098 ft^3/s; the previous high was 1,199 ft^3/s set in 1983. The instantaneous peak flow was 8,250 ft^3/s on July 7th. Runoff in 1993 was 23.34 inches, which is 19.37 inches above the average for the period of record.

In the Mississippi River at Aitkin in north-central Minnesota (fig. 4), monthly flows were below the 30-year average through May. When the amount of rainfall increased in June and July in the north-central part of Minnesota (fig. 3), monthly flows at Aitkin beginning in June, surpassed the monthly 30-year averages during the rest of the water year. The monthly flow in July was a record 8,201 ft^3/s; the previous high was 7,134 ft^3/s set in 1975. Runoff in 1993 was 7.00 inches, which is 0.61 inches above the average for the period of record.

In the Mississippi River at St. Paul, monthly flows were above the 30-year average every month except March, and June, July, and August had record flows. The instantaneous peak flow was 104,000 ft^3/s on June 26th; this is 67,000 ft^3/s below the record set April 16, 1965. Runoff in 1993 was 10.65 inches, which is 6.51 inches above the average for the period of record.

In the Minnesota River near Jordan, just west of the Twin Cities, monthly flows were above the 30-year average every month except March. November and May through September had record flows, and the annual-mean flow was a record 16,910 ft^3/s. The previous annual high was 10,670 ft^3/s set in 1986. Runoff in 1993 was 14.18 inches, which is 10.78 inches above the average for the period of record.

In the Root River near Houston, in southeastern Minnesota, monthly flows were above the 30-year average every month except February and March. August had a record flow of 2,257 ft^3/s, and the annual-mean flow was a record 1,590 ft^3/s. Runoff in 1993 was 16.99 inches, which is 9.29 inches above the average for the period of record.

The combined storage in the 6 Mississippi River Headwater Reservoirs (Winnibigoshish, Leech, Pokegama, Pine, Sandy, and Gull), in north-central Minnesota, was 1,611,040 acre-feet at the close of the 1993 water year. This was an increase of 63,670 acre-feet from the close of last year.

Water Quality

Boxplots for 3 U.S. Geological Survey National Stream-Quality Accounting Network (NASQAN) stations and 1 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 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 whose ends are defined by the 75th and 25th percentiles. Whiskers from the ends of the box 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 open circle.

Dissolved-solids concentrations in samples collected from the Mississippi River near Royalton were below the 25th percentile in November, April, and September (fig. 5). The greatest departure from the median was in the February sample with the concentration being about a third higher than the median. Dissolved-solids concentrations in the Minnesota River near Jordan were highest in the February sample; because of the high flows from the summer rains, the concentrations were much lower than the monthly medians in the June and September samples. In the Mississippi River at Nininger just below the Twin Cities and in the North Fork Whitewater River near Elba in southeast Minnesota, the dissolved-solids concentrations were above the medians in all the samples collected in 1993 water year.

Nitrate concentrations reported as nitrogen (analyzed for nitrate plus nitrite, with nitrite concentration assumed to be negligible) were close to the median in all samples from the Mississippi River near

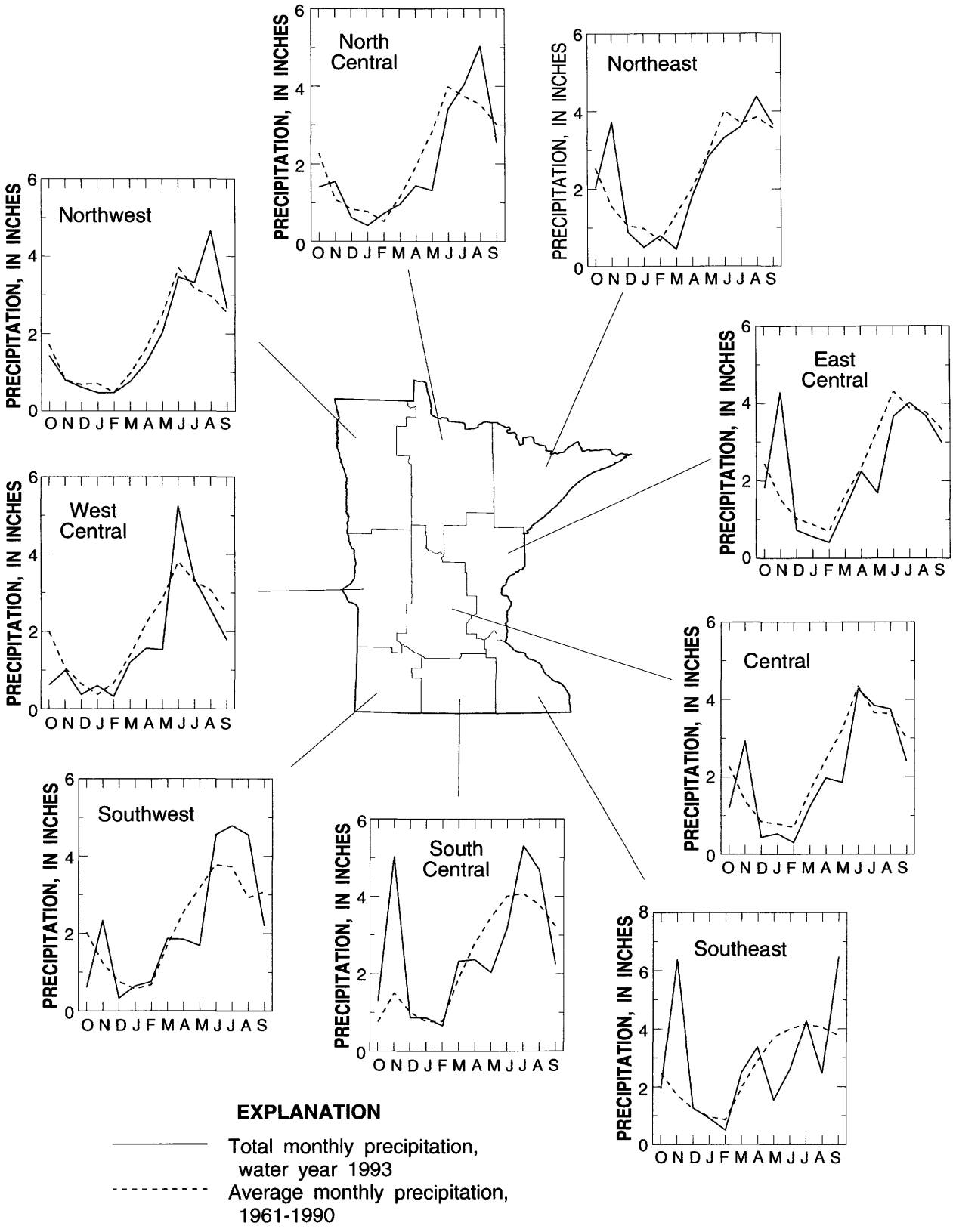


Figure 3.--Total monthly precipitation compared to average monthly precipitation by climatological division for a 30-year base period.

Royalton (fig. 6). All the nitrate concentrations in the Minnesota River near Jordan were above the medians except the concentration in the June sample, which was slightly below the median. The June sample was collected the same day that the discharge peak of the year occurred. Nitrate concentrations in all samples from the Mississippi River near Nininger and from the North Fork Whitewater River near Elba, except for the December sample near Elba, were all above the median. All samples at Nininger were even above the 75 percentile.

Several samples were collected from 71 wells in 13 counties. Nitrate concentrations were above the primary drinking-waters standard of 10 mg/L (Minnesota Pollution Control Agency, 1988) in 39 samples. Twelve samples had iron concentrations above the 300 ug/L standard, and 16 samples had manganese concentrations above the 50 ug/L standard.

Ground-water Levels

Data from 2 wells in surficial sand aquifers, 1 in the St. Peter aquifer, 8 in the Prairie du Chien-Jordan aquifer, 2 in the Franconia-Ironton-Galesville aquifer, and 2 in the Mount Simon-Hinckley-Fond du Lac aquifer are presented in this volume. Last year there were data for 104 wells in this volume, most of which were phased out in the 1992 water year. Data for the upper carbonate and buried sand and gravel aquifers are no longer available.

Surficial Sand Aquifer

The surficial sand aquifer is recharged by direct infiltration of snowmelt and rainfall. Excessive rainfall during the water year produced water-level rises of about 4 feet in both wells. Most of the rise occurred between April and July. Water levels in well 440037094372601 located in south-central Minnesota, rose 4.2 feet between April and July in response to nearly 29 inches of rainfall, which was 15 inches above normal. The highest levels were reached in mid-June and equaled the previous highest levels recorded in 28 years of record; the previous high occurred in 1971. The water level in the other well (460444094212501), located in the central part of the state, rose 4 feet during the same four-month period in response to over 17 inches of rainfall, which was 6 inches above normal. Water levels in this well were the highest since 1986.

St. Peter Aquifer

Well 450116093205301 with 19 years of record and located in east-central Minnesota, had record monthly high water levels from May through September. Rainfall for this period was over 25 inches, which was over 8 inches above normal. This rainfall along with less pumping from the aquifer because of a cool summer, probably account for the high water levels.

Prairie du Chien-Jordan Aquifer

Four of 8 wells reported in this volume had record high water levels. Well 445700093051001 in St. Paul had record monthly high water levels for all months except October, December, and March. Well 44533009354310 in West St. Paul had record monthly high water levels for the entire water year. In July, well 450927093033801 in northern Ramsey County had a record high water level for 22 years of record. The water level in well 444205092500001 in Dakota County set a record high in September, following a gradual rise throughout the water year of over 7 feet. These record high water levels reflect a year with unusually high rainfall and a decrease in withdrawals from the aquifer.

Four wells in this aquifer had their lowest water levels of the water year in October while three had lowest levels in July and August. The October low levels reflect withdrawals from the previous year. The latter wells which had yearly lows in July and August are located in regions where withdrawals for air conditioning are common.

Franconia-Ironton-Galesville Aquifer

Well 444427093353902 near Shakopee with 9 years of record, had an all-time high water level in April. Rock quarry operations near this well may influence water levels. Well 440050094102801 near Vernon Center in south central Minnesota has over 20 years of record and had an all-time record high water level in July; it is not noticeably affected by pumping operations. Rainfall at both sites was in excess of eight inches above normal for the water year. Water levels in both wells had water-level rises of about 3 feet during this period.

Mount Simon-Hinckley-Fond du Lac Aquifer

Data from two wells, one located in St. Paul (444427093353903) and the other near Shakopee (445751093072301), are available for this volume. Both wells had their lowest water levels for the year in October and highest levels in June-July. Both wells also had about 4 feet of water level recovery from the previous year. The water level in the well in St. Paul has recovered 24 feet since 1989 while the well near Shakopee has recovered 9 feet since 1988. Despite these recoveries, the water levels in both wells remain below historical averages. The monthly water levels for the St. Paul well were 12 feet below average from October through May and 6 feet below average from June through September.

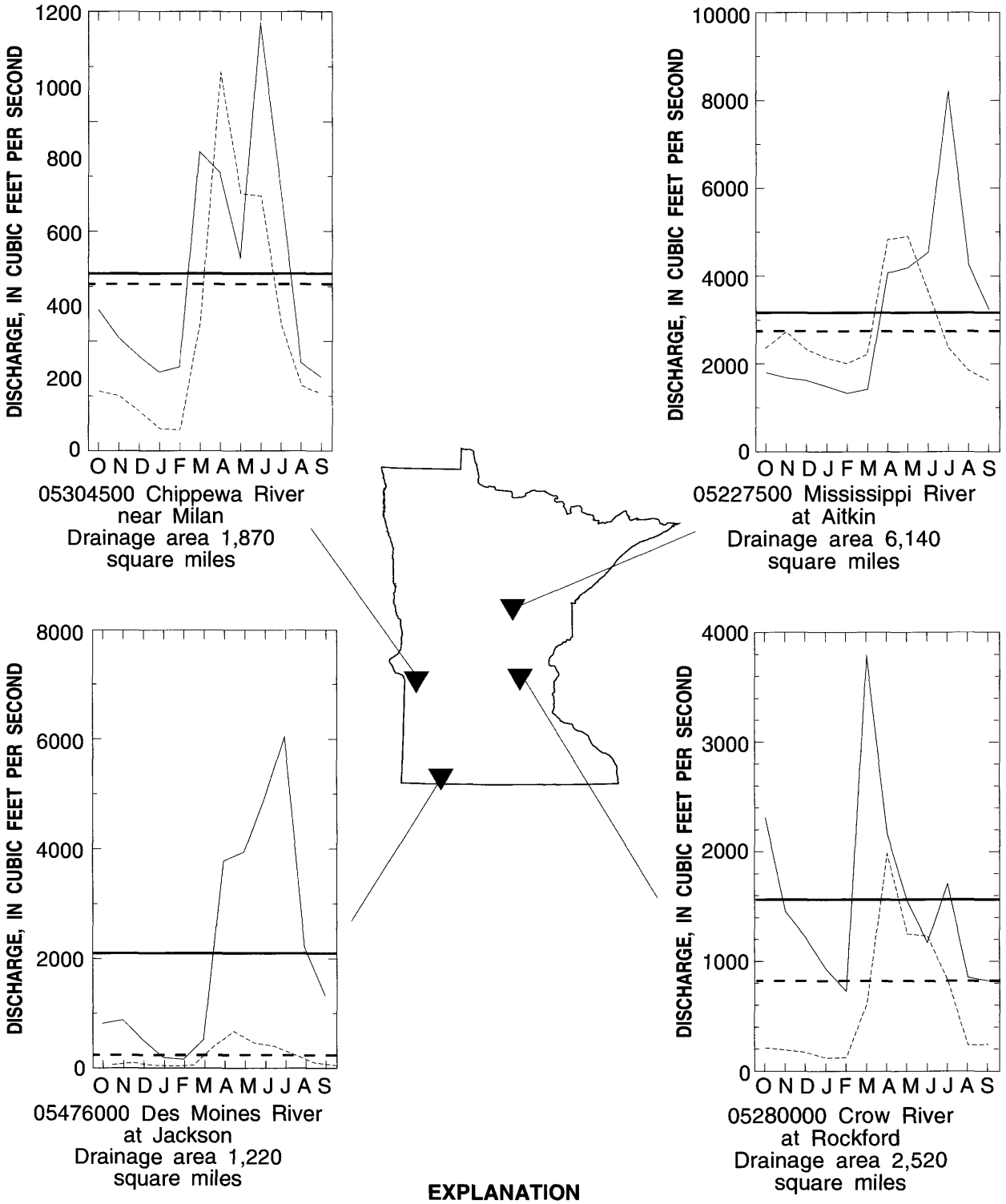


Figure 4.--Comparison of mean discharge for the 1993 water year with the median of mean discharges for 1961-90 at four long-term representative gaging stations.

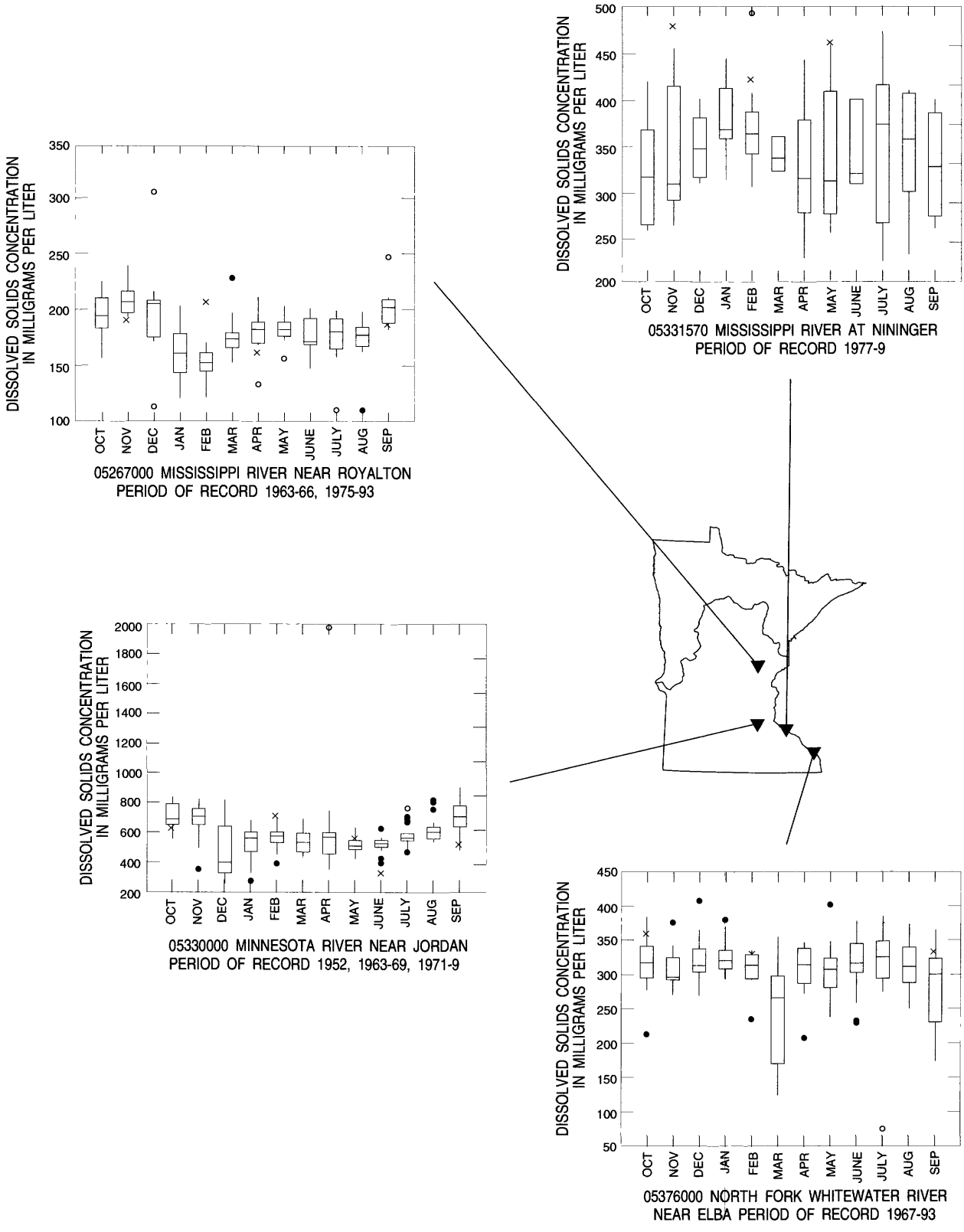


Figure 5--Dissolved-solids concentrations in samples collected during water year 1993 and selected statistics for period of record at five national network stations.

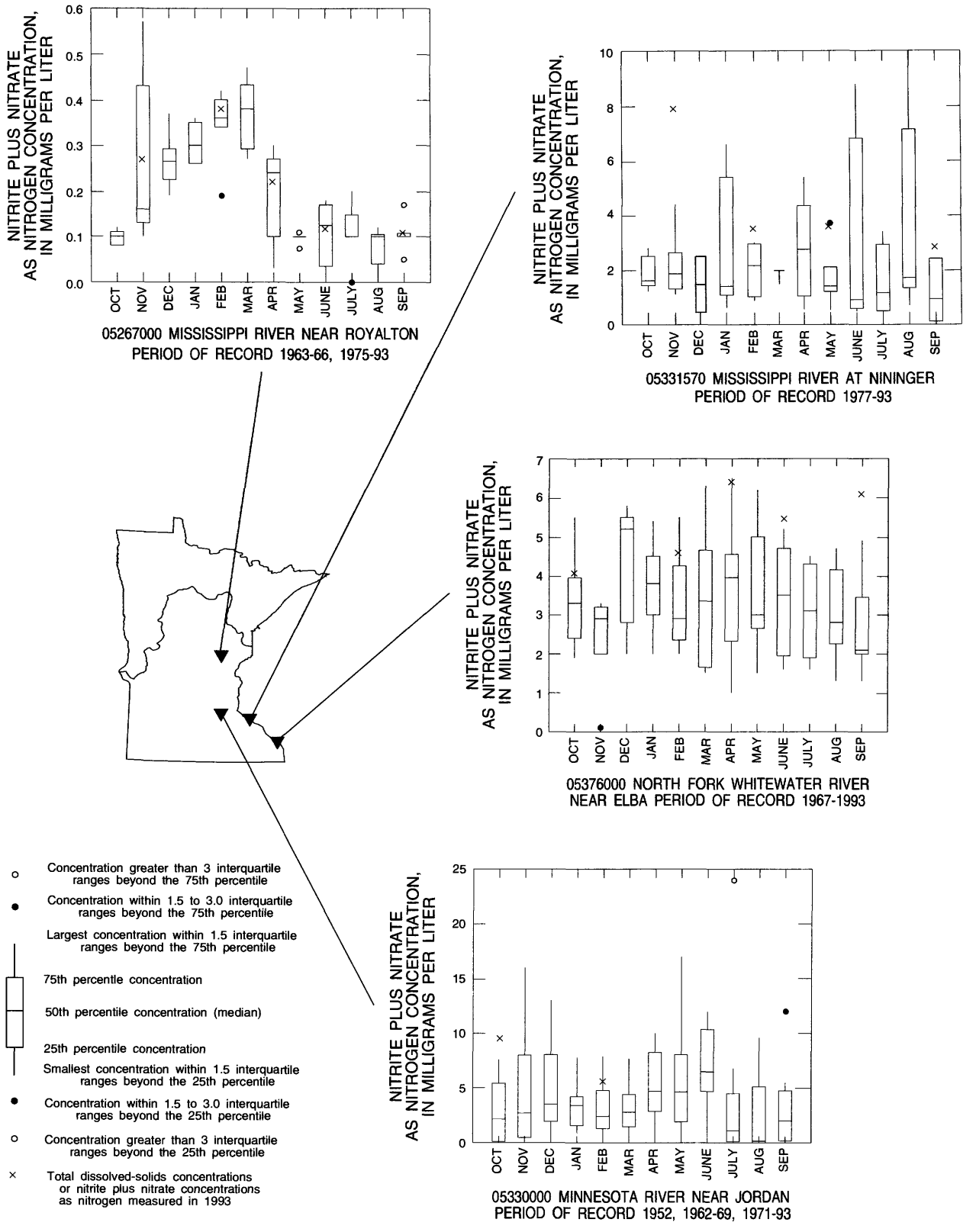


Figure 6--Nitrite plus nitrate concentrations in samples collected during water year 1993 and selected statistics for period of record at four national network stations.

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 human activities.

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.

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 1993 water year that began October 1, 1992, 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 8, 9, 10, and 11. 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."

numbering 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 7. 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.

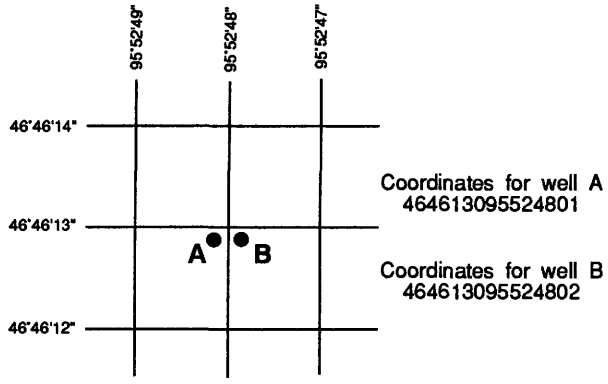


Figure 7. Example of system for numbering wells and miscellaneous sites.

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.

Records of stage and discharge are obtained with recorders that trace continuous graphs of stage; or encode stage values, at selected time intervals, on a variety of mediums. 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. 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 U.S. 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 quantity 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 estimated 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 U.S. 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 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

Water quality data must be presentative of 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 U.S. 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. Geological Survey 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 U.S. 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 U.S. 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 used 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-U.S. Geological 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 U.S. 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-FS 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.....Ephemeridae

Genus.....**Hexagenia**

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

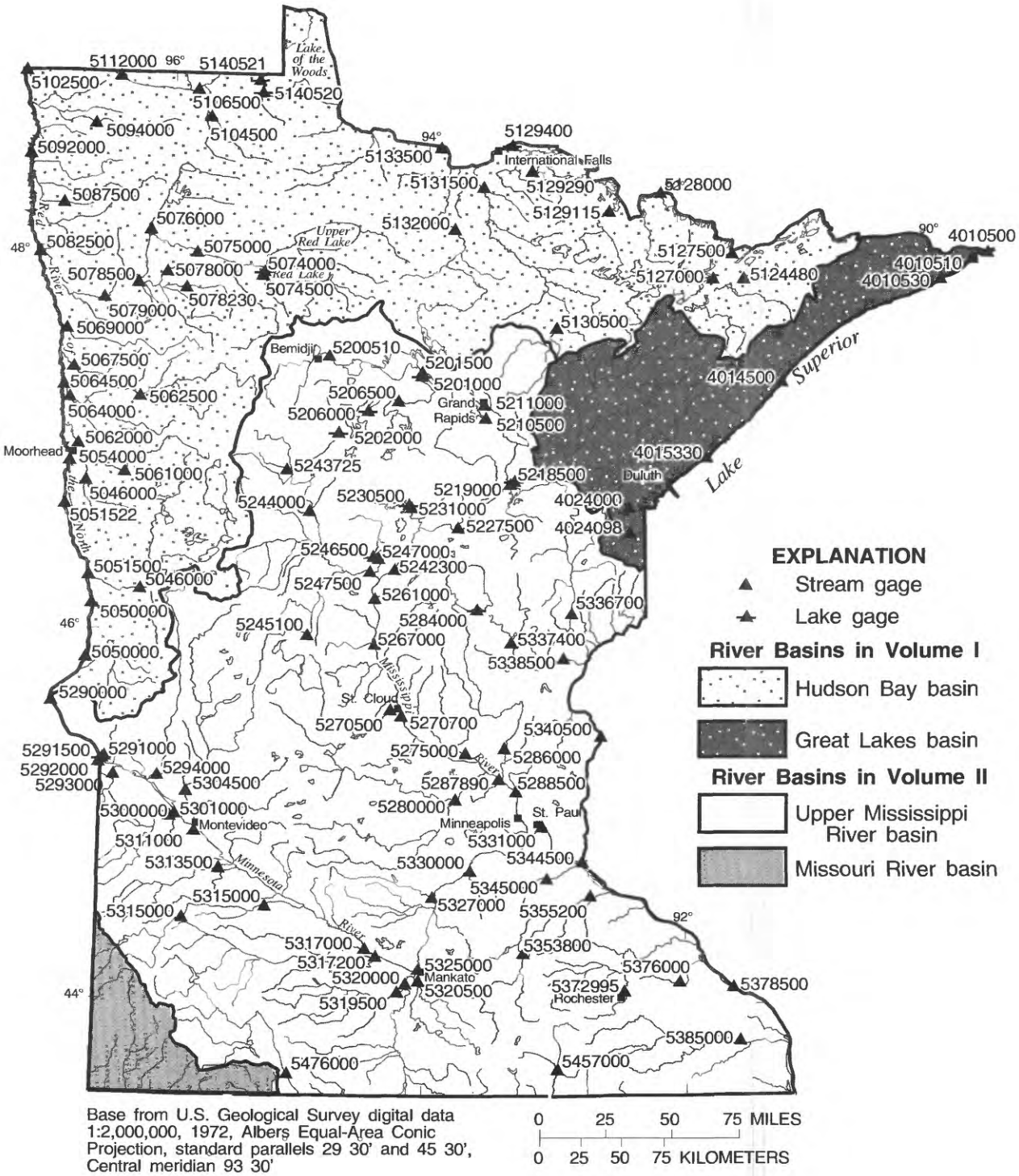


Figure 8.--Location of lake and stream-gaging stations

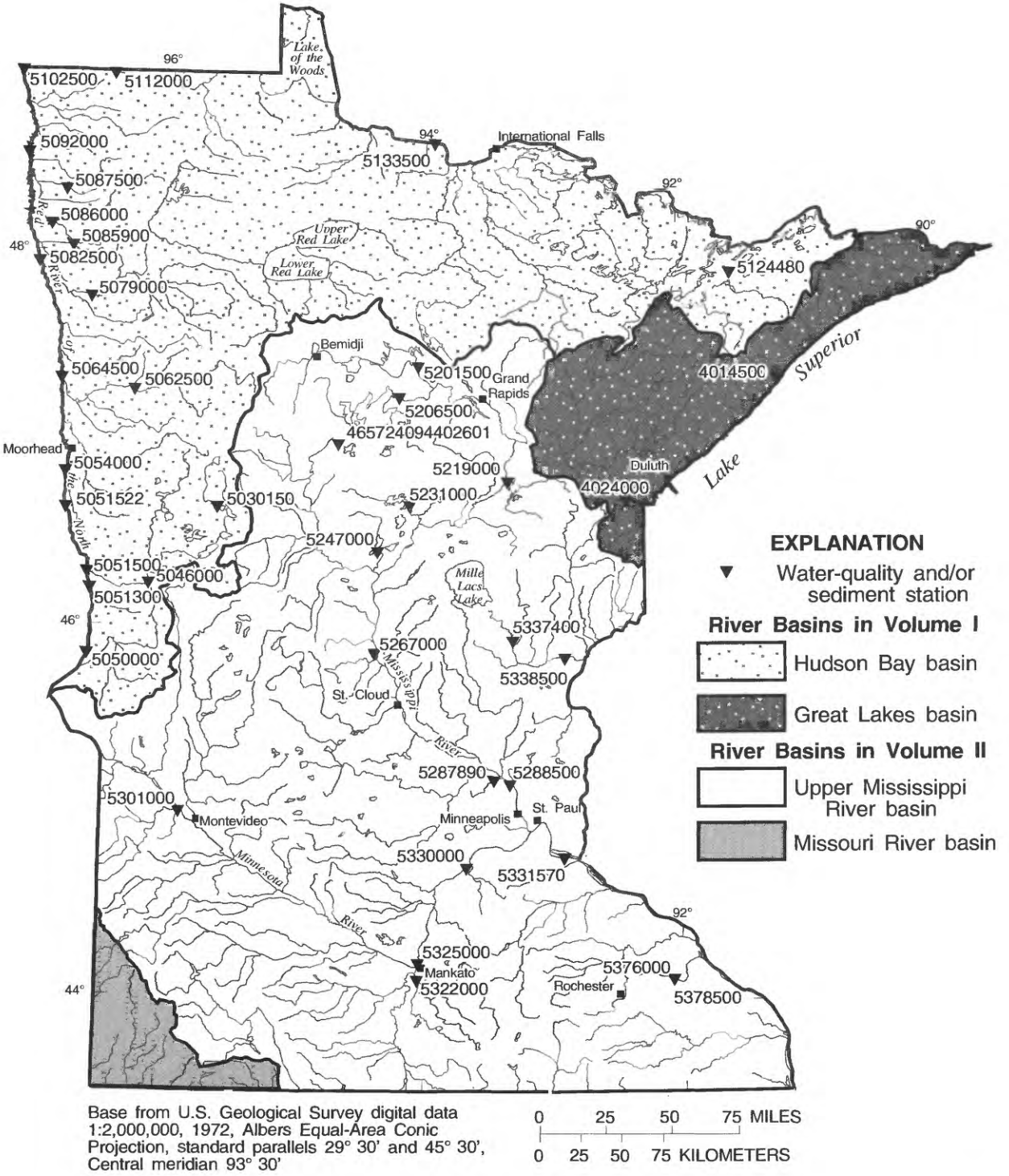


Figure 9.--Location of surface-water quality stations.

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. Regulated by Stump Lake dam upstream from station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	309	---	---	---	---	---	114	323	332	367	367	493
2	306	---	---	---	---	---	101	327	332	366	367	502
3	305	---	---	---	---	---	99	374	330	363	367	494
4	303	---	---	---	---	---	99	442	322	363	367	490
5	301	---	---	---	---	---	97	471	320	363	367	481
6	303	---	---	---	---	---	122	468	319	363	368	475
7	---	---	---	---	---	---	240	679	319	363	370	471
8	---	---	---	---	---	---	303	734	319	363	370	466
9	---	---	---	---	---	---	359	724	319	363	451	465
10	---	---	---	---	---	---	411	709	319	362	503	459
11	---	---	---	---	---	---	407	695	321	360	492	449
12	---	---	---	---	---	---	404	677	323	362	493	443
13	---	---	---	---	---	---	349	659	323	362	492	444
14	---	---	---	---	---	---	313	522	324	360	449	445
15	---	---	---	---	---	---	315	467	323	360	504	443
16	---	---	---	---	---	---	316	465	319	360	536	402
17	---	---	---	---	---	---	316	462	319	360	544	354
18	---	---	---	---	---	---	316	410	318	360	533	366
19	---	---	---	---	---	---	316	322	316	358	530	367
20	---	---	---	---	---	---	316	323	316	356	526	367
21	---	---	---	---	---	---	316	323	314	362	520	370
22	---	---	---	---	---	---	313	323	313	367	514	328
23	---	---	---	---	---	---	272	323	315	364	515	306
24	---	---	---	---	---	---	243	328	318	363	510	306
25	---	---	---	---	---	---	245	329	348	363	498	306
26	---	---	---	---	---	---	250	329	367	363	499	304
27	---	---	---	---	---	---	248	329	367	363	519	303
28	---	---	---	---	---	---	246	329	367	365	510	305
29	---	---	---	---	---	126	243	329	367	367	501	306
30	99	---	---	---	---	122	278	331	367	367	509	306
31	---	---	---	---	---	104	---	332	---	367	501	---
TOTAL	1926	---	---	---	---	352	7967	13858	9876	11245	14592	12016
MEAN	275	---	---	---	---	117	266	447	329	363	471	401
MAX	309	---	---	---	---	126	411	734	367	367	544	502
MIN	99	---	---	---	---	104	97	322	313	356	367	303
AC-FT	3820	---	---	---	---	698	15800	27490	19590	22300	28940	23830
CFSM	.45	---	---	---	---	.19	.44	.73	.54	.59	.77	.66
IN.	.12	---	---	---	---	.02	.49	.85	.60	.69	.89	.73

e Estimated.

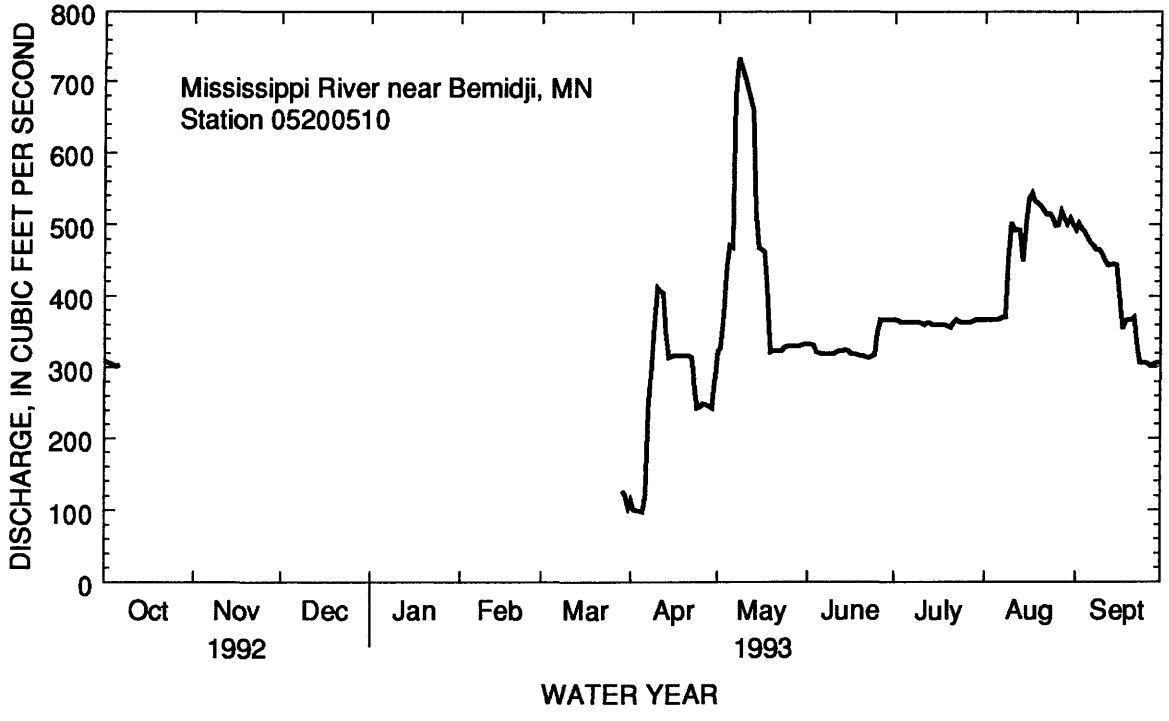
MISSISSIPPI RIVER MAIN STEM

05200510 MISSISSIPPI RIVER NEAR BEMIDJI, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	152	---	---	---	---	---	253	345	223	197	166	194
MAX	263	---	---	---	---	---	399	479	329	363	471	401
(WY)	1989	---	---	---	---	---	1989	1989	1993	1993	1993	1993
MIN	75.5	---	---	---	---	---	148	181	104	62.2	61.9	62.3
(WY)	1991	---	---	---	---	---	1992	1992	1988	1988	1989	1990

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1987 - 1993	
HIGHEST DAILY MEAN	463	Jul 15	734	May 8	771	Apr 28 1989
LOWEST DAILY MEAN	79	Jun 16	97	Apr 5	22	Jul 12 1988
INSTANTANEOUS PEAK FLOW			938	May 7	938	May 7 1993
INSTANTANEOUS PEAK STAGE			4.93	May 7	4.93	May 7 1993



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.

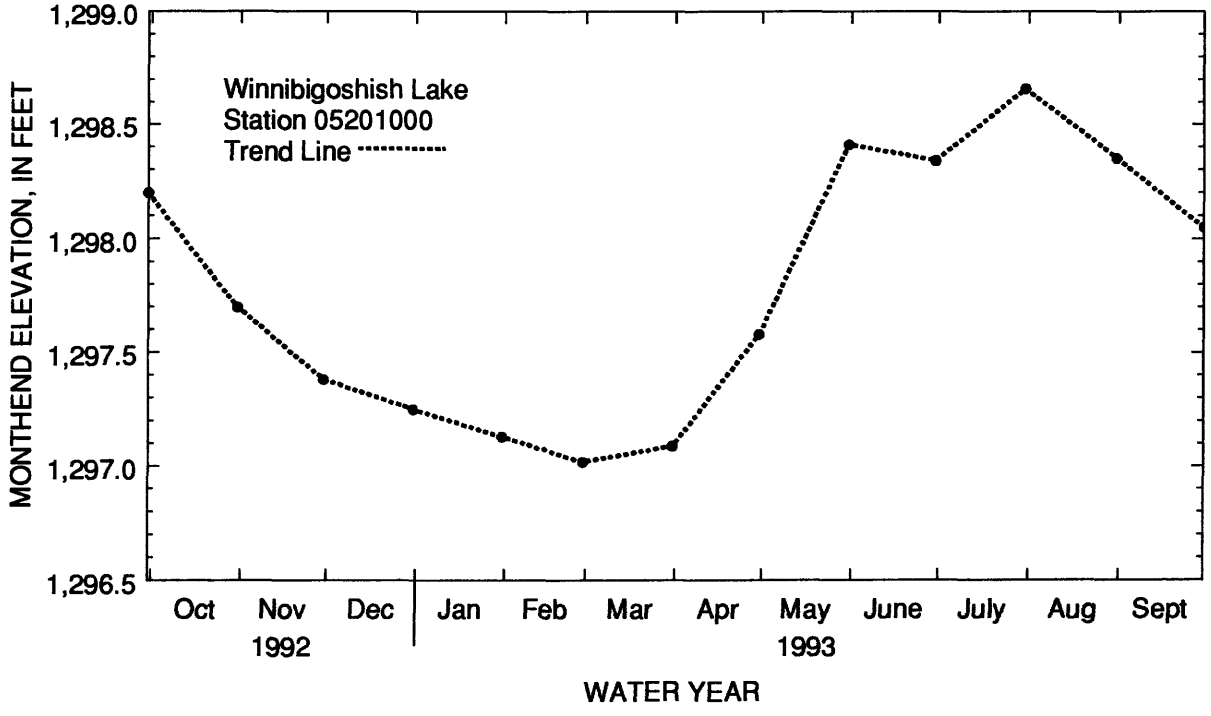
COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

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, 741,940 acre-ft, July 28, elevation, 1,298.83 ft; minimum, 621,080 acre-ft, Mar. 9, elevation, 1,296.99 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1298.20	700510	
Oct. 31	1297.70	667680	-32830
Nov. 30	1297.38	646670	-21010
Dec. 31	1297.25	638150	-8520
CAL YR 1992			+15750
Jan. 31	1297.13	630280	-7870
Feb. 28	1297.02	623050	-7230
Mar. 31	1297.09	627640	+4590
Apr. 30	1297.58	659800	+32160
May 31	1298.41	714310	+54510
June 30	1298.34	709710	-4600
July 31	1298.66	730710	+21000
Aug. 31	1298.35	710370	-20340
Sept. 30	1298.05	690670	-19700
WTR YR 1993			-9840


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
1992
1993
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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	600	640	640	590	540	400	300	100	100	916	730	726
2	600	640	640	590	540	400	300	100	150	821	730	729
3	650	640	640	590	540	400	250	100	200	821	827	729
4	650	640	640	590	540	400	250	100	250	821	918	729
5	650	640	640	590	540	400	250	100	250	821	1010	729
6	650	640	640	590	540	400	250	100	250	839	1100	729
7	650	640	640	590	540	400	250	100	250	920	1100	729
8	650	640	640	590	540	400	200	100	250	1010	1100	680
9	690	640	640	590	540	400	150	100	250	1010	1100	636
10	690	640	640	590	540	400	150	100	300	900	1100	636
11	690	640	590	590	540	400	150	100	350	900	1100	636
12	690	640	590	540	490	400	150	100	400	900	1100	636
13	690	640	590	540	490	400	100	100	400	915	1100	636
14	735	640	590	540	490	400	100	100	400	821	1100	637
15	735	640	590	540	490	400	100	100	500	727	1100	637
16	735	640	590	540	490	400	100	100	600	630	1100	637
17	735	640	590	540	490	400	100	100	700	537	1100	637
18	735	640	590	540	440	400	100	100	700	431	1100	638
19	735	640	590	540	400	400	100	100	700	443	1100	638
20	735	640	590	540	400	400	100	100	700	443	1000	638
21	735	640	590	540	400	400	100	100	700	443	905	638
22	735	640	590	540	400	400	100	100	750	444	811	638
23	735	640	590	540	400	400	100	100	850	445	814	640
24	735	640	590	540	400	400	200	100	980	445	814	640
25	735	640	590	540	400	400	200	100	1020	445	816	640
26	735	640	590	540	400	400	200	100	1020	443	818	640
27	680	640	590	540	400	400	200	100	1020	444	821	640
28	625	640	590	540	400	400	200	100	1020	447	725	640
29	625	640	590	540	---	400	100	100	1020	543	725	640
30	640	640	590	540	---	350	100	100	1010	640	727	640
31	640	---	590	540	---	300	---	100	---	730	727	---
TOTAL	21315	19200	18790	17290	13320	12250	4950	3100	17090	21095	29318	19818
MEAN	688	640	606	558	476	395	165	100	570	680	946	661
MAX	735	640	640	590	540	400	300	100	1020	1010	1100	729
MIN	600	640	590	540	400	300	100	100	100	431	725	636
AC-FT	42280	38080	37270	34290	26420	24300	9820	6150	33900	41840	58150	39310
CFSM	.48	.44	.42	.39	.33	.27	.11	.07	.40	.47	.66	.46
IN.	.55	.50	.48	.45	.34	.32	.13	.08	.44	.54	.76	.51

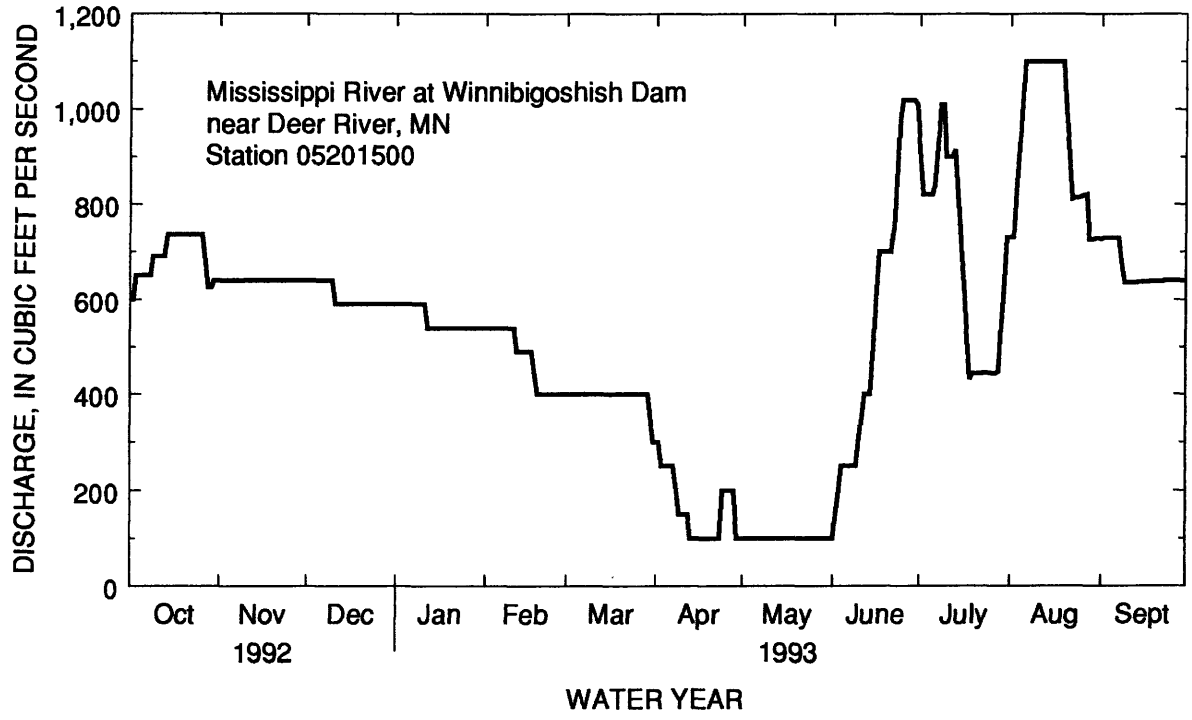
MISSISSIPPI RIVER MAIN STEM

05201500 MISSISSIPPI RIVER AT WINNIBIGOSHISH DAM NEAR DEER RIVER, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1887 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	496	462	462	476	469	329	179	249	408	483	530	484
MAX	1231	1436	1237	1269	1586	1172	712	1180	1982	2492	2437	1494
(WY)	1986	1954	1951	1945	1945	1971	1901	1945	1962	1950	1950	1950
MIN	50.2	.000	.000	39.6	17.6	.000	.000	.000	.000	.000	50.9	21.0
(WY)	1905	1892	1893	1896	1891	1891	1890	1891	1893	1901	1961	1934

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR	
ANNUAL TOTAL	140747		197536	
ANNUAL MEAN	385		541	
HIGHEST ANNUAL MEAN				
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	794	Jan 1	1100	Aug 6-15
LOWEST DAILY MEAN	100	Jun 9 to Jul 2	100	Apr 13-23,29 to Jun 1
ANNUAL SEVEN-DAY MINIMUM	100	Jun 9	100	Apr 13
ANNUAL RUNOFF (AC-FT)	279200		391800	
ANNUAL RUNOFF (CFSM)	.27		.38	
ANNUAL RUNOFF (INCHES)	3.63		5.10	
10 PERCENT EXCEEDS	640		823	
50 PERCENT EXCEEDS	300		590	
90 PERCENT EXCEEDS	200		100	



MISSISSIPPI RIVER MAIN STEM

05201500 MISSISSIPPI RIVER AT WINNIBIGOSHISH DAM NEAR DEER RIVER, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1992, 1993.

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
NOV											
02...	1015	709	278	8.4	4.5	--	3.3	<0.010	<0.050	<0.010	<0.010
MAR											
16...	0845	397	335	8.1	0.0	--	4.9	<0.010	<0.050	0.010	<0.010
JUL											
14...	1000	700	290	8.4	19.0	730	5.4	<0.010	<0.050	0.020	<0.010
SEP											
22...	1045	639	275	8.5	12.5	--	3.2	<0.010	<0.050	0.010	<0.010

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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.

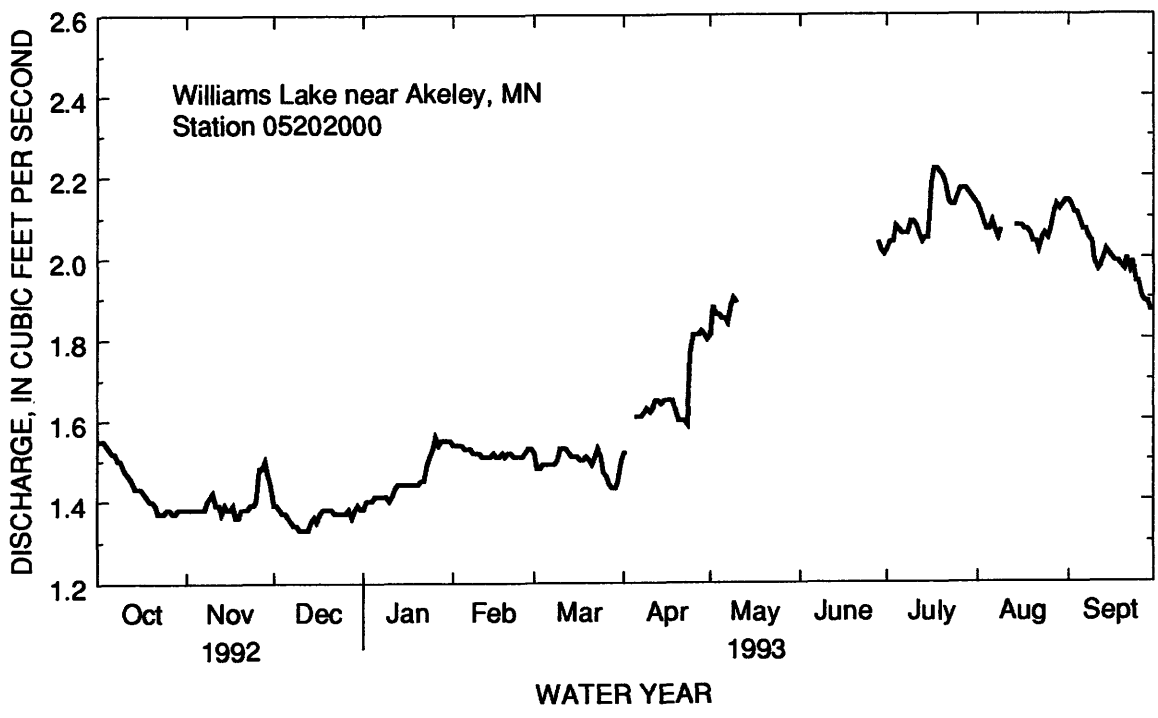
EXTREMES FOR PERIOD OF RECORD--Maximum gage height, 3.33 ft, present datum, June 25, 1989; minimum, 1.32 ft, Dec. 13,1992.

EXTREMES FOR CURRENT YEAR--Maximum gage height, 2.25 ft, July 16; minimum, 1.32 ft, Dec. 13.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.55	1.38	1.39	1.38	1.54	1.52	1.52	1.81	---	2.02	2.13	2.14
2	1.55	1.38	1.39	1.40	1.54	1.48	1.52	1.88	---	2.04	2.11	2.13
3	1.55	1.38	1.38	1.40	1.54	1.48	---	1.86	---	2.04	2.09	2.11
4	1.54	1.38	1.37	1.40	1.54	1.49	---	1.86	---	2.08	2.07	2.11
5	1.53	1.38	1.37	1.41	1.53	1.49	1.61	1.85	---	2.07	2.07	2.09
6	1.52	1.38	1.36	1.41	1.53	1.49	1.61	1.85	---	2.06	2.09	2.07
7	1.52	1.38	1.35	1.41	1.53	1.49	1.61	1.84	---	2.06	2.07	2.07
8	1.50	1.40	1.34	1.41	1.52	1.49	1.62	1.88	---	2.06	2.05	2.05
9	1.50	1.41	1.34	1.41	1.52	1.50	1.63	1.90	---	2.09	2.07	2.04
10	1.48	1.42	1.33	1.40	1.52	1.53	1.62	1.89	---	2.09	---	1.99
11	1.47	1.39	1.33	1.41	1.51	1.53	1.63	---	---	2.08	---	1.97
12	1.46	1.39	1.33	1.43	1.51	1.53	1.65	---	---	2.06	---	1.98
13	1.45	1.37	1.33	1.44	1.51	1.52	1.65	---	---	2.04	---	2.00
14	1.43	1.39	1.35	1.44	1.51	1.51	1.64	---	---	2.05	2.08	2.02
15	1.43	1.38	1.36	1.44	1.52	1.51	1.65	---	---	2.05	2.08	2.01
16	1.43	1.38	1.35	1.44	1.51	1.51	1.65	---	---	2.18	2.08	2.00
17	1.42	1.39	1.37	1.44	1.51	1.50	1.65	---	---	2.22	2.07	1.99
18	1.41	1.36	1.38	1.44	1.52	1.50	1.65	---	---	2.22	2.07	1.99
19	1.40	1.36	1.38	1.44	1.51	1.51	1.62	---	---	2.21	2.06	1.98
20	1.40	1.38	1.38	1.44	1.52	1.50	1.60	---	---	2.20	2.04	1.97
21	1.39	1.38	1.38	1.45	1.52	1.49	1.60	---	---	2.18	2.04	2.00
22	1.37	1.38	1.37	1.45	1.51	1.51	1.60	---	---	2.14	2.02	1.97
23	1.37	1.39	1.37	1.49	1.51	1.53	1.59	---	---	2.13	2.05	1.99
24	1.37	1.39	1.37	1.51	1.51	1.51	1.76	---	---	2.13	2.06	1.94
25	1.38	1.40	1.37	1.53	1.51	1.47	1.81	---	---	2.15	2.05	1.94
26	1.38	1.48	1.37	1.56	1.52	1.46	1.81	---	---	2.17	2.07	1.90
27	1.37	1.48	1.38	1.54	1.53	1.44	1.81	---	---	2.17	2.11	1.89
28	1.37	1.50	1.36	1.55	1.53	1.43	1.82	---	2.04	2.17	2.13	1.89
29	1.38	1.47	1.38	1.55	---	1.43	1.81	---	2.02	2.16	2.12	1.87
30	1.38	1.44	1.39	1.55	---	1.45	1.80	---	2.01	2.15	2.13	1.87
31	1.38	---	1.38	1.55	---	1.50	---	---	---	2.14	2.14	---
MEAN	1.44	1.40	1.36	1.46	1.52	1.49	---	---	---	2.12	---	2.00
MAX	1.55	1.50	1.39	1.56	1.54	1.53	---	---	---	2.22	---	2.14
MIN	1.37	1.36	1.33	1.38	1.51	1.43	---	---	---	2.02	---	1.87


Williams Lake near Akeley, MN
Station 05202000
DISCHARGE, IN CUBIC FEET PER SECOND
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
1992
1993
WATER YEAR

LEECH LAKE RIVER BASIN

465724094402601 WILLIAMS LAKE NEAR AKELEY, MN --Continued

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 1992 TO SEPTEMBER 1993

DATE	TIME	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	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)
OCT 1992									
07...	1015	180	7.9	25	8.2	1.5	0.90	93	0.60
07...	1100	--	--	--	--	--	--	--	--
22...	1015	174	7.9	25	7.8	1.3	1.1	93	0.60
22...	1100	--	--	--	--	--	--	--	--
NOV									
05...	1015	182	7.8	25	7.9	1.3	0.90	94	0.80
05...	1100	--	--	--	--	--	--	--	--
DEC									
05...	1115	190	8.0	27	8.6	1.6	1.0	98	0.90
05...	1200	--	--	--	--	--	--	--	--
JAN 1993									
04...	1215	204	8.0	27	8.3	1.5	1.0	106	0.60
04...	1300	--	--	--	--	--	--	--	--
FEB									
12...	1200	--	--	--	--	--	--	--	--
MAR									
12...	1215	205	7.9	27	8.6	1.7	1.1	105	0.70
12...	1300	--	--	--	--	--	--	--	--
APR									
22...	1015	192	7.7	27	7.8	1.6	1.0	98	0.80
22...	1100	--	--	--	--	--	--	--	--
MAY									
06...	1200	--	--	--	--	--	--	--	--
21...	1015	189	8.5	28	8.0	1.6	1.0	100	0.70
21...	1100	--	--	--	--	--	--	--	--
JUN									
03...	1100	--	--	--	--	--	--	--	--
17...	1015	181	8.4	24	7.5	1.4	1.0	92	0.70
17...	1100	--	--	--	--	--	--	--	--
JUL									
01...	1015	177	8.6	24	7.6	1.3	0.60	90	0.10
01...	1100	--	--	--	--	--	--	--	--
15...	1015	175	8.7	23	7.4	1.3	0.80	89	0.80
15...	1100	--	--	--	--	--	--	--	--
30...	1015	163	8.4	22	7.5	1.4	0.80	85	0.60
30...	1100	--	--	--	--	--	--	--	--
AUG									
13...	1015	162	8.6	22	7.6	1.4	0.90	84	0.80
13...	1100	--	--	--	--	--	--	--	--
26...	1015	158	8.7	23	8.1	1.5	0.90	84	1.0
26...	1100	--	--	--	--	--	--	--	--
SEP									
11...	1015	167	7.9	21	7.5	1.4	1.0	86	0.80
11...	1100	--	--	--	--	--	--	--	--
25...	1015	169	8.2	23	7.6	1.5	0.90	91	0.90
25...	1100	--	--	--	--	--	--	--	--

LEECH LAKE RIVER BASIN

465724094402601 WILLIAMS LAKE NEAR AKELEY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CHLOR A PHYTOPLANKTON CHROMO FLUOROM (UG/L (70953)	CHLOR B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)
OCT 1992										
07...	0.50	1.1	--	--	--	--	20	16	--	--
07...	--	--	0.014	0.039	0.012	<0.001	--	--	5.00	0.200
22...	0.60	0.12	--	--	--	--	11	3	--	--
22...	--	--	0.011	0.044	0.013	<0.001	--	--	4.60	0.200
NOV										
05...	0.60	0.27	--	--	--	--	7	5	--	--
05...	--	--	0.009	0.052	0.006	<0.001	--	--	4.00	0.200
DEC										
05...	0.70	0.35	--	--	--	--	4	12	--	--
05...	--	--	0.098	0.086	0.007	0.002	--	--	1.20	<0.100
JAN 1993										
04...	0.60	0.31	--	--	--	--	9	14	--	--
04...	--	--	0.020	0.186	0.046	0.001	--	--	0.500	<0.100
FEB										
12...	--	--	0.061	0.179	0.011	0.003	--	--	0.400	<0.100
MAR										
12...	0.70	1.2	--	--	--	--	5	59	--	--
12...	--	--	0.227	0.153	0.019	0.007	--	--	2.30	0.100
APR										
22...	0.40	1.2	--	--	--	--	9	14	--	--
22...	--	--	0.206	0.010	0.044	<0.001	--	--	5.20	0.200
MAY										
06...	--	--	<0.005	<0.002	0.015	<0.001	--	--	4.00	<0.100
21...	0.50	0.88	--	--	--	--	9	44	--	--
21...	--	--	0.005	<0.002	0.021	<0.001	--	--	2.40	<0.100
JUN										
03...	--	--	<0.005	0.007	0.010	<0.001	--	--	1.80	<0.100
17...	0.40	0.52	--	--	--	--	14	2	--	--
17...	--	--	0.051	0.011	0.015	0.001	--	--	4.00	0.200
JUL										
01...	0.40	0.44	--	--	--	--	62	2	--	--
01...	--	--	<0.005	<0.002	0.010	0.001	--	--	2.90	0.100
15...	0.50	0.58	--	--	--	--	3	1	--	--
15...	--	--	<0.005	0.007	0.013	0.001	--	--	2.90	0.100
30...	0.30	0.86	--	--	--	--	6	3	--	--
30...	--	--	<0.005	0.006	0.021	0.001	--	--	7.50	0.300
AUG										
13...	0.50	0.74	--	--	--	--	<3	2	--	--
13...	--	--	<0.005	<0.002	0.016	0.001	--	--	4.40	<0.100
26...	0.40	1.9	--	--	--	--	12	100	--	--
26...	--	--	<0.005	<0.002	0.013	0.001	--	--	2.80	<0.100
SEP										
11...	0.70	1.1	--	--	--	--	4	<1	--	--
11...	--	--	<0.005	0.003	0.015	0.001	--	--	3.40	--
25...	1.9	1.3	--	--	--	--	15	2	--	--
25...	--	--	<0.005	0.003	0.014	0.001	--	--	4.60	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.29 W., Cass County, Hydrologic Unit 07010102, on Leech Lake Indian Reservation, at head of Leech Lake River, 1 mi. northeast of Battle Point, 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.

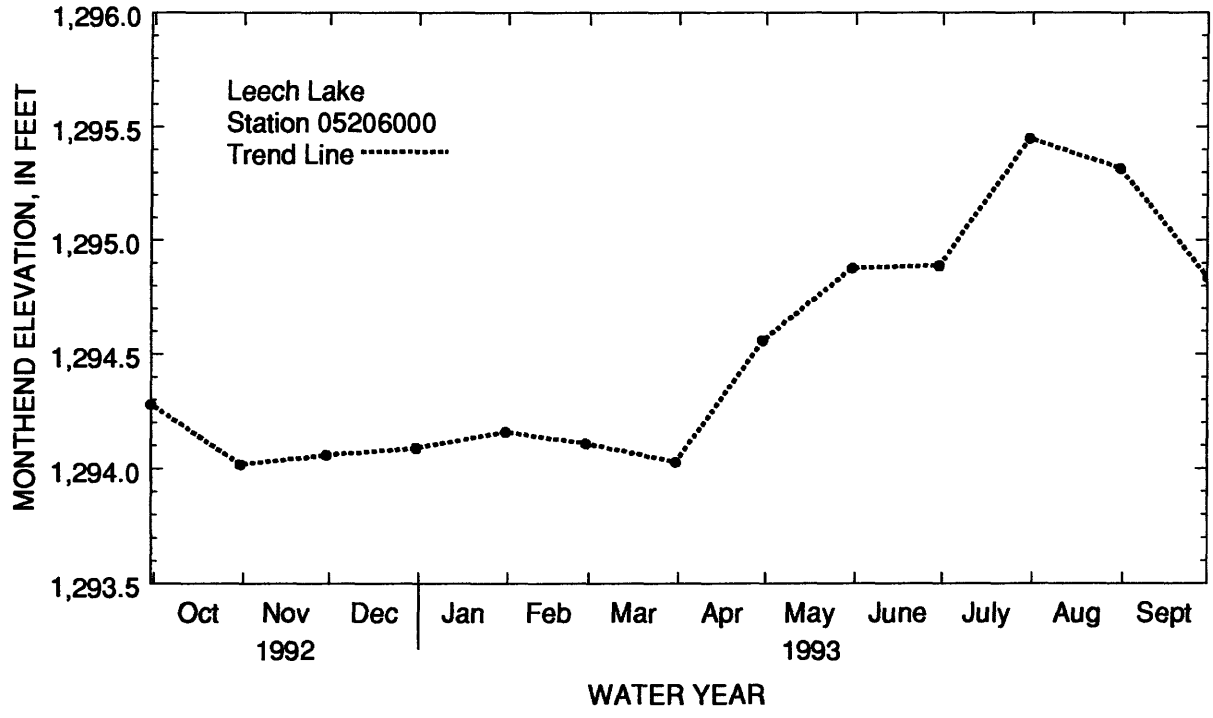
COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

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, 687,490 acre-ft, July 26, elevation, 1295.52 ft; minimum, 490,480 acre-ft, Nov. 2, elevation, 1,293.96 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1294.28	530680	
Oct. 31	1294.02	497800	-32880
Nov. 30	1294.06	502860	+5060
Dec. 31	1294.09	506640	+3780
CAL YR 1992			+14960
Jan. 31	1294.16	515510	+8870
Feb. 28	1294.11	509180	-6330
Mar. 31	1294.03	499070	-10110
Apr. 30	1294.56	566090	+67020
May 31	1294.88	606550	+40460
June 30	1294.89	607810	+1260
July 31	1295.45	678620	+70810
Aug. 31	1295.32	662180	-16440
Sept. 30	1294.84	601,490	-60690
WTR YR 1993			+70,810


1,296.0
1,295.5
1,295.0
1,294.5
1,294.0
1,293.5
MONTHEND ELEVATION, IN FEET
Leech Lake
Station 05206000
Trend Line
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
1992
1993
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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	206	200	200	300	200	580	350	130	208	457	540	800
2	206	200	200	300	200	590	300	130	208	457	600	800
3	206	200	200	300	200	590	250	130	218	457	690	800
4	206	200	200	300	200	590	250	136	218	457	780	800
5	206	200	200	300	200	590	250	136	254	457	780	780
6	206	200	200	300	200	590	250	136	300	457	760	780
7	206	200	200	300	200	635	250	131	328	477	780	780
8	202	200	200	300	200	635	200	137	328	494	780	820
9	206	200	200	300	200	635	154	137	350	494	780	820
10	206	200	200	300	200	635	112	146	432	447	780	820
11	202	200	250	300	200	635	112	146	432	447	780	820
12	210	200	250	250	250	635	112	198	432	447	780	820
13	202	200	250	250	300	635	112	198	432	447	780	820
14	202	200	250	250	300	635	112	198	474	433	780	840
15	200	200	300	250	300	635	112	198	432	434	780	840
16	200	200	300	250	300	580	112	198	466	442	780	840
17	200	200	300	250	350	580	112	198	466	344	780	840
18	200	200	300	250	400	580	112	211	511	283	800	840
19	200	200	300	250	450	580	112	198	511	316	800	840
20	200	200	300	250	450	580	112	211	511	316	780	840
21	200	200	300	250	450	580	112	211	511	324	780	840
22	200	200	300	250	450	580	116	137	496	324	780	840
23	200	200	300	250	500	540	116	96	496	336	800	840
24	200	200	300	250	500	540	122	99	496	336	800	840
25	200	200	300	250	580	540	125	150	511	350	800	840
26	200	200	300	250	580	500	125	200	496	350	800	840
27	200	200	300	200	580	500	125	200	472	344	800	840
28	200	200	300	200	580	500	130	200	457	344	800	840
29	200	200	300	200	---	500	130	200	457	395	800	840
30	200	200	300	200	---	450	130	200	434	414	800	840
31	200	---	300	200	---	400	---	205	---	494	800	---
TOTAL	6272	6000	8100	8050	9520	17775	4717	5201	12337	12574	23870	24740
MEAN	202	200	261	260	340	573	157	168	411	406	770	825
MAX	210	200	300	300	580	635	350	211	511	494	800	840
MIN	200	200	200	200	200	400	112	96	208	283	540	780
AC-FT	12440	11900	16070	15970	18880	35260	9360	10320	24470	24940	47350	49070
CFSM	.17	.17	.22	.22	.29	.49	.14	.14	.35	.35	.66	.71
IN.	.20	.19	.26	.26	.30	.57	.15	.17	.39	.40	.76	.79

e Estimated.

LEECH LAKE RIVER BASIN

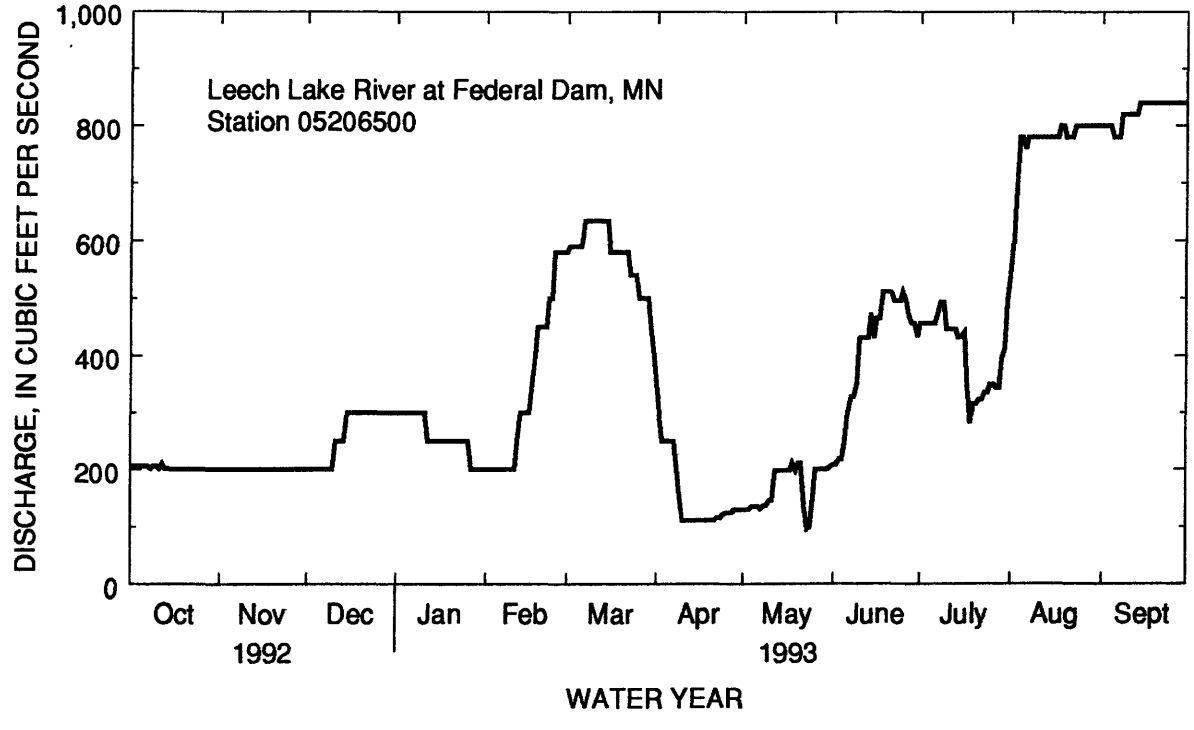
05206500 LEECH LAKE RIVER AT FEDERAL DAM, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1885 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	413	396	402	388	374	295	168	268	338	364	371	393
MAX	1190	1100	1042	986	1001	868	674	935	1000	920	954	901
(WY)	1979	1983	1983	1983	1980	1945	1974	1974	1985	1985	1975	1900
MIN	24.6	24.0	25.2	25.6	5.00	5.00	13.8	14.3	3.00	25.8	26.4	21.1
(WY)	1937	1937	1937	1936	1934	1934	1936	1936	1932	1935	1935	1885

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR	
ANNUAL TOTAL	83919		139156	
ANNUAL MEAN	229		381	
HIGHEST ANNUAL MEAN				
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	800[a]		840	Sep 14-30
LOWEST DAILY MEAN	100[b]		96	May 23
ANNUAL SEVEN-DAY MINIMUM	100	Mar 28	112	Apr 10
ANNUAL RUNOFF (AC-FT)	166500		276000	
ANNUAL RUNOFF (CFSM)	.20		.33	
ANNUAL RUNOFF (INCHES)	2.68		4.45	
10 PERCENT EXCEEDS	640		800	
50 PERCENT EXCEEDS	162		300	
90 PERCENT EXCEEDS	103		152	

a Jan 1-14, Nov 27 to Dec 1, 11-14, 21-31.
b Mar 28 to Apr 14, Jun 15-16.



LEECH LAKE RIVER BASIN

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

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1992., 1993

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
NOV											
02...	1245	164	272	8.2	3.0	--	9.6	<0.010	<0.050	<0.010	<0.010
MAR											
16...	0945	585	310	8.1	0.0	--	10	<0.010	<0.050	0.010	<0.010
JUL											
14...	0830	433	279	8.1	19.0	731	7.5	<0.010	<0.050	0.020	<0.010
SEP											
22...	0930	880	258	8.3	12.5	--	10	<0.010	<0.050	0.020	<0.010

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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.

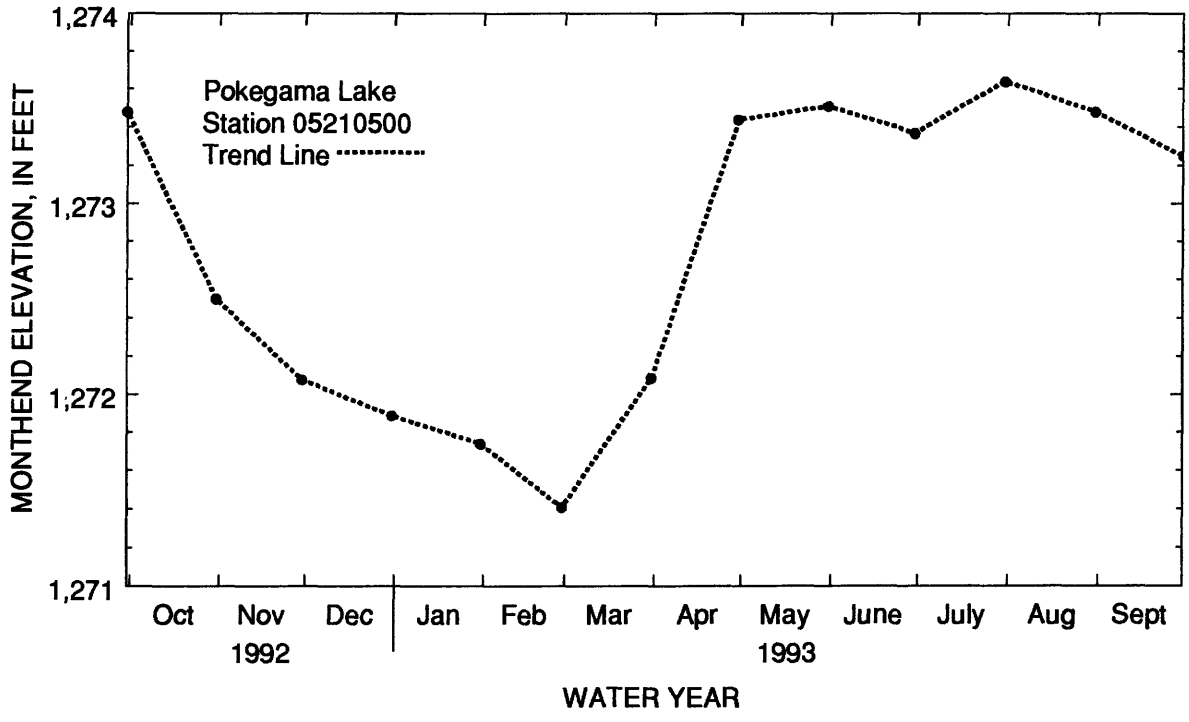
COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

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, 128,100 acre-ft, July 17, elevation, 1,275.08 ft; minimum, 67,090 acre-ft, Mar. 24, elevation, 1,271.30 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1273.48	98870	
Oct. 31	1272.50	84120	-14750
Nov. 30	1272.08	78090	-6030
Dec. 31	1271.89	75380	-2710
CAL YR 1992			+570
Jan. 31	1271.74	73240	-2140
Feb. 28	1271.41	68560	-4680
Mar. 31	1272.09	78230	+9670
Apr. 30	1273.44	98210	+19980
May 31	1273.51	99370	+1160
June 30	1273.37	97100	-2270
July 31	1273.64	101550	+4450
Aug. 31	1273.48	98870	-2680
Sept. 30	1273.25	95320	-3550
WTR YR 1993			-3550


1,274
1,273
1;272
1,271
MONTHEND ELEVATION, IN FEET
Pokegama Lake
Station 05210500
Trend Line
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
1992
1993
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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1200	1180	985	e920	e930	e890	1400	1060	1060	e1400	2390	2780
2	1200	1190	1070	e910	e930	904	1410	1130	1080	e1400	2210	2760
3	1200	1200	1110	e910	e930	935	1440	1240	1080	e1410	2100	2680
4	1200	1170	1100	e920	926	962	1430	1370	916	e1420	2140	2660
5	1230	1120	1100	e950	956	949	1310	1360	766	e1430	2110	2650
6	1270	1130	1130	e960	926	948	1200	1370	770	e1300	2080	2630
7	1240	1130	701	e940	911	947	1080	1490	775	e900	2050	2540
8	1240	1110	825	e950	905	951	997	1640	817	e600	1950	2400
9	1240	1110	1080	e950	920	946	1110	1670	996	e700	1900	2420
10	1220	1120	1180	e950	916	952	1250	1500	1190	e850	1910	2380
11	1220	1090	1300	e950	937	1000	1280	1270	1230	e1000	2050	2420
12	1200	1100	1240	e950	957	1060	1260	1170	1270	e1200	2010	2440
13	1220	1100	1240	e960	960	1040	1290	1180	1290	e1600	2030	2420
14	1220	1060	766	e960	e940	1050	1260	1000	1220	1840	2090	2450
15	1210	1100	769	e960	e920	1080	1270	748	1180	2020	2100	2430
16	1210	1010	881	e950	e900	1040	1210	723	1180	2270	2110	2450
17	1200	898	842	e950	e900	1050	1060	648	1200	2700	2060	2440
18	1200	874	896	e940	e890	1060	1100	621	1190	2900	2170	2420
19	1200	980	905	e940	e890	1050	1060	595	1200	2950	2320	2440
20	1200	991	1010	e940	e880	1060	1020	563	1200	2950	2320	2440
21	1200	993	984	e940	e880	1030	907	552	1180	2830	2340	2390
22	1190	1020	1000	e940	e880	1050	765	517	1160	2820	2400	2370
23	1210	1050	1000	e940	e880	1080	616	543	e1180	2840	2500	2370
24	1200	1120	e980	e940	e880	1070	652	648	e1220	2810	2670	2380
25	1200	1100	e960	e940	e880	1070	564	691	e1260	2810	2620	2340
26	1200	1110	e940	e930	e880	1100	483	699	e1310	2790	2700	2370
27	1200	1110	e920	e930	e890	1170	510	740	e1400	2710	2720	2300
28	1200	1060	e920	e930	e890	1190	654	721	e1450	2650	2670	2350
29	1200	1080	e920	e930	---	1210	1080	756	e1420	2600	2670	2350
30	1190	1030	e930	e930	---	1230	1140	793	e1400	2520	2820	2360
31	1180	---	e930	e930	---	1330	---	937	---	2460	2790	---
TOTAL	37490	32336	30614	29140	25484	32404	31808	29945	34590	62680	71000	73830
MEAN	1209	1078	988	940	910	1045	1060	966	1153	2022	2290	2461
MAX	1270	1200	1300	960	960	1330	1440	1670	1450	2950	2820	2780
MIN	1180	874	701	910	880	890	483	517	766	600	1900	2300
AC-FT	74360	64140	60720	57800	50550	64270	63090	59400	68610	124300	140800	146400
CFSM	.36	.32	.29	.28	.27	.31	.31	.29	.34	.60	.68	.73
IN.	.41	.36	.34	.32	.28	.36	.35	.33	.38	.69	.78	.81

e Estimated.

MISSISSIPPI RIVER MAIN STEM

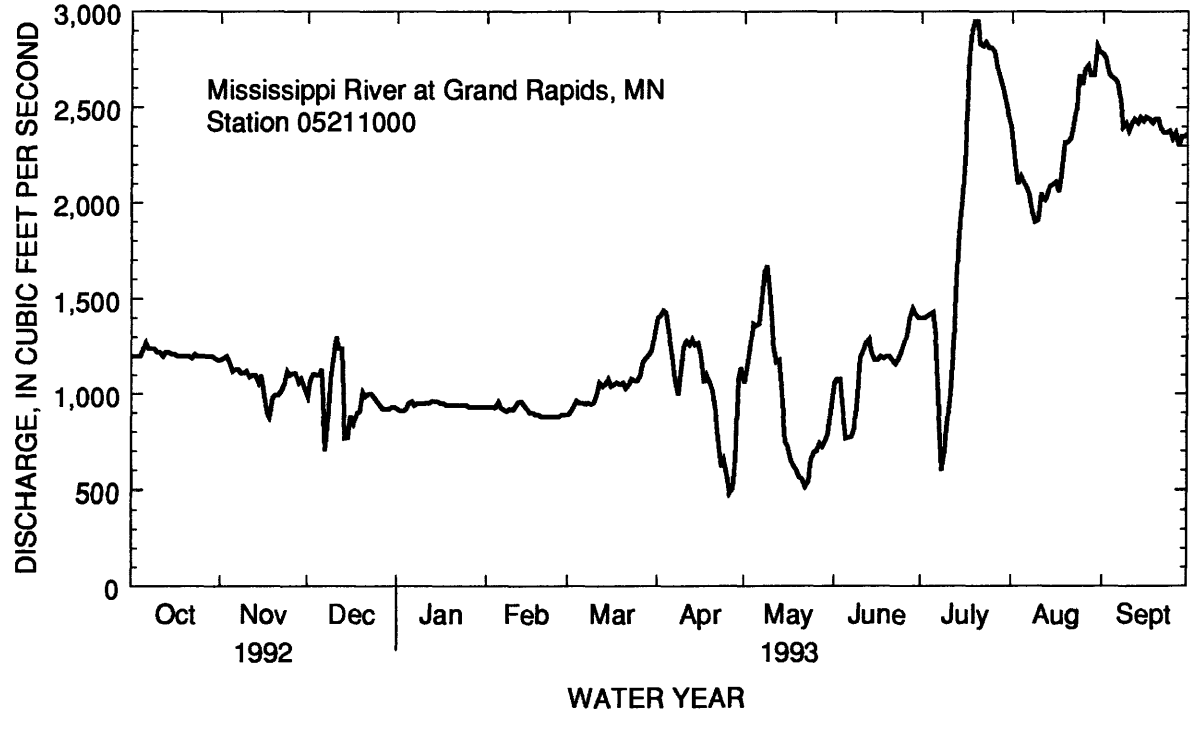
05211000 MISSISSIPPI RIVER AT GRAND RAPIDS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1396	1537	1439	1454	1461	1372	1191	1267	1305	1359	1243	1248
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

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1942 - 1993	
ANNUAL TOTAL	309818		491321			
ANNUAL MEAN	846		1346		1363[a]	
HIGHEST ANNUAL MEAN					2265	1950
LOWEST ANNUAL MEAN					277	1977
HIGHEST DAILY MEAN	2100	Jan 9	2950	Jul 19,20	4610	Apr 17 1969
LOWEST DAILY MEAN	184	Jun 11	483	Apr 26[a]	.00	Many days
ANNUAL SEVEN-DAY MINIMUM	209	Jun 10	577	May 17	24	May 9 1949
INSTANTANEOUS PEAK FLOW			3030	Jul 20	12500[b]	Sep 3 1948
INSTANTANEOUS PEAK STAGE			10.26	Jul 20	15.20[c]	Sep 3 1948
INSTANTANEOUS LOW FLOW			234	Dec 8		
ANNUAL RUNOFF (AC-FT)	614500		974500		987600	
ANNUAL RUNOFF (CFSM)	.25		.40		.40	
ANNUAL RUNOFF (INCHES)	3.42		5.42		5.50	
10 PERCENT EXCEEDS	1240		2440		2320	
50 PERCENT EXCEEDS	803		1120		1330	
90 PERCENT EXCEEDS	420		878		341	

a Average based on 110 years of record is 1,184 ft³/s; median is 1,060 ft³/s.
b From rating curve extended above 4,500 ft³/s.
c 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.

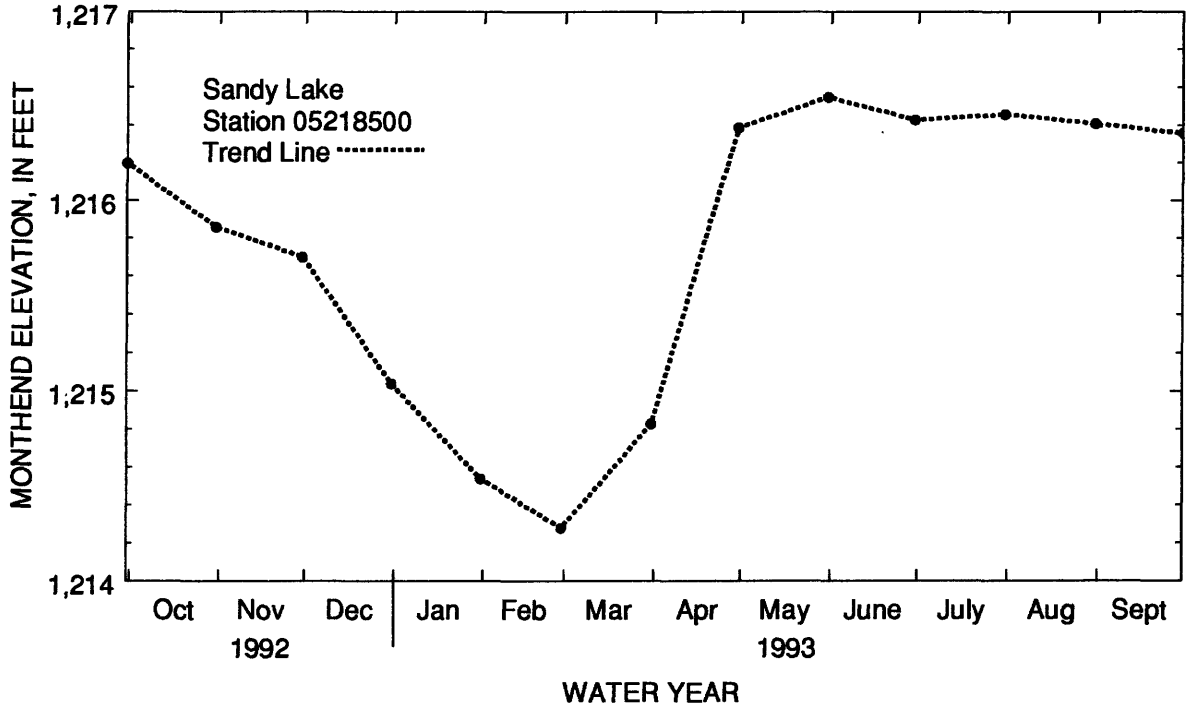
COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

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, 79,490 acre-ft, July 14, elevation, 1,218.08 ft; minimum, 43,800 acre-ft, Mar. 2, elevation, 1,214.24 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1216.20	60890	
Oct. 31	1215.86	57750	-3140
Nov. 30	1215.70	56310	-1440
Dec. 31	1215.04	50500	-5810
CAL YR 1992			+1890
Jan. 31	1214.54	46270	-4230
Feb. 28	1214.28	44120	-2150
Mar. 31	1214.83	48690	+4570
Apr. 30	1216.39	62680	+13990
May 31	1216.55	64200	+1520
June 30	1216.43	63060	-1140
July 31	1216.46	63340	+280
Aug. 31	1216.41	62870	-470
Sept. 30	1216.36	62390	-480
WTR YR 1993			+1500


1,217
1,216
1,215
1,214
MONTHEND ELEVATION, IN FEET
Sandy Lake
Station 05218500
Trend Line
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
1992
1993
WATER YEAR

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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	98	247	193	130	50	160	923	996	1020	828	200
2	21	98	242	193	126	49	158	884	1220	1020	828	200
3	22	98	242	193	126	49	169	845	1170	1020	272	200
4	22	98	242	193	126	49	173	1120	1170	928	352	100
5	22	98	237	193	126	48	180	880	1180	650	204	100
6	100	98	239	191	126	47	306	928	1180	312	216	100
7	100	98	242	191	126	47	306	928	1200	480	150	54
8	100	99	242	189	126	47	319	826	632	648	95	55
9	100	99	239	189	126	46	328	826	688	768	50	55
10	100	99	242	189	126	46	468	812	680	315	50	55
11	100	99	242	189	126	46	462	540	672	506	50	56
12	100	99	236	155	126	47	450	576	960	664	50	57
13	100	147	228	155	126	47	444	360	924	756	50	57
14	98	147	221	155	126	48	444	390	912	1180	75	57
15	98	147	221	155	126	48	450	287	702	1390	77	57
16	98	144	226	155	126	48	450	298	729	1340	77	57
17	99	220	239	155	63	46	456	312	738	1210	78	57
18	99	220	242	155	65	46	468	326	747	1190	79	57
19	99	225	242	155	65	48	480	333	510	1120	80	57
20	99	225	242	130	65	48	319	340	522	1530	82	57
21	99	225	242	130	65	46	326	343	528	1060	82	57
22	99	225	207	130	65	48	334	257	534	908	83	57
23	99	225	205	130	50	47	338	263	546	908	83	57
24	99	255	200	130	50	47	630	265	540	742	148	57
25	99	244	196	130	50	47	616	204	1610	742	148	57
26	98	255	193	130	50	47	609	260	672	742	148	57
27	98	252	193	130	50	46	1070	260	768	722	144	57
28	98	250	193	130	50	46	1030	260	804	682	385	57
29	98	250	193	130	---	43	1010	588	804	672	370	57
30	98	252	193	130	---	42	975	750	1060	672	365	57
31	98	---	193	130	---	40	---	730	---	828	200	---
TOTAL	2681	5089	6961	4903	2708	1449	13928	16914	25398	26725	5899	2258
MEAN	86.5	170	225	158	96.7	46.7	464	546	847	862	190	75.3
MAX	100	255	247	193	130	50	1070	1120	1610	1530	828	200
MIN	21	98	193	130	50	40	158	204	510	312	50	54
AC-FT	5320	10090	13810	9730	5370	2870	27630	33550	50380	53010	11700	4480
CFSM	.21	.40	.53	.38	.23	.11	1.10	1.30	2.01	2.05	.45	.18
IN.	.24	.45	.62	.43	.24	.13	1.23	1.49	2.24	2.36	.52	.20

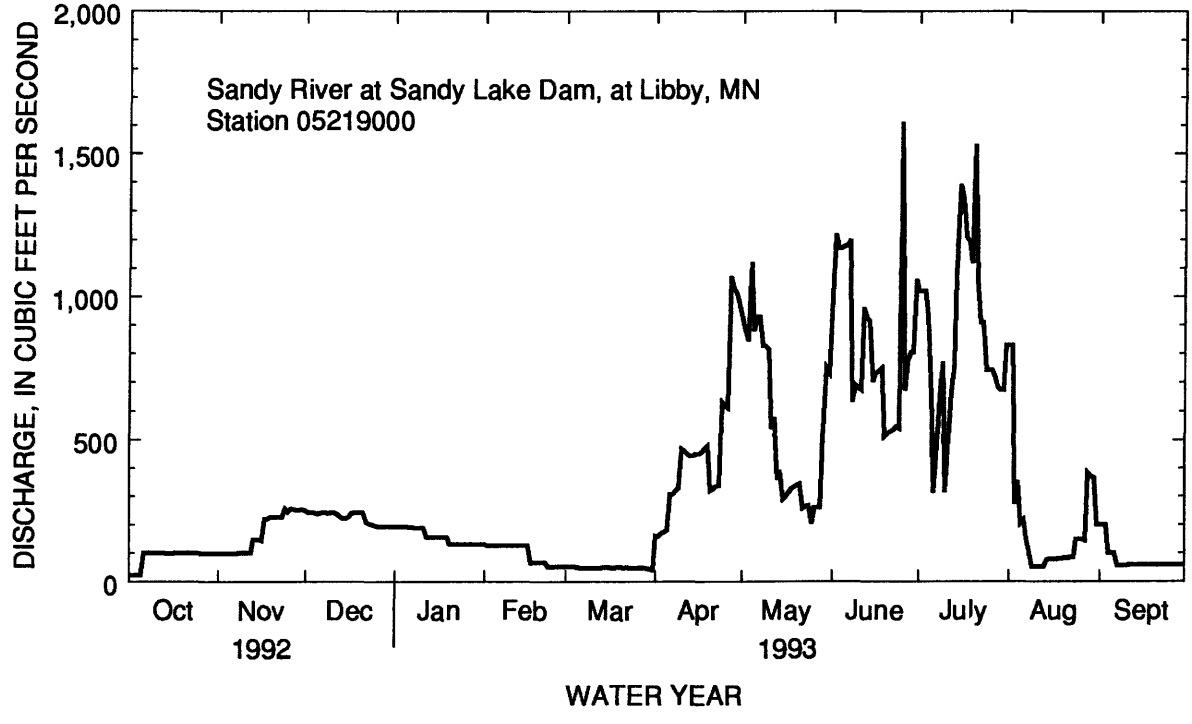
SANDY RIVER BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1899 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	187	161	135	109	92.3	95.3	277	435	313	196	159	174
MAX	1003	853	444	436	551	450	1013	1659	1070	916	1158	1052
(WY)	1983	1972	1966	1966	1907	1927	1986	1979	1965	1991	1972	1986
MIN	.000	.000	.000	.000	.000	.000	.000	3.06	5.00	.000	.000	.000
(WY)	1902	1901	1900	1899	1899	1899	1899	1918	1924	1904	1900	1910

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR	
ANNUAL TOTAL	92078.0		114913	
ANNUAL MEAN	252		315	
HIGHEST ANNUAL MEAN				
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	996	Apr 14-17	1610	Jun 25
LOWEST DAILY MEAN	8.0	Apr 13	21	Oct 1-2
ANNUAL SEVEN-DAY MINIMUM	20	Jul 30	44	Oct 1
ANNUAL RUNOFF (AC-FT)	182600	227900		
ANNUAL RUNOFF (CFSM)	.60	.75		
ANNUAL RUNOFF (INCHES)	8.14	10.15		
10 PERCENT EXCEEDS	670	859		
50 PERCENT EXCEEDS	193	189		
90 PERCENT EXCEEDS	22	50		



SANDY RIVER BASIN

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

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1992, 1993.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
NOV											
04...	0900	98	120	7.7	4.0	--	1.6	0.010	0.050	0.090	<0.010
MAR											
17...	0845	4850	178	7.2	0.0	--	4.4	<0.010	0.260	0.020	0.010
JUL											
15...	0815	1390	117	7.6	19.5	733	2.4	<0.010	<0.050	0.030	<0.010
SEP											
23...	0815	57	117	7.7	13.0	--	2.6	<0.010	<0.050	0.020	<0.010

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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, 5,630 ft³/s, July 10, gage height, 14.20 ft. Diversion channel: Maximum discharge, 4,540 ft³/s, July 10, gage height, 14.31 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2020	1680	e1500	e1500	e1420	e1190	e3200	4930	4970	5280	6980	3710
2	2010	1680	e1500	e1500	e1420	e1190	e3500	5590	5160	5440	6750	3700
3	1980	1690	e1520	e1500	e1410	e1190	e3900	6000	5220	5510	6430	3720
4	1930	1700	e1540	e1500	e1410	e1190	e4200	6220	5190	6300	6010	3700
5	1880	1710	e1560	e1500	e1410	e1200	e4500	6260	5080	8070	5640	3590
6	1840	1710	e1590	e1500	e1400	e1200	e4600	6170	4950	8830	5280	3530
7	1850	1710	e1620	e1500	e1400	e1210	e4400	6140	4780	9160	5000	3450
8	1890	1680	e1650	e1500	e1400	e1210	4290	6080	4480	9440	4720	3370
9	1920	1680	e1680	e1500	e1390	e1220	4020	5890	4210	9690	4560	3310
10	1910	1710	e1710	e1500	e1380	e1220	3950	5760	4210	9780	4410	3270
11	1890	1720	e1740	e1500	e1370	e1230	4020	5650	4230	9620	4290	3220
12	e1850	1740	e1780	e1500	e1360	e1230	4160	5420	4270	9340	4140	3180
13	e1820	1770	e1820	e1500	e1350	e1230	4340	5080	4320	9170	3980	3130
14	1780	1770	e1860	e1500	e1340	e1240	4410	4610	4280	9080	3880	3100
15	1780	1710	e1870	e1500	e1330	e1240	4440	4170	4160	9030	3810	3090
16	1780	1640	e1870	e1500	e1320	e1250	4430	3820	3940	8950	3710	3090
17	1760	1670	e1800	e1500	e1310	e1260	4360	3450	3820	8830	3660	3170
18	1740	e1690	e1740	e1500	e1300	e1270	4280	3110	3710	8720	3600	3130
19	1720	e1790	e1670	e1500	e1290	e1280	4120	2840	3590	8590	3530	3100
20	1720	e1800	e1600	e1500	e1280	e1290	3890	2600	3420	8500	3420	3100
21	1700	e1760	e1550	e1490	e1270	e1300	3660	2430	3310	8450	3330	3110
22	1700	e1710	e1520	e1480	e1260	e1320	3430	2290	3180	8430	3290	3120
23	1700	e1670	e1500	e1470	e1250	e1340	3280	2180	3150	8310	3310	3110
24	1690	e1640	e1500	e1460	e1240	e1380	3290	2220	4000	8220	3310	3080
25	1690	e1610	e1500	e1450	e1230	e1460	3790	2340	5650	8140	3350	3070
26	1700	e1580	e1500	e1440	e1220	e1550	4080	2550	6270	8010	3380	3060
27	1690	e1550	e1500	e1440	e1210	e1700	4180	2690	6100	7830	3510	3030
28	1690	e1520	e1500	e1430	e1200	e1900	4330	2750	5780	7650	3600	3010
29	1700	e1500	e1500	e1430	---	e2200	4440	2770	5500	7450	3760	3000
30	1700	e1500	e1500	e1430	---	e2500	4630	3350	5330	7270	3850	2990
31	1690	---	e1500	e1420	---	e2800	---	4500	---	7130	3820	---
TOTAL	55720	50290	50190	45940	37170	43990	122120	129860	136260	254220	132310	97240
MEAN	1797	1676	1619	1482	1327	1419	4071	4189	4542	8201	4268	3241
MAX	2020	1800	1870	1500	1420	2800	4630	6260	6270	9780	6980	3720
MIN	1690	1500	1500	1420	1200	1190	3200	2180	3150	5280	3290	2990
AC-FT	110500	99750	99550	91120	73730	87250	242200	257600	270300	504200	262400	192900
CFSM	.29	.27	.26	.24	.22	.23	.66	.68	.74	1.34	.70	.53
IN.	.34	.30	.30	.28	.23	.27	.74	.79	.83	1.54	.80	.59

e Estimated.

MISSISSIPPI RIVER MAIN STEM

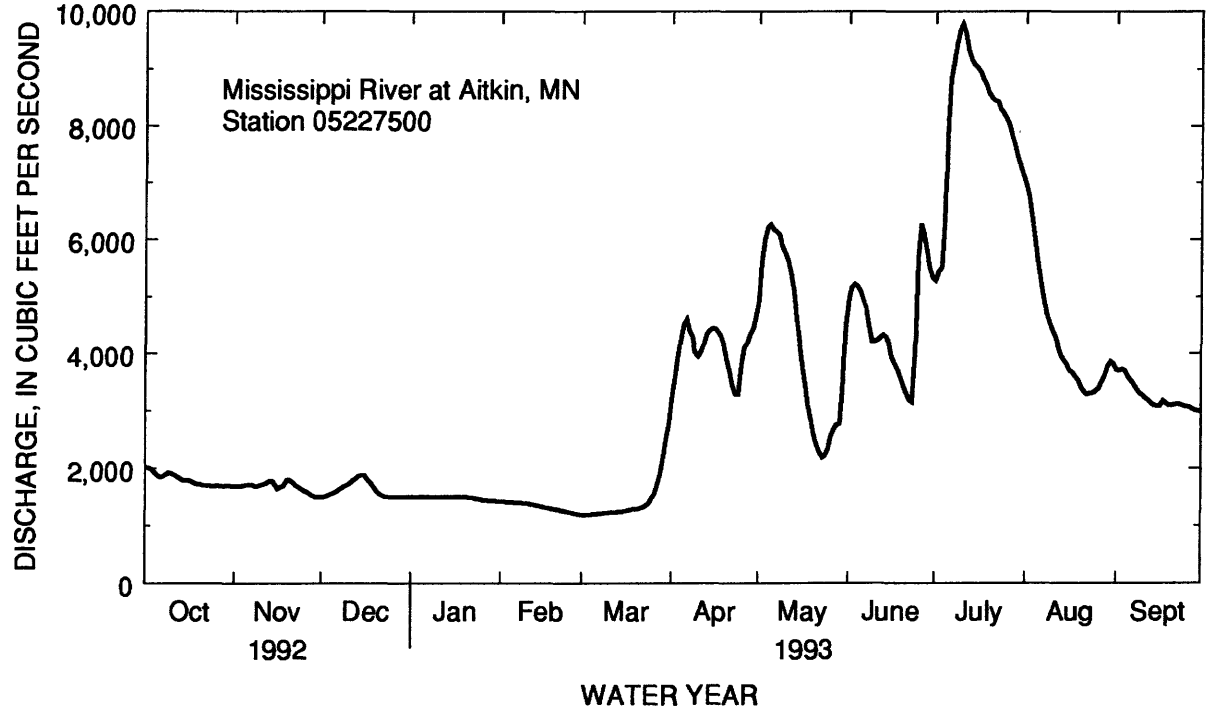
05227500 MISSISSIPPI RIVER AT AITKIN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	2563	2635	2159	1896	1811	2174	5109	5234	3704	2948	2296	2235
MAX	6534	6756	3762	3525	3196	5415	10830	15510	8072	8201	8270	6689
(WY)	1966	1972	1972	1966	1966	1945	1966	1950	1965	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1945 - 1993	
ANNUAL TOTAL	759719		1155310			
ANNUAL MEAN	2076		3165		2887	
HIGHEST ANNUAL MEAN					4985	1966
LOWEST ANNUAL MEAN					796	1977
HIGHEST DAILY MEAN	5810	Apr 26	9780	Jul 10	19900	May 20 1950
LOWEST DAILY MEAN	595	Jun 16	1190	Mar 1-4	153	Sep 1 1961
ANNUAL SEVEN-DAY MINIMUM	684	Jun 11	1190	Feb 28	195	Aug 26 1961
INSTANTANEOUS PEAK STAGE			14.20	Jul 10	22.49a	May 20 1950
INSTANTANEOUS LOW FLOW					151	Sep 1 1961
ANNUAL RUNOFF (AC-FT)	1507000		2292000		2092000	
ANNUAL RUNOFF (CFSM)	.34		.52		.47	
ANNUAL RUNOFF (INCHES)	4.60		7.00		6.39	
10 PERCENT EXCEEDS	3330		6120		5790	
50 PERCENT EXCEEDS	1880		2290		2280	
90 PERCENT EXCEEDS	1130		1340		932	

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.

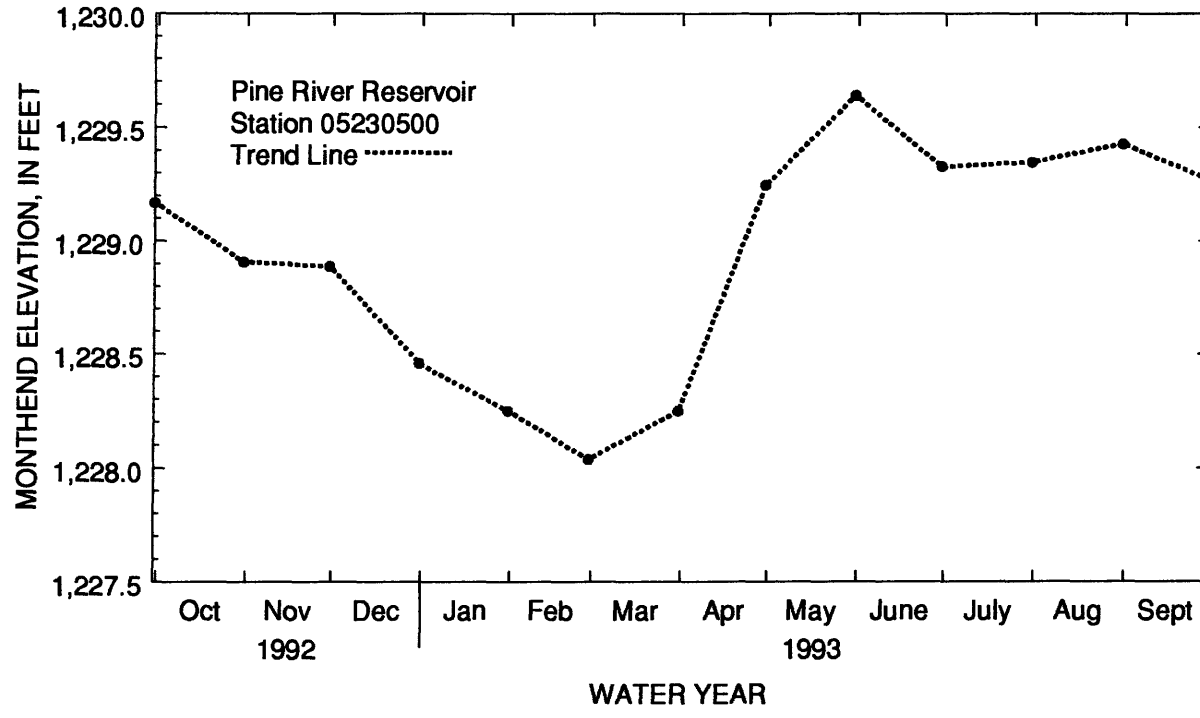
EXTREMES FOR PERIOD OF RECORD.--Maximum contents observed, 173,600 acre-ft, capacity table then in use, July 10, 1916, elevation, 1,234.56 ft; minimum observed, 1,310 acre-ft, below zero of capacity table then in use, Aug. 20, 1918, elevation, 1,217.67 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 108,600 acre-ft, July 11, elevation, 1,229.85 ft; minimum, 83,520 acre-ft, Mar. 5, elevation, 1,227.99 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

Date	Elevation (feet)	Contents (acre-feet)	Change in content (acre-feet)
Sept. 30	1229.17	99310	
Oct. 31	1228.91	95800	-3510
Nov. 30	1228.89	95530	-270
Dec. 31	1228.46	89750	-5780
CAL YR 1992			+1870
Jan. 31	1228.25	86950	-2800
Feb. 28	1228.04	84180	-2770
Mar. 31	1228.25	86950	+2770
Apr. 30	1229.25	100390	+13440
May 31	1229.64	105720	+5330
June 30	1229.33	101490	-4230
July 31	1229.35	101760	+270
Aug. 31	1229.43	102850	+1090
Sept. 30	1229.27	100670	-2180
WTR YR 1993			+1360

05230500 PINE RIVER RESERVOIR AT CROSS LAKE, MN--Continued



PINE RIVER BASIN

05231000 PINE RIVER AT CROSS LAKE DAM, 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 at outlet of Cross Lake at city of Cross Lake.

DRAINAGE AREA.--562 mi².

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 ft³/s, 5.29 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 2,250 ft³/s, in June 1896 (does not include flow by passing dam through crevasse); no flow at times.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	200	50	210	168	135	135	150	100	1000	150	380	630
2	200	50	210	168	135	135	150	100	1000	150	380	630
3	200	50	210	168	135	135	150	100	1000	350	300	300
4	200	50	210	168	135	135	150	100	1000	350	300	300
5	200	50	210	168	135	135	150	100	800	550	200	300
6	200	50	210	168	135	100	150	100	800	550	200	300
7	200	50	210	168	135	100	150	400	800	550	200	300
8	200	50	210	168	135	100	50	400	600	550	200	150
9	200	50	210	168	135	100	50	400	600	550	200	150
10	50	50	210	168	135	100	50	400	600	800	200	150
11	50	100	210	168	135	100	50	550	600	800	200	150
12	50	100	210	168	135	100	50	550	600	1000	200	150
13	50	100	210	168	135	100	50	700	600	1000	200	150
14	50	100	210	168	135	100	50	700	600	1000	250	150
15	50	100	168	135	135	100	50	550	500	1120	250	150
16	50	100	168	135	135	100	50	400	500	1250	250	150
17	50	100	168	135	135	100	50	400	500	1250	300	150
18	50	100	168	135	135	100	50	200	500	1250	300	150
19	50	100	168	135	135	100	50	200	400	1250	300	150
20	50	100	168	135	135	100	50	150	400	1250	300	150
21	50	200	168	135	135	100	50	150	400	1100	300	150
22	50	200	168	135	135	100	50	120	400	1000	300	150
23	50	200	168	135	135	100	50	120	400	1000	300	150
24	50	200	168	135	135	100	50	120	350	750	300	150
25	50	200	168	135	135	100	50	300	350	750	300	150
26	50	200	168	135	135	50	50	300	350	750	300	150
27	50	200	168	135	135	50	50	300	350	750	630	150
28	50	200	168	135	135	50	50	540	350	750	630	150
29	50	200	168	135	---	50	50	700	250	600	630	150
30	50	200	168	135	---	50	50	700	250	600	630	150
31	50	---	168	135	---	50	---	700	---	380	630	---
TOTAL	2900	3500	5796	4647	3780	2975	2200	10650	16850	24150	10060	6210
MEAN	93.5	117	187	150	135	96.0	73.3	344	562	779	325	207
MAX	200	200	210	168	135	135	150	700	1000	1250	630	630
MIN	50	50	168	135	135	50	50	100	250	150	200	150
AC-FT	5750	6940	11500	9220	7500	5900	4360	21120	33420	47900	19950	12320
CFSM	.17	.21	.33	.27	.24	.17	.13	.61	1.00	1.39	.58	.37
IN.	.19	.23	.38	.31	.25	.20	.15	.70	1.12	1.60	.67	.41

PINE RIVER BASIN

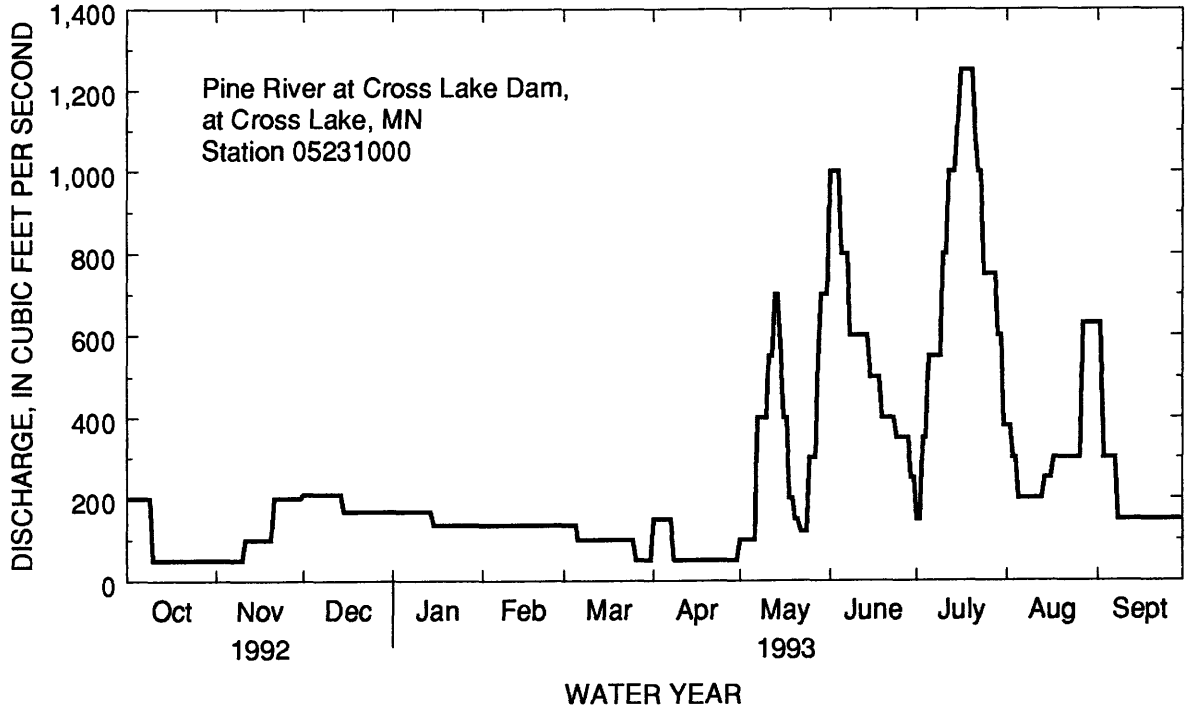
05231000 PINE RIVER AT CROSS LAKE DAM, AT CROSS LAKE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1898 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	236	190	188	200	183	181	212	284	285	257	204	216
MAX	1126	898	547	499	613	657	907	1213	1316	988	853	787
(WY)	1974	1972	1987	1944	1910	1910	1966	1950	1965	1985	1972	1898
MIN	10.0	10.0	4.35	7.94	10.0	10.0	5.27	6.35	8.73	9.10	10.0	10.0
(WY)	1937	1935	1899	1899	1935	1935	1931	1931	1931	1931	1936	1936

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR	
ANNUAL TOTAL	54302		93718	
ANNUAL MEAN	148		257	
HIGHEST ANNUAL MEAN				
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	520	Apr 23-27	1250	Jul 16-20
LOWEST DAILY MEAN	30[a]		50	Oct 10 to Nov 10, Apr 8-30
ANNUAL SEVEN-DAY MINIMUM	30	Jun 10	50	Oct 10
ANNUAL RUNOFF (AC-FT)	107700		185900	
ANNUAL RUNOFF (CFSM)	.26		.46	
ANNUAL RUNOFF (INCHES)	3.59		6.20	
10 PERCENT EXCEEDS	300		630	
50 PERCENT EXCEEDS	140		150	
90 PERCENT EXCEEDS	50		50	

a Jun 10-16, Aug 1-10,13-24,28 to Sep 1.



PINE RIVER BASIN

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

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1993.

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
NOV											
03...	1230	67	212	8.1	3.0	--	7.9	0.010	<0.050	0.020	<0.010
MAR											
15...	1045	100	265	8.0	0.0	--	8.4	<0.010	0.060	<0.010	<0.010
JUL											
13...	1300	1000	225	8.4	20.0	730	6.4	<0.010	<0.050	0.020	<0.010
SEP											
21...	1145	99	222	8.2	14.5	--	7.6	<0.010	<0.050	0.020	<0.010

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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), Pine River Reservoir at Cross Lake (sta. 05230500), and by hydro-plant in Brainerd.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2180	1890	1510	2520	e2000	e1550	3450	5500	6830	6250	8470	4630
2	2190	2110	1520	2550	e2000	e1550	3720	5970	7210	6260	8260	4660
3	1930	2110	e1470	2400	e2000	e1550	4020	6690	7220	6360	7930	4590
4	2280	1760	e1480	2460	e2000	e1550	4350	7100	7190	7050	7440	4530
5	1670	1900	e1550	2380	e1950	e1550	4770	7220	7040	8820	6880	4370
6	1920	1900	e1600	2380	e1950	e1550	5320	7230	6800	9950	6370	4170
7	1890	1910	e1700	2360	e1900	e1550	5370	7140	6650	10700	5850	4020
8	1970	1930	e1800	e2300	e1850	e1550	5130	7140	6200	11300	5590	3950
9	1970	1900	e1900	e2300	e1850	e1550	4660	7120	5810	11700	5370	3800
10	1960	1950	2060	e2250	e1800	e1550	4640	7010	5440	11900	4990	3580
11	1960	1910	2120	e2250	e1750	e1550	4710	6810	5440	12100	5070	3600
12	1970	1890	2140	e2200	e1800	e1600	4680	6720	5420	12100	4840	3530
13	2010	2020	2130	e2250	e1850	e1600	4830	6260	5410	12100	4710	3460
14	1980	2030	2200	e2250	e1800	e1600	5020	6120	5440	12000	4510	3430
15	1890	2060	2320	e2200	e1800	e1600	5000	5440	5420	11800	4450	3370
16	1940	1750	2320	e2150	e1800	e1650	4910	5050	5280	11800	4340	3340
17	1940	1780	2460	e2150	e1800	e1650	4910	4540	4980	11800	4250	3470
18	1940	1770	2290	e2150	e1750	e1650	4860	4050	4850	11600	4240	3360
19	1920	1790	e2000	e2150	e1700	e1700	4670	3690	4580	11300	4100	3370
20	1920	2290	e1800	e2150	e1650	e1700	4400	3310	4590	11200	4100	3470
21	1870	2250	e1900	e2150	e1600	1730	4180	3140	4480	10900	3860	3460
22	1780	2030	1950	e2150	e1600	1710	3870	2820	4180	10800	3840	3440
23	1790	2090	e1850	e2100	e1600	1780	3840	2910	4340	10600	3880	3450
24	1790	2070	e1600	e2100	e1600	1780	3910	2950	4700	10500	3920	3300
25	1930	2090	e1700	e2050	e1600	1710	4180	3170	5880	10200	3850	3510
26	1910	2100	e1850	e1950	e1550	1740	4620	3490	7390	10100	3870	3280
27	1830	1970	e2000	e1850	e1550	1960	4820	3620	7510	9830	4290	3390
28	1850	1630	e2050	e1900	e1550	2140	4750	3830	7320	9600	4150	3380
29	1820	1530	e2050	e1950	---	2460	5060	3830	6780	9390	4380	3280
30	1840	1520	e2050	e2000	---	2810	5030	4740	6420	9110	4670	3250
31	1830	---	2060	e2000	---	3280	---	5900	---	8830	4720	---
TOTAL	59670	57930	59430	68000	49650	54900	137680	160510	176800	317950	157190	110440
MEAN	1925	1931	1917	2194	1773	1771	4589	5178	5893	10260	5071	3681
MAX	2280	2290	2460	2550	2000	3280	5370	7230	7510	12100	8470	4660
MIN	1670	1520	1470	1850	1550	1550	3450	2820	4180	6250	3840	3250
AC-FT	118400	114900	117900	134900	98480	108900	273100	318400	350700	630700	311800	219100
CFSM	.26	.26	.26	.30	.24	.24	.63	.71	.81	1.40	.69	.50
IN.	.30	.29	.30	.35	.25	.28	.70	.82	.90	1.62	.80	.56

e Estimated.

MISSISSIPPI RIVER MAIN STEM

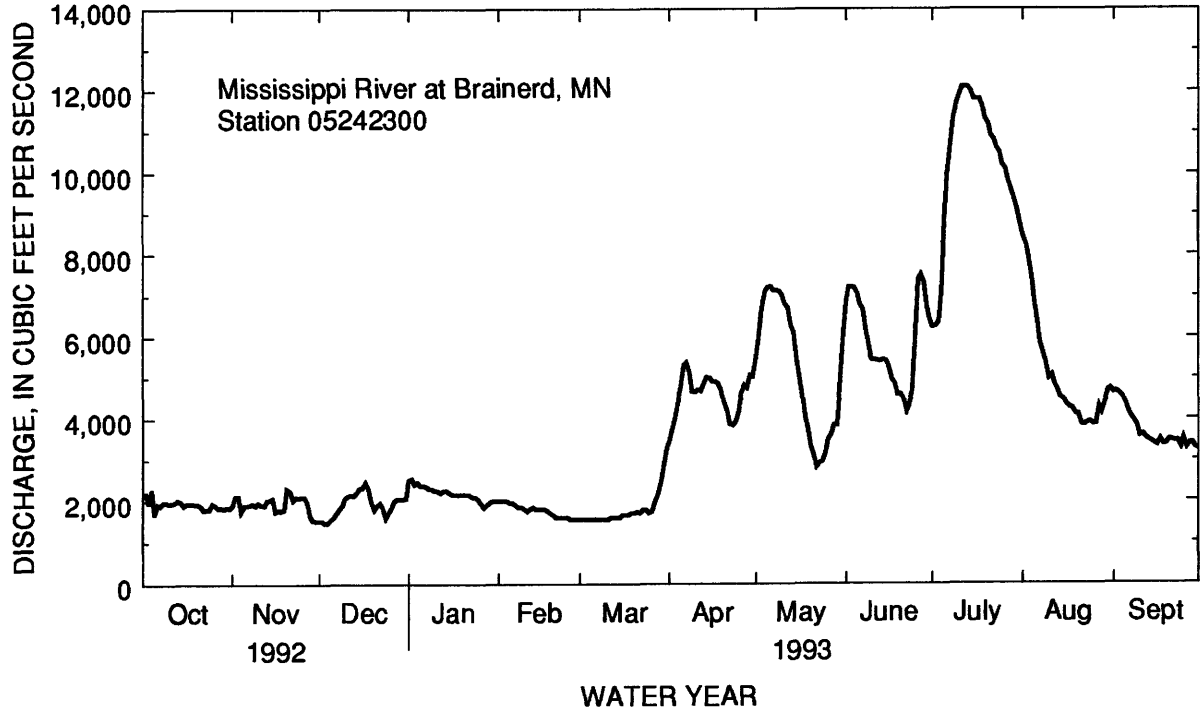
05242300 MISSISSIPPI RIVER AT BRAINERD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	2313	2434	2070	1953	1751	2164	4908	4633	3596	3617	1974	2373
MAX	2635	3430	3200	2728	2250	2732	8601	6923	6193	10260	5071	3681
(WY)	1991	1992	1992	1992	1989	1990	1989	1989	1990	1993	1993	1993
MIN	1840	1931	1362	1140	1040	1435	3400	1928	662	442	935	1166
(WY)	1992	1993	1991	1991	1991	1991	1990	1988	1988	1988	1990	1990

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1987 - 1993	
ANNUAL TOTAL	914012		1410150			
ANNUAL MEAN	2497		3863		2869	
HIGHEST ANNUAL MEAN					3863	1993
LOWEST ANNUAL MEAN					1950	1988
HIGHEST DAILY MEAN	7290	Apr 26	12100	Jul 11-13	12100	Jul 11[a] 1993
LOWEST DAILY MEAN	686	Jun 15	1470	Dec 3	348	Jul 30 1988
ANNUAL SEVEN-DAY MINIMUM	826	Jun 11	1510	Nov 29	357	Jul 29 1988
INSTANTANEOUS PEAK FLOW			12200	Jul 10	12200	Jul 10 1993
INSTANTANEOUS PEAK STAGE			13.65	Jul 10	13.65	Jul 10 1993
INSTANTANEOUS LOW FLOW			1260	Oct 7	273	Jul 12 1988
ANNUAL RUNOFF (AC-FT)	1813000		2797000		2079000	
ANNUAL RUNOFF (CFSM)	.34		.53		.39	
ANNUAL RUNOFF (INCHES)	4.64		7.17		5.33	
10 PERCENT EXCEEDS	4060		7220		5060	
50 PERCENT EXCEEDS	2260		2910		2250	
90 PERCENT EXCEEDS	1240		1650		1100	

a Jul 11-13, 1993.



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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40	45	e52	e45	e45	e48	e70	66	71	59	e80	78
2	40	48	e52	e45	e45	e49	e69	67	68	58	e79	77
3	41	50	e52	e44	e45	e50	e68	64	65	57	e78	75
4	40	51	e51	e44	e45	e52	e67	63	62	59	e77	74
5	40	51	e51	e44	e45	e53	e65	66	60	59	e76	73
6	41	50	e51	e44	e45	e55	e62	63	59	59	e75	73
7	41	49	e50	e43	e45	e57	e60	62	58	e58	e73	72
8	43	48	e50	e43	e46	e58	e58	64	59	e58	e72	71
9	44	48	e50	e44	e46	e60	57	65	61	e59	70	72
10	44	50	e50	e44	e46	e60	57	63	60	e60	69	74
11	42	50	e49	e44	e46	e59	57	62	60	e61	68	73
12	41	50	e49	e44	e46	e57	58	60	57	e63	69	73
13	41	e52	e49	e44	e46	e56	57	59	60	e66	70	73
14	41	e54	e49	e44	e46	e54	56	57	66	e70	72	76
15	41	e56	e48	e44	e46	e51	55	56	65	e75	74	76
16	41	e57	e48	e44	e46	e49	55	54	70	e78	74	76
17	42	e56	e48	e44	e47	e49	54	53	72	e83	74	75
18	42	e56	e48	e44	e47	e48	54	52	70	e84	75	73
19	42	e56	e48	e44	e47	e47	54	51	68	e80	73	72
20	42	e56	e47	e44	e47	e47	53	51	65	e77	72	73
21	41	e55	e47	e44	e47	e47	52	50	63	e75	73	73
22	41	e55	e47	e44	e47	e48	50	53	61	e75	74	74
23	44	e54	e47	e45	e47	e50	50	58	60	e76	77	73
24	44	e54	e46	e45	e47	e52	78	76	68	e77	77	73
25	44	e54	e46	e45	e47	e54	89	78	70	e78	77	72
26	45	e54	e46	e45	e47	e56	81	74	69	e80	78	72
27	44	e53	e46	e45	e48	e58	78	76	66	e80	77	72
28	44	e53	e45	e45	e48	e60	74	74	61	e81	77	73
29	44	e53	e45	e45	---	e61	71	71	58	e81	76	73
30	44	e52	e45	e45	---	e63	68	75	59	e80	80	73
31	44	---	e45	e45	---	e67	---	76	---	e80	79	---
TOTAL	1308	1570	1497	1373	1295	1675	1877	1959	1911	2186	2315	2207
MEAN	42.2	52.3	48.3	44.3	46.2	54.0	62.6	63.2	63.7	70.5	74.7	73.6
MAX	45	57	52	45	48	67	89	78	72	84	80	78
MIN	40	45	45	43	45	47	50	50	57	57	68	71
AC-FT	2590	3110	2970	2720	2570	3320	3720	3890	3790	4340	4590	4380
CFSM	.79	.98	.91	.83	.87	1.02	1.18	1.19	1.20	1.33	1.40	1.38
IN.	.91	1.10	1.05	.96	.91	1.17	1.31	1.37	1.34	1.53	1.62	1.54

e Estimated.

CROW WING RIVER BASIN

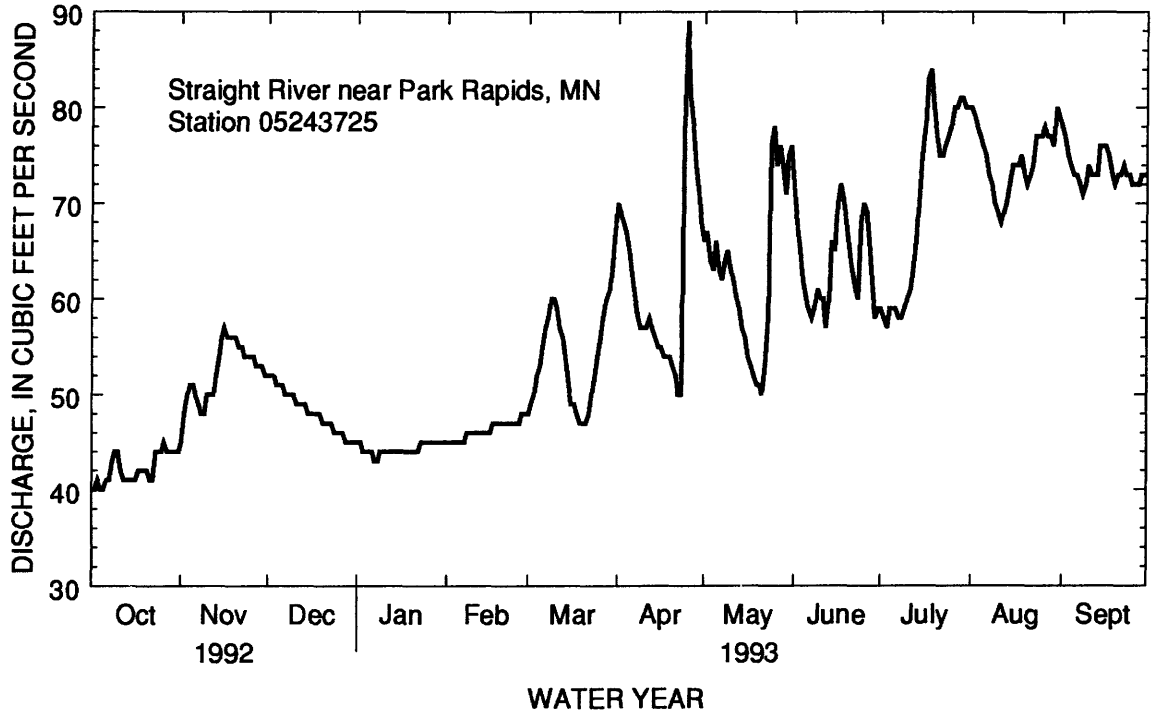
05243725 STRAIGHT RIVER NEAR PARK RAPIDS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	52.2	51.7	48.3	43.8	46.5	55.1	62.8	59.5	53.0	50.6	48.1	52.7
MAX	73.6	54.8	51.0	46.0	49.1	61.3	73.0	68.2	63.7	70.5	74.7	73.6
(WY)	1987	1988	1988	1989	1988	1988	1989	1987	1993	1993	1993	1993
MIN	42.2	47.4	46.0	41.9	44.8	50.9	56.1	46.2	41.9	39.5	35.9	38.7
(WY)	1993	1989	1989	1992	1992	1989	1991	1992	1992	1988	1990	1990

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1987 - 1993	
ANNUAL TOTAL	17481		21173			
ANNUAL MEAN	47.8		58.0		52.1	
HIGHEST ANNUAL MEAN					58.0	1993
LOWEST ANNUAL MEAN					48.0	1992
HIGHEST DAILY MEAN	67	Apr 20	89	Apr 25	89	Apr 25 1993
LOWEST DAILY MEAN	28	Jan 9	40	Oct 1-2,4-5	28	Jan 9 1992
ANNUAL SEVEN-DAY MINIMUM	37	Jun 8	40	Oct 1	34	Aug 5 1990
INSTANTANEOUS PEAK FLOW			93	Apr 25	93	Apr 25 1993
INSTANTANEOUS PEAK STAGE			2.00	Apr 25	2.71a	Nov 4 1991
INSTANTANEOUS LOW FLOW			38	Oct 1,2,3,4.5.6	25b	Jan 9 1992
ANNUAL RUNOFF (AC-FT)	34670		42000		37740	
ANNUAL RUNOFF (CFSM)	.90		1.09		.98	
ANNUAL RUNOFF (INCHES)	12.22		14.81		13.31	
10 PERCENT EXCEEDS	56		76		70	
50 PERCENT EXCEEDS	47		56		51	
90 PERCENT EXCEEDS	41		44		41	

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 estimated daily discharges, which are fair. Flow affected by natural storage in many lakes.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	258	224	e301	e253	e260	e272	e1150	825	1170	694	805	766
2	248	239	e300	e251	e261	e276	e900	952	1090	704	818	736
3	233	251	e300	e250	e262	e280	727	959	984	692	824	712
4	224	250	e298	e249	e262	e285	638	920	928	828	824	690
5	222	248	e296	e248	e263	e290	642	871	893	796	824	666
6	212	e245	e293	e247	e263	e295	651	829	870	725	812	647
7	212	e240	e292	e245	e265	e300	650	802	853	690	799	631
8	213	e250	e290	e243	e266	e301	660	862	850	680	767	603
9	217	e300	e288	e243	e268	e301	666	902	833	668	786	587
10	226	e370	e288	e243	e268	e301	650	890	785	645	782	575
11	232	e360	e287	e245	e269	e301	647	844	724	645	780	561
12	232	e330	e286	e247	e270	e301	642	798	677	620	778	543
13	250	e310	e284	e249	e270	e301	619	759	663	603	773	537
14	242	e290	e282	e250	e270	e301	595	728	655	590	786	566
15	227	e280	e280	e250	e270	e301	576	686	636	567	783	561
16	223	e315	e279	e250	e270	e301	564	645	688	610	761	544
17	222	e340	e278	e251	e270	e301	557	620	730	664	739	519
18	222	e340	e275	e251	e270	e301	551	590	707	646	745	502
19	221	e350	e273	e251	e270	e301	577	531	682	629	718	492
20	222	e350	e271	e252	e270	e301	570	484	669	622	704	515
21	226	e340	e270	e252	e270	e301	531	447	650	648	691	519
22	241	e330	e268	e253	e270	e301	476	432	629	660	691	522
23	249	e330	e266	e254	e270	e301	445	473	639	697	729	525
24	251	e320	e265	e255	e270	e305	608	905	675	722	710	526
25	244	e320	e263	e256	e270	e312	731	958	701	792	679	526
26	232	e330	e261	e257	e270	e330	697	936	699	824	690	529
27	237	e340	e260	e258	e270	e370	664	927	702	818	717	530
28	234	e340	e259	e259	e270	e450	666	913	692	824	694	547
29	228	e350	e258	e260	---	e600	687	879	682	818	674	556
30	223	e320	e257	e260	---	e900	743	1090	685	812	797	556
31	222	---	e255	e260	---	e1300	---	1220	---	812	798	---
TOTAL	7145	9202	8623	7792	7497	11381	19480	24677	22841	21745	23478	17289
MEAN	230	307	278	251	268	367	649	796	761	701	757	576
MAX	258	370	301	260	270	1300	1150	1220	1170	828	824	766
MIN	212	224	255	243	260	272	445	432	629	567	674	492
AC-FT	14170	18250	17100	15460	14870	22570	38640	48950	45310	43130	46570	34290
CFSM	.23	.30	.28	.25	.27	.36	.64	.79	.75	.69	.75	.57

e Estimated.

CROW WING RIVER BASIN

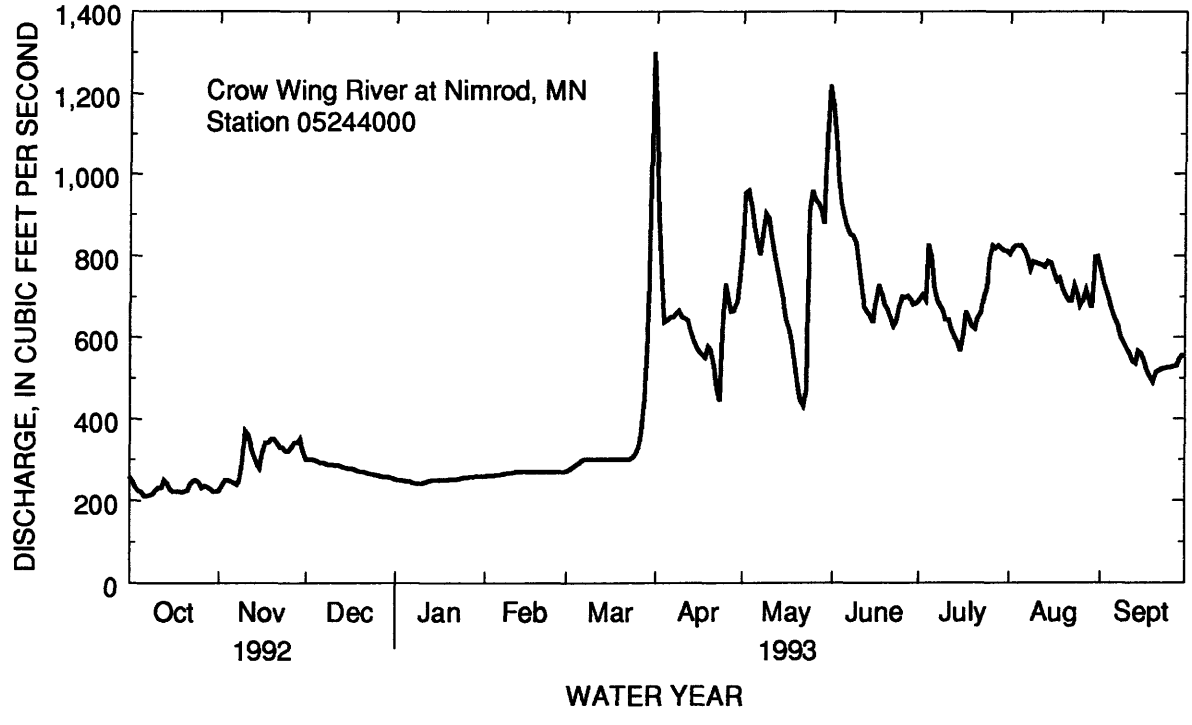
05244000 CROW WING RIVER AT NIMROD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	398	390	327	289	293	387	740	661	573	428	371	381
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 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1910 - 1993	
ANNUAL TOTAL	120322		181150			
ANNUAL MEAN	329		496		469	
HIGHEST ANNUAL MEAN					719	1966
LOWEST ANNUAL MEAN					230	1940
HIGHEST DAILY MEAN	602	Apr 24	1300	Mar 31	3580	Oct 10 1973
LOWEST DAILY MEAN	168	Jun 15	212	Oct 6	45	Aug 7 1936
ANNUAL SEVEN-DAY MINIMUM	180	Jun 10	218	Oct 4	55	Aug 3 1936
INSTANTANEOUS PEAK FLOW			1300	Mar 31	3700	Oct 10 1973
INSTANTANEOUS PEAK STAGE			5.60	Apr 1a	7.64	Apr 20 1950
INSTANTANEOUS LOW FLOW			207	Oct 6	45	Aug 7 1936
ANNUAL RUNOFF (AC-FT)	238700		359300		339500	
ANNUAL RUNOFF (CFSM)	.33		.49		.46	
10 PERCENT EXCEEDS	478		824		784	
50 PERCENT EXCEEDS	304		473		367	
90 PERCENT EXCEEDS	226		247		192	

a Backwater from ice.



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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e39	36	35	e24	e28	e25	e380	186	527	308	319	263
2	e38	41	35	e24	e28	e25	e370	203	494	306	311	257
3	e35	45	36	e24	e28	e25	e355	205	462	299	303	251
4	e34	48	35	e24	e28	e25	e340	206	451	311	295	249
5	e33	44	28	e24	e28	e25	e330	200	436	304	288	238
6	e33	35	27	e24	e28	e25	e320	188	404	292	283	231
7	32	38	26	e24	e28	e25	e310	180	358	298	277	223
8	33	36	26	e24	e27	e25	e315	216	328	323	272	227
9	34	45	26	e24	e27	e24	e295	260	306	448	269	218
10	34	53	27	e24	e27	e24	e285	278	285	546	265	211
11	34	52	28	e24	e26	e24	e270	287	266	546	258	206
12	33	52	28	e24	e26	e24	e260	291	247	491	252	200
13	32	48	28	e24	e26	e24	e245	280	237	475	244	200
14	32	31	29	e24	e26	e24	e230	244	258	484	247	199
15	32	41	29	e24	e26	e24	e220	218	254	492	249	195
16	34	48	29	e24	e26	e24	e210	200	249	495	253	192
17	35	47	e26	e24	e26	e24	e200	185	278	486	254	190
18	35	45	e24	e24	e26	e24	e190	172	322	470	271	187
19	35	44	e24	e24	e26	e24	e180	163	342	454	272	186
20	35	44	e24	e24	e26	e25	e170	154	380	437	271	204
21	36	46	e24	e25	e26	e28	165	145	397	417	275	210
22	37	46	e24	e26	e26	e30	167	148	391	399	270	208
23	38	41	e24	e27	e26	e33	160	184	382	390	275	208
24	37	48	e24	e27	e26	e36	166	308	382	381	285	206
25	37	45	e24	e27	e25	e42	178	352	383	378	283	205
26	37	33	e24	e28	e25	e56	190	377	371	372	289	208
27	36	38	e24	e28	e25	e68	205	388	352	365	293	211
28	36	37	e24	e28	e25	e74	204	417	335	355	284	211
29	35	39	e24	e28	---	e81	193	442	322	348	276	206
30	35	38	e24	e28	---	e110	184	478	318	338	274	202
31	35	---	e24	e28	---	e220	---	536	---	328	270	---
TOTAL	1081	1284	834	780	741	1267	7287	8091	10517	12336	8527	6402
MEAN	34.9	42.8	26.9	25.2	26.5	40.9	243	261	351	398	275	213
MAX	39	53	36	28	28	220	380	536	527	546	319	263
MIN	32	31	24	24	25	24	160	145	237	292	244	186
AC-FT	2140	2550	1650	1550	1470	2510	14450	16050	20860	24470	16910	12700
CFSM	.08	.10	.06	.06	.06	.09	.56	.60	.81	.92	.64	.49

e Estimated.

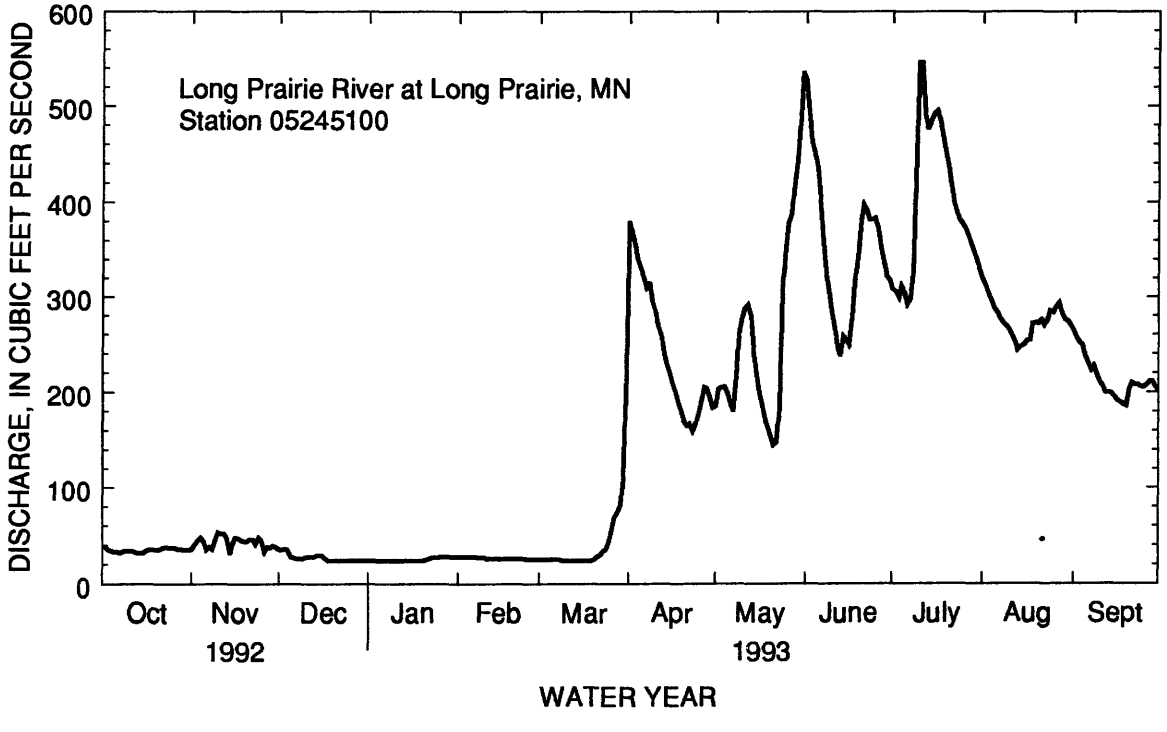
CROW WING RIVER BASIN

05245100 LONG PRAIRIE RIVER AT LONG PRAIRIE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1972 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	121	113	70.5	56.5	56.1	162	338	243	208	186	136	122
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1972 - 1993	
ANNUAL TOTAL	38294		59147			
ANNUAL MEAN	105		162		151	
HIGHEST ANNUAL MEAN					366	1972
LOWEST ANNUAL MEAN					25.2	1977
HIGHEST DAILY MEAN	589	Mar 12	546	Jul 10	2900	Jul 22 1972
LOWEST DAILY MEAN	24	Dec 18	24	Dec 18	.84	Jan 12 1977
ANNUAL SEVEN-DAY MINIMUM	24	Dec 18	24	Dec 18	.84	Jan 12 1977
INSTANTANEOUS PEAK FLOW			550	May 31	3270	Jul 22 1972
INSTANTANEOUS PEAK STAGE			5.24	Jul 10	9.37	Jul 22 1972
INSTANTANEOUS LOW FLOW			24	Dec 18	.84	Jan 12 1977
ANNUAL RUNOFF (AC-FT)	75960		117300		109600	
ANNUAL RUNOFF (CFSM)	.24		.38		.35	
10 PERCENT EXCEEDS	205		374		358	
50 PERCENT EXCEEDS	69		148		89	
90 PERCENT EXCEEDS	33		24		20	



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.

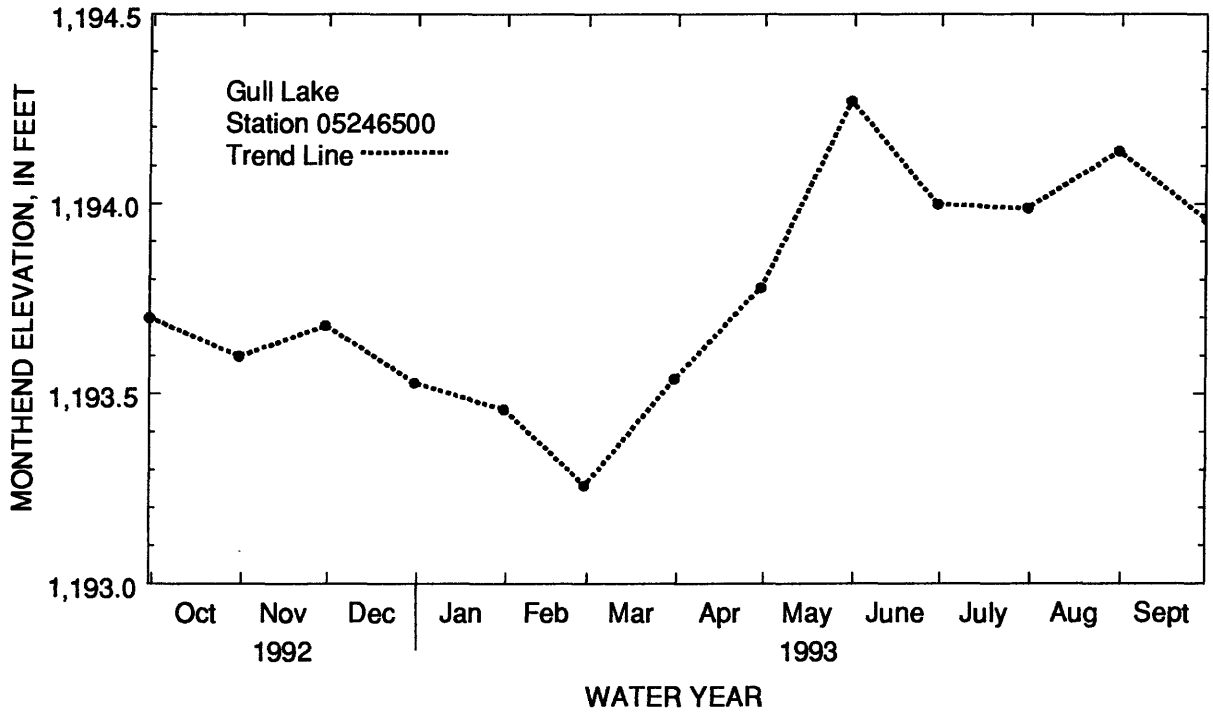
COOPERATION.--Records were provided by U.S. Army Corps of Engineers.

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, 64,680 acre-ft, June 1, elevation, 1,194.28 ft; minimum, 51,290 acre-ft, Mar. 7, elevation, 1,193.25.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1193.70	57110	
Oct. 31	1193.60	55810	-1300
Nov. 30	1193.68	56850	+1040
Dec. 31	1193.53	54910	-1940
CAL YR 1992			+3620
Jan. 31	1193.46	54000	-910
Feb. 28	1193.26	51420	-2580
Mar. 31	1193.54	55040	+3620
Apr. 30	1193.78	58160	+3120
May 31	1194.27	64550	+6390
June 30	1194.00	61020	-3530
July 31	1193.99	60890	-130
Aug. 31	1194.14	62850	+1960
Sept. 30	1193.96	60500	-2350
WTR YR 1993			+3390


1,194.5
1,194.0
1,193.5
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
1992
1993
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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	18	76	115	165	63	153	103	584	57	22	187
2	19	18	77	115	165	63	149	103	584	57	22	102
3	19	19	77	115	165	63	211	121	584	121	22	102
4	19	19	76	115	165	63	211	58	575	121	22	102
5	19	19	76	115	165	63	211	58	457	197	22	102
6	19	19	76	115	164	63	207	58	457	244	22	102
7	19	19	76	115	162	63	207	58	457	206	22	102
8	18	19	76	115	162	63	209	150	351	197	22	50
9	19	19	76	115	129	46	209	150	340	196	22	50
10	18	19	76	115	129	47	150	150	260	343	22	50
11	18	19	118	115	129	47	152	150	260	341	22	28
12	18	19	117	66	115	47	152	290	172	337	22	28
13	18	19	118	69	115	47	211	285	172	337	22	28
14	18	19	118	69	115	47	211	200	280	413	22	20
15	18	19	118	69	114	48	211	200	238	413	22	20
16	18	19	118	69	114	65	211	200	244	275	22	20
17	18	19	118	69	84	64	211	200	334	275	22	20
18	18	19	118	69	84	65	211	50	344	275	22	20
19	18	19	118	69	60	65	211	55	274	275	48	20
20	18	19	116	69	62	65	99	55	268	375	48	20
21	18	19	117	69	62	65	99	55	222	305	48	78
22	18	19	117	69	62	65	99	55	249	186	48	80
23	18	19	117	70	62	65	99	55	248	185	48	79
24	18	78	116	131	62	65	99	57	152	51	48	78
25	18	78	116	131	63	65	99	153	293	51	48	20
26	18	77	116	131	63	65	99	153	369	51	48	20
27	18	77	116	131	63	46	46	260	365	51	157	20
28	18	77	115	131	63	47	46	500	363	51	189	20
29	18	77	115	130	---	47	47	340	117	22	189	20
30	18	77	116	130	---	47	48	340	57	22	189	20
31	18	---	116	165	---	48	---	557	---	22	189	---
TOTAL	566	976	3216	3171	3063	1782	4578	5219	9670	6052	1693	1608
MEAN	18.3	32.5	104	102	109	57.5	153	168	322	195	54.6	53.6
MAX	19	78	118	165	165	65	211	557	584	413	189	187
MIN	18	18	76	66	60	46	46	50	57	22	22	20
AC-FT	1120	1940	6380	6290	6080	3530	9080	10350	19180	12000	3360	3190
CFSM	.06	.11	.36	.36	.38	.20	.53	.59	1.12	.68	.19	.19
IN.	.07	.13	.42	.41	.40	.23	.59	.68	1.25	.78	.22	.21

CROW WING RIVER BASIN

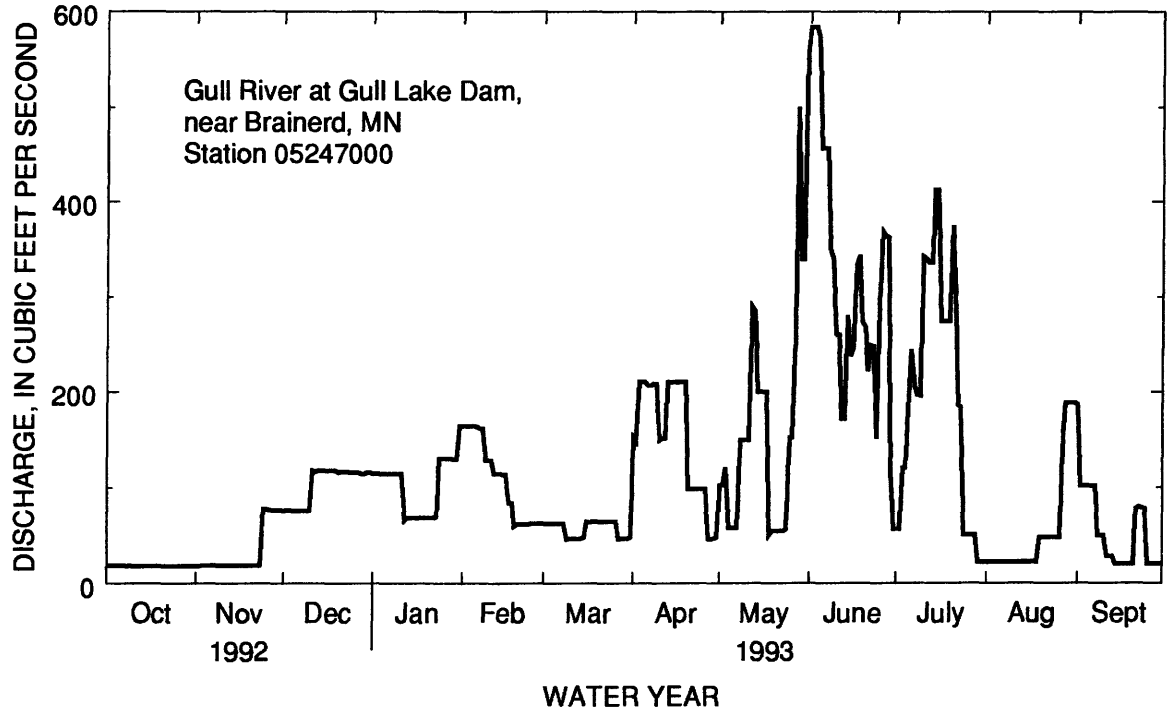
05247000 GULL RIVER AT GULL LAKE DAM, NEAR BRAINERD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1912 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	89.0	104	105	103	99.8	101	160	153	147	97.4	65.4	70.7
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR	
ANNUAL TOTAL	25072		41594	
ANNUAL MEAN	68.5		114	
HIGHEST ANNUAL MEAN				
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	400	Jun 20	584	Jun 1-3
LOWEST DAILY MEAN	18a		18	Oct 8,10 to Nov 2
ANNUAL SEVEN-DAY MINIMUM	18	Oct 10	18	Oct 10
ANNUAL RUNOFF (AC-FT)	49730	82500		
ANNUAL RUNOFF (CFSM)	.24	.40		
ANNUAL RUNOFF (INCHES)	3.25	5.39		
10 PERCENT EXCEEDS	146	263		
50 PERCENT EXCEEDS	47	76		
90 PERCENT EXCEEDS	19	19		

a Aug 13-14,Oct 8,10 to Nov 2.



CROW WIING RIVER BASIN

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

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1992, 1993.

WATER QUALITY DATA, WATER YEARS OCTOBER 1992 TO SEPTEMBER 1993

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)
NOV											
03...	1030	19	230	8.2	3.0	--	--	<0.010	<0.050	<0.010	<0.010
MAR											
15...	0915	48	260	7.9	0.0	--	2.1	<0.010	0.078	0.010	<0.010
JUL											
13...	1130	338	230	8.4	19.5	731	2.3	<0.010	<0.050	0.030	<0.010
SEP											
21...	1000	87	233	8.0	14.5	--	5.3	<0.010	<0.050	0.050	<0.010

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

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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	484	516	398	e528	e529	e445	3110	1930	6460	2550	2490	3030
2	537	528	542	e527	e527	e480	3520	2230	7130	2520	2310	3170
3	532	527	655	e527	e603	e518	4170	2570	7030	2560	2140	3020
4	529	623	653	e498	e635	e550	4800	2560	6440	2560	2060	2870
5	495	627	616	e477	e595	589	5140	2440	5850	2550	2180	2870
6	414	589	600	e477	e641	606	3900	2240	5520	2570	2310	2830
7	358	589	559	e477	e771	622	2830	2240	4560	2680	2340	2600
8	401	591	498	e453	e672	665	2670	2260	3990	2680	2160	2250
9	451	554	467	e478	e631	673	3010	2560	3680	2850	2070	2330
10	459	540	558	e478	e714	686	3070	2800	3460	3150	2100	2170
11	459	572	563	e478	e727	722	3010	2750	3490	3210	2100	2050
12	475	625	e602	e499	e704	775	2830	2660	3030	3310	2070	1860
13	482	650	e602	e527	e684	765	2530	2580	2850	3400	2000	1890
14	478	645	e602	e527	e683	702	2440	2450	2520	3690	1960	1730
15	481	624	e602	e502	e646	675	2380	2280	2460	3740	1970	1820
16	478	530	e602	e476	e495	683	2280	2060	2720	3720	2090	1940
17	479	472	e630	e476	e483	689	2120	1870	2510	3600	2120	1810
18	478	492	e581	e432	e485	684	2100	1860	2550	3330	2120	1680
19	478	579	e607	e410	e478	681	2090	1530	2740	3230	2520	2590
20	480	659	e605	e411	e478	672	1900	1440	2730	3180	2700	2800
21	506	649	e482	e411	e479	668	1600	1390	2960	3030	2700	1520
22	516	657	e414	e431	e460	614	1520	1290	2680	2980	2490	666
23	512	654	e459	e442	e479	601	1500	1390	2640	2980	2630	1320
24	513	644	e478	e443	e479	672	1500	3210	2870	2900	2820	1730
25	513	651	e478	e498	e478	762	1650	3790	2530	2830	3010	1620
26	515	646	e478	e529	e478	757	2160	4500	2600	2740	2920	1580
27	522	547	e478	e529	e458	993	2250	4490	2710	2720	3200	1590
28	521	496	e478	e529	e399	1220	2000	5050	2710	2690	3210	1630
29	524	493	e507	e529	---	1550	1970	5060	2670	2540	3190	1530
30	520	407	e527	e529	---	1980	1990	5130	2670	2520	3140	1540
31	520	---	e527	e530	---	2820	---	5550	---	2490	2890	---
TOTAL	15110	17376	16848	15058	15891	25519	78040	86160	108760	91500	76010	62036
MEAN	487	579	543	486	568	823	2601	2779	3625	2952	2452	2068
MAX	537	659	655	530	771	2820	5140	5550	7130	3740	3210	3170
MIN	358	407	398	410	399	445	1500	1290	2460	2490	1960	666
AC-FT	29970	34470	33420	29870	31520	50620	154800	170900	215700	181500	150800	123000
CFSM	.15	.18	.16	.15	.17	.25	.79	.84	1.10	.89	.74	.63
IN.	.17	.20	.19	.17	.18	.29	.88	.97	1.23	1.03	.86	.70

e Estimated.

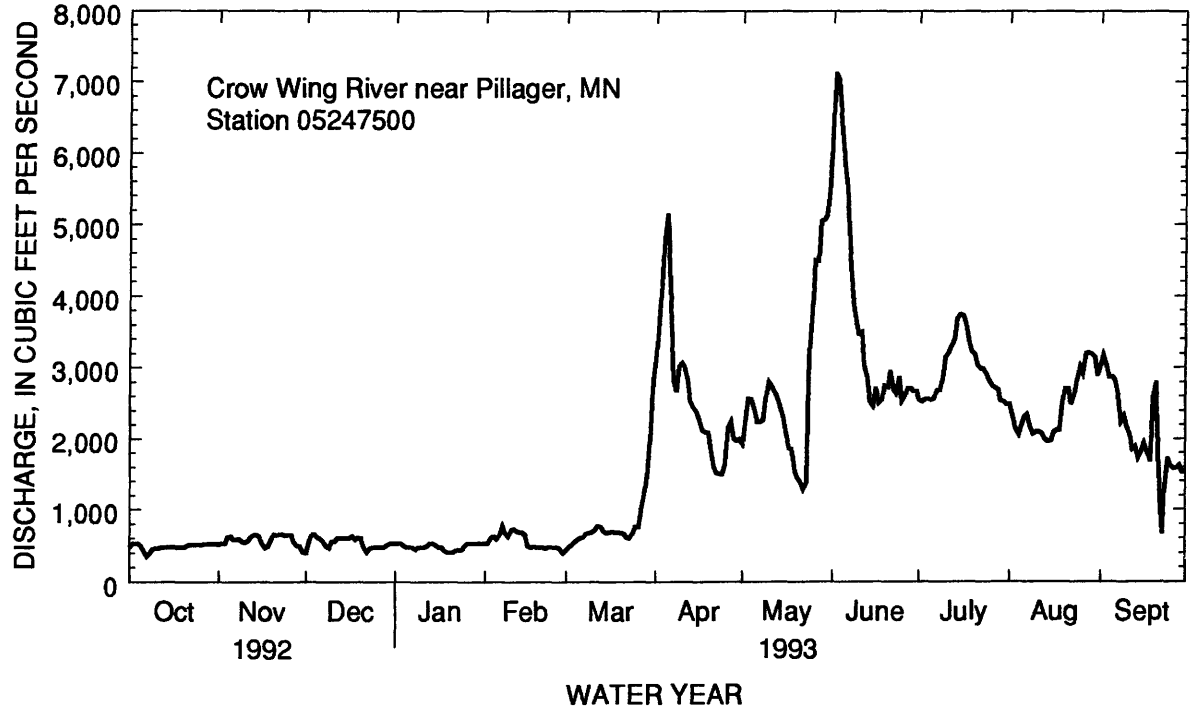
CROW WING RIVER BASIN

05247500 CROW WING RIVER NEAR PILLAGER, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1969 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1131	1130	756	626	632	1254	3038	2238	1638	1330	918	900
MAX	3771	3674	1544	1188	1125	2996	7429	5671	3625	3295	3520	3309
(WY)	1974	1972	1972	1986	1986	1972	1969	1986	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1969 - 1993	
ANNUAL TOTAL	322120		608308			
ANNUAL MEAN	880		1667		1300	
HIGHEST ANNUAL MEAN					2564	1972
LOWEST ANNUAL MEAN					446	1977
HIGHEST DAILY MEAN	2840	Mar 11	7130	Jun 2	16600	Apr 12 1969
LOWEST DAILY MEAN	358	Oct 7	358	Oct 7	60	Aug 10 1976
ANNUAL SEVEN-DAY MINIMUM	431	Oct 6	426	Jan 18	68	Aug 9 1976
INSTANTANEOUS PEAK FLOW			7360	Jun 2		
INSTANTANEOUS PEAK STAGE			7.07	Jun 2		
ANNUAL RUNOFF (AC-FT)	638900		1207000		941900	
ANNUAL RUNOFF (CFSM)	.27		.51		.39	
ANNUAL RUNOFF (INCHES)	3.63		6.86		5.35	
10 PERCENT EXCEEDS	1460		3180		2740	
50 PERCENT EXCEEDS	674		1390		839	
90 PERCENT EXCEEDS	492		478		405	



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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2760	2480	e1950	e2950	e2600	e2240	7240	7640	13400	9320	10900	7310
2	2860	2670	e1850	e3000	e2650	e2230	7450	8530	14400	9290	10500	7500
3	2880	2570	e1800	e3000	e2650	e2220	8430	9520	14600	9350	9920	7320
4	2910	2510	e1750	e3000	e2650	e2210	9410	10000	14300	9740	9370	7030
5	2660	2760	e1850	e2950	e2650	e2200	10100	10200	13800	11200	8900	6930
6	2640	2620	e2000	e2900	e2600	e2200	10400	9890	12900	12700	8560	6710
7	2480	2620	e2200	e2900	e2600	e2200	9320	9800	12000	13800	8070	6460
8	2430	2630	e2350	e2850	e2550	e2200	8330	9820	11300	14500	7670	6060
9	2580	2600	e2550	e2800	e2550	e2200	8320	10000	10500	15300	7350	5940
10	2580	2560	e2700	e2750	e2550	e2200	8180	10300	9660	15900	7020	5660
11	2580	2590	e2700	e2700	e2500	e2250	8380	10100	9400	16400	6970	5580
12	2580	2690	e2700	e2700	e2500	e2250	8050	9810	9030	16400	6760	5370
13	2630	2760	e2750	e2750	e2500	e2250	7910	9460	8670	16600	6570	5360
14	2590	2940	e2800	e2900	e2450	e2250	8090	9040	8330	16600	6340	5190
15	2490	2760	e2800	e2850	e2450	e2250	8010	8340	8200	16500	6300	5110
16	2500	2500	e2850	e2800	e2450	e2250	7930	7630	8380	16500	6240	5210
17	2510	2320	e2800	e2800	e2400	e2250	7670	6900	7920	16300	6150	5280
18	2500	2330	e2700	e2800	e2400	e2250	7510	6430	7800	15800	6250	5030
19	2510	2650	e2550	e2800	e2400	e2250	7460	5700	7640	15200	6330	5490
20	2510	3170	e2500	e2800	e2400	e2250	6970	5190	7640	15000	6390	6320
21	2510	3110	e2400	e2800	e2350	e2250	6490	5020	7780	14500	6300	5290
22	2490	2950	e2550	e2800	e2350	e2250	6050	4440	7360	14300	6130	4290
23	2470	2930	e2450	e2800	e2250	e2300	5860	4540	7050	14000	6190	4560
24	2470	2950	e2200	e2750	e2250	e2300	5850	6230	7830	13700	6340	4960
25	2470	e2900	e2050	e2700	e2250	e2300	5990	7540	8480	13300	6450	5100
26	2590	e2700	e2400	e2650	e2250	e2300	6910	8540	9970	13000	6500	4910
27	2460	e2300	e2550	e2550	e2250	e2320	7540	8920	10600	12700	7020	4950
28	2460	e2100	e2600	e2500	e2250	e3010	7240	9280	10600	12400	6990	5080
29	2460	e2050	e2600	e2500	---	e4240	7450	9330	10000	11900	7130	4870
30	2440	e2000	e2600	e2500	---	5170	7470	9950	9630	11500	7390	4850
31	2450	---	e2750	e2550	---	6280	---	11700	---	11200	7070	---
TOTAL	79450	78720	75300	86100	68700	79320	232010	259790	299170	424900	226070	169720
MEAN	2563	2624	2429	2777	2454	2559	7734	8380	9972	13710	7293	5657
MAX	2910	3170	2850	3000	2650	6280	10400	11700	14600	16600	10900	7500
MIN	2430	2000	1750	2500	2250	2200	5850	4440	7050	9290	6130	4290
AC-FT	157600	156100	149400	170800	136300	157300	460200	515300	593400	842800	448400	336600
CFSM	.23	.24	.22	.25	.22	.23	.70	.76	.91	1.24	.66	.51

e Estimated.

MISSISSIPPI RIVER MAIN STEM

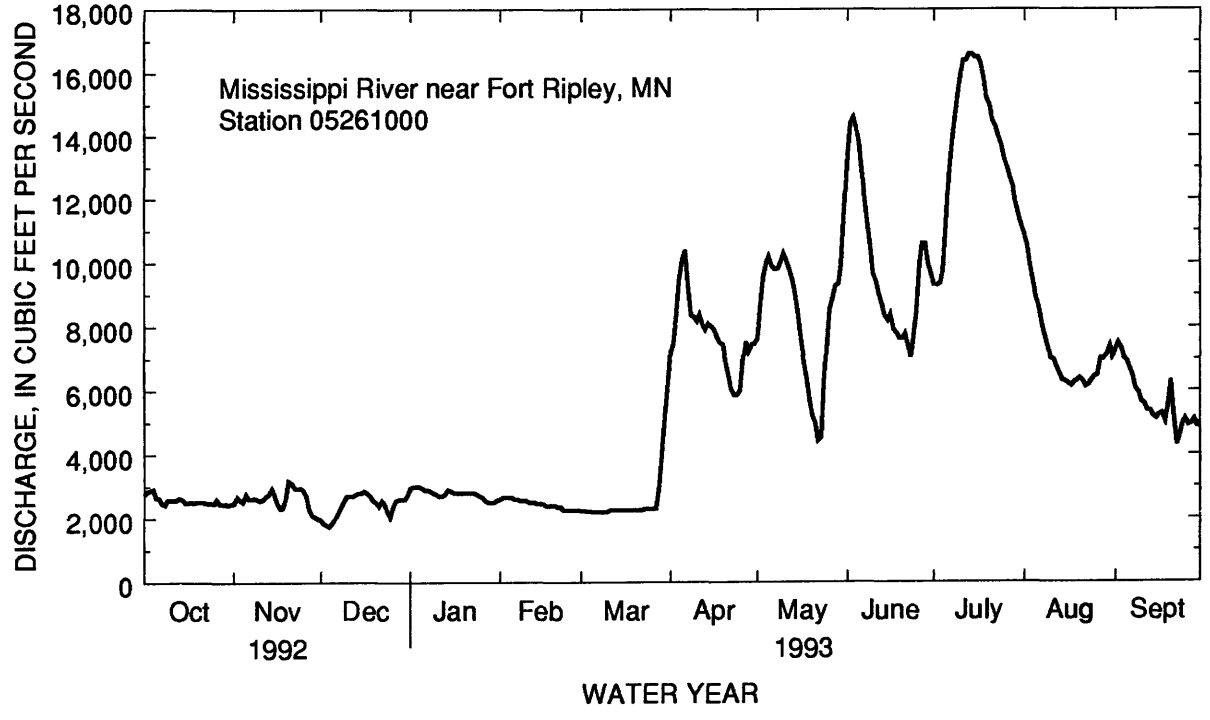
05261000 MISSISSIPPI RIVER NEAR FORT RIPLEY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3062	3194	2595	2401	2262	3704	7480	6987	5286	4933	2902	3357
MAX	3343	4244	3848	3387	2707	6042	12210	9403	9972	13710	7293	5657
(WY)	1989	1992	1992	1992	1992	1990	1989	1991	1993	1993	1993	1993
MIN	2563	2624	1827	1518	1508	2559	5510	3025	1196	729	1517	1769
(WY)	1993	1993	1991	1991	1991	1993	1990	1988	1988	1988	1989	1990

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1987 - 1993	
ANNUAL TOTAL	1326860		2079250			
ANNUAL MEAN	3625		5697		4053	
HIGHEST ANNUAL MEAN					5697	1993
LOWEST ANNUAL MEAN					2813	1988
HIGHEST DAILY MEAN	10600	Apr 27	16600	Jul 13	16600	Jul 13 1993
LOWEST DAILY MEAN	1390	Jun 16	1750	Dec 4	558	Jul 30 1988
ANNUAL SEVEN-DAY MINIMUM	1590	Jun 10	1890	Nov 30	626	Jul 24 1988
INSTANTANEOUS PEAK FLOW			16700	Jul 14	16700	Jul 14 1993
INSTANTANEOUS PEAK STAGE			9.95a	Dec 18	10.30	Mar 18 1990
INSTANTANEOUS LOW FLOW			1850	Dec 4	528	Jul 30 1988
ANNUAL RUNOFF (AC-FT)	2632000		4124000		2936000	
ANNUAL RUNOFF (CFSM)	.33		.52		.37	
10 PERCENT EXCEEDS	5880		11000		7670	
50 PERCENT EXCEEDS	3000		4540		3020	
90 PERCENT EXCEEDS	2060		2250		1590	

a Backwater from ice.



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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2920	2890	2030	3050	2990	2470	10100	8690	15100	10600	11800	8350
2	3440	3270	2340	3330	2680	2370	10600	9900	16300	10500	11600	8700
3	3000	3150	2800	3120	2940	2370	11500	10400	16300	11100	10600	8330
4	3210	2870	2650	3120	2840	2480	13100	10600	15900	11500	10400	7910
5	3120	3220	2400	3110	2960	2680	11900	10700	15300	12600	9590	8410
6	2820	3180	2410	3140	2910	2470	11200	10700	14500	14400	9730	7950
7	2940	2910	2680	2960	2960	2540	10200	11200	13700	16000	9060	7920
8	2530	3200	2620	3150	3060	2680	8610	11400	12800	16700	8680	7200
9	2700	2970	2760	3200	2990	2860	8570	11800	11900	17700	8290	7140
10	2880	3080	2920	3040	2920	2850	8230	12000	11000	18100	7940	6550
11	2780	2830	2630	3040	3120	2780	8660	11800	10400	19000	7790	6270
12	2930	3320	2740	2890	2990	2700	9450	11400	10200	18600	7530	6030
13	2790	3060	3220	3210	3000	2860	10300	11100	9710	19000	7390	6050
14	3030	3540	3100	3310	2910	2900	9230	10500	9380	18600	7410	5880
15	2790	3320	3200	3070	3160	2770	9880	9930	8990	18500	7010	5510
16	2680	3120	3400	3040	2920	2780	9730	8730	9480	18300	6660	5760
17	2700	2790	3080	3080	2840	2940	8990	8010	9170	17900	6650	5930
18	2760	2800	2470	3120	2680	2650	8950	7160	8990	17500	7170	5520
19	2690	2850	2390	2990	2770	2770	8630	6470	8600	16800	7210	5810
20	2850	3620	2400	3110	2750	2900	8360	5650	8720	16100	7110	7330
21	2760	3590	2470	3010	2590	2850	7580	5130	8870	15900	7160	6110
22	2690	3440	2810	2960	2830	2660	6820	4830	8790	15300	6870	4810
23	2690	3270	2120	2940	2470	2800	6540	4820	8090	15300	6970	4700
24	2920	3400	2400	2800	2640	2810	6570	6700	9190	14800	6800	5570
25	2710	3400	2460	3110	2420	2860	6890	9050	10500	14100	7140	5730
26	2750	3180	2470	3010	2770	3020	8130	10300	11500	13700	7180	5700
27	2960	3080	2570	2900	2570	3420	9400	11100	12500	13700	7920	5300
28	2610	2750	2710	3080	2520	4740	9560	11100	12100	13200	8020	5890
29	2790	2410	2640	3080	---	5230	9620	11200	11200	12600	8340	5250
30	2740	2300	2620	2940	---	6840	9620	11600	10600	12300	8740	5370
31	2530	---	2400	3170	---	9160	---	13800	---	12200	8610	---
TOTAL	87710	92810	81910	95080	79200	100210	276920	297770	339780	472600	253370	192980
MEAN	2829	3094	2642	3067	2829	3233	9231	9605	11330	15250	8173	6433
MAX	3440	3620	3400	3330	3160	9160	13100	13800	16300	19000	11800	8700
MIN	2530	2300	2030	2800	2420	2370	6540	4820	8090	10500	6650	4700
AC-FT	174000	184100	162500	188600	157100	198800	549300	590600	674000	937400	502600	382800
CFSM	.24	.27	.23	.26	.24	.28	.80	.83	.98	1.31	.70	.55
IN.	.28	.30	.26	.30	.25	.32	.89	.95	1.09	1.52	.81	.62

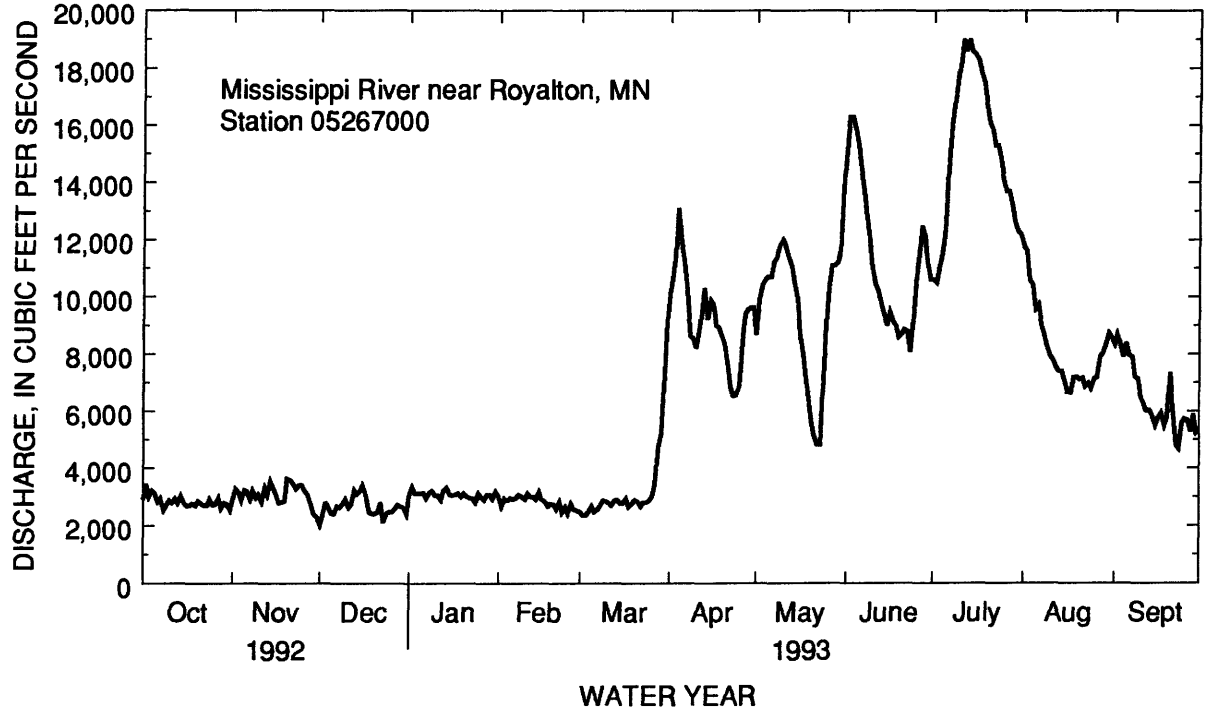
MISSISSIPPI RIVER MAIN STEM

05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1924 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3953	3740	2917	2604	2498	3634	8874	8444	6433	4667	3587	3523
MAX	12930	14640	6456	5713	5048	12290	22200	24600	18160	15250	15230	12940
(WY)	1966	1972	1952	1966	1984	1966	1966	1950	1965	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1924 - 1993	
ANNUAL TOTAL	1457950		2370340			
ANNUAL MEAN	3983		6494		4600	
HIGHEST ANNUAL MEAN					9555	1966
LOWEST ANNUAL MEAN					1213	1934
HIGHEST DAILY MEAN	12300	Apr 26	19000	Jul 11,13	37700	Apr 16 1965
LOWEST DAILY MEAN	1390	Aug 22	2030	Dec 1	254	Nov 25 1936
ANNUAL SEVEN-DAY MINIMUM	1760	Aug 17	2420	Nov 29	358	Sep 3 1936
INSTANTANEOUS PEAK FLOW			19000	Jul 11	37700	Apr 16 1965
INSTANTANEOUS LOW FLOW			2030	Dec 1	254	Nov 25 1936
ANNUAL RUNOFF (AC-FT)	2892000		4702000		3332000	
ANNUAL RUNOFF (CFSM)	.34		.56		.40	
ANNUAL RUNOFF (INCHES)	4.68		7.60		5.39	
10 PERCENT EXCEEDS	6340		12400		9560	
50 PERCENT EXCEEDS	3290		4830		3300	
90 PERCENT EXCEEDS	2360		2650		1270	



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, letter E indicates estimated value.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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												
30...	1100	1800	--	348	8.1	7.7	0.5	2.1	740	--	160	K3
FEB												
23...	1200	E1840	--	363	8.3	7.7	0.0	2.2	739	8.2	100	K17
APR												
14...	0945	8020	274	268	8.3	7.9	5.5	2.6	735	11.2	K7	K14
JUN												
08...	1005	12200	251	260	8.5	7.9	17.0	4.6	720	8.2	E250	40
18...	0859	E8100	--	--	--	--	--	--	--	--	--	--
SEP												
10...	1000	6040	--	310	--	8.1	--	2.0	--	--	K33	K34

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												
30...	40	14	7.5	1.8	159	160	0	194	12	5.4	0.10	7.3
FEB												
23...	45	15	7.4	1.9	170	176	0	207	9.9	5.4	0.10	11
APR												
14...	34	11	4.4	2.6	112	123	0	137	9.4	5.1	0.10	9.7
JUN												
08...	35	9.7	4.2	1.1	--	126	--	--	5.2	4.0	0.10	10
18...	--	--	--	--	--	--	--	--	--	--	--	--
SEP												
10...	42	13	5.2	1.5	177	155	0	216	5.6	4.4	0.20	13

MISSISSIPPI RIVER MAIN STEM

05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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 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, DIS-SOLVED (MG/L AS P) (00671)	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)
NOV											
30...	191	0.020	0.270	0.020	0.40	0.020	<0.010	0.020	7	80	--
FEB											
23...	208	0.020	0.380	0.120	0.70	0.030	0.010	0.010	4	80	<10
APR											
14...	162	0.010	0.220	0.030	1.5	0.340	0.020	0.010	5	100	<10
JUN											
08...	182	<0.010	0.120	0.050	0.70	0.050	0.070	0.020	--	--	<10
18...	--	--	--	--	--	--	--	--	14	96	--
SEP											
10...	187	<0.010	0.110	0.030	<0.20	<0.010	0.040	0.020	13	97	<10

DATE	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											
30...	--	--	--	--	--	--	--	--	--	--	--
FEB											
23...	46	<3	130	<4	60	<10	<1	<1	<1.0	94	<6
APR											
14...	40	<3	240	<4	28	<10	1	<1	<1.0	64	<6
JUN											
08...	42	<3	150	<4	54	<10	2	<1	<1.0	65	<6
18...	--	--	--	--	--	--	--	--	--	--	--
SEP											
10...	42	<3	210	<4	18	<10	<1	<1	<1.0	83	<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., Steams 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 current year. 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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	92	139	161	e107	e110	e94	1440	545	817	1800	674	639
2	93	173	159	e106	e110	e94	1710	634	817	1740	647	645
3	91	228	157	e103	e110	e94	1820	651	819	1690	629	621
4	83	228	e147	e101	e112	e95	1800	679	828	1660	609	600
5	80	217	e142	e100	e112	e95	1750	707	838	1710	586	571
6	86	209	e142	e100	e110	e97	1680	709	827	1760	556	546
7	92	198	e147	e100	e110	e98	1640	707	789	1850	528	513
8	109	193	e150	e100	e110	e100	1600	844	842	1920	517	486
9	120	191	e160	e100	e110	e102	1550	940	849	1870	510	469
10	135	205	e165	e103	e107	e105	1470	1010	786	1810	487	418
11	133	203	e170	e105	e104	e102	1400	1090	732	1730	462	384
12	133	202	e175	e110	e100	e101	1350	1140	680	1640	440	363
13	128	217	173	e110	e100	e101	1270	1140	644	1550	422	353
14	110	203	183	e109	e99	e100	1260	1110	626	1440	457	352
15	110	192	157	e107	e98	e101	1240	1040	562	1350	468	321
16	122	184	130	e102	e97	e102	1180	974	542	1260	444	304
17	129	186	126	e97	e96	e103	1140	923	588	1170	429	301
18	132	193	e120	e96	e96	e107	1100	901	581	1100	525	291
19	133	206	e117	e96	e96	e110	980	820	618	1040	525	280
20	142	222	e113	e99	e97	e120	920	758	688	960	501	367
21	147	224	e110	e102	e95	e130	913	695	701	890	489	395
22	148	211	e109	e107	e94	e150	856	631	715	833	541	426
23	161	204	e109	e110	e93	e200	785	613	855	826	688	447
24	158	211	e107	e112	e92	e250	726	709	1240	786	697	448
25	156	214	e107	e115	e92	e300	692	678	1440	780	736	443
26	160	215	e107	e116	e92	e350	632	657	1670	767	758	445
27	155	217	e109	e110	e92	e400	608	687	1850	706	814	440
28	157	198	e110	e108	e93	e450	589	718	1860	687	774	441
29	144	176	e110	e107	---	536	556	731	1820	625	734	428
30	138	159	e109	e104	---	795	522	765	1820	579	706	419
31	135	---	e108	e108	---	1090	---	821	---	596	670	---
TOTAL	3912	6018	4189	3250	2827	6672	35179	25027	28444	39125	18023	13156
MEAN	126	201	135	105	101	215	1173	807	948	1262	581	439
MAX	161	228	183	116	112	1090	1820	1140	1860	1920	814	645
MIN	80	139	107	96	92	94	522	545	542	579	422	280
AC-FT	7760	11940	8310	6450	5610	13230	69780	49640	56420	77600	35750	26090
CFSM	.14	.22	.15	.11	.11	.23	1.27	.87	1.03	1.36	.63	.47

e Estimated.

SAUK RIVER BASIN

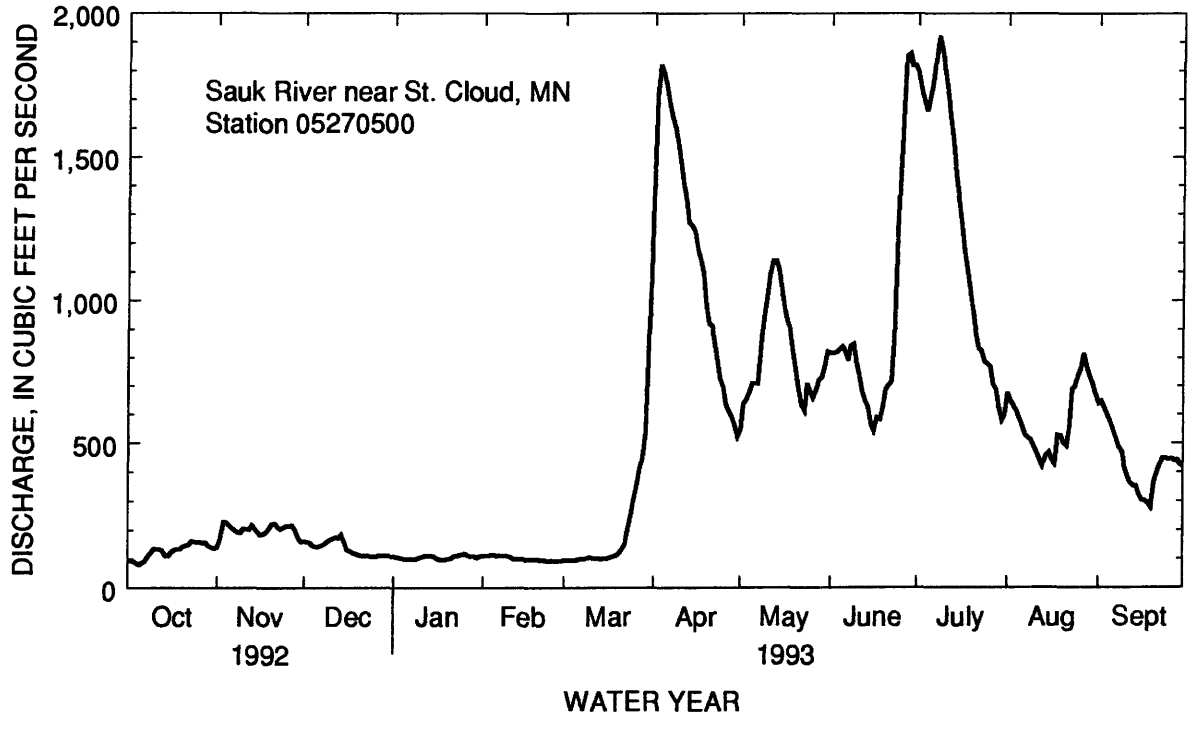
05270500 SAUK RIVER NEAR ST. CLOUD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	145	161	125	91.1	99.6	287	771	471	400	307	199	176
MAX	555	1091	528	336	568	1380	2810	1572	1333	1262	1250	1136
(WY)	1958	1972	1972	1980	1966	1966	1965	1975	1957	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1909 - 1993	
ANNUAL TOTAL	133408		185822			
ANNUAL MEAN	365		509		285[a]	
HIGHEST ANNUAL MEAN					732	1972
LOWEST ANNUAL MEAN					51.0	1931
HIGHEST DAILY MEAN	1310	Mar 11	1920	Jul 8	7940	Apr 14 1965
LOWEST DAILY MEAN	80	Oct 5	80	Oct 5	1.3	Jan 6 1935
ANNUAL SEVEN-DAY MINIMUM	88	Oct 1	88	Oct 1	1.5	Jan 2 1935
INSTANTANEOUS PEAK FLOW			1970	Jul 8	9100	Apr 13 1965
INSTANTANEOUS PEAK STAGE			5.28	Jul 8	10.68	Apr 13 1965
INSTANTANEOUS LOW FLOW			78	Oct 5	.30	Nov 25 1936
ANNUAL RUNOFF (AC-FT)	264600		368600		206700	
ANNUAL RUNOFF (CFSM)	.39		.55		.31	
10 PERCENT EXCEEDS	884		1250		676	
50 PERCENT EXCEEDS	210		352		125	
90 PERCENT EXCEEDS	127		100		34	

a Median of annual mean discharges is 244 ft^3/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 reservoirs.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3050	3430	e2350	e3500	e3250	e3000	12000	9320	15600	13400	12500	9400
2	3110	3310	e2250	e3550	e3350	3030	13100	10400	17100	13800	12300	9740
3	3350	3610	e2150	e3600	e3400	2930	13400	11400	17200	14000	11700	9410
4	3260	3550	e2100	e3600	e3400	2970	14600	12000	16800	14600	11100	9260
5	3310	3240	e2300	e3600	e3400	3180	14500	12300	16200	15400	10500	8520
6	3170	3830	e2500	e3600	e3400	3420	14800	11900	15400	16700	10200	8420
7	3260	2870	e2700	e3550	e3400	3020	13600	12000	14600	18000	9450	8230
8	3090	3520	e2900	e3500	e3350	3620	12500	12700	13800	18800	9240	7680
9	2740	3650	e3000	e3500	e3350	3670	12200	13000	13200	20000	8960	7440
10	3220	3700	e3100	e3500	e3300	3430	11800	13400	12100	20500	8310	7170
11	2880	3550	e3200	e3500	e3300	3370	11900	13200	11300	20900	8020	6770
12	3210	3710	e3200	e3500	e3300	3370	11700	12900	11200	20300	7910	6910
13	3180	3910	e3200	e3400	e3250	3330	11300	12400	10500	20400	7720	6700
14	3080	3590	e3200	e3400	e3250	3410	11100	11800	10200	20300	7860	6740
15	3300	3450	e3200	e3400	e3200	3180	11500	11200	9440	19900	7940	6150
16	2880	4000	e3200	e3400	e3200	2890	10900	9890	9710	19500	7420	6460
17	3050	3380	e3100	e3400	e3200	3140	10500	9330	10000	19200	7470	6560
18	2490	3780	e2950	e3400	e3150	3020	10400	8450	9620	18500	8390	6330
19	2510	3690	e2900	e3400	e3100	2870	10100	7940	9570	17800	7910	6180
20	3280	3880	e2800	e3400	e3100	2840	9050	6920	9760	17100	7840	7710
21	3040	4130	e2850	e3300	e3100	3080	8630	6490	9850	16500	7910	7560
22	3300	4380	e2900	e3300	e3050	2850	8150	6480	9790	16000	8050	6630
23	3400	4120	e2750	e3250	e3000	2870	7680	6200	10000	16100	8400	5540
24	2900	4020	e2550	e3200	e3000	2980	7200	7370	12300	15600	8380	6390
25	3370	4240	e2500	e3150	e3000	3500	7550	10000	13500	15400	8460	6600
26	3000	4020	e2800	e3100	e3000	3780	7280	11000	14500	14700	8540	6760
27	3140	2950	e3000	e3050	e3000	4910	8750	12300	15300	14800	9620	6110
28	3200	e2700	e3150	e2950	e3000	5860	9360	12000	15000	14000	9760	6670
29	3130	e2500	e3250	e2800	---	7200	8800	12300	14600	13400	9740	6260
30	3370	e2400	e3350	e3000	---	9450	8870	12600	13900	13100	10000	6170
31	3020	---	e3450	e3100	---	10800	---	14200	---	12900	9850	---
TOTAL	96290	107110	88850	103900	89800	120970	323220	333390	382040	521600	281450	216470
MEAN	3106	3570	2866	3352	3207	3902	10770	10750	12730	16830	9079	7216
MAX	3400	4380	3450	3600	3400	10800	14800	14200	17200	20900	12500	9740
MIN	2490	2400	2100	2800	3000	2840	7200	6200	9440	12900	7420	5540
AC-FT	191000	212500	176200	206100	178100	239900	641100	661300	757800	1035000	558300	429400
CFSM	.23	.27	.22	.25	.24	.29	.81	.81	.96	1.26	.68	.54

e Estimated.

MISSISSIPPI RIVER MAIN STEM

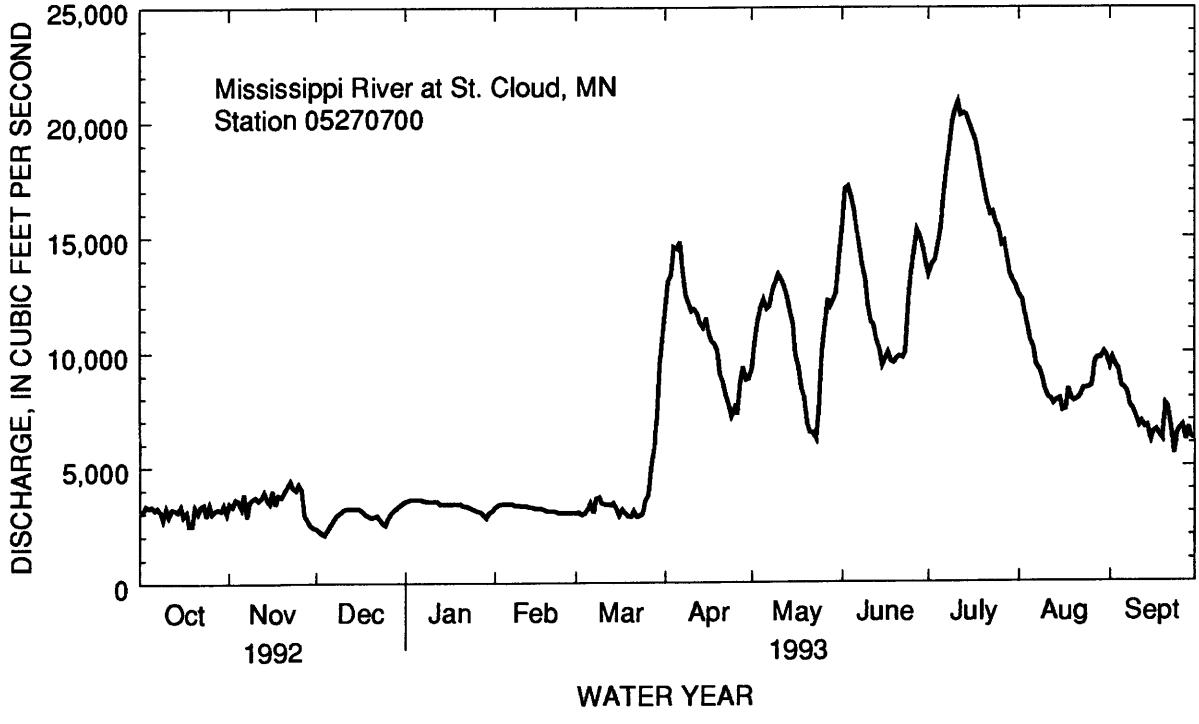
05270700 MISSISSIPI RIVER AT ST. CLOUD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3541	3755	3115	2936	2699	5221	10150	9786	7840	7657	3717	4947
MAX	4176	5161	5195	4624	3563	7557	15760	12480	12730	16830	9079	7360
(WY)	1991	1992	1992	1992	1992	1990	1989	1991	1993	1993	1993	1988
MIN	3106	2953	2310	1927	1815	3860	6576	6210	3743	3930	1535	2297
(WY	1993	1989	1991	1991	1990	1989	1990	1992	1992	1989	1989	1990

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1988 - 1993	
ANNUAL TOTAL	1680910		2665090			
ANNUAL MEAN	4593		7302		5415[a]	
HIGHEST ANNUAL MEAN					7302	1993
LOWEST ANNUAL MEAN					4615	1990
HIGHEST DAILY MEAN	13300	Apr 27	20900	Jul 11	20900	Jul 11 1993
LOWEST DAILY MEAN	1570	Aug 23	2100	Dec 4	1010	Aug 24 1989
ANNUAL SEVEN-DAY MINIMUM	2000	Aug 17	2290	Nov 29	1250	Aug 13 1989
INSTANTANEOUS PEAK FLOW			21700	Jul 11	21700	Jul 11 1993
INSTANTANEOUS PEAK STAGE			8.08	Jul 11	8.08	Jul 11 1993
INSTANTANEOUS LOW FLOW			484b	Oct 18	484[b]	Oct 18 1992
ANNUAL RUNOFF (AC-FT)	3334000		5286000		3923000	
ANNUAL RUNOFF (CFSM)	.34		.55		.41	
10 PERCENT EXCEEDS	7150		14500		11300	
50 PERCENT EXCEEDS	3930		6170		4000	
90 PERCENT EXCEEDS	2500		2960		2010	

a Median of annual mean discharges is 5081 ft^3/s.
b Result of regulation.



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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	103	e130	e125	e109	e108	612	230	443	679	220	528
2	74	126	e130	e125	e109	e107	613	259	419	634	208	537
3	75	148	e125	e123	e108	e106	594	267	422	590	191	512
4	75	156	e110	e122	e108	e107	573	267	436	584	176	481
5	72	151	e107	e122	e108	e108	534	280	428	547	164	449
6	74	146	e108	e121	e108	e108	484	291	400	528	156	418
7	86	139	e112	e120	e108	e108	445	288	376	542	148	385
8	115	134	e118	e120	e108	e107	450	318	376	609	157	353
9	131	132	e123	e119	e108	e107	444	379	360	597	244	326
10	127	146	e126	e119	e107	e108	420	408	353	564	218	304
11	119	156	e129	e118	e107	e108	418	457	359	561	189	288
12	113	156	e131	e118	e107	e107	423	506	370	510	183	274
13	108	156	e134	e118	e107	e108	410	545	386	478	191	257
14	105	148	e138	e118	e107	e108	406	526	393	439	220	244
15	105	144	e137	e117	e107	e108	423	476	374	388	263	226
16	101	156	e137	e116	e106	e108	419	421	355	344	249	205
17	99	142	e136	e115	e106	e108	401	389	439	319	235	190
18	101	137	e135	e115	e106	e109	378	410	437	307	267	181
19	102	143	e134	e114	e105	e110	356	365	393	291	314	177
20	100	151	e135	e114	e106	e111	330	329	371	275	295	238
21	98	152	e135	e113	e106	e108	309	307	345	260	272	278
22	99	149	e132	e113	e106	e109	286	295	325	249	281	280
23	97	147	e131	e112	e107	e111	268	309	320	250	276	277
24	96	144	e130	e113	e107	e120	259	384	388	243	259	273
25	99	140	e130	e113	e106	e150	250	413	395	252	262	263
26	99	152	e129	e110	e107	e200	238	416	385	248	291	254
27	102	e150	e128	e110	e106	e250	234	449	414	238	417	244
28	103	e140	e127	e109	e107	e300	235	473	490	230	439	234
29	102	e135	e127	e109	---	354	232	474	620	221	415	219
30	100	e130	e126	e109	---	428	224	469	706	210	427	210
31	101	---	e126	e109	---	539	---	475	---	208	477	---
TOTAL	3051	4309	3956	3599	2997	4828	11668	11875	12278	12395	8104	9105
MEAN	98.4	144	128	116	107	156	389	383	409	400	261	303
MAX	131	156	138	125	109	539	613	545	706	679	477	537
MIN	72	103	107	109	105	106	224	230	320	208	148	177
AC-FT	6050	8550	7850	7140	5940	9580	23140	23550	24350	24590	16070	18060
CFSM	.16	.23	.21	.19	.17	.25	.63	.62	.67	.65	.43	.49
IN.	.18	.26	.24	.22	.18	.29	.71	.72	.74	.75	.49	.55

e Estimated.

ELK RIVER BASIN

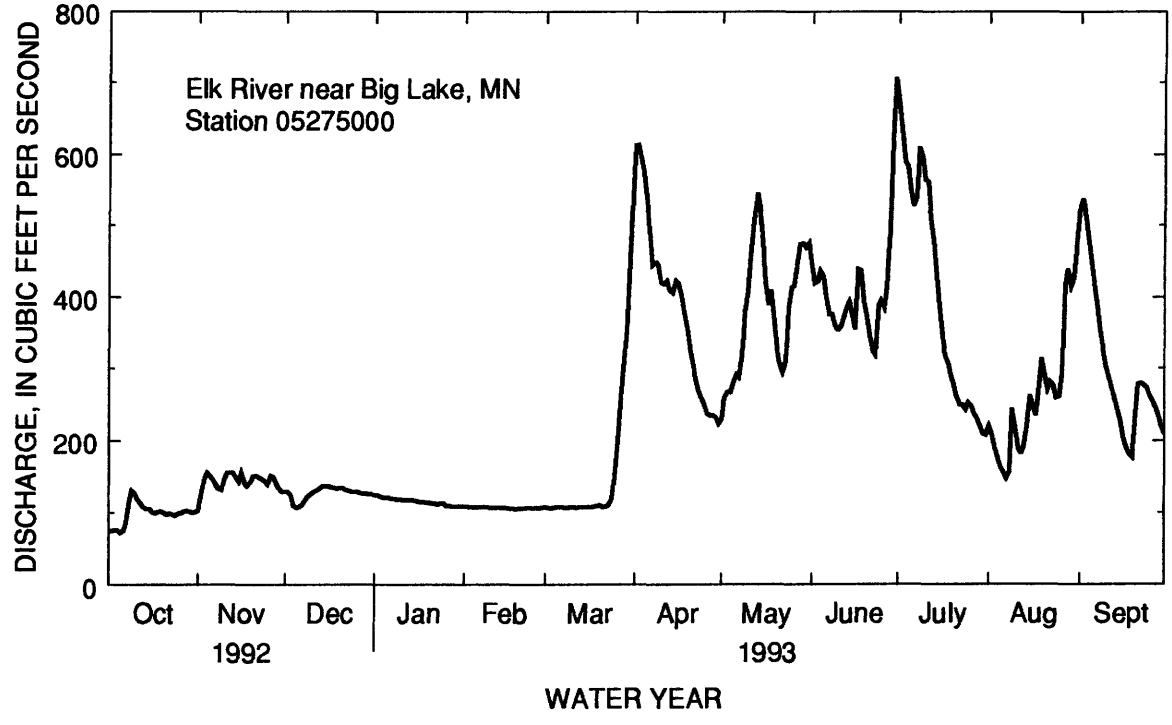
05275000 ELK RIVER NEAR BIG LAKE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1911 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	211	211	149	111	117	302	645	440	346	271	178	202
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1911 - 1993	
ANNUAL TOTAL	91075		88165			
ANNUAL MEAN	249		242		277[a]	
HIGHEST ANNUAL MEAN					669	1986
LOWEST ANNUAL MEAN					88.0	1935
HIGHEST DAILY MEAN	1720	Mar 11	706	Jun 30	7170	Apr 16 1965
LOWEST DAILY MEAN	72	Oct 5	72	Oct 5	4.0	Aug 1 1934
ANNUAL SEVEN-DAY MINIMUM	75	Sep 30	76	Oct 1	4.5	Jul 27 1934
INSTANTANEOUS PEAK FLOW			716	Jun 30	7360	Apr 16 1965
INSTANTANEOUS PEAK STAGE			2.97	Jun 30	10.86	Apr 16 1965
INSTANTANEOUS LOW FLOW			72	Oct 5	3.6	Jul 31 1934
ANNUAL RUNOFF (AC-FT)	180600		174900		200400	
ANNUAL RUNOFF (CFSM)	.40		.39		.45	
ANNUAL RUNOFF (INCHES)	5.51		5.33		6.11	
10 PERCENT EXCEEDS	483		462		555	
50 PERCENT EXCEEDS	178		181		164	
90 PERCENT EXCEEDS	101		107		66	

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



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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	463	611	e873	e360	e230	e216	3970	2660	2650	8020	3320	2670
2	445	627	e807	e355	e225	e216	4410	2640	2540	8100	3210	2600
3	423	662	e751	e345	e220	e216	4890	2610	2430	8170	3070	2510
4	400	715	e664	e340	e220	e216	5250	2580	2330	8560	2910	2420
5	377	746	e602	e335	e215	e216	5480	2540	2240	8880	2760	2310
6	359	768	e590	e325	e215	e216	5530	2490	2150	9180	2670	2200
7	357	791	e633	e320	e215	e216	5410	2500	2050	e9460	2600	2080
8	404	811	e731	e310	e215	e216	5290	2660	2020	e9930	2620	1960
9	503	831	e800	e305	e215	e216	5060	2950	2020	e9720	2650	1860
10	604	894	783	e300	e215	e216	4830	3400	2020	9240	2660	1760
11	670	994	e873	e295	e215	e216	4570	4140	2030	8750	2640	1680
12	699	1100	e800	e290	e215	e216	4520	4870	2000	8230	2550	1600
13	704	1160	724	e290	e215	e216	4400	5650	1990	7870	2420	1540
14	704	1180	695	e290	e215	e216	4320	6230	2000	7690	2320	1540
15	705	1190	690	e290	e215	e216	4260	6430	2000	7580	2310	1520
16	711	1200	e690	e285	e210	e216	4220	6400	2030	7430	2300	1460
17	704	1190	e690	e285	e210	e216	4220	6100	2630	7190	2300	1380
18	697	1190	e680	e280	e210	e216	4220	5720	2940	6840	2350	1310
19	669	1190	e670	e280	e210	e216	4170	5280	3450	6400	2540	1250
20	651	1190	e650	e280	e210	e216	4100	4870	4190	5940	2780	1340
21	633	1190	e610	e275	e210	e216	3990	4510	4830	5510	2990	1520
22	620	1190	e595	e270	e210	e220	3840	4200	5840	5130	3130	1660
23	607	1170	e560	e270	e210	e240	3660	3980	6780	4810	3190	1710
24	595	1160	e530	e265	e210	e270	3500	3810	7760	4530	3190	1740
25	583	1160	e510	e260	e210	e356	3330	3640	8310	4300	3190	1740
26	565	1160	e490	e255	e210	e549	3170	3470	8400	4090	3120	1740
27	550	e1070	e460	e250	e210	e1030	3030	3310	8260	3890	3060	1700
28	535	e934	e415	e245	e210	e1680	2910	3150	7960	3710	2980	1640
29	517	e911	e383	e240	---	2200	2820	2990	7890	3560	2900	1570
30	509	e903	e380	e235	---	2600	2730	2870	7910	3460	2830	1500
31	545	---	e370	e235	---	3540	---	2770	---	3360	2750	---
TOTAL	17508	29888	19699	8960	5990	17221	126100	121420	121650	209530	86310	53510
MEAN	565	996	635	289	214	556	4203	3917	4055	6759	2784	1784
MAX	711	1200	873	360	230	3540	5530	6430	8400	9930	3320	2670
MIN	357	611	370	235	210	216	2730	2490	1990	3360	2300	1250
AC-FT	34730	59280	39070	17770	11880	34160	250100	240800	241300	415600	171200	106100
CFSM	.22	.40	.25	.11	.08	.22	1.67	1.55	1.61	2.68	1.10	.71
IN.	.26	.44	.29	.13	.09	.25	1.86	1.79	1.80	3.09	1.27	.79

e Estimated.

CROW RIVER BASIN

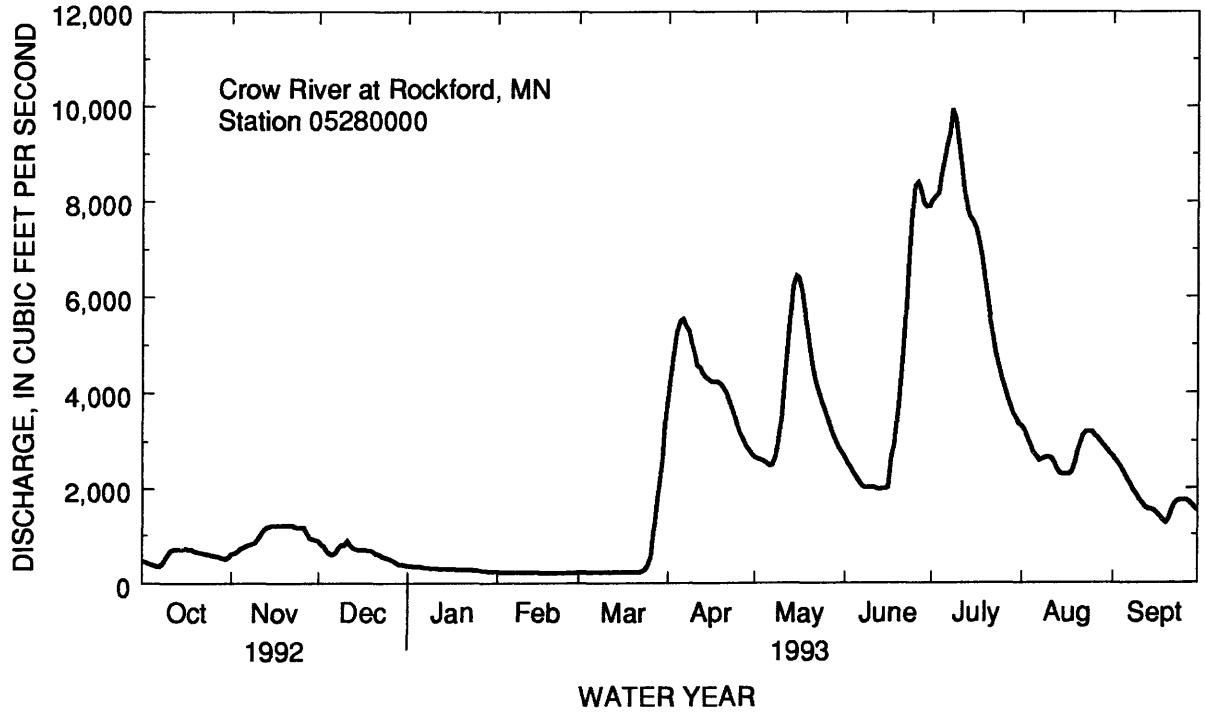
05280000 CROW RIVER AT ROCKFORD, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1906 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	424	396	276	161	156	814	2078	1378	1246	969	519	478
MAX	3809	1909	1477	928	1115	4085	9026	5992	6166	6759	2784	4941
(WY)	1986	1972	1983	1992	1966	1983	1965	1986	1906	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1906 - 1993	
ANNUAL TOTAL	485837		817786			
ANNUAL MEAN	1327		2241		772[a]	
HIGHEST ANNUAL MEAN					2754	1986
LOWEST ANNUAL MEAN					64.5	1931
HIGHEST DAILY MEAN	5860	Mar 9	9930	Jul 8	22100	Apr 16 1965
LOWEST DAILY MEAN	357	Oct 7	210	Feb 16	3.8	Aug 4 1934
ANNUAL SEVEN-DAY MINIMUM	395	Oct 2	210	Feb 16	4.0	Jul 31 1934
INSTANTANEOUS PEAK FLOW			10000	Jul 8	22400	Apr 16 1965
INSTANTANEOUS PEAK STAGE			13.23[b]	Jul 8	19.27[b]	Apr 16 1965
INSTANTANEOUS LOW FLOW			210[c]	Feb 16	1.8[d]	Nov 15 1936
ANNUAL RUNOFF (AC-FT)	963700		1622000		559300	
ANNUAL RUNOFF (CFSM)	.53		.89		.31	
ANNUAL RUNOFF (INCHES)	7.17		12.07		4.16	
10 PERCENT EXCEEDS	2450		5520		2120	
50 PERCENT EXCEEDS	960		1460		240	
90 PERCENT EXCEEDS	590		216		37	

a Median of annual mean discharges is 598 ft^3/s.
b From floodmark.
c Daily mean discharge occurred Feb. 16-18.
d 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.

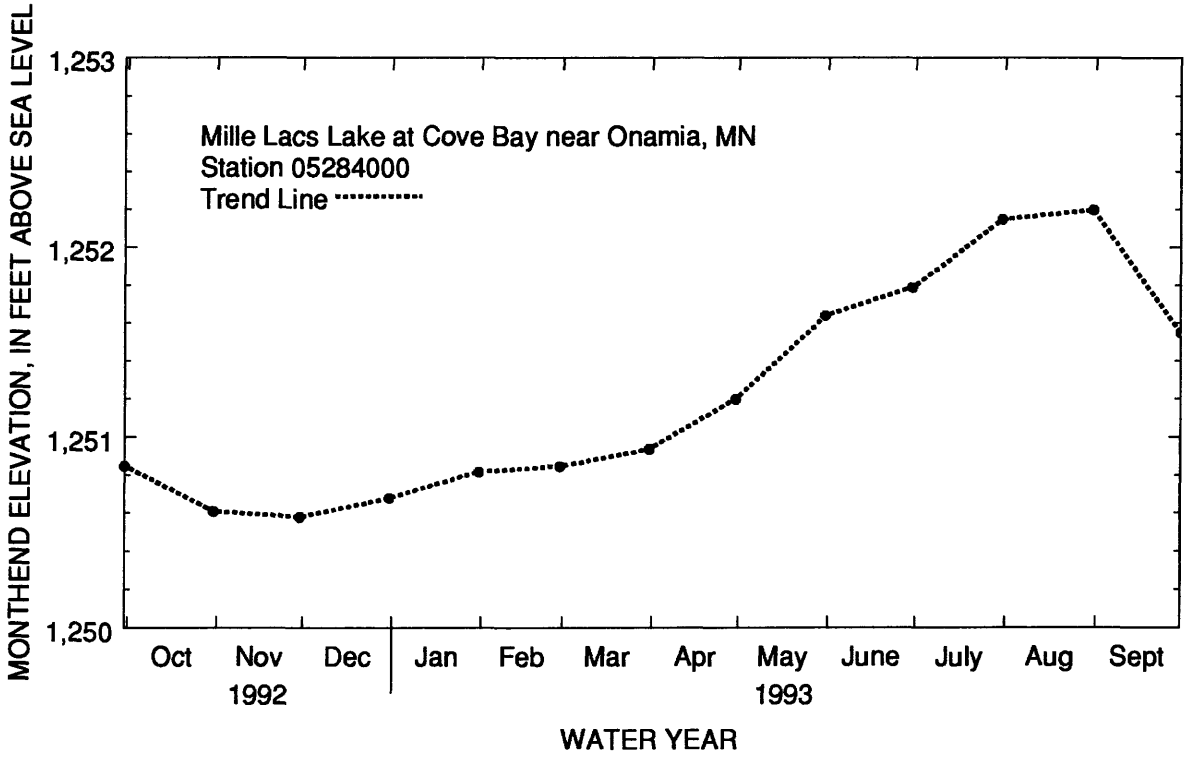
EXTREMES FOR PERIOD OF RECORD.--Maximum elevation, 1,253.87 ft, Aug. 14, 1972, affected by wind action and seiche action; maximum daily, 1,253.43 ft, Aug. 22, 1972; minimum observed, 1,245.74 ft, Oct. 16-19, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,252.77 ft, Aug. 18, affected by wind and seiche action; maximum daily, 1,252.27 ft, Aug. 27; minimum, 1,250.37 ft, Dec. 13, affected by wind and seiche action; minimum daily, 1,250.57 ft, Dec. 5, 6.

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

Oct. 31 ..... 1250.61	Feb. 28 ..... 1250.85	June 30 ..... 1251.79
Nov. 30 ..... 1250.58	Mar. 31 ..... 1250.94	July 31 ..... 1252.15
Dec. 31 ..... 1250.68	Apr. 30 ..... 1251.20	Aug. 31 ..... 1252.20
Jan. 31 ..... 1250.82	May 31 ..... 1251.64	Sept. 30 ..... 1251.55

Note--Elevations other than those shown are available.


MONTHEND ELEVATION, IN FEET ABOVE SEA LEVEL
1,253
1,252
1,251
1,250
Mille Lacs Lake at Cove Bay near Onamia, MN
Station 05284000
Trend Line
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
1992
1993
WATER YEAR

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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	167	229	e250	e201	e179	e167	1720	675	1140	2300	534	694
2	167	262	e250	e200	e177	e166	1770	684	1110	2390	514	694
3	167	297	e248	e200	e176	e166	1830	695	1140	2220	496	662
4	166	323	e245	e209	e175	e166	1800	717	1190	1910	479	635
5	162	334	e242	e200	e174	e167	1740	774	1210	1590	463	608
6	170	336	e240	e199	e175	e167	1610	827	1150	1440	459	582
7	195	330	e240	e196	e175	e166	1440	836	1030	1380	448	556
8	231	325	e239	e193	e173	e169	1300	802	918	1370	438	530
9	251	321	e232	e192	e173	e168	1220	776	831	e1320	469	509
10	266	332	e230	e193	e172	e167	1190	773	779	e1280	472	495
11	262	357	e225	e191	e172	e169	1240	778	766	e1250	461	477
12	257	370	e222	e190	e172	e167	1320	808	769	1210	441	461
13	251	380	e222	e190	e172	e165	1380	796	748	1200	432	484
14	248	383	e222	e189	e171	e168	1400	787	693	1240	453	469
15	229	359	e220	e189	e171	e165	1410	720	640	1210	469	458
16	225	341	e220	e187	e170	e164	1400	645	588	1150	465	446
17	220	348	e219	e187	e170	e163	1360	582	679	1090	469	450
18	221	337	e216	e186	e169	e166	1280	540	680	1030	526	449
19	223	337	e214	e185	e169	e169	1180	498	740	961	602	439
20	225	340	e213	e184	e169	e179	1090	467	772	892	616	463
21	224	343	e211	e182	e167	e190	1000	442	789	835	597	482
22	222	343	e210	e182	e168	e200	920	426	775	800	600	502
23	225	347	e210	e181	e167	e220	865	437	766	764	586	525
24	232	344	e209	e181	e168	e240	826	504	972	722	550	532
25	233	331	e209	e181	e168	307	788	607	1100	714	558	532
26	242	317	e208	e180	e168	358	742	723	1180	692	632	526
27	250	283	e206	e180	e166	495	721	875	1250	650	712	525
28	237	e269	e204	e180	e168	619	712	1020	1460	638	683	504
29	226	e260	e202	e179	---	862	698	1090	1770	616	651	474
30	221	e254	e202	e178	---	1220	678	1140	2090	579	667	448
31	221	---	e201	e178	---	1610	---	1170	---	558	684	---
TOTAL	6836	9732	6881	5843	4794	9665	36630	22614	29725	36001	16626	15611
MEAN	221	324	222	188	171	312	1221	729	991	1161	536	520
MAX	266	383	250	209	179	1610	1830	1170	2090	2390	712	694
MIN	162	229	201	178	166	163	678	426	588	558	432	439
AC-FT	13560	19300	13650	11590	9510	19170	72660	44850	58960	71410	32980	30960
CFSM.	16	.24	.16	.14	.13	.23	.90	.54	.73	.85	.39	.38

e Estimated.

RUM RIVER BASIN

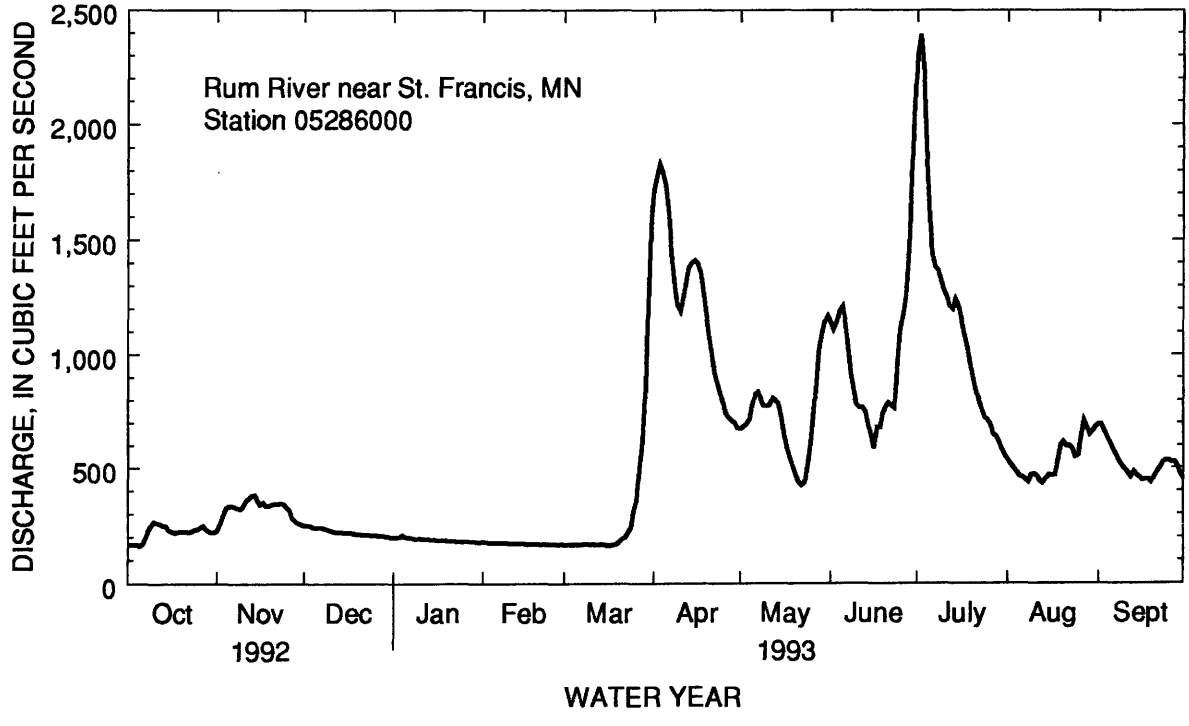
05286000 RUM RIVER NEAR ST. FRANCIS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	459	439	322	241	241	607	1501	1098	892	639	398	426
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1929 - 1993	
ANNUAL TOTAL	194582		200958			
ANNUAL MEAN	532		551		625	
HIGHEST ANNUAL MEAN					1512	1986
LOWEST ANNUAL MEAN					66.1	1934
HIGHEST DAILY MEAN	3750	Mar 14	2390	Jul 2	10000	Apr 13 1969
LOWEST DAILY MEAN	162	Oct 5	162	Oct 5	30	Aug 3 1934
ANNUAL SEVEN-DAY MINIMUM	168	Sep 30	165	Mar 12	31	Aug 1 1934
INSTANTANEOUS PEAK FLOW			2410	Jul 2	10100[a]	Apr 20 1965
INSTANTANEOUS PEAK STAGE			5.64	Jul 2	11.63	Apr 13 1969
INSTANTANEOUS LOW FLOW					29	Aug 18 1934
ANNUAL RUNOFF (AC-FT)	386000		398600		452700	
ANNUAL RUNOFF (CFSM)	.39		.40		.46	
10 PERCENT EXCEEDS	1280		1210		1360	
50 PERCENT EXCEEDS	311		441		350	
90 PERCENT EXCEEDS	222		170		110	

a Also occurred Apr. 13, 1969.



ELM CREEK BASIN

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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	18	e32	9.5	3.4	2.6	252	66	55	148	52	86
2	16	22	30	9.2	3.4	2.4	238	70	53	146	48	85
3	15	28	28	9.0	3.5	2.4	236	70	50	148	44	79
4	14	33	e26	8.0	3.7	2.6	221	69	46	210	40	74
5	14	35	e25	7.7	3.8	3.1	200	66	42	265	36	68
6	15	36	23	7.3	4.0	4.4	180	64	39	286	32	61
7	19	35	21	7.3	3.9	7.4	164	63	36	293	28	56
8	24	35	20	7.5	4.1	e10	158	69	41	296	32	52
9	29	35	19	7.3	4.2	e12	151	90	40	287	88	46
10	30	41	20	7.1	4.3	e14	141	100	38	268	139	42
11	30	48	20	6.9	4.3	e15	141	118	35	263	163	38
12	29	49	18	6.6	4.2	e17	141	123	32	242	170	35
13	30	50	18	6.8	4.1	e16	138	123	30	219	178	44
14	30	49	17	6.8	3.9	e15	137	120	28	198	189	53
15	28	e49	18	6.6	3.7	e14	138	112	26	176	214	55
16	32	51	19	6.8	3.6	e13	132	101	27	157	229	52
17	26	49	e18	6.6	3.6	e13	124	88	115	141	215	51
18	25	47	e19	6.6	3.4	e12	120	84	169	126	222	49
19	24	45	e18	6.2	3.3	12	126	74	217	116	242	47
20	23	46	e18	5.7	3.1	11	118	67	270	104	240	62
21	23	47	17	5.4	3.0	11	105	60	305	92	230	76
22	22	48	16	4.9	2.8	10	96	54	311	82	225	81
23	21	48	14	4.8	2.8	11	86	53	302	77	216	81
24	20	47	14	4.4	2.8	18	80	61	308	73	205	81
25	20	47	13	4.3	2.8	46	74	64	301	79	188	79
26	19	46	13	4.3	2.8	64	67	61	268	75	163	76
27	18	44	12	4.2	2.7	109	69	59	235	73	152	73
28	16	e41	11	3.7	2.6	182	71	57	204	69	133	68
29	17	40	11	3.9	---	227	69	53	176	61	120	63
30	16	34	10	3.9	---	238	65	53	162	55	110	58
31	16	---	9.9	3.8	---	258	---	57	---	53	98	---
TOTAL	679	1243	567.9	193.1	97.8	1372.9	4038	2369	3961	4878	4441	1871
MEAN	21.9	41.4	18.3	6.23	3.49	44.3	135	76.4	132	157	143	62.4
MAX	32	51	32	9.5	4.3	258	252	123	311	296	242	86
MIN	14	18	9.9	3.7	2.6	2.4	65	53	26	53	28	35
AC-FT	1350	2470	1130	383	194	2720	8010	4700	7860	9680	8810	3710
CFSM	.26	.49	.22	.07	.04	.52	1.59	.90	1.56	1.85	1.69	.73
IN.	.30	.54	.25	.08	.04	.60	1.77	1.04	1.74	2.14	1.95	.82

e Estimated.

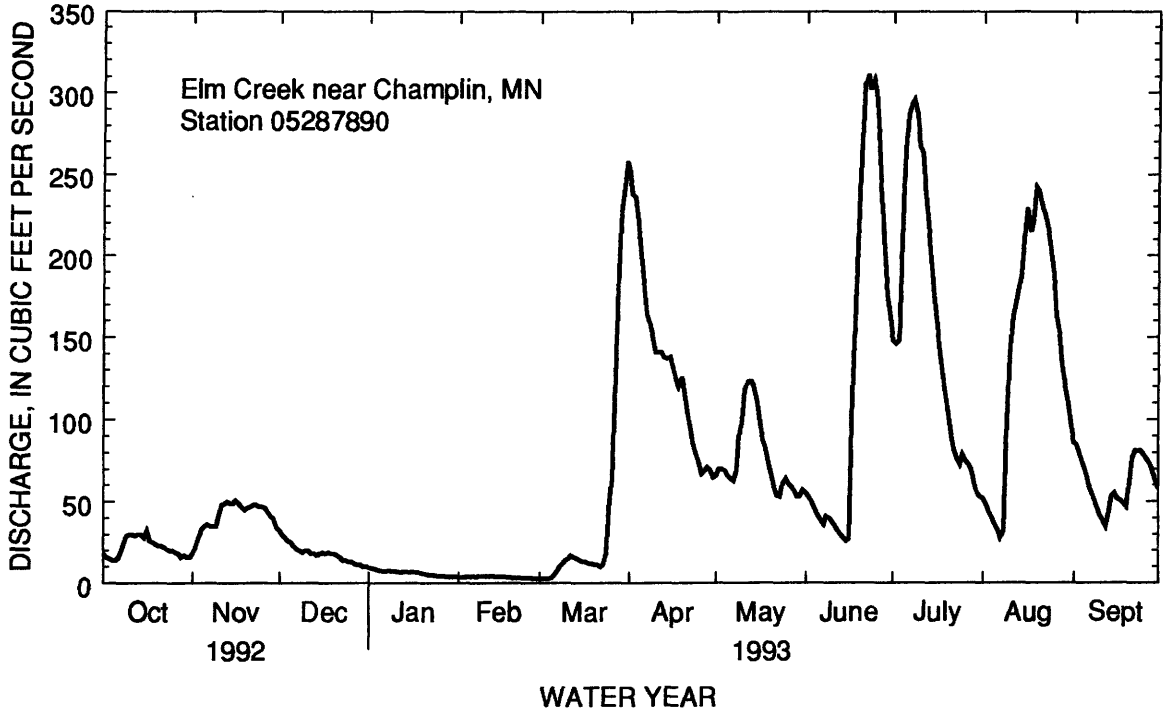
ELM CREEK BASIN

05287890 ELM CREEK NEAR CHAMPLIN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1979 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	29.5	17.5	11.5	5.88	10.9	68.7	86.7	53.6	43.9	35.5	29.0	33.0
MAX	229	62.7	41.3	22.0	99.1	182	221	146	140	157	143	170
(WY)	1986	1992	1992	1992	1984	1992	1986	1991	1991	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1979 - 1993	
ANNUAL TOTAL	14185.7		25711.7			
ANNUAL MEAN	38.8		70.4		35.6	
HIGHEST ANNUAL MEAN					75.1	1986
LOWEST ANNUAL MEAN					4.54	1988
HIGHEST DAILY MEAN	376	Mar 8	311	Jun 22	545	Mar 27 1986
LOWEST DAILY MEAN	2.2	Jun 6	2.4	Mar 2	.31	Jun 30 1988
ANNUAL SEVEN-DAY MINIMUM	2.6	Jun 6	2.6	Feb 26	.35	Jun 26 1988
INSTANTANEOUS PEAK FLOW			315	Jun 22	597	Mar 27 1986
INSTANTANEOUS PEAK STAGE			8.41	Jun 22	9.93	Mar 27 1986
INSTANTANEOUS LOW FLOW			2.3	Mar 2	.29	Jul 9 1989
ANNUAL RUNOFF (AC-FT)	28140		51000		25760	
ANNUAL RUNOFF (CFSM)	.46		.83		.42	
ANNUAL RUNOFF (INCHES)	6.22		11.27		5.69	
10 PERCENT EXCEEDS	82		204		105	
50 PERCENT EXCEEDS	20		46		10	
90 PERCENT EXCEEDS	7.8		4.3		1.4	



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 1992 TO SEPTEMBER 1993

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)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)
OCT									
13...	1300	30	482	7.9	9.0	720	8.8	33	1
NOV									
30...	1320	34	556	7.6	1.0	740	12.3	27	1
DEC									
15...	1050	18	595	7.8	1.0	731	11.0	33	7
JAN									
19...	1030	8.3	639	8.6	1.0	754	8.1	27	<1
FEB									
26...	1400	2.9	680	8.3	1.0	751	9.9	59	1
MAR									
23...	1025	10	642	7.5	1.0	747	10.8	37	1
APR									
01...	1030	233	368	8.2	1.0	742	10.1	37	22
13...	0850	183	427	7.9	4.5	745	9.5	43	15
28...	0745	71	522	7.8	11.0	740	7.5	50	8
MAY									
12...	0750	126	541	7.8	17.0	740	5.1	60	18
JUN									
15...	1445	26	544	7.4	19.0	742	8.5	42	2
JUL									
09...	0900	291	422	7.4	21.0	735	3.6	50	7
26...	1130	76	425	7.2	21.5	741	4.3	--	26
SEP									
08...	1400	51	428	8.1	15.5	--	6.8	56	12
29...	1630	84	452	7.9	9.5	748	9.1	38	3

ELM CREEK BASIN

05287890 ELM CREEK NEAR CHAMPLIN, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	RESIDUE VOLATILE, SUSPENDED (MG/L) (00535)	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 TOTAL (MG/L AS N) (00625)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)
OCT								
13...	1	--	--	--	1.0	0.120	0.080	--
NOV								
30...	--	--	--	--	0.80	0.070	<0.010	--
DEC								
15...	7	--	--	--	0.90	0.050	0.040	--
JAN								
19...	<1	--	--	--	0.90	0.040	0.020	--
FEB								
26...	<1	--	--	--	0.80	0.040	0.060	--
MAR								
23...	8	--	--	--	1.2	0.100	0.020	--
APR								
01...	9	--	--	--	1.3	0.210	0.090	--
13...	<1	--	--	--	1.0	0.090	0.060	--
28...	4	--	--	--	0.90	0.090	0.050	--
MAY								
12...	4	--	--	--	1.1	0.150	0.120	--
JUN								
15...	8	--	--	--	1.0	0.210	0.150	--
JUL								
09...	7	--	--	--	1.0	0.280	0.210	--
26...	9	<0.010	0.071	0.150	--	0.260	--	0.140
SEP								
08...	2	0.030	0.130	0.130	--	0.230	--	0.110
29...	--	0.010	0.140	0.080	--	0.110	--	0.080

ELM CREEK BASIN

05287890 ELM CREEK NEAR CHAMPLIN, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
OCT				
02...	1454	16	12	0.100
05...	0930	12	7	0.130
06...	1848	15	5	0.130
07...	1127	18	11	0.110
08...	0406	23	13	0.130
08...	2045	26	11	0.130
09...	1324	29	4	0.130
10...	0603	30	11	0.140
MAR				
24...	1100	15	35	0.350
25...	0339	39	27	0.320
26...	1257	61	26	0.310
27...	2215	141	42	0.330
28...	1454	194	34	0.310
30...	0012	235	30	0.250
APR				
01...	1848	256	28	0.190
03...	2045	233	31	0.190
06...	1521	177	19	0.140
07...	0800	166	22	0.140
08...	0039	161	54	0.140
08...	1718	158	131	0.150
11...	1154	142	19	0.120
12...	0433	142	20	0.120
JUN				
17...	0250	54	1050	0.950
17...	1839	138	794	0.570
19...	0357	196	31	0.260
20...	1315	273	26	0.230
21...	2233	312	17	0.220
23...	0751	303	11	0.200
26...	0227	282	16	0.250
28...	2103	191	16	0.240
JUL				
01...	1539	145	24	0.280
03...	1736	156	33	0.370
04...	1015	206	24	0.370
05...	1933	274	59	0.450

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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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3800	4170	4120	3540	3740	3490	18100	13700	19900	26500	18300	15100
2	3890	4930	4500	3840	4370	3820	20200	14300	21200	26600	17400	14900
3	3830	4720	4250	4100	4140	3800	21000	15300	22000	26800	17200	14800
4	3940	5090	4150	4650	3980	3870	21900	16200	22000	27900	15900	14100
5	3930	5070	4380	4050	4170	3590	23200	16600	21400	28300	15600	13800
6	3950	4790	3840	4140	4080	3520	23300	16900	20600	29400	14800	13000
7	4080	5350	4930	3940	4050	3890	23000	16500	19700	30800	14400	12600
8	4420	4850	4250	3930	4000	4040	22000	17200	18900	32800	13900	12200
9	4350	5070	4360	3840	4100	4540	20400	17900	17900	33400	14800	11500
10	4100	5300	4840	3750	4140	4350	19900	18800	16900	34100	14000	11100
11	4520	5390	4680	3840	3800	3770	19400	19500	15900	34400	13200	10500
12	4310	5460	4460	3810	3740	4020	19500	20200	15000	33600	12800	10100
13	4530	5660	4700	4050	4340	3980	19000	20600	14900	32500	12400	10500
14	4540	5890	5220	4000	3740	3770	18800	21000	14300	32500	12600	9930
15	4390	5600	5280	3570	3670	4350	18400	20400	13900	31700	13300	9790
16	4680	5940	4930	4080	3720	4810	18600	19700	13600	31000	13000	9140
17	4300	5830	4920	3700	3820	3520	18200	18000	15700	30400	12200	9450
18	4260	5330	4370	3640	3350	3410	17500	17500	15700	29500	12900	9320
19	4280	5650	3870	4020	3370	4390	17300	15900	16200	28000	14100	8880
20	4100	5740	2760	3960	3600	4440	16700	14700	16600	26500	13700	9640
21	4430	5580	3160	3780	3850	4370	15600	13400	17400	25300	13600	11400
22	4260	5940	3600	4160	3900	3870	14900	12500	18200	24200	13900	10900
23	4360	6220	3700	3710	3190	3980	14100	12600	19200	23400	14300	10000
24	4460	5880	3400	3860	3070	4430	13600	12600	21900	22900	14200	9160
25	4020	5730	2440	3440	3440	4730	12900	14000	24500	22600	14100	9990
26	5490	5720	3220	3240	3460	5680	12900	16100	26100	21600	14100	10100
27	4900	5540	3860	4130	3410	6220	13100	17000	26900	20700	15000	10000
28	4230	5070	4680	3410	3620	7760	14000	17600	27200	20200	15500	9360
29	4160	5060	4720	2810	---	9970	14100	17400	26900	19500	15300	9770
30	4070	4760	4520	3170	---	12800	13700	17700	26900	18700	15300	9020
31	4300	---	4410	4320	---	16200	---	18300	---	18500	15400	---
TOTAL	132880	161330	130520	118480	105860	159380	535300	520100	587500	844300	447200	330050
MEAN	4286	5378	4210	3822	3781	5141	17840	16780	19580	27240	14430	11000
MAX	5490	6220	5280	4650	4370	16200	23300	21000	27200	34400	18300	15100
MIN	3800	4170	2440	2810	3070	3410	12900	12500	13600	18500	12200	8880
AC-FT	263600	320000	258900	235000	210000	316100	1062000	1032000	1165000	1675000	887000	654700
CFSM	.22	.28	.22	.20	.20	.27	.93	.88	1.03	1.43	.76	.58
IN.	.26	.31	.25	.23	.21	.31	1.04	1.01	1.14	1.64	.87	.64

e Estimated.

MISSISSIPPI RIVER MAIN STEM

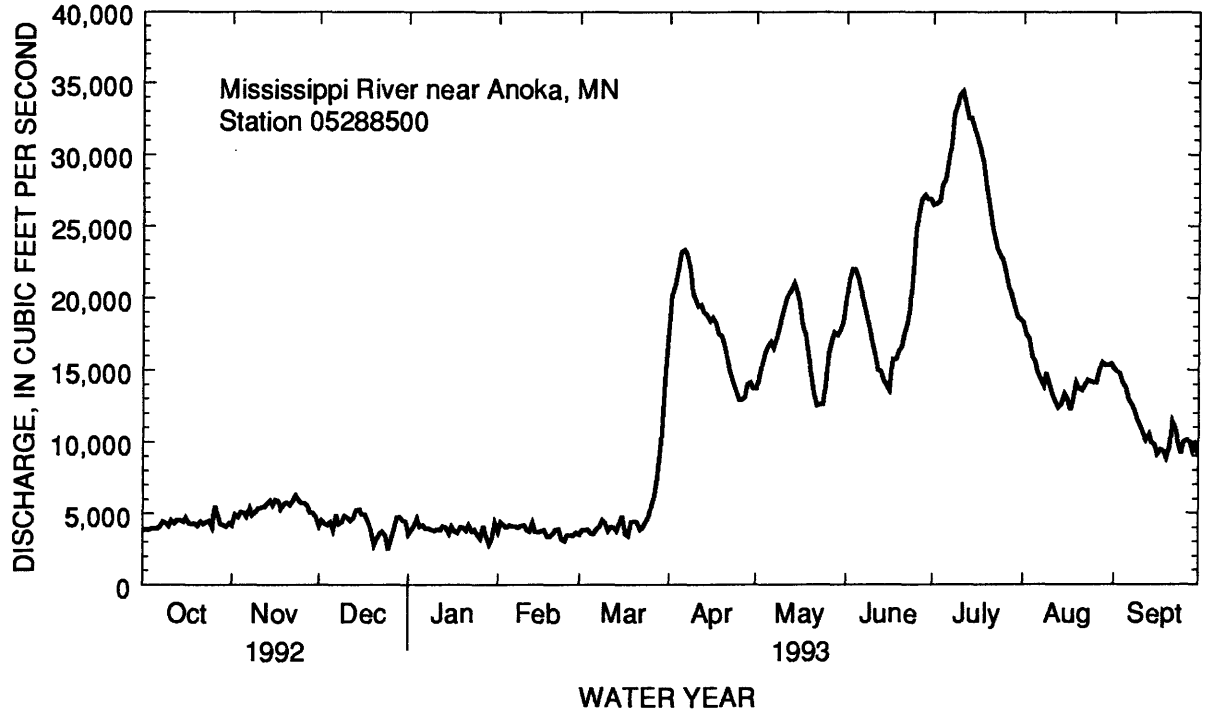
05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	6188	5986	4617	4093	3992	7017	17000	14590	11490	8434	5905	5799
MAX	21250	22800	10800	8304	9947	23410	42970	39760	29910	27240	22490	23570
(WY)	1987	1972	1972	1986	1966	1966	1969	1986	1943	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1931 - 1993	
ANNUAL TOTAL	2643050		4072900			
ANNUAL MEAN	7221		11160		7959	
HIGHEST ANNUAL MEAN					17750	1986
LOWEST ANNUAL MEAN					1603	1934
HIGHEST DAILY MEAN	21600	Mar 14	34400	Jul 11	90300	Apr 17 1965
LOWEST DAILY MEAN	2440	Dec 25	2440	Dec 25	602	Sep 10 1934
ANNUAL SEVEN-DAY MINIMUM	3140	Aug 18	3180	Dec 20	646	Aug 26 1934
INSTANTANEOUS PEAK FLOW			34600	Jul 11	91000	Apr 17 1965
INSTANTANEOUS PEAK STAGE			10.26	Jul 11	19.53	Apr 17 1965
INSTANTANEOUS LOW FLOW			2440	Dec 25	529a	Aug 29 1976
ANNUAL RUNOFF (AC-FT)	5242000		8079000		5766000	
ANNUAL RUNOFF (CFSM)	.38		.58		.42	
ANNUAL RUNOFF (INCHES)	5.15		7.93		5.66	
10 PERCENT EXCEEDS	12600		22000		17400	
50 PERCENT EXCEEDS	5660		9160		5430	
90 PERCENT EXCEEDS	3960		3750		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.

WATER TEMPERATURES: Water years 1976, 77, 79, 80, 82 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.: Maximum observed 31.0°C, Aug. 25, 26, 1976, July 19, 1977; minimum observed, 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 observed, 28.0°C, Aug. 12, minimum observed: 4.0°C Nov. 2, 3, Apr. 7, 13.

SEDIMENT CONCENTRATION: Maximum daily mean, 58 mg/L, June 25 and July 7; minimum daily mean, 5 mg/L, Oct. 19.

SEDIMENT LOADS: Maximum daily, 4820 tons, July 7; minimum daily, 46 tons, Dec. 25.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18.0	---	---	---	---	---	---	12.0	15.0	20.0	24.0	21.0
2	20.0	4.0	---	---	---	---	---	10.0	16.0	19.0	23.0	---
3	18.0	4.0	---	---	---	---	---	13.0	17.0	---	21.0	---
4	19.0	---	---	---	---	---	---	15.0	17.0	---	22.0	---
5	18.0	---	---	---	---	---	---	17.0	17.0	---	21.0	---
6	16.0	---	---	---	---	---	---	15.0	19.0	---	21.0	19.0
7	13.0	---	---	---	---	---	4.0	17.0	18.0	20.0	20.0	20.0
8	---	---	---	---	---	---	---	16.0	20.0	21.0	22.0	19.0
9	11.0	---	---	---	---	---	---	18.0	20.0	22.0	25.0	17.0
10	13.0	---	---	---	---	---	---	17.0	21.0	23.0	25.0	16.0
11	14.0	---	---	---	---	---	---	18.0	23.0	23.0	26.0	16.0
12	13.0	---	---	---	---	---	---	19.0	22.0	22.0	28.0	20.0
13	11.0	---	---	---	---	---	4.0	19.0	22.0	21.0	25.0	18.0
14	10.0	---	---	---	---	---	---	19.0	20.0	21.0	24.0	15.0
15	---	---	---	---	---	---	---	18.0	20.0	22.0	25.0	15.0
16	8.0	---	---	---	---	---	5.0	17.0	20.0	21.0	25.0	15.0
17	7.0	---	---	---	---	---	9.0	18.0	20.0	23.0	24.0	15.0
18	7.0	---	---	---	---	---	11.0	16.0	18.0	24.0	25.0	14.0
19	6.0	---	---	---	---	---	9.0	15.0	17.0	---	25.0	13.0
20	6.0	---	---	---	---	---	9.0	16.0	17.0	24.0	24.0	13.0
21	8.0	---	---	---	---	---	10.0	17.0	21.0	24.0	24.0	12.0
22	13.0	---	---	---	---	---	12.0	18.0	23.0	22.0	22.0	15.0
23	13.0	---	---	---	---	---	12.0	17.0	23.0	22.0	23.0	15.0
24	11.0	---	---	---	---	---	10.0	---	24.0	22.0	25.0	15.0
25	14.0	---	---	---	---	---	10.0	17.0	21.0	23.0	26.0	16.0
26	12.0	---	---	---	---	---	12.0	18.0	21.0	24.0	26.0	13.0
27	12.0	---	---	---	---	---	12.0	18.0	21.0	25.0	25.0	12.0
28	10.0	---	---	---	---	---	15.0	16.0	21.0	24.0	25.0	11.0
29	8.0	---	---	---	---	---	14.0	15.0	21.0	24.0	24.0	10.0
30	8.0	---	---	---	---	---	13.0	14.0	20.0	23.0	22.0	12.0
31	8.0	---	---	---	---	---	---	15.0	---	25.0	21.0	---

MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA,MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MEAN CONCEN-TRATION DAY(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	8	82	27	304	9	100	7	67	7	71	766
2	10	105	29	386	40	486	7	73	7	83	772
3	11	114	13	166	12	138	7	77	7	78	772
4	11	117	20	275	10	112	7	88	7	75	773
5	11	117	23	315	24	284	7	77	7	79	768
6	12	128	25	323	14	145	7	78	7	77	767
7	10	110	33	477	22	293	7	74	7	77	774
8	9	107	47	615	11	126	7	74	7	76	776
9	10	117	44	602	9	106	7	73	7	77	786
10	9	100	35	501	9	118	7	71	7	78	782
11	10	122	33	480	8	101	7	73	7	72	771
12	10	116	31	457	7	84	7	72	7	71	776
13	12	147	24	367	7	89	7	77	7	82	775
14	10	123	17	270	7	99	7	76	7	71	771
15	10	119	16	242	7	100	7	67	7	69	782
16	9	114	15	241	7	93	7	77	7	70	791
17	8	93	15	236	7	93	7	70	7	72	767
18	6	69	16	230	7	83	7	69	7	63	764
19	5	58	20	305	7	73	7	76	7	64	783
20	6	66	20	310	7	52	7	75	7	68	784
21	7	84	13	196	7	60	7	71	7	73	783
22	7	81	10	160	7	68	7	79	7	74	773
23	8	94	11	185	7	70	7	70	7	60	775
24	10	120	11	175	7	64	7	73	7	58	784
25	10	109	12	186	7	46	7	65	7	65	789
26	11	163	14	216	7	61	7	61	7	65	10153
27	15	198	12	179	7	73	7	78	7	64	14235
28	52	594	11	151	7	88	7	64	7	68	17356
29	24	270	10	137	7	89	7	53	---	---	20538
30	20	220	10	129	7	85	7	60	---	---	24829
31	27	313	---	---	7	83	7	82	---	---	271180
TOTAL---	4370	---	8816	---	3562	---	2240	---	2000	---	5195

MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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	30	1470	22	814	34	1830	43	3080	25	1240	18	734
2	33	1800	26	1000	35	2000	32	2300	23	1080	17	684
3	37	2100	29	1200	45	2670	31	2240	24	1110	15	599
4	40	2370	30	1310	45	2670	42	3160	26	1120	17	647
5	43	2690	28	1250	47	2720	30	2290	26	1100	11	410
6	46	2890	29	1320	37	2060	34	2700	25	999	9	316
7	50	3100	28	1250	34	1810	58	4820	27	1050	10	340
8	49	2910	28	1300	30	1530	52	4610	30	1130	11	362
9	48	2640	29	1400	22	1060	47	4240	30	1200	11	342
10	40	2150	31	1570	19	867	47	4330	24	907	12	360
11	35	1830	34	1790	21	902	46	4270	21	748	13	369
12	27	1420	36	1960	26	1050	44	3990	20	691	13	355
13	26	1330	37	2060	26	1050	41	3600	20	670	11	312
14	25	1270	40	2270	27	1040	44	3860	20	680	13	349
15	25	1240	40	2200	28	1050	45	3850	29	1040	14	370
16	28	1410	38	2020	27	991	46	3850	26	913	15	370
17	36	1770	31	1510	29	1230	38	3120	18	593	17	434
18	45	2130	27	1280	37	1570	46	3660	19	662	17	428
19	37	1730	25	1070	37	1620	34	2570	18	685	19	456
20	31	1400	25	992	37	1660	32	2290	19	703	18	469
21	27	1140	25	904	32	1500	31	2120	21	771	18	554
22	24	966	26	877	29	1430	29	1890	23	863	18	530
23	24	914	27	919	34	1760	32	2020	23	888	17	459
24	21	771	28	953	43	2540	34	2100	18	690	13	322
25	19	662	29	1100	58	3840	37	2260	13	495	18	486
26	22	766	30	1300	44	3100	38	2220	12	457	25	682
27	24	849	30	1380	38	2760	30	1680	12	486	22	594
28	20	756	30	1430	48	3530	27	1470	13	544	20	505
29	19	723	30	1410	42	3050	25	1320	15	620	20	528
30	19	703	29	1390	48	3490	24	1210	17	702	20	487
31	---	---	30	1480	---	---	23	1150	19	790	---	---
TOTAL---		47900	---	42709	---	58380	---	88270	---	25627	---	13853
YEAR		302922										

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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 (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Apr. 1	0300	836	5.61	July 18	1430	884	5.75
June 27	0930	597	4.99	July 25	1830	*8,900	*13.58
July 11	2200	528	4.82				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.66	2.6	e5.7	e.92	e1.7	e2.9	768	134	71	346	695	76
2	.66	4.2	e5.5	e.89	e1.8	e3.0	585	132	64	310	575	71
3	.69	7.0	e5.4	e.87	e1.9	e3.1	452	131	57	324	495	66
4	.69	7.6	e5.3	e.86	e2.0	e3.2	362	118	53	312	430	61
5	.75	6.6	e5.1	e.84	e2.1	e3.3	311	108	49	309	376	57
6	.85	5.3	e5.0	e.83	e2.2	e3.6	275	100	45	255	334	53
7	.85	4.2	e4.8	e.82	e2.3	e3.9	251	96	43	212	300	51
8	1.4	4.2	e4.7	e.81	e2.4	e5.0	264	138	42	213	265	48
9	1.5	5.0	e4.5	e.80	e2.5	e9.0	295	205	50	337	235	44
10	1.2	5.5	e4.3	e.80	e2.6	e9.0	277	255	55	428	207	40
11	1.1	6.1	e4.2	e.80	e2.8	e8.7	288	210	50	492	190	38
12	.96	7.5	e4.0	e.81	e2.9	e8.5	315	164	42	472	175	35
13	.92	9.2	e3.9	e.83	e3.0	e8.3	337	141	36	402	163	34
14	.91	8.2	e3.7	e.86	e3.0	e8.2	355	118	32	374	158	32
15	.99	e8.0	e3.5	e.88	e3.1	e8.0	357	108	29	340	160	32
16	1.0	e7.9	e3.4	e.92	e3.1	e7.9	327	93	31	289	159	31
17	1.0	8.0	e3.2	e.95	e3.1	e7.7	295	86	42	605	148	29
18	1.0	7.7	e3.0	e.98	e3.1	e7.7	262	83	58	841	178	28
19	.95	8.4	e2.8	e1.0	e3.1	e7.6	249	77	58	692	203	28
20	.98	8.5	e2.6	e1.0	e3.1	e7.6	225	73	74	692	254	37
21	1.0	8.5	e2.4	e1.1	e3.1	e7.6	191	71	96	599	280	55
22	1.0	8.6	e2.3	e1.1	e3.0	e7.6	172	70	70	457	235	60
23	1.1	8.3	e2.2	e1.1	e3.0	e10	154	69	72	368	190	52
24	1.0	8.2	e2.1	e1.2	e3.0	e38	156	72	212	350	161	46
25	1.0	7.9	e2.0	e1.2	e3.0	e70	198	80	530	5400	139	41
26	.92	7.4	e1.9	e1.3	e3.0	e110	216	77	498	4630	121	37
27	1.1	6.6	e1.7	e1.3	e3.0	e180	200	69	579	2380	108	33
28	1.2	e6.2	e1.5	e1.4	e2.9	e260	173	63	497	1480	100	30
29	1.5	e6.0	e1.3	e1.4	---	e340	150	61	386	1130	92	28
30	1.4	e5.8	e1.0	e1.5	---	e450	139	61	335	956	86	26
31	1.7	---	e.95	e1.6	---	e560	---	66	---	814	80	---
TOTAL	31.98	205.2	103.95	31.67	75.8	2159.4	8599	3329	4256	26809	7292	1299
MEAN	1.03	6.84	3.35	1.02	2.71	69.7	287	107	142	865	235	43.3
MAX	1.7	9.2	5.7	1.6	3.1	560	768	255	579	5400	695	76
MIN	.66	2.6	.95	.80	1.7	2.9	139	61	29	212	80	26
AC-FT	63	407	206	63	150	4280	17060	6600	8440	53180	14460	2580
CFSM	.00	.02	.01	.00	.01	.16	.64	.24	.32	1.93	.53	.10
IN.	.00	.02	.01	.00	.01	.18	.72	.28	.35	2.23	.61	.11

MINNESOTA RIVER BASIN

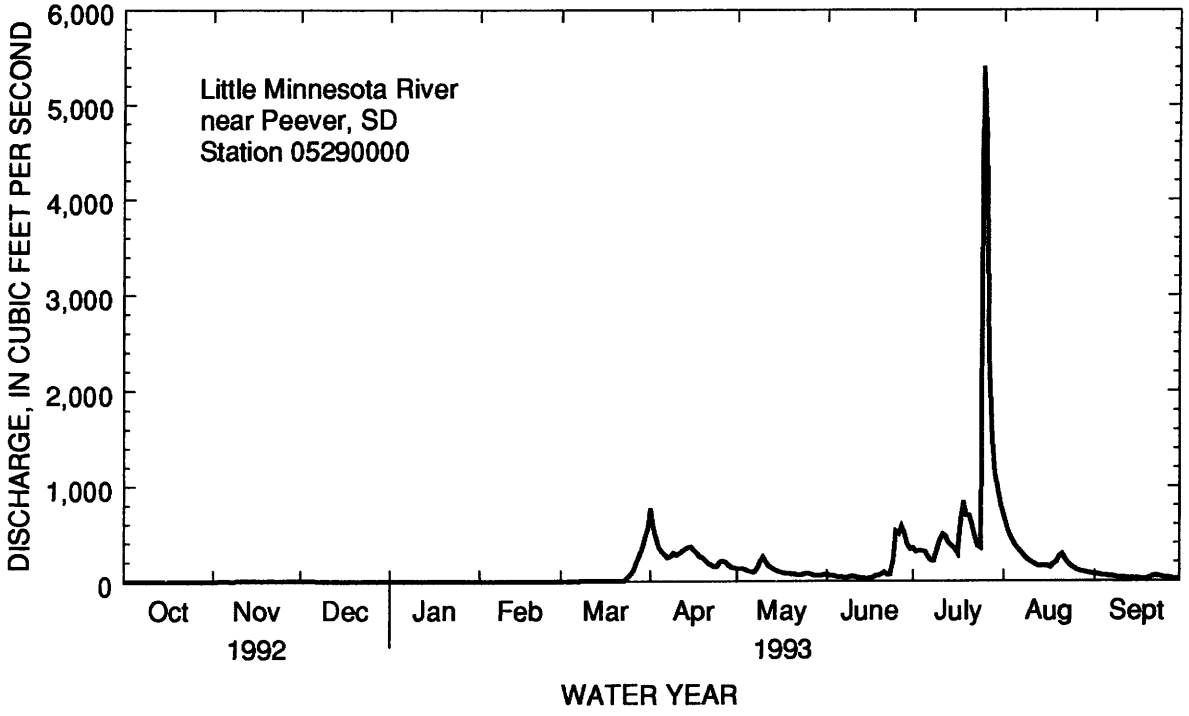
05290000 LITTLE MINNESOTA RIVER NEAR PEEVER, SD--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3.54	4.48	2.37	1.10	2.37	94.3	199	82.8	74.2	56.0	13.0	4.42
MAX	40.7	34.7	10.8	4.25	21.8	573	1321	531	355	865	235	43.3
(WY)	1943	1958	1958	1947	1976	1943	1952	1962	1942	1993	1993	1993
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1940 - 1993	
ANNUAL TOTAL	7710.45		54192.00			
ANNUAL MEAN	21.1		148		44.8[a]	
HIGHEST ANNUAL MEAN					153	1962
LOWEST ANNUAL MEAN					1.37	1981
HIGHEST DAILY MEAN	204	Jul 13	5400	Jul 25	5400	Jul 25 1993
LOWEST DAILY MEAN	.55	Sep 25	.66	Oct 1,2	.00	Many years
ANNUAL SEVEN-DAY MINIMUM	.61	Sep 23	.74	Oct 1	.00	Many years
INSTANTANEOUS PEAK FLOW			8900	Jul 25	8900	Jul 25 1993
INSTANTANEOUS PEAK STAGE			13.58[b]	Jul 25	13.58[b]	Jul 25 1993
INSTANTANEOUS LOW FLOW			.59	Oct 2		
ANNUAL RUNOFF (AC-FT)	15290		107500		32470	
ANNUAL RUNOFF (CFSM)	.047		.33		.10	
ANNUAL RUNOFF (INCHES)	.64		4.51		1.36	
10 PERCENT EXCEEDS	64		356		96	
50 PERCENT EXCEEDS	6.0		31		2.7	
90 PERCENT EXCEEDS	1.1		1.0		.30	

a Median of annual mean discharges is 31.5 ft³/s.
b From highwater mark.



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)
Mar. 9		256a	ice jam	June 21	1200	540	5.14
Mar. 29	0330	1210	7.00	July 1	2100	580	5.28
Apr. 1	1200	1470	7.56	July 5	0500	2880	9.93
Apr. 12	1700	571	5.25	July 10	1100	769	5.87
Apr. 16	0400	811	5.99	July 18	1100	*3890	*11.25
May 10	1900	384	4.54	July 26	0900	2520	9.40

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.5	13	15	e9.9	e10	e8.6	1250	100	65	403	185	53
2	5.7	19	16	e9.7	e10	e8.7	693	99	65	488	155	51
3	5.5	17	e16	e9.6	e9.9	e8.8	402	102	87	394	147	49
4	5.7	15	e16	e9.5	e9.9	e9.0	296	106	68	1310	130	48
5	6.0	13	e15	e9.3	e9.8	e9.2	258	98	52	2450	119	46
6	5.5	12	e14	e9.1	e9.7	e9.4	233	91	51	1150	110	45
7	5.5	11	e14	e9.0	e9.6	e17	234	93	54	536	102	44
8	5.5	9.7	e14	e8.8	e9.5	e65	292	107	66	351	96	43
9	6.0	11	e14	e8.7	e9.4	e256	469	168	63	573	92	42
10	6.4	12	e13	e8.6	e9.2	e209	386	317	65	738	86	38
11	6.7	13	e13	e8.5	e9.1	e151	421	305	67	557	83	37
12	8.7	15	e13	e8.4	e9.0	e143	553	193	62	403	78	36
13	6.6	15	e13	e8.3	e8.9	e143	472	137	57	314	75	41
14	5.3	15	e13	e8.2	e8.8	e139	448	108	50	245	79	45
15	5.9	16	e13	e8.1	e8.7	e137	659	91	44	208	82	43
16	6.5	16	e14	e8.0	e8.6	124	695	82	47	188	95	41
17	8.6	15	e13	e8.0	e8.6	e113	515	75	56	769	95	39
18	7.0	16	e13	e8.1	e8.5	e102	359	74	68	3440	87	37
19	6.4	18	e12	e8.2	e8.6	91	305	71	91	2460	81	38
20	6.6	19	e12	e8.3	e8.6	82	271	69	161	2030	75	57
21	7.9	18	e12	e8.4	e8.6	79	221	67	444	1040	69	67
22	7.8	18	e12	e8.5	e8.6	75	181	62	268	890	76	83
23	7.0	18	e11	e8.6	e8.6	e79	160	61	183	338	75	81
24	6.9	18	e11	e8.8	e8.6	e117	151	72	156	282	68	71
25	6.1	18	e11	e9.1	e8.6	e176	148	73	157	1150	67	64
26	6.2	e18	e11	e9.3	e8.6	e249	146	75	137	2170	65	56
27	6.4	e18	e11	e9.4	e8.6	e365	133	75	108	1110	61	52
28	6.3	e17	e10	e9.4	e8.6	737	119	68	90	601	59	49
29	7.7	16	e10	e9.4	---	924	110	63	84	358	57	46
30	7.1	16	e10	e9.6	---	608	102	62	131	268	56	44
31	8.5	---	e10	e9.8	---	779	---	66	---	225	55	---
TOTAL	203.5	465.7	395	274.6	253.2	6013.7	10682	3230	3097	27439	2760	1486
MEAN	6.56	15.5	12.7	8.86	9.04	194	356	104	103	885	89.0	49.5
MAX	8.7	19	16	9.9	10	924	1250	317	444	3440	185	83
MIN	5.3	9.7	10	8.0	8.5	8.6	102	61	44	188	55	36
AC-FT	404	924	783	545	502	11930	21190	6410	6140	54430	5470	2950
CFSM	.02	.04	.03	.02	.02	.50	.92	.27	.27	2.28	.23	.13

a Daily mean discharge.

MINNESOTA RIVER BASIN

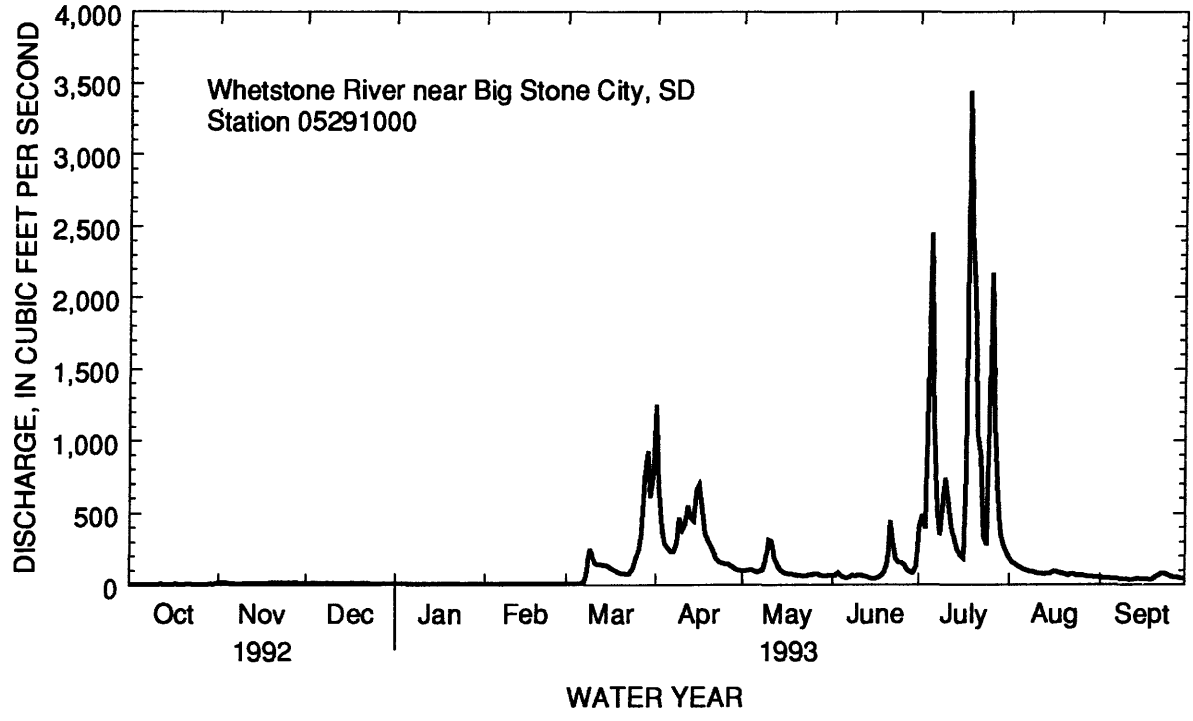
05291000 WHETSTONE RIVER NEAR BIG STONE CITY, SD--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	8.92	10.5	7.27	4.80	10.8	145	181	79.4	75.2	48.9	17.1	8.75
MAX	70.5	78.3	43.3	20.5	118	612	1386	491	478	885	327	65.7
(WY)	1958	1972	1972	1987	1984	1978	1952	1972	1984	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1910 - 1993	
ANNUAL TOTAL	16653.3		56299.7			
ANNUAL MEAN	45.5		154		51.3b	
HIGHEST ANNUAL MEAN					181	1986
LOWEST ANNUAL MEAN					1.52	1934
HIGHEST DAILY MEAN	1280	Jun 18	3440	Jul 18	6090	Apr 8 1969
LOWEST DAILY MEAN	5.3	Oct 14	5.3	Oct 14	.00c	Sep 13 1931
ANNUAL SEVEN-DAY MINIMUM	5.6	Oct 1	5.6	Oct 1	.00	Jul 31 1933
INSTANTANEOUS PEAK FLOW			3890	Jul 18	6870	Apr 8 1969
INSTANTANEOUS PEAK STAGE			11.25	Jul 18	14.32d	Apr 8 1969
INSTANTANEOUS LOW FLOW			5.2	Oct 14,15		
ANNUAL RUNOFF (AC-FT)	33030		111700		37170	
ANNUAL RUNOFF (CFSM)	.12		.40		.13	
10 PERCENT EXCEEDS	76		397		90	
50 PERCENT EXCEEDS	18		51		7.0	
90 PERCENT EXCEEDS	7.2		8.4		1.3	

b Median of annual mean discharges is 35 ft³/s.
c No flow at times in most years.
d From floodmark.



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.

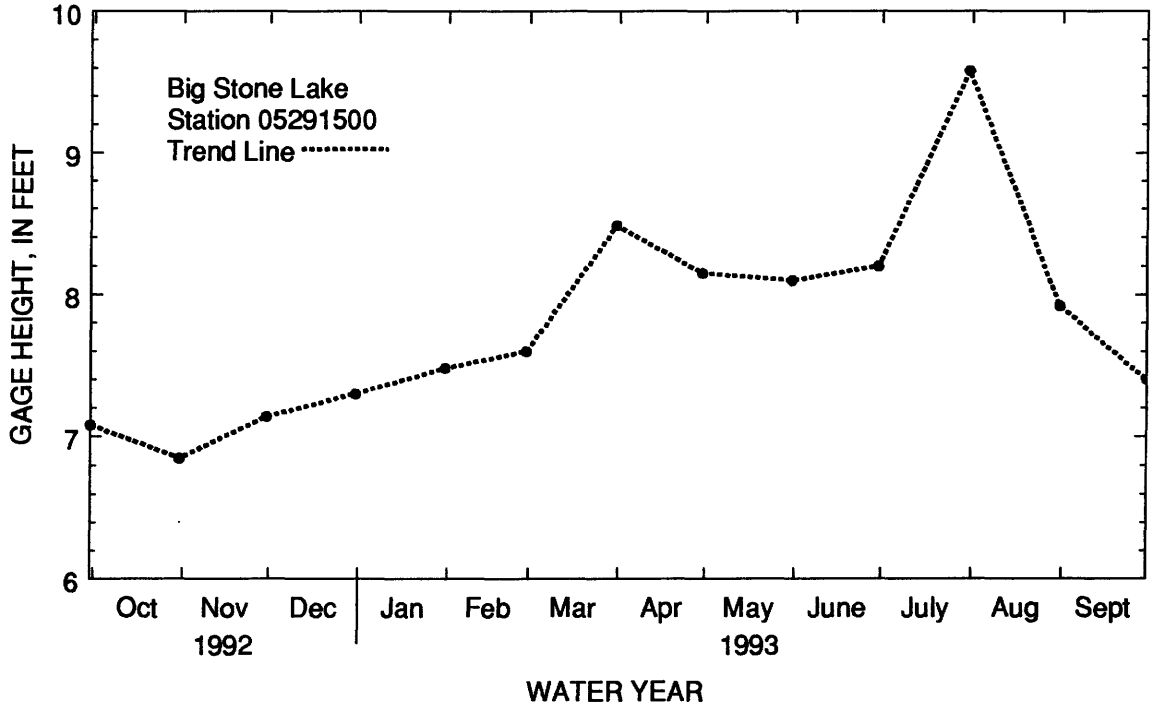
EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 12.73 ft, Apr. 17, 1952; minimum observed, 3.53 ft, Mar. 2, 1957 (strong upstream wind in channel). Minimum observations of 3.10 ft, Mar. 2, 1940, and 2.20 ft, Nov. 20, 1940, at spillway site are the result of blockage of channel to spillway by ice and snow and do not represent lake elevations.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 9.88 ft, July 28; minimum observed, 6.63 ft, Oct. 21.

GAGE HEIGHT, IN FEET, OCTOBER 1992 TO SEPTEMBER 1993

Oct. 31 ..... 6.85	Feb. 29 ..... 7.60	June 30 ..... 8.20
Nov. 30 ..... 7.14	Mar. 31 ..... 8.48	July 31 ..... 9.58
Dec. 31 ..... 7.30	Apr. 30 ..... 8.15	Aug. 31 ..... 7.92
Jan. 31 ..... 7.48	May 31 ..... 8.10	Sept. 28 ..... 7.40

NOTE.--Gage-height record other than that shown above is available in the District Office.


Big Stone Lake
Station 05291500
Trend Line
GAGE HEIGHT, IN FEET
10
9
8
7
6
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
1992
1993
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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	13	13	e8.8	e8.2	e8.3	2050	231	127	731	2290	74
2	11	13	14	e8.2	e8.3	e8.4	2110	231	86	1150	2220	74
3	11	13	14	e7.8	e8.5	e8.8	1160	230	142	759	2220	105
4	11	13	14	e7.6	e8.6	e9.4	822	244	140	1650	2220	126
5	12	13	14	e7.4	e8.5	e10	914	231	89	2400	2220	119
6	13	13	14	e7.5	e8.4	e12	841	226	80	2310	2220	113
7	14	13	14	e7.4	e8.3	e13	675	226	130	1870	2210	108
8	13	13	14	e7.4	e8.2	e15	962	234	311	1580	2210	100
9	13	13	14	e7.3	e7.8	e19	950	239	62	1760	2210	92
10	12	13	14	e7.3	e7.6	e20	944	260	59	1840	2210	101
11	12	13	14	e7.3	e7.4	e21	949	454	51	1730	2210	100
12	11	13	14	e7.2	e7.2	e20	949	698	46	1340	2210	91
13	11	13	14	e7.2	e7.2	e19	1100	737	48	858	2210	86
14	11	13	14	e7.2	e7.1	e18	1260	666	49	749	2210	73
15	11	13	14	e7.2	e7.0	e18	1260	466	42	763	2210	63
16	11	13	14	e7.1	e6.7	e18	1560	463	140	763	2210	60
17	11	13	14	e7.0	e6.8	e18	1750	251	189	1170	1260	59
18	11	13	14	e6.9	e7.0	e19	1560	82	182	1930	371	55
19	11	13	14	e6.8	e7.3	e20	e922	82	185	2410	371	52
20	11	13	14	e7.0	e7.5	e21	e780	70	186	2390	369	53
21	11	13	14	e7.4	e7.7	e24	e933	62	543	2200	364	96
22	12	13	14	e8.0	e8.0	e27	e722	61	657	1790	364	165
23	12	13	14	e8.5	e8.4	e32	e575	231	450	1620	369	162
24	11	13	e14	e8.6	e8.6	37	e495	575	469	1430	365	160
25	11	13	e13	e8.4	e8.8	191	e389	281	448	2220	246	160
26	11	13	e12	e8.3	e8.7	480	e248	186	360	2580	140	167
27	11	13	e11	e8.2	e8.5	673	e192	186	235	2790	133	272
28	11	13	e9.8	e7.8	e8.5	1000	230	182	254	2890	119	369
29	11	13	e9.3	e7.6	---	1650	269	176	289	2670	109	275
30	14	13	e9.1	e7.6	---	1590	230	180	409	2480	113	218
31	13	---	e9.0	e7.8	---	1590	---	180	---	2400	100	---
TOTAL	360	390	408.2	235.8	220.8	7609.9	27801	8621	6458	55223	40283	3748
MEAN	11.6	13.0	13.2	7.61	7.89	245	927	278	215	1781	1299	125
MAX	14	13	14	8.8	8.8	1650	2110	737	657	2890	2290	369
MIN	11	13	9.0	6.8	6.7	8.3	192	61	42	731	100	52
AC-FT	714	774	810	468	438	15090	55140	17100	12810	109500	79900	7430
CFSM	.01	.01	.01	.01	.01	.21	.80	.24	.19	1.54	1.12	.11

e Estimated.

MINNESOTA RIVER BASIN

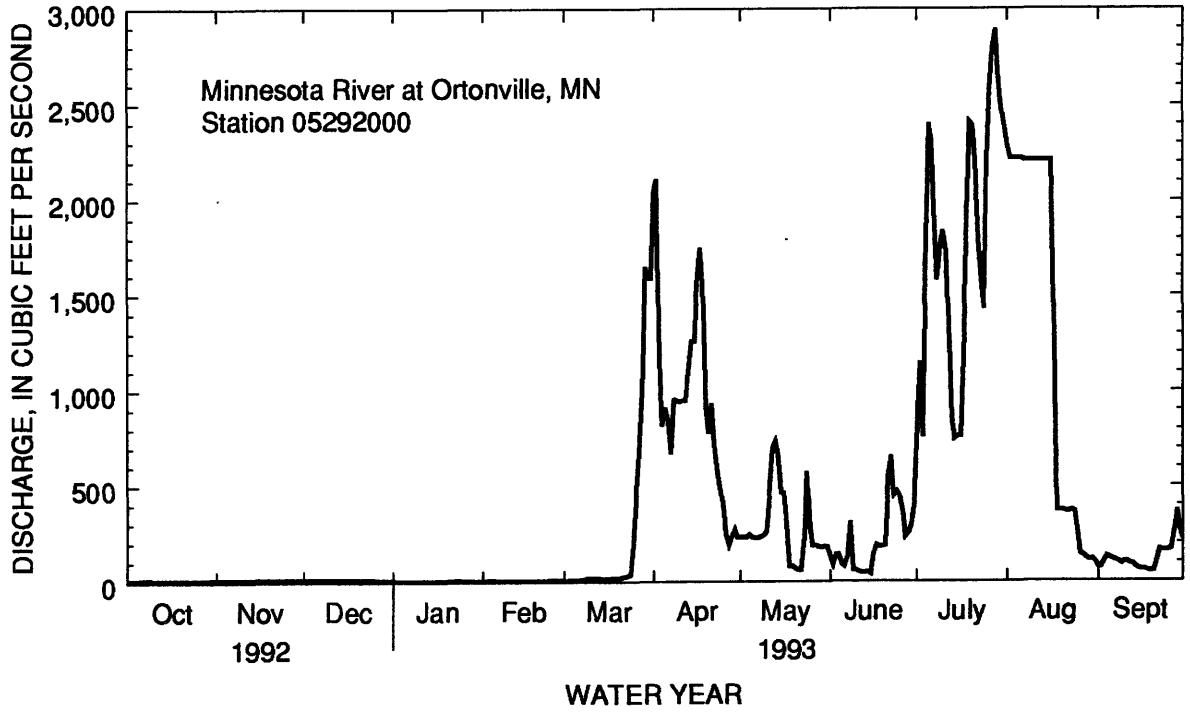
05292000 MINNESOTA RIVER AT ORTONVILLE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	20.6	15.8	16.4	17.3	21.8	146	418	232	182	146	73.5	32.0
MAX	186	166	194	164	150	731	2195	887	1034	1781	1299	250
(WY)	1987	1943	1943	1943	1943	1986	1952	1986	1962	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1938 - 1993	
ANNUAL TOTAL	27419.0		151358.7			
ANNUAL MEAN	74.9		415		112a	
HIGHEST ANNUAL MEAN					415	1993
LOWEST ANNUAL MEAN					2.39	1977
HIGHEST DAILY MEAN	1290	Jun 18	2890	Jul 28	3050	Apr 13 1952
LOWEST DAILY MEAN	7.0	Sep 24	6.7	Feb 16	.00	Dec 13 1940
ANNUAL SEVEN-DAY MINIMUM	10	Sep 24	7.0	Feb 12	.08	Sep 12 1988
INSTANTANEOUS PEAK FLOW			2950	Jul 28	3060	Apr 13 1952
INSTANTANEOUS PEAK STAGE			7.93	Jun 18	12.92	Apr 13 1952
INSTANTANEOUS LOW FLOW			6.7	Feb 16		
ANNUAL RUNOFF (AC-FT)	54390		300200		80780	
ANNUAL RUNOFF (CFSM)	.065		.36		.096	
10 PERCENT EXCEEDS	114		1740		288	
50 PERCENT EXCEEDS	30		55		14	
90 PERCENT EXCEEDS	12		7.9		1.0	

a Median of annual mean discharges is 83 ft³/s.



MINNESOTA RIVER BASIN

05292704 NORTH FORK YELLOW BANK RIVER NEAR ODESSA, MN

LOCATION.--Lat 45°11'21", long 96°24'54", in NW¼NW¼SW¼ sec.22, T.120 N., R.46 W., Lac qui Parle County, Hydrologic Unit 07020001, on left bank at upstream side of County Highway #7 bridge, 11.0 mi east-southeast of Milbank, SD, 6.4 mi southwest of Odessa, and 2.9 mi upstream from mouth.

DRAINAGE AREA.--Undetermined.

PERIOD OF RECORD.--May 1991 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 1,020 ft above sea level, from topographic map.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Water temperature and specific conductance measured during the year are compiled in the Miscellaneous Temperature Measurements and Field Determinations section.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.9	5.7	e7.8	e7.3	e7.6	e5.5	909	60	31	518	169	20
2	4.1	8.5	e7.7	e7.4	e7.5	e5.8	535	62	32	393	140	20
3	4.7	10	e7.3	e7.4	e7.4	e6.6	356	65	32	317	129	17
4	4.7	9.2	e6.8	e7.3	e7.3	e9.0	251	66	34	715	111	19
5	4.1	8.3	e6.3	e7.2	e7.0	e16	205	58	32	1170	97	22
6	3.9	6.6	e6.5	e7.1	e6.3	e24	177	53	31	697	85	18
7	4.5	6.6	e6.7	e6.9	e5.8	e27	159	55	31	414	75	16
8	4.9	6.8	e6.6	e6.7	e5.3	e48	197	71	56	314	67	15
9	3.8	8.2	e7.2	e6.2	e4.9	e130	342	136	50	319	61	14
10	3.8	9.7	e7.3	e6.3	e5.5	e120	235	169	49	303	55	13
11	3.6	10	e7.2	e6.3	e5.2	e110	278	123	42	246	49	13
12	3.6	12	e7.1	e6.3	e5.0	e100	517	92	38	180	46	12
13	3.3	11	e7.2	e6.2	e5.4	e90	381	74	35	147	42	13
14	3.3	11	e7.5	e6.2	e5.3	e85	331	63	33	126	51	17
15	3.4	10	e7.9	e6.0	e4.9	e80	447	55	31	112	63	17
16	3.4	10	e8.5	e5.9	e4.8	e80	495	50	32	103	79	16
17	3.5	9.6	e7.6	e5.6	e5.0	e75	301	46	46	473	69	15
18	3.6	9.8	e7.5	e5.5	e5.0	e70	200	44	57	1020	56	14
19	3.6	10	e7.1	e5.3	e5.0	e60	169	41	90	1120	49	14
20	3.6	11	e6.8	e5.2	e5.0	e65	152	38	285	1000	42	25
21	4.7	10	e6.9	e5.1	e5.0	e65	130	36	586	588	38	55
22	6.7	10	e7.1	e5.2	e5.0	e65	112	34	357	392	37	96
23	4.6	10	e6.8	e5.3	e5.0	e70	101	35	227	301	38	82
24	4.1	11	e6.7	e5.6	e5.0	e90	94	38	202	247	34	61
25	4.3	10	e7.2	e5.8	e5.0	e260	86	42	199	797	30	48
26	3.7	9.8	e7.3	e6.1	e5.0	e360	79	43	150	1260	27	36
27	3.7	7.7	e7.1	e6.3	e5.1	e500	74	39	113	865	27	29
28	3.5	7.5	e7.2	e6.6	e5.2	e600	69	37	84	541	24	25
29	3.5	7.4	e7.3	e6.0	---	581	64	34	76	376	22	26
30	3.5	e7.4	e7.0	e7.1	---	316	59	33	145	268	22	22
31	3.7	---	e7.2	e7.3	---	535	---	32	---	210	22	---
TOTAL	123.3	274.8	222.4	194.7	155.5	4648.9	7505	1824	3206	15532	1856	810
MEAN	3.98	9.16	7.17	6.28	5.55	150	250	58.8	107	501	59.9	27.0
MAX	6.7	12	8.5	7.4	7.6	600	909	169	586	1260	169	96
MIN	3.3	5.7	6.3	5.1	4.8	5.5	59	32	31	103	22	12
AC-FT	245	545	441	386	308	9220	14890	3620	6360	30810	3680	1610

e Estimated

MINNESOTA RIVER BASIN

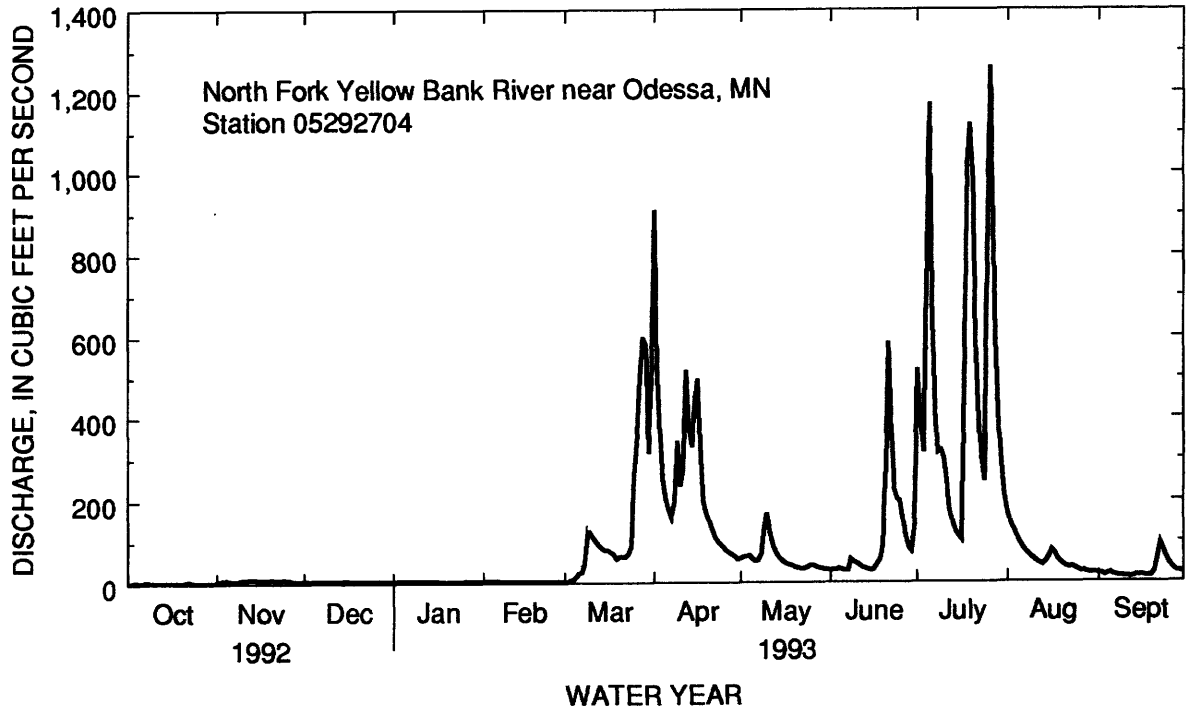
05292704 NORTH FORK YELLOW BANK RIVER NEAR ODESSA--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1992 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	5.47	7.37	6.48	6.48	12.7	93.4	136	34.0	159	318	36.4	16.6
MAX	6.95	9.16	7.17	6.68	19.7	150	250	58.8	212	501	59.9	27.0
(WY)	1992	1993	1993	1992	1992	1993	1993	1993	1992	1993	1993	1993
MIN	3.98	5.59	5.79	6.28	5.55	36.9	21.8	9.14	107	135	13.0	6.23
(WY)	1993	1992	1992	1993	1993	1992	1992	1992	1993	1992	1992	1992

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1992 - 1993	
ANNUAL TOTAL	14630.3		36352.6			
ANNUAL MEAN	40.0		99.6		69.7	
HIGHEST ANNUAL MEAN					99.6	1993
LOWEST ANNUAL MEAN					39.8	1992
HIGHEST DAILY MEAN	1810	Jun 18	1260	Jul 26	1810	Jun 18 1992
LOWEST DAILY MEAN	3.3	Oct 13	3.3	Oct 13,14	3.0	Dec 3 1991a
ANNUAL SEVEN-DAY MINIMUM	3.4	Oct 11	3.4	Oct 11	3.4	Nov 30 1991
INSTANTANEOUS PEAK FLOW			1480	Jul 26	2020	Jun 18 1992
INSTANTANEOUS PEAK STAGE			12.02	Jul 26	13.32	Jun 18 1992
ANNUAL RUNOFF (AC-FT)	29020		72110		50500	
10 PERCENT EXCEEDS	61		315		158	
50 PERCENT EXCEEDS	9.6		25		12	
90 PERCENT EXCEEDS	4.1		5.0		5.0	

a Also Dec. 4, 5, 1991.



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)
Apr. 1	-	1340	8.80	July 5	2000	1450	9.13
Apr. 12	-	886	7.33	July 19	-	e1250	-
May 10	-	415	5.35	July 26	2400	*1910	*10.36
June 21	2100	1170	8.27	Aug. 17	1100	355	5.03

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.0	16	e21	e12	e12	e11	1340	131	81	451	394	76
2	8.6	28	e20	e12	e12	e12	1100	140	79	630	331	76
3	7.1	35	e19	e12	e12	e22	788	149	78	539	296	83
4	7.8	39	e18	e12	e12	e38	597	158	79	767	260	77
5	8.6	34	e18	e12	e12	e39	493	162	81	1280	229	72
6	7.0	28	e18	e11	e12	e44	423	134	77	1270	214	71
7	6.8	27	e18	e11	e12	e49	375	135	77	855	202	67
8	8.3	26	e17	e11	e11	e155	394	177	91	641	188	64
9	10	26	e17	e11	e11	e168	567	308	103	555	172	61
10	8.3	32	e17	e11	e11	e173	574	415	121	468	149	58
11	7.7	34	e17	e10	e11	e165	563	381	112	e410	134	55
12	7.2	37	e17	e10	e11	e144	886	312	97	e320	128	53
13	7.1	42	e17	e10	e11	e126	864	252	93	e250	121	50
14	6.7	43	e17	e10	e11	e113	704	207	86	e210	117	50
15	7.1	39	e17	e10	e11	e107	716	169	79	e190	141	51
16	7.5	37	e16	e10	e11	e102	897	144	77	e180	260	56
17	7.6	38	e16	e10	e11	e95	679	133	87	e640	337	80
18	9.1	38	e16	e10	e11	e86	509	124	150	e1200	265	112
19	9.4	37	e15	e10	e11	e78	415	115	225	e1250	216	153
20	9.3	46	e15	e10	e11	e75	354	107	534	e1150	189	181
21	8.9	40	e14	e10	e11	e72	301	99	1040	e820	158	169
22	14	40	e14	e10	e11	e70	272	91	1010	611	143	144
23	15	41	e14	e11	e11	e73	244	88	743	498	135	125
24	12	41	e14	e11	e11	e115	220	91	587	421	124	113
25	11	39	e14	e11	e11	e345	197	94	532	1180	110	104
26	9.8	35	e13	e11	e11	e523	180	101	449	1760	97	99
27	9.8	e30	e13	e11	e11	e556	168	101	357	1600	91	92
28	9.6	e27	e13	e11	e11	e625	154	93	284	1030	89	87
29	15	e24	e13	e11	---	966	143	88	239	747	84	82
30	12	e22	e13	e12	---	780	133	84	275	581	80	77
31	12	---	e13	e12	---	802	---	83	---	477	79	---
TOTAL	288.3	1021	494	336	315	6729	15250	4866	7923	22981	5533	2638
MEAN	9.30	34.0	15.9	10.8	11.2	217	508	157	264	741	178	87.9
MAX	15	46	21	12	12	966	1340	415	1040	1760	394	181
MIN	6.7	16	13	10	11	11	133	83	77	180	79	50
AC-FT	572	2030	980	666	625	13350	30250	9650	15720	45580	10970	5230
CFSM	.02	.09	.04	.03	.03	.55	1.28	.39	.66	1.86	.45	.22

MINNESOTA RIVER BASIN

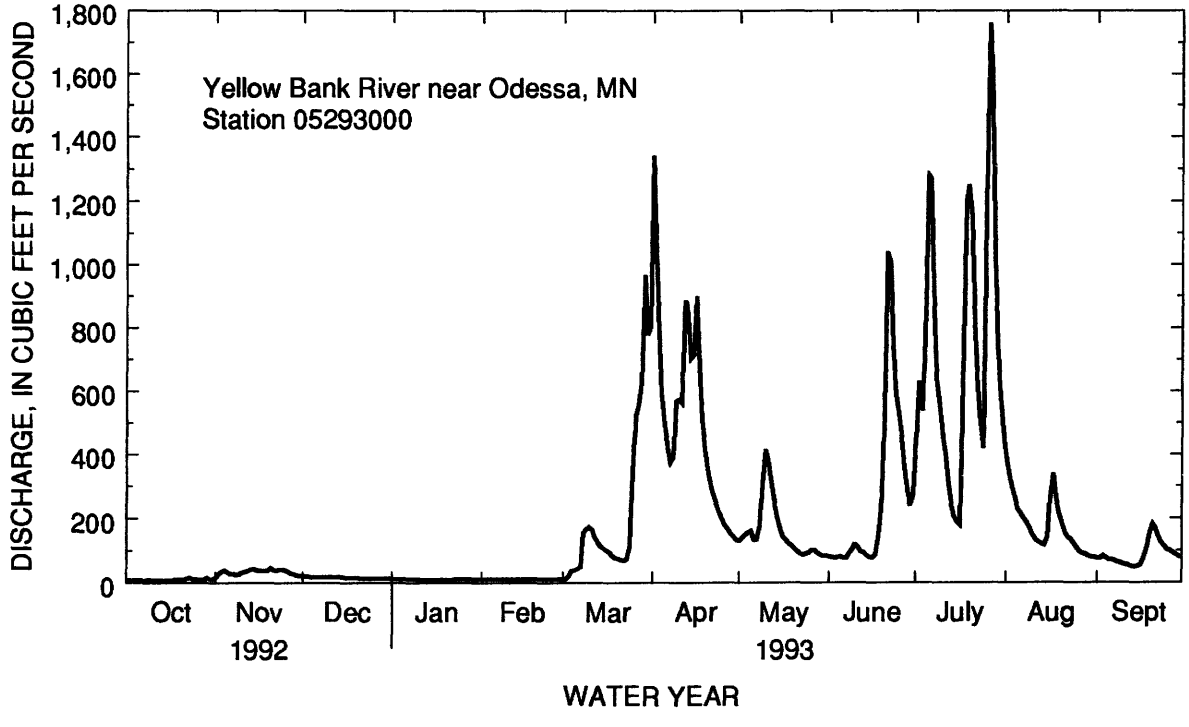
05293000 YELLOW BANK RIVER NEAR ODESSA, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	12.6	16.5	8.79	5.04	10.7	150	234	94.2	103	58.7	27.9	15.2
MAX	104	201	66.8	19.7	117	653	1341	652	577	741	281	273
(WY)	1985	1972	1972	1986	1984	1986	1952	1972	1992	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1940 - 1993	
ANNUAL TOTAL	35345.7		68374.3			
ANNUAL MEAN	96.6		187		61.5[a]	
HIGHEST ANNUAL MEAN					225	1986
LOWEST ANNUAL MEAN					3.98	1981
HIGHEST DAILY MEAN	3360	Jun 18	1760	Jul 26	6640	Apr 9 1969
LOWEST DAILY MEAN	6.3	Sep 28	6.7	Oct 14	.00[b]	Jan 26 1940
ANNUAL SEVEN-DAY MINIMUM	7.1	Sep 25	7.3	Oct 11	.00	Jan 26 1940
INSTANTANEOUS PEAK FLOW			1910	Jul 26	6970	Apr 9 1969
INSTANTANEOUS PEAK STAGE			10.36	Jul 26	19.07[c]	Apr 9 1969
INSTANTANEOUS LOW FLOW			6.1	Oct 7		
ANNUAL RUNOFF (AC-FT)	70110		135600		44550	
ANNUAL RUNOFF (CFSM)	.24		.47		.15	
10 PERCENT EXCEEDS	165		577		127	
50 PERCENT EXCEEDS	27		78		9.1	
90 PERCENT EXCEEDS	12		11		.94	

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. 29	1900	1070	7.15	July 10	1200	*2370	*9.56
May 10	0500	277	5.65	July 28	1800	2240	9.33
May 30	0900	366	5.91				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	30	44	19	e21	e17	641	188	332	487	1800	381
2	27	34	44	e19	e20	e18	717	188	326	499	1570	370
3	24	36	42	e18	e20	e19	698	189	316	526	1420	350
4	22	43	36	18	e20	e20	680	181	280	565	1280	334
5	23	35	37	18	e19	e20	618	176	278	623	1170	321
6	23	42	33	e18	e19	e21	577	172	261	778	1060	315
7	23	37	36	e18	e19	e22	567	179	251	1190	956	307
8	28	48	36	e18	e19	e23	522	212	243	e1940	871	290
9	26	45	36	e17	e18	e23	520	251	236	2300	798	302
10	24	47	36	e17	e17	e23	506	275	229	2330	735	310
11	24	46	36	e17	e17	e22	486	260	223	2210	681	300
12	24	48	36	e17	e17	e21	486	231	217	2000	632	290
13	23	48	36	e17	e16	e21	482	210	217	1830	594	288
14	23	36	36	e17	e16	e20	453	198	220	1670	609	281
15	23	45	36	e17	e15	e19	431	187	220	1470	600	270
16	23	57	37	e17	e15	e18	402	180	229	1300	587	265
17	24	59	38	e17	e16	e18	363	173	274	1280	565	257
18	22	55	38	e17	e16	e18	335	165	309	1480	539	249
19	23	57	38	e17	e17	e18	309	161	332	1380	519	239
20	23	56	36	e18	e17	e18	277	161	342	1210	516	233
21	23	56	36	e18	e17	e19	257	159	380	1060	518	225
22	23	52	36	e18	e18	e20	241	152	418	947	541	223
23	23	52	34	e19	e18	e23	224	157	442	868	550	220
24	26	50	33	e19	e17	e29	215	199	468	805	536	214
25	24	48	30	e18	e17	e40	209	255	492	806	511	211
26	23	31	28	e18	e17	94	207	300	501	1050	483	206
27	22	29	27	e18	e17	185	196	322	486	1830	460	205
28	22	39	26	e18	e17	334	187	340	474	2170	445	204
29	23	46	24	e19	---	716	182	350	473	2200	425	202
30	23	46	23	e20	---	679	180	352	474	2050	407	198
31	26	---	20	e21	---	579	---	334	---	1990	396	---
TOTAL	738	1353	1064	557	492	3117	12168	6857	9943	42844	22774	8060
MEAN	23.8	45.1	34.3	18.0	17.6	101	406	221	331	1382	735	269
MAX	28	59	44	21	21	716	717	352	501	2330	1800	381
MIN	22	29	20	17	15	17	180	152	217	487	396	198
AC-FT	1460	2680	2110	1100	976	6180	24140	13600	19720	84980	45170	15990
CFSM	.03	.05	.04	.02	.02	.11	.45	.24	.37	1.53	.81	.30

e Estimated.

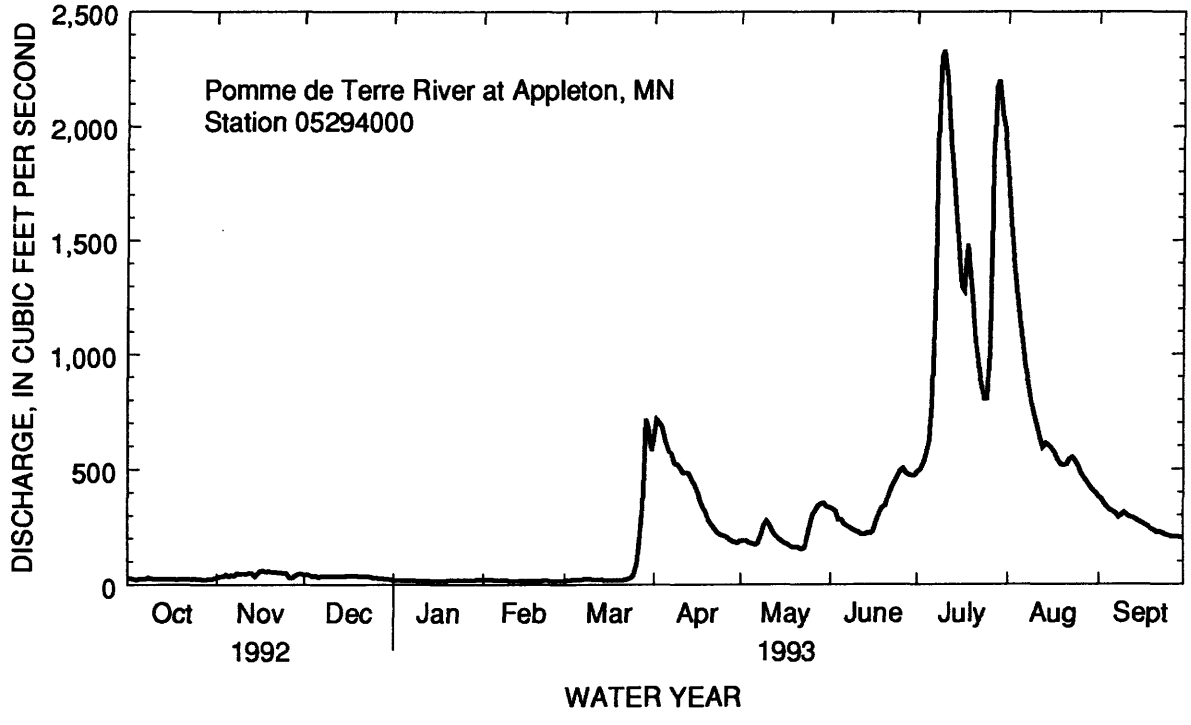
MINNESOTA RIVER BASIN

05294000 POMME DE TERRE RIVER AT APPLETON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	56.4	54.9	37.9	24.4	22.9	141	343	183	158	131	71.1	52.7
MAX	508	339	182	141	147	673	1587	846	516	1382	735	331
(WY)	1985	1985	1987	1987	1987	1985	1969	1969	1965	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1931 - 1993	
ANNUAL TOTAL	29588		109967			
ANNUAL MEAN	80.8		301		113	
HIGHEST ANNUAL MEAN					363	1986
LOWEST ANNUAL MEAN					21.1	1977
HIGHEST DAILY MEAN	383	Mar 8	2330	Jul 10	5210	Apr 11 1969
LOWEST DAILY MEAN	18	Aug 23	15	Feb 15-16	.00	Aug 3 1934
ANNUAL SEVEN-DAY MINIMUM	20	Aug 17	16	Feb 12	.00	Feb 1 1936
INSTANTANEOUS PEAK FLOW			2370	Jul 10	5520	Apr 11 1969
INSTANTANEOUS PEAK STAGE			9.56	Jul 10	14.58	Apr 9 1969
INSTANTANEOUS LOW FLOW			15	Feb 15		
ANNUAL RUNOFF (AC-FT)	58690		218100		82170	
ANNUAL RUNOFF (CFSM)	.089		.33		.13	
10 PERCENT EXCEEDS	166		724		257	
50 PERCENT EXCEEDS	55		165		44	
90 PERCENT EXCEEDS	23		18		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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	41	42	118	e27	e17	e17	e2500	508	398	e2390	959	327
2	38	54	111	e26	e18	e18	e2620	535	391	e2510	989	306
3	35	75	113	e24	e19	e20	e2800	646	379	e2540	975	286
4	36	106	100	e23	e19	e22	e2700	766	400	e2720	865	263
5	33	100	e90	e21	e19	e21	e2500	745	412	e2690	777	244
6	27	89	e85	e20	e19	e21	e2200	673	395	e2780	712	225
7	25	104	e80	e19	e19	e22	e2000	628	373	e2700	645	214
8	27	96	e75	e18	e19	e23	e1800	1080	354	e2540	580	201
9	31	93	e72	e17	e18	e22	e1700	1750	354	2270	528	185
10	30	100	e69	e16	e17	e21	e1800	2300	403	2060	491	173
11	41	107	e67	e16	e18	e21	e1900	2600	431	1870	451	154
12	51	114	e65	e16	e18	e20	e2000	2490	413	1690	416	149
13	50	128	e62	e15	e17	e19	e2200	2090	394	1530	370	145
14	46	131	e61	e15	e17	e19	e2200	1740	366	1390	366	143
15	42	136	e59	e15	e17	e18	e2300	1420	358	1260	481	140
16	41	141	e58	e15	e16	e18	e2200	1150	358	1130	717	142
17	40	146	e57	e16	e16	e17	e2100	949	466	1070	879	142
18	40	136	e55	e16	e16	e18	e1900	804	873	1090	992	137
19	38	130	e54	e17	e16	e19	e1700	720	1550	1170	1030	134
20	38	126	e53	e17	e16	e20	e1600	659	2430	1150	962	170
21	38	123	e52	e17	e16	e70	e1400	592	2910	1050	862	223
22	38	125	e50	e17	e17	e200	e1200	534	e4330	951	768	e370
23	40	127	e48	e16	e17	e452	e1100	495	e4520	856	687	404
24	40	127	e46	e16	e17	e700	e980	500	e4370	798	638	453
25	41	125	e44	e16	e16	e1200	e900	518	e3830	986	578	410
26	42	126	e42	e17	e16	e2300	e770	534	e3410	1170	513	349
27	38	103	e38	e17	e16	e2100	e700	523	e3080	1430	462	304
28	37	142	e34	e17	e16	e1800	e630	482	e2720	1330	426	274
29	36	129	e31	e16	---	e2100	e570	448	e2470	1070	400	249
30	35	115	e30	e15	---	e2500	e540	426	e2500	920	372	230
31	36	---	e29	e15	---	e2400	---	406	---	886	348	---
TOTAL	1171	3396	1948	548	482	16218	51510	29711	45638	49997	20239	7146
MEAN	37.8	113	62.8	17.7	17.2	523	1717	958	1521	1613	653	238
MAX	51	146	118	27	19	2500	2800	2600	4520	2780	1030	453
MIN	25	42	29	15	16	17	540	406	354	798	348	134
AC-FT	2320	6740	3860	1090	956	32170	102200	58930	90520	99170	40140	14170
CFSM	.04	.12	.06	.02	.02	.53	1.75	.97	1.55	1.64	.66	.24

e Estimated.

MINNESOTA RIVER BASIN

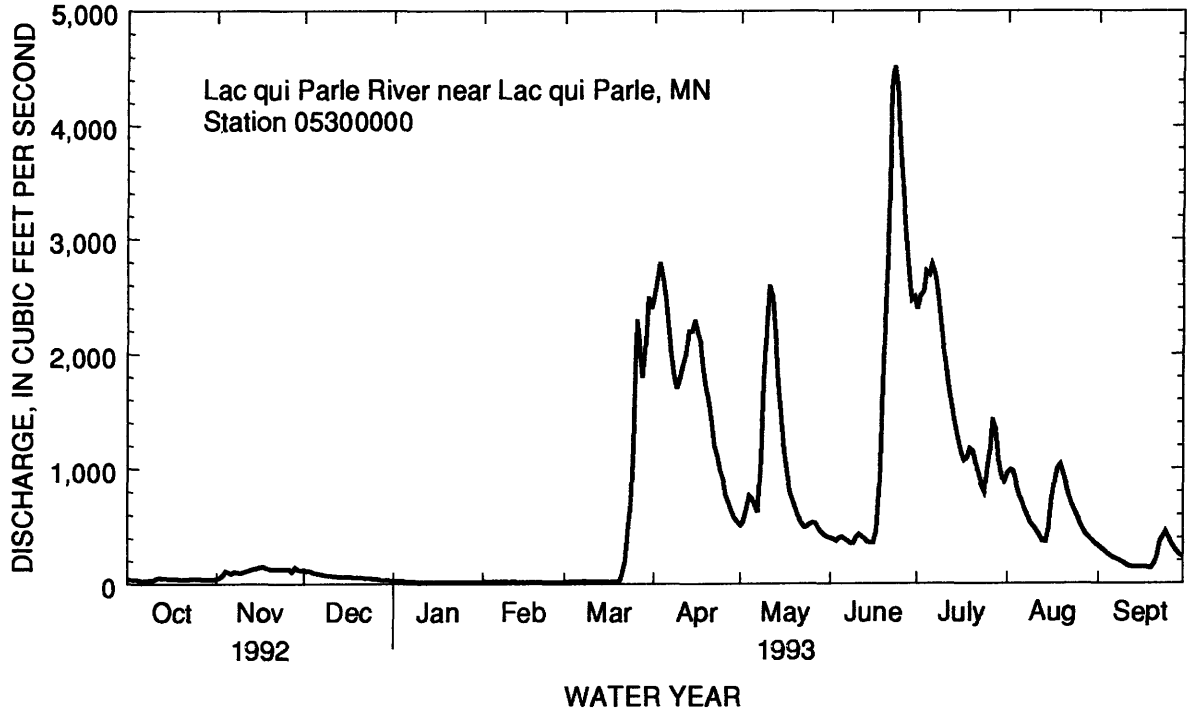
05300000 LAC QUI PARLE RIVER NEAR LAC QUI PARLE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	28.9	37.2	19.1	8.36	16.9	283	518	208	254	131	69.5	35.2
MAX	482	345	112	43.9	140	1634	3578	1028	1762	1613	765	535
(WY)	1985	1971	1972	1987	1984	1985	1969	1944	1984	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1910 - 1993	
ANNUAL TOTAL	94335		228004			
ANNUAL MEAN	258		625		142[a]	
HIGHEST ANNUAL MEAN					625	1993
LOWEST ANNUAL MEAN					.000	1934
HIGHEST DAILY MEAN	6140	Jun 20	4520	Jun 23	16000	Apr 10 1969
LOWEST DAILY MEAN	25	Jun 5	15	Jan 13	.00[b]	
ANNUAL SEVEN-DAY MINIMUM	27	Jun 3	15	Jan 10	.00	Jul 15 1931
INSTANTANEOUS PEAK FLOW			4520	Jun 23	17100	Apr 10 1969
INSTANTANEOUS PEAK STAGE			12.20[c]	Jun 23	19.37[d]	Apr 9 1965
ANNUAL RUNOFF (AC-FT)	187100		452200		102800	
ANNUAL RUNOFF (CFSM)	.26		.64		.14	
10 PERCENT EXCEEDS	446		2140		298	
50 PERCENT EXCEEDS	102		173		17	
90 PERCENT EXCEEDS	35		17		.35	

a Median of annual mean discharge is 110 ft³/s.
b Many days in several years.
c Maximum observed.
d 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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	159	188	e340	e195	e129	e292	1700	2290	e1530	6340	8580	2490
2	138	269	e327	e183	e211	e283	2680	2260	e1550	6270	9240	2370
3	123	364	e360	e188	e208	e290	3620	2070	1540	6200	10100	2210
4	124	436	e365	e188	e250	e286	4690	1910	1540	6330	9950	2040
5	109	476	e385	e134	e330	e283	5470	1920	1540	6620	9670	2000
6	74	469	e400	e134	e320	e282	5520	1970	1530	6830	9250	1970
7	74	471	e415	e134	e320	e282	5470	2130	1500	6950	8670	1890
8	73	471	e395	e136	e310	e280	5370	2330	1500	7040	8200	1770
9	74	466	e375	e136	e303	e210	5230	2700	1540	7160	7790	1760
10	74	463	e327	e136	e303	e160	5060	3620	1520	7250	7220	1630
11	75	465	e292	e136	e299	e158	5000	e4360	1510	7530	6830	1460
12	75	460	e233	e136	e260	e160	4950	e4520	1470	7490	6440	1450
13	74	459	e233	e134	e260	e160	4890	e4560	1490	7380	5960	1410
14	76	463	e233	e130	e260	e160	4910	e4540	1520	7310	5570	1340
15	76	458	e233	e130	e260	e160	5240	e4410	1490	e7200	5410	1230
16	78	427	e233	e130	e260	e202	5170	e4300	1460	7010	5250	1020
17	78	373	e238	e130	e260	e387	5100	e4120	1580	7050	5080	984
18	78	373	e238	e130	e260	e300	5010	e4000	e1900	6990	4870	991
19	80	372	e238	e130	e260	e288	4810	e3810	2290	6990	4230	1000
20	80	352	e240	e130	e260	e282	4690	e3610	2930	6880	4470	1020
21	80	367	e240	e130	e260	e385	4510	e3450	3170	6750	4750	1030
22	81	370	e240	e129	e260	450	4330	e3200	4770	6610	4560	1220
23	114	369	e240	e129	e260	523	4130	e3100	5720	6540	4200	1420
24	135	365	e240	e129	e320	528	4020	e3200	6800	6470	4520	1550
25	136	e340	e240	e129	e300	655	3820	e2980	7160	6540	4390	1440
26	135	e340	e240	e129	e296	872	3420	e2860	7130	6700	4230	1500
27	149	e340	e240	e129	e300	1140	2970	e2450	6980	7310	3910	1480
28	186	e338	e240	e129	e300	1440	2820	e1690	6810	7940	3540	1510
29	185	e338	e240	e129	---	1520	2720	e1600	6560	8060	3410	1480
30	187	e338	e220	e129	---	1490	2590	e1530	6380	7960	3220	1460
31	188	---	e205	e129	---	1430	---	e1530	---	8050	2850	---
TOTAL	3368	11780	8685	4300	7619	15338	129910	93020	94410	217750	186360	46125
MEAN	109	393	280	139	272	495	4330	3001	3147	7024	6012	1537
MAX	188	476	415	195	330	1520	5520	4560	7160	8060	10100	2490
MIN	73	188	205	129	129	158	1700	1530	1460	6200	2850	984
AC-FT	6680	23370	17230	8530	15110	30420	257700	184500	187300	431900	369600	91490
CFSM	.03	.10	.07	.03	.07	.12	1.07	.74	.78	1.73	1.48	.38
IN.	.03	.11	.08	.04	.07	.14	1.19	.85	.87	2.00	1.71	.42

e Estimated.

MINNESOTA RIVER BASIN

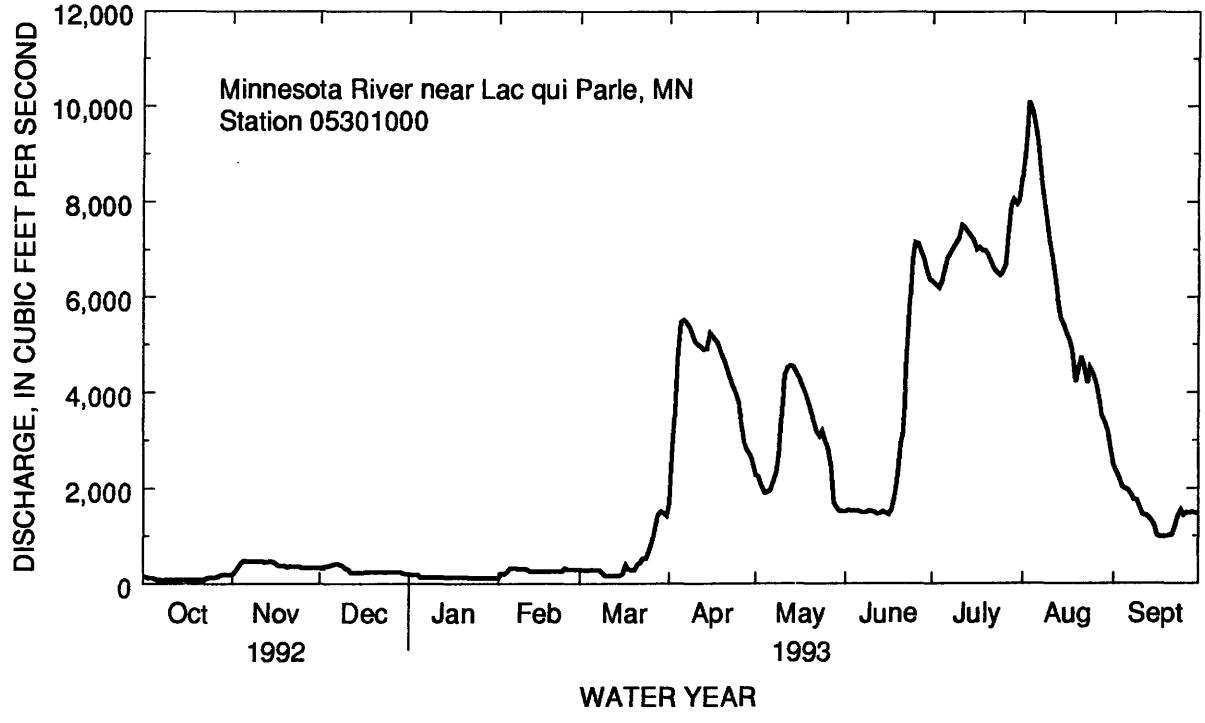
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	251	263	202	142	171	769	2562	1307	1132	956	518	267
MAX	2924	2327	1204	574	634	4108	10750	5771	4229	7024	6012	2402
(WY)	1987	1985	1985	1987	1987	1985	1986	1986	1984	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1943 - 1993	
ANNUAL TOTAL	322750		818665			
ANNUAL MEAN	882		2243		712	
HIGHEST ANNUAL MEAN					2507	1986
LOWEST ANNUAL MEAN					75.7	1959
HIGHEST DAILY MEAN	7890	Jun 22	10100	Aug 3	28700	Apr 12 1969
LOWEST DAILY MEAN	73	Oct 8	73	Oct 8	.00[a]	Oct 19 1951
ANNUAL SEVEN-DAY MINIMUM	74	Oct 6	74	Oct 6	.00	Oct 19 1951
INSTANTANEOUS PEAK FLOW			10200	Aug 3	29400	Apr 12 1969
INSTANTANEOUS PEAK STAGE			35.95	Aug 3	39.75	Apr 12 1969
ANNUAL RUNOFF (AC-FT)	640200		1624000		515800	
ANNUAL RUNOFF (CFSM)	.22		.55		.18	
ANNUAL RUNOFF (INCHES)	2.96		7.52		2.39	
10 PERCENT EXCEEDS	1900		6770		1750	
50 PERCENT EXCEEDS	442		1030		203	
90 PERCENT EXCEEDS	195		130		26	

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 1992 TO SEPTEMBER 1993

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)	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)
NOV												
04...	1100	474	957	8.6	1.5	13.5	740	20	0.010	0.490	0.070	0.060
JAN												
20...	1200	140	1140	8.7	1.0	9.4	750	23	0.030	0.720	0.270	0.110
MAR												
24...	0930	519	1320	7.8	3.0	9.9	744	25	0.010	0.550	0.290	0.080
JUL												
22...	1010	6620	894	7.7	22.0	6.8	741	22	0.020	0.810	0.090	0.110
SEP												
09...	1210	1760	881	8.2	18.5	9.9	734	21	0.020	1.20	0.060	0.100

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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)
Mar. 31	--	2140	--	Aug. 1	1500	*4790	*9.56
May 8	2000	4060	8.66	Aug. 16	0100	2200	6.04
June 20	1900	3240	7.58	Aug. 24	0800	2110	5.89
July 5	1200	3090	7.37	Sept. 21	1100	1180	4.26
July 26	0500	2270	6.15				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	141	150	e138	e115	e119	e105	2120	736	1020	1710	4710	1150
2	138	165	e136	e115	e120	e106	1750	831	996	1800	4760	1150
3	134	175	e135	e115	e120	e107	1540	903	959	1990	4670	1150
4	132	177	e135	e115	e119	e108	1400	886	926	2640	4410	1090
5	131	176	e134	e115	e118	e109	1300	856	897	3060	3950	1040
6	129	186	e133	e114	e117	e110	1210	834	868	2840	3370	991
7	128	187	e132	e114	e117	e110	1150	917	860	2430	2750	948
8	137	177	e131	e114	e117	e111	1140	3470	947	2110	2180	908
9	147	199	e130	e113	e116	e111	1130	3730	973	1980	1800	863
10	148	205	e130	e113	e116	e111	1090	2850	930	1980	1590	818
11	143	193	e130	e113	e115	e110	1120	2190	874	1900	1440	781
12	138	208	e130	e113	e115	e110	1220	1880	833	1780	1340	748
13	135	210	e130	e113	e115	e110	1200	1690	850	1650	1270	726
14	131	194	e130	e113	e115	e110	1180	1540	1080	1590	1370	743
15	131	210	e130	e113	e115	e111	1230	1430	948	1530	2000	750
16	133	231	e129	e112	e114	e111	1190	1330	935	1480	2160	734
17	133	225	e128	e111	e114	e111	1130	1230	1460	1510	1900	718
18	133	208	e126	e111	e113	e112	1090	1130	2410	1550	1750	696
19	133	205	e124	e111	e112	e112	1050	1050	2580	1540	1720	684
20	133	213	e123	e111	e111	e113	993	985	3190	1470	1600	855
21	133	216	e122	e111	e110	e114	946	937	3100	1400	1460	1160
22	137	216	e121	e111	e109	e114	899	893	2690	1350	1400	1140
23	138	216	e120	e111	e108	e115	869	865	2900	1350	1800	1100
24	139	216	e120	e111	e108	e205	843	917	2630	1350	2070	1030
25	138	216	e120	e112	e107	e640	831	1030	2250	1810	1860	1000
26	137	217	e119	e113	e106	e800	810	1030	1960	2190	1600	964
27	135	152	e118	e114	e106	e880	795	1010	1720	1820	1500	930
28	133	e150	e117	e115	e105	e960	774	997	1560	1590	1430	897
29	135	e145	e117	e116	---	e1000	750	980	1450	1470	1330	861
30	137	e140	e116	e117	---	e1050	731	974	1620	1400	1270	829
31	140	---	e116	e117	---	2140	---	1010	---	2510	1220	---
TOTAL	4210	5778	3920	3512	3177	10216	33481	41111	46416	56780	67680	27454
MEAN	136	193	126	113	113	330	1116	1326	1547	1832	2183	915
MAX	148	231	138	117	120	2140	2120	3730	3190	3060	4760	1160
MIN	128	140	116	111	105	105	731	736	833	1350	1220	684
AC-FT	8350	11460	7780	6970	6300	20260	66410	81540	92070	112600	134200	54460
CFSM	.07	.10	.07	.06	.06	.18	.60	.71	.83	.98	1.17	.49
IN.	.08	.11	.08	.07	.06	.20	.67	.82	.92	1.13	1.35	.55

MINNESOTA RIVER BASIN

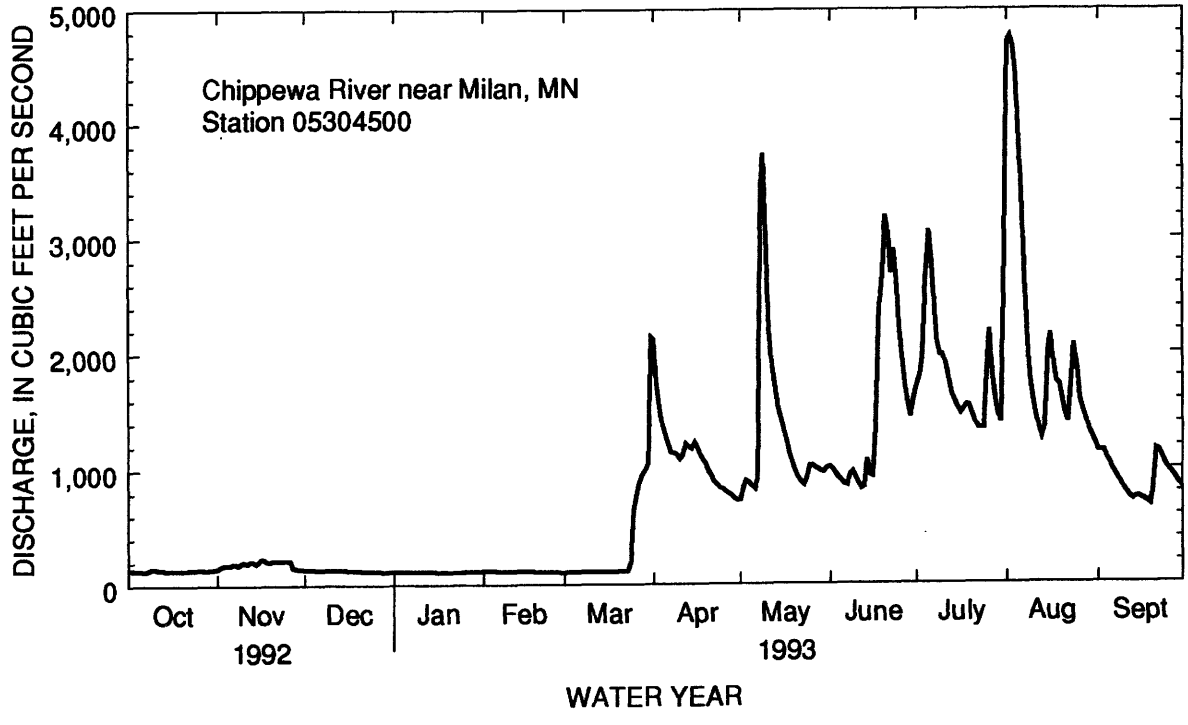
05304500 CHIPPEWA RIVER NEAR MILAN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	192	170	105	59.9	56.7	359	925	600	559	402	245	209
MAX	1996	1318	655	425	404	2141	3661	2462	2248	1832	2183	2273
(WY)	1985	1985	1985	1987	1987	1985	1952	1986	1984	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1938 - 1993	
ANNUAL TOTAL	162636		303735			
ANNUAL MEAN	444		832		324[a]	
HIGHEST ANNUAL MEAN					1307	1986
LOWEST ANNUAL MEAN					45.4	1940
HIGHEST DAILY MEAN	4600	Jun 18	4760	Aug 2	10100	Apr 10 1969
LOWEST DAILY MEAN	116	Deb 30	105	Feb 28 - Mar. 1.	.00[b]	Jan 4 1940
ANNUAL SEVEN-DAY MINIMUM	118	Dec 25	106	Feb 25	.00	Jan 4 1940
INSTANTANEOUS PEAK FLOW			4790	Aug 1	11400	Apr 9 1969
INSTANTANEOUS PEAK STAGE			9.56	Aug 1	15.45	Apr 9 1969
INSTANTANEOUS LOW FLOW			105	Feb 28	.00	Jan 4 1940
ANNUAL RUNOFF (AC-FT)	322600		602500		234800	
ANNUAL RUNOFF (CFSM)	.24		.45		.17	
ANNUAL RUNOFF (INCHES)	3.24		6.04		2.35	
10 PERCENT EXCEEDS	874		1920		882	
50 PERCENT EXCEEDS	230		736		115	
90 PERCENT EXCEEDS	133		112		14	

a Median of annual mean discharges is 249 ft^3/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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	259	242	361	e260	e210	e425	e2330	e3160	2030	e7420	9100	3820
2	245	254	392	e260	e240	e435	e3110	e2990	2040	e7460	9870	3360
3	226	407	425	e250	e270	e440	e3480	e2810	2050	e7320	10700	3140
4	208	461	458	e245	e325	e438	e4180	e2490	2050	7750	11100	2860
5	191	550	e465	e200	e355	e425	e5740	e2380	2040	e7630	10800	2670
6	175	547	e480	e195	e395	e415	e7160	e2500	2020	e7650	10100	2560
7	159	e510	e490	e195	e390	e385	e7420	e2910	2010	e7690	9440	2470
8	144	e490	e500	e195	e385	e330	e7420	e4150	2000	e7840	9050	2290
9	133	e465	e490	e195	e380	e280	e7200	e4630	2050	e8100	8740	2230
10	131	454	e465	e195	e370	e235	e7000	e4660	2070	8120	8380	2150
11	131	465	e400	e195	e360	e220	e6600	e4680	2040	8230	7970	1920
12	130	492	e365	e195	e340	e220	e6400	e4960	1980	8260	7540	1870
13	129	e480	e320	e195	e340	e220	e6200	e5310	1950	8250	7170	1860
14	127	e475	e310	e190	e340	e220	e5820	e5170	2010	8120	7070	1730
15	126	e465	e310	e190	e340	e220	e6000	e5670	2070	7980	6940	1560
16	125	453	e310	e190	e340	e300	e6100	e5380	2040	7840	6830	1310
17	126	451	e310	e190	e330	e400	e6300	e5130	2290	7970	6700	1210
18	126	447	e310	e190	e330	e450	e6500	e5040	2580	7900	e6400	1200
19	126	453	e310	e190	e340	e425	e6660	e4850	3110	7920	e6100	1210
20	127	460	e310	e190	e340	e410	e6420	e4580	e3690	7760	e5800	1300
21	127	463	e300	e190	e345	e460	e6200	e4330	e4380	7590	e5500	1480
22	127	492	e300	e190	e345	e530	e6030	e4070	e4520	7460	e5200	1640
23	126	528	e300	e190	e345	e580	e5680	e3840	e5670	7370	e4900	1950
24	162	562	e300	e190	e345	e670	e5440	e3720	e7020	7300	e4600	2100
25	171	575	e300	e190	e370	e692	e5140	e3620	e7750	7580	e4300	2030
26	173	e550	e300	e190	e385	e820	e4890	e3450	e8070	7490	e4190	2010
27	173	e510	e300	e190	e400	e1000	e4470	3220	e8030	7600	5740	1990
28	207	e480	e300	e190	e415	e1300	e3770	2570	e7840	8180	5290	1990
29	226	e440	e300	e190	---	e1700	e3590	2120	e7650	8470	4970	1970
30	227	e420	e290	e195	---	e2000	e3380	2020	e7630	8410	4770	1920
31	232	---	e270	e195	---	e2200	---	2040	---	8790	4350	---
TOTAL	5095	14041	11041	6205	9670	18845	166630	118450	112680	243450	219610	61800
MEAN	164	468	356	200	345	608	5554	3821	3756	7853	7084	2060
MAX	259	575	500	260	415	2200	7420	5670	8070	8790	11100	3820
MIN	125	242	270	190	210	220	2330	2020	1950	7300	4190	1200
AC-FT	10110	27850	21900	12310	19180	37380	330500	234900	223500	482900	435600	122600
CFSM	.03	.08	.06	.03	.06	.10	.90	.62	.61	1.27	1.15	.33

e Estimated.

MINNESOTA RIVER BASIN

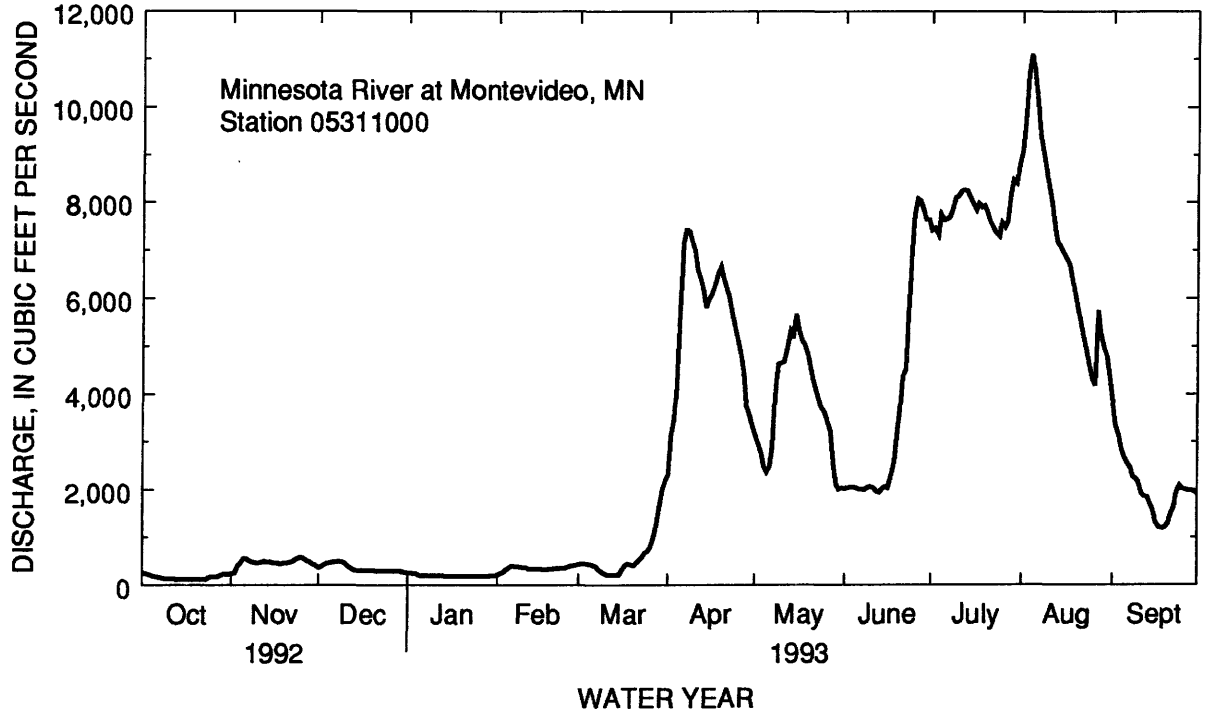
05311000 MINNESOTA RIVER AT MONTEVIDEO, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	295	304	228	154	177	788	2413	1397	1224	1039	535	326
MAX	3171	3164	1352	760	740	4893	12550	7315	5088	7853	7084	2613
(WY)	1987	1985	1985	1987	1987	1985	1952	1986	1984	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1909 - 1993	
ANNUAL TOTAL	417704		987517			
ANNUAL MEAN	1141		2706		777[a]	
HIGHEST ANNUAL MEAN					2961	1986
LOWEST ANNUAL MEAN					4.43	1934
HIGHEST DAILY MEAN	8810	Jun 25	11100	Aug 4	34400	Apr 13 1969
LOWEST DAILY MEAN	125	Oct 16	125	Oct 16	.00[b]	
ANNUAL SEVEN-DAY MINIMUM	126	Oct 14	126	Oct 14	.00	Jul, 5 1934
INSTANTANEOUS PEAK FLOW					35100	Apr 12 1969
INSTANTANEOUS PEAK STAGE					21.68[c]	Apr 12 1969
ANNUAL RUNOFF (AC-FT)	828500		1959000		562600	
ANNUAL RUNOFF (CFSM)	.18		.44		.13	
10 PERCENT EXCEEDS	2540		7640		1990	
50 PERCENT EXCEEDS	550		1300		226	
90 PERCENT EXCEEDS	300		190		33	

a Median of annual mean discharges is 593 ft3/s.
b Occurred several days in 1933, 1934, and 1936.
c From highwater mark.



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. 30	--	e2020	--	July 6	2300	4090	8.51
Apr. 13	1500	1220	5.45	July 19	1000	1130	5.31
May 10	2200	4030	8.45	July 26	1400	1210	5.44
June 5	0000	463	4.08	Aug. 18	0600	942	5.02
June 21	1200	*8380	*11.46	Aug. 23	1400	1210	5.44
				Sept. 22	2200	494	4.15

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	35	e53	e17	e10	e9.7	1760	331	300	1990	529	274
2	12	37	e51	e15	e10	e9.8	1910	395	304	2200	491	244
3	10	37	e50	e14	e10	e9.9	1940	560	359	2310	451	209
4	19	63	e49	e13	e10	e10	1660	668	446	2740	419	188
5	13	81	e48	e12	e10	e10	1340	605	451	2940	391	170
6	12	91	e47	e12	e10	e10	1140	541	404	3750	357	157
7	12	76	e46	e12	e10	e10	992	532	365	3920	333	141
8	13	49	e45	e11	e10	e10	913	1550	362	3330	309	128
9	15	83	e44	e11	e10	e9.9	959	2380	406	2690	284	120
10	17	95	e43	e11	e10	e9.5	1050	3300	424	2160	262	111
11	30	102	e42	e11	e10	e9.6	1020	e2300	392	2100	239	108
12	37	e105	e41	e11	e10	e9.6	1030	e1700	347	1790	218	101
13	35	e127	e41	e11	e10	e9.6	1200	e1350	315	1540	199	94
14	41	127	e41	e11	e10	e9.6	1180	e1100	285	1310	213	92
15	36	e146	e41	e11	e9.6	e9.6	1120	e960	275	1120	384	91
16	35	e149	e40	e11	e9.6	e9.6	1110	e800	285	980	582	93
17	34	e149	e40	e11	e9.6	e9.6	1110	e700	887	888	816	92
18	31	e139	e39	e11	e9.6	e9.6	1030	e640	1790	847	926	85
19	29	130	e39	e11	e9.6	e9.5	910	e600	4140	1060	793	85
20	28	127	e38	e11	e9.6	e9.5	788	566	6960	955	647	106
21	28	127	e38	e11	e9.6	e9.4	688	556	8250	825	580	202
22	26	127	e38	e11	e9.6	e9.4	609	502	7890	692	967	448
23	25	126	e37	e11	e9.6	e10	546	462	6690	618	1190	483
24	27	117	e35	e11	e9.6	e12	504	429	5390	580	782	439
25	27	98	e33	e11	e9.6	e20	461	417	4770	967	572	384
26	26	58	e31	e11	e9.6	e140	423	402	4380	1190	487	336
27	27	75	e28	e11	e9.6	e555	398	374	3720	1160	436	294
28	29	e70	e24	e11	e9.6	e915	370	343	3070	971	417	267
29	26	e62	e22	e11	---	e1210	353	323	2530	770	391	241
30	26	e57	e20	e10	---	e2020	336	313	2190	634	357	225
31	30	---	e19	e10	---	1760	---	302	---	578	310	---
TOTAL	766	2865	1203	357	274.4	6855.4	28850	26001	68377	49605	15332	6008
MEAN	24.7	95.5	38.8	11.5	9.80	221	962	839	2279	1600	495	200
MAX	41	149	53	17	10	2020	1940	3300	8250	3920	1190	483
MIN	10	35	19	10	9.6	9.4	336	302	275	578	199	85
AC-FT	1520	5680	2390	708	544	13600	57220	51570	135600	98390	30410	11920
CFSM	.04	.15	.06	.02	.02	.34	1.47	1.28	3.49	2.45	.76	.31
IN.	.04	.16	.07	.02	.02	.39	1.64	1.48	3.90	2.83	.87	.34

e Estimated.

MINNESOTA RIVER BASIN

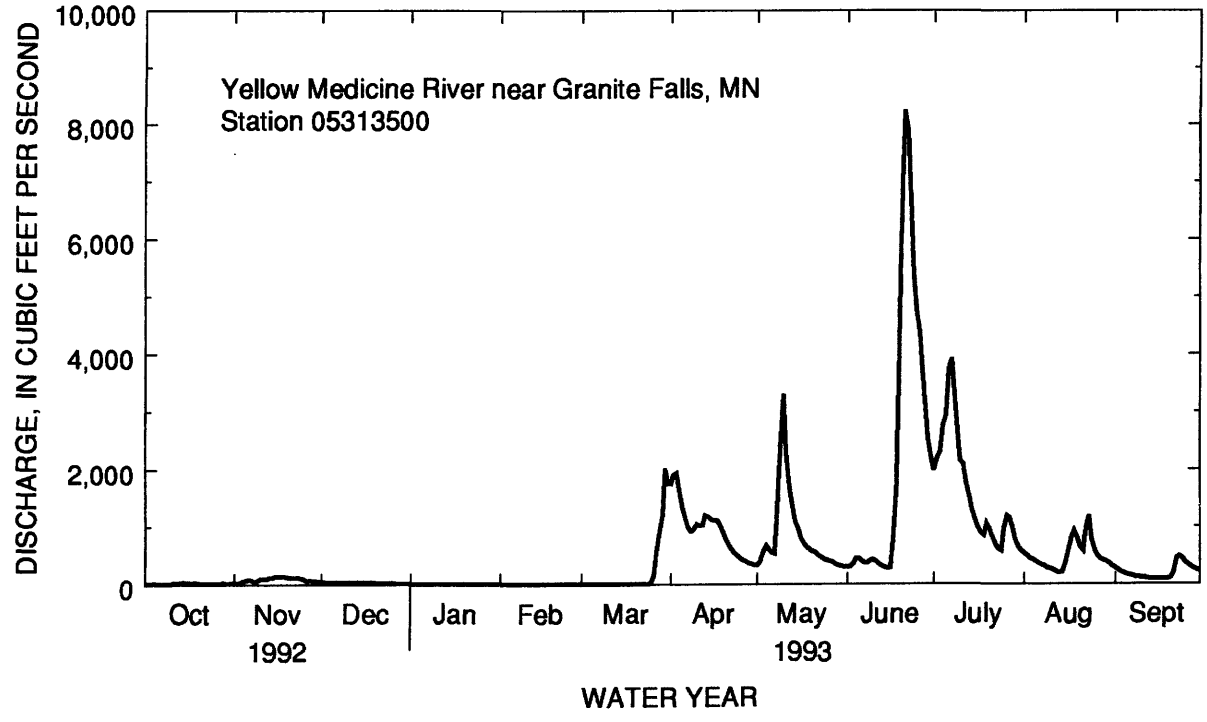
05313500 YELLOW MEDICINE RIVER NEAR GRANITE FALLS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	31.7	36.5	21.6	11.3	15.3	205	449	179	272	134	62.3	41.1
MAX	409	274	135	75.5	97.1	933	3302	1087	2484	1600	510	1005
(WY)	1987	1971	1987	1987	1966	1986	1969	1944	1984	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1931 - 1993	
ANNUAL TOTAL	47103		206493.8			
ANNUAL MEAN	129		566		130a	
HIGHEST ANNUAL MEAN					566	1993
LOWEST ANNUAL MEAN					8.32	1959
HIGHEST DAILY MEAN	1110	Jun 19	8250	Jun 21	16400	Apr 10 1969
LOWEST DAILY MEAN	10	Oct 1	9.4	Mar 21	.00b	Jul 26 1931
ANNUAL SEVEN-DAY MINIMUM	12	Sep 27	9.5	Mar 16	.00	Jan 21 1948
INSTANTANEOUS PEAK FLOW			8380	Jun 21	17200	Apr 10 1969
INSTANTANEOUS PEAK STAGE			11.46	Jun 21	14.90	Apr 10 1969
INSTANTANEOUS LOW FLOW			9.0	Oct 3		
ANNUAL RUNOFF (AC-FT)	93430		409600		94500	
ANNUAL RUNOFF (CFSM)	.20		.87		.20	
ANNUAL RUNOFF (INCHES)	2.68		11.76		2.71	
10 PERCENT EXCEEDS	323		1540		273	
50 PERCENT EXCEEDS	61		127		16	
90 PERCENT EXCEEDS	25		10		2.2	

a Median of annual mean discharges is 84 ft^3/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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	41	e38	e19	e16	e18	e907	e437	245	1080	393	403
2	21	57	e37	e19	e16	e18	e826	e573	326	993	366	371
3	20	64	e36	e18	e15	e18	e782	e978	338	2420	345	344
4	19	62	e33	e18	e15	e18	e754	e1430	303	2550	322	320
5	18	58	e31	e17	e15	e18	e725	e1800	269	2560	307	298
6	19	59	e29	e17	e15	e18	e701	e2500	249	2340	292	280
7	22	e60	e27	e16	e15	e18	e692	e3400	241	1990	277	266
8	48	e60	e26	e16	e15	e18	e671	e4300	261	1770	264	252
9	74	59	e25	e16	e15	e18	e649	5300	255	1700	252	238
10	75	73	e24	e15	e15	e18	e645	2910	238	1530	240	222
11	70	92	e24	e15	e15	e18	e622	e2060	218	1420	230	210
12	62	98	e23	e15	e15	e18	e600	1570	205	1320	221	199
13	56	91	e23	e15	e16	e18	e585	1300	208	1240	214	202
14	54	83	e23	e14	e16	e18	e568	1150	205	1140	290	194
15	51	e82	e23	e14	e16	e18	e543	955	202	1050	1680	184
16	50	79	e23	e14	e16	e18	e515	809	344	962	1750	178
17	47	78	e22	e14	e16	e18	e508	684	3030	958	1600	174
18	47	78	e22	e14	e17	e18	e447	600	1670	935	1440	171
19	47	78	e22	e14	e17	e18	e438	530	2520	831	1270	179
20	46	80	e22	e15	e17	e18	e428	482	2400	725	862	409
21	46	77	e22	e15	e17	e18	e405	439	1980	645	505	424
22	44	75	e22	e15	e18	e18	e412	401	1640	587	954	371
23	44	73	e22	e16	e18	e19	e354	387	1520	568	609	339
24	42	69	e22	e16	e18	e22	e330	360	1570	553	610	328
25	41	63	e21	e16	e18	e37	e326	330	1520	1040	578	317
26	40	47	e21	e16	e18	e95	e317	311	1440	691	536	296
27	39	e39	e21	e16	e18	e165	e284	302	1300	591	564	274
28	40	e38	e21	e16	e18	e300	e230	279	1170	516	543	258
29	36	e38	e21	e16	---	e1200	e183	261	1080	459	503	242
30	35	e39	e20	e16	---	e1100	e322	258	1140	421	468	227
31	34	---	e20	e16	---	e996	---	248	---	413	433	---
TOTAL	1309	1990	766	489	456	4330	15769	37344	28087	35998	18918	8170
MEAN	42.2	66.3	24.7	15.8	16.3	140	526	1205	936	1161	610	272
MAX	75	98	38	19	18	1200	907	5300	3030	2560	1750	424
MIN	18	38	20	14	15	18	183	248	202	413	214	171
AC-FT	2600	3950	1520	970	904	8590	31280	74070	55710	71400	37520	16210
CFSM	.16	.26	.10	.06	.06	.54	2.03	4.65	3.61	4.48	2.36	1.05

e Estimated.

MINNESOTA RIVER BASIN

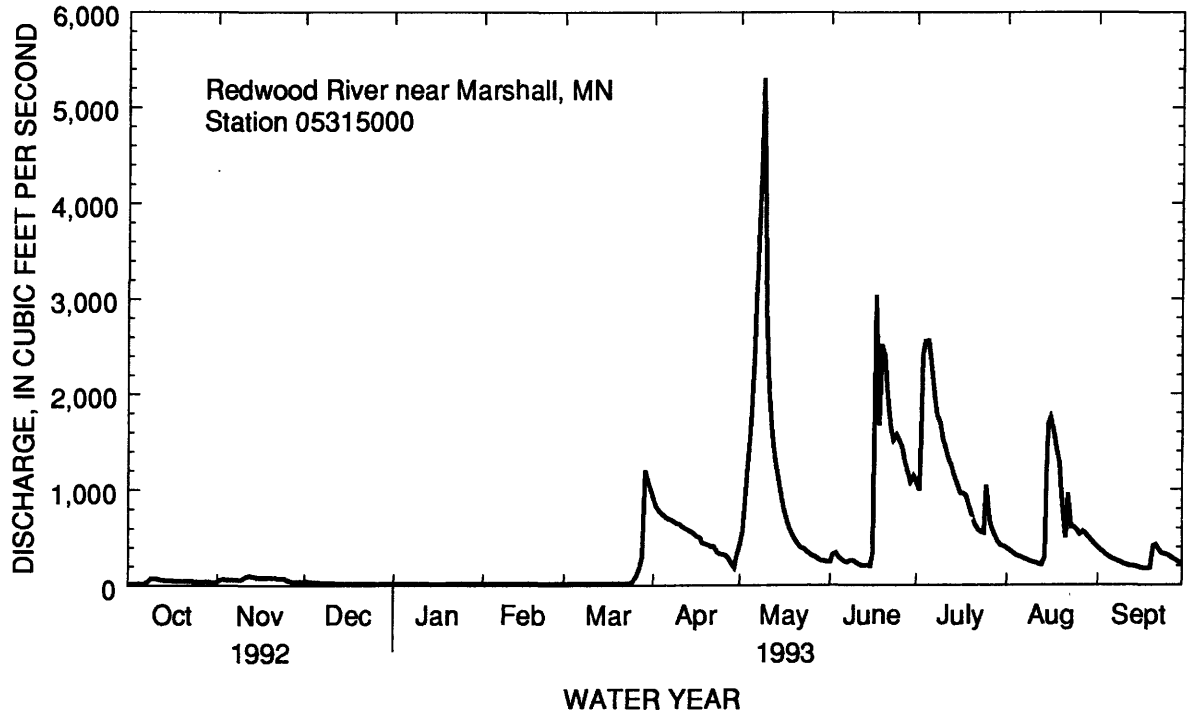
05315000 REDWOOD RIVER NEAR MARSHALL, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	20.3	20.2	11.7	6.77	11.9	113	211	110	109	65.9	30.1	24.8
MAX	222	153	81.7	42.2	101	571	1152	1205	936	1161	610	292
(WY)	1969	1980	1983	1987	1983	1983	1969	1993	1993	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1940 - 1993	
ANNUAL TOTAL	19455		153626			
ANNUAL MEAN	53.2		421		61.7[a]	
HIGHEST ANNUAL MEAN					421	1993
LOWEST ANNUAL MEAN					5.13	1981
HIGHEST DAILY MEAN	400	Jun 18	5300	May 9	5300	May 9 1993
LOWEST DAILY MEAN	11	Jan 14x	14	Jan 14 - 19	.00[b]	
ANNUAL SEVEN-DAY MINIMUM	11	Jan 14	14	Jan 13	.00	Jul 28 1940
INSTANTANEOUS PEAK FLOW			6380	May 9	6380	May 9 1993
INSTANTANEOUS PEAK STAGE			17.00	May 9	17.00	May 9 1993
INSTANTANEOUS LOW FLOW			14	Jan 14		
ANNUAL RUNOFF (AC-FT)	38590		304700		44730	
ANNUAL RUNOFF (CFSM)	.21		1.63		.24	
10 PERCENT EXCEEDS	98		1250		134	
50 PERCENT EXCEEDS	40		183		10	
90 PERCENT EXCEEDS	12		16		1.7	

a Median of annual mean discharges is 41 ft³/s.
b Many days in several years.



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)
Apr. 4	1900	2080	6.26	June 18	2400	*12600	*15.73
May 4	0900	742	3.78	July 5	2000	5870	10.57
May 10	1400	7430	11.96	July 28	1700	1360	5.09
June 8	1200	695	3.72	Aug. 19	1200	1880	5.97
				Sept. 22	1900	719	3.73

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	65	104	e129	e53	e35	e35	2040	527	520	1940	e940	656
2	64	129	e122	e51	e35	e35	2050	659	551	1800	e800	603
3	59	157	e117	e49	e35	e35	2050	721	661	2350	e700	554
4	55	174	e109	e48	e35	e35	1900	736	686	3180	e620	508
5	53	170	e102	e46	e34	e35	1650	696	669	4510	e580	471
6	53	162	e97	e44	e34	e35	1380	644	628	5190	e540	436
7	63	159	e92	e43	e34	e35	1220	683	589	4350	e480	405
8	180	156	e88	e42	e34	e34	1220	2140	668	3940	e450	382
9	314	170	e85	e40	e34	e34	1170	2210	637	3530	e390	364
10	310	201	e82	e40	e34	e34	1150	6410	598	3080	e370	344
11	265	229	e79	e38	e34	e34	1290	6200	556	2810	e370	322
12	234	229	e77	e37	e35	e34	1350	4510	511	2250	e440	305
13	210	244	e75	e36	e35	e34	1280	3280	510	1920	e650	300
14	191	231	e74	e35	e36	e34	1310	2540	478	1710	e800	297
15	163	212	e73	e35	e36	e34	1340	2040	458	1520	e1050	297
16	157	214	e72	e35	e37	e34	1250	1680	570	1370	1280	280
17	153	209	e72	e35	e37	e34	1180	1400	3520	1280	1170	266
18	145	196	e71	e35	e37	e34	1130	1200	6720	1220	1450	255
19	138	192	e70	e35	e37	e34	1080	1070	11400	1170	1850	249
20	137	194	e69	e35	e37	e34	977	968	8970	1130	1740	334
21	134	199	e68	e35	e37	e34	879	869	7810	1070	e1600	587
22	129	200	e66	e36	e36	e34	804	786	6430	991	e1500	702
23	127	198	e65	e36	e36	e35	750	732	5330	925	e1350	714
24	123	195	e64	e36	e36	e42	707	700	4600	874	e1270	667
25	120	189	e63	e36	e35	e49	667	662	3870	966	e1190	623
26	116	172	e62	e37	e35	e94	634	620	3440	955	e1090	585
27	110	e130	e62	e36	e35	e200	605	594	3110	1120	e1000	542
28	107	e128	e61	e36	e35	e400	585	567	2720	1310	e930	496
29	106	e131	e56	e36	---	e990	554	537	2360	1290	e860	447
30	104	e132	e55	e35	---	1210	518	526	2150	1100	e765	417
31	102	---	e53	e35	---	1730	---	528	---	952	717	---
TOTAL	4287	5406	2430	1206	990	5505	34720	47435	81720	61803	28942	13408
MEAN	138	180	78.4	38.9	35.4	178	1157	1530	2724	1994	934	447
MAX	314	244	129	53	37	1730	2050	6410	11400	5190	1850	714
MIN	53	104	53	35	34	34	518	526	458	874	370	249
AC-FT	8500	10720	4820	2390	1960	10920	68870	94090	162100	122600	57410	26590
CFSM	.22	.29	.12	.06	.06	.28	1.84	2.43	4.33	3.17	1.48	.71
IN.	.25	.32	.14	.07	.06	.33	2.05	2.81	4.83	3.66	1.71	.79

MINNESOTA RIVER BASIN

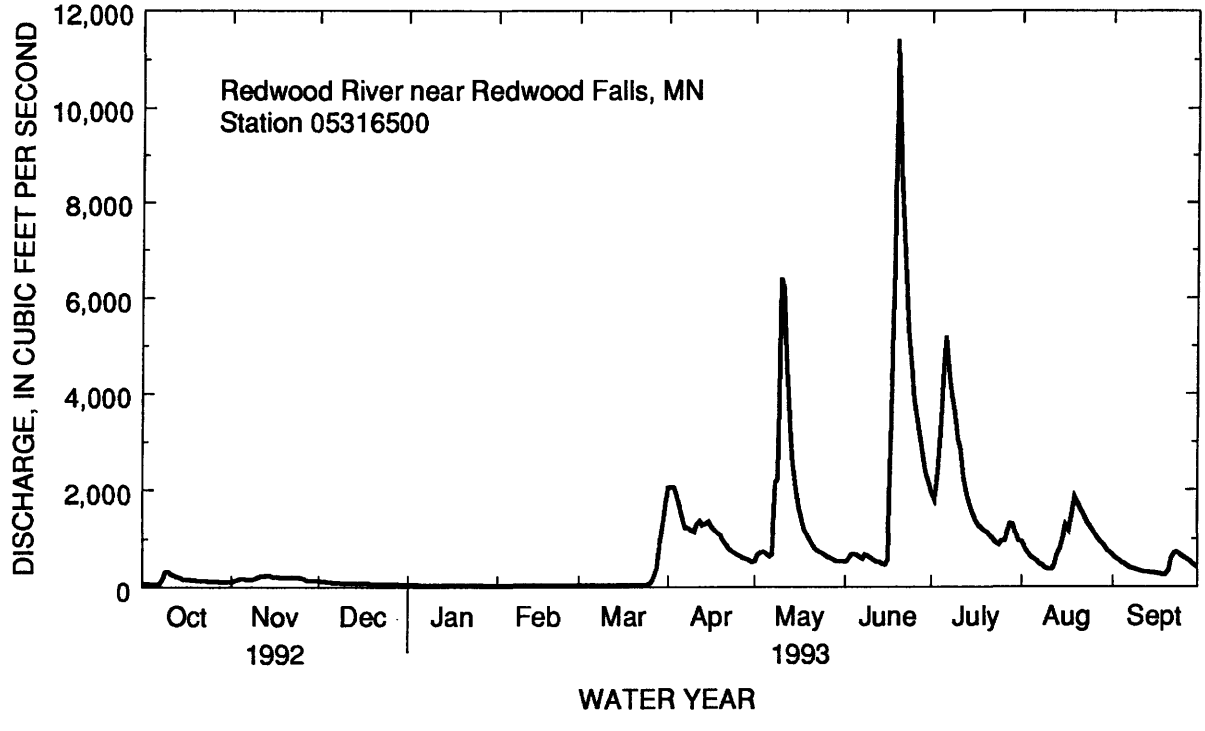
05316500 REDWOOD RIVER NEAR REDWOOD FALLS, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	44.3	50.3	27.4	12.9	17.3	221	394	198	246	142	69.7	49.1
MAX	395	541	245	75.9	167	1289	2880	1530	2724	1994	934	673
(WY)	1987	1980	1983	1987	1983	1983	1969	1993	1993	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1909 - 1993	
ANNUAL TOTAL	65613		287852			
ANNUAL MEAN	179		789		136[a]	
HIGHEST ANNUAL MEAN					789	1993
LOWEST ANNUAL MEAN					10.8	1959
HIGHEST DAILY MEAN	1400	Jun 17	11400	Jun 19	13200	Apr 9 1969
LOWEST DAILY MEAN	48	Jun 15	34[b]	Feb 5	.00[c]	Jan 17 1940
ANNUAL SEVEN-DAY MINIMUM	53	Jan 21	34	Feb 5	.01	Jan 25 1940
INSTANTANEOUS PEAK FLOW			12600	Jun 18	19700	Jun 18 1957
INSTANTANEOUS PEAK STAGE			15.73	Jun 18	15.92[d]	Jun 18 1957
ANNUAL RUNOFF (AC-FT)	130100		571000		98870	
ANNUAL RUNOFF (CFSM)	.29		1.25		.22	
ANNUAL RUNOFF (INCHES)	3.88		17.02		2.95	
10 PERCENT EXCEEDS	335		1930		277	
50 PERCENT EXCEEDS	134		300		23	
90 PERCENT EXCEEDS	58		35		2.0	

a Median of annual mean discharges is 88 ft³/s.
b Occurred Feb. 5-11, Mar. 8-22.
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)
Oct. 11		e2180	6.96	Jul 5	2100	9300	14.37
Apr. 2	0300	5430	11.98	Jul 17		e3740	
May 10	1200	16800	16.47	Jul 26		e2730	
Jun 8	1600	2820	8.54	Aug. 21	0200	3740	10.34
Jun 19	0800	*24300	*18.90	Sept. 23	0400	1430	6.22

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	207	509	e580	e220	e118	e95	5170	1390	1610	3300	e1890	1260
2	204	558	e540	e210	e117	e96	5340	1690	1690	3130	e1710	1260
3	203	622	e470	e200	e115	e97	4620	2070	1910	e3740	1550	1160
4	196	700	e400	e190	e113	e98	3770	2100	2250	e7960	1420	1040
5	183	769	357	e180	e111	e100	3220	1920	2180	e8580	e1390	934
6	190	808	e440	e175	e110	e120	2840	1760	1950	e8330	1300	844
7	218	812	e510	e170	e109	e210	2560	1660	1890	e7390	1220	769
8	288	806	e560	e165	e108	e300	2480	3390	2580	e6400	1120	714
9	850	794	e600	e160	e105	e560	2710	7620	2780	e5240	1040	669
10	e1920	859	e640	e155	e105	e730	2760	15100	2540	e4800	970	625
11	e2100	1090	e670	e153	e104	e660	2740	13500	2160	5010	906	575
12	1840	1270	e680	e151	e104	e470	2950	10300	1890	4500	848	533
13	1560	1240	e680	e150	e103	e350	2930	7030	1750	3880	797	521
14	1350	1140	e660	e148	e102	e270	2800	5160	1770	3410	826	481
15	1180	1030	e630	e148	e102	e230	2930	3930	1860	e3000	1960	475
16	1050	950	e600	e147	e101	e210	2980	3180	1840	e2660	3280	502
17	944	899	e550	e145	e101	e200	2750	2670	4510	e2900	3280	512
18	877	854	e510	e142	e101	e190	2490	2360	12300	e3380	3140	505
19	823	813	e480	e140	e100	e185	2280	2170	21800	e2980	3250	491
20	779	798	e460	e138	e100	e195	2110	2010	18700	2620	3510	613
21	742	791	e430	e135	e99	e210	1960	1880	18600	e2310	3560	838
22	714	815	e390	e132	e98	e214	1820	1760	15000	2100	2830	1260
23	681	826	e370	e130	e98	e270	1720	1680	10900	1960	2280	1410
24	657	815	e350	e130	e98	e350	1650	1640	8490	e1840	1940	1320
25	635	776	e330	e128	e98	e800	1560	1590	7450	e2100	1690	1190
26	616	732	e310	e125	e97	e2000	1450	1550	6610	e2650	1480	1070
27	597	695	e290	e125	e96	e2500	1400	1490	5540	e2670	1350	965
28	576	601	e270	e123	e95	e2700	1420	1440	4780	e2610	1270	877
29	546	568	e250	e122	---	e3000	1470	1400	4050	e2470	1230	809
30	518	643	e240	e121	---	3450	1440	1450	3560	e2270	1240	749
31	500	---	e230	e120	---	4030	---	1510	---	e2070	1230	---
TOTAL	23744	24583	14477	4678	2908	24890	78320	108400	174940	118260	55507	24971
MEAN	766	819	467	151	104	803	2611	3497	5831	3815	1791	832
MAX	2100	1270	680	220	118	4030	5340	15100	21800	8580	3560	1410
MIN	183	509	230	120	95	95	1400	1390	1610	1840	797	475
AC-FT	47100	48760	28720	9280	5770	49370	155300	215000	347000	234600	110100	49530
CFSM	.60	.64	.36	.12	.08	.63	2.04	2.73	4.56	2.98	1.40	.65

MINNESOTA RIVER BASIN

05317000 COTTONWOOD RIVER NEAR NEW ULM, MN--Continued

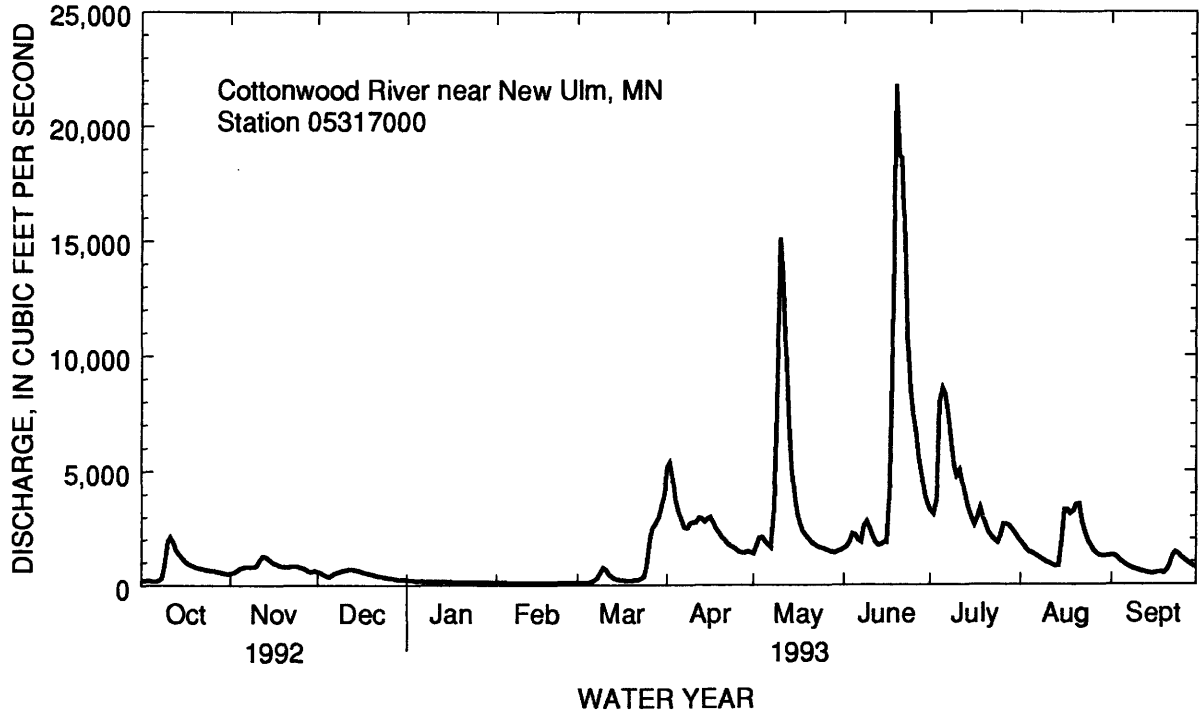
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	161	140	90.2	49.5	87.7	608	943	534	573	331	176	151
MAX	3208	1099	572	282	628	2236	7075	3497	5831	3815	1791	2438
(WY)	1969	1980	1980	1992	1983	1983	1969	1993	1993	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1909 - 1993	
ANNUAL TOTAL	267318		655678			
ANNUAL MEAN	730		1796		347[a]	
HIGHEST ANNUAL MEAN					1796	1993
LOWEST ANNUAL MEAN					41.1	1940
HIGHEST DAILY MEAN	2720	Jul 4	21800	Jun 19	27100	Apr 9 1969
LOWEST DAILY MEAN	178	Jan 30	95[b]	Feb 28	.60	Aug 1 1934
ANNUAL SEVEN-DAY MINIMUM	190	Jan 27	96	Feb 25	.64	Feb 1 1940
INSTANTANEOUS PEAK FLOW			24300	Jun 19	28700	Apr 10 1969
INSTANTANEOUS PEAK STAGE			18.90	Jun 19	20.86	Apr 8 1965
INSTANTANEOUS LOW FLOW					.50	Nov 27 1952
ANNUAL RUNOFF (AC-FT)	530200		1301000		251500	
ANNUAL RUNOFF (CFSM)	.57		1.40		.27	
10 PERCENT EXCEEDS	1520		3630		759	
50 PERCENT EXCEEDS	578		877		70	
90 PERCENT EXCEEDS	240		122		11	

a Median of annual mean discharges is 228 ft3/s.

b Gage height, 2.36 ft (affected by backwater); minimum gage height, 2.25 ft, Oct 6.



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)
Mar. 31	1330	916	7.44	July 18	0900	639	6.55
May 11	--	1450	8.88	Aug. 15	2030	651	6.63
June 12	2130	390	5.48	Aug. 18	1030	794	7.03
June 20	0200	*3520	*10.45	Sept. 22	1300	217	4.80
July 7	0730	1030	7.83				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	63	73	24	18	13	824	250	212	585	257	157
2	18	82	73	23	18	13	657	278	229	532	220	153
3	19	97	59	23	18	13	625	282	258	722	203	144
4	18	106	64	22	18	14	655	284	243	961	189	136
5	18	111	31	21	18	15	579	287	236	883	174	124
6	18	110	71	20	18	15	490	295	235	936	162	112
7	31	111	71	19	19	17	438	314	228	1010	152	105
8	94	113	62	18	19	e19	414	414	238	962	142	99
9	144	117	67	16	19	e22	387	495	274	861	134	94
10	147	141	64	16	20	e24	370	781	291	765	128	89
11	150	145	59	16	20	e25	396	1320	336	724	121	86
12	157	143	58	16	20	e25	401	1180	382	637	113	79
13	166	146	57	16	20	e24	385	945	376	553	107	88
14	163	147	57	16	20	e23	395	807	321	480	109	98
15	150	144	61	17	20	e22	408	681	267	417	458	89
16	136	139	56	18	20	e21	387	555	266	367	531	81
17	122	129	52	18	20	e20	365	460	726	411	363	78
18	111	120	45	18	19	e18	355	387	971	619	586	77
19	102	116	43	18	18	e17	346	327	1400	592	656	76
20	94	115	34	18	17	e17	341	271	2850	531	445	137
21	88	113	e35	18	17	e16	325	249	2330	500	359	187
22	84	112	e34	19	16	e16	303	234	1760	457	328	212
23	81	109	e33	19	15	e16	290	225	1370	387	293	192
24	77	104	e32	19	14	e33	278	227	1250	309	241	170
25	74	102	e31	19	14	e112	263	225	1150	272	205	154
26	70	99	e30	19	13	e146	248	212	1030	258	182	136
27	66	85	e29	19	13	e180	251	203	953	257	169	123
28	64	73	e28	19	13	e211	259	191	868	274	159	114
29	60	91	e27	19	---	e280	253	179	760	292	149	104
30	57	84	e26	18	---	e535	245	180	680	305	175	98
31	55	---	e25	18	---	e772	---	210	---	296	174	---
TOTAL	2651	3367	1487	579	494	2694	11933	12948	22490	17155	7684	3592
MEAN	85.5	112	48.0	18.7	17.6	86.9	398	418	750	553	248	120
MAX	166	147	73	24	20	772	824	1320	2850	1010	656	212
MIN	17	63	25	16	13	13	245	179	212	257	107	76
AC-FT	5260	6680	2950	1150	980	5340	23670	25680	44610	34030	15240	7120
CFSM	.37	.49	.21	.08	.08	.38	1.73	1.82	3.26	2.41	1.08	.52
IN.	.43	.54	.24	.09	.08	.44	1.93	2.09	3.64	2.77	1.24	.58

e Estimated.

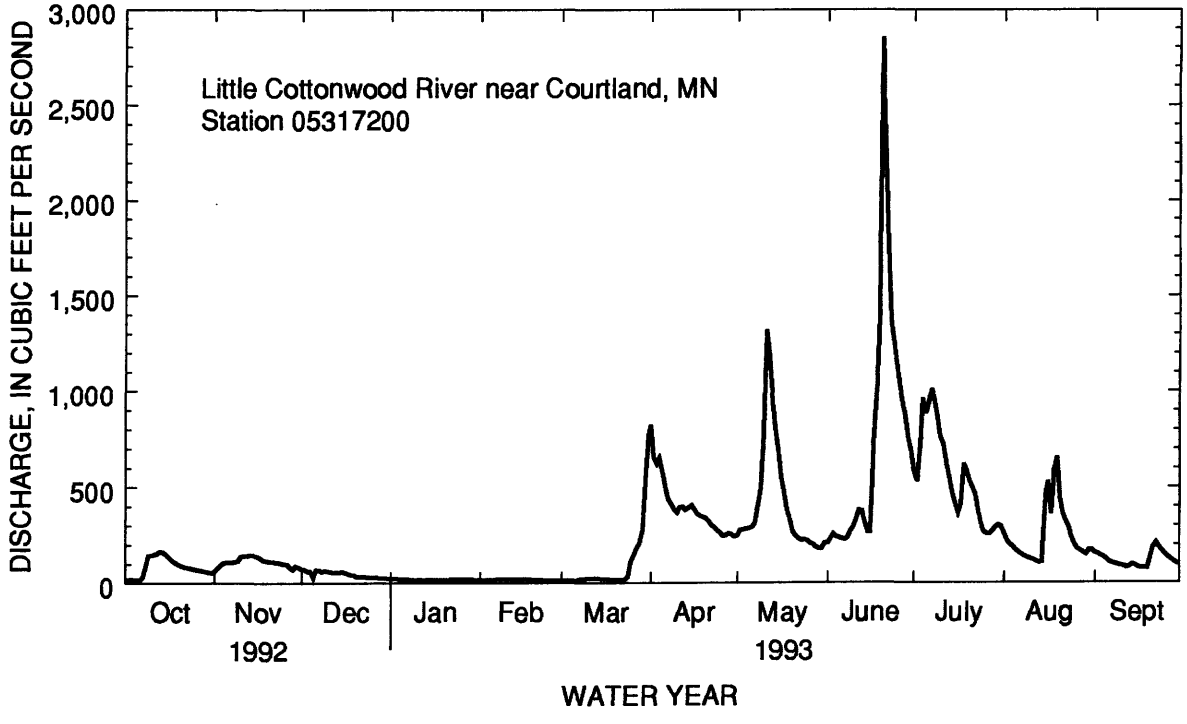
MINNESOTA RIVER BASIN

05317200 LITTLE COTTONWOOD RIVER NEAR COURTLAND, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	34.1	41.3	24.3	13.0	18.4	114	159	113	133	87.6	51.4	41.8
MAX	163	134	118	80.1	105	360	463	418	750	553	248	262
(WY)	1987	1983	1992	1992	1983	1992	1983	1993	1993	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1974 - 1993	
ANNUAL TOTAL	46897		87074			
ANNUAL MEAN	128		239		69.3	
HIGHEST ANNUAL MEAN					239	1993
LOWEST ANNUAL MEAN					9.18	1989
HIGHEST DAILY MEAN	536	Mar 6	2850	Jun 20	2850	Jun 20 1993
LOWEST DAILY MEAN	17	Oct 1	13	Feb 26-Mar 3	.02	Sep 12 1977
ANNUAL SEVEN-DAY MINIMUM	18	Sep 30	13	Feb 25	.08	Sep 11 1977
INSTANTANEOUS PEAK FLOW			3520	Jun 20	3520	Jun 20 1993
INSTANTANEOUS PEAK STAGE			10.45	Jun 20	10.45	Jun 20 1993
INSTANTANEOUS LOW FLOW			13	Feb 25	.01	Sep 17 1977
ANNUAL RUNOFF (AC-FT)	93020		172700		50210	
ANNUAL RUNOFF (CFSM)	.56		1.04		.30	
ANNUAL RUNOFF (INCHES)	7.59		14.08		4.09	
10 PERCENT EXCEEDS	307		621		189	
50 PERCENT EXCEEDS	96		124		20	
90 PERCENT EXCEEDS	45		18		1.1	



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)
Oct. 10	1700	1740	5.45	Jul. 06	1900	4180	8.61
Nov. 12	1945	1490	4.57	Aug. 16	1200	1550	4.67
Apr. 03	0300	4890	9.52	Sept. 01	2000	1270	4.15
May 12	1100	5080	9.76	Sept. 15	0700	1160	3.93
June 11	1200	2450	6.14	Sept. 22	1200	1380	4.36
June 20	0100	*13900	*15.91				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	116	434	519	e170	e88	e72	4560	1370	1620	3300	1330	1230
2	113	621	497	e165	e87	e72	4790	1480	1730	2980	1340	1210
3	111	828	486	e155	e87	e74	4840	1770	1900	2880	1200	1040
4	108	929	441	e150	e87	e76	4420	1910	2060	3140	1090	863
5	103	951	324	e140	e86	e95	3820	1840	2070	3550	973	716
6	110	940	396	e135	e86	e120	3260	1720	1940	4040	886	614
7	290	912	516	e130	e86	e130	2850	1680	1790	4030	800	537
8	916	882	521	e125	e86	e150	2650	1710	1870	3630	710	474
9	1450	880	468	e122	e85	e160	2580	2200	e2100	3200	648	419
10	1690	1020	443	e121	e84	e160	2530	3040	2380	2850	598	377
11	1720	1210	444	e118	e83	e165	2460	4400	2430	2640	548	335
12	1590	e1410	401	e117	e82	e170	2420	5010	2300	2450	497	300
13	1380	1210	404	e115	e80	e165	2380	4560	2140	2280	449	600
14	1190	1110	406	e112	e79	e155	2330	3870	2080	2240	433	985
15	1030	995	402	e110	e78	e150	2350	3250	1880	2190	1100	1130
16	913	915	404	e108	e77	e135	2400	2700	1760	2090	1420	957
17	827	856	368	e105	e76	e130	2370	2260	3400	1970	1280	834
18	755	797	365	e102	e75	e125	2250	1990	7600	2180	1090	721
19	694	753	e350	e101	e74	e120	2100	1780	11600	2470	971	639
20	648	746	e325	e100	e73	e130	2330	1610	13400	2570	878	741
21	622	749	e310	e99	e72	e160	2660	1440	11000	2340	795	1180
22	589	736	e290	e98	e72	e180	2840	1290	8320	2040	714	1370
23	561	714	e270	e97	e72	e200	2770	1200	6620	1780	653	1320
24	542	683	e260	e96	e72	e230	2510	1170	6220	1580	593	1180
25	519	651	e250	e95	e72	e375	2200	1150	7600	1430	532	1040
26	495	623	e235	e94	e71	e700	1860	1060	7400	1310	474	926
27	474	593	e220	e93	e72	e1500	1680	1000	6240	1300	588	833
28	455	563	e210	e93	e72	e3200	1640	964	5200	1430	619	741
29	437	536	e200	e92	---	3310	1580	931	4410	1510	538	658
30	416	541	e190	e92	---	3670	1460	1030	3760	1400	697	594
31	401	---	e180	90	---	4030	---	1390	---	1270	1050	---
TOTAL	21265	24788	11095	3540	2214	20109	80890	62775	134820	74070	25494	24564
MEAN	686	826	358	114	79.1	649	2696	2025	4494	2389	822	819
MAX	1720	1410	521	170	88	4030	4840	5010	13400	4040	1420	1370
MIN	103	434	180	90	71	72	1460	931	1620	1270	433	300
AC-FT	42180	49170	22010	7020	4390	39890	160400	124500	267400	146900	50570	48720

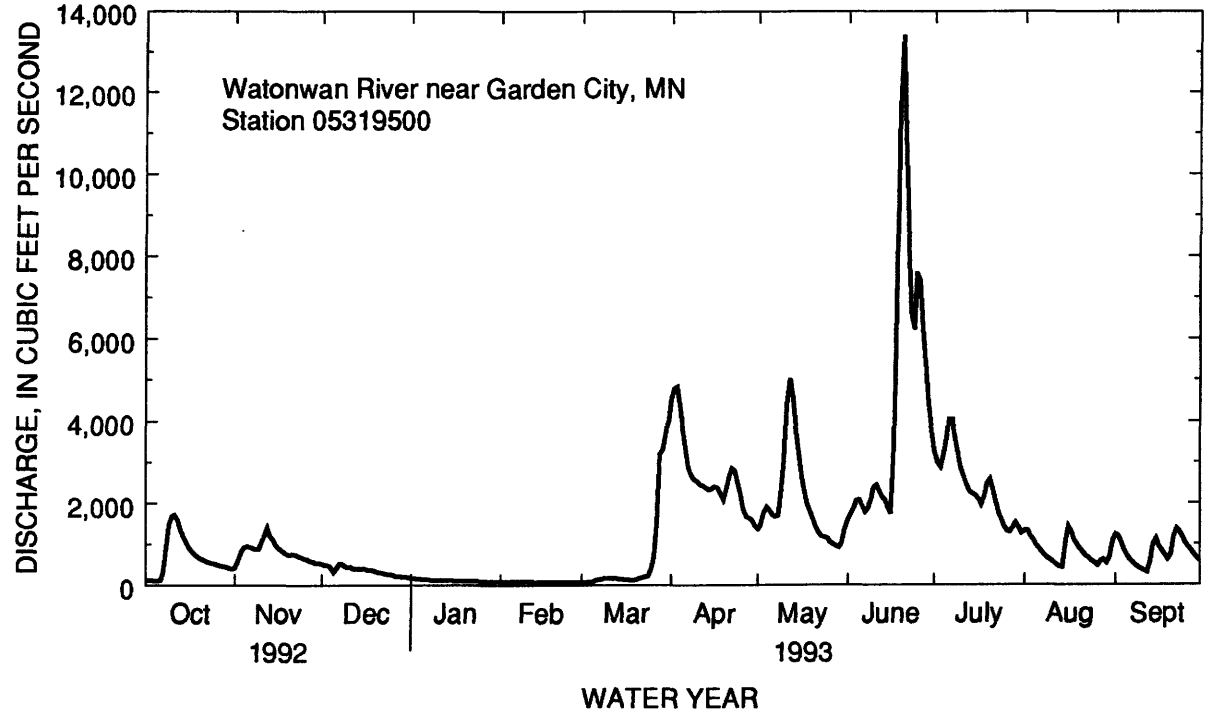
MINNESOTA RIVER BASIN

05319500 WATONWAN RIVER NEAR GARDEN CITY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	182	226	136	64.5	93.7	563	835	583	861	426	216	219
MAX	686	826	530	319	626	2105	2696	2025	4494	2389	1095	819
(WY)	1993	1993	1992	1992	1983	1992	1993	1993	1993	1993	1979	1993
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1940 - 1993	
ANNUAL TOTAL	269495		485624			
ANNUAL MEAN	736		1330		382	
HIGHEST ANNUAL MEAN					1330	1993
LOWEST ANNUAL MEAN					43.7	1989
HIGHEST DAILY MEAN	3090	Mar 9	13400	Jun 20	13400	Jun 20 1993
LOWEST DAILY MEAN	103	Oct 5	71	Feb 26	1.8	Dec 24 1989
ANNUAL SEVEN-DAY MINIMUM	111	Sep 30	72	Feb 21	1.9	Jan 20 1977
INSTANTANEOUS PEAK FLOW			13900	Jun 20	13900	Jun 20 1993
INSTANTANEOUS PEAK STAGE			15.91	Jun 20	15.91	Jun 20 19933
INSTANTANEOUS LOW FLOW				71	Feb 26	
ANNUAL RUNOFF (AC-FT)	534500		963200		276400	
ANNUAL RUNOFF (CFSM)	.91		1.64		.47	
10 PERCENT EXCEEDS	1580		3080		1030	
50 PERCENT EXCEEDS	525		795		114	
90 PERCENT EXCEEDS	270		93		9.9	



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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	430	1440	1900	e880	471	323	12300	6070	5790	10400	6510	4760
2	456	1820	1700	e870	482	325	14300	5630	7110	10200	6250	6240
3	386	2900	1820	e860	578	316	16300	5680	8750	10300	5980	7670
4	377	3680	1550	e850	484	345	16200	5740	9370	10900	5700	7420
5	405	4110	906	888	708	320	14700	5580	9350	11500	5330	6320
6	393	4040	992	912	567	344	13100	5310	9050	11400	4750	5450
7	499	3950	1260	776	554	353	11800	5340	8620	10700	4230	4670
8	1670	3430	1370	904	479	408	10800	5170	8320	9680	3800	3990
9	3750	3320	1560	853	477	520	10000	5750	8580	8610	3470	3570
10	4810	3430	1700	733	489	539	9480	6650	9730	7820	3160	3140
11	4980	3650	1540	723	475	624	9130	8450	10800	7480	3100	2700
12	4980	3780	1370	598	476	642	8860	9440	10400	7390	3600	2530
13	4610	3670	1550	700	475	660	8510	9330	9470	7290	3980	3770
14	3920	3430	1500	626	499	635	8210	8870	8680	8150	3730	5360
15	3420	3150	1490	788	466	615	8210	8310	7960	8930	4390	5640
16	3180	2960	1550	676	498	567	8170	7410	7620	9410	5400	5180
17	2950	2810	1540	e760	e498	605	8180	6560	10100	9580	5590	4710
18	2690	2660	1410	e760	e490	569	8140	5850	14500	9530	6380	4040
19	2440	2560	1480	732	466	571	7950	5380	17400	9070	6990	3660
20	2330	2540	1200	773	491	430	8390	5030	19800	8800	6790	3440
21	2340	2530	e1150	625	468	508	9200	4710	19300	8940	5960	4160
22	2050	2530	e1100	595	464	511	10200	4400	17300	8660	5270	4420
23	1980	2530	e1050	506	568	509	12000	3940	15300	8080	4620	4290
24	1990	2530	e980	550	413	583	12500	3890	14400	7360	4190	3980
25	1900	2320	e920	545	392	985	11400	3720	15500	6760	3830	3630
26	1710	2300	e930	521	366	1760	10100	3500	16100	6140	3380	3490
27	1690	2200	e1000	528	322	2910	9090	3320	15200	5840	3290	3020
28	1670	2130	e1050	483	352	4780	8230	3280	13600	6110	3190	2990
29	1500	1910	e950	e510	---	6320	7330	3420	12100	6530	2780	2630
30	1540	2030	e920	e500	---	8370	6580	4230	10800	6680	2880	2520
31	1440	---	e900	500	---	10500	---	4700	---	6500	3650	---
TOTAL	68486	86340	40338	21525	13468	47447	309360	174660	351000	264740	142170	129390
MEAN	2209	2878	1301	694	481	1531	10310	5634	11700	8540	4586	4313
MAX	4980	4110	1900	912	708	10500	16300	9440	19800	11500	6990	7670
MIN	377	1440	900	483	322	316	6580	3280	5790	5840	2780	2520
AC-FT	135800	171300	80010	42690	26710	94110	613600	346400	696200	525100	282000	256600
CFSM	.91	1.18	.54	.29	.20	.63	4.24	2.32	4.81	3.51	1.89	1.77
IN.	1.05	1.32	.62	.33	.21	.73	4.74	2.67	5.37	4.05	2.18	1.98

e Estimated.

MINNESOTA RIVER BASIN

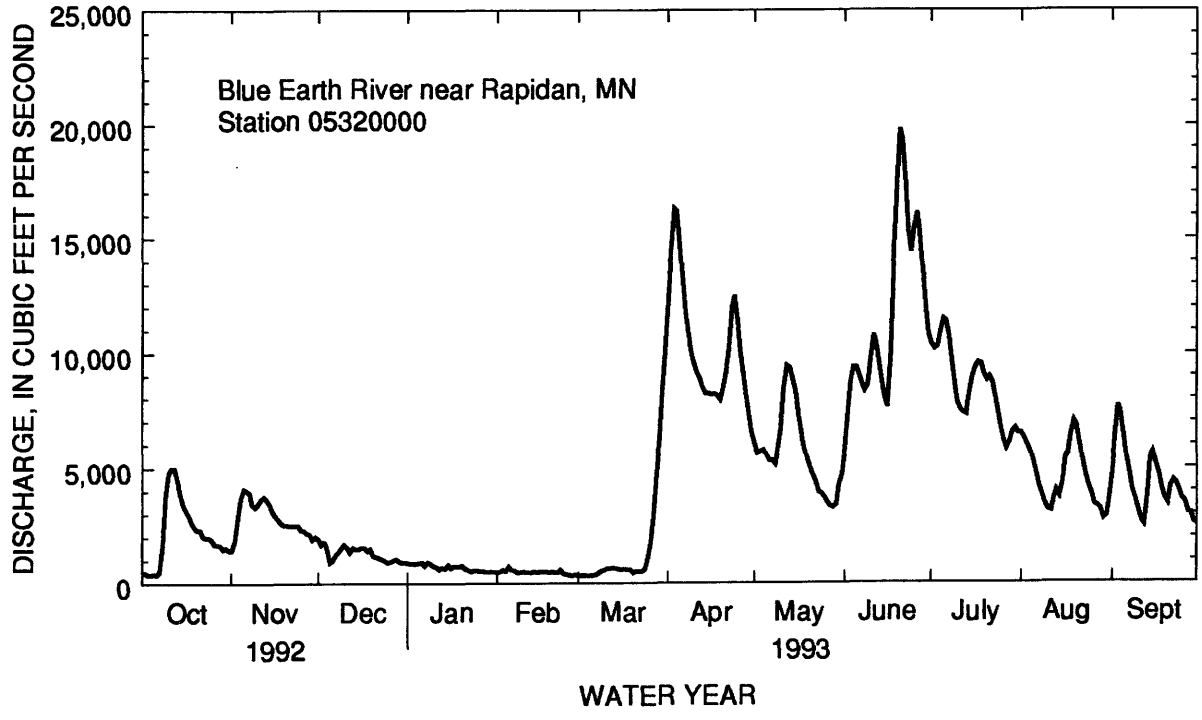
05320000 BLUE EARTH RIVER NEAR RAPIDAN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	518	519	326	194	239	1358	2631	1664	2036	1259	654	542
MAX	5121	2878	1724	1093	1793	6277	13230	5775	11700	8540	5541	4313
(WY)	1969	1993	1992	1992	1983	1983	1965	1991	1993	1993	1979	1993
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1909 - 1993	
ANNUAL TOTAL	860227		1648924			
ANNUAL MEAN	2350		4518		1013	
HIGHEST ANNUAL MEAN					4518	1993
LOWEST ANNUAL MEAN					105	1940
HIGHEST DAILY MEAN	8380	Mar 3	19800	Jun 20	42500	Apr 9 1965
LOWEST DAILY MEAN	377	Oct 4	316	Mar 3	7.4	Oct 28 1955
ANNUAL SEVEN-DAY MINIMUM	421	Oct 1	329	Feb 27	8.1	Oct 24 1955
INSTANTANEOUS PEAK FLOW			20300	Jun 20	43100	Apr 9 1965
INSTANTANEOUS PEAK STAGE			13.32	Jun 20	21.36a	Apr 9 1965
INSTANTANEOUS LOW FLOW			166	Feb 4	6.9	Oct 12 1955
ANNUAL RUNOFF (AC-FT)	1706000		3271000		734100	
ANNUAL RUNOFF (CFSM)	.97		1.86		.42	
ANNUAL RUNOFF (INCHES)	13.17		25.24		5.67	
10 PERCENT EXCEEDS	4500		10100		2630	
50 PERCENT EXCEEDS	1750		3440		317	
90 PERCENT EXCEEDS	916		495		38	

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 to poor.

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)
Oct. 12		3460a		July 05	2400	4680	8.19
Nov. 05		2710a		July 11	1700	4050	7.58
Apr. 02	1400	10100	11.41	Aug. 03	1000	3110	6.55
Apr. 24		6000a		Aug. 18	2300	10400	12.48
May 11	0900	4790	7.51	Sept. 02	1200	3260	6.63
June 03	0300	3820	7.09	Sept. 14	1000	2540	5.79
June 21	1500	*11500	*13.32				

a Daily mean discharge.
e Estimated.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	243	e1120	e680	e340	e205	e151	e9830	2300	2930	2960	2620	3100
2	232	e1300	e650	e330	e205	e151	9990	2370	3570	3250	2900	3170
3	223	e2000	609	e320	e200	e151	9140	2430	3710	3370	3070	2960
4	213	2710	567	e315	e195	e152	7710	2390	3450	4250	3010	2570
5	208	2710	372	e310	e190	e155	6130	2270	3060	4520	2810	2190
6	213	2670	383	e300	e195	e160	4900	2240	2620	4520	2440	1850
7	394	2530	516	e285	e197	e175	4190	2970	2370	3970	2030	1600
8	1710	e2400	536	e275	e199	e200	3790	3360	2340	3470	1700	1430
9	e2680	e2250	506	e270	e200	e220	3630	3330	2480	2990	1440	1270
10	e3340	e2100	497	e260	e200	e210	3490	3720	2560	2530	1250	1140
11	e3440	e2000	510	e255	e200	e195	3470	4690	2300	3660	1110	1020
12	e3460	e1870	500	e252	e197	e180	3530	4640	2010	3830	1040	884
13	e3220	e1750	488	e245	e195	e170	3640	4480	1850	3550	913	1660
14	e2790	e1690	480	e240	e190	e165	3550	4040	1720	3320	834	2410
15	2690	e1600	480	e235	e185	e158	3510	3420	1530	3150	3420	1970
16	e2400	e1500	479	e230	e180	e155	3530	2910	e1410	3050	5840	1610
17	e2250	e1470	467	e230	e175	e150	3550	2530	e1380	2830	7280	1380
18	e2100	e1390	457	e235	e165	e151	3380	e2400	e1360	2600	9360	1200
19	e1900	e1300	448	e240	e163	e152	3180	e2200	e3140	2420	10100	1070
20	e1750	e1250	438	e240	e165	e151	4220	2060	9730	2240	8840	1200
21	e1650	e1150	430	e240	e170	e155	e4800	1920	11300	2050	7300	1230
22	e1550	e1100	e420	e240	e172	e168	e5400	1770	10100	1880	6230	1180
23	e1500	e1050	e410	e240	e170	e185	e5900	1680	7970	1760	5230	1120
24	e1450	e980	404	e235	e167	e300	e6000	1670	7440	1600	4150	1060
25	e1400	e930	396	e230	e165	e435	e5300	1670	6390	1620	3320	987
26	e1350	e880	388	e225	e158	e2000	e4750	1580	5240	1760	2760	924
27	e1270	e850	379	e215	e155	3360	3840	1520	4270	1760	2490	855
28	e1250	e800	371	e210	e152	4360	2790	1430	3470	1680	2190	807
29	e1220	e750	e365	e200	---	5460	2600	1330	2940	1610	1910	755
30	e1190	e720	e360	e200	---	6680	2430	1600	2750	1510	2250	713
31	e1150	---	e350	e205	---	8320	---	2340	---	1560	2870	---
TOTAL	50436	46820	14336	7847	5110	34775	142170	79260	117390	85270	112707	45315
MEAN	1627	1561	462	253	182	1122	4739	2557	3913	2751	3636	1510
MAX	3460	2710	680	340	205	8320	9990	4690	11300	4520	10100	3170
MIN	208	720	350	200	152	150	2430	1330	1360	1510	834	713
AC-FT	100000	92870	28440	15560	10140	68980	282000	157200	232800	169100	223600	89880
CFSM	1.47	1.41	.42	.23	.16	1.01	4.27	2.30	3.53	2.48	3.28	1.36

MINNESOTA RIVER BASIN

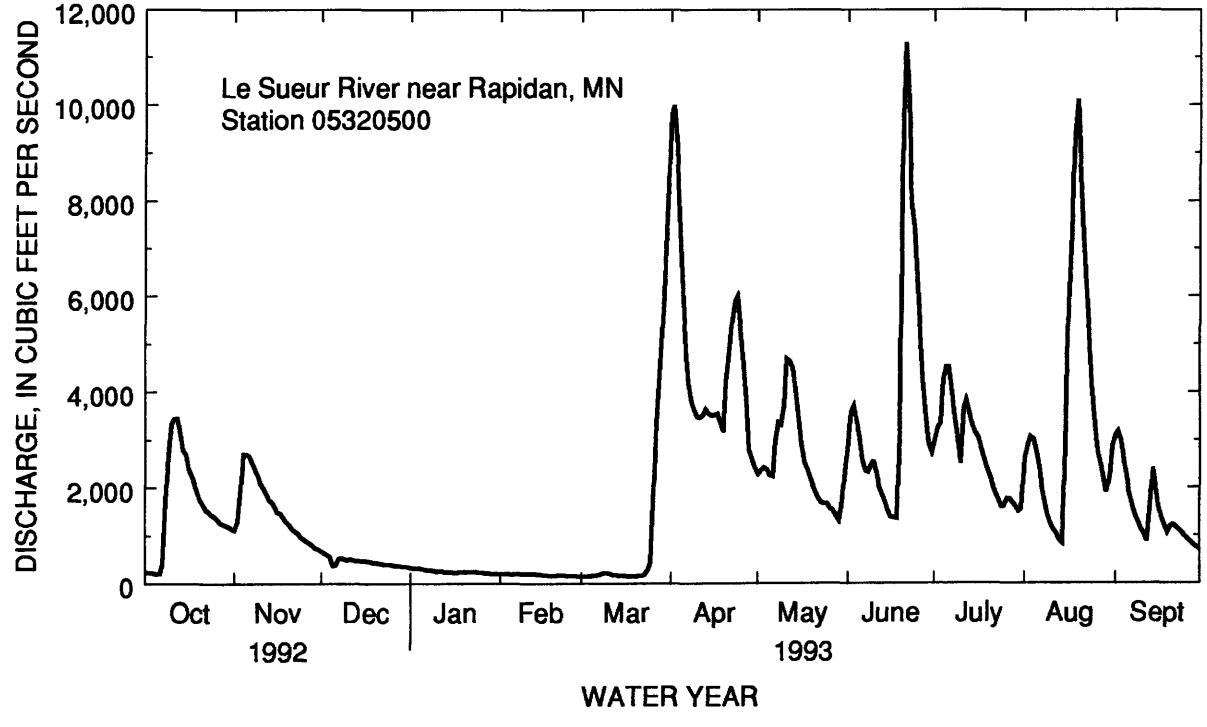
05320500 LE SUEUR RIVER NEAR RAPIDAN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	294	258	139	77.9	121	810	1319	901	923	589	379	248
MAX	3300	1561	698	493	1299	3465	6563	3706	3913	2751	3636	1510
(WY)	1969	1993	1992	1992	1984	1983	1965	1960	1993	1993	1993	1993
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1940 - 1993	
ANNUAL TOTAL	434495		741436			
ANNUAL MEAN	1187		2031		507	
HIGHEST ANNUAL MEAN					2031	1993
LOWEST ANNUAL MEAN					51.4	1977
HIGHEST DAILY MEAN	4700	Feb 28	11300	Jun 21	23400	Apr 8 1965
LOWEST DAILY MEAN	208	Oct 5	150	Mar 17	1.6[a]	Feb 9 1959
ANNUAL SEVEN-DAY MINIMUM	227	Sep 30	152	Feb 27	1.6	Feb9 1959
INSTANTANEOUS PEAK FLOW			11500	Jun 21	24700	Apr 8 1965
INSTANTANEOUS PEAK STAGE			13.32	Jun 21	22.72[b]	May 22 1960
ANNUAL RUNOFF (AC-FT)	861800		1471000		367200	
ANNUAL RUNOFF (CFSM)	1.07		1.83		.46	
10 PERCENT EXCEEDS	2520		4310		1400	
50 PERCENT EXCEEDS	811		1560		131	
90 PERCENT EXCEEDS	382		195		15	

a Occurred Feb. 9-25, 1959.
b From floodmark.



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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1920	3700	4800	e2900	e1020	e1020	35100	18700	15500	39800	e24500	17400
2	1940	4870	4700	e2800	e1020	e1020	39600	17900	17000	37900	e24500	15500
3	1850	6630	4600	e2700	e1020	e1020	41800	18500	18400	35600	e24000	18900
4	1800	8200	4400	e2650	e1020	e1020	41500	19200	18900	39800	e23500	19500
5	1780	9100	4000	e2550	e1020	e1020	41400	17800	18500	44800	e23000	17300
6	1870	9120	2800	e2450	e1020	e1020	39300	17500	17600	48200	e22500	14900
7	2300	8950	2400	e2400	e1020	e1020	33100	18200	16600	48400	e22000	13000
8	4230	8340	3790	e2300	e1020	e1100	30600	18700	16200	47300	e21500	12000
9	7920	8130	4260	e2200	e1020	e1200	28600	21000	16800	44200	e20500	10900
10	11300	8730	4580	e2150	e1020	e1300	27600	25500	18000	40400	e20000	9680
11	12600	9160	4440	e2050	e1020	e1500	27000	34300	19000	39500	e19500	8390
12	12600	9500	4240	e1950	e1020	e1800	26800	40700	18300	36300	e19000	7750
13	11500	9430	4410	e1850	e1020	e1980	26500	42900	17000	33500	e18500	9210
14	9930	8790	4370	e1800	e1020	e2000	27000	41400	15800	33200	e18000	12500
15	8650	8160	4350	e1700	e1020	e2000	27300	37800	14500	32600	e20000	11600
16	7820	7680	4310	e1650	e1020	e2000	27600	33600	13800	31200	e26000	10400
17	7100	7260	4260	e1550	e1020	e1970	27700	29700	18800	31100	e32500	9540
18	6450	6820	4050	e1500	e1020	e1900	27400	26800	27200	30800	e38500	8570
19	5910	6680	3880	e1400	e1020	e1800	26900	24400	40000	e30000	e38000	7700
20	5590	6620	3320	e1370	e1020	e1740	27400	22600	66900	e29500	e37500	7780
21	5450	6560	3200	e1310	e1020	e1730	28600	20900	75100	e28500	31800	8720
22	5050	6540	3430	e1280	e1020	e1720	29500	19200	73400	e27000	31400	10000
23	4870	6550	3580	e1230	e1020	e1700	30500	17700	67900	e26000	28300	10100
24	4800	6440	e3500	e1200	e1020	e1720	30000	16800	65000	e25000	24200	9940
25	4590	6380	e3400	e1180	e1020	e2500	28100	15900	62600	e24500	19800	9550
26	4290	6200	e3350	e1150	e1020	e5200	25800	14800	60500	e24000	15700	9210
27	4160	6000	e3300	e1120	e1020	9550	24200	13900	56500	e23500	15500	8690
28	4080	5600	e3200	e1100	e1020	13700	22600	13100	51500	e23000	17100	8160
29	3830	5400	e3150	e1080	---	19100	21300	12500	46800	e23500	17100	7780
30	3810	5200	e3100	e1050	---	23300	19800	12700	42700	e24000	17000	7340
31	3640	---	e3000	e1020	---	28300	---	14000	---	e24000	17800	---
TOTAL	173630	216740	118170	54640	28560	137950	890600	698700	1026800	1027100	729200	332010
MEAN	5601	7225	3812	1763	1020	4450	29690	22540	34230	33130	23520	11070
MAX	12600	9500	4800	2900	1020	28300	41800	42900	75100	48400	38500	19500
MIN	1780	3700	2400	1020	1020	1020	19800	12500	13800	23000	15500	7340
AC-FT	344400	429900	234400	108400	56650	273600	1767000	1386000	2037000	2037000	1446000	658500
CFSM.	.38	.48	.26	.12	.07	.30	1.99	1.51	2.30	2.22	1.58	.74

e Estimated.

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

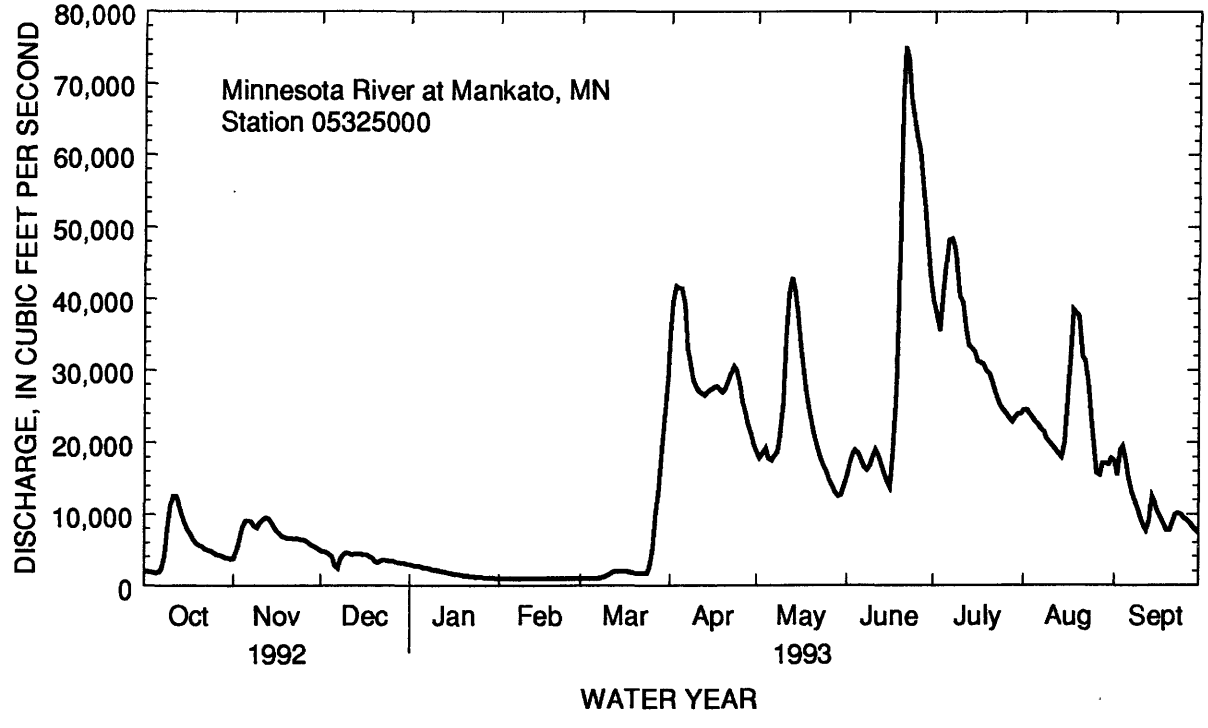
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1903 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1477	1412	908	566	708	4271	8679	5367	5829	4310	2216	1620
MAX	14600	7225	4770	3009	4505	18230	44780	22540	34230	33130	23520	11070
(WY)	1969	1993	1983	1992	1983	1983	1969	1993	1993	1993	1993	1993
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1903 - 1993	
ANNUAL TOTAL	2640380		5434100			
ANNUAL MEAN	7214		14890		3230[a]	
HIGHEST ANNUAL MEAN					14890	1993
LOWEST ANNUAL MEAN					136	1934
HIGHEST DAILY MEAN	23700	Mar 11	75100	Jun 21	92700	Apr 10 1965
LOWEST DAILY MEAN	1780	Oct 5	1020	Jan 31	31	Aug 3 1934
ANNUAL SEVEN-DAY MINIMUM	1880	Sep 30	1020	Jan 31	33	Jul 29 1934
INSTANTANEOUS PEAK FLOW			75600	Jun 21	94100	Apr 10 1965
INSTANTANEOUS PEAK STAGE			30.11	Jun 21	30.11	Jun 21 1993
INSTANTANEOUS LOW FLOW					26[b]	Aug 4 1934
ANNUAL RUNOFF (AC-FT)	5237000		10780000		2340000	
ANNUAL RUNOFF (CFSM)	.48		1.00		.22	
50 PERCENT EXCEEDS	5340		9430		1120	
90 PERCENT EXCEEDS	2860		1040		180	

a Median of annual mean discharges is 2570 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 observed, 31.0°C, July 4-9, 1989; minimum observed, 0.0°C on many days each year.

SEDIMENT CONCENTRATIONS: Maximum daily mean, 2850 mg/L, Aug. 7, 1968; minimum daily mean, 9 mg/L, Jan. 15-19, 1991.

SEDIMENT LOADS: Maximum daily, 414,000 tons, June 21, 1993; minimum daily, 5.2 tons, Nov. 6, 1976.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum observed, 29.0°C, July 9; minimum observed, 0.0°C, Feb. 9.

SEDIMENT CONCENTRATIONS: Maximum daily mean, 2040 mg/L, June 21; minimum daily mean, 61 mg/L, Mar. 22.

SEDIMENT LOADS: Maximum daily, 414,000 tons, June 21; minimum daily, 275 tons, Feb. 16-23, Mar. 5.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.0	---	2.0	---	---	.0	---	11.0	---	20.5	23.0	20.0
2	8.0	---	---	---	---	1.0	3.0	11.5	---	---	24.0	21.0
3	9.0	4.0	---	---	---	1.0	2.5	12.0	---	---	22.0	21.0
4	8.0	3.0	---	---	---	1.0	---	13.0	---	---	22.0	19.0
5	8.0	3.0	---	---	---	1.0	---	---	---	23.0	21.0	19.0
6	7.5	3.0	---	---	---	.5	---	---	---	25.0	20.0	18.0
7	8.0	3.0	---	---	---	1.0	5.0	---	---	24.0	21.0	17.0
8	7.0	4.5	---	---	---	1.0	5.0	13.5	---	24.0	22.0	19.0
9	7.0	3.5	---	---	.0	---	5.0	13.0	---	29.0	24.0	18.0
10	7.0	3.0	---	---	---	---	6.0	13.0	---	25.0	25.0	17.0
11	5.5	3.0	---	---	---	---	6.0	---	---	23.0	25.0	17.0
12	5.0	2.5	---	---	---	---	5.0	---	---	25.0	25.0	21.0
13	6.0	2.5	---	---	---	---	5.0	---	---	23.0	25.0	18.0
14	4.0	2.0	---	---	---	---	5.0	---	---	21.0	24.0	15.0
15	8.0	3.0	---	---	---	2.0	5.0	---	---	23.0	24.0	15.0
16	7.0	3.0	---	---	---	1.5	6.0	16.5	---	23.0	24.0	16.0
17	6.5	3.0	---	---	---	---	8.0	16.0	---	---	24.0	15.0
18	6.0	4.0	---	---	---	---	8.0	15.0	---	24.0	23.0	16.0
19	5.0	4.0	---	---	---	---	7.0	14.0	---	23.0	24.0	14.0
20	6.5	3.5	---	---	---	---	8.0	16.0	18.0	24.0	24.0	15.0
21	7.0	4.0	---	---	---	---	7.0	16.0	18.5	24.0	24.0	15.0
22	11.0	3.0	---	---	---	2.0	9.0	---	19.0	22.0	23.0	15.0
23	9.0	3.0	---	---	---	1.5	10.0	---	21.5	---	24.0	15.0
24	8.0	4.0	---	---	---	2.0	10.5	---	24.0	23.0	26.0	15.0
25	12.0	---	---	---	---	1.5	10.0	---	21.0	23.0	26.0	15.0
26	10.0	2.0	---	---	---	2.0	10.5	---	---	23.0	25.0	14.0
27	7.0	2.0	---	---	---	2.5	12.0	---	24.0	25.0	24.0	13.0
28	4.0	3.0	---	---	.5	2.5	13.0	---	23.0	23.0	24.0	12.0
29	3.5	1.0	---	---	---	---	13.0	---	21.5	24.0	23.0	12.0
30	3.5	---	---	---	---	---	12.5	---	21.0	25.0	22.0	14.0
31	3.0	---	---	---	---	2.0	---	---	---	24.0	21.0	---

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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	69	358	124	1240	137	1780	86	673	104	286	121	333
2	82	430	159	2090	130	1650	88	665	104	286	122	336
3	86	430	261	4670	120	1490	89	649	104	286	117	322
4	86	418	301	6660	111	1320	90	644	103	284	104	286
5	86	413	286	7030	102	1100	90	620	103	284	100	275
6	86	434	252	6210	93	703	90	595	103	284	102	281
7	88	546	228	5510	87	564	91	590	103	284	106	292
8	108	1230	207	4660	87	890	92	571	103	284	111	330
9	187	4080	191	4190	88	1010	92	546	103	284	109	353
10	420	12800	194	4570	90	1110	94	546	102	281	105	369
11	372	12700	198	4900	92	1100	95	526	102	281	101	409
12	255	8680	198	5080	95	1090	96	505	102	281	100	486
13	227	7050	196	4990	95	1130	98	490	102	281	100	535
14	218	5840	195	4630	95	1120	99	481	101	278	99	535
15	225	5250	195	4300	95	1120	100	459	101	278	98	529
16	241	5090	187	3880	95	1110	102	454	100	275	92	497
17	264	5060	166	3250	93	1070	103	431	100	275	88	468
18	270	4700	153	2820	90	984	105	425	100	275	85	436
19	268	4280	141	2540	86	901	107	404	100	275	78	379
20	263	3970	128	2290	85	762	108	399	100	275	74	348
21	252	3710	132	2340	85	734	108	382	100	275	69	322
22	240	3270	161	2840	86	796	108	373	100	275	61	283
23	227	2980	177	3130	87	841	107	355	100	275	75	344
24	215	2790	180	3130	90	850	106	343	101	278	127	590
25	203	2520	178	3070	91	835	106	338	102	281	154	1040
26	197	2280	168	2810	89	805	106	329	103	284	412	5780
27	195	2190	165	2670	87	775	106	321	108	297	890	22900
28	194	2140	165	2490	87	752	106	315	116	319	1040	38500
29	192	1990	156	2270	86	731	105	306	---	---	1100	56700
30	149	1530	145	2040	85	711	105	298	---	---	1150	72300
31	121	1190	---	---	85	688	105	289	---	---	1120	85600
TOTAL	---	110349	---	112300	---	30522	---	14322	---	7901	---	292158

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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	833	78900	151	7620	147	6150	140	15000	205	13600	240	11300
2	609	65100	148	7150	162	7440	140	14300	198	13100	239	10000
3	510	57600	162	8090	175	8690	239	23000	194	12600	273	13900
4	424	47500	225	11700	180	9190	415	44600	187	11900	257	13500
5	340	38000	216	10400	177	8840	262	31700	175	10900	240	11200
6	263	27900	218	10300	168	7980	192	25000	152	9230	245	9860
7	210	18800	277	13600	158	7080	162	21200	143	8490	258	9060
8	190	15700	394	19900	154	6740	148	18900	143	8300	260	8420
9	177	13700	612	34700	161	7300	141	16800	161	8910	247	7270
10	181	13500	735	50600	171	8310	132	14400	162	8750	213	5570
11	182	13300	714	66100	181	9290	197	21000	159	8370	191	4330
12	180	13000	480	52700	174	8600	188	18400	164	8410	201	4210
13	180	12900	330	38200	161	7390	162	14700	157	7840	429	11300
14	173	12600	244	27300	151	6440	149	13400	183	8890	604	20400
15	166	12200	208	21200	139	5440	136	12000	703	38000	395	12400
16	167	12400	179	16200	132	4920	142	12000	532	37300	244	6850
17	188	14100	151	12100	446	22600	163	13700	437	38300	201	5180
18	213	15800	144	10400	994	73000	172	14300	334	34700	200	4630
19	242	17600	166	10900	1170	126000	161	13000	302	31000	200	4160
20	262	19400	185	11300	1510	273000	142	11300	261	26400	199	4180
21	276	21300	196	11100	2040	414000	164	12600	196	16800	201	4730
22	285	22700	183	9490	776	154000	201	14700	176	14900	247	6670
23	290	23900	169	8080	284	52100	213	15000	174	13300	230	6270
24	293	23700	160	7260	238	41800	216	14600	164	10700	204	5470
25	324	24600	152	6530	240	40600	226	14900	158	8450	203	5230
26	294	20500	140	5590	195	31900	228	14800	165	6990	204	5070
27	190	12400	132	4950	158	24100	226	14300	191	7990	187	4390
28	151	9210	125	4420	138	19200	223	13800	210	9700	164	3610
29	150	8630	119	4020	131	16600	220	14000	206	9510	155	3260
30	156	8340	123	4220	135	15600	216	14000	196	9000	150	2970
31	---	---	133	5030	---	---	212	13700	218	10500	---	---
TOTAL	---	695280	---	511150	---	1424300	---	525100	---	462830	---	225390
YEAR		4411602										

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER .SECOND (00061)	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 (&0344)	SED. SUSP. FALL DIAM. % FINER THAN .500 MM (70345)	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)
Apr 01	1000	40400	65	--	--	--	--	--	--	826
June 23	1710	--	77	--	--	--	--	--	--	238

DATE	TIME	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)
Apr 01	1000	--	--	--	--	--	--	--	--	--
June 23	1710	0	0	0.4	7	22	37	56	79	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. 9	0330	399	2.99	June 17	0300	*2750	*9.72
Nov. 10	1100	450	3.35	June 23	0430	2300	9.42
Mar. 26	1700	731	4.70	Aug. 18	1030	1180	8.60
Mar. 31	1800	837	5.27	Aug. 27	1100	491	5.74
May 8	2200	1440	8.30	Sept. 20	2030	595	6.32

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	94	94	95	e32	e24	e22	706	149	270	1290	443	284
2	86	173	96	e31	e24	e22	672	169	275	1240	421	255
3	81	205	96	e30	e24	22	677	162	271	1340	411	227
4	78	215	77	e29	e24	22	712	156	265	1450	392	206
5	72	219	63	e29	e24	e22	758	155	262	1330	362	188
6	70	217	96	e28	e24	e23	765	205	262	1280	334	171
7	87	211	82	e28	e24	e24	752	579	267	1280	322	157
8	290	209	75	e27	e24	e26	785	1150	326	1290	299	143
9	382	247	76	e27	e24	e28	715	1250	347	1300	278	129
10	328	427	73	e27	e24	e30	635	1030	342	1270	259	117
11	304	386	67	e26	e24	e32	595	1050	353	1470	238	107
12	295	344	67	e26	e24	e32	549	921	357	1270	220	102
13	279	328	67	e26	e24	e30	491	915	470	1170	202	146
14	254	315	65	e26	e25	e28	506	909	596	1120	201	183
15	219	297	68	e26	e25	e27	540	840	524	1090	236	132
16	198	280	62	e25	e25	e26	517	760	663	1060	232	116
17	186	254	56	e25	e24	e25	497	682	1920	1050	221	108
18	173	227	e54	e25	e24	e24	488	607	1740	1000	791	104
19	157	208	e52	e25	e24	23	471	524	1520	944	761	103
20	150	213	e50	e25	e23	23	420	432	1400	876	534	366
21	145	210	e47	e25	e23	23	370	371	1660	813	427	468
22	136	192	e45	e25	e23	23	328	315	2050	749	384	364
23	127	179	e43	e25	e23	22	280	284	2190	688	364	319
24	105	164	e42	e24	e23	58	243	265	2010	636	332	269
25	101	153	e40	e24	e23	302	217	263	1890	607	300	244
26	100	145	e39	e24	e23	476	198	247	1730	557	262	213
27	94	117	e38	e24	e22	526	187	262	1570	532	394	192
28	96	123	e37	e24	e22	421	173	254	1450	515	347	173
29	88	115	e36	e24	---	430	157	243	1390	492	309	150
30	82	111	e35	e24	---	551	145	259	1350	472	341	137
31	79	---	e33	e24	---	740	---	276	---	464	328	---
TOTAL	4936	6578	1872	810	664	4083	14549	15684	29720	30645	10945	5873
MEAN	159	219	60.4	26.1	23.7	132	485	506	991	989	353	196
MAX	382	427	96	32	25	740	785	1250	2190	1470	791	468
MIN	70	94	33	24	22	22	145	149	262	464	201	102
AC-FT	9790	13050	3710	1610	1320	8100	28860	31110	58950	60780	21710	11650
CFSM	.67	.93	.25	.11	.10	.56	2.05	2.13	4.18	4.17	1.49	.83
IN.	.77	1.03	.29	.13	.10	.64	2.28	2.46	4.66	4.81	1.72	.92

MINNESOTA RIVER BASIN

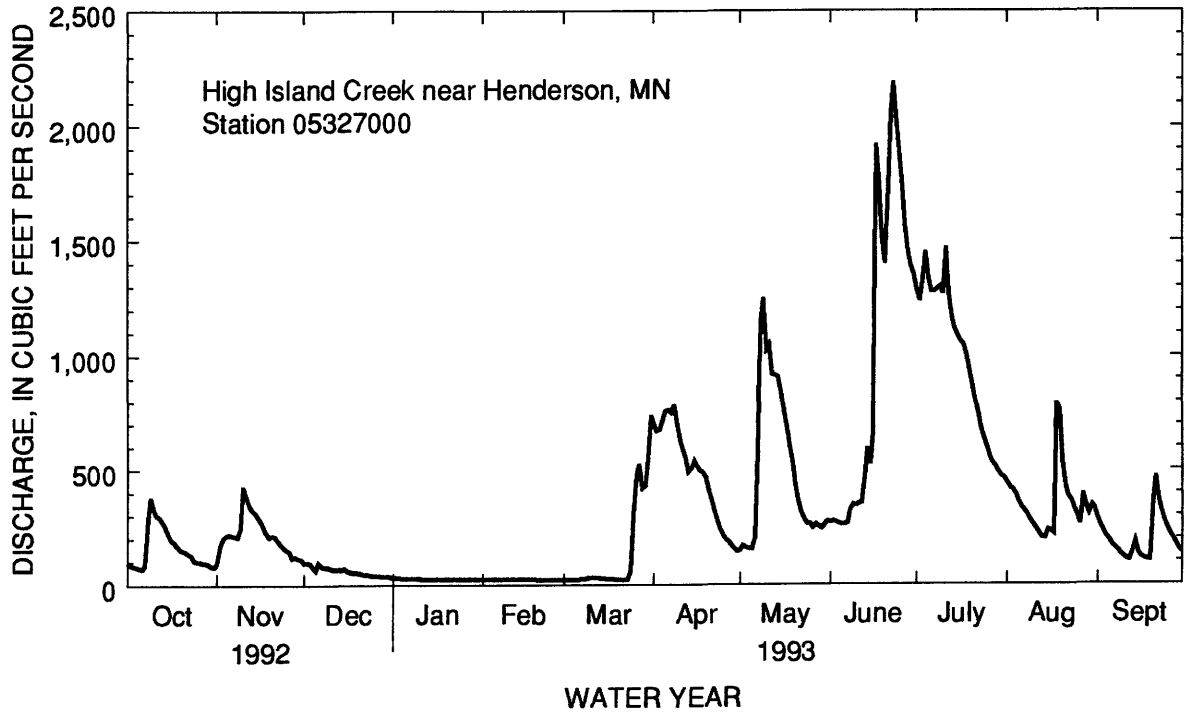
05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	72.5	61.8	35.6	15.1	20.2	157	236	148	173	123	75.4	101
MAX	298	219	111	72.5	121	547	593	506	991	989	353	592
(WY)	1986	1993	1983	1992	1984	1992	1983	1993	1993	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1974 - 1993	
ANNUAL TOTAL	64697		126359			
ANNUAL MEAN	177		346		102	
HIGHEST ANNUAL MEAN					346	1993
LOWEST ANNUAL MEAN					9.23	1976
HIGHEST DAILY MEAN	1350	Sep 16	2190	Jun 23	2190	Jun 23 1993
LOWEST DAILY MEAN	33	Dec 31	22	Feb 27	.46	Oct 3 1976
ANNUAL SEVEN-DAY MINIMUM	37	Dec 25	22	Feb 27	.59	Jul 10 1976
INSTANTANEOUS PEAK FLOW			2750	Jun 17	2750	Jun 17 1993
INSTANTANEOUS PEAK STAGE			9.72	Jun 17	9.72	Jun 17 1993
INSTANTANEOUS LOW FLOW			20	Mar 23	.20a	Jan 4 1981
ANNUAL RUNOFF (AC-FT)	128300		250600		73700	
ANNUAL RUNOFF (CFSM)	.75		1.46		.43	
ANNUAL RUNOFF (INCHES)	10.15		19.83		5.83	
10 PERCENT EXCEEDS	363		966		289	
50 PERCENT EXCEEDS	103		208		25	
90 PERCENT EXCEEDS	63		24		1.7	

a Result of freezeup.



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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e2200	3780	5650	e3550	e1500	e1490	20200	23800	16500	56200	26000	19800
2	e2180	4250	5540	e3500	e1500	e1490	27000	22600	16800	51200	26100	19800
3	e2150	5440	5530	e3450	e1500	e1490	33300	21600	17600	46800	26200	20000
4	e2100	7090	e5340	e3350	e1500	e1500	37600	20900	18600	45800	26000	20500
5	e2080	8530	e4880	e3300	e1500	e1500	40200	20300	19600	46200	25600	20900
6	e2040	9390	e3590	e3200	e1500	e1500	40700	19900	20500	47200	25300	20800
7	e2020	9700	e3250	e3050	e1500	e1500	39600	19800	21100	49100	24900	19900
8	2900	9740	e3880	e2950	e1500	e1520	37500	20200	21300	51400	24500	18900
9	5340	9390	e4080	e2850	e1500	e1550	35000	21800	21100	52000	24100	17600
10	8600	9570	e4610	e2750	e1500	e1600	32800	24600	20900	50800	23100	15900
11	10700	10400	e5060	e2650	e1490	e1650	31100	27200	20900	49100	22100	13800
12	11900	10800	e5120	e2550	e1490	e1700	29700	30400	21300	46400	21300	12100
13	12600	10800	e4910	e2450	e1490	e1800	29100	34800	22100	43800	20600	10900
14	12900	10600	e4890	e2300	e1490	e1880	28800	39000	23200	41300	20200	11200
15	12300	10100	e4850	e2250	e1490	e1980	28900	40600	23400	38700	20200	12600
16	10900	9320	e4800	e2150	e1490	e2050	28900	39900	22900	36900	20600	13400
17	9430	8660	e4800	e2050	e1490	e2050	28900	37400	24900	35400	23200	13300
18	8400	8060	e4800	e2000	e1490	e2080	28800	34600	31200	34600	27600	12600
19	7610	7550	e4750	e1950	e1490	e2100	28800	31400	37900	33800	32300	11400
20	6920	7360	e4650	e1850	e1490	e2100	28700	29000	45700	33000	35900	10800
21	6410	7240	e4550	e1800	e1490	e2090	28300	27300	59400	32000	36600	10900
22	5950	7130	e4400	e1750	e1490	e1940	28300	25500	76000	30700	35300	11600
23	5610	7040	e4300	e1740	e1490	e1870	28700	23900	85800	29900	32900	12300
24	5240	7280	e4200	e1700	e1480	e1920	29300	22300	90800	29100	30400	12800
25	4920	7420	e4150	e1680	e1480	e2590	29800	21200	90900	28400	28300	12800
26	4760	7180	e4100	e1650	e1490	e4310	29700	20200	86100	27800	26400	12500
27	4440	6900	e4000	e1600	e1490	e8300	29000	19600	80700	26900	24700	12000
28	4180	6630	e3900	e1580	e1490	e11100	28000	18900	75000	26300	22800	11500
29	4060	6330	e3800	e1550	---	e12000	26700	18100	69000	25800	21500	10800
30	3880	5980	e3700	e1520	---	e13900	25200	17300	62600	25500	20700	10300
31	3750	---	e3650	e1500	---	e16600	---	16800	---	25600	20100	---
TOTAL	188470	239660	139730	72220	41800	111150	918600	790900	1243800	1197700	795500	433700
MEAN	6080	7989	4507	2330	1493	3585	30620	25510	41460	38640	25660	14460
MAX	12900	10800	5650	3550	1500	16600	40700	40600	90900	56200	36600	20900
MIN	2020	3780	3250	1500	1480	1490	20200	16800	16500	25500	20100	10300
AC-FT	373800	475400	277200	143200	82910	220500	1822000	1569000	2467000	2376000	1578000	860200
CFSM	.38	.49	.28	.14	.09	.22	1.89	1.57	2.56	2.38	1.58	.89
IN.	.43	.55	.32	.17	.10	.26	2.11	1.82	2.86	2.75	1.83	1.00

e Estimated.

MINNESOTA RIVER BASIN

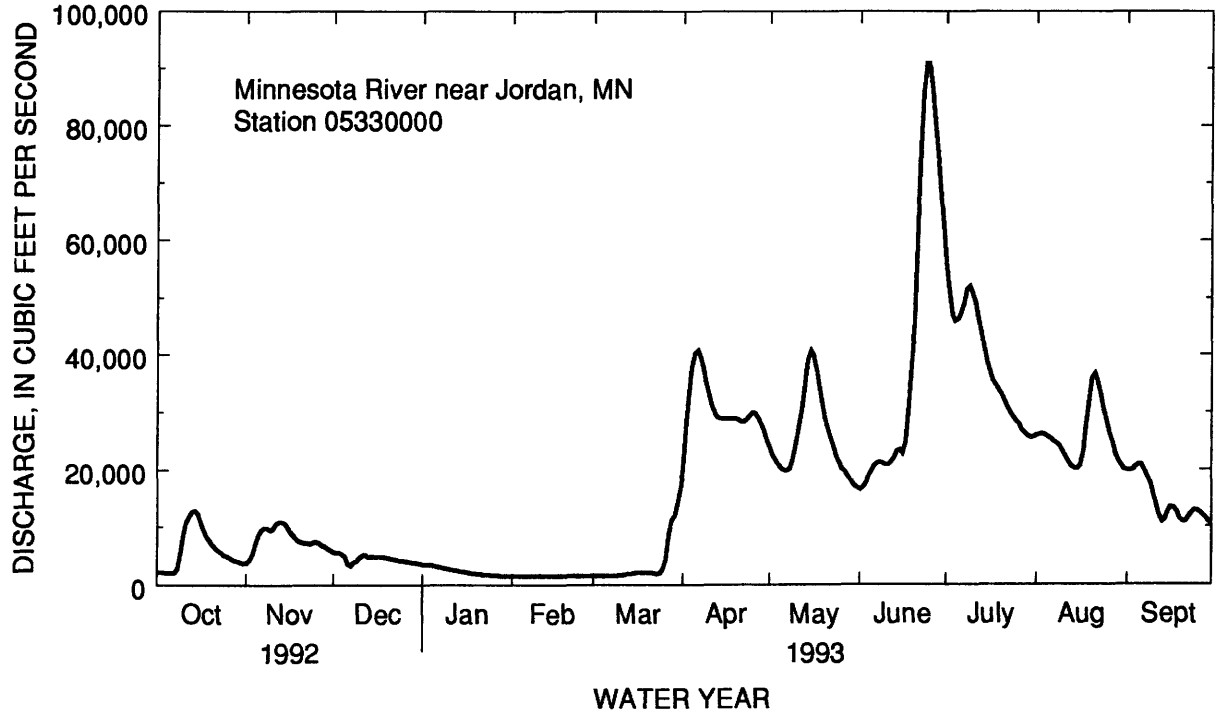
05330000 MINNESOTA RIVER NEAR JORDAN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1935 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	1976	1920	1341	818	895	4881	11380	7341	7247	5526	3073	2225
MAX	16030	7989	5216	3344	3992	21170	48210	25510	41460	38640	25660	14460
(WY)	1969	1993	1983	1992	1983	1983	1969	1993	1993	1993	1993	1993
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1935 - 1993	
ANNUAL TOTAL	3000880		6173230			
ANNUAL MEAN	8199		16910		4057a	
HIGHEST ANNUAL MEAN					16910	1993
LOWEST ANNUAL MEAN					687	1940
HIGHEST DAILY MEAN	26100	Mar 7	90900	Jun 25	112000	Apr 11 1965
LOWEST DAILY MEAN	2020	Oct 7	1480	Feb 24	85	Jan 21 1940
ANNUAL SEVEN-DAY MINIMUM	2110	Oct 1	1490	Feb 19	89	Jan 20 1940
INSTANTANEOUS PEAK FLOW			92200	Jun 24	117000	Apr 11 1965
INSTANTANEOUS PEAK STAGE			33.52	Jun 24	35.07	Apr 12 1965
INSTANTANEOUS LOW FLOW			1480	Feb 24,25	79	Nov 17 1955
ANNUAL RUNOFF (AC-FT)	5952000		12240000		2939000	
ANNUAL RUNOFF (CFSM)	.51		1.04		.25	
ANNUAL RUNOFF (INCHES)	6.89		14.18		3.40	
10 PERCENT EXCEEDS	17000		37100		10600	
50 PERCENT EXCEEDS	5880		11500		1580	
90 PERCENT EXCEEDS	3150		1510		295	

a Median of annual discharges is 3370 ft³/s.



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 1992 TO SEPTEMBER 1993

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)
OCT											
28...	1330	4180	962	954	8.2	8.2	10.0	1.7	740	11.6	K38
FEB											
24...	1500	1480	1050	1090	7.8	7.8	0.0	0.50	752	9.8	160
MAY											
27...	1300	19900	840	860	8.3	8.2	16.0	20	734	8.5	48
JUN											
25...	1200	91500	493	501	7.7	7.9	20.5	76	740	8.2	660
SEP											
09...	1200	17800	787	787	8.2	8.3	18.0	42	732	8.0	98

DATE	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	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)
OCT											
28...	79	130	47	19	3.2	310	304	0	378	150	31
FEB											
24...	34	130	48	29	4.6	344	350	0	420	190	38
MAY											
27...	140	100	41	16	4.3	255	257	0	311	180	21
JUN											
25...	3100	63	20	6.7	4.1	151	158	0	184	69	9.9
SEP											
09...	46	100	39	14	4.4	247	284	0	301	130	16

MINNESOTA RIVER BASIN

05330000 MINNESOTA RIVER NEAR JORDAN, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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 TOTAL (MG/L AS N) (00625)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	SEDIMENT, SUSPENDED (MG/L) (80154)
OCT											
28...	0.40	22	636	0.020	9.60	<0.010	1.3	0.170	0.030	0.020	125
FEB											
24...	0.30	21	710	0.050	5.70	0.220	0.70	0.120	0.090	0.100	25
MAY											
27...	0.30	14	561	0.030	6.00	0.030	0.80	0.080	0.050	0.060	197
JUN											
25...	0.20	20	327	0.120	6.00	0.100	0.70	0.180	0.190	0.170	210
SEP											
09...	0.40	24	523	0.020	4.10	0.020	0.60	0.140	0.130	0.120	311

DATE	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)	SILVER, DISSOLVED (UG/L AS AG) (01075)
OCT											
28...	78	10	78	<3	3	40	6	<10	2	3	<1.0
FEB											
24...	48	<10	77	<3	14	34	89	10	2	2	<1.0
MAY											
27...	70	100	74	<3	<3	33	11	<10	2	3	<1.0
JUN											
25...	99	20	61	<3	28	17	4	10	2	2	<1.0
SEP											
09...	83	<10	78	<3	7	30	5	10	2	2	<1.0

MINNESOTA RIVER BASIN

05330000 MINNESOTA RIVER NEAR JORDAN, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	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)	ALPHA, COUNT, 2 SIGMA WAT DIS AS NAT U (UG/L) (75986)	ALPHA COUNT, 2 SIGMA WAT DIS AS TH-230 (PCI/L) (75987)	ALPHA, 2 SIGMA SED SUS TOT DRY AS TH-230 (PCI/L) (76004)	ALPHA RADIO. WATER DISS AS TH-230 (PCI/L) (04126)	ALPHA SED SUSP DRY WGH AS TH-230 (PCI/L) (04127)	GROSS BETA, DIS-SOLVED (PCI/L AS CS-137) (03515)
OCT										
28...	410	<6	20	0.9	6.9	4.9	1.0	14	1.1	9.4
FEB										
24...	440	<6	--	--	--	--	--	--	--	--
MAY										
27...	350	<6	--	--	--	--	--	--	--	--
JUN										
25...	190	6	--	--	--	--	--	--	--	--
SEP										
09...	320	6	10	2.9	4.9	3.2	2.0	6.4	2.5	11

DATE	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)	BETA, 2 SIGMA WATER, DISS, AS SR90/Y90 (PCI/L (75988)	BETA, 2 SIGMA WATER, DISS, AS CS-137 (PCI/L) (75989)	BETA, 2 SIGMA SED, SUSP, TOT DRY SR90Y90 (PCI/L) (76005)	RADIUM 226, DIS-SOLVED, RADON METHOD (PCI/L) (09511)	RA-226 2 SIGMA WATER, DISS, (PCI/L) (76001)	URANIUM NATURAL DIS-SOLVED (UG/L AS U) (22703)	URANIUM NATURAL 2 SIGMA WATER, DISS, (UG/L) (75990)
OCT										
28...	5.9	7.0	5.6	1.7	2.3	1.2	0.08	0.020	14	2.0
FEB										
24...	--	--	--	--	--	--	--	--	--	--
MAY										
27...	--	--	--	--	--	--	--	--	--	--
JUN										
25...	--	--	--	--	--	--	--	--	--	--
SEP										
09...	6.5	8.1	5.9	1.8	2.4	1.3	0.10	0.020	10	1.5

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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 do not include this diversion.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6360	8220	10900	8150	5810	5050	33500	40000	35800	91300	48800	36300
2	6030	7940	9910	7250	5200	4900	39200	38600	37000	88600	47800	35600
3	6040	8970	10200	7450	5810	5250	48400	37900	38700	85200	47300	35500
4	5970	10300	9920	7640	5590	5220	55800	37800	40300	83500	46600	35600
5	6070	12400	9640	8130	5430	5300	61200	38000	41400	81800	45800	35400
6	6030	13900	9420	7430	5600	5010	65300	37700	41800	81500	44900	35600
7	6000	14500	8200	7470	5530	4950	65900	37600	41900	82300	44100	34700
8	6140	15400	8590	7150	5500	5330	64400	37100	41700	84900	44000	33300
9	6420	14900	7570	7000	5430	5470	61300	38200	41100	87100	46700	31900
10	7790	14800	8400	6800	5540	5980	57000	40600	39900	88300	44200	29700
11	13000	15200	9540	6610	5570	5820	54200	44500	38700	88900	38100	27600
12	15600	16100	9850	6600	5240	5260	52000	47900	37600	87600	36200	24900
13	16700	16600	9700	6460	5180	5580	50600	51900	37200	85200	35000	22700
14	17600	16800	9730	6590	5770	5590	49500	56900	37900	83000	33800	21800
15	18000	16800	10200	6440	5170	5410	48900	61700	38500	80500	33600	21500
16	17200	16000	10200	5850	5100	6100	48700	62800	38300	78100	34400	22800
17	16000	15600	9840	6320	5140	6650	48900	61400	37500	75500	34400	23000
18	14100	14800	9840	5880	5250	5460	48400	57100	43400	73400	36300	23200
19	13000	13600	9300	5760	4780	5410	47600	53600	48000	71400	41700	22400
20	12100	13400	8760	6030	4800	6430	47400	48700	53800	69300	47800	20700
21	11200	13300	7560	5920	5030	6540	46700	44900	60800	67100	51200	20800
22	11000	13000	7830	5700	5280	6440	45200	41900	70300	65100	51700	22600
23	10400	13300	8080	5980	5320	5930	44500	39100	81800	62900	50700	22800
24	10100	13500	8080	5470	4610	6040	44100	37500	92000	61000	48600	22800
25	9790	13400	7690	5570	4510	6330	44200	35800	99000	59900	45800	22400
26	9020	13400	6660	5130	4860	6560	44100	36000	104000	57700	43500	23300
27	10300	13100	7410	4890	4870	8630	43900	37100	103000	55500	41600	23000
28	9380	12700	7980	5760	4840	14800	43400	37400	101000	53600	40600	22400
29	8450	11900	8740	5000	---	19300	43200	37300	97900	51600	39100	21300
30	8260	11600	8680	4350	---	22400	42000	36300	94700	50000	37700	20900
31	8070	---	8360	4690	---	27300	---	35700	---	49400	36900	---
TOTAL	322120	405430	276780	195470	146760	240440	1489500	1349000	1715000	2281200	1318900	796500
MEAN	10390	13510	8928	6305	5241	7756	49650	43520	57170	73590	42550	26550
MAX	18000	16800	10900	8150	5810	27300	65900	62800	104000	91300	51700	36300
MIN	5970	7940	6660	4350	4510	4900	33500	35700	35800	49400	33600	20700
AC-FT	638900	804200	549000	387700	291100	476900	2954000	2676000	3402000	4525000	2616000	1580000
CFSM	.28	.37	.24	.17	.14	.21	1.35	1.18	1.55	2.00	1.16	.72
IN.	.33	.41	.28	.20	.15	.24	1.51	1.36	1.73	2.31	1.33	.81

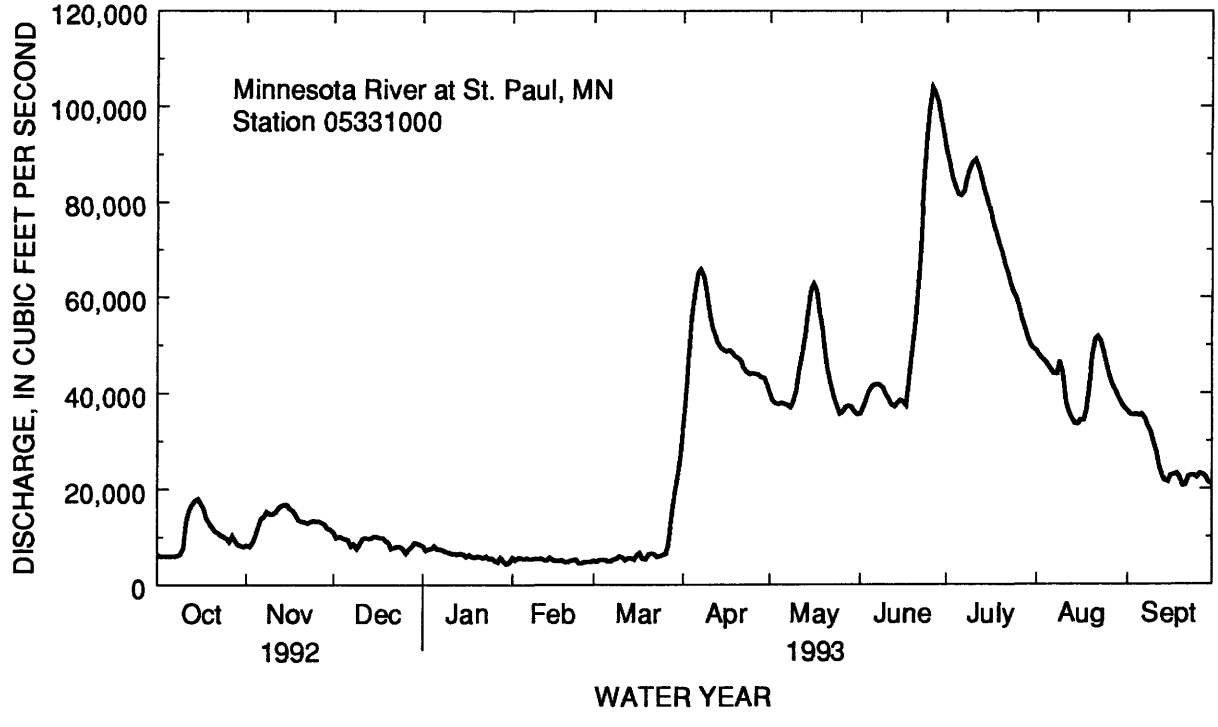
MISSISSIPPI RIVER MAIN STEM

05331000 MISSISSIPPI RIVER AT ST. PAUL, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1892 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	8261	7474	5356	4381	4345	10700	24830	20090	17850	13950	8619	8014
MAX	38210	27660	16080	11500	14700	43240	91610	66470	57170	73590	42550	34380
(WY)	1987	1972	1983	1983	1966	1983	1969	1986	1993	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1892 - 1993	
ANNUAL TOTAL	5734590		10537100			
ANNUAL MEAN	15670		28870		11200	
HIGHEST ANNUAL MEAN					29580	1986
LOWEST ANNUAL MEAN					1935	1934
HIGHEST DAILY MEAN	48500	Mar 14	104000	Jun 26	171000	Apr 16 1965
LOWEST DAILY MEAN	5970	Oct 4	4350	Jan 30	632	Aug 26 1934
ANNUAL SEVEN-DAY MINIMUM	6040	Oct 2	4810	Feb 24	741	Aug 26 1934
INSTANTANEOUS PEAK FLOW			104000	Jun 26	171000	Apr 16 1965
INSTANTANEOUS PEAK STAGE			19.15	Jun 26	26.01	Apr 16 1965
ANNUAL RUNOFF (AC-FT)	11370000		20900000		8115000	
ANNUAL RUNOFF (CFSM)	.43		.78		.30	
ANNUAL RUNOFF (INCHES)	5.80		10.65		4.14	
10 PERCENT EXCEEDS	29900		62100		26400	
50 PERCENT EXCEEDS	11700		20900		6820	
90 PERCENT EXCEEDS	7850		5470		2650	



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 1992 TO SEPTEMBER 1993

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												
10...	1000	15600	738	760	8.4	8.2	4.5	1.5	747	12.7	K320	180
FEB												
22...	1130	5420	703	729	7.8	8.0	0.5	1.3	744	12.9	170	K140
MAY												
26...	1245	36900	688	704	8.3	8.3	16.0	16	746	9.2	160	44
SEP												
07...	1100	36600	553	613	7.1	8.2	20.0	25	749	9.3	110	44

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												
10...	89	32	17	3.7	272	265	6	320	76	32	0.40	17
FEB												
22...	80	28	29	3.9	--	246	0	--	73	39	0.20	15
MAY												
26...	84	32	14	4.0	--	223	0	--	120	20	0.30	12
SEP												
07...	73	29	12	3.8	215	226	0	262	80	16	0.30	19

MISSISSIPPI RIVER MAIN STEM

05331570 MISSISSIPPI RIVER AT NININGER, MN--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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 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, DIS-SOLVED (MG/L AS P) (00671)	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)
NOV											
10...	481	0.020	7.90	0.040	0.90	0.190	0.130	0.110	95	83	<10
FEB											
22...	424	0.070	3.50	0.370	1.0	0.190	0.150	0.170	7	89	<10
MAY											
26...	463	0.030	3.60	0.040	0.80	0.110	0.070	0.070	87	98	30
SEP											
07...	383	0.020	2.90	0.030	0.60	0.150	0.140	0.120	123	97	10

DATE	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											
10...	61	<3	7	22	18	<10	2	2	<1.0	250	<6
FEB											
22...	60	<3	11	14	78	<10	2	1	<1.0	210	<6
MAY											
26...	69	<3	5	24	19	<10	2	2	<1.0	260	<6
SEP											
07...	64	<3	14	20	13	<10	3	<1	<1.0	220	<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)
June 1	0530	3750	7.71	June 25	1530	*8510	*10.59
June 10	1130	4600	8.23				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	200	230	280	e205	e185	e165	1520	1300	3620	1680	e520	999
2	196	247	287	e200	e185	e165	1500	1470	3060	1710	e480	822
3	189	289	269	e200	e185	168	1400	1670	2420	1820	e420	698
4	182	331	249	e200	e185	168	1280	1550	1970	3440	e380	610
5	175	340	227	e200	e185	168	1190	1390	1620	e3400	e340	534
6	171	341	247	e195	186	172	1150	1240	1350	e3200	e310	475
7	171	333	246	e195	186	178	1140	1130	1220	e3000	e280	431
8	186	330	235	e195	184	192	1210	1040	1310	e2800	e280	403
9	214	328	230	e195	178	200	1770	1080	2140	e2500	e290	369
10	226	337	233	e195	175	211	2510	1130	3980	e2550	e295	341
11	232	369	242	e195	172	e210	2500	1110	3690	e2650	e300	316
12	238	412	237	e195	168	e203	2320	1050	2850	e2800	e305	300
13	238	426	232	e195	168	e203	2150	945	2270	e2900	312	288
14	233	417	230	e190	e165	e200	2080	833	2020	e2750	408	286
15	229	390	232	e190	e165	200	1990	728	1780	e2650	388	283
16	226	392	235	e190	e165	200	1790	636	1470	e2400	398	283
17	229	369	229	e190	e165	e190	1570	570	1340	e2200	399	284
18	230	355	182	e190	e165	e185	1430	509	1680	e2000	385	274
19	229	342	e200	e190	e165	178	1290	457	1860	e1850	382	262
20	234	337	e220	e190	e165	172	1150	412	1970	e1700	369	258
21	234	339	e230	e190	e165	168	1030	367	2920	e1550	349	259
22	234	342	227	e190	e165	165	937	340	2560	e1400	345	274
23	234	342	221	e190	e165	168	857	345	2070	e1250	415	279
24	236	342	236	e190	e165	165	888	613	4440	e1100	493	273
25	245	341	e240	e190	e165	189	1350	1680	7910	e960	473	264
26	245	329	e235	e190	e165	270	1490	1700	6920	e880	424	258
27	237	275	e235	e190	e165	724	1450	1610	4940	e870	512	253
28	232	315	e225	e190	e165	1290	1410	1800	3710	e800	642	243
29	230	316	e220	e185	---	1580	1350	1740	2780	e720	562	238
30	227	307	e215	e185	---	1920	1330	1920	2100	e640	553	234
31	226	---	e210	e185	---	1980	---	3110	---	e580	1120	---
TOTAL	6808	10163	7236	5970	4817	12347	45032	35475	83970	60750	13129	11091
MEAN	220	339	233	193	172	398	1501	1144	2799	1960	424	370
MAX	245	426	287	205	186	1980	2510	3110	7910	3440	1120	999
MIN	171	230	182	185	165	165	857	340	1220	580	280	234
AC-FT	13500	20160	14350	11840	9550	24490	89320	70360	166600	120500	26040	22000
CFSM	.25	.39	.27	.22	.20	.46	1.74	1.33	3.24	2.27	.49	.43
IN .	.29	.44	.31	.26	.21	.53	1.94	1.53	3.62	2.62	.57	.48

e Estimated.

ST. CROIX RIVER BASIN

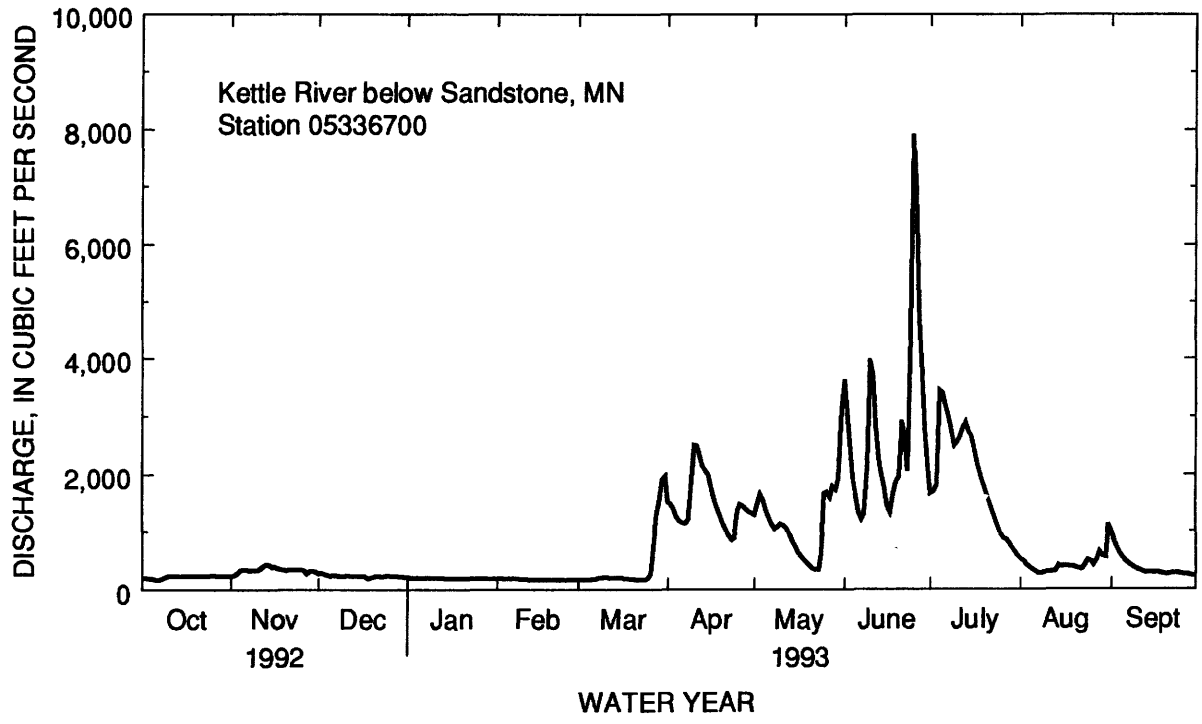
05336700 KETTLE RIVER BELOW SANDSTONE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	769	605	277	176	170	517	2303	1283	926	679	381	587
MAX	2652	2414	652	411	417	1742	4653	3168	2799	2869	2094	3065
(WY)	1969	1972	1984	1984	1984	1973	1969	1986	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1968 - 1993	
ANNUAL TOTAL	235268		296788			
ANNUAL MEAN	643		813		723	
HIGHEST ANNUAL MEAN					1390	1972
LOWEST ANNUAL MEAN					254	1977
HIGHEST DAILY MEAN	4660	Apr 23	7910	Jun 25	16400	Jul 23 1972
LOWEST DAILY MEAN	171	Oct 6	165	Feb 14-Mar 2	43	Nov 12 1976
ANNUAL SEVEN-DAY MINIMUM	181	Oct 2	165	Feb 14	62	Jan 14 1971
INSTANTANEOUS PEAK FLOW			8510	Jun 25	17200	Jul 23 1972
INSTANTANEOUS PEAK STAGE			10.59	Jun 25	15.38	Jul 23 1972
INSTANTANEOUS LOW FLOW			161	Mar 23	25a	Nov 11 1977
ANNUAL RUNOFF (AC-FT)	466700		588700		523500	
ANNUAL RUNOFF (CFSM)	.74		.94		.84	
ANNUAL RUNOFF (INCHES)	10.14		12.79		11.38	
10 PERCENT EXCEEDS	1630		2090		1790	
50 PERCENT EXCEEDS	316		328		282	
90 PERCENT EXCEEDS	221		180		125	

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)
June 25	2300	*489	*4.21	No other peak above base discharge.			

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.6	9.2	19	e13	e11	e10	206	63	253	99	16	45
2	2.4	21	19	e13	e11	e10	195	66	236	111	13	46
3	2.3	23	18	e13	e11	e10	178	73	196	137	12	42
4	2.3	24	e18	e13	e11	e10	157	78	154	147	10	35
5	2.4	23	e18	e13	e11	10	140	74	122	151	10	30
6	2.3	21	e18	e13	11	e10	128	70	106	129	11	25
7	2.7	20	e17	e13	11	e10	127	69	100	121	9.1	21
8	7.6	19	e16	e13	e11	e10	144	67	100	130	7.4	19
9	9.0	19	e16	e13	11	e10	172	71	108	162	9.5	18
10	7.8	20	e15	e13	11	e9.6	198	77	103	182	11	19
11	7.3	20	e14	e12	e11	e9.3	197	71	90	173	9.7	17
12	6.5	21	14	e12	10	e8.8	189	67	74	139	9.2	17
13	6.3	22	14	e12	10	e8.0	181	51	63	125	9.2	18
14	6.7	22	e14	e12	e10	7.4	172	51	52	111	10	17
15	7.1	23	e15	e12	10	e9.0	161	43	47	95	13	14
16	7.1	22	e15	e12	10	e12	135	35	42	81	14	11
17	6.1	22	e15	e12	e10	e14	119	29	46	74	11	11
18	5.7	22	e15	e12	e10	e14	110	28	46	69	26	9.6
19	5.7	22	e15	e12	e10	e14	118	24	45	59	31	9.1
20	6.2	22	e14	e12	e10	14	86	20	46	53	31	17
21	7.3	23	e14	e12	e10	14	75	18	47	46	27	19
22	6.8	23	e14	e12	e10	14	70	17	46	38	36	21
23	7.2	23	e14	e12	e10	13	69	23	50	35	56	21
24	7.7	22	e14	e12	e10	e14	68	92	147	32	63	19
25	7.7	22	e13	e12	e10	e15	61	201	397	32	62	20
26	7.7	21	e13	e12	e10	e20	50	262	429	30	62	20
27	7.8	21	e13	e12	e10	e43	49	258	307	29	72	21
28	7.3	21	e13	e12	e10	e77	51	233	222	25	62	20
29	7.4	21	e13	e12	---	124	53	190	160	23	55	19
30	7.4	20	e13	e12	---	168	53	195	120	19	55	15
31	7.4	---	e13	e11	---	219	---	234	---	18	51	---
TOTAL	187.8	634.2	466	381	291	931.1	3712	2850	3954	2675	874.1	635.7
MEAN	6.06	21.1	15.0	12.3	10.4	30.0	124	91.9	132	86.3	28.2	21.2
MAX	9.0	24	19	13	11	219	206	262	429	182	72	46
MIN	2.3	9.2	13	11	10	7.4	49	17	42	18	7.4	9.1
AC-FT	373	1260	924	756	577	1850	7360	5650	7840	5310	1730	1260
CFSM	.06	.21	.15	.12	.10	.29	1.21	.90	1.29	.85	.28	.21
IN.	.07	.23	.17	.14	.11	.34	1.35	1.04	1.44	.98	.32	.23

e Estimated.

ST. CROIX RIVER BASIN

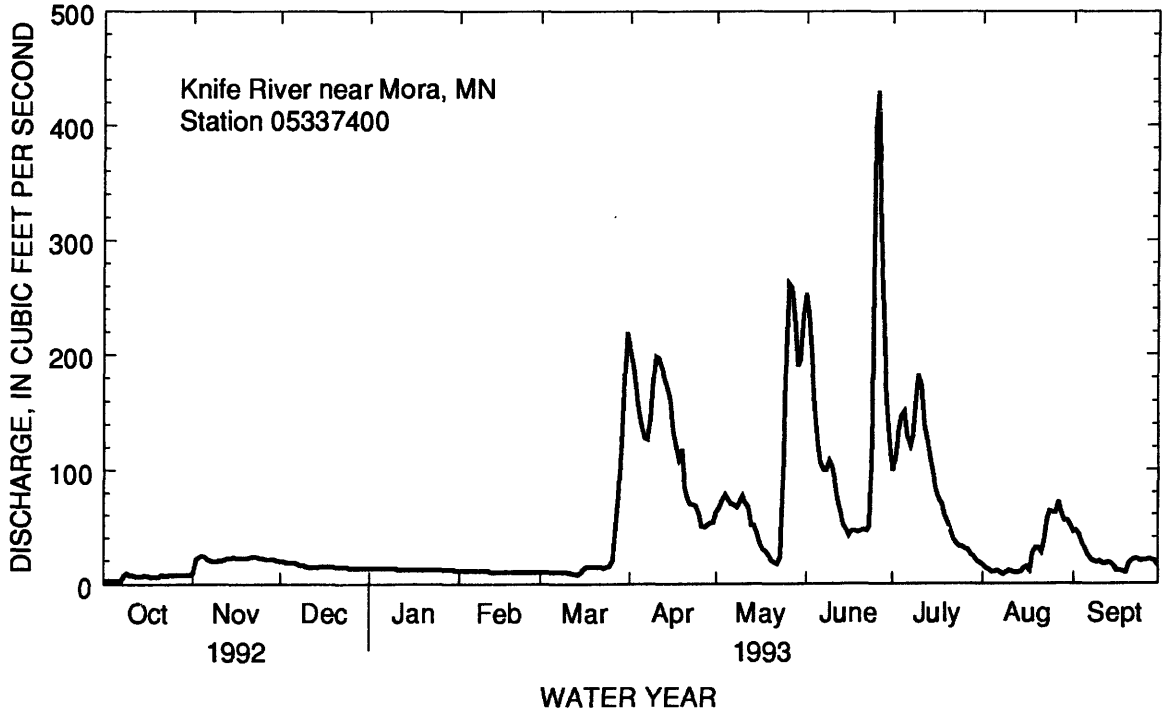
05337400 KNIFE RIVER NEAR MORA, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	52.9	41.5	25.4	12.9	13.4	66.6	215	107	66.1	59.7	24.9	40.6
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1974 - 1993	
ANNUAL TOTAL	15272.5		17591.9			
ANNUAL MEAN	41.7		48.2		60.7	
HIGHEST ANNUAL MEAN					135	1986
LOWEST ANNUAL MEAN					16.8	1988
HIGHEST DAILY MEAN	632	Apr 22	429	Jun 26	1610	Apr 1 1986
LOWEST DAILY MEAN	2.3	Oct 3	2.3	Oct 3	.76	Jul 7 1988
ANNUAL SEVEN-DAY MINIMUM	2.4	Sep 30	2.4	Oct 1	.86	Jul 23 1988
INSTANTANEOUS PEAK FLOW			489	Jun 25	1840	May 10 1979
INSTANTANEOUS PEAK STAGE			4.21	Jun 25	6.69	Nov 24 1977
INSTANTANEOUS LOW FLOW			2.2	Oct 3	.74[a]	Jul 6 1988
ANNUAL RUNOFF (AC-FT)	30290		34890		43970	
ANNUAL RUNOFF (CFSM)	.41		.47		.60	
ANNUAL RUNOFF (INCHES)	5.57		6.42		8.08	
10 PERCENT EXCEEDS	105		142		144	
50 PERCENT EXCEEDS	17		19		20	
90 PERCENT EXCEEDS	5.7		9.1		4.2	

a Occurred July 6, 7, 28, 29, 1988.



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, Oct. 1992 to current year.

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 estimated daily discharges, 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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	80	138	192	e98	103	88	1470	662	1810	2110	287	649
2	83	194	194	100	103	90	1680	711	1870	1860	256	718
3	78	234	184	106	104	93	1870	730	1910	1600	229	720
4	79	236	177	107	106	92	1890	776	1900	1570	213	688
5	78	229	157	110	106	95	1690	819	1820	1530	208	614
6	82	225	149	108	107	100	1500	814	1650	1460	198	543
7	89	229	152	109	108	105	1340	781	1410	1370	193	478
8	110	219	145	109	110	110	1300	779	1250	1310	179	417
9	159	230	141	106	107	118	1330	792	1170	1280	212	393
10	155	254	145	103	109	e118	1360	779	1120	1300	214	325
11	142	234	140	101	e108	e115	1470	774	1080	1400	200	275
12	150	265	136	e98	107	e113	1580	750	1020	1460	193	262
13	115	271	136	e97	e105	e110	1610	726	981	1530	176	263
14	111	246	144	e96	e102	e108	1620	672	904	1570	184	256
15	107	244	150	e96	e100	e107	1570	592	780	1510	205	227
16	129	246	151	e97	e98	e108	1580	515	716	1390	201	213
17	122	252	148	e97	e96	e110	1500	455	674	1240	192	221
18	114	246	142	97	e94	e111	1380	425	603	1100	270	210
19	104	234	143	105	e93	e112	1210	383	578	975	330	200
20	124	250	140	105	e92	e113	1160	352	613	845	327	232
21	116	253	132	106	e91	e114	1060	314	645	736	325	242
22	125	231	e126	105	e91	e116	947	291	673	639	318	262
23	143	233	e120	e105	e92	e122	847	363	726	566	355	253
24	136	234	e116	e107	e91	130	806	649	1050	504	374	246
25	144	221	e110	e108	e90	152	747	893	1390	484	410	239
26	146	214	e104	e110	e88	218	689	1240	1780	460	450	256
27	136	201	e100	111	e88	405	681	1520	2040	394	498	238
28	141	189	e96	e110	e89	628	696	1630	2240	386	479	238
29	146	190	e96	e108	---	853	672	1650	2310	333	531	219
30	150	192	e96	e106	---	1060	672	1710	2270	303	635	197
31	145	---	e95	e103	---	1270	---	1780	---	287	639	---
TOTAL	3739	6834	4257	3224	2778	7184	37927	25327	38983	33502	9481	10294
MEAN	121	228	137	104	99.2	232	1264	817	1299	1081	306	343
MAX	159	271	194	111	110	1270	1890	1780	2310	2110	639	720
MIN	78	138	95	96	88	88	672	291	578	287	176	197
AC-FT	7420	13560	8440	6390	5510	14250	75230	50240	77320	66450	18810	20420
CFSM	.13	.24	.14	.11	.10	.24	1.32	.85	1.36	1.13	.32	.36
IN.	.15	.27	.17	.13	.11	.28	1.47	.98	1.51	1.30	.37	.40

e Estimated.

ST. CROIX RIVER BASIN

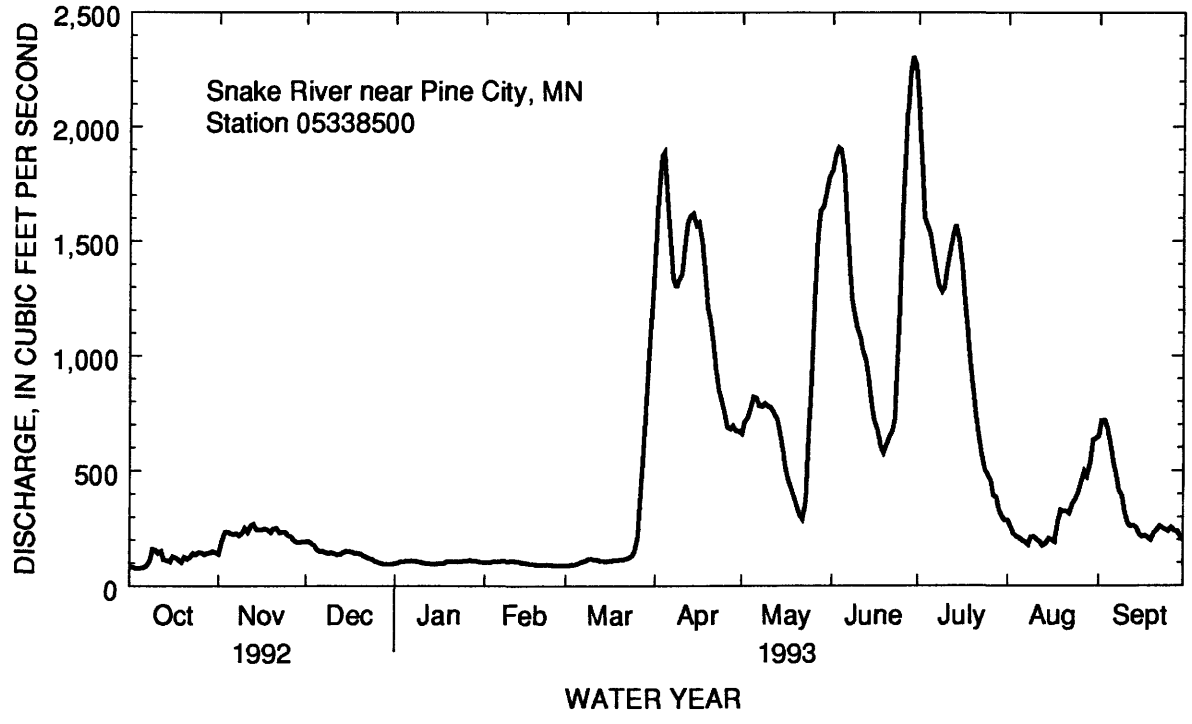
05338500 SNAKE RIVER NEAR PINE CITY, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	411	402	207	125	124	441	1976	1161	873	750	324	303
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 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1913 - 1993	
ANNUAL TOTAL		168688		183530		
ANNUAL MEAN		461		503	587[a]	
HIGHEST ANNUAL MEAN					1223	1972
LOWEST ANNUAL MEAN					177	1959
HIGHEST DAILY MEAN	3340	Apr 26	2310	Jun 29	14200	Jul 27 1972
LOWEST DAILY MEAN	78	Jun 15	78	Oct 3	26	Aug 29 1976
ANNUAL SEVEN-DAY MINIMUM	79	Sep 29	81	Oct 1	28	Jan 21 1977
INSTANTANEOUS PEAK FLOW			2320	Jun 29	14300	Jul 27 1972
INSTANTANEOUS PEAK STAGE			5.39	Jun 29	10.38	Jul 27 1972
INSTANTANEOUS LOW FLOW			71	Feb 16	5.5[b]	Oct 1 1964
ANNUAL RUNOFF (AC-FT)	334600		364000		425000	
ANNUAL RUNOFF (CFSM)	.48		.52		.61	
ANNUAL RUNOFF (INCHES)	6.55		7.13		8.32	
10 PERCENT EXCEEDS	1290		1470		1440	
50 PERCENT EXCEEDS	210		231		214	
90 PERCENT EXCEEDS	104		98		72	

a Median of annual mean discharges is 526 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, 1993.
REMARKS.--Letter K indicates non-ideal colony count.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
NOV								
05...	0915	230	244	7.6	4.5	10.9	740	--
JAN								
26...	0930	115	287	8.8	1.0	9.3	732	--
MAR								
25...	0910	132	335	7.1	1.0	10.1	746	--
JUL								
21...	1040	742	169	7.3	23.5	6.7	746	--
AUG								
05...	1530	220	217	7.5	22.5	7.5	738	K15
SEP								
07...	1522	486	172	8.4	20.0	8.2	740	--

(COLS. DATE	STREP-TOCOCCI FECAL, KF AGAR (MG/L PER 100 ML) (31673)	SILICA, DIS-SOLVED SOLVED 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 TOTAL (MG/L AS P) (00665)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
NOV							
05...	--	6.4	<0.010	0.099	0.030	--	<0.010
JAN							
26...	--	14	0.030	0.450	0.160	--	0.010
MAR							
25...	--	16	0.010	0.560	0.110	--	<0.010
JUL							
21...	--	9.6	<0.010	0.098	0.050	--	0.050
AUG							
05...	100	--	<0.010	0.061	0.060	0.070	0.040
SEP							
07...	--	12	0.010	0.140	0.050	--	0.060

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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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2490	2960	2840	2500	2410	2280	11800	6490	13000	9400	3220	4030
2	2210	3160	3110	2680	2480	2030	10600	6680	13700	10400	3000	4160
3	2410	3500	2890	2490	2460	2240	9820	7180	12900	9230	2980	4220
4	2020	3880	2930	2380	2720	2440	9680	7960	11700	10100	2740	3520
5	2450	3250	2470	2790	2650	2360	8720	8170	10300	11700	2640	3410
6	2200	3070	1730	2740	2710	2650	8390	7790	9000	12400	3010	3160
7	2430	4400	2240	2570	2470	2610	8140	7170	8130	12300	2880	3200
8	3130	4570	2070	2520	2550	2790	7900	7050	7730	11300	2280	2970
9	3080	3640	2630	2320	2560	2720	8400	7080	8150	10800	3510	2810
10	3480	3470	2660	2330	2520	3200	10400	7090	9790	13500	2780	2810
11	3850	4050	2730	2420	2680	2740	11800	7470	11800	14800	2580	2760
12	4230	4060	3010	2260	2660	3040	12300	7620	11200	14600	2680	2440
13	3780	4160	3200	2150	2460	3070	12100	7340	9570	12500	2680	3060
14	3840	4240	3110	2530	2570	2690	12000	7220	8990	10300	2580	3020
15	3830	4130	3460	2500	2540	2990	11400	6660	9260	9310	3260	2770
16	3690	3850	3260	2380	2660	2850	10700	6180	8980	8470	2870	2860
17	4700	3930	3250	2550	2380	2770	9700	5610	9640	7870	2790	3070
18	3580	3620	3010	2490	2320	2790	9340	5280	8180	7070	3030	2690
19	3350	3590	2520	2430	2210	2720	8360	4310	7750	6500	3340	2620
20	3270	3580	1810	2520	2060	2500	8090	4660	8220	6010	3270	3090
21	3220	3820	2290	2500	2210	2660	6620	4530	8450	5880	2770	3090
22	3340	3750	2340	2450	2260	2640	6470	3930	9560	4960	2840	3470
23	3440	3870	2290	2540	2040	2540	6000	3480	9810	4270	3520	3210
24	3330	3610	2280	2580	2250	3220	6210	4930	13200	4590	3030	3080
25	3250	3600	2320	2540	2100	3400	6080	6220	16200	4280	3310	2780
26	3220	3590	2350	2280	2520	4100	6510	8780	19700	4350	3150	2920
27	3170	3660	2220	2540	2160	5210	7080	9960	19700	3900	3210	2990
28	3100	2930	2420	2180	2070	5850	6790	10100	16400	3700	3040	3030
29	3070	2730	2340	2750	---	7970	6440	10500	14000	3440	3480	3160
30	2970	3070	2540	2570	---	10600	6480	10800	11600	3210	3460	2630
31	2900	---	2550	2320	---	11800	---	11200	---	3470	3620	---
TOTAL	99030	109740	80870	76800	67680	113470	264320	219440	336610	254610	93550	93030
MEAN	3195	3658	2609	2477	2417	3660	8811	7079	11220	8213	3018	3101
MAX	4700	4570	3460	2790	2720	11800	12300	11200	19700	14800	3620	4220
MIN	2020	2730	1730	2150	2040	2030	6000	3480	7730	3210	2280	2440
CFSM	.51	.59	.42	.40	.39	.59	1.41	1.13	1.80	1.32	.48	.50
IN.	.59	.65	.48	.46	.40	.68	1.58	1.31	2.01	1.52	.56	.55

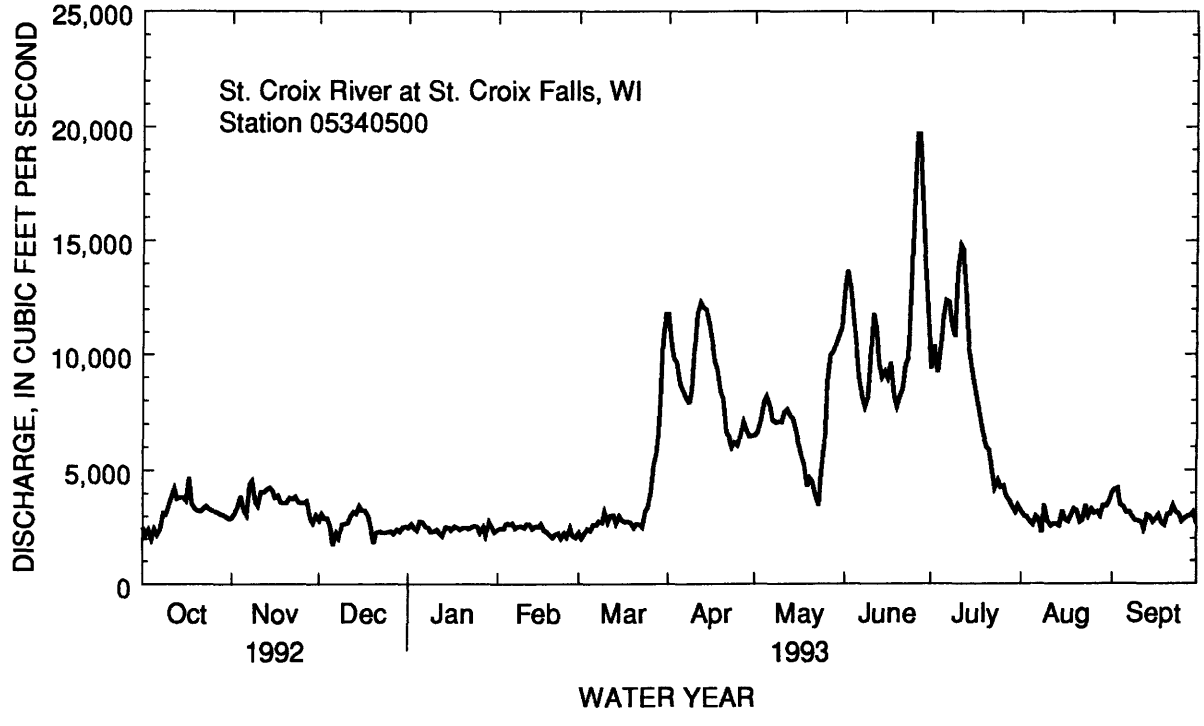
ST. CROIX RIVER BASIN

05340500 ST. CROIX RIVER AT ST. CROIX FALLS, WI--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1902 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3739	3406	2539	2156	2111	4163	9946	7509	5817	4125	2827	3482
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1902 - 1993	
ANNUAL TOTAL	1773830		1809150			
ANNUAL MEAN	4847		4957		4331	
HIGHEST ANNUAL MEAN					8569	1986
LOWEST ANNUAL MEAN					1754	1934
HIGHEST DAILY MEAN	22300	Apr 24	19700	Jun 26,27	53900	May 8 1950
LOWEST DAILY MEAN	1700	Aug 22	1730	Dec 6	75	Jul 17 1910
ANNUAL SEVEN-DAY MINIMUM	2100	Aug 16	2160	Feb 19	754	Jul 29 1934
INSTANTANEOUS PEAK FLOW			20700	Jun 26,27	54900	May 8 1950
INSTANTANEOUS PEAK STAGE			10.08	Jun 27	25.19	May 8 1950
ANNUAL RUNOFF (CFSM)	.78		.79		.69	
ANNUAL RUNOFF (INCHES)	10.57		10.79		9.43	
10 PERCENT EXCEEDS	9350		10400		9040	
50 PERCENT EXCEEDS	3500		3250		2710	
90 PERCENT EXCEEDS	2320		2360		1550	



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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10600	12100	15900	11900	7960	7660	41600	50900	49300	111000	55500	42700
2	9800	12400	15000	11600	9230	8240	48300	48900	51300	105000	54500	42500
3	9160	12400	14200	10800	8650	7840	52600	47700	53500	103000	53300	42000
4	9380	13700	14300	10900	9220	8430	61500	47600	54300	98800	52700	41900
5	8870	15400	14000	11000	9270	8630	68700	47900	54600	98200	51800	41100
6	9470	16900	13100	11900	9070	8610	73200	48700	54200	98000	50900	40800
7	9200	18400	12000	11100	9300	8630	77100	48100	53400	98300	50300	40800
8	9550	20300	11400	11000	8970	8510	77500	47300	52700	99000	49300	39900
9	10400	21500	11700	10600	9040	9090	75800	46600	52000	101000	48800	38300
10	10500	20100	11300	10300	8970	9170	73000	47900	51800	102000	52900	36600
11	12400	19700	12200	10100	9020	10200	70800	50400	52200	107000	49600	34400
12	18200	20600	13400	9960	9170	9570	69400	54700	53100	109000	42900	32100
13	21300	21600	14000	9810	8810	9220	67700	58400	51400	107000	41100	28900
14	21900	22200	14100	9560	8550	9540	66000	62400	49300	102000	39800	27400
15	22900	22500	14100	10100	9190	9160	64800	67400	49400	97600	38500	26300
16	23300	22500	14900	9910	8540	9360	63500	71800	50300	94000	38900	25700
17	22300	21400	14700	9160	8580	10000	62400	72300	50100	90600	39400	27200
18	22200	20900	14200	9800	8380	10300	61600	70100	50200	87100	39400	27700
19	18900	19700	13900	9300	8470	9140	60800	65300	54700	84000	41700	27400
20	17500	18600	12900	9120	7890	9120	58900	60700	59200	81500	47300	26600
21	16600	18400	11500	9510	7730	9870	58300	55900	65900	78900	53700	25400
22	15600	18500	10800	9380	8130	10200	55900	52000	73200	76300	56500	25400
23	15500	18100	11300	9150	8460	10100	54200	48200	84100	73300	57100	27700
24	15000	18400	11500	9510	8240	9470	53000	44900	96500	70300	56800	27700
25	14700	18400	11300	9010	7680	10300	52800	44800	111000	68600	54100	27500
26	14300	18400	10900	9020	7420	10700	52800	44300	121000	67200	51500	26800
27	13400	18300	9910	8330	8210	12800	53200	47300	130000	65100	49000	27800
28	14700	18100	10600	8370	7870	15100	53700	49700	128000	62300	47100	27700
29	13600	16900	11500	8870	---	22100	52800	50100	123000	60200	46000	27200
30	12600	15900	12200	8600	---	29000	52200	50300	117000	57800	44900	26100
31	12300	---	12300	7780	---	35200	---	49500	---	55800	43400	---
TOTAL	456130	552300	395110	305450	240020	355260	1834100	1652100	2096700	2709900	1498700	959600
MEAN	14710	18410	12750	9853	8572	11460	61140	53290	69890	87420	48350	31990
MAX	23300	22500	15900	11900	9300	35200	77500	72300	130000	111000	57100	42700
MIN	8870	12100	9910	7780	7420	7660	41600	44300	49300	55800	38500	25400
AC-FT	904700	1095000	783700	605900	476100	704700	3638000	3277000	4159000	5375000	2973000	1903000
CFSM	.33	.41	.28	.22	.19	.26	1.36	1.19	1.56	1.95	1.08	.71
IN. .	38	.46	.33	.25	.20	.29	1.52	1.37	1.74	2.25	1.24	.80

e Estimated.

MISSISSIPPI RIVER MAIN STEM

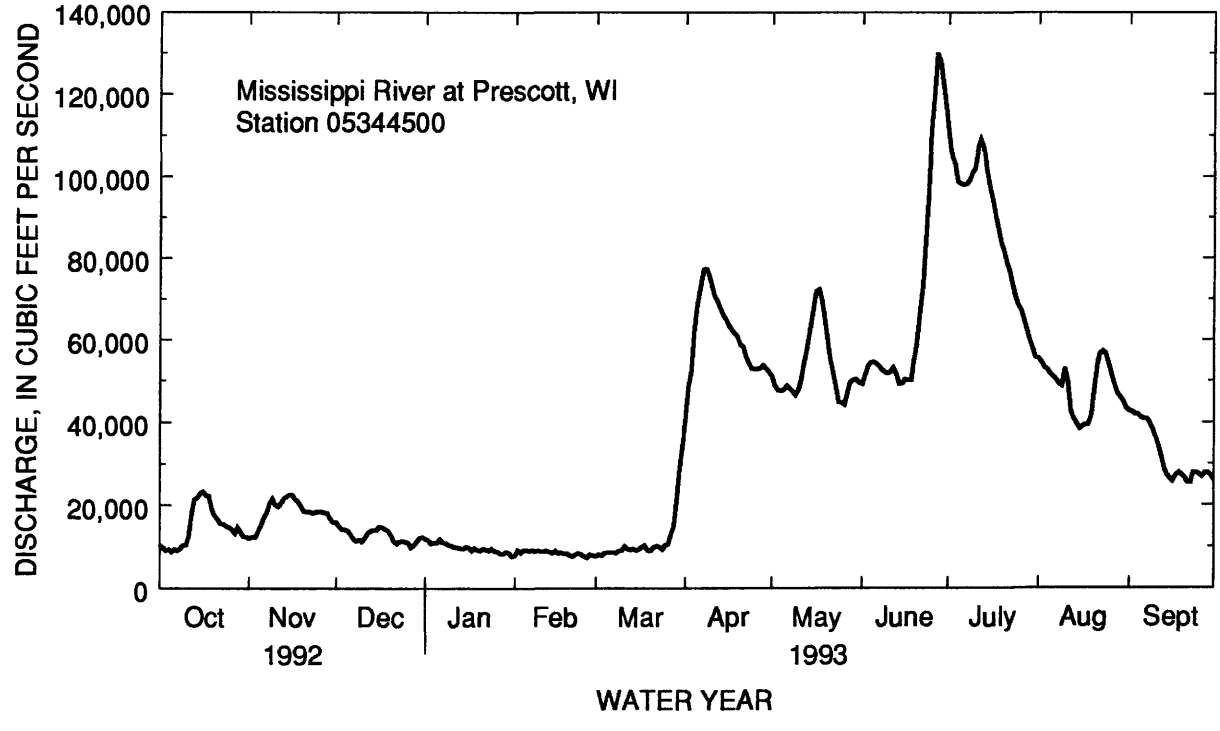
05344500 MISSISSIPPI RIVER AT PRESCOTT, WI--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	13050	12700	9527	7984	7890	16680	39850	31320	25620	19940	12910	12730
MAX	49740	40360	21460	16060	21390	55010	117600	90100	69890	87420	48350	45950
(WY)	1987	1972	1983	1983	1966	1983	1965	1986	1993	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1928 - 1993	
ANNUAL TOTAL	8062850		13055370			
ANNUAL MEAN	22030		35770		17560a	
HIGHEST ANNUAL MEAN					38540	1986
LOWEST ANNUAL MEAN					4367	1934
HIGHEST DAILY MEAN	69400	Mar 14	130000	Jun 27	226000	Apr 18 1965
LOWEST DAILY MEAN	8870	Oct 5	7420	Feb 26	1380	Jul 13 1940
ANNUAL SEVEN-DAY MINIMUM	9350	Oct 2	7850	Feb 25	2190	Aug 11 1936
INSTANTANEOUS PEAK FLOW					228000	Apr 18 1965
INSTANTANEOUS PEAK STAGE			37.70	Jun 27,28	43.11	Apr 18 1965
ANNUAL RUNOFF (AC-FT)	15990000		25900000		12720000	
ANNUAL RUNOFF (CFSM)	.49		.80		.39	
ANNUAL RUNOFF (INCHES)	6.70		10.84		5.33	
10 PERCENT EXCEEDS	42100		73100		38700	
50 PERCENT EXCEEDS	16400		25700		11200	
90 PERCENT EXCEEDS	11500		9030		4960	

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)
Oct. 10	1230	245	5.48	June 18	0300	*1780	*8.37
Mar. 27	1730	495	6.42	July 03	1700	451	6.29
Apr. 01	0930	499	6.43	Aug. 19	2330	747	7.02
Apr. 10	0130	219	5.26	Aug. 31	2100	230	5.35
May 12	0500	273	5.64				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	102	91	93	60	52	44	446	168	153	194	145	220
2	99	126	92	57	52	44	390	186	133	248	175	183
3	96	159	91	57	52	44	293	183	118	378	166	160
4	92	171	89	57	51	45	244	167	106	381	143	142
5	91	159	80	55	52	47	215	163	98	392	127	127
6	92	143	80	54	53	48	179	165	93	292	117	119
7	143	130	81	52	53	51	157	184	96	249	106	114
8	202	125	79	51	52	69	175	180	105	234	102	108
9	238	124	81	51	52	76	209	194	105	238	111	103
10	243	147	84	51	52	71	212	216	96	225	112	97
11	227	177	84	50	51	61	195	254	88	216	103	92
12	190	187	83	51	51	59	186	269	81	214	97	92
13	161	167	81	51	52	55	171	237	82	201	106	111
14	142	145	88	51	51	53	159	197	124	191	107	144
15	130	126	100	52	51	51	165	158	153	182	131	136
16	124	118	106	53	49	51	168	134	132	161	149	116
17	119	115	97	52	e48	48	157	130	396	151	134	105
18	114	112	88	51	e47	48	155	121	1480	167	187	102
19	111	113	85	52	e46	49	154	118	988	182	451	103
20	112	129	75	51	46	47	158	111	976	191	573	143
21	109	158	77	53	46	47	156	108	655	180	323	178
22	106	159	76	52	46	48	154	108	448	160	233	187
23	108	140	73	53	45	50	154	119	339	146	208	178
24	105	128	65	52	e44	70	156	124	284	137	190	158
25	100	119	71	51	e43	146	155	130	275	149	167	135
26	97	113	62	52	43	245	154	122	268	173	146	127
27	92	106	61	52	44	410	166	134	233	153	163	122
28	91	101	61	51	44	391	184	143	209	138	193	115
29	88	97	61	51	---	316	177	123	189	125	182	109
30	86	95	61	52	---	287	164	121	188	115	194	109
31	85	---	59	52	---	341	---	155	---	116	224	---
TOTAL	3895	3980	2464	1630	1368	3412	5808	4922	8691	6279	5565	3935
MEAN	126	133	79.5	52.6	48.9	110	194	159	290	203	180	131
MAX	243	187	106	60	53	410	446	269	1480	392	573	220
MIN	85	91	59	50	43	44	154	108	81	115	97	92

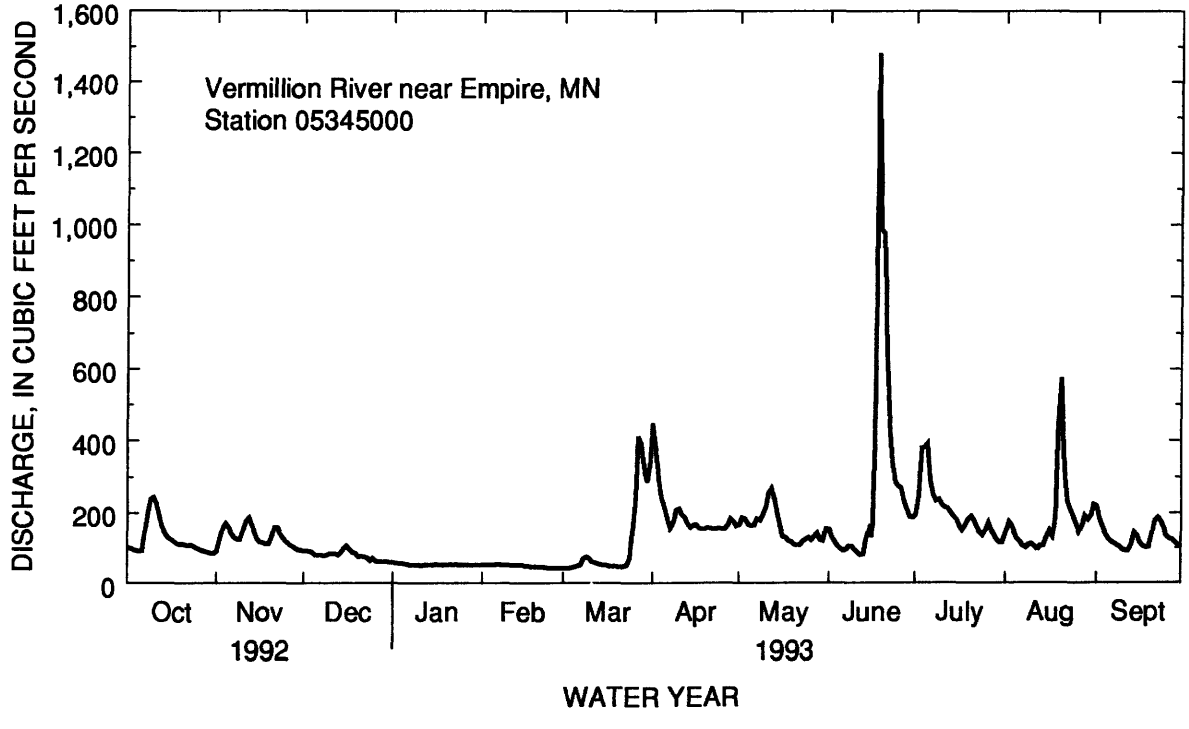
VERMILLION RIVER BASIN

05345000 VERMILLION RIVER NEAR EMPIRE, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	45.5	43.0	34.7	27.9	32.2	96.8	97.2	86.6	82.0	58.4	48.7	63.7
MAX	135	133	79.5	52.6	85.2	199	244	223	290	203	180	310
(WY)	1987	1993	1993	1993	1984	1983	1983	1986	1993	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1943 - 1993	
ANNUAL TOTAL	40747		51949			
ANNUAL MEAN	111		142		59.3	
HIGHEST ANNUAL MEAN					142	1993
LOWEST ANNUAL MEAN					23.6	1977
HIGHEST DAILY MEAN	2910	Sep 16	1480	Jun 18	2910	Sep 16 1992
LOWEST DAILY MEAN	32	Jun 13	43	Feb 25	8.4	Jan 15 1975
ANNUAL SEVEN-DAY MINIMUM	34	Jun 8	44	Feb 24	9.0	Jan 13 1975
INSTANTANEOUS PEAK FLOW			1780	Jun 18	6570	Sep 16 1992
INSTANTANEOUS PEAK STAGE			8.37	Jun 18	10.00	Sep 16 1992
INSTANTANEOUS LOW FLOW			37	Feb 23,26	6.8	Aug 15 1992
ANNUAL RUNOFF (AC-FT)	80820		103000		42990	
10 PERCENT EXCEEDS	170		233		120	
50 PERCENT EXCEEDS	79		118		37	
90 PERCENT EXCEEDS	41		51		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)
Oct. 09	2200	1810	7.39	June 01	0500	1580	7.07
Apr. 01	0200	5070	10.61	June 17	2300	*5730	*11.16
Apr. 11	1900	1980	7.63	July 04	0200	2820	8.67
Apr. 21	1100	3210	9.10	Aug. 18	1900	3480	4.36
May 11	0100	2040	7.71	Aug. 30	1700	2410	8.18

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	240	327	e180	e95	e100	4700	903	1550	816	844	1630
2	103	500	315	e165	e95	e103	3780	1180	1400	1040	828	1310
3	100	857	293	e150	e95	e104	2920	e1150	1140	1450	710	980
4	94	976	282	e140	e95	e106	2430	e1100	928	2610	556	759
5	91	925	241	e130	e95	e107	2070	e1070	779	2460	478	630
6	96	777	e260	e120	e95	e108	1790	1020	677	2060	431	586
7	560	648	e300	e110	e95	e112	1590	1160	626	1570	387	482
8	1330	569	e295	e100	e95	e120	1550	1110	757	1260	355	435
9	e1750	551	e275	e95	e95	e125	1610	1530	e754	994	332	401
10	1680	683	e255	e95	e95	e120	1520	1670	730	834	354	360
11	1380	690	e240	e95	e95	e108	1750	e1720	631	1110	305	331
12	1040	e600	e230	e95	e95	e110	1960	1780	542	1080	281	383
13	774	541	e220	e95	e95	e110	1820	1470	509	988	261	518
14	625	487	e220	e95	e95	e110	1610	1200	482	1030	289	628
15	523	440	e240	e95	e95	e110	1610	966	441	1050	1220	732
16	464	413	e265	e95	e95	e111	1660	814	514	959	2080	721
17	416	393	e290	e95	e95	e112	1520	724	2720	854	2270	618
18	381	374	e280	e95	e95	e115	1320	694	4360	901	2880	559
19	352	356	e230	e95	e95	e120	1310	683	4270	940	2980	538
20	337	430	e205	e95	e95	e125	2620	633	3550	835	2560	564
21	320	610	e225	e95	e95	e127	3160	580	2920	714	2140	591
22	298	696	e275	e95	e95	e130	2660	530	2380	625	1770	685
23	282	646	e275	e95	e95	e140	2030	512	1900	568	1510	739
24	271	555	e290	e95	e95	e150	1640	526	1620	528	1300	721
25	259	490	e305	e95	e95	e170	1350	509	1390	696	1100	673
26	250	458	e290	e95	e95	e250	1120	478	1160	713	886	628
27	238	422	e270	e95	e95	e1000	1130	476	951	671	727	585
28	231	389	e250	e95	e98	e1800	1140	450	813	606	622	555
29	221	366	e235	e95	---	2550	1060	425	721	555	554	519
30	213	344	e215	e95	---	3030	939	823	744	482	1700	495
31	204	---	e200	e95	---	3970	---	1430	---	828	1850	---
TOTAL	14989	16426	8093	3280	2663	15553	57369	29316	41959	31827	34560	19356
MEAN	484	548	261	106	95.1	502	1912	946	1399	1027	1115	645
MAX	1750	976	327	180	98	3970	4700	1780	4360	2610	2980	1630
MIN	91	240	200	95	95	100	939	425	441	482	261	331
AC-FT	29730	32580	16050	6510	5280	30850	113800	58150	83230	63130	68550	38390
CFSM	1.09	1.24	.59	.24	.22	1.14	4.33	2.14	3.16	2.32	2.52	1.46
IN.	1.26	1.38	.68	.28	.22	1.31	4.83	2.47	3.53	2.68	2.91	1.63

CANNON RIVER BASIN

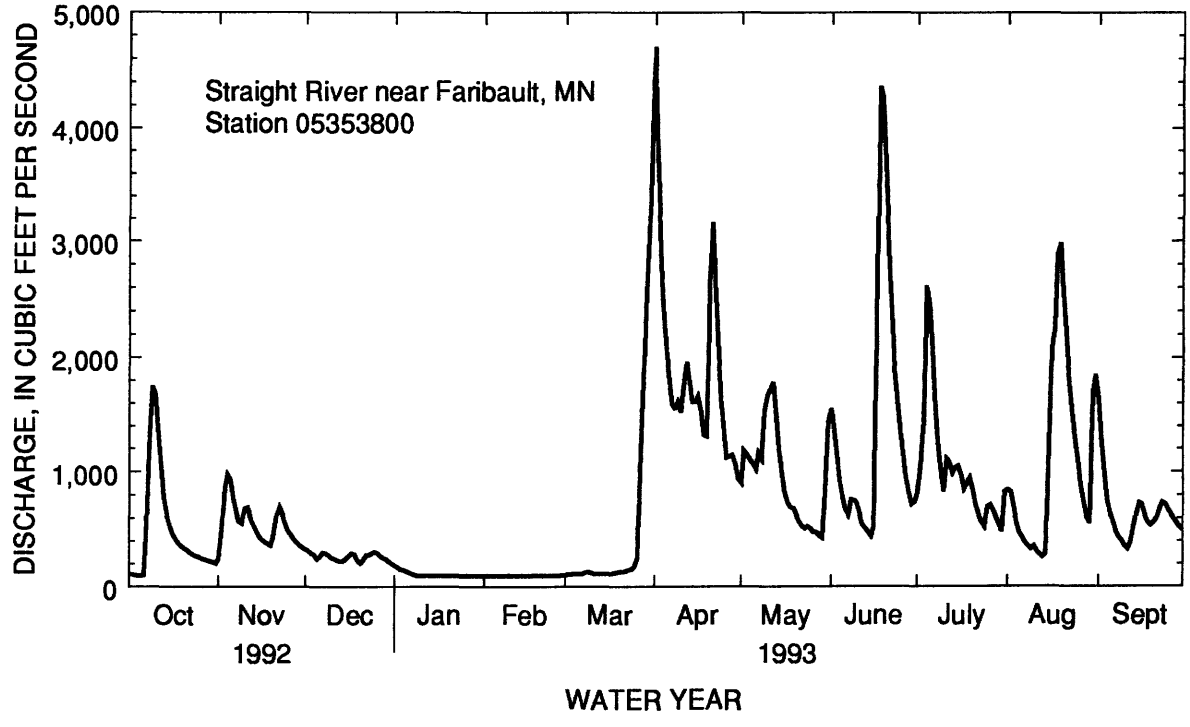
05353800 STRAIGHT RIVER NEAR FARIBAULT, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	216	195	117	68.1	113	533	623	431	368	301	217	173
MAX	831	595	336	167	837	1270	1912	1224	1399	1027	1136	645
(WY)	1969	1971	1983	1992	1984	1973	1993	1973	1993	1993	1979	1993
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1966 - 1993	
ANNUAL TOTAL	148228		275391			
ANNUAL MEAN	405		754		280	
HIGHEST ANNUAL MEAN					754	1993
LOWEST ANNUAL MEAN					43.9	1977
HIGHEST DAILY MEAN	1750	Oct 9	4700	Apr 1	5410	May 2 1973
LOWEST DAILY MEAN	81	Sep 2	91	Oct 5	11	Feb 18 1968
ANNUAL SEVEN-DAY MINIMUM	92	Aug 28	95	Jan 9	11	Feb 18 1968
INSTANTANEOUS PEAK FLOW			5730	Jun 17	6030	Jul 7 1990
INSTANTANEOUS PEAK STAGE			11.16	Jun 17	12.74[a]	Mar 5 1974
INSTANTANEOUS LOW FLOW			89	Oct 5	10	Oct 27 1976
ANNUAL RUNOFF (AC-FT)	294000		546200		203000	
ANNUAL RUNOFF (CFSM)	.92		1.71		.63	
ANNUAL RUNOFF (INCHES)	12.48		23.18		8.61	
10 PERCENT EXCEEDS	890		1750		710	
50 PERCENT EXCEEDS	275		519		112	
90 PERCENT EXCEEDS	131		95		28	

a Backwater from ice.



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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	794	1010	1140	e550	e390	e376	9300	2510	2750	3450	2800	3570
2	767	1240	1150	e540	e388	e376	10500	2790	2880	3930	2360	3290
3	634	1310	1120	e530	e385	380	9600	3020	2640	4420	2280	2910
4	674	1500	1060	e520	e382	e380	7710	2960	2200	5360	2120	2540
5	644	1680	925	e515	e380	e380	6800	2910	1900	6280	1930	2170
6	651	1740	970	e510	e380	e380	5580	2700	1750	5940	1820	1910
7	892	1700	903	e500	e380	e380	4800	2830	1670	5150	1710	1770
8	1010	1600	902	e490	e380	e385	4600	3020	1730	4590	1670	1750
9	1790	1520	940	e480	e380	e385	4850	3330	1740	4140	1730	1770
10	3010	1520	1000	e470	e375	e385	4760	3980	1710	3550	1710	1500
11	2910	1610	1010	e465	e372	e385	4720	4860	1590	3500	1490	1420
12	2480	1670	999	e460	e370	e385	5040	5110	1450	3730	1340	1430
13	1950	1540	958	e455	e365	e385	5190	4570	1390	3590	1370	1540
14	1730	1390	955	e450	362	e385	4870	3890	1410	3330	1170	1810
15	1490	1270	959	e440	e365	e385	4310	3160	1260	3300	1520	1710
16	1440	1240	1010	e435	e370	e380	4420	2770	1350	3240	2630	1830
17	1220	1270	1050	e430	e370	380	4290	2460	6620	3060	3250	1800
18	1240	1310	1020	e425	e372	e390	3730	2300	11700	2920	4660	1680
19	1140	1250	995	e422	e372	e400	3380	2170	10100	2900	8340	1600
20	1240	1240	946	e420	e372	e405	3830	2160	9650	2790	7430	1580
21	1090	1430	839	e415	e372	418	5810	2060	8950	2620	6040	1630
22	1130	1610	887	e413	e372	425	6590	1910	8130	2400	4930	1650
23	1040	1660	903	e411	e372	433	5830	1860	7420	2170	4400	1670
24	983	1530	636	e410	e372	480	4490	1910	6480	2110	3640	1670
25	971	1370	e630	e408	e372	597	3590	1680	5530	2270	3220	1620
26	968	1300	e615	e405	e375	1170	3100	1690	4970	2370	2880	1520
27	1020	1220	e600	e402	e375	2790	2740	1720	4320	2330	2650	1450
28	1170	1210	e590	e400	e375	3590	3000	1670	3900	2200	2440	1390
29	1080	1180	e570	e396	---	4700	2940	1560	3580	2060	2300	1330
30	1040	1140	e565	e395	---	5490	2730	1580	3540	1880	2420	1190
31	1010	---	e560	e392	---	6430	---	2140	---	2040	3220	---
TOTAL	39208	42260	27407	13954	10495	34210	153100	83280	124310	103620	91470	54700
MEAN	1265	1409	884	450	375	1104	5103	2686	4144	3343	2951	1823
MAX	3010	1740	1150	550	390	6430	10500	5110	11700	6280	8340	3570
MIN	634	1010	560	392	362	376	2730	1560	1260	1880	1170	1190
AC-FT	77770	83820	54360	27680	20820	67860	303700	165200	246600	205500	181400	108500
CFSM	.96	1.07	.67	.34	.28	.84	3.87	2.04	3.14	2.53	2.24	1.38
IN.	1.10	1.19	.77	.39	.30	.96	4.31	2.35	3.50	2.92	2.58	1.54

e Estimated.

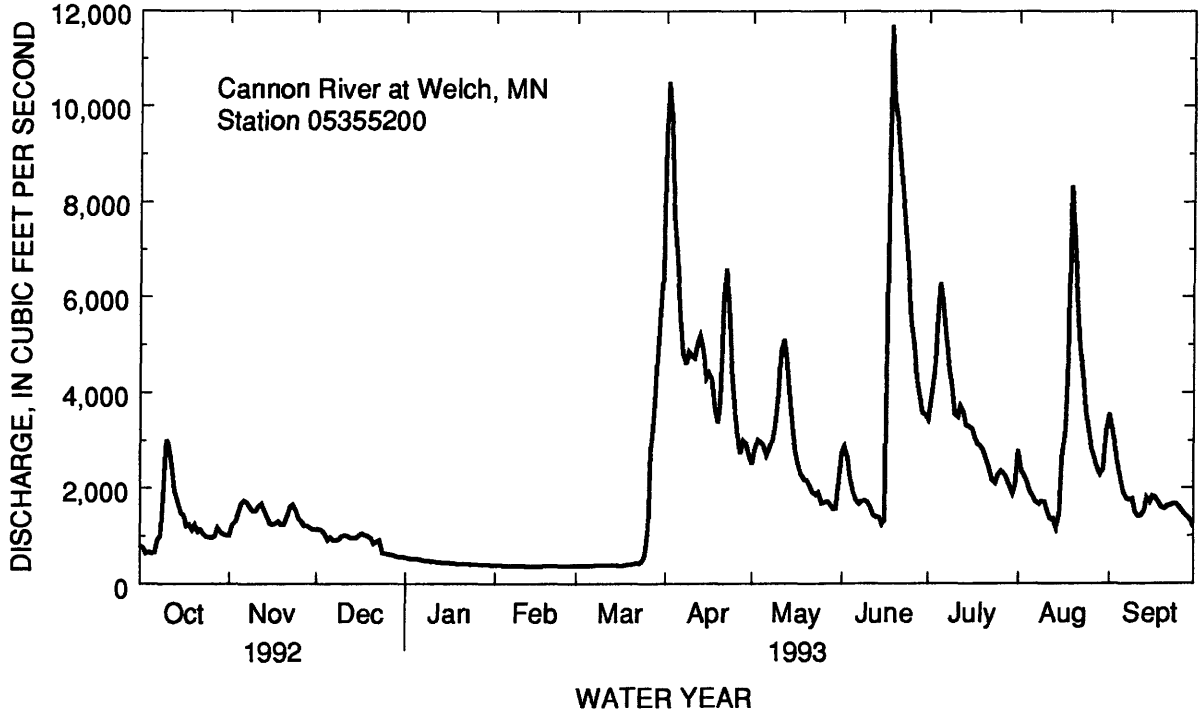
CANNON RIVER BASIN

05355200 CANNON RIVER AT WELCH, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	331	331	257	218	276	957	1301	698	730	525	382	353
MAX	1806	1708	1105	662	1141	2627	8240	2966	4144	3343	2951	1823
(WY)	1969	1971	1992	1992	1966	1992	1965	1944	1993	1993	1993	1993
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 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1909 - 1993	
ANNUAL TOTAL	398499		778014			
ANNUAL MEAN	1089		2132		552	
HIGHEST ANNUAL MEAN					2132	1993
LOWEST ANNUAL MEAN					137	1934
HIGHEST DAILY MEAN	3620	Mar 2	11700	Jun 18	28700	Apr 8 1965
LOWEST DAILY MEAN	276	Sep 3	362	Feb 14	19	Jan 2 1950
ANNUAL SEVEN-DAY MINIMUM	320	Aug 30	368	Feb 11	42	Aug 12 1936
INSTANTANEOUS PEAK FLOW			17200	Jun 17	36100	Apr 8 1965
INSTANTANEOUS PEAK STAGE			13.19	Jun 17	14.01	Apr 8 1965
INSTANTANEOUS LOW FLOW			303	Feb 14	2.5	Jan 3 1950
ANNUAL RUNOFF (AC-FT)	790400		1543000		399800	
ANNUAL RUNOFF (CFSM)	.82		1.61		.42	
ANNUAL RUNOFF (INCHES)	11.23		21.93		5.68	
10 PERCENT EXCEEDS	2130		4780		1180	
50 PERCENT EXCEEDS	889		1560		240	
90 PERCENT EXCEEDS	414		385		96	



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. 1	0200	*6260	*13.06	June 8	1700	1560	6.94
Apr. 9	0700	1360	6.47	June 20	0100	4580	11.32
Apr. 20	1600	4230	10.88	July 4	1000	2760	8.98
May 2	1700	1370	6.51	Aug 19	1500	2390	8.42

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	81	128	181	e93	75	65	4180	634	786	592	322	384
2	80	224	174	e88	75	66	1560	1120	629	699	303	339
3	78	335	162	e88	73	70	1160	1110	563	948	282	306
4	73	298	156	e88	75	72	1070	868	500	2340	263	284
5	72	252	112	e88	72	73	944	768	447	1290	251	262
6	70	218	131	e91	71	70	816	672	406	861	240	e249
7	104	196	147	e93	71	80	835	630	485	717	222	e241
8	104	180	147	e88	71	82	1110	594	957	656	253	e226
9	102	173	142	e84	73	80	1290	564	1270	613	311	208
10	112	173	144	e87	75	85	1010	707	882	547	277	e207
11	108	177	142	e84	76	74	955	1040	598	950	260	e200
12	102	178	136	82	74	65	923	799	517	819	238	181
13	98	172	132	82	e77	69	770	639	534	724	225	e350
14	94	158	148	e84	e76	68	822	566	484	1000	267	e590
15	91	149	158	e79	e67	70	1020	517	421	738	553	e520
16	90	148	160	85	e67	79	1090	469	492	625	847	e450
17	88	143	157	e84	e67	65	1010	443	1690	608	530	e400
18	85	138	120	e76	66	64	858	435	2990	602	950	e360
19	83	144	140	e84	66	75	1050	435	3270	573	2180	e330
20	88	280	e140	e78	65	75	3390	396	3310	521	1070	e400
21	88	437	e135	78	65	74	2440	380	1710	473	630	e470
22	88	425	133	81	64	73	1540	359	1270	427	554	e400
23	84	338	e116	81	63	74	1180	392	1130	408	486	345
24	84	290	e106	e85	63	84	973	389	1010	397	434	309
25	81	262	e104	e78	61	100	811	360	847	404	388	275
26	77	242	e103	82	60	165	709	336	731	373	359	256
27	75	221	101	e84	60	419	746	331	647	370	333	234
28	75	208	101	e84	61	667	769	315	592	352	310	220
29	75	197	101	e76	---	1100	683	297	594	323	296	206
30	75	191	e101	e76	---	1670	618	719	669	301	479	195
31	76	---	e98	75	---	3530	---	1200	---	313	479	---
TOTAL	2681	6675	4128	2586	1929	9403	36332	18484	30431	20564	14592	9397
MEAN	86.5	222	133	83.4	68.9	303	1211	596	1014	663	471	313
MAX	112	437	181	93	77	3530	4180	1200	3310	2340	2180	590
MIN	70	128	98	75	60	64	618	297	406	301	222	181
AC-FT	5320	13240	8190	5130	3830	18650	72060	36660	60360	40790	28940	18640
CFSM	.29	.73	.44	.28	.23	1.00	4.00	1.97	3.35	2.19	1.55	1.03

ZUMBRO RIVER BASIN

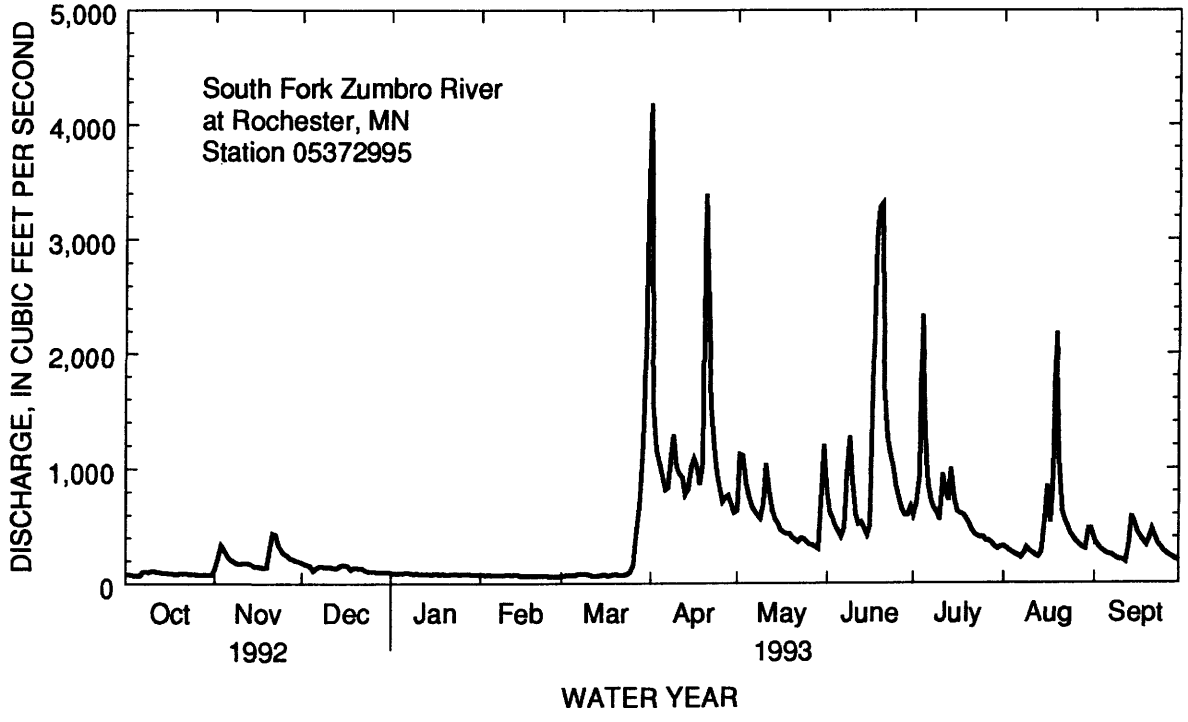
05372995 SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1981 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	177	163	136	82.0	125	401	429	334	239	245	170	209
MAX	824	338	358	167	454	760	1211	617	1014	663	501	1075
(WY)	1987	1992	1992	1983	1984	1983	1993	1991	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1981 - 1993	
ANNUAL TOTAL	81042		157202			
ANNUAL MEAN	221		431		228	
HIGHEST ANNUAL MEAN					431	1993
LOWEST ANNUAL MEAN					87.3	1989
HIGHEST DAILY MEAN	1720	Apr 21	4180	Apr 1	7710	Sep 21 1986
LOWEST DAILY MEAN	49	Sep 1	60	Feb 26-27	12	Sep 12 1988
ANNUAL SEVEN-DAY MINIMUM	54	Aug 28	62	Feb 22	14	Sep 8 1988
INSTANTANEOUS PEAK FLOW			6260	Apr 1	10000	Sep 21 1986
INSTANTANEOUS PEAK STAGE			13.06	Apr 1	20.77	Sep 21 1986
INSTANTANEOUS LOW FLOW					10[a]	Oct 23 1981
ANNUAL RUNOFF (AC-FT)	160700		311800		165400	
ANNUAL RUNOFF (CFSM)	.73		1.42		.75	
10 PERCENT EXCEEDS	437		984		521	
50 PERCENT EXCEEDS	147		249		122	
90 PERCENT EXCEEDS	76		74		35	
	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)
Mar. 31	1900	875	6.85	June 24	0330	843	6.46
June 17	1000	1470	7.14	July 2	0800	*5770	*9.75

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	42	43	33	35	28	429	84	105	129	152	95
2	35	51	42	33	36	29	156	126	93	3380	147	91
3	35	62	41	34	36	29	101	125	88	1310	138	84
4	35	56	41	35	36	29	87	111	80	1500	135	80
5	35	49	38	35	36	30	73	99	75	550	134	78
6	36	47	41	33	36	30	65	89	71	406	133	74
7	36	44	40	34	35	30	63	85	71	325	131	73
8	39	43	39	35	34	30	102	83	109	295	129	73
9	42	44	38	35	35	30	128	78	137	283	152	73
10	40	43	39	34	35	32	99	90	98	248	124	72
11	39	43	38	34	35	31	89	141	86	254	86	69
12	39	43	38	35	35	29	88	104	79	243	80	68
13	38	41	38	36	34	28	75	90	78	228	78	76
14	38	40	37	37	33	28	76	85	79	254	77	111
15	37	40	38	36	33	30	98	79	76	215	116	81
16	38	39	38	35	33	30	117	73	80	201	106	73
17	38	39	38	34	29	27	143	70	612	194	90	73
18	38	38	38	38	30	28	115	70	558	230	323	70
19	37	38	39	38	28	30	133	69	648	211	252	69
20	37	47	33	36	28	29	354	67	540	190	124	73
21	37	63	39	36	31	29	339	64	323	176	105	76
22	37	66	38	36	32	30	214	63	244	170	95	77
23	37	60	36	36	30	30	174	64	289	169	89	79
24	37	54	32	35	29	29	146	71	515	168	87	76
25	37	51	36	32	29	25	120	68	226	171	84	74
26	37	49	34	36	29	23	102	62	175	165	84	73
27	38	47	33	37	28	45	100	60	150	157	84	72
28	38	45	33	37	28	55	117	59	134	157	82	72
29	38	44	34	31	---	125	100	56	125	150	80	70
30	38	43	34	35	---	187	87	94	148	146	185	68
31	38	---	33	35	---	557	---	170	---	149	128	---
TOTAL	1159	1411	1159	1086	908	1722	4090	2649	6092	12424	3810	2293
MEAN	37.4	47.0	37.4	35.0	32.4	55.5	136	85.5	203	401	123	76.4
MAX	42	66	43	38	36	557	429	170	648	3380	323	111
MIN	35	38	32	31	28	23	63	56	71	129	77	68
AC-FT	2300	2800	2300	2150	1800	3420	8110	5250	12080	24640	7560	4550
CFSM	.37	.47	.37	.35	.32	.55	1.35	.85	2.01	3.97	1.22	.76
IN.	.43	.52	.43	.40	.33	.63	1.51	.98	2.24	4.58	1.40	.84

WHITEWATER RIVER BASIN

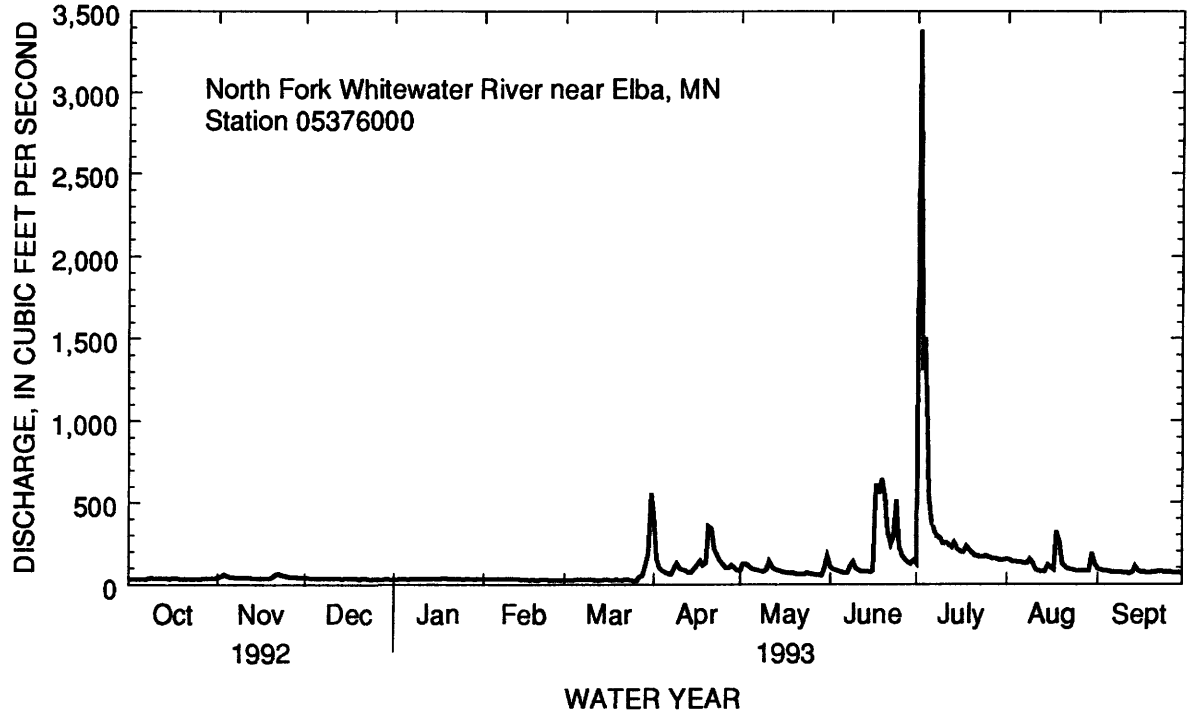
05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	35.9	35.8	32.4	30.2	34.1	88.9	62.8	50.1	62.0	70.6	40.3	42.5
MAX	143	71.6	60.9	74.6	97.2	244	177	120	364	401	123	184
(WY)	1987	1987	1992	1973	1985	1973	1974	1973	1974	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1939 - 1993	
ANNUAL TOTAL	18386		38803			
ANNUAL MEAN	50.2		106		49.2	
HIGHEST ANNUAL MEAN					106	1993
LOWEST ANNUAL MEAN					19.4	1968
HIGHEST DAILY MEAN	275	Apr 21	3380	Jul 2	6440	Jun 21 1974
LOWEST DAILY MEAN	32	Dec 24	23	Mar 26	9.6	Dec 24 1990
ANNUAL SEVEN-DAY MINIMUM	34	Dec 24	28	Mar 20	12	Dec 30 1939
INSTANTANEOUS PEAK FLOW			5770	Jul 2	16100	Jun 21 1974
INSTANTANEOUS PEAK STAGE			9.75	Jul 2	16.32[a]	Jun 21 1974
INSTANTANEOUS LOW FLOW			21	Mar 17,18	7.0[b]	Dec 26 1990
ANNUAL RUNOFF (AC-FT)	36470		76970		35650	
ANNUAL RUNOFF (CFSM)	.50		1.05		.49	
ANNUAL RUNOFF (INCHES)	6.77		14.29		6.62	
10 PERCENT EXCEEDS	67		186		74	
50 PERCENT EXCEEDS	43		63		33	
90 PERCENT EXCEEDS	36		31		18	

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 (discontinued).
REMARKS.--Letter K indicates non-ideal colony count.

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
OCT											
21...	0900	37	570	576	8.5	8.1	6.0	0.90	745	12.2	K24
DEC											
09...	1100	38	562	586	8.2	8.1	2.5	1.6	738	12.4	K9
FEB											
24...	1215	36	550	584	7.6	8.1	0.5	4.7	752	14.4	K5
APR											
19...	1315	113	557	571	8.2	8.1	9.0	14	736	9.8	21
JUN											
10...	0845	113	548	551	7.5	8.0	14.5	48	740	8.6	K4400
SEP											
03...	1315	84	654	617	7.8	7.9	15.5	4.8	744	10.2	K1600

DATE	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	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)
OCT											
21...	110	75	27	5.8	1.4	--	275	0	--	18	12
DEC											
09...	--	76	26	6.5	1.4	267	273	0	325	16	14
FEB											
24...	K9	77	27	7.3	1.2	268	269	0	327	16	14
APR											
19...	340	78	22	7.1	2.3	233	243	0	284	17	16
JUN											
10...	84	72	21	6.5	3.5	223	236	0	272	15	17
SEP											
03...	91	83	27	6.7	2.0	308	281	0	376	19	16

WHITEWATER RIVER BASIN

05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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 TOTAL (MG/L AS N) (00625)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	SEDIMENT, SUSPENDED (MG/L) (80154)
OCT											
21...	0.10	17	361	<0.010	4.10	0.020	<0.20	0.060	0.060	0.050	7
DEC											
09...	0.10	15	328	0.020	5.00	<0.010	<0.20	0.090	0.060	0.070	44
FEB											
24...	0.10	15	331	0.020	4.60	0.030	0.20	0.080	0.050	0.060	--
APR											
19...	0.20	13	330	0.020	6.40	0.040	0.40	0.150	0.150	0.130	69
JUN											
10...	0.30	16	339	0.060	5.50	0.150	0.60	0.260	0.220	0.190	143
SEP											
03...	0.10	18	335	<0.010	6.10	0.020	0.20	0.120	0.120	0.100	94

DATE	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)	SILVER, DISSOLVED (UG/L AS AG) (01075)
OCT											
21...	56	--	--	--	--	--	--	--	--	--	--
DEC											
09...	22	<10	51	<3	<3	<4	5	<10	<1	<1	<1.0
FEB											
24...	--	20	49	<3	<3	<4	10	<10	<1	<1	<1.0
APR											
19...	80	<10	140	<3	5	<4	16	<10	<1	<1	<1.0
JUN											
10...	97	20	70	<3	13	4	12	<10	2	<1	<1.0
SEP											
03...	46	--	--	--	--	--	--	--	--	--	--

WHITEWATER RIVER BASIN

05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	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)	ALPHA, COUNT, 2 SIGMA WAT DIS AS NAT U (UG/L) (75986)	ALPHA COUNT, 2 SIGMA WAT DIS AS TH-230 (PCI/L) (75987)	ALPHA, 2 SIGMA SED SUS TOT DRY AS TH-230 (PCI/L) (76004)	ALPHA RADIO. WATER DISS AS TH-230 (PCI/L) (04126)	ALPHA SED SUSP DRY WGH AS TH-230 (PCI/L) (04127)	GROSS BETA, DIS-SOLVED (PCI/L AS CS-137) (03515)
OCT										
21...	--	--	0.9	<0.6	1.2	0.83	0.22	0.7	<0.6	2.1
DEC										
09...	77	<6	--	--	--	--	--	--	--	--
FEB										
24...	73	<6	--	--	--	--	--	--	--	--
APR										
19...	88	<6	--	--	--	--	--	--	--	--
JUN										
10...	92	<6	--	--	--	--	--	--	--	--
SEP										
03...	--	--	1.6	<0.6	1.6	1.3	0.45	1.2	<0.6	3.1

DATE	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)	BETA, 2 SIGMA WATER, DISS, AS SR90 /Y90 (PCI/L (75988)	BETA, 2 SIGMA WATER, DISS, AS CS-137 (PCI/L) (75989)	BETA, 2 SIGMA SED, SUSP, TOT DRY SR90Y90 (PCI/L) (76005)	RADIUM 226, DIS-SOLVED, RADON METHOD (PCI/L) (09511)	RA-226 2 SIGMA WATER, DISS, (PCI/L) (76001)	URANIUM NATURAL DIS-SOLVED (UG/L AS U) (22703)	URANIUM NATURAL 2 SIGMA WATER, DISS, (UG/L) (75990)
OCT										
21...	<0.6	1.5	<0.6	0.68	0.91	0.52	<0.02	<0.00	0.54	<1.0
DEC										
09...	--	--	--	--	--	--	--	--	--	--
FEB										
24...	--	--	--	--	--	--	--	--	--	--
APR										
19...	--	--	--	--	--	--	--	--	--	--
JUN										
10...	--	--	--	--	--	--	--	--	--	--
SEP										
03...	0.8	2.3	0.8	0.84	1.1	0.61	0.07	0.020	0.75	<1.0

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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 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17100	23000	30900	21300	16500	17200	64900	75200	70200	159000	72700	68800
2	17800	23700	29600	19800	16600	16700	70300	76200	71100	158000	72000	66600
3	17800	25900	29100	19100	17300	16100	77100	76500	73100	155000	68600	65100
4	18000	27700	27200	19300	17900	16900	80400	78100	75400	150000	65100	64100
5	18000	28200	23700	19300	18600	18400	78900	81000	76400	146000	64300	61700
6	17900	29900	20400	19600	19600	20600	78600	84500	75600	142000	64500	58100
7	18200	32200	14200	19500	19900	22800	80300	86900	74400	139000	64500	55800
8	19800	33100	14100	19400	19800	21900	83000	86700	72800	134000	65600	55500
9	24300	33700	19600	19400	18500	20500	86600	84500	71900	131000	67100	54100
10	29600	33100	22900	19300	18000	19400	91800	81200	71500	129000	66700	52100
11	33300	32000	26100	19200	17900	19400	98000	79700	71900	128000	68200	49800
12	38400	32100	29700	17900	17900	20200	103000	78300	72500	129000	70500	49100
13	40100	33700	29100	17500	18100	20700	107000	77400	72700	131000	71200	47900
14	41000	35100	29100	17600	18300	21300	109000	77700	73200	131000	69000	50100
15	41100	35300	30200	18000	18200	21700	108000	78800	73400	131000	66800	48100
16	38700	35300	31300	18000	18200	19100	108000	80200	72500	128000	63200	44800
17	36300	35300	30200	18000	17900	19000	105000	80000	72000	125000	60700	44400
18	35600	35300	28900	17400	17200	19200	102000	80100	75200	122000	61300	46100
19	33600	34300	27400	17300	16900	19000	100000	81700	83200	117000	62600	45700
20	31700	33200	24100	16200	16700	19200	99000	83400	98700	113000	64300	43300
21	31500	33900	19500	15800	16900	21500	96100	83900	111000	108000	66200	41000
22	30700	34100	13800	16800	17000	21500	95100	82400	122000	103000	66500	40800
23	28900	34300	12100	18700	17300	19800	94700	79500	133000	98800	66500	41600
24	27700	36300	13400	20000	16600	17200	90800	76400	150000	94700	67600	42600
25	27300	39300	15400	20200	16200	16100	85100	73700	164000	91400	70200	42600
26	27000	39900	15500	19100	16300	15600	80200	70200	168000	87700	71800	42300
27	26800	36400	16800	17000	16400	19700	77400	67500	168000	85200	72300	42200
28	26400	32900	18700	16900	17000	33900	75700	68000	166000	82800	72300	41000
29	25800	33200	20800	16800	---	42900	75400	67900	164000	80500	71300	39500
30	24800	32000	21600	16400	---	51000	75100	67700	162000	77500	70500	39000
31	23600	---	21400	16400	---	58700	---	69400	---	74500	70200	---
TOTAL	868800	984400	706800	567200	493700	707200	2676500	2414700	3005700	3682100	2094300	1483800
MEAN	28030	32810	22800	18300	17630	22810	89220	77890	100200	118800	67560	49460
MAX	41100	39900	31300	21300	19900	58700	109000	86900	168000	159000	72700	68800
MIN	17100	23000	12100	15800	16200	15600	64900	67500	70200	74500	60700	39000
AC-FT	1723000	1953000	1402000	1125000	979300	1403000	5309000	4790000	5962000	7303000	4154000	2943000
CFSM	.47	.55	.39	.31	.30	.39	1.51	1.32	1.69	2.01	1.14	.84

e Estimated.

MISSISSIPPI RIVER MAIN STEM

05378500 MISSISSIPPI RIVER AT WINONA, MN--Continued

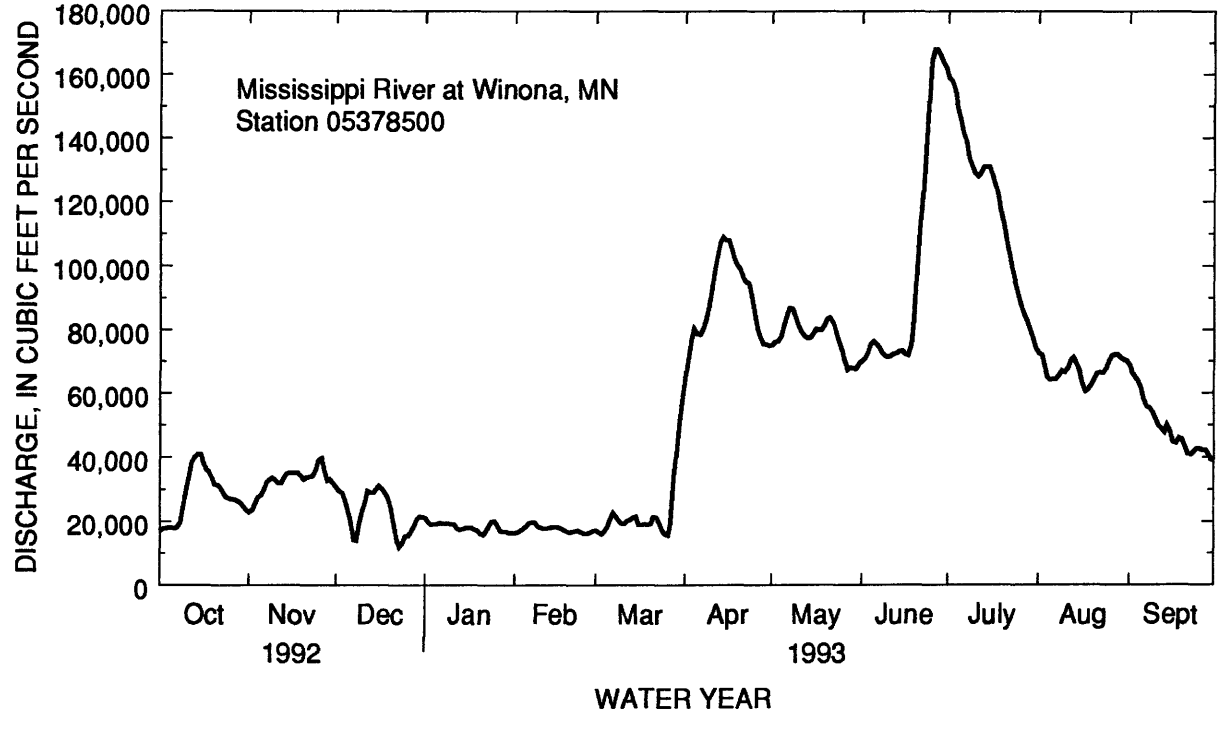
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	21890	22060	17090	14760	14900	29740	59560	47450	39020	30930	20640	22090
MAX	85950	50040	40440	30480	35900	86420	152600	111500	100200	118800	67560	69490
(WY)	1987	1972	1992	1983	1984	1983	1965	1986	1993	1993	1993	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	1934	1933

SUMMARY STATISTICS	FOR 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1928 - 1993	
ANNUAL TOTAL	13148500		19685200			
ANNUAL MEAN	35920		53930		28370	
HIGHEST ANNUAL MEAN					56850	1986
LOWEST ANNUAL MEAN					9742	1934
HIGHEST DAILY MEAN	91500	Apr 26	168000	Jun 26	264000	Apr 20 1965
LOWEST DAILY MEAN	12100	Dec 23	12100	Dec 23	2250	Dec 29 1933
ANNUAL SEVEN-DAY MINIMUM	15100	Dec 22	15100	Dec 22	3210	Dec 27 1933
INSTANTANEOUS PEAK FLOW					268000	Apr 19 1965
INSTANTANEOUS PEAK STAGE			16.63	Jun 26	20.77[a]	Apr 19 1965
INSTANTANEOUS LOW FLOW					1940[b]	Dec 12 1980
ANNUAL RUNOFF (AC-FT)	26080000		39050000		20550000	
ANNUAL RUNOFF (CFSM)	.61		.91		.48	
10 PERCENT EXCEEDS	63800		104000		59100	
50 PERCENT EXCEEDS	30200		41000		20000	
90 PERCENT EXCEEDS	19400		17300		9780	

a From floodmark.

b Result of ice jam.



MISSISSIPPI RIVER MAIN STEM

05378500 MISSISSIPPI RIVER AT WINONA, MN--Continued

SUSPENDED SEDIMENT CONCENTRATIONS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	TEMPER-ATURE WATER (DEG C) (00010)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
DEC					
08...	1300	32700	--	10	93
08...	1420	32700	--	9	89
APR					
21...	0830	95100	--	18	90
21...	0910	95100	11.0	22	75
JUN					
09...	1515	--	--	27	--
JUL					
01...	1416	159000	--	66	61
01...	1923	159000	--	43	70

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	TIME	NUMBER OF SAM-PLING POINTS (COUNT) (00063)	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)
DEC										
08...	1230	3	0	0	3	41	84	98	100	100
JUN										
09...	1500	3	0	0	3	53	89	98	100	--
JUL										
01...	1415	1	0	1	19	55	22	3	1	--

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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 diurnal 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)
Apr. 2	0500	*15800	*16.14	Aug. 17	0300	7660	12.07
Apr. 21	1700	11800	14.45	Aug. 20	0800	6280	11.06
June 21	0100	8780	12.89				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	756	596	985	e617	e510	e535	12600	1900	2430	2190	1600	2120
2	738	690	951	e640	e510	e570	14400	1930	2040	2070	1980	1860
3	710	852	933	e640	e520	e600	5500	2130	1830	2290	1770	1700
4	690	1770	908	e630	e530	e620	3980	2420	1740	2920	1570	1580
5	675	1520	800	e620	e540	e640	3510	2530	1630	2860	1470	1490
6	657	1220	760	e610	e550	e650	3090	2460	1520	2350	1410	1420
7	650	1070	774	e595	e560	e660	2760	2270	1490	2060	1350	1360
8	650	983	821	e560	e550	e660	2740	2230	1750	1900	1300	1310
9	650	925	819	e550	e520	e640	4090	2180	2820	1830	1420	1280
10	655	890	812	e540	e480	e600	4130	2050	3040	1770	1670	1240
11	660	871	815	e540	e460	e580	3290	2680	2370	1980	1580	1200
12	685	860	814	e560	e430	e500	2850	3300	1990	2130	1420	1190
13	688	848	809	e574	e410	e440	2610	2740	1810	1950	1340	1180
14	688	828	804	e600	e400	e440	2370	2390	1800	2040	1290	1330
15	683	805	806	e580	e380	e440	2490	2170	1730	2590	1550	1370
16	678	791	830	e560	e350	e450	3090	1980	1610	2210	5010	1250
17	672	780	830	e530	e360	e460	3200	1850	1760	2010	6000	1200
18	655	766	817	e510	e360	e470	3770	1800	2770	3190	3200	1180
19	650	759	770	e530	e370	e490	3400	1790	4420	3050	4090	1150
20	646	842	690	e540	e390	e500	5610	1700	7560	2590	5660	1150
21	646	1060	664	e555	e420	e510	10500	1620	6640	2290	3430	1200
22	646	2070	e660	e560	e420	e530	7320	1540	3920	2060	2700	1230
23	631	2000	e658	e590	e410	567	4410	1500	3220	1930	2370	1250
24	623	1590	e650	e600	e390	542	3570	1520	3790	1850	2140	1220
25	623	1390	e640	e601	e380	559	3030	1530	3080	1770	1940	1180
26	616	1270	e650	e570	e400	612	2600	1450	2650	1720	1780	1150
27	609	1170	e660	e550	e450	795	2360	1400	2360	1640	1650	1130
28	600	1100	e680	e520	e490	1190	2300	1370	2160	1600	1560	1100
29	596	1040	e700	e520	---	1740	2170	1310	2000	1630	1480	1070
30	592	1010	e660	e520	---	3540	2020	1360	2030	1530	1820	1040
31	591	---	e618	e520	---	6980	---	1670	---	1470	2420	---
TOTAL	20309	32366	23788	17632	12540	28510	129760	60770	79960	65470	69970	39130
MEAN	655	1079	767	569	448	920	4325	1960	2665	2112	2257	1304
MAX	756	2070	985	640	560	6980	14400	3300	7560	3190	6000	2120
MIN	591	596	618	510	350	440	2020	1310	1490	1470	1290	1040
AC-FT	40280	64200	47180	34970	24870	56550	257400	120500	158600	129900	138800	77610
CFSM	.52	.85	.60	.45	.35	.72	3.41	1.54	2.10	1.66	1.78	1.03

e Estimated.

ROOT RIVER BASIN

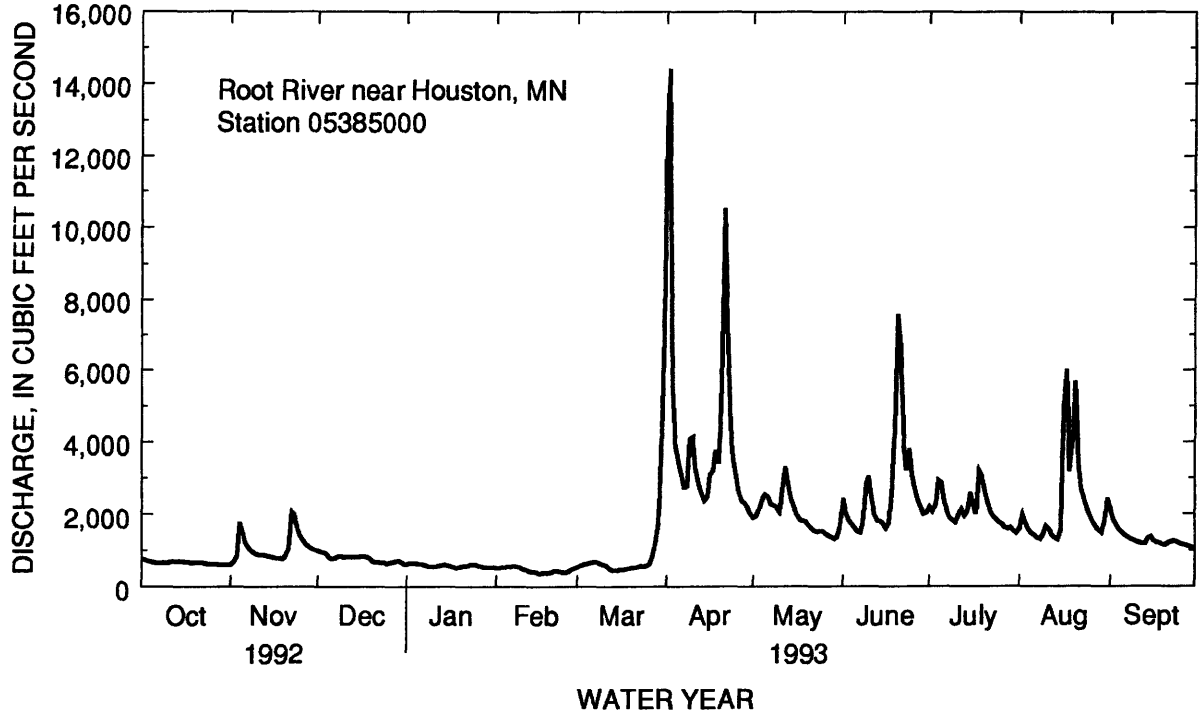
05385000 ROOT RIVER NEAR HOUSTON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	502	505	423	406	475	1397	1181	813	883	777	632	563
MAX	1465	1494	1671	1152	1427	3512	4963	2440	2803	3252	2257	2105
(WY)	1974	1983	1992	1973	1966	1961	1965	1973	1974	1978	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1910 - 1993	
ANNUAL TOTAL	381231		580205			
ANNUAL MEAN	1042		1590		719	
HIGHEST ANNUAL MEAN					1590	1993
LOWEST ANNUAL MEAN					294	1931
HIGHEST DAILY MEAN	5100	Mar 10	14400	Apr 2	31100	Apr 1 1952
LOWEST DAILY MEAN	588	Sep 1	350	Feb 16	82	Nov 28 1937
ANNUAL SEVEN-DAY MINIMUM	596	Aug 27	373	Feb 14	113	Dec 25 1933
INSTANTANEOUS PEAK FLOW			15800	Apr 2	37000	Apr 1 1952
INSTANTANEOUS PEAK STAGE			16.14	Apr 2	18.32a	Mar 2 1965
INSTANTANEOUS LOW FLOW			350	Feb 16	65b	Mar 2 1965
ANNUAL RUNOFF (AC-FT)	756200		1151000		521100	
ANNUAL RUNOFF (CFSM)	.82		1.25		.57	
10 PERCENT EXCEEDS	1760		3040		1280	
50 PERCENT EXCEEDS	819		1200		447	
90 PERCENT EXCEEDS	610		520		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 2,000 ft³/s (revised) and maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)	Date	Time	Discharge (ft³/s)	Gage height (ft)
Apr. 01	0330	8310	16.55	July 04	0430	2760	8.45
Apr. 09	1000	2220	7.48	July 14	0730	2410	7.83
Apr. 16	0630	2060	7.18	July 18	0630	2110	7.27
Apr. 20	0730	6070	13.63	Aug. 01	0300	4550	11.38
May 11	0530	2030	7.12	Aug. 15	1900	*10800	*19.43
May 31	0830	2220	7.48	Aug. 30	2100	2070	7.20
June 08	2330	2710	8.36	Sept. 14	1330	2870	8.64
June 20	0230	7260	15.24				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	134	212	292	e148	e119	e97	7100	777	1640	1070	3750	1100
2	131	771	289	e145	e119	97	3350	1670	1310	792	1720	808
3	128	1460	267	e140	e119	99	2370	1610	1160	1090	1010	663
4	120	1220	239	e138	e119	101	2010	1360	897	2430	723	564
5	118	932	219	e137	e119	101	1750	1120	718	1590	578	495
6	117	702	272	e135	e119	101	1550	957	606	996	486	445
7	144	565	234	e134	e119	107	1460	993	1490	721	416	410
8	239	487	220	e132	e119	116	1840	980	2400	626	376	382
9	449	450	213	e130	e119	126	2170	1490	2330	566	446	354
10	518	435	221	e129	e119	131	1810	1780	1460	495	471	323
11	426	415	215	e128	e119	103	1550	1940	969	1430	397	301
12	358	402	200	e127	e119	104	1650	1510	710	1500	368	285
13	308	377	196	e125	e119	101	1390	1130	656	1370	332	810
14	280	333	211	e124	e119	98	1440	875	599	2290	347	2710
15	255	299	230	e123	e119	105	1900	729	506	1660	6820	2190
16	238	289	246	e122	e119	104	2000	621	493	1110	6220	1390
17	220	283	236	e121	e118	99	1680	602	1730	1240	3350	955
18	207	266	212	e120	e115	102	1290	687	3850	1960	3500	728
19	198	263	219	e120	e114	100	1800	626	6140	1350	5270	622
20	196	489	186	e120	e112	98	5650	552	6070	969	3470	734
21	191	1100	240	e120	e110	97	4010	491	3070	746	2330	880
22	184	1050	207	e120	e108	101	2350	438	2090	620	1770	787
23	181	824	186	e120	e107	101	1690	435	1540	541	1420	707
24	174	638	181	e120	e105	116	1340	435	1190	478	1190	658
25	166	535	e175	e119	e103	134	1080	397	1020	463	936	569
26	165	471	e168	e119	e100	217	883	363	806	417	761	508
27	160	413	e165	e119	e98	535	818	353	674	413	656	460
28	157	373	e160	e119	e98	1180	863	343	589	450	569	427
29	156	344	e155	e119	---	2580	818	318	603	386	509	396
30	150	321	e152	e119	---	e4680	727	1080	1410	338	1460	369
31	147	---	e150	e119	---	e6600	---	2140	---	1970	1670	---
TOTAL	6615	16719	6556	3911	3192	18431	60339	28802	48726	32077	53321	22030
MEAN	213	557	211	126	114	595	2011	929	1624	1035	1720	734
MAX	518	1460	292	148	119	6600	7100	2140	6140	2430	6820	2710
MIN	117	212	150	119	98	97	727	318	493	338	332	285
AC-FT	13120	33160	13000	7760	6330	36560	119700	57130	96650	63620	105800	43700
CFSM	.50	1.31	.50	.30	.27	1.40	4.73	2.19	3.82	2.43	4.05	1.73

IOWA RIVER BASIN

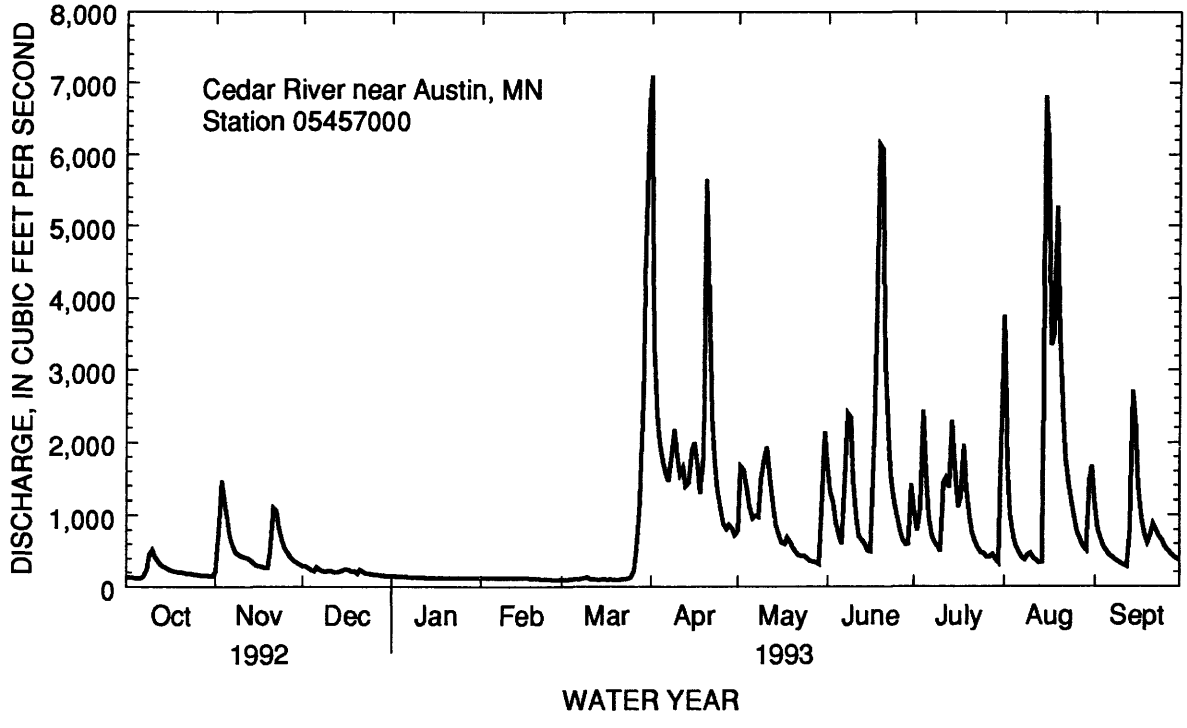
05457000 CEDAR RIVER NEAR AUSTIN, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	159	158	104	72.8	100	476	511	298	277	243	181	151
MAX	884	997	431	261	701	1428	2011	1222	1624	1456	1720	734
(WY)	1974	1910	1992	1973	1984	1973	1993	1991	1993	1978	1993	1993
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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1909 - 1993	
ANNUAL TOTAL	145879		300719			
ANNUAL MEAN	399		824		228[a]	
HIGHEST ANNUAL MEAN					824	1993
LOWEST ANNUAL MEAN					58.1	1977
HIGHEST DAILY MEAN	2760	Apr 21	7100	Apr 1	8720	Mar 29 1962
LOWEST DAILY MEAN	96	Sep 1	97	Mar 1,2,21	.00[b]	Jan 15 1911
ANNUAL SEVEN-DAY MINIMUM	102	Aug 29	99	Feb 26	13	Sep 1 1912
INSTANTANEOUS PEAK FLOW			10800	Aug 15	12400	Jul 17 1978
INSTANTANEOUS PEAK STAGE			19.43	Aug 15	20.35[c]	Jul 17 1978
INSTANTANEOUS LOW FLOW			67	Mar 17		
ANNUAL RUNOFF (AC-FT)	289400		596500		165200	
ANNUAL RUNOFF (CFSM)	.94		1.94		.54	
ANNUAL RUNOFF (INCHES)	12.77		26.32		7.29	
10 PERCENT EXCEEDS	869		1860		472	
50 PERCENT EXCEEDS	239		427		88	
90 PERCENT EXCEEDS	135		119		43	

a Median of annual mean discharges is 203 ft³/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)
Oct. 14	0700	1270	7.40	June 19	0200	7540	16.22
Nov. 13	2100	1000	6.66	July 7	1400	*8250	*16.67
Nov. 29	1700	994	6.63	Aug. 23	1100	2550	11.14
Apr. 5	0300	4780	13.86	Sept. 2	0700	2210	10.13
May 10	0100	7720	16.35	Sept. 24	1400	1380	8.01
June 8	2100	4300	13.42				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	325	686	813	e225	e145	e125	3580	2380	2980	e5800	3760	2160
2	316	726	786	e230	e140	e115	4170	2450	3220	5530	3400	2180
3	312	766	704	e230	e140	e120	4590	2480	3320	5570	3100	2100
4	291	783	542	e180	e140	e120	4700	2410	3350	6360	2840	1910
5	281	774	454	e180	e145	e120	4730	2360	3240	7250	2640	1740
6	303	725	482	e180	e145	e125	4560	2360	3170	7710	2440	1590
7	395	797	598	e180	e150	e130	4500	2510	3550	8130	2260	1470
8	638	836	659	e180	e150	e135	4410	3060	4240	8180	2100	1350
9	857	841	651	e180	e150	e150	4290	6290	4200	8040	2030	1250
10	1000	919	702	e180	e150	e145	4030	7250	3850	7580	1930	1160
11	1090	981	719	e185	e145	e140	3940	6310	3670	7350	1800	1080
12	1170	e991	673	e190	e150	e140	3930	6060	3640	7110	1680	1030
13	1200	999	638	e190	e145	e135	3920	6180	3610	7060	1620	1040
14	1250	999	594	e180	e140	e135	3940	6140	3480	7110	1580	1000
15	1190	963	581	e180	e140	e150	3930	5910	3280	6990	1680	984
16	1120	964	562	e180	e145	e150	3900	5560	3930	6610	1610	981
17	1070	938	545	e175	e130	e150	3760	5220	4030	6730	1620	967
18	1010	912	533	e170	e135	e145	3660	4870	6310	6560	1740	931
19	973	891	558	e155	e145	e150	3710	4490	7220	6330	1980	919
20	956	896	480	e160	e145	e150	e4170	3970	6850	5780	2230	1180
21	933	912	404	e165	e145	e150	e3840	3650	6820	5420	2310	1280
22	928	904	e440	e170	e140	e145	e3580	3450	6690	5120	2450	1280
23	897	904	e235	e165	e140	e145	3420	3310	6670	4730	2490	1330
24	844	891	e225	e150	e145	e235	3260	3190	6950	4410	2420	1370
25	815	895	e240	e145	e145	e285	3090	3000	6940	4150	2300	1360
26	795	811	e250	e155	e140	e390	2880	2780	6610	4070	2170	1320
27	793	597	e240	e150	e130	e1050	2730	2730	6240	4230	2100	1210
28	776	789	e260	e145	e125	e1800	2630	2700	e5940	4310	1930	1120
29	737	889	e240	e140	---	2680	2520	2620	e6270	4220	1800	1070
30	701	869	e225	e145	---	2920	2390	2940	e6500	4090	1910	1010
31	679	---	e220	e150	---	2960	---	2980	---	4020	2020	---
TOTAL	24645	25848	15253	5390	3985	15490	112760	121610	146770	186550	67940	39372
MEAN	795	862	492	174	142	500	3759	3923	4892	6018	2192	1312
MAX	1250	999	813	230	150	2960	4730	7250	7220	8180	3760	2180
MIN	281	597	220	140	125	115	2390	2360	2980	4020	1580	919
AC-FT	48880	51270	30250	10690	7900	30720	223700	241200	291100	370000	134800	78090
CFSM	.65	.71	.40	.14	.12	.41	3.08	3.22	4.01	4.93	1.80	1.08
IN.	.75	.79	.47	.16	.12	.47	3.44	3.71	4.48	5.69	2.07	1.20

DES MOINES RIVER BASIN

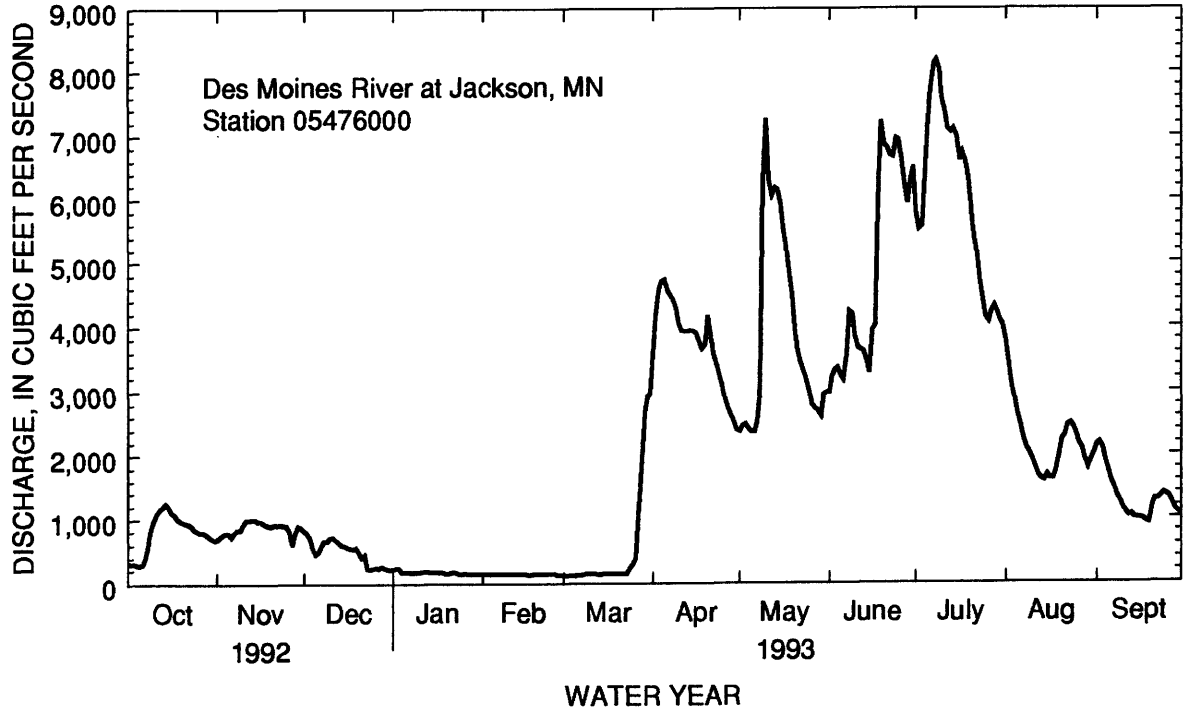
05476000 DES MOINES RIVER AT JACKSON, MN--Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1930 - 1993, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	149	156	90.1	43.1	62.9	437	1010	599	576	510	210	180
MAX	1724	1833	792	298	504	2250	6045	3923	4892	6018	2192	2243
(WY)	1987	1980	1980	1980	1983	1983	1969	1993	1993	1993	1993	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 1992 CALENDAR YEAR		FOR 1993 WATER YEAR		WATER YEARS 1930 - 1993	
ANNUAL TOTAL	300316		765613			
ANNUAL MEAN	821		2098		357[a]	
HIGHEST ANNUAL MEAN					2098	1993
LOWEST ANNUAL MEAN					15.1	1956
HIGHEST DAILY MEAN	2450	Mar 6	8180	Jul 8	15500	Apr 11 1969
LOWEST DAILY MEAN	115	Jan 26	115	Mar 2	.00[b]	Jul 19 1931
ANNUAL SEVEN-DAY MINIMUM	120	Jan 24	121	Feb 28	.00	Jul 19 1931
INSTANTANEOUS PEAK FLOW			8250	Jul 7	15700	Apr 11 1969
INSTANTANEOUS PEAK STAGE			16.67	Jul 7	19.45	Apr 11 1969
INSTANTANEOUS LOW FLOW					.00	Jul 19 1931
ANNUAL RUNOFF (AC-FT)	595700		1519000		258500	
ANNUAL RUNOFF (CFSM)	.67		1.72		.29	
ANNUAL RUNOFF (INCHES)	9.16		23.34		3.97	
10 PERCENT EXCEEDS	1570		5840		948	
50 PERCENT EXCEEDS	772		1080		74	
90 PERCENT EXCEEDS	210		145		2.6	

a Median of annual mean discharges is 246 ft³/s.
b Many days in several years.



DISCHARGE AT PARTIAL-RECORD

AND

MISCELLANEOUS SITES

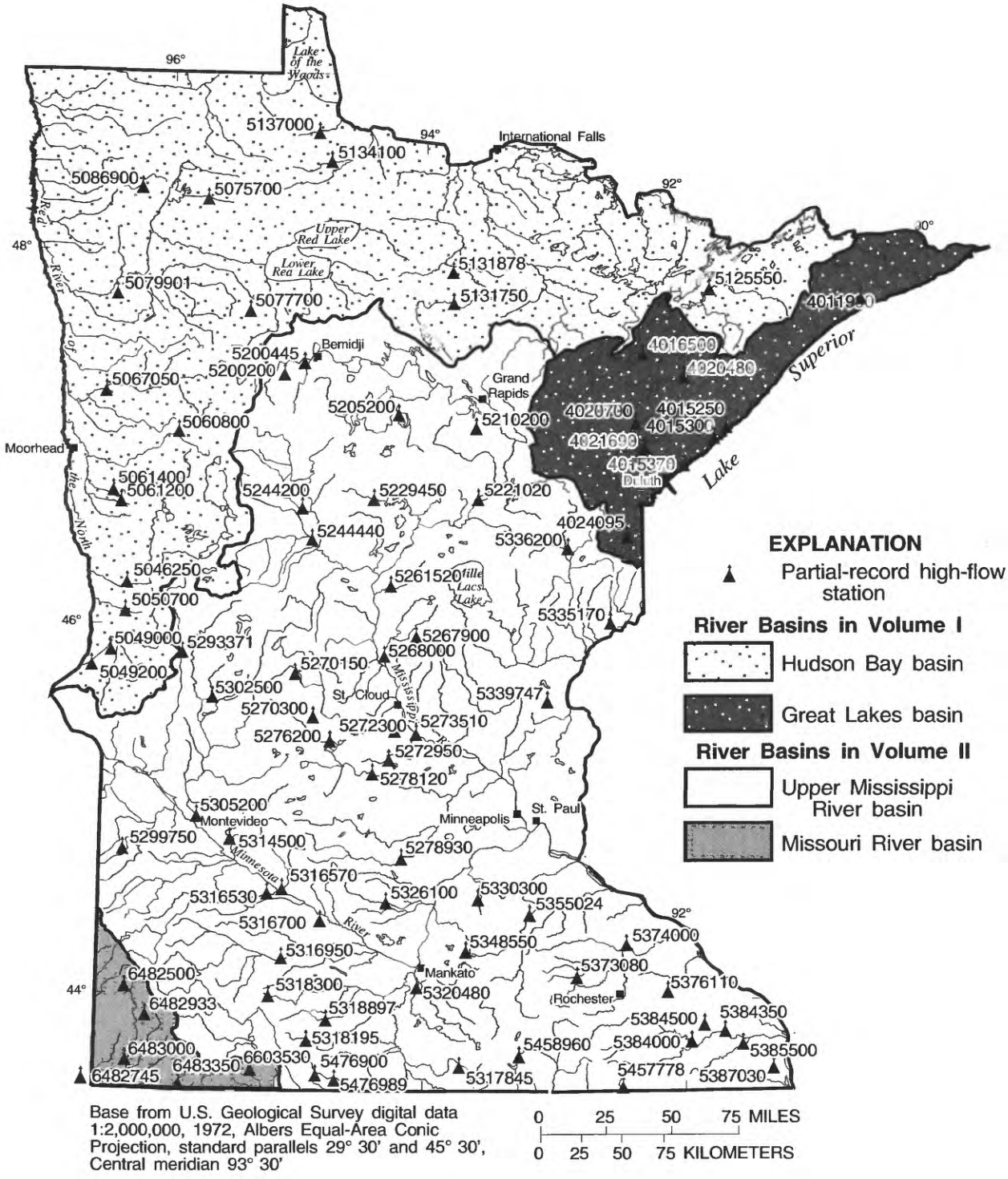


Figure 10.--Location of high-flow partial-record stations.

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 station 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 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 1993

Station name and number	Location and drainage area	Period of record	Water year 1993 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.	1979-93	4-25-93	a12.18	77	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#, 1990-93	4-7-93	a11.47	396	4-23-79	13.04	1690
			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.	1986-93	7-17-93	b11.43	185	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 1993--Continued

Station name and number	Location and drainage area	Period of record	Water year 1993 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 SE¼NW¼ 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.	1961-93	7-4-93	5.22	74	8-5-81	7.95	445
			Willow River basin					
Willow River below Palisade, MN 05221020	Lat 46°42'36", long 93°33'21", in NW¼NE¼ 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.	1972-93	7-10-93	15.64	2770	4-25-79	17.25	3730
			Pine River basin					
Pine River near Pine River, MN 05229450	Lat 48°41'39", long 94°22'11", in NE¼SE¼ 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.	1986-93	5-30-93	ac3.44	595	3-28-86	4.35	1150
			Crow Wing River basin					
Cat River near Nimrod, MN 05244200	Lat 46°37'49", long 94°55'51", in SW¼SW¼ 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.	1961-93	5-30-93	bc6.75	147	10-12-73	9.43	560
Leaf River near Aldrich, MN 05244440	Lat 46°27'25", long 94°50'29", in SW¼SW¼ 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.	1972-93	5-30-93	a13.72	1372	4-22-79	16.15	5170

"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 1993--Continued

Station name and number	Location and drainage area	Period of record	Water year 1993 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.	1979-93	5-30-93	12.65	200	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+, 1986-93	7-15-93	12.68	515	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.	1964-93	6-24-93	13.43	348	4-9-69	15.48	2960
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, 1972-93	3-31-93	11.71	1700	7-26-72	7.84	6850
			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# 1990-93	4-17-93	ac14.55	290	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 1993--Continued

Station name and number	Location and drainage area	Period of record	Water year 1993 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.	1960-93	3-31-93	10.34	125	7-8-78	22.76	1440
			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.	1964-93	8-22-93	13.23	346	9-9-85	16.37	2350
			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 -.	1985-93	6-24-93	15.69	474	9-9-85	17.11	1040
			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 -.	1972-93	7-11-93	a13.88	21500	4-24-79	18.75	33900
			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.	1973-93	6-24-93	5.40	980	6-21-83	9.29	2300

"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 1993--Continued

Station name and number	Location and drainage area	Period of record	Water year 1993 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 $SW^1/_4SE^1/_4$ 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 -.	1986-93	6-24-93	c15.73	2770	5-1-86	17.82	4850
Buffalo Creek near Glencoe, MN 05278930	Lat 44°45'50", long 94°05'27", in $SW^1/_4SW^1/_4$ 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# 1991-93	6-19-93	10.89	3380	9-12-91	11.78	4300
			Minnesota River basin					
Pomme de terre River near Elbow Lake, MN 05293371	Lat 46°57'47", long 95°53'07", in $SE^1/_4SW^1/_4$ 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.	1986-93	7-26-93	7.08	420	7-26-93	7.08	420
Florida Creek near Burr, MN 05299750	Lat 44°49'00", long 96°25'10", in $SE^1/_4SE^1/_4$ 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 d77.3 mi^2.	1982 1983-84# 1991-93	6-19-93	20.01	810	6-17-92	20.85	996
Little Chippewa River near Starbuck, MN 05302500	Lat 45°36'52", long 95°37'12", in $NW^1/_4NE^1/_4$ 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.	1979-93	7-4-93	b12.22	128	6-30-91	a12.54	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 1993--Continued

Station name and number	Location and drainage area	Period of record	Water year 1993 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 d15.8 mi^2.	1959-93	5-9-93	17.20	377	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#, 1981-93	6-18-93	a18.76	2400	6-18-57	16.10	6970
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 -.	1991-93	6-17-93	25.94	920	6-17-93	25.94	920
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.	1972-93	6-17-93	13.86	2750	6-17-93	13.86	2750
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.	1959-93	6-17-93	17.91	960	6-17-93	17.91	960
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.	1973-93	6-18-93	b31.40	14500	4-8-69	31.55	18300

"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 1993--Continued

Station name and number	Location and drainage area	Period of record	Water year 1993 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 $SE^1/_4SE^1/_4$ 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 d30.2 mi^2.	1979-93	8-15-93	18.73	595	8-15-93	18.73	595
Elm Creek near Trimont, MN 05318195	Lat 43°45'27", long 94°50'30", in $NW^1/_4NW^1/_4$ 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 -.	1991-93	6-24-93	a23.13	1900	6-4-91	22.92	2000
Watonwan River near Delft, MN 05318300	Lat 43°59'55", long 95°07'11", in $NE^1/_4SE^1/_4$ 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 d13.5 mi^2.	1960-93	6-18-93	e17.70	1000	6-18-93	e17.70	1000
South Fork Watonwan River near Ormsby, MN 05318897	Lat 43°53'08", long 94°41'27", in $SE^1/_4NW^1/_4$ 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 d107 mi^2.	1979-93	6-19-93	17.20	1500	5-31-80	18.40	1920
Maple River near Rapidan, MN 05320480	Lat 44°03'54", long 94°01'32", in $SW^1/_4$ 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 338 mi^2.	1972-93	6-20-93	12.46	3950	3-1-83	12.73	4550
Middle Branch Rush River near Gaylord, MN 05326100	Lat 44°30'27", long 94°15'00", in $SW^1/_4NW^1/_4$ 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.	1979-93	6-17-93	19.93	1380	6-17-93	19.93	1380

"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 1993--Continued

Station name and number	Location and drainage area	Period of record	Water year 1993 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					
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.	1960-93	6-24-93	13.79	855	5-21-60	14.84	1100
			St. Croix River basin					
Crooked Creek near Hinckley, MN 05335170	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+, 1986-93	6-24-93	11.43	335	5-28-89	15.52	1630
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#, 1971-93	6-24-93	7.30	700	7-22-72	10.18	1370
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 f60 mi^2.	1986-93	6-24-93	7.33	263	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 -.	1985-93	6-17-93	a14.36	535	6-17-93	a14.36	535
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.	1980-93	6-18-93	a905.00	8000	6-18-93	a905.00	8000

"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 1993--Continued

Station name and number	Location and drainage area	Period of record	Water year 1993 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.	1979-93	4-1-93	14.30	560	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 f1,130 mi^2.	1909-17#, 1929-80#, 1990-93	6-18-93	21.05	15700	7-21-51	30.80	35900
			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 -.	1986-93	6-17-93	66.90	†	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# 1991-93	4-1-93	15.35	14300	3-29-62	16.11	22100
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 -.	1985-93	3-11-85 9-21-86 10-13-86 4-1-93	21.40 25.26 -- 26.10	g6350 g13300 gh10400 15200	4-1-93	26.10	15200

"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 1993--Continued

Station name and number	Location and drainage area	Period of record	Water year 1993 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 mouth. Drainage area 129 mi^2.	1942-79#, 1980-93	4-19-93	6.92	2500	3-26-50	13.54	11600
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#, 1985-93	4-1-93	11.21	3470	6-21-74	13.81	11000
			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.	1979-93	6-17-93	12.15	720	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 of Minnesota-Iowa border. Drainage area 46 mi^2.	1986-93	8-16-93	17.58	9280	8-16-93	17.58	9280
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+, 1986-93	8-16-93	8.26	700	8-16-93	8.26	700

"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 1993--Continued

Station name and number	Location and drainage area	Period of record	Water year 1993 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 $SW^1/_4NW^1/_4$ 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.	1960-93	6-29-93	a16.41	980	7-4-62	16.15	2200
			Des Moines River basin					
East Fork Des Moines River near Ceylon, MN 05476989	Lat 43°33'53", long 94°39'15", in $NW^1/_4SW^1/_4$ 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.	1986-93	7-5-93	21.65	1350	7-5-93	21.65	1350
			Big Sioux River basin					
Pipestone Creek near Pipestone, MN 06482500	Lat 44°04'54", long 96°18'27", in $SE^1/_4SE^1/_4$ 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 -.	1991-93	5-8-93	20.28	2650	5-8-93	20.28	2650
Beaver Creek at Valley Springs, S.D. 06482745	Lat 43°35'10", long 96°28'20", in $NW^1/_4NW^1/_4$ 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.	1986-93	5-8-93	24.21	2000	7-2-92	24.69	2200
Chanarambi Creek near Edgerton, MN 06482933	Lat 43°53'59", long 96°03'39", in $NW^1/_4SW^1/_4$ 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.	1979-93	5-8-93	18.14	850	5-8-93	18.14	850

"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 1993--Continued

Station name and number	Location and drainage area	Period of record	Water year 1993 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--Continued					
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#, 1972-93	5-8-93	14.23	35400	5-8-93	14.23	35400
Kanaranzi Creek tributary near Lismore, MN 06483200	Lat 43°45'41", long 95°55'56", in SW¼SW¼ sec. 31, T. 104 N., R. 42 W., Nobles County, Hydrologic Unit 10170204, at culvert on county highway adjacent to State Highway 91, 60 ft upstream from mouth, and 1.2 miles northeast of Lismore. Drainage area .14 mi^2.	1959-81, 1993	7-10-93	21.90	393	7-10-93	21.90	393
Kanaranzi Creek tributary No. 2 near Wilmont, MN 06483210	Lat 43°43'32", long 95°52'20", in SW¼NW¼ sec.15, T. 103 N., R. 42 W., Nobles County, Hydrologic Unit 10170204, at culvert on County Highway 15, 3.5 miles southwest of Wilmont, 3.7 miles upstream from mouth. Drainage area 2.14 mi^2.	1966-90, 1993	7-10-93	11.32	585	6-29-69	12.03	1230
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.	1991-93	7-11-93	27.04	4290	7-11-93	27.04	4290
			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.	1962-93	6-30-93	b10.37	1100	6-29-69	12.06	4500

< Less than peak stage unknown, discharge estimated.
+ Operated as low flow site.
# Operated as a continuous-record gaging station.
† Discharge not determined.
a Affected by shifting control.
b Backwater from aquatic growth or debris.
c Not annual maximum gage height.
d Revised.
e Peak stage at downstream side of road.
f Approximately.
g Not previously published.
h Discharge estimated.

MISCELLANEOUS SITES

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 1993

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 47°25'42", long 94°03'00", in $SW^1/_4$ sec.25, T. 146 N., R. 27 W., Itasca County, Hydrologic Unit 07010101, on Leech Lake Indian Reservation, at dam 1 mile northwest of Little Winnibigoshish Lake, 14 miles northwest of city of Deer River, at mile 1,248 upstream from Ohio River (05201500).	1,442	1884-93#	11-2-92 4-19-93 9-24-93	703 89 678
		Leech Lake River basin				
Leech Lake River	Mississippi River	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 miles downstream from natural outlet of Leech Lake (05206500).	1,163	1984-93#	11-2-92 4-22-93 9-22-93	164 114 869
		Mississippi River main stem				
Mississippi River	Gulf of Mexico	Lat 47°15'00", long 93°35'12", in $N^1/_2$ sec.13, T.155 N., R. 26 W., Itasca County, Hydrologic Unit 07010103, at dam at outlet of Pokegama Lake, 3.5 miles northwest of Grand Rapids, MN (05210700).	a3,360	1929-30, 1944-45, 1948-55, 1957-75, 1982-93	4-19-93 9-24-93	978 2040
		Sandy River basin				
Sandy River	Mississippi River	Lat 46°47'20", long 93°19'10", in sec. 25, T. 50 N., R. 24 W., Aitkin County, Hydrologic Unit 07010103, dam at outlet of Sandy Lake, at Libby, 1.2 miles above mouth, and 14 miles north of McGregor (05219000).	421	1893-94, 1894-95, 1895-1993	4-20-93	237
		Pine River Basin				
Pine River	Mississippi River	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 (05231000).	562	1886-1993	11-3-92 4-21-93 9-21-93	67 70 99

"See footnotes at end of the table."

Discharge measurements made at miscellaneous sites during water year 1993

Stream	Tributary	Location	Drainage area (mi^2)	Period of record	Date	Discharge (ft^3/s)
		Crow Wing River basin				
Gull River	Crow Wing River	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 miles northwest of Brainerd. (05247000).	287	1911-93	4-21-93 9-21-93	94 87
		Mississippi River main stem				
Mississippi River	Gulf of Mexico	Lat 44°58'46", long 93°14'50", in $SE^1/_4SE^1/_4$ 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, 1990-93	11-25-92	5680
		Minnesota River basin				
Redwood River	Minnesota River	Lat 44°30'00", long 95°14'51", in $SW^1/_4SW^1/_4$ 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).	-	1992-93	4-7-93 5-4-93 5-12-93 6-21-93	1240 727 3490 †7380
Judicial Ditch	Redwood River	Lat 44°30'00", long 95°21'06", in $SW^1/_4SE^1/_4$ 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 (05316470).	-	1992-93	4-7-93 5-4-83	12 10
Little Cottonwood River	Minnesota River	Lat 44°14'19", long 94°26'04", in $NE^1/_4NE^1/_4$ sec. 21, T. 109 N., R. 30 W., Brown County, Hydrologic Unit 07020007, at bridge on State Highway 15, 0.75 mile north of Searles, and 3 miles south of New Ulm (05317190).	-	1972-79, 1993	6-25-93	†1160
Coon Creek	Blue Earth River	Lat 43°36'38", long 94°05'13", in $SW^1/_4NW^1/_4$ sec. 28, T. 102 N., R. 27 W., Faribault County, Hydrologic Unit 07020009, at bridge on Trunk Highway 169, 1 mile south of Blue Earth, MN.	-	1993	6-8-93 8-31-93	†1040 †1380
Elm Creek	Blue Earth River	Lat 43°46'14", long 94°25'36", in $SW^1/_4NW^1/_4$ sec. 34, T. 104 N., R. 30 W., Martin County, at bridge on Trunk Highway 15, 3.5 miles south of Truman, MN.	-	1993	6-9-93 6-24-93	†890 †1730

"See footnotes at end of the table."

Discharge measurements made at miscellaneous sites during water year 1993

Stream	Tributary	Location	Drainage area (mi^2)	Period of record	Date	Discharge (ft^3/s)
		Minnesota River basin--Continued				
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 (05318135).		1992-93	4-6-93 4-13-93 4-20-93 4-28-93 5-5-93 6-10-93	4680 3040 3350 2980 1900 †5080
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).	-	1992-93	3-31-93 4-6-93 4-13-93	499 557 378
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, 2.0 miles south of Winnebago (05318141).	-	1992-93	3-30-93 4-5-93 4-12-93 4-19-93 4-27-93 5-5-93 6-9-93	5700 5990 3740 3410 3960 2310 †7010
Pauls Creek	Minnesota River	Lat 44°19'57", long 93°55'11", in NE¼SW¼ sec. 14, T. 110 N., R. 26 W, Le Sueur County, Hydrologic Unit 07020007, at outlet to trout pond, 0.2 mile west of State Highway 23, 1.8 miles northwest of St. Peter, MN.	-	1993	7-15-93	1.8
		Zumbro River basin				
South Fork River on Belt Line	Zumbro River	Lat 44°00'26", long 92°28'19", in SE¼SW¼ sec. 2, T. 106 N., R. 14 W., Olmsted County, Hydrologic Unit 07040004, at bridge on west-bound lane of U.S. Highway 14 at Rochester, and 1.5 miles upstream from Bear Creek (05372800).	155	1969-82, 1993	4-1-93	2230
		Root River basin				
Root River	Mississippi River	Lat 43°46'37", long 91°17'51", in SE¼SE¼ sec. 27, T. 104 N., R. 4 W., Houston County, Hydrologic Unit 07040008, at bridge on Trunk Highway 26, 2.8 miles upstream from mouth, 3.5 miles south of LeCrescent, MN.	-	1935-37, 1993	4-3-93	†23,140
		Iowa River basin				
Turtle Creek	Cedar River	Lat 43°41'05", long 93°02'15", in NE¼NW¼ sec. 31, T. 103 N., R. 18 W., Mower County, Hydrologic Unit 07080201, at bridge on County Road, 3 miles west of Austin, MN (05456500).	144	1947-51#, 1993	8-17-93	1830

operated as a continuous record gaging station.
a approximately.

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

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.

05322000 - BLUE EARTH RIVER AT MOUTH AT MANKATO

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	TIME	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)
MAR 03...	1145	924	7.5	1.0	10.5	741	43	1.4	32

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 DIS-SOLVED (MG/L AS N) (00631)	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 03...	K9	<1	<1	0.040	6.60	0.180	0.60	0.90

DATE	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)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	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)
MAR 03...	0.080	0.070	0.060	114	5.7	0.5	0.700	<0.100

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)							
JUL 1993 27...	515	17	77	6.8	23.0	741	5.5
05337150 SNAKE RIVER NEAR MCGRATH, MN (LAT 46 13 05N LONG 093 14 25W)							
JUL 1993 26...	1700	83	89	7.1	24.0	740	6.7
460746093110200 CHELSEY BROOK NEAR WOODLAND MN (LAT 46 07 46N LONG 093 11 02W)							
JUL 1993 27...	1200	7.5	119	7.5	21.0	733	6.7
05337220 SNOWSHOE BROOK NEAR WARMAN, MN (LAT 46 01 29N LONG 093 14 20W)							
JUL 1993 27...	1345	2.4	288	7.8	21.0	733	7.5
455945093151900 SNAKE RIVER BLW SNOWSHOE BROOK NR WARMAN MN (LAT 45 59 45N LONG 093 15 19W)							
JUL 1993 28...	1420	120	135	7.3	23.5	734	6.2
05337300 KNIFE RIVER NEAR WARMAN, MN (LAT 46 02 47N LONG 093 25 57W)							
JUL 1993 27...	1645	9.6	181	7.5	24.0	732	6.4
455834093194400 KNIFE RIVER ABV KNIFE LAKE NR MORA MN (LAT 45 58 34N LONG 093 19 44W)							
JUL 1993 28...	1100	18	247	7.3	23.0	731	8.1
05337500 SNAKE RIVER AT MORA, MN (LAT 45 51 50N LONG 093 17 47W)							
JUL 1993 29...	1000	160	211	6.9	21.0	738	7.1

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	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)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
05337100 SNAKE RIVER AT PLINY, MN (LAT 46 20 21N LONG 093 15 42W)							
JUL 1993 27...	K160	K210	0.010	0.082	0.030	0.140	0.040
05337150 SNAKE RIVER NEAR MCGRATH, MN (LAT 46 13 05N LONG 093 14 25W)							
JUL 1993 26...	86	160	0.010	0.066	0.030	0.100	0.050
460746093110200 CHELSEY BROOK NEAR WOODLAND MN (LAT 46 07 46N LONG 093 11 02W)							
JUL 1993 27...	120	160	0.010	0.120	0.050	0.070	0.090
05337220 SNOWSHOE BROOK NEAR WARMAN, MN (LAT 46 01 29N LONG 093 14 20W)							
JUL 1993 27...	92	170	<0.010	0.079	0.040	0.060	0.050
455945093151900 SNAKE RIVER BLW SNOWSHOE BROOK NR WARMAN MN (LAT 45 59 45N LONG 093 15 19W)							
JUL 1993 28...	42	100	0.010	0.150	0.040	0.070	0.040
05337300 KNIFE RIVER NEAR WARMAN, MN (LAT 46 02 47N LONG 093 25 57W)							
JUL 1993 27...	80	130	0.010	0.120	0.120	0.070	0.140
455834093194400 KNIFE RIVER ABV KNIFE LAKE NR MORA MN (LAT 45 58 34N LONG 093 19 44W)							
JUL 1993 28...	120	76	<0.010	0.100	0.070	0.040	0.100
05337500 SNAKE RIVER AT MORA, MN (LAT 45 51 50N LONG 093 17 47W)							
JUL 1993 29...	68	110	0.010	0.320	0.060	0.100	0.100

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
05337530 LITTLE ANN RIVER NEAR MORA, MN (LAT 45 56 01N LONG 093 25 11W)							
JUL 1993 27...	1800	6.4	162	7.7	24.5	733	6.9
05337550 ANN RIVER NEAR MORA, MN (LAT 45 50 07N LONG 093 19 54W)							
JUL 1993 29...	1215	15	252	7.4	21.5	738	8.1
455020093165700 SNAKE RIVER SOUTH OF MORA MN (LAT 45 50 20N LONG 093 16 57W)							
JUL 1993 29...	1515	196	198	7.5	23.0	738	6.8
455223093282400 GROUNDHOUSE RIVER ABV OGILVIE MN (LAT 45 52 23N LONG 093 28 24W)							
JUL 1993 28...	1720	6.7	204	7.3	23.0	734	6.6
05337600 GROUNDHOUSE RIVER NEAR OGILVIE, MN (LAT 45 48 12N LONG 093 23 52W)							
JUL 1993 29...	1345	8.6	296	7.6	20.5	738	8.8
454718093122500 RICE CREEK NEAR GRASSTON MN (LAT 45 47 18N LONG 093 12 25W)							
JUL 1993 30...	1645	12	320	7.8	27.5	742	11.1
05337790 MUD CREEK AT QUAMBA, MN (LAT 45 55 10N LONG 093 09 48W)							
JUL 1993 30...	0830	1.5	330	6.9	18.0	742	2.1
454954093091500 MUD CREEK NEAR GRASSTON MN (LAT 45 49 54N LONG 093 09 15W)							
JUL 1993 30...	1100	5.2	270	7.5	21.0	743	6.9

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	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)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
05337530 LITTLE ANN RIVER NEAR MORA, MN (LAT 45 56 01N LONG 093 25 11W)							
JUL 1993 27...	480	130	<0.010	0.080	0.050	0.050	0.080
05337550 ANN RIVER NEAR MORA, MN (LAT 45 50 07N LONG 093 19 54W)							
JUL 1993 29...	K220	43	<0.010	0.140	0.030	0.070	0.080
455020093165700 SNAKE RIVER SOUTH OF MORA MN (LAT 45 50 20N LONG 093 16 57W)							
JUL 1993 29...	74	75	0.010	0.300	0.040	0.080	0.090
455223093282400 GROUNDHOUSE RIVER ABV OGILVIE MN (LAT 45 52 23N LONG 093 28 24W)							
JUL 1993 28...	K170	160	<0.010	0.050	0.090	0.050	0.130
05337600 GROUNDHOUSE RIVER NEAR OGILVIE, MN (LAT 45 48 12N LONG 093 23 52W)							
JUL 1993 29...	K140	160	0.020	0.620	0.080	0.030	0.090
454718093122500 RICE CREEK NEAR GRASSTON MN (LAT 45 47 18N LONG 093 12 25W)							
JUL 1993 30...	K32	27	<0.010	<0.050	0.060	0.070	0.140
05337790 MUD CREEK AT QUAMBA, MN (LAT 45 55 10N LONG 093 09 48W)							
JUL 1993 30...	76	130	0.010	0.053	0.060	0.190	0.140
454954093091500 MUD CREEK NEAR GRASSTON MN (LAT 45 49 54N LONG 093 09 15W)							
JUL 1993 30...	150	72	<0.010	0.160	0.040	0.070	0.090

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
05337900 SNAKE RIVER AT GRASSTON, MN (LAT 45 47 19N LONG 093 08 48W)							
JUL 1993 30...	1430	206	204	7.4	24.0	742	6.6
454722093083000 SNAKE RIVER NEAR GRASSTON MN (LAT 45 47 22N LONG 093 08 30W)							
JUL 1993 30...	1230	227	203	7.4	23.0	743	6.5
454737093043800 SNAKE RIVER WEST OF POKEGAMA LAKE NR PINE CITY MN (LAT 45 47 37N LONG 093 04 38W)							
JUL 1993 31...	1145	232	218	7.3	23.5	738	5.7
455729093045800 POKEGAMA CREEK ABOVE BROOK PARK MN (LAT 45 57 29N LONG 093 04 58W)							
AUG 1993 01...	1030	0.45	279	6.9	18.5	735	1.8
455508093010600 POKEGAMA CREEK AT CNTY RD 130 NR BEROUN MN (LAT 45 55 08N LONG 093 01 06W)							
AUG 1993 05...	1145	2.6	322	7.2	16.5	738	1.0
455416093015400 POKEGAMA CREEK AT HWY 14 NR BEROUN MN (LAT 45 54 16N LONG 093 01 54W)							
AUG 1993 05...	1300	1.2	336	7.3	17.0	738	6.6
455324093051200 POKEGAMA CREEK TRIBUTARY NEAR HENRIETTE MN (LAT 45 53 24N LONG 093 05 12W)							
JUL 1993 31...	1415	2.3	330	6.8	20.5	728	1.5
455238093034500 POKEGAMA CREEK TRIB ON HWY 13 NR HENRIETTE MN (LAT 45 52 38N LONG 093 03 45W)							
AUG 1993 03...	1515	0.21	311	7.3	19.5	740	4.0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	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)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
05337900 SNAKE RIVER AT GRASSTON, MN (LAT 45 47 19N LONG 093 08 48W)							
JUL 1993 30...	54	48	<0.010	0.320	0.040	0.070	0.090
454722093083000 SNAKE RIVER NEAR GRASSTON MN (LAT 45 47 22N LONG 093 08 30W)							
JUL 1993 30...	81	32	0.010	0.320	0.030	0.060	0.090
454737093043800 SNAKE RIVER WEST OF POKEGAMA LAKE NR PINE CITY MN (LAT 45 47 37N LONG 093 04 38W)							
JUL 1993 31...	210	70	0.010	0.320	0.040	0.070	0.080
455729093045800 POKEGAMA CREEK ABOVE BROOK PARK MN (LAT 45 57 29N LONG 093 04 58W)							
AUG 1993 01...	120	210	<0.010	<0.050	0.060	0.250	0.150
455508093010600 POKEGAMA CREEK AT CNTY RD 130 NR BEROUN MN (LAT 45 55 08N LONG 093 01 06W)							
AUG 1993 05...	240	150	0.010	0.140	0.040	0.040	0.080
455416093015400 POKEGAMA CREEK AT HWY 14 NR BEROUN MN (LAT 45 54 16N LONG 093 01 54W)							
AUG 1993 05...	86	150	<0.010	0.061	0.030	0.060	0.090
455324093051200 POKEGAMA CREEK TRIBUTARY NEAR HENRIETTE MN (LAT 45 53 24N LONG 093 05 12W)							
JUL 1993 31...	190	620	<0.010	<0.050	0.120	0.590	0.320
455238093034500 POKEGAMA CREEK TRIB ON HWY 13 NR HENRIETTE MN (LAT 45 52 38N LONG 093 03 45W)							
AUG 1993 03...	K210	120	0.010	0.130	0.040	0.080	0.100

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
455218093023800 POKEGAMA CR ABV POKEGAMA LAKE NR PINE CITY MN (LAT 45 52 18N LONG 093 02 38W)							
AUG 1993 05...	1250	1.4	313	7.2	17.5	738	0.7
454928093032100 POKEGAMA LAKE SW OUTFLOW NEAR PINE CITY MN (LAT 45 49 28N LONG 093 03 21W)							
AUG 1993 04...	1125	9.1	210	7.1	19.5	744	3.6
454917093022800 POKEGAMA LAKE SE OUTFLOW NEAR PINE CITY MN (LAT 45 49 17N LONG 093 02 28W)							
AUG 1993 04...	1120	24	220	8.4	23.0	744	10.5
455948092554700 MISSION CREEK BELOW HINCKLEY MN (LAT 45 59 48N LONG 092 55 47W)							
AUG 1993 01...	1300	0.21	389	7.1	20.5	735	2.9
455507092584700 MISSION CREEK NEAR MISSION CREEK MN (LAT 45 55 07N LONG 092 58 47W)							
AUG 1993 01...	1530	4.2	215	7.2	24.0	735	4.6
455415092583700 MISSION CREEK NEAR BEROUN MN (LAT 45 54 15N LONG 092 58 37W)							
AUG 1993 01...	1700	4.7	218	7.4	24.0	735	7.0
455652092593100 POKEGAMA CREEK TRIB EAST NR BROOK PARK MN (LAT 45 56 52N LONG 092 59 31W)							
AUG 1993 03...	1300	0.18	346	7.0	19.5	740	3.3
455652092595000 POKEGAMA CREEK TRIB WEST NR BROOK PARK MN (LAT 45 56 52N LONG 092 59 50W)							
AUG 1993 03...	1145	0.56	295	7.6	17.0	737	8.4

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	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)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
455218093023800 POKEGAMA CR ABV POKEGAMA LAKE NR PINE CITY MN (LAT 45 52 18N LONG 093 02 38W)							
AUG 1993 05...	K36	190	<0.010	<0.050	0.020	0.070	0.030
454928093032100 POKEGAMA LAKE SW OUTFLOW NEAR PINE CITY MN (LAT 45 49 28N LONG 093 03 21W)							
AUG 1993 04...	K5	K24	<0.010	<0.050	0.040	0.040	0.070
454917093022800 POKEGAMA LAKE SE OUTFLOW NEAR PINE CITY MN (LAT 45 49 17N LONG 093 02 28W)							
AUG 1993 04...	K1	K12	<0.010	<0.050	<0.010	0.030	0.070
455948092554700 MISSION CREEK BELOW HINCKLEY MN (LAT 45 59 48N LONG 092 55 47W)							
AUG 1993 01...	760	1000	0.050	0.170	0.060	0.370	0.200
455507092584700 MISSION CREEK NEAR MISSION CREEK MN (LAT 45 55 07N LONG 092 58 47W)							
AUG 1993 01...	62	130	<0.010	<0.050	0.100	0.110	0.200
455415092583700 MISSION CREEK NEAR BEROUN MN (LAT 45 54 15N LONG 092 58 37W)							
AUG 1993 01...	K150	940	0.040	0.120	0.090	0.060	0.180
455652092593100 POKEGAMA CREEK TRIB EAST NR BROOK PARK MN (LAT 45 56 52N LONG 092 59 31W)							
AUG 1993 03...	K140	160	<0.010	<0.050	0.190	0.290	0.300
455652092595000 POKEGAMA CREEK TRIB WEST NR BROOK PARK MN (LAT 45 56 52N LONG 092 59 50W)							
AUG 1993 03...	K510	490	<0.010	0.150	0.030	0.060	0.070

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
455231092592300 MISSION CREEK NR PINE CITY MN (LAT 45 52 31N LONG 092 59 23W)							
AUG 1993 01...	1815	7.1	231	7.3	24.0	735	6.7
454900093011900 SNAKE RIVER EAST OF POKEGAMA LAKE NR PINE CITY MN (LAT 45 49 00N LONG 093 01 19W)							
AUG 1993 04...	1925	192	216	7.6	21.0	744	6.7

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	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)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
455231092592300 MISSION CREEK NR PINE CITY MN (LAT 45 52 31N LONG 092 59 23W)							
AUG 1993 01...	100	170	0.040	0.170	0.070	0.050	0.160
454900093011900 SNAKE RIVER EAST OF POKEGAMA LAKE NR PINE CITY MN (LAT 45 49 00N LONG 093 01 19W)							
AUG 1993 04...	K30	180	0.010	0.270	0.030	0.030	0.070

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	TIME	RESER-VOIR DEPTH (FEET) (72025)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	SAM-PLING DEPTH (FEET) (00003)	TEMPER-ATURE WATER (DEG C) (00010)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)
455003093021400 POKEGAMA LAKE NEAR PINE CITY MN (SITE 4) (LAT 45 50 03N LONG 093 02 14W)							
AUG 1993							
04...	1545	21.0	0.86	1.50	23.5	194	8.4
04...	1546	--	--	3.50	22.0	180	7.8
04...	1547	--	--	5.50	21.5	180	7.8
04...	1548	--	--	7.50	21.5	180	7.7
04...	1549	--	--	9.50	21.5	180	7.7
04...	1550	--	--	11.5	21.5	180	7.7
04...	1551	--	--	13.5	21.5	183	7.7
04...	1552	--	--	15.5	21.5	184	7.7
04...	1553	--	--	17.5	21.5	184	7.7
04...	1554	--	--	19.5	21.5	183	7.6
04...	1555	--	--	20.5	21.5	183	7.6
455003093023600 POKEGAMA LAKE NEAR PINE CITY MN (SITE 3) (LAT 45 50 03N LONG 093 02 36W)							
AUG 1993							
04...	1630	19.5	0.79	1.50	23.0	218	8.4
04...	1631	--	--	3.50	22.0	218	8.3
04...	1632	--	--	5.50	22.0	186	8.0
04...	1633	--	--	7.50	21.5	184	7.9
04...	1634	--	--	9.50	21.5	182	7.8
04...	1635	--	--	11.5	21.5	182	7.8
04...	1636	--	--	13.5	21.5	183	7.7
04...	1637	--	--	15.5	21.5	183	7.7
04...	1638	--	--	17.5	21.5	182	7.7
04...	1639	--	--	18.5	21.5	182	7.6
455003093030200 POKEGAMA LAKE NEAR PINE CITY MN (SITE 2) (LAT 45 50 03N LONG 093 03 02W)							
AUG 1993							
04...	1515	14.6	0.87	1.50	24.5	182	8.4
04...	1516	--	--	2.50	22.0	244	8.2
04...	1517	--	--	3.50	22.0	242	8.0
04...	1518	--	--	5.50	21.5	185	7.8
04...	1519	--	--	7.50	21.5	185	7.8
04...	1520	--	--	9.50	21.5	239	7.8
04...	1521	--	--	11.5	21.5	230	7.8
04...	1522	--	--	13.5	21.5	211	7.8
455202093022400 POKEGAMA LAKE NEAR PINE CITY MN (SITE 1) (LAT 45 52 02N LONG 093 02 24W)							
AUG 1993							
04...	1428	3.9	1.12	0.50	20.5	287	7.3
04...	1430	--	--	1.50	20.0	294	7.2
04...	1431	--	--	2.42	20.0	293	7.3
04...	1435	--	--	3.40	19.5	294	7.2

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	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)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
455003093021400 POKEGAMA LAKE NEAR PINE CITY MN (SITE 4) (LAT 45 50 03N LONG 093 02 14W)						
AUG 1993						
04...	10.9	<0.010	<0.050	<0.010	0.030	0.100
04...	7.1	--	--	--	--	--
04...	6.8	--	--	--	--	--
04...	6.8	--	--	--	--	--
04...	6.7	--	--	--	--	--
04...	6.6	--	--	--	--	--
04...	6.6	--	--	--	--	--
04...	6.8	--	--	--	--	--
04...	6.7	--	--	--	--	--
04...	6.0	<0.010	<0.050	<0.010	0.060	0.060
04...	6.0	--	--	--	--	--
455003093023600 POKEGAMA LAKE NEAR PINE CITY MN (SITE 3) (LAT 45 50 03N LONG 093 02 36W)						
AUG 1993						
04...	9.5	<0.010	<0.050	<0.010	0.040	0.070
04...	9.5	--	--	--	--	--
04...	7.5	--	--	--	--	--
04...	7.2	--	--	--	--	--
04...	6.8	--	--	--	--	--
04...	6.6	--	--	--	--	--
04...	6.6	--	--	--	--	--
04...	6.8	--	--	--	--	--
04...	6.2	--	--	--	--	--
04...	5.8	<0.010	<0.050	0.010	0.060	0.110
455003093030200 POKEGAMA LAKE NEAR PINE CITY MN (SITE 2) (LAT 45 50 03N LONG 093 03 02W)						
AUG 1993						
04...	11.0	<0.010	<0.050	<0.010	0.030	0.070
04...	8.8	--	--	--	--	--
04...	7.7	--	--	--	--	--
04...	7.2	--	--	--	--	--
04...	7.0	--	--	--	--	--
04...	7.5	--	--	--	--	--
04...	7.5	--	--	--	--	--
04...	7.5	<0.010	<0.050	<0.010	0.030	0.030
455202093022400 POKEGAMA LAKE NEAR PINE CITY MN (00000000SITE 1) (LAT 45 52 02N LONG 093 02 24W)						
AUG 1993						
04...	5.0	--	--	--	--	--
04...	3.8	<0.010	<0.050	0.020	0.040	0.050
04...	3.6	--	--	--	--	--
04...	2.9	<0.010	<0.050	0.020	0.050	0.050

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	TIME	RESER-VOIR DEPTH (FEET) (72025)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	SAM-PLING DEPTH (FEET) (00003)	TEMPER-ATURE WATER (DEG C) (00010)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	OXYGEN, DIS-SOLVED (MG/L) (00300)
		454931093195400 FISH LAKE NEAR MORA MN (LAT 45 49 31N LONG 093 19 54W)						
AUG 1993								
09...	0915	8.0	0.57	1.50	22.0	178	8.2	6.9
09...	0916	--	--	3.50	21.5	179	8.1	6.3
09...	0917	--	--	5.50	21.5	180	8.1	6.3
09...	0918	--	--	7.50	21.5	183	8.1	6.3
		454956092573400 CROSS LAKE AT PINE CITY MN (LAT 45 49 56N LONG 092 57 34W)						
AUG 1993								
09...	1600	27.2	1.10	1.50	23.0	244	7.6	7.4
09...	1601	--	--	3.50	23.0	246	7.6	7.2
09...	1602	--	--	5.50	23.0	237	7.6	7.3
09...	1603	--	--	7.50	22.0	197	7.6	6.5
09...	1604	--	--	9.50	21.5	195	7.6	6.3
09...	1605	--	--	11.5	21.5	199	7.5	6.2
09...	1606	--	--	13.5	21.5	199	7.5	6.0
09...	1607	--	--	15.5	21.5	195	7.5	6.0
09...	1608	--	--	17.5	21.5	196	7.4	5.8
09...	1609	--	--	19.5	21.0	211	7.4	5.9
09...	1610	--	--	21.5	21.0	212	7.4	6.0
09...	1611	--	--	23.5	21.0	215	7.4	5.9
09...	1612	--	--	25.5	21.0	221	7.4	6.1
09...	1613	--	--	26.2	21.0	226	7.4	6.1
		455349093103600 MUD LAKE NEAR QUAMBA MN (QUAMBA LAKE) (LAT 45 53 49N LONG 093 10 36W)						
AUG 1993								
09...	1445	8.4	0.50	1.50	23.5	229	8.8	10.9
09...	1446	--	--	3.50	23.0	237	8.8	10.8
09...	1447	--	--	5.50	22.5	254	8.8	10.3
09...	1448	--	--	7.50	21.5	286	8.6	7.6
		455429093253200 ANN LAKE NEAR MORA MN (LAT 45 54 29N LONG 093 25 32W)						
AUG 1993								
09...	1115	13.8	0.81	1.50	22.0	137	8.0	7.6
09...	1116	--	--	2.50	22.0	136	7.6	7.5
09...	1117	--	--	3.50	22.0	128	7.8	7.3
09...	1118	--	--	5.50	21.5	128	7.7	6.8
09...	1119	--	--	7.50	21.5	128	7.6	6.7
09...	1120	--	--	9.50	21.5	128	7.6	6.6
09...	1121	--	--	11.5	21.0	129	7.5	6.1
09...	1122	--	--	12.0	21.0	129	7.5	5.9

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	TIME	RESER-VOIR DEPTH (FEET) (72025)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	SAM-PLING DEPTH (FEET) (00003)	TEMPER-ATURE WATER (DEG C) (00010)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	OXYGEN, DIS-SOLVED (MG/L) (00300)
455926093172500 KNIFE LAKE NEAR MORA MN (LAT 45 59 26N LONG 093 17 25W)								
AUG 1993								
09...	1200	12.0	0.88	1.50	23.0	175	8.7	10.4
09...	1201	--	--	2.50	23.0	183	8.7	10.4
09...	1202	--	--	3.50	22.5	185	8.7	9.8
09...	1203	--	--	5.50	22.0	206	8.4	7.9
09...	1204	--	--	7.50	22.0	200	8.3	7.5
09...	1205	--	--	9.50	22.0	145	8.2	6.9

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

454931093195400 - FISH LAKE NEAR MORA MN

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	TIME	DEPTH AT SAMPLE LOC-ATION, TOTAL (FEET) (81903)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	SAM-PLING DEPTH (FEET) (00003)	TEMPER-ATURE WATER (DEG C) (00010)	CON-DUCT-ANCE (US/CM) (00095)	PH SPE-CIFIC FIELD (STAND-ARD UNITS) (00400)	WATER WHOLE OXYGEN, DIS-SOLVED (MG/L) (00300)
AUG								
09...	0915	8.00	0.57	1.50	22.0	178	8.2	6.9
09...	0916	--	--	3.50	21.5	179	8.1	6.3
09...	0917	--	--	5.50	21.5	180	8.1	6.3
09...	0918	--	--	7.50	21.5	183	8.1	6.3

454956092573400 - CROSS LAKE AT PINE CITY MN

DATE	TIME	DEPTH AT SAMPLE LOC-ATION, TOTAL (FEET) (81903)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	SAM-PLING DEPTH (FEET) (00003)	TEMPER-ATURE WATER (DEG C) (00010)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	OXYGEN, DIS-SOLVED (MG/L) (00300)
AUG								
09...	1600	27.2	1.10	1.50	23.0	244	7.6	7.4
09...	1601	--	--	3.50	23.0	246	7.6	7.2
09...	1602	--	--	5.50	23.0	237	7.6	7.3
09...	1603	--	--	7.50	22.0	197	7.6	6.5
09...	1604	--	--	9.50	21.5	195	7.6	6.3
09...	1605	--	--	11.5	21.5	199	7.5	6.2
09...	1606	--	--	13.5	21.5	199	7.5	6.0
09...	1607	--	--	15.5	21.5	195	7.5	6.0
09...	1608	--	--	17.5	21.5	196	7.4	5.8
09...	1609	--	--	19.5	21.0	211	7.4	5.9
09...	1610	--	--	21.5	21.0	212	7.4	6.0
09...	1611	--	--	23.5	21.0	215	7.4	5.9
09...	1612	--	--	25.5	21.0	221	7.4	6.1
09...	1613	--	--	26.2	21.0	226	7.4	6.1

455349093103600 - MUD LAKE NEAR QUAMBA MN (QUAMBA LAKE)

DATE	TIME	DEPTH AT SAMPLE LOC-ATION, TOTAL (FEET) (81903)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	SAM-PLING DEPTH (FEET) (00003)	TEMPER-ATURE WATER (DEG C) (00010)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	OXYGEN, DIS-SOLVED (MG/L) (00300)
AUG								
09...	1445	8.40	0.50	1.50	23.5	229	8.8	10.9
09...	1446	--	--	3.50	23.0	237	8.8	10.8
09...	1447	--	--	5.50	22.5	254	8.8	10.3
09...	1448	--	--	7.50	21.5	286	8.6	7.6

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

455429093253200 - ANN LAKE NEAR MORA MN

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	TIME	DEPTH AT SAMPLE LOCATION, TOTAL (FEET) (81903)	TRANSPARENCY (SECCHI DISK) (M) (00078)	SAMPLING DEPTH (FEET) (00003)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)
AUG								
09...	1115	13.8	0.81	1.50	22.0	137	8.0	7.6
09...	1116	--	--	2.50	22.0	136	7.6	7.5
09...	1117	--	--	3.50	22.0	128	7.8	7.3
09...	1118	--	--	5.50	21.5	128	7.7	6.8
09...	1119	--	--	7.50	21.5	128	7.6	6.7
09...	1120	--	--	9.50	21.5	128	7.6	6.6
09...	1121	--	--	11.5	21.0	129	7.5	6.1
09...	1122	--	--	12.0	21.0	129	7.5	5.9

455926093172500 - KNIFE LAKE NEAR MORA MN

DATE	TIME	DEPTH AT SAMPLE LOCATION, TOTAL (FEET) (81903)	TRANSPARENCY (SECCHI DISK) (M) (00078)	SAMPLING DEPTH (FEET) (00003)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)
AUG								
09...	1200	12.0	0.88	1.50	23.0	175	8.7	10.4
09...	1201	--	--	2.50	23.0	183	8.7	10.4
09...	1202	--	--	3.50	22.5	185	8.7	9.8
09...	1203	--	--	5.50	22.0	206	8.4	7.9
09...	1204	--	--	7.50	22.0	200	8.3	7.5
09...	1205	--	--	9.50	22.0	145	8.2	6.9

POKEGAMA LAKE NEAR PINE CITY MN

DATE	TIME	DEPTH AT SAMPLE LOCATION, TOTAL (FEET) (81903)	TRANSPARENCY (SECCHI DISK) (M) (00078)	SAMPLING DEPTH (FEET) (00003)	TEMPERATURE WATER (DEG C) (00010)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)
AUG							
04...	1428	3.90	1.12	0.50	20.5	287	7.3
04...	1430	--	--	1.50	20.0	294	7.2
04...	1431	--	--	2.42	20.0	293	7.3
04...	1435	--	--	3.40	19.5	294	7.2

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

455202093022400 - POKEGAMA LAKE NEAR PINE CITY MN

DATE	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)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
AUG						
04...	5.0	--	--	--	--	--
04...	3.8	<0.010	<0.050	0.020	0.040	0.050
04...	3.6	--	--	--	--	--
04...	2.9	<0.010	<0.050	0.020	0.050	0.050

455003093030200 - POKEGAMA LAKE NEAR PINE CITY (SITE 2)

DATE	TIME	DEPTH AT SAMPLE LOC-ATION, TOTAL (FEET) (81903)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	SAM-PLING DEPTH (FEET) (00003)	TEMPER-ATURE WATER (DEG C) (00010)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)
AUG							
04...	1515	14.6	0.87	1.50	24.5	182	8.4
04...	1516	--	--	2.50	22.0	244	8.2
04...	1517	--	--	3.50	22.0	242	8.0
04...	1518	--	--	5.50	21.5	185	7.8
04...	1519	--	--	7.50	21.5	185	7.8
04...	1520	--	--	9.50	21.5	239	7.8
04...	1521	--	--	11.5	21.5	230	7.8
04...	1522	--	--	13.5	21.5	211	7.8

DATE	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)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
AUG						
04...	11.0	<0.010	<0.050	<0.010	0.030	0.070
04...	8.8	--	--	--	--	--
04...	7.7	--	--	--	--	--
04...	7.2	--	--	--	--	--
04...	7.0	--	--	--	--	--
04...	7.5	--	--	--	--	--
04...	7.5	--	--	--	--	--
04...	7.5	<0.010	<0.050	<0.010	0.030	0.030

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

455003093023600 - POKEGAMA LAKE NEAR PINE CITY MN (SITE 3)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	TIME	DEPTH AT SAMPLE LOC-ATION, TOTAL (FEET) (81903)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	SAM-PLING DEPTH (FEET) (00003)	TEMPER-ATURE WATER (DEG C) (00010)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)
AUG							
04...	1630	19.5	0.79	1.50	23.0	218	8.4
04...	1631	--	--	3.50	22.0	218	8.3
04...	1632	--	--	5.50	22.0	186	8.0
04...	1633	--	--	7.50	21.5	184	7.9
04...	1634	--	--	9.50	21.5	182	7.8
04...	1635	--	--	11.5	21.5	182	7.8
04...	1636	--	--	13.5	21.5	183	7.7
04...	1637	--	--	15.5	21.5	183	7.7
04...	1638	--	--	17.5	21.5	182	7.7
04...	1639	--	--	18.5	21.5	182	7.6

DATE	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)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
AUG						
04...	9.5	<0.010	<0.050	<0.010	0.040	0.070
04...	9.5	--	--	--	--	--
04...	7.5	--	--	--	--	--
04...	7.2	--	--	--	--	--
04...	6.8	--	--	--	--	--
04...	6.6	--	--	--	--	--
04...	6.6	--	--	--	--	--
04...	6.8	--	--	--	--	--
04...	6.2	--	--	--	--	--
04...	5.8	<0.010	<0.050	0.010	0.060	0.110

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

455003093021400 - POKEGAMA LAKE NEAR PINE CITY MN (SITE 4)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

DATE	TIME	DEPTH AT SAMPLE LOCATION, TOTAL (FEET) (81903)	TRANSPARENCY (SECCHI DISK) (M) (00078)	SAMPLING DEPTH (FEET) (00003)	TEMPERATURE WATER (DEG C) (00010)	PH SPECIFIC CONDUCTANCE (US/CM) (00095)	WATER WHOLE FIELD (STANDARD UNITS) (00400)
AUG							
04...	1545	21.0	0.86	1.50	23.5	194	8.4
04...	1546	--	--	3.50	22.0	180	7.8
04...	1547	--	--	5.50	21.5	180	7.8
04...	1548	--	--	7.50	21.5	180	7.7
04...	1549	--	--	9.50	21.5	180	7.7
04...	1550	--	--	11.5	21.5	180	7.7
04...	1551	--	--	13.5	21.5	183	7.7
04...	1552	--	--	15.5	21.5	184	7.7
04...	1553	--	--	17.5	21.5	184	7.7
04...	1554	--	--	19.5	21.5	183	7.6
04...	1555	--	--	20.5	21.5	183	7.6

DATE	OXYGEN, DISSOLVED (MG/L) (00300)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	PHOSPHORUS TOTAL (MG/L AS P) (00665)
AUG						
04...	10.9	<0.010	<0.050	<0.010	0.030	0.100
04...	7.1	--	--	--	--	--
04...	6.8	--	--	--	--	--
04...	6.8	--	--	--	--	--
04...	6.7	--	--	--	--	--
04...	6.6	--	--	--	--	--
04...	6.6	--	--	--	--	--
04...	6.8	--	--	--	--	--
04...	6.7	--	--	--	--	--
04...	6.0	<0.010	<0.050	<0.010	0.060	0.060
04...	6.0	--	--	--	--	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

454928093032100 - POKEGAMA LAKE SW IN/OUTFLOW NR PINE CITY MN PL-5

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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 04...	1125	9.1	210	7.1	19.5	744	3.6

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	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)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
AUG 04...	K5	K24	<0.010	<0.050	0.040	0.040	0.070

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

454917093022800 - POKEGAMA LAKE SE OUTFLOW NR PINE CITY MN (PL-6)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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 04...	1120	24	220	8.4	23.0	744	10.5

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	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)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
AUG 04...	K1	K12	<0.010	<0.050	<0.010	0.030	0.070

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

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 1992 TO SEPTEMBER 1993

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (US/CM)	PH WATER WHOLE FIELD (STAND-ARD UNITS)	TEMPER-ATURE WATER (DEG C)	BARO-METRIC PRES-SURE (MM OF HG)	OXYGEN, DIS-SOLVED (MG/L)
		(00061)	(00095)	(00400)	(00010)	(00025)	(0030)
		005337100 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

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
05337900 SNAKE RIVER AT GRASSTON, MN (LAT 45 47 19N LONG 093 08 48W)							
AUG 1992 12...	0800	0.72	166	7.1	18.5	740	3.8
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

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
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
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

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
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
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

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
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
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

GROUND-WATER LEVELS

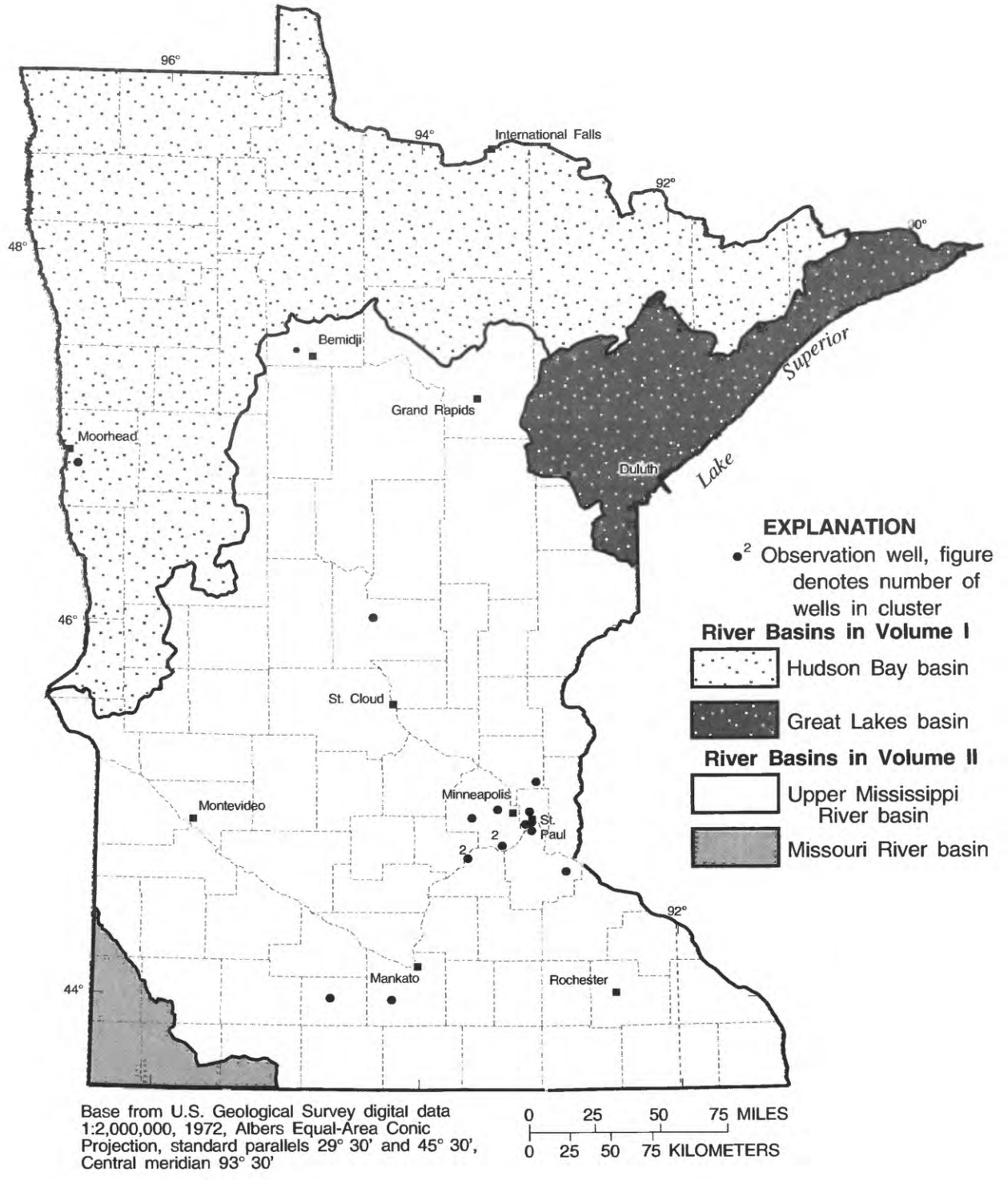


Figure 11.--Location of ground-water wells.

GROUND-WATER LEVELS

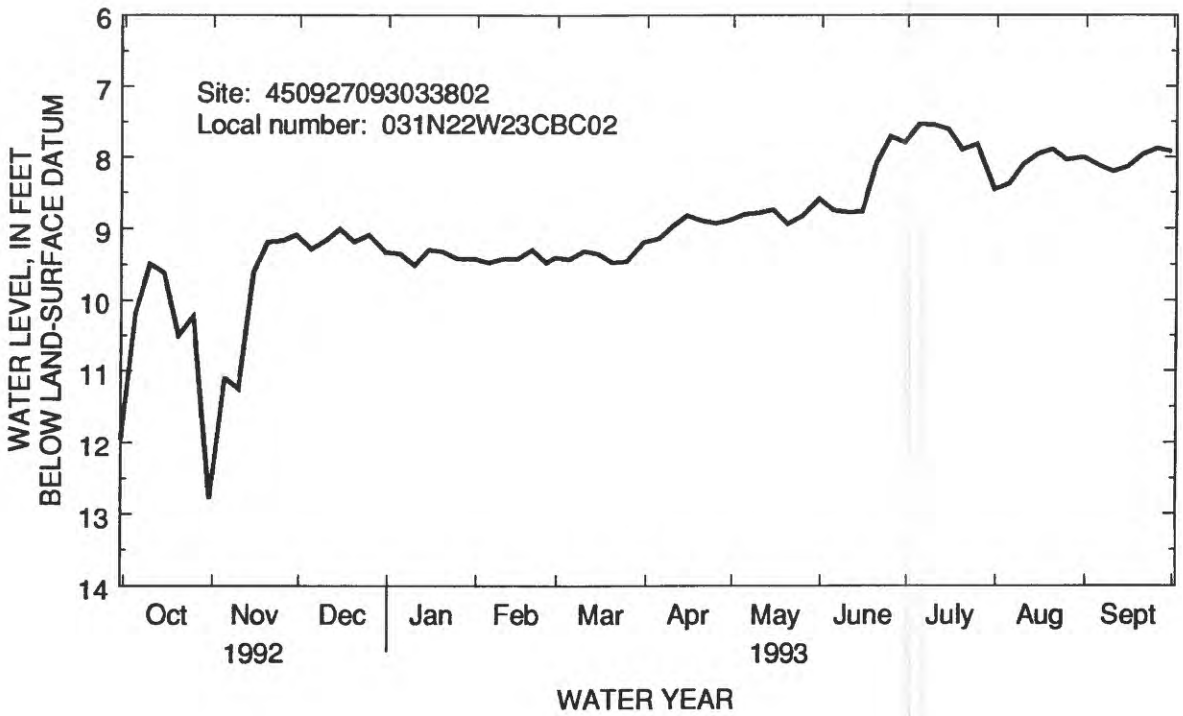
ANOKA COUNTY

450927093033802. Local number, 031N22W23CBC02.
LOCATION.--Lat 45°09'27", long 93°03'38", in SW¼NW¼SW¼ 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, 7.50 ft below land-surface datum, July 8, 1993; lowest, 18.57 ft below land-surface datum, Oct. 2, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MINIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	10.19	11.10	9.28	9.35	9.47	9.43	9.14	8.80	8.75	7.53	8.38	8.12
10	9.49	11.25	9.17	9.51	9.42	9.31	8.97	8.79	8.78	7.54	8.10	8.21
15	9.61	9.60	9.01	9.29	9.42	9.35	8.82	8.74	8.77	7.60	7.96	8.14
20	10.50	9.19	9.19	9.32	9.29	9.47	8.89	8.94	8.09	7.90	7.89	7.97
25	10.23	9.17	9.09	9.42	9.47	9.45	8.93	8.83	7.71	7.82	8.04	7.88
EOM	12.78	9.09	9.33	9.42	9.40	9.19	8.88	8.59	7.80	8.46	8.00	7.92



GROUND-WATER LEVELS

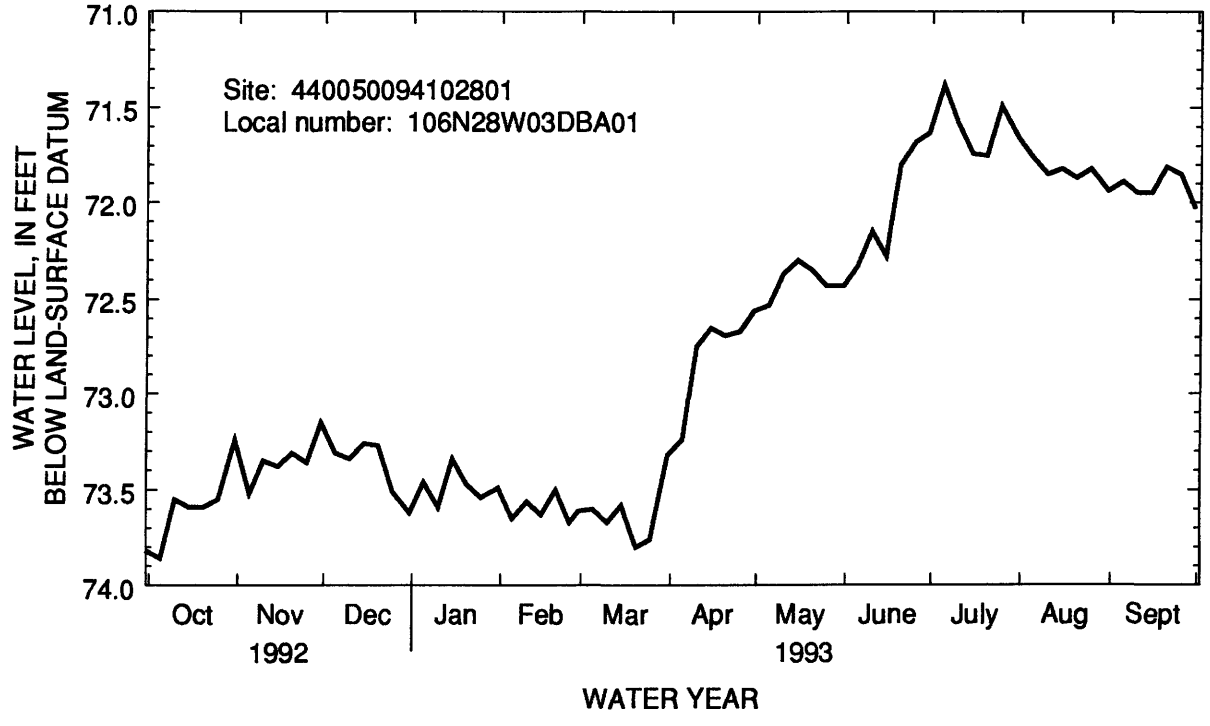
BLUE EARTH COUNTY

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 flow, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--October 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 71.25 below land-surface datum, July 4, 1993; lowest, 76.73 ft below land-surface datum, Oct. 18, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	73.86	73.52	73.31	73.46	73.65	73.60	73.24	72.53	72.33	71.38	71.76	71.89
10	73.55	73.35	73.34	73.59	73.56	73.67	72.75	72.37	72.15	71.58	71.85	71.95
15	73.59	73.38	73.26	73.34	73.63	73.58	72.65	72.30	72.28	71.74	71.82	71.95
20	73.59	73.31	73.27	73.47	73.50	73.80	72.69	72.35	71.80	71.75	71.87	71.81
25	73.55	73.36	73.51	73.54	73.67	73.76	72.67	72.43	71.68	71.49	71.82	71.85
EOM	73.24	73.15	73.62	73.49	73.61	73.32	72.56	72.43	71.63	71.66	71.94	72.03



GROUND-WATER LEVELS

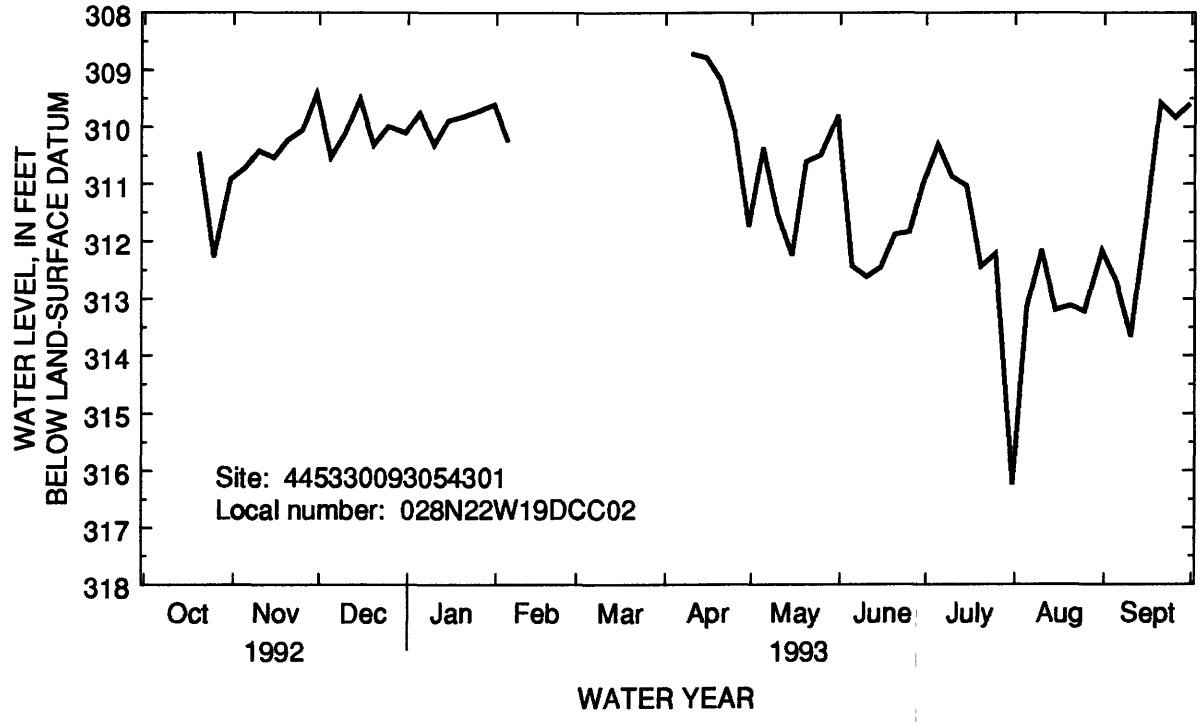
DAKOTA COUNTY

445330093054301. Local number, 028N22W19DCC02.
LOCATION.--Lat 44°53'30", Long 93°05'43", in SW¼SW¼S¼E sec. 19, T.28 N., R. 22W., 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, 308.40 ft below land-surface datum, Apr. 11, 1993; lowest, 328.0 ft below land-surface datum.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	---	310.72	310.53	309.76	310.25	---	---	310.36	312.43	310.30	313.15	312.72
10	---	310.42	310.12	310.31	---	---	308.72	311.53	312.62	310.87	312.15	313.66
15	---	310.54	309.51	309.89	---	---	308.78	312.24	312.45	311.04	313.19	311.66
20	310.45	310.23	310.32	309.83	---	---	309.17	310.60	311.88	312.44	313.11	309.58
25	312.27	310.06	309.99	309.74	---	---	310.07	310.48	311.84	312.22	313.22	309.84
EOM	310.93	309.42	310.10	309.61	---	---	311.74	309.80	310.98	316.24	312.16	309.60



GROUND-WATER LEVELS

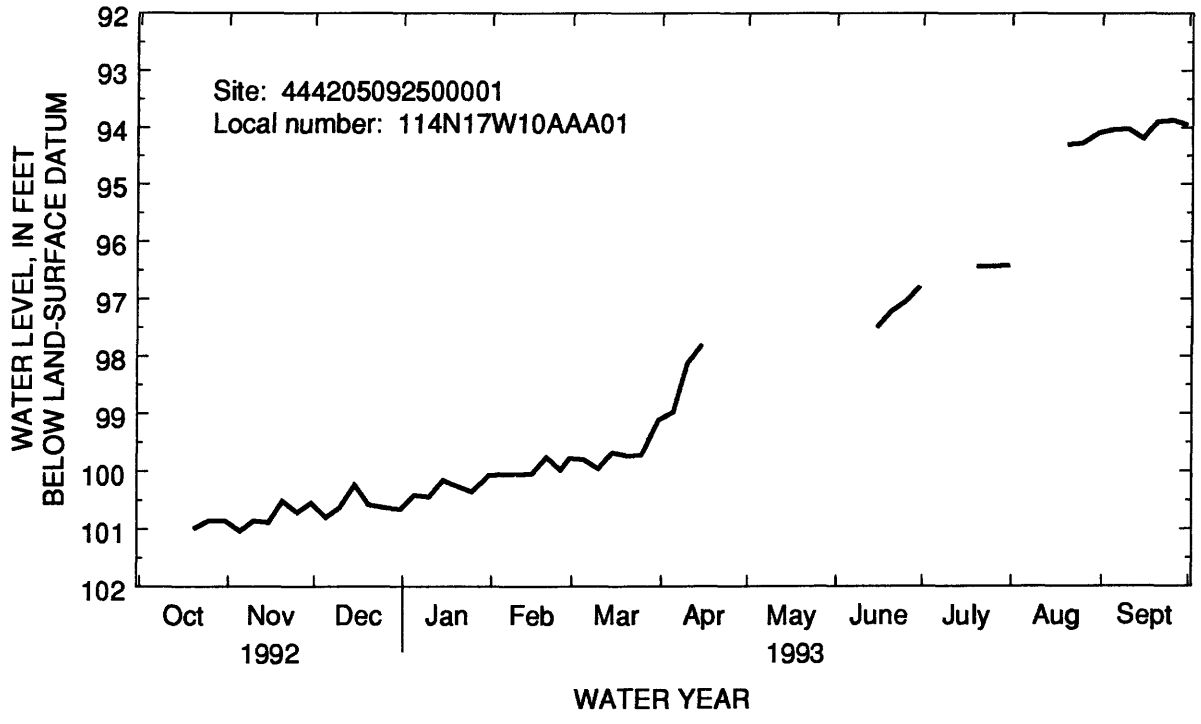
DAKOTA COUNTY--Continued

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, 93.47 ft below land-surface datum, Sept. 30, 1993; lowest, 107.4 ft below land-surface datum, Mar. 12, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	---	101.03	100.80	100.41	100.05	99.80	98.98	---	---	---	---	94.03
10	---	100.86	100.62	100.44	100.06	99.95	98.13	---	---	---	---	94.02
15	---	100.89	100.23	100.16	100.04	99.68	97.80	---	97.50	---	---	94.19
20	100.99	100.51	100.58	100.25	99.75	99.73	---	---	97.22	96.43	94.30	93.89
25	100.85	100.71	100.62	100.36	99.98	99.72	---	---	97.04	96.43	94.28	93.87
EOM	100.85	100.54	100.65	100.07	99.78	99.11	---	---	96.79	96.42	94.09	93.94



GROUND-WATER LEVELS

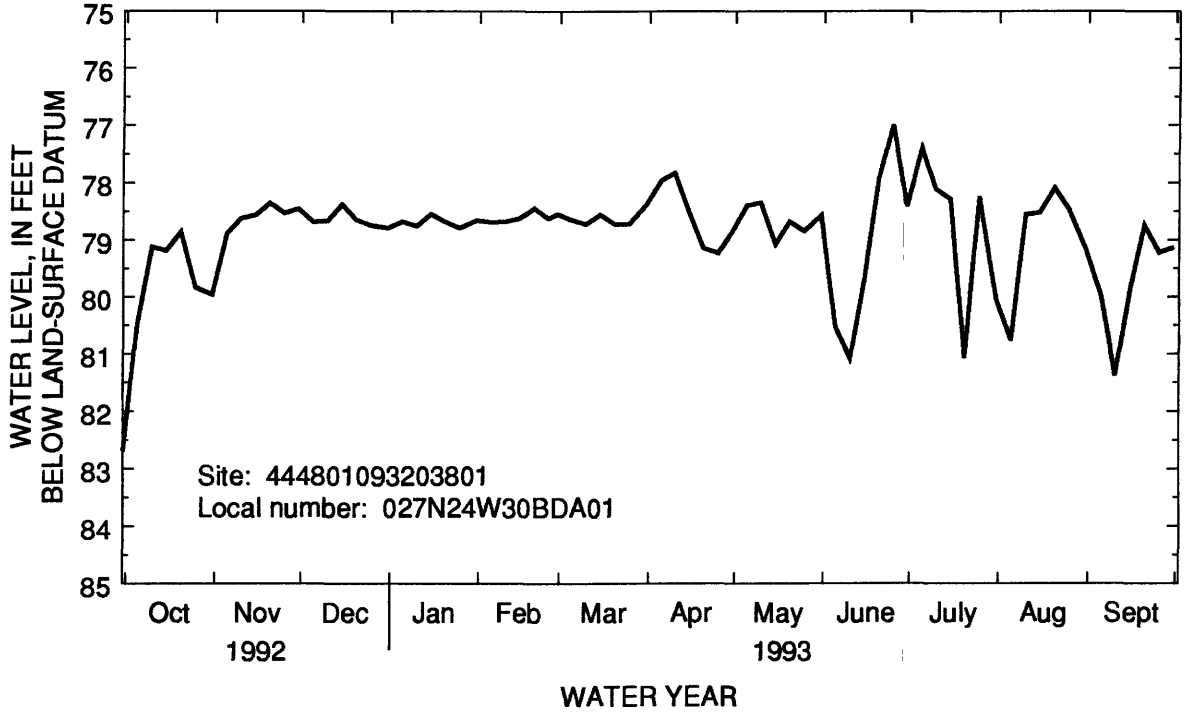
HENNEPIN COUNTY

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 1992 TO SEPTEMBER 1993

MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	80.49	78.89	78.69	78.67	78.68	78.64	77.96	78.40	80.53	77.40	80.76	79.95
10	79.12	78.62	78.66	78.75	78.67	78.72	77.83	78.34	81.07	78.11	78.55	81.37
15	79.19	78.56	78.37	78.54	78.62	78.55	78.53	79.07	79.71	78.28	78.52	79.87
20	78.85	78.35	78.64	78.67	78.44	78.72	79.14	78.67	77.95	81.06	78.08	78.74
25	79.83	78.53	78.74	78.78	78.62	78.72	79.23	78.84	77.00	78.24	78.45	79.22
EOM	79.95	78.45	78.79	78.65	78.54	78.38	78.85	78.56	78.41	80.06	79.16	79.13



GROUND-WATER LEVELS

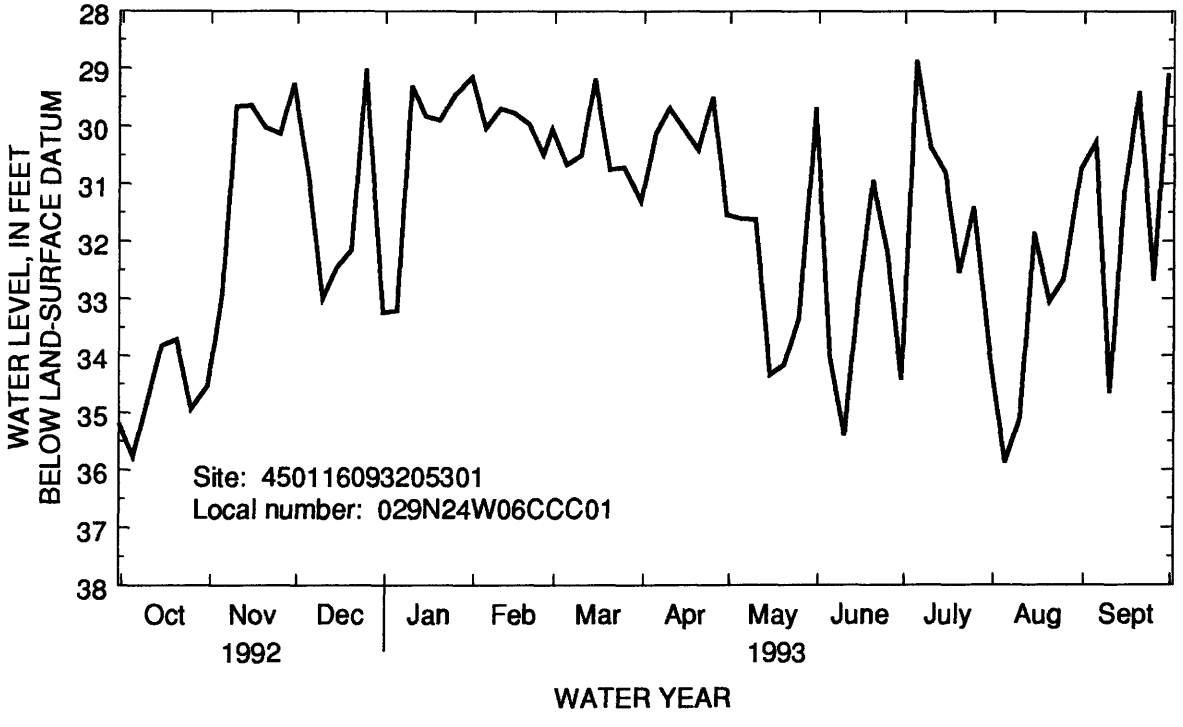
HENNEPIN COUNTY--Continued

450116093205301. Local number, 029N24W06CCC01.
LOCATION.--Lat 45°61'16", long 93°20'53", in SW¼SW¼SW¼ 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 1992 TO SEPTEMBER 1993

MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	35.77	32.91	30.89	33.21	30.03	30.66	30.13	31.61	33.98	28.87	35.88	30.28
10	34.78	29.67	33.00	29.31	29.70	30.51	29.69	31.62	35.40	30.37	35.10	34.64
15	33.82	29.64	32.44	29.83	29.78	29.19	30.05	34.34	32.93	30.81	31.85	31.05
20	33.71	30.02	32.15	29.90	29.97	30.75	30.41	34.17	30.94	32.54	33.04	29.41
25	34.93	30.13	29.02	29.47	30.49	30.71	29.50	33.33	32.21	31.41	32.66	32.68
EOM	34.53	29.27	33.24	29.15	30.05	31.30	31.54	29.69	34.42	34.13	30.73	29.10



GROUND-WATER LEVELS

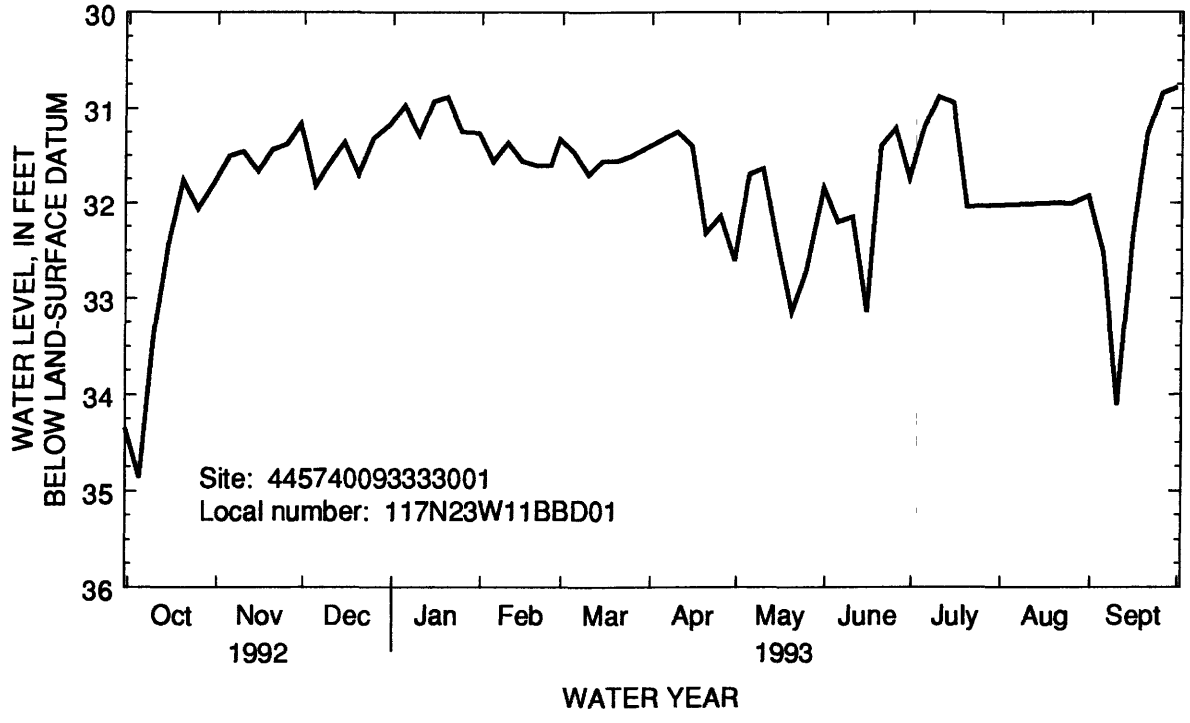
HENNEPIN COUNTY--Continued

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 1992 TO SEPTEMBER 1993

MAXIMUM VALUES

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 05	34.86	JAN 05	30.97	APR 10	31.25	JUL 05	31.19
10	33.36	10	31.28	15	31.40	10	30.88
15	32.44	15	30.93	20	32.32	15	30.94
20	31.76	20	30.88	25	32.14	20	32.04
25	32.06	25	31.25	30	32.61	AUG 20	32.00
31	31.79	31	31.26	MAY 05	31.70	25	32.01
NOV05	31.51	FEB 05	31.57	10	31.64	31	31.93
10	31.46	10	31.37	15	32.44	SEP 05	32.53
15	31.67	15	31.56	20	33.15	10	34.11
20	31.44	20	31.61	25	32.70	15	32.38
25	31.38	25	31.61	31	31.84	20	31.27
30	31.16	28	31.33	JUN 05	32.20	25	30.84
DEC 05	31.82	MAR 05	31.47	10	32.15	30	30.78
10	31.58	10	31.71	15	33.14		
15	31.36	15	31.56	20	31.40		
20	31.70	20	31.56	25	31.21		
25	31.32	25	31.51	30	31.74		
31	31.16						



GROUND-WATER LEVELS

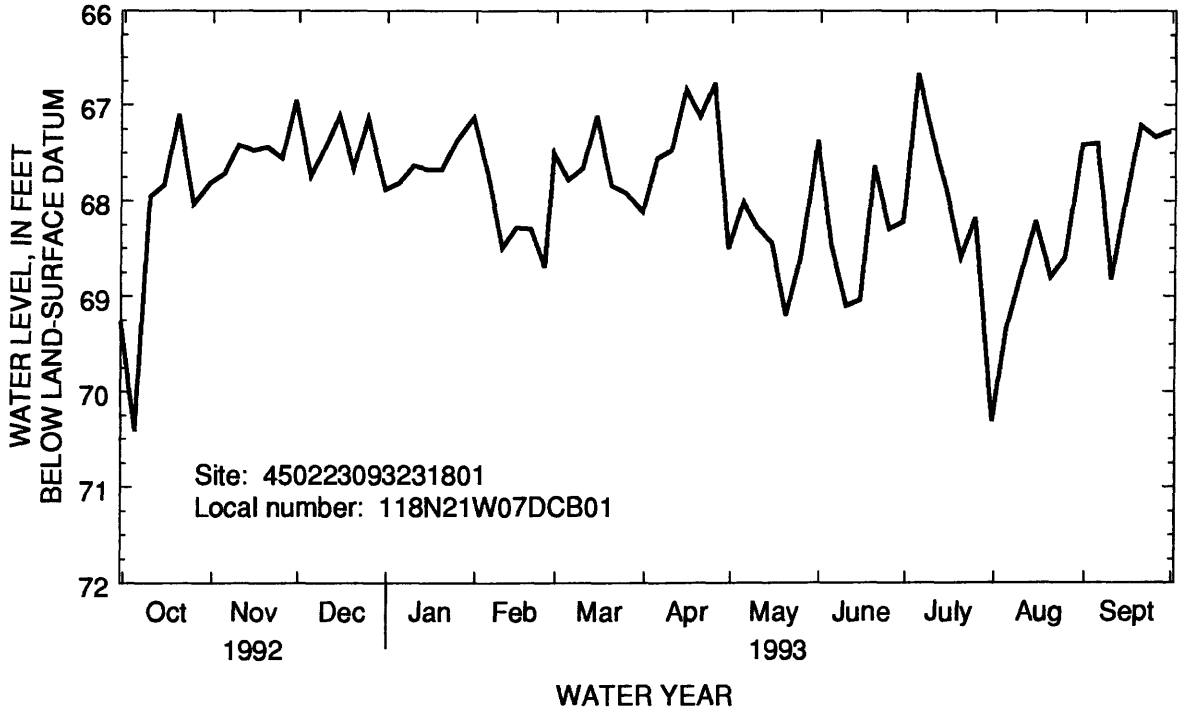
HENNEPIN COUNTY--Continued

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 1992 TO SEPTEMBER 1993

MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	70.41	67.71	67.74	67.81	67.70	67.78	67.55	68.01	68.47	66.67	69.34	67.40
10	67.95	67.42	67.45	67.63	68.49	67.66	67.47	68.28	69.10	67.32	68.75	68.82
15	67.83	67.47	67.11	67.67	68.28	67.11	66.84	68.44	69.04	67.90	68.21	67.96
20	67.10	67.44	67.66	67.67	68.29	67.84	67.12	69.20	67.64	68.59	68.80	67.21
25	68.03	67.55	67.14	67.37	68.69	67.91	66.77	68.60	68.29	68.18	68.60	67.33
EOM	67.81	66.95	67.88	67.13	67.50	68.11	68.50	67.37	68.22	70.31	67.41	67.27



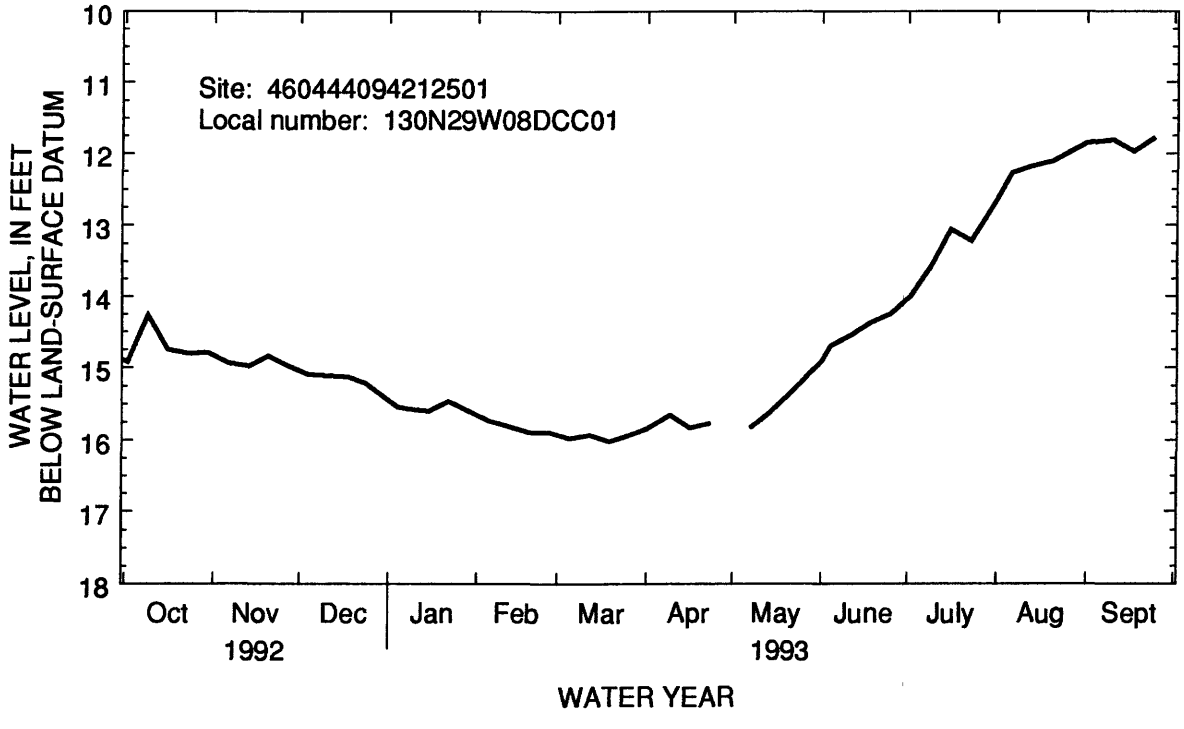
GROUND-WATER LEVELS

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 1992 TO SEPTEMBER 1993

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 02	14.92	JAN 04	15.55	APR 09	15.66	JUL 09	13.58
09	14.27	08	15.58	16	15.83	16	13.06
16	14.75	15	15.60	23	15.77	23	13.22
23	14.80	22	15.47	30	15.72	31	12.70
30	14.79	FEB 05	15.74	MAY 07	15.83	AUG 06	12.27
NOV 06	14.94	12	15.81	14	15.62	13	12.18
13	14.98	19	15.89	21	15.35	20	12.11
20	14.84	26	15.89	JUN 01	14.91	27	11.96
27	14.98	MAR 05	15.97	04	14.69	SEP 01	11.85
DEC 04	15.10	12	15.93	11	14.55	10	11.81
11	15.11	19	16.02	18	14.37	17	11.97
18	15.13	26	15.93	25	14.25	24	11.78
24	15.22	APR 01	15.84	JUL 02	14.00		



GROUND-WATER LEVELS

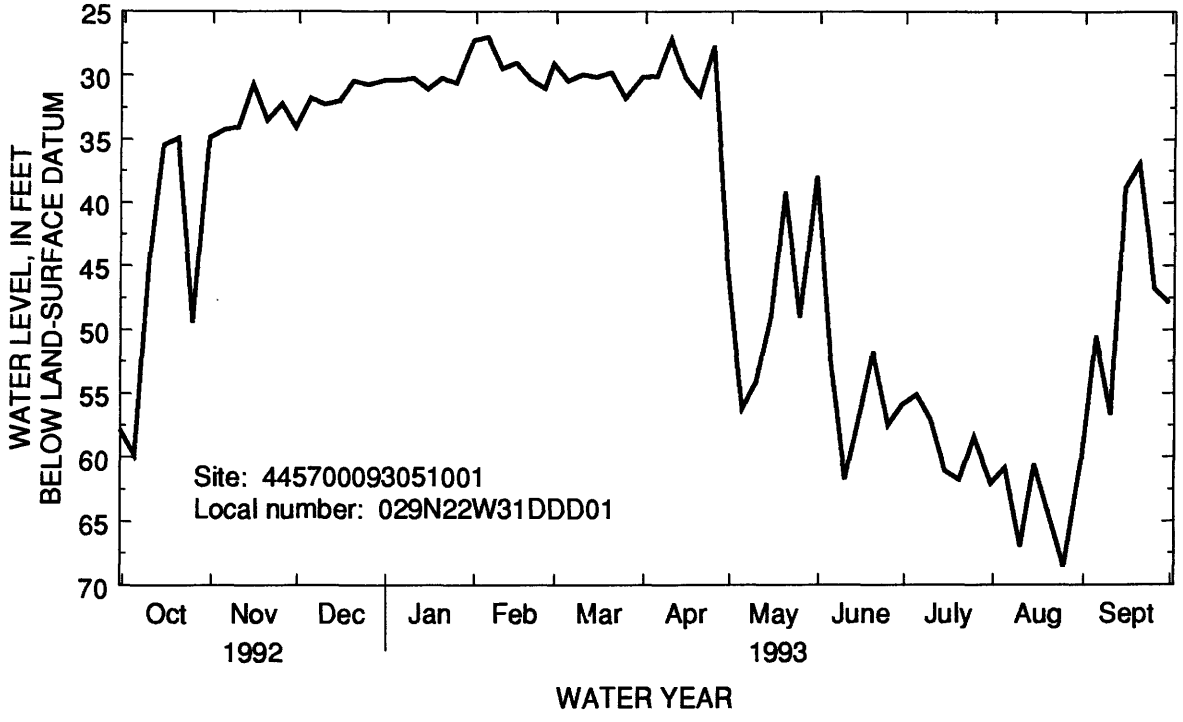
RAMSEY COUNTY

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, 24.44 ft below land-surface datum, Apr. 11, 1993; lowest, 83.28 ft below land-surface datum, Aug. 4, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	59.83	34.25	31.79	30.35	27.04	30.45	30.07	56.25	52.23	55.13	60.81	50.50
10	44.59	34.06	32.28	30.23	29.47	29.90	27.16	54.10	61.73	57.12	66.97	56.65
15	35.49	30.66	32.03	31.06	29.03	30.14	30.16	48.97	56.82	61.08	60.58	38.81
20	34.94	33.50	30.43	30.20	30.34	29.75	31.51	39.16	51.77	61.78	64.60	36.91
25	49.42	32.25	30.75	30.57	31.02	31.78	27.75	49.03	57.52	58.41	68.58	46.76
EOM	34.87	34.08	30.36	27.27	29.05	30.12	44.95	37.93	55.93	62.09	60.36	47.87



GROUND-WATER LEVELS

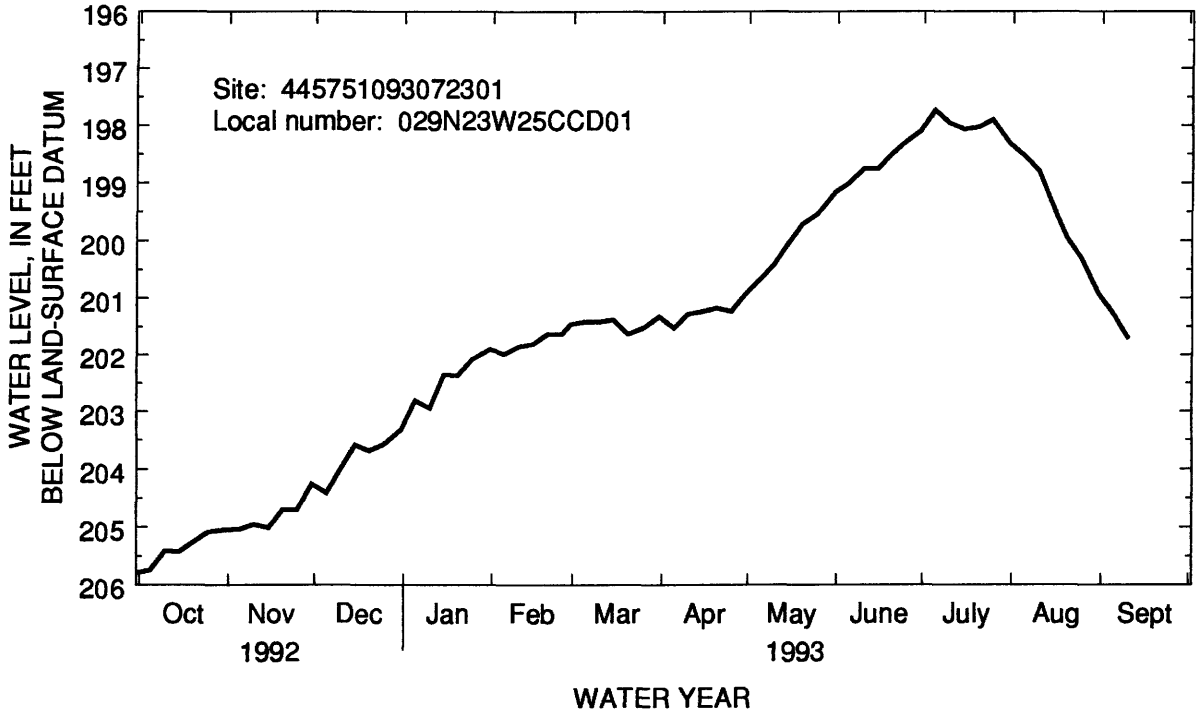
RAMSEY COUNTY--Continued

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 1992 TO SEPTEMBER 1993

MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	205.75	205.04	204.41	202.81	201.99	201.41	201.52	200.68	199.00	197.74	198.53	201.29
10	205.41	204.96	204.00	202.95	201.86	201.41	201.28	200.42	198.76	197.96	198.80	201.71
15	205.42	205.01	203.59	202.36	201.81	201.38	201.23	200.05	198.76	198.07	199.39	---
20	205.26	204.70	203.69	202.37	201.64	201.64	201.18	199.71	198.50	198.04	199.96	---
25	205.08	204.70	203.58	202.08	201.63	201.54	201.23	199.55	198.28	197.90	200.30	---
EOM	205.05	204.26	203.32	201.90	201.46	201.32	200.93	199.17	198.10	198.32	200.93	---



GROUND-WATER LEVELS

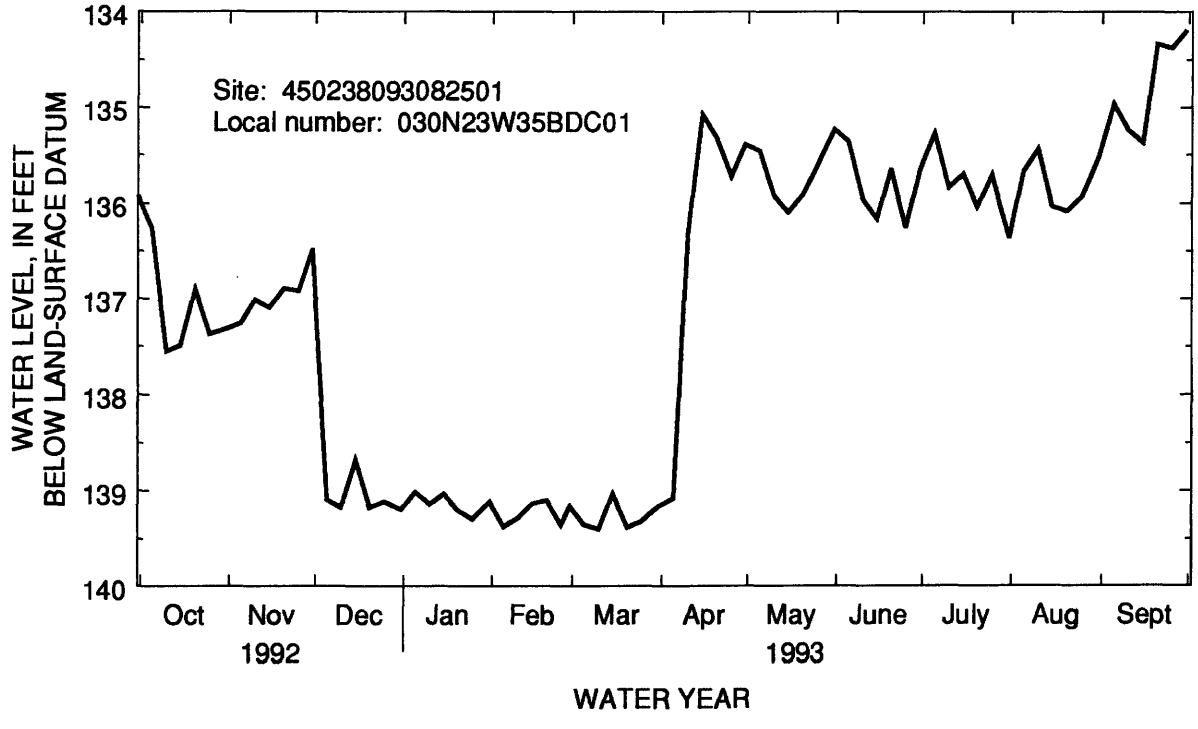
RAMSEY COUNTY--Continued

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 1992 TO SEPTEMBER 1993

MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	136.26	137.26	139.09	139.01	139.37	139.35	139.08	135.46	135.36	135.27	135.67	134.96
10	137.55	137.01	139.17	139.14	139.28	139.40	136.34	135.91	135.95	135.83	135.44	135.24
15	137.49	137.09	138.67	139.03	139.13	139.03	135.07	136.09	136.16	135.69	136.03	135.37
20	136.90	136.89	139.17	139.20	139.10	139.38	135.32	135.91	135.64	136.03	136.08	134.34
25	137.37	136.92	139.11	139.29	139.35	139.32	135.72	135.61	136.25	135.70	135.93	134.37
EOM	137.32	136.48	139.19	139.11	139.16	139.16	135.39	135.23	135.65	136.36	135.51	134.19



GROUND-WATER LEVELS

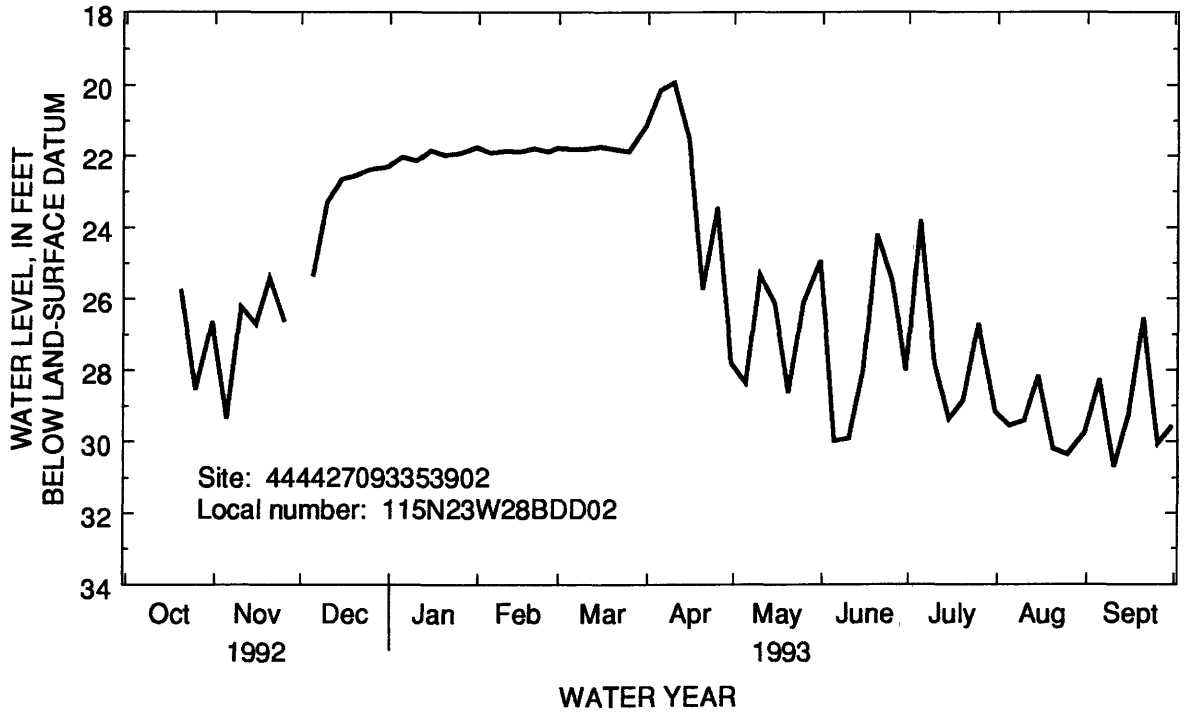
SCOTT COUNTY

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, 19.59 ft below land-surface datum, Apr. 8, 1993; lowest, 45.28 ft below land-surface datum, July 29, 1991.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	---	29.33	25.36	22.04	21.90	21.80	20.14	28.36	29.97	23.80	29.55	28.26
10	---	26.22	23.31	22.13	21.85	21.80	19.93	25.31	29.90	27.80	29.41	30.69
15	---	26.71	22.66	21.84	21.86	21.73	21.49	26.12	28.01	29.35	28.17	29.25
20	25.74	25.41	22.56	21.97	21.78	21.80	25.73	28.63	24.19	28.85	30.19	26.55
25	28.53	26.63	22.39	21.93	21.88	21.88	23.45	26.10	25.46	26.70	30.34	30.05
EOM	26.65	---	22.31	21.75	21.76	21.16	27.81	24.93	28.01	29.16	29.74	29.57



GROUND-WATER LEVELS

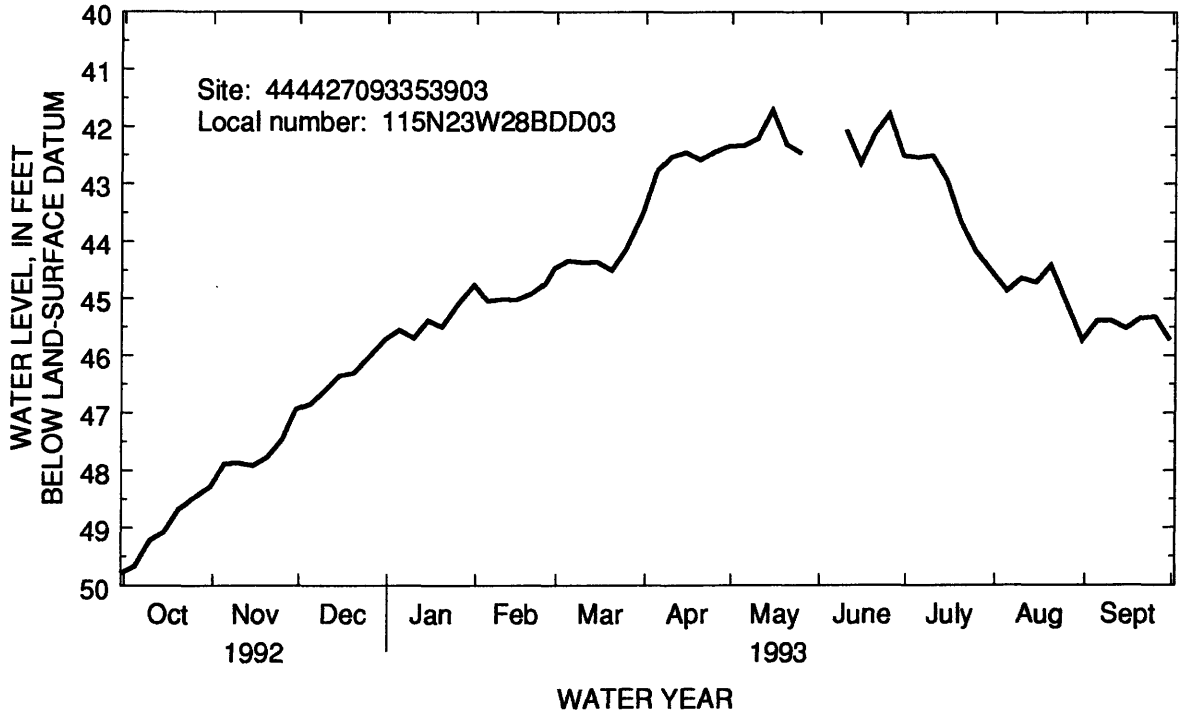
SCOTT COUNTY--Continued

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 1992 TO SEPTEMBER 1993

MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	49.67	47.88	46.85	45.56	45.05	44.34	42.77	42.34	---	42.55	44.86	45.39
10	49.23	47.87	46.61	45.70	45.01	44.37	42.54	42.21	42.07	42.52	44.64	45.39
15	49.08	47.92	46.36	45.39	45.03	44.36	42.46	41.71	42.65	42.94	44.72	45.53
20	48.68	47.77	46.32	45.50	44.91	44.50	42.59	42.32	42.13	43.66	44.42	45.35
25	48.48	47.47	46.05	45.14	44.74	44.15	42.45	42.47	41.78	44.16	45.02	45.33
EOM	48.29	46.94	45.73	44.76	44.47	43.51	42.35	---	42.52	44.55	45.74	45.73



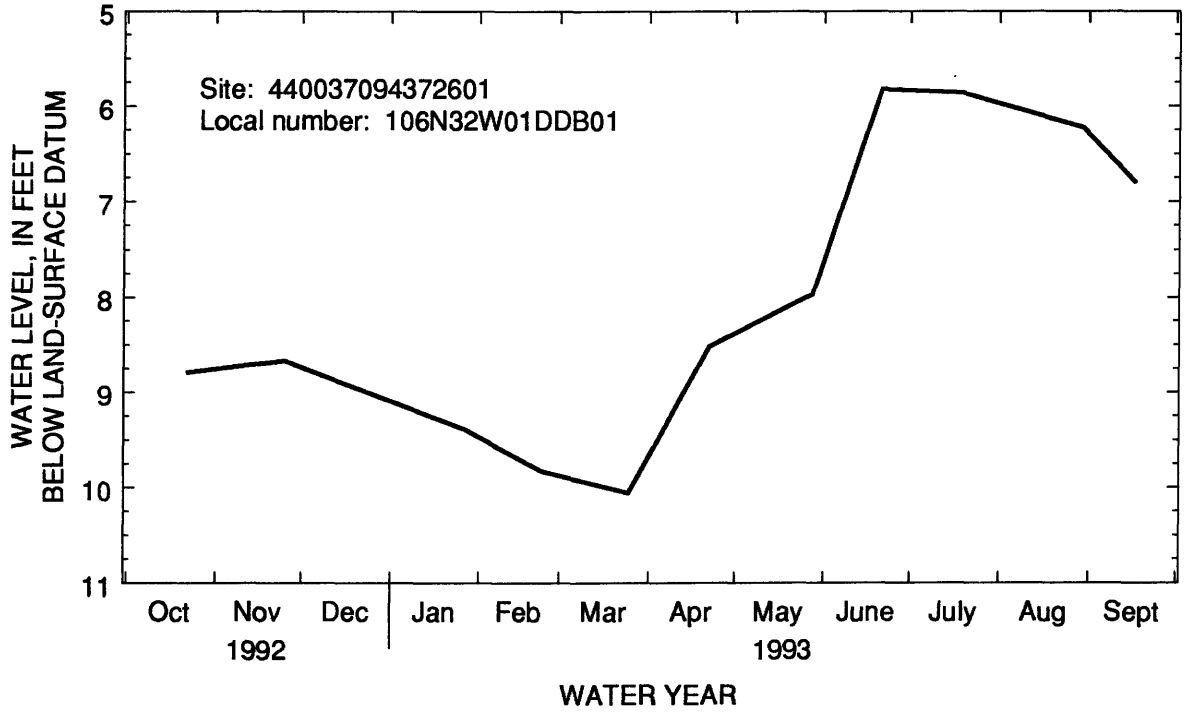
GROUND-WATER LEVELS

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 1992 TO SEPTEMBER 1993

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 22	8.79	JAN 27	9.39	APR 22	8.52	JUL 19	5.86
NOV 25	8.67	FEB 23	9.83	MAY 28	7.97	AUG 30	6.23
DEC 28	9.05	MAR 25	10.06	JUN 21	5.82	SEP 17	6.80



QUALITY OF GROUND WATER

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

AITKIN COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	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)
461457093313301	03-22-93	1215	90.00	626	7.5	71	33	8.2	2.2	350
461753093294601	03-17-93	1300	125.00	404	7.9	45	19	9.9	1.7	220
462145093285901	03-17-93	1155	35.00	1570	7.6	170	80	38	10	380
462346093360401	03-26-93	1030	55.00	--	--	--	--	--	--	--
462427093294202	03-17-93	1035	102.00	226	8.3	27	8.2	6.6	1.4	121
462508093334402	03-26-93	0820	30.00	199	7.2	23	8.7	4.3	0.60	81

DATE	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)	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)
03-22-93	--	3.5	<0.10	22	0.010	<0.050	0.300	0.60	<0.010	930	500
03-17-93	0.60	8.5	0.20	18	<0.010	<0.050	0.310	0.40	0.060	490	120
03-17-93	98	72	0.10	22	0.020	77.0	0.020	0.70	0.020	10	1
03-26-93	--	--	--	--	0.010	<0.050	0.320	0.90	0.030	--	--
03-17-93	2.1	0.70	0.10	16	<0.010	<0.050	0.150	<0.20	0.060	58	67
03-26-93	16	2.7	0.10	35	0.010	0.190	0.030	<0.20	0.020	33	23

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

BECKER COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)
465145095094501	10-28-92	1000	21.00	<0.001	0.095	<0.002	<0.20
465145095094501	05-11-93	1700	21.00	<0.001	0.147	<0.002	<0.20
465145095094501	09-01-93	1130	21.00	<0.001	0.107	0.004	<0.20
465356095083401	05-12-93	1030	29.00	<0.001	24.0	<0.002	0.30
465356095083401	09-02-93	1500	29.00	0.001	9.60	<0.002	<0.20
465356095121701	10-28-92	1600	29.00	0.001	<0.005	0.410	0.40
465356095121701	05-10-93	1730	29.00	<0.001	<0.005	0.193	0.30
465356095121701	08-03-93	1030	29.00	--	--	--	--
465356095121701	08-31-93	1910	29.00	<0.001	<0.005	0.174	0.30
465455095133001	11-04-92	1100	27.00	0.003	0.008	0.176	<0.20
465455095133001	05-10-93	1800	27.00	<0.001	2.70	0.003	<0.20
465455095133001	08-31-93	1825	27.00	0.001	3.00	<0.002	<0.20
465537095163701	05-11-93	1530	35.00	<0.001	0.976	0.003	<0.20
465537095163701	08-03-93	1240	35.00	--	--	--	--
465537095163701	08-31-93	1730	35.00	<0.001	0.874	0.005	<0.20
465607095110201	11-04-92	1000	62.00	0.004	4.90	0.014	<0.20
465607095110201	05-11-93	1030	62.00	<0.001	5.40	<0.002	<0.20
465607095110201	08-03-93	0800	62.00	--	--	--	--
465607095110201	08-31-93	1430	62.00	<0.001	5.70	0.005	<0.20
465657095144801	01-13-93	1330	49.00	0.001	0.740	0.017	<0.20
465657095144801	05-11-93	1200	49.00	<0.001	19.0	<0.002	<0.20
465657095144801	08-31-93	1530	49.00	<0.001	0.789	<0.002	<0.20
465722095170701	05-11-93	1300	16.00	<0.001	12.0	<0.002	<0.20
465722095170701	08-31-93	1635	16.00	<0.001	7.20	<0.002	<0.20

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

BECKER COUNTY--Continued

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)
465356095121701	08-03-93	1030	29.00	<0.01	<0.01	<0.01	76	<0.01	<0.01	<0.01
465537095163701	08-03-93	1240	35.00	<0.01	<0.01	<0.01	69	<0.01	<0.01	<0.01
465607095110201	08-03-93	0800	62.00	<0.01	<0.01	<0.01	70	0.01	<0.01	<0.01

DATE	CARBARYL WATER FLTRD 0.7 U GF, REC (UG/L) (82680)	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)	DEETHYLATRAZINE, 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)
08-03-93	<0.05	<0.01	<0.00	<0.01	<0.00	<0.02	<0.01	85	<0.02	<0.02	<0.02
08-03-93	<0.05	<0.01	<0.00	<0.01	<0.00	<0.02	<0.01	82	<0.02	<0.02	<0.02
08-03-93	<0.05	<0.01	<0.00	<0.01	<0.00	<0.02	<0.01	84	<0.02	<0.02	<0.02

DATE	ETHOPROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)	LINDANE DISSOLVED (UG/L) (39341)	LINURON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	MALATHION, DISSOLVED (UG/L) (39532)	METHYL AZINPHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)	METHYL PARATHION WAT FLT 0.7 U GF, REC (UG/L) (82667)	METOLACHLOR WATER DISSOLV (UG/L) (39415)	METRIBUZIN SENCOR WATER DISSOLV (UG/L) (82630)	MOLINATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)
08-03-93	<0.01	<0.01	<0.01	<0.04	<0.01	<0.08	<0.03	<0.01	<0.01	<0.01
08-03-93	<0.01	<0.01	<0.01	<0.04	<0.01	<0.08	<0.03	<0.01	<0.01	<0.01
08-03-93	<0.01	<0.01	<0.01	<0.04	<0.01	<0.08	<0.03	<0.01	<0.01	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

BECKER COUNTY--Continued

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)
08-03-93	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02
08-03-93	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02
08-03-93	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02

DATE	PRO-PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	PRO-PARGITE WATER FLTD 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)
08-03-93	<0.02	<0.01	<0.01	<0.02	<0.03	<0.01	100	<0.01	<0.00	<0.01
08-03-93	<0.02	<0.01	<0.01	<0.02	<0.03	<0.01	110	<0.01	<0.00	<0.01
08-03-93	<0.02	<0.01	<0.01	<0.02	<0.03	<0.01	98	<0.01	<0.00	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

BELTRAMI COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	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)
472705094521800	07-27-93	1300	14.00	2050	7.8	42	6.3	380
472724095055200	07-27-93	1010	26.50	--	--	--	--	--
472846094533700	07-27-93	1600	21.00	502	7.6	61	14	20
472938094522800	07-27-93	1645	14.00	1340	6.9	170	31	37
473010094494000	07-28-93	1400	50.00	409	7.4	54	18	1.8
473045094545400	07-27-93	1450	14.00	430	7.2	64	15	1.1
473140095041200	07-27-93	1210	16.00	631	7.5	69	24	6.3
473238094581400	07-27-93	1305	15.00	--	--	--	--	--
473318094565300	07-27-93	1400	17.50	--	--	--	--	--

DATE	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	CHLO-SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	FLUO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	SILICA, RIDE, DIS-SOLVED (MG/L AS F) (00950)	NITRO-GEN, 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,AM-AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)
07-27-93	1.0	19	440	0.20	17	<0.010	1.80	0.020	0.20
07-27-93	--	--	--	--	--	<0.010	<0.050	0.360	0.50
07-27-93	1.6	4.8	20	<0.10	17	<0.010	1.40	0.030	<0.20
07-27-93	4.3	1.2	150	0.10	30	<0.010	<0.050	9.10	52
07-28-93	1.8	2.9	0.40	<0.10	22	<0.010	<0.050	0.420	0.40
07-27-93	0.80	3.4	0.50	0.10	16	<0.010	<0.050	0.080	0.40
07-27-93	2.0	0.50	0.60	0.10	19	<0.010	<0.050	0.300	0.40
07-27-93	--	--	--	--	--	<0.010	0.092	0.040	<0.20
07-27-93	--	--	--	--	--	<0.010	0.260	<0.010	<0.20

DATE	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	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)
07-27-93	0.060	1	<1.0	<1	<1	<10	<0.1	<1
07-27-93	0.030	--	--	--	--	--	--	--
07-27-93	0.090	2	<1.0	1	<1	1	<0.1	<1
07-27-93	0.320	1	<1.0	1	3	660	<0.1	<1
07-28-93	0.050	--	--	--	--	--	--	--
07-27-93	0.020	<1	<1.0	<1	<1	1000	<0.1	<1
07-27-93	<0.010	--	--	--	--	--	--	--
07-27-93	<0.010	<1	<1.0	<1	<1	60	<0.1	<1
07-27-93	0.020	<1	<1.0	<1	<1	<10	<0.1	<1

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

BELTRAMI COUNTY--Continued

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	ALA-CHLOR TOTAL RECOVER (UG/L) (77825)	AME-TRYNE TOTAL (82184)	ATRA-ZINE WATER UNFLTRD REC (UG/L) (39630)	CARBOX-IN WATER WHOLE RECOV-ERABLE (UG/L) (30245)	CYAN-AZINE TOTAL (UG/L) (81757)
473238094581400	07-27-93	1305	15.00	<0.10	<0.10	<0.1	<0.20	<0.20
473318094565300	07-27-93	1400	17.50	<0.10	<0.10	<0.1	<0.20	<0.20

DATE	CYCLO-ATE WATER WHOLE RECOV-ERABLE (UG/L) (30254)	DEETHYL ATRA-ZINE, WATER, WHOLE, TOTAL (UG/L) (75981)	DE-ISO PROPYL ATRAZIN WATER, WHOLE, TOTAL (UG/L) (75980)	DIPHEN-AMID WATER WHOLE RECOV-ERABLE (UG/L) (30255)	HEXAZI-NONE WATER WHOLE RECOV-ERABLE (UG/L) (30264)	METOLA-CHLOR WATER WHOLE TOT.REC (UG/L) (82612)	METRI-BUZIN WATER WHOLE TOT.REC (UG/L) (82611)	PROME-TONE TOTAL (UG/L) (39056)
07-27-93	<0.10	<0.20	<0.20	<0.10	1.0	<0.20	<0.10	<0.20
07-27-93	<0.10	<0.20	<0.20	<0.10	<0.20	<0.20	<0.10	<0.20

DATE	PROME-TRYNE TOTAL (UG/L) (39057)	PROPA-CHLOR WATER WHOLE RECOV. (UG/L) (30295)	PRO-PAZINE TOTAL (UG/L) (39024)	SIMA-ZINE TOTAL (UG/L) (39055)	SIME-TRYNE TOTAL (UG/L) (39054)	TER-BACIL WATER WHOLE RECOV. (UG/L) (30311)	TRI-FLURA-LIN TOTAL RECOVER (UG/L) (39030)	VER-NOLATE WATER WHOLE RECOV. (UG/L) (30324)
07-27-93	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10
07-27-93	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

CROW WING COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	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)
462708093522501	03-24-93	1430	143.00	327	7.8	40	12	7.6	1.7	177
462827093582602	03-23-93	1115	65.00	333	7.4	46	8.4	7.4	1.3	159
462827093582603	03-23-93	1115	50.00	319	7.2	41	9.2	7.0	1.1	142
462829093561201	03-23-93	1430	45.00	297	7.4	44	6.8	5.2	1.2	153
462848093564301	03-23-93	1300	90.00	324	7.8	41	8.6	8.0	1.5	149

DATE	CHLO-SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	FLUO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	SILICA, RIDE, DIS-SOLVED (MG/L AS F) (00950)	NITRO-GEN, 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)	NITROGEN 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)
03-24-93	0.40	1.5	0.10	19	0.020	<0.050	0.380	0.70	0.090	690	34
03-23-93	5.9	17	<0.10	22	<0.010	<0.050	0.290	0.30	0.030	4900	590
03-23-93	12	18	<0.10	23	0.030	0.089	0.220	0.20	<0.010	5800	1200
03-23-93	<0.10	5.3	<0.10	21	0.030	<0.050	0.580	0.70	0.030	5800	410
03-23-93	3.9	12	<0.10	16	<0.010	<0.050	0.670	0.70	0.030	1400	610

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

GRANT COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)
455153095064801	09-27-93	1800	32.00	720	7.2	8.0	6.5	--	--	--	--
455153095064801	09-28-93	1200	32.00	1930	6.8	12.5	0.1	<0.010	<0.050	0.270	<0.010

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)
455153095064801 '	09-28-93	1200	32.00	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20

DATE	BENZENE 1,2,4-TRI-CHLORO-WAT UNF REC (UG/L) (34551)	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)
09-28-93	<0.20	<0.2	<0.20	6.9	<0.2	<0.2	<0.20	<0.2	<0.20	2.3	<0.2

DATE	2-CHLORO-ETHYL-VINYL-ETHER TOTAL (UG/L) (34576)	ACRO-LEIN TOTAL (UG/L) (34210)	ACRYLO-NITRILE TOTAL (UG/L) (34215)	BROMO-BENZENE WATER, BENZENE TOTAL (UG/L) (34030)	BROMO-WHOLE, TOTAL (UG/L) (81555)	CARBON-TETRA-CHLO-FORM TOTAL (UG/L) (32104)	CHLORO-RIDE TOTAL (UG/L) (32102)	CHLORO-DI-BROMO-BENZENE TOTAL (UG/L) (34301)	CHLORO-METHANE TOTAL (UG/L) (32105)	ETHANE TOTAL (UG/L) (34311)
09-28-93	<1.0	<20	<20	78	<0.2	<0.2	<0.2	<0.20	<0.2	<0.2

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

GRANT COUNTY--Continued

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-METHANE TOTAL (UG/L) (32101)	DI-CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	ETHYL-BENZENE TOTAL (UG/L) (34371)	FREON-113 WATER UNFLTRD REC (UG/L) (77652)	HEXA-CHLORO-BUT-ADIENE TOTAL (UG/L) (39702)	MESIT-YLENE WATER UNFLTRD REC (UG/L) (77226)
09-28-93	<0.2	<0.2	<0.2	<1.0	<0.2	<0.2	0.9	<0.5	<0.2	<0.20

DATE	METHYL-BROMIDE TOTAL (UG/L) (34413)	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)	PSEUDO-CUMENE WATER UNFLTRD REC (UG/L) (77222)
09-28-93	<0.2	<0.2	<0.2	<0.20	<0.20	<0.2	<0.2	<0.20	<0.20	<0.20

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)
09-28-93	<0.20	<0.2	<0.20	<0.2	0.6	<0.2	<0.2	<0.2	<0.2	5.3

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

HUBBARD COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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-AMONIA + 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)	TRITIUM TOTAL (PCI/L) (07000)
465228095071201	10-27-92	1400	--	0.010	0.158	0.076	<0.20	--	--	--
465228095071201	05-14-93	1000	--	<0.001	0.184	0.070	<0.20	--	--	--
465228095071201	09-01-93	1730	--	<0.001	0.184	0.027	<0.20	--	--	--
465230095044501	10-26-92	1600	27.00	0.005	3.70	0.016	<0.20	--	--	--
465230095044501	05-11-93	1830	27.00	0.012	4.80	<0.002	<0.20	--	--	--
465230095044501	09-01-93	1445	27.00	0.009	4.40	<0.002	<0.20	--	--	--
465235095065801	10-27-92	1200	--	0.003	60.0	0.013	0.30	--	--	--
465235095065801	05-14-93	1100	--	<0.001	51.0	<0.002	0.50	--	--	--
46523509506580	1 05-14-93	1115	--	<0.001	52.0	<0.002	0.40	--	--	--
465235095065801	09-01-93	1600	--	<0.001	42.0	<0.002	0.30	--	--	--
465235095065801	09-01-93	1605	--	<0.001	42.0	<0.002	0.30	--	--	--
465235095065802	10-27-92	1215	--	0.009	18.0	0.019	0.20	--	--	--
465235095065802	05-14-93	1200	--	0.016	7.70	<0.002	0.30	--	--	--
465235095065802	09-01-93	1700	--	0.024	23.0	0.006	0.20	--	--	--
465237095094301	10-28-92	0800	28.00	0.003	0.552	0.003	<0.20	--	--	--
465237095094301	05-11-93	1730	28.00	<0.001	0.892	<0.002	<0.20	--	--	--
465237095094301	08-03-93	1455	28.00	--	--	--	--	--	--	--
465237095094301	09-01-93	1035	28.00	<0.001	0.794	0.007	<0.20	--	--	--
465237095094301	09-08-93	1030	28.00	--	--	--	--	--	--	75
465255095065701	10-27-92	0930	--	0.012	4.20	0.011	<0.20	--	--	--
465255095065701	05-13-93	1300	--	<0.001	6.50	<0.002	0.20	--	--	--
465255095065701	09-02-93	1130	--	<0.001	1.00	<0.002	<0.20	--	--	--
465255095065702	10-27-92	0945	--	0.004	8.40	0.010	<0.20	--	--	--
465255095065702	05-13-93	1330	--	<0.001	9.60	<0.002	<0.20	--	--	--
465255095065702	09-02-93	1200	--	<0.001	11.0	<0.002	<0.20	--	--	--
465303095042201	10-26-92	1500	29.00	0.003	10.0	0.008	<0.20	--	--	--
465303095042201	05-11-93	1900	29.00	<0.001	11.0	<0.002	<0.20	--	--	--
465303095042201	08-02-93	1700	29.00	--	--	--	--	--	--	--
465303095042201	09-08-93	2000	29.00	0.001	12.0	<0.002	<0.20	--	--	--
465328095090501	10-28-92	1415	--	0.004	17.0	0.009	0.20	--	--	--
465328095090501	05-13-93	0900	--	<0.001	18.0	<0.002	0.30	--	--	--
465328095090501	08-30-93	1845	--	<0.001	15.0	0.004	<0.20	--	--	--
465328095090501	09-01-93	0930	--	<0.001	12.0	<0.002	<0.20	0.003	<0.001	--
465328095090502	10-28-92	1415	--	0.004	9.20	0.006	<0.20	--	--	--
465328095090502	05-13-93	0930	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

HUBBARD COUNTY--Continued

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)	TRITIUM TOTAL (PCI/L) (07000)
465328095090502	05-13-93	0930	--	<0.001	15.0	0.005	<0.20	--	--	--
465328095090502	08-30-93	1915	--	<0.001	18.0	0.006	<0.20	--	--	--
465330095062201	10-27-92	1600	--	0.003	11.0	0.026	<0.20	--	--	--
465330095062201	05-13-93	1430	--	<0.001	21.0	<0.002	<0.20	--	--	--
465330095062201	08-03-93	1830	--	--	--	--	--	--	--	--
465330095062201	09-08-93	1645	--	<0.001	21.0	<0.002	0.20	--	--	--
465330095062202	10-27-92	1615	--	0.003	4.20	0.010	<0.20	--	--	--
465330095062202	05-13-93	1500	--	<0.001	6.90	<0.002	<0.20	--	--	--
465330095062202	09-08-93	1715	--	<0.001	6.40	<0.002	<0.20	--	--	--
465330095070001	10-27-92	1055	--	0.002	9.10	0.008	<0.20	--	--	--
465330095070001	03-15-93	1230	--	--	--	--	--	--	--	--
465330095070001	05-12-93	1800	--	<0.001	18.0	0.003	<0.20	--	--	--
465330095070001	09-01-93	1900	--	<0.001	17.0	<0.002	<0.20	--	--	--
465330095070002	10-27-92	1100	--	0.003	6.00	0.006	<0.20	--	--	--
465330095070002	05-12-93	1830	--	<0.001	7.60	<0.002	<0.20	--	--	--
465330095070002	09-01-93	1930	--	<0.001	6.40	<0.002	<0.20	--	--	--
465356095072101	10-27-92	1500	--	0.004	8.80	0.007	<0.20	--	--	--
46535609507210 1	05-13-93	1530	--	<0.001	7.80	<0.002	<0.20	--	--	--
465356095072101	09-08-93	1830	--	<0.001	7.30	<0.002	0.30	--	--	--
46535609507210 1	09-08-93	1835	--	<0.001	7.20	<0.002	<0.20	--	--	--
465356095072102	10-27-92	1515	--	0.003	3.80	0.007	<0.20	--	--	--
465356095072102	05-13-93	1600	--	<0.001	4.00	<0.002	<0.20	--	--	--
465356095072102	09-08-93	1900	--	<0.001	4.00	<0.002	<0.20	0.006	0.006	--
465408095084201	05-12-93	1400	28.50	<0.001	20.0	<0.002	<0.20	--	--	--
465408095084201	06-29-93	1100	28.50	<0.001	23.0	0.009	<0.20	--	--	--
465408095084201	07-15-93	1000	28.50	--	--	--	--	--	--	--
465408095084201	07-15-93	1200	28.50	<0.001	21.0	<0.002	<0.20	--	--	--
465408095084201	08-03-93	1700	28.50	<0.001	1.00	0.063	0.30	0.013	0.002	--
465408095084201	08-18-93	1430	28.50	0.002	25.0	<0.002	0.30	--	--	--
465408095084201	09-02-93	0945	28.50	<0.001	24.0	<0.002	<0.20	--	--	45

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

HUBBARD COUNTY--Continued

STATION NUMBER	DATE	TIME	NITRO-GEN, DEPTH OF WELL, TOTAL (FEET) (72008)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN,AM-AMMONIA DIS-SOLVED (MG/L AS N) (00608)	MONIA + ORGANIC DIS. (MG/L AS N) (00623)	TRITIUM TOTAL (PCI/L) (07000)
465408095084301	07-15-93	1400	--	0.001	0.063	0.493	0.80	--
465408095084301	07-15-93	1500	--	--	--	--	--	--
465408095084301	08-02-93	1800	--	--	--	--	--	--
465408095084301	09-02-93	0930	--	<0.001	0.005	0.448	0.70	47
465422095091101	05-12-93	1200	30.00	<0.001	0.676	<0.002	<0.20	--
465422095091101	09-08-93	1445	30.00	0.001	15.0	<0.002	0.20	--
465442095094001	10-28-92	1100	--	0.002	17.0	0.006	<0.20	--
465442095094001	05-13-93	1030	--	<0.001	11.0	0.009	<0.20	--
465442095094001	09-08-93	1130	--	<0.001	17.0	<0.002	<0.20	--
465442095094002	10-28-92	1115	--	<0.001	0.007	0.052	<0.20	--
465442095094002	05-13-93	1100	--	<0.001	<0.005	0.052	<0.20	--
465442095094002	09-08-93	1215	--	0.002	<0.005	0.062	0.30	--
465445095071801	11-04-92	0900	67.00	0.004	2.30	0.031	<0.20	--
465445095071801	11-04-92	0915	67.00	0.004	2.30	0.037	<0.20	--
465445095071801	03-19-93	1230	67.00	--	--	--	--	--
465445095071801	05-10-93	1900	67.00	<0.001	2.20	<0.002	<0.20	--
465445095071801	08-02-93	1530	67.00	--	--	--	--	--
465445095071801	08-30-93	1515	67.00	<0.001	1.60	<0.002	<0.20	--
465512095080801	11-03-92	1100	49.00	0.006	1.00	0.014	<0.20	--
465512095080801	05-10-93	1600	49.00	<0.001	14.0	<0.002	0.30	--
465512095080801	08-30-93	1630	49.00	0.003	3.60	<0.002	<0.20	--
465540095091701	11-03-92	1500	--	0.011	<0.005	0.176	<0.20	--
465540095091701	05-12-93	1630	--	<0.001	3.50	0.021	0.40	--
465540095091701	08-31-93	0945	--	<0.001	3.90	<0.002	<0.20	--
465540095091702	11-03-92	1515	--	0.006	1.00	0.024	<0.20	--
465540095091702	05-12-93	1700	--	<0.001	2.70	<0.002	<0.20	--
465540095091702	08-31-93	1030	--	<0.001	2.90	0.002	<0.20	--
465554095094301	11-03-92	1415	--	0.014	2.10	0.118	<0.20	--
465554095094301	05-12-93	1500	--	<0.001	1.10	<0.002	<0.20	--
465554095094301	08-31-93	1130	--	<0.001	4.40	0.006	<0.20	--
465554095094302	11-03-92	1400	--	0.010	1.00	0.067	<0.20	--
465554095094302	05-12-93	1530	--	0.002	<0.005	0.085	<0.20	--
465554095094302	08-31-93	1200	--	<0.001	0.009	0.074	<0.20	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

HUBBARD COUNTY--Continued

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)
465237095094301	08-03-93	1455	28.00	<0.01	<0.01	<0.01	71	<0.01	<0.01	<0.01
465303095042201	08-02-93	1700	29.00	<0.01	<0.01	<0.01	78	0.11	<0.01	<0.01
465330095062201	08-03-93	1830	--	<0.01	<0.01	<0.01	79	0.04	<0.01	<0.01
465408095084201	08-03-93	1700	28.50	0.00	0.02	<0.01	80	0.03	<0.01	<0.01

DATE	CARBARYL WATER FLTRD 0.7 U GF, REC (UG/L) (82680)	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)
08-03-93	<0.05	<0.01	<0.00	<0.01	<0.00	<0.02	<0.01	79	<0.02	<0.02	<0.02
08-02-93	<0.05	<0.01	<0.00	<0.01	<0.00	<0.02	<0.01	79	<0.02	<0.02	<0.02
08-03-93	<0.05	<0.01	<0.00	<0.01	<0.00	<0.02	<0.01	83	<0.02	<0.02	<0.02
08-03-93	<0.05	<0.01	<0.00	<0.01	<0.00	<0.02	<0.01	88	<0.02	<0.02	<0.02

DATE	ETHOPROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)	LINDANE DISSOLVED (UG/L) (39341)	LINURON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	MALATHION, DISSOLVED (UG/L) (39532)	METHYL AZINPHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)	METHYL PARATHION WAT FLT 0.7 U GF, REC (UG/L) (82667)	METOLACHLOR WATER DISSOLV (UG/L) (39415)	METRIBUZIN SENCOR WATER DISSOLV (UG/L) (82630)	MOLINATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)
08-03-93	<0.01	<0.01	<0.01	<0.04	<0.01	<0.08	<0.03	<0.01	<0.01	<0.01
08-02-93	<0.01	<0.01	<0.01	<0.04	<0.01	<0.08	<0.03	<0.01	<0.01	<0.01
08-03-93	<0.01	<0.01	<0.01	<0.04	<0.01	<0.08	<0.03	<0.01	<0.01	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

HUBBARD COUNTY--Continued

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)
08-03-93	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02
08-02-93	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02
08-03-93	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02
08-03-93	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02

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)
08-03-93	<0.02	<0.01	<0.01	<0.02	<0.03	<0.01	100	<0.01	<0.00	<0.01
08-02-93	<0.02	<0.01	<0.01	<0.02	<0.03	<0.01	92	<0.01	<0.00	<0.01
08-03-93	<0.02	<0.01	<0.01	<0.02	<0.03	<0.01	97	<0.01	<0.00	<0.01
08-03-93	<0.02	<0.01	<0.01	<0.02	<0.03	<0.01	110	<0.01	<0.00	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

HUBBARD COUNTY--Continued

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)
465445095071801	08-02-93	1530	67.00	<0.01	<0.01	<0.01	76	<0.01	<0.01	<0.01

DATE	ETHOPROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)	LINDANE DISSOLVED (UG/L) (39341)	LINURON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	MALATHION, DISSOLVED (UG/L) (39532)	METHYL AZINPHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)	METHYL PARATHION WAT FLT 0.7 U GF, REC (UG/L) (82667)	METOLACHLOR WATER DISSOLV (UG/L) (39415)	METRIBUZIN SENCOR WATER DISSOLV (UG/L) (82630)	MOLINATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)
08-02-93	<0.01	<0.01	<0.01	<0.04	<0.01	<0.08	<0.03	<0.01	<0.01	<0.01

DATE	NAPROPAMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	P,P' DDE DISSOLV (UG/L) (34653)	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)	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)
08-02-93	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02

DATE	PROPANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	PROPARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	SIMAZINE, WATER, DISS, REC (UG/L) (04035)	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)	THIOBENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TRIALLATE WATER FLTRD 0.7 U GF, REC (UG/L) (82678)	TRIFLURALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)
08-02-93	<0.02	<0.01	<0.01	<0.02	<0.03	<0.01	95	<0.01	<0.00	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

KANABEC COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH WATER WHOLE LAB (STANDARD UNITS) (00403)	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)
460054093221301	03-22-93	1415	17.00	178	6.6	17	6.6	3.5	1.3	84

DATE	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	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)
03-22-93	8.2	0.90	<0.10	26	0.010	<0.050	0.130	0.70	<0.010	350	3600

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MILLE LACS COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	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)
460017093394701	03-24-93	1100	46.50	--	--	--	--	--
460421093294301	03-18-93	1400	11.00	573	7.4	55	38	8.9
460555093395902	03-16-93	1110	13.00	196	9.1	6.5	12	12
460619093434801	03-24-93	1230	45.00	442	8.1	72	21	4.4
460705093264001	03-17-93	1430	28.00	268	8.5	37	7.8	4.9
460907093443701	03-22-93	1100	100.00	484	7.9	49	29	7.4
461004093281601	03-22-93	1315	150.00	409	7.6	51	18	5.3

DATE	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)	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)
03-24-93	--	--	--	--	--	--	0.020	<0.050	0.020
03-18-93	2.5	319	1.7	0.90	<0.10	22	0.020	<0.050	0.040
03-16-93	2.4	86	3.2	9.7	0.90	0.20	0.020	<0.050	0.230
03-24-93	1.9	252	<0.10	4.9	<0.10	27	0.010	<0.050	0.540
03-17-93	1.4	132	4.7	8.5	0.10	19	0.020	<0.050	0.080
03-22-93	1.9	251	<0.10	1.4	0.20	21	<0.010	<0.050	0.260
03-22-93	1.6	228	<0.10	0.90	0.10	25	<0.010	<0.050	0.190

DATE	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	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)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
03-24-93	0.30	<0.010	<10	<1	<1	22	<1	110	4
03-18-93	0.80	0.130	--	--	--	920	--	1000	--
03-16-93	0.40	<0.010	--	--	--	110	--	43	--
03-24-93	0.60	<0.010	--	--	--	3200	--	230	--
03-17-93	0.20	0.100	--	--	--	49	--	98	--
03-22-93	0.70	<0.010	--	--	--	310	--	37	--
03-22-93	0.30	0.060	--	--	--	2000	--	110	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MILLE LACS COUNTY--Continued

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	ETHANE, 1112-TETRACHLORO-WAT UNF REC (UG/L) (77562)	1,1,1-TRICHLORO-ETHANE TOTAL (UG/L) (34506)	ETHANE, 1,1,2,2-TETRACHLORO-WAT UNF REC (UG/L) (34516)	1,1,2-TRICHLORO-ETHANE TOTAL (UG/L) (34511)	1,1-DICHLORO-ETHANE TOTAL (UG/L) (34496)	1,1-DICHLORO-ETHYLENE TOTAL (UG/L) (34501)	1,2,3-TRICHLORO BENZENE, WHWAT, WH (UG/L) (77613)	BENZENE 1,2,4-TRICHLORO-WAT UNF REC (UG/L) (34551)
460017093394701	03-24-93	1100	46.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20	<5.0

DATE	1,2,5,6-DIBENZ-ANTHRACENE TOTAL (UG/L) (34556)	1,2-DIBROMO ETHANE WATER WHOLE TOTAL (UG/L) (77651)	BENZENE O-CHLORO-WATER UNFLTRD REC (UG/L) (34536)	1,2-DICHLORO-ETHANE TOTAL (UG/L) (32103)	1,2-DICHLORO-PROPANE TOTAL (UG/L) (34541)	1,2-TRANSDICHLORO-ETHENE TOTAL (UG/L) (34546)	BENZENE 1,3-DICHLORO-WATER UNFLTRD REC (UG/L) (34566)	1,3-DICHLORO-PROPANE WAT. TOTAL (UG/L) (77173)	BENZENE 1,4-DICHLORO-WATER UNFLTRD REC (UG/L) (34571)	123-TRI2,2-DI CHLORO-PROPANE WATER WHOLE TOTAL (UG/L) (77443)	CHLORO-CHLORO-WAT, WH TOTAL (UG/L) (77170)	2,4,6-PRO-TRI-PHEN TOTAL (UG/L) (34621)
03-24-93	<10.0	<0.2	<5.0	<0.2	<0.2	<0.2	<5.0	<0.2	<5.0	<0.2	<0.2	<20.0

DATE	2,4-DIMETHYL-PHENOL TOTAL (UG/L) (34606)	2,4-DICHLORO-PHENOL TOTAL (UG/L) (34601)	2,4,-DINITRO-TOLUENE TOTAL (UG/L) (34616)	2,4-DINITRO-TOLUENE TOTAL (UG/L) (34611)	2,6-DINITRO-ETHER TOTAL (UG/L) (34626)	2-CHLORO-ETHYL-VINYL-THALENE TOTAL (UG/L) (34576)	2-CHLORO-NAPHPHENOL TOTAL (UG/L) (34581)	2-CHLORO-PHENOL TOTAL (UG/L) (34586)	2-NITRO-CRESOL TOTAL (UG/L) (34591)	4-4,6-DINITRO BROMO-PHENYL ETHER TOTAL (UG/L) (34657)	4-CHLORO-PHENYLPHENYL-ORTHO-PHENYLPHENYL ETHER TOTAL (UG/L) (34636)	4-CHLORO-PHENYLPHENYL ETHER TOTAL (UG/L) (34641)
03-24-93	<5.0	<5.0	<20.0	<5.0	<5.0	<1.0	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0

DATE	4-NITRO-PHENOL TOTAL (UG/L) (34646)	ACE-NAPHTHENE TOTAL (UG/L) (34205)	ACE-NAPHTHYLENE TOTAL (UG/L) (34200)	ACRO-LEIN TOTAL (UG/L) (34210)	ACRYLO-NITRILE TOTAL (UG/L) (34215)	ALACHLOR, WATER, DISS, REC, (UG/L) (46342)	ANTHRACENE TOTAL (UG/L) (34220)	ATRAZINE, WATER, DISS, REC (UG/L) (39632)	BENZENE TOTAL (UG/L) (34030)	BENZO A-PYRENE TOTAL (UG/L) (34247)	BBENZO K BENZO-FLUOR-AN-THENE TOTAL (UG/L) (34230)	FLUOR-AN-THENE TOTAL (UG/L) (34242)
03-24-93	<30.0	<5.0	<5.0	<20	<20	<0.05	<5.0	<0.05	<0.2	<10.0	<10.0	<10.0

DATE	BENZO ANTHRACENE1,2-BENZANTHRACENE TOTAL (UG/L) (34526)	BENZOGHI PERYLENE1,12 BENZOPERYLENE TOTAL (UG/L) (34521)	BIS (2-CHLORO-ETHOXY) METHANE TOTAL (UG/L) (34278)	BIS (2-CHLORO-ISO-PROPYL) ETHER TOTAL (UG/L) (34283)	BIS(2-ETHYL HEXYL) PHTHALATE TOTAL (UG/L) (39100)	BIS 2-CHLORO-ETHYL ETHER TOTAL (UG/L) (34273)	BROMO BENZENE WATER, WHOLE, TOTAL (UG/L) (81555)	BROMO-FORM TOTAL (UG/L) (32104)	CARBON-TETRA-CHLORIDE TOTAL (UG/L) (32102)	CHLORO-BENZENE TOTAL (UG/L) (34301)	CHLORO-DI-BROMO-METHANE TOTAL (UG/L) (32105)	CHLORO-DI-CHLORO-ETHA TOTAL (UG/L) (34311)
03-24-93	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	<0.2	<0.2	<0.2	<0.20	<0.2	<0.2

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MILLE LACS COUNTY--Continued

DATE	CHLORO-FORM TOTAL (UG/L) (32106)	CHRY-SENE TOTAL (UG/L) (34320)	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)	DEETHYLDIBROMO ATRA-ZINE, WATER, DISS, REC (UG/L) (04040)	CHLORO-PROPANE WATER WHOLE TOT.REC (UG/L) (82625)	DI-BROMO-METHANE TOTAL (UG/L) (32101)	DI-CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	DI-DIETHYLPHTHAL-ATE TOTAL (UG/L) (34336)	DI-METHYLPHTHAL-ATE TOTAL (UG/L) (34341)	DI-N-BUTYL PHTHA ATE TOTAL (UG/L) (39110)
03-24-93	3.0	<10.0	<0.2	<0.2	<0.20	<0.05	<1.0	<0.2	<0.2	<5.0	<5.0	<5.0

DATE	DI-N-OCTYL PHTHAL-ATE TOTAL (UG/L) (34596)	ETHYL-BENZENE TOTAL (UG/L) (34371)	FLUOR-ANTHENE TOTAL (UG/L) (34376)	FLUOR-ENE TOTAL (UG/L) (34381)	FREON-113 WATER UNFLTRD REC (UG/L) (77652)	HEXA-CHLORO-BENZENE TOTAL (UG/L) (39700)	HEXA-CHLORO-BUT-ADIENE TOTAL (UG/L) (39702)	HEXA-CHLORO-CYCLO-PENT-ADIENE TOTAL (UG/L) (34386)	HEXA-CHLORO-ETHANE TOTAL (UG/L) (34396)	INDENO (1,2,3-CD) PYRENE TOTAL (UG/L) (34403)	MESIT-YLENE ISO-PHORONE TOTAL (UG/L) (34408)	WATER UNFLT REC (UG/L) (77226)
03-24-93	<10.0	<0.2	<5.0	<5.0	<0.5	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	<0.20

DATE	METHYL-BROMIDE TOTAL (UG/L) (34413)	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)	BENZENEN-BUTYL N-BUTYL WATER UNFLTRD REC (UG/L) (77342)	N-BUTYLBENZENE BENZYL PHTHAL-ATE TOTAL (UG/L) (34292)	NITRO-N-PROPY WATER UNFLTRD REC (UG/L) (77224)	SODI-N-PROPYL-AMINE TOTAL (UG/L) (34428)	N-NITRON-METHY-LAMINE TOTAL (UG/L) (34438)	NITRO -SODI--PHENY-AMINE TOTAL (UG/L) (34433)	SODI-NAPHTH-ALENE TOTAL (UG/L) (34696)
03-24-93	<0.2	<0.2	<0.2	<0.05	<0.05	<0.20	<5.0	<0.20	<5.0	<5.0	<5.0	<5.0

DATE	NITRO-BENZENE TOTAL (UG/L) (34447)	O-CHLORO-TOLUENE WATER WHOLE TOTAL (UG/L) (77275)	P-CHLOR-TOLUENE WATER UNFLTRD REC (UG/L) (77277)	P-ISO-PROPYL-TOLUENE WATER WHOLE REC (UG/L) (77356)	PARA-CHLORO-META CRESOL TOTAL (UG/L) (34452)	PENTA-CHLORO-PHENOL TOTAL (UG/L) (39032)	PHENAN-THRENE TOTAL (UG/L) (34461)	PHENOL (C6H-5OH) TOTAL (UG/L) (34694)	PRO-METON, WATER, DISS, REC (UG/L) (04037)	PSEUDO-CUMENE WATER UNFLTRD REC (UG/L) (77222)	PYRENE TOTAL (UG/L) (34469)
03-24-93	<5.0	<0.2	<0.20	<0.20	<30.0	<30.0	<5.0	<5.0	<0.05	<0.20	<5.0

DATE	BENZENE SEC BUTYL-WATER UNFLTRD REC (UG/L) (77350)	SI-MAZINE, WATER, DISS, REC (UG/L) (04035)	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 UNFLTR REC (UG/L) (81551)
03-24-93	<0.20	<0.05	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MORRISON COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	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)
455752093510701	03-18-93	1015	60.00	376	8.2	36	11	24
460439093512601	03-18-93	1130	43.00	--	--	--	--	--

DATE	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	POTAS-SIUM, LAB (MG/L AS CACO3) (90410)	ALKA-LINITY DIS-SOLVED (MG/L AS SO4) (00945)	SULFATE DIS-SOLVED (MG/L AS CL) (00940)	CHLO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	FLUO-RIDE, SOLVED (MG/L AS SIO2) (00955)	NITRO-SILICA, DIS-DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN,GEN, NO2+NO3AMM DIS-SOLVED (MG/L AS N) (00608)
03-18-93	1.7	145	20	20	0.30	13	0.020	0.370	0.140
03-18-93	--	--	--	--	--	--	<0.010	0.890	0.020

DATE	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	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)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
03-18-93	0.30	0.100	--	--	--	6	--	47	--
03-18-93	<0.20	0.010	<10	<1	36	34	<1	11	2100

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MORRISON COUNTY--Continued

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)	BENZE 1,2,4-TRI-CHLORO-WAT UNF REC (UG/L) (34551)
460439093512601	03-18-93	1130	43.00	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.20<5.0

DATE	1,2,5,6-DIBENZ-ANTHRA-CENE TOTAL (UG/L) (34556)	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-TRANSDICHLORO-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 CHLOR PRO-TRI-CHLORO-WAT, WH TOTAL (UG/L) (77170)	PHEN TOTAL (UG/L) (34621)
03-18-93	<10.0	<0.2	<5.0	<0.2	<0.2	<0.2	<5.0	<0.2	<5.0	<0.2	<0.2	<20.0

DATE	2,4,-DI-METHYL-PHENOL TOTAL (UG/L) (34606)	2,4-DI-CHLORO-PHENOL TOTAL (UG/L) (34601)	2-DI-NITRO-PHENOL TOTAL (UG/L) (34616)	4-CHLORO-2,4-DI-NITRO-TOLUENE TOTAL (UG/L) (34611)	4-2-2,6-DI-NITRO-TOLUENE TOTAL (UG/L) (34626)	4,6-ETHYL-VINYL-ETHER TOTAL (UG/L) (34576)	BROMO-CHLORO-NAPH-THALENE TOTAL (UG/L) (34581)	2-CHLORO-PHENOL TOTAL (UG/L) (34586)	2-NITRO-PHENOL TOTAL (UG/L) (34591)	DINITROPHENYL-ORTHO-CRESOL TOTAL (UG/L) (34657)	PHENYLPHENYL-PHENYLETHER TOTAL (UG/L) (34636)	PHENYL ETHER TOTAL (UG/L) (34641)
03-18-93	<5.0	<5.0	<20.0	<5.0	<5.0	<1.0	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0

DATE	4-NITRO-PHENOL TOTAL (UG/L) (34646)	ACE-NAPHTH-ENE TOTAL (UG/L) (34205)	ACE-NAPHTH-YLENE TOTAL (UG/L) (34200)	ACRO-LEIN TOTAL (UG/L) (34210)	ACRYLO-NITRILE TOTAL (UG/L) (34215)	ALA-CHLOR, WATER, DISS, REC, (UG/L) (46342)	ATRA-ZINE, ANTHRA-CENE TOTAL (UG/L) (34220)	BENZO-WATER, DISS, REC (UG/L) (39632)	FLUOR-A-BENZENE TOTAL (UG/L) (34030)	BENZO B FLUOR-AN-PYRENE TOTAL (UG/L) (34247)	BENZO K FLUOR-AN-THENE TOTAL (UG/L) (34230)	THENE TOTAL (UG/L) (34242)
03-18-93	<30.0	<5.0	<5.0	<20	<20	<0.05	<5.0	<0.05	<0.2	<10.0	<10.0	<10.0

DATE	BENZO A ANTHRAC-ENE1,2-BENZANT-HRACENE TOTAL (UG/L) (34526)	BENZOGH I PERYL ENE1,12 BENZOPERYLENE TOTAL (UG/L) (34521)	BIS (2-CHLORO-ETHOXY) METHANE TOTAL (UG/L) (34278)	BIS (2-CHLORO-ISO-PROPYL) ETHER TOTAL (UG/L) (34283)	BIS(2-ETHYL HEXYL) PHTHAL-ATE TOTAL (UG/L) (39100)	BIS 2-CHLORO-ETHYL ETHER TOTAL (UG/L) (34273)	BROMO-BENZEN1 WATER, WHOLE, TOTAL (UG/L) (81555)	BROMO-FORM TOTAL (UG/L) (32104)	CARBON-ETETRA-CHLO-RIDE TOTAL (UG/L) (32102)	CHLORO-DI-CHLORO-BROMO-METHANE TOTAL (UG/L) (34301)	CHLO BENZENE TOTAL (UG/L) (32105)	ETH TOTAL (UG/L) (34311)
03-18-93	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	<0.2	<0.2	<0.2	<0.20	<0.2	<0.2

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MORRISON COUNTY--Continued

DATE	CHLORO-FORM TOTAL (UG/L) (32106)	CHRY-SENE TOTAL (UG/L) (34320)	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)	DEETHYLDIBROMO ATRA-ZINE, WATER, DISS, REC (UG/L) (04040)	CHLORO-PROPANE WATER WHOLE TOT.REC (UG/L) (82625)	DI-CHLORO-METHANE TOTAL (UG/L) (32101)	DI-CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	DI-ETHYLPHTHAL-ATE TOTAL (UG/L) (34336)	DI-METHYLPHTHAL-ATE TOTAL (UG/L) (34341)	DI-N-BUTYL-PHTH TOTAL (UG/L) (39110)
03-18-93	<0.2	<10.0	<0.2	<0.2	<0.20	<0.05	<1.0	<0.2	<0.2	<5.0	<5.0	<5.0

DATE	DI-N-OCTYL PHTHAL-ATE TOTAL (UG/L) (34596)	ETHYL-BENZENE TOTAL (UG/L) (34371)	FLUOR-ANTHENE TOTAL (UG/L) (34376)	FLUOR-ENE TOTAL (UG/L) (34381)	FREON-113 WATER UNFLTRD REC (UG/L) (77652)	HEXA-CHLORO-BENZENE TOTAL (UG/L) (39700)	HEXA-CHLORO-BUT-ADIENE TOTAL (UG/L) (39702)	HEXA-CHLORO-CYCLO-PENT-ADIENE TOTAL (UG/L) (34386)	HEXA-CHLORO-ETHANE TOTAL (UG/L) (34396)	INDENO (1,2,3-CD) PYRENE TOTAL (UG/L) (34403)	ISO-PHORONE TOTAL (UG/L) (34408)	MESIT-YLENE WATER UNFL REC (UG/L) (77226)
03-18-93	<10.0	<0.2	<5.0	<5.0	<0.5	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	<0.20

DATE	METHYL-BROMIDE TOTAL (UG/L) (34413)	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)	BENZENE N-BUTYL WATER UNFLTRD REC (UG/L) (77342)	N-BUTYL BENZYL PHTHAL-ATE TOTAL (UG/L) (34292)	N-PROPY WATER UNFLTRD REC (UG/L) (77224)	N-NITRO-SODI-N-PROPYL-AMINE TOTAL (UG/L) (34428)	N-NITRON-SODI-METHY-LAMINE TOTAL (UG/L) (34438)	NITRON-SODI-PHENY-LAMINE TOTAL (UG/L) (34433)	NITRO-NAPHTH-ALENE TOTAL (UG/L) (34696)
03-18-93	<0.2	<0.2	<0.2	<0.05	<0.05	<0.20	<5.0	<0.20	<5.0	<5.0	<5.0	<5.0

DATE	NITRO-BENZENE TOTAL (UG/L) (34447)	O-CHLORO-TOLUENE WATER WHOLE TOTAL (UG/L) (77275)	P-CHLOR TOLUENE WATER UNFLTRD REC (UG/L) (77277)	P-ISO-PROPYL-TOLUENE WATER WHOLE REC (UG/L) (77356)	PARA-CHLORO-META CRESOL TOTAL (UG/L) (34452)	PENTA-CHLORO-PHENOL TOTAL (UG/L) (39032)	PHENAN-THRENE TOTAL (UG/L) (34461)	PHENOL (C6H-5OH) TOTAL (UG/L) (34694)	PRO-METON, WATER, DISS, REC (UG/L) (04037)	PSEUDO-CUMENE WATER UNFLTRD REC (UG/L) (77222)	PYRENE TOTAL (UG/L) (34469)
03-18-93	<5.0	<0.2	<0.20	<0.20	<30.0	<30.0	<5.0	<5.0	<0.05	<0.20	<5.0

DATE	BENZENE SEC BUTYL-WATER UNFLTRD REC (UG/L) (77350)	SI-MAZINE, WATER, DISS, REC (UG/L) (04035)	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 UNFLT REC (UG/L) (81551)
03-18-93	<0.20	<0.05	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MURRAY COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	PH SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	NITRO-WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	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)
435133095360801	09-29-93	1840	37.00	798	7.4	11.0	3.2	<0.010	0.810	0.020	<0.010

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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 BENZE WAT, WH REC (UG/L) (77613)
435133095360801	09-29-93	1840	37.00	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20

DATE	BENZENE 1,2,4-TRI-CHLORO-WAT UNF REC (UG/L) (34551)	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)
09-29-93	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2	<0.20	<0.2	<0.20	<0.2	<0.2

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

MURRAY COUNTY--Continued

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)
09-29-93	<1.0	<20	<20	<0.2	<0.2	<0.2	<0.2	<0.20	<0.2	<0.2

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-DI-CHLORO-BROMO-METHANE TOTAL (UG/L) (32101)	CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	FREON-113 ETHYL-BENZENE TOTAL (UG/L) (34371)	HEXA-CHLORO-WATER UNFLTRD REC (UG/L) (77652)	MESIT-YLENE BUT-ADIENE TOTAL (UG/L) (39702)	WATER UNFLTRD REC (UG/L) (77226)
09-29-93	<0.2	<0.2	<0.2	<1.0	<0.2	<0.2	<0.2	<0.5	<0.2	<0.20

DATE	METHYL-BROMIDE TOTAL (UG/L) (34413)	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)	P-ISO-PROPYL-TOLUENE P-CHLOR WATER UNFLTRD REC (UG/L) (77277)	P-ISO-PROPYL-TOLUENE WATER WHOLE REC (UG/L) (77356)	PSEUDO-CUMENE WATER UNFLTRD REC (UG/L) (77222)
09-29-93	<0.2	<0.2	<0.2	<0.20	<0.20	<0.2	<0.2	<0.20	<0.20	<0.20

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)
09-29-93	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

OTTER TAIL COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	NITROGEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	PHOSPHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
463140095344601	09-27-93	1800	41.00	<0.010	17.0	0.030	0.010

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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 BENZE WAT, WH REC (UG/L) (77613)
463140095344601	09-27-93	1800	41.00	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20

DATE	BENZENE 1,2,4-TRI-CHLORO-WAT UNF REC (UG/L) (34551)	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)
09-27-93	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2	<0.20	<0.2	<0.20	<0.2	<0.2

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

OTTER TAIL COUNTY--Continued

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)
09-27-93	<1.0	<20	<20	<0.2	<0.2	<0.2	<0.2	<0.20	<0.2	<0.2

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)	FREON-113 WATER UNFLTRD REC (UG/L) (77652)	HEXA-CHLORO-BUT-ADIENE TOTAL (UG/L) (39702)	MESIT-YLENE WATER UNFLTRD REC (UG/L) (77226)
09-27-93	<0.2	<0.2	<0.2	<1.0	<0.2	<0.2	<0.2	<0.5	<0.2	<0.20

DATE	METHYL-BROMIDE TOTAL (UG/L) (34413)	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)	P-ISO-TOLUENE P-CHLOR WATER UNFLTRD REC (UG/L) (77277)	PROPYL-TOLUENE WATER WHOLE REC (UG/L) (77356)	PSEUDO-CUMENE WATER UNFLTRD REC (UG/L) (77222)
09-27-93	<0.2	<0.2	<0.2	<0.20	<0.20	<0.2	<0.2	<0.20	<0.20	<0.20

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)
09-27-93	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

SHERBURNE COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	NITROGEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
453144093370801	07-19-93	0200	12.67	0.020	12.0	0.070	0.30	<0.010
453144093370802	07-19-93	0200	15.33	<0.010	14.0	0.030	<0.20	<0.010
453144093370803	07-19-93	0100	17.75	<0.010	5.50	0.020	<0.20	0.020
453145093370501	07-19-93	1330	6.00	0.030	2.20	0.060	0.30	<0.010
453145093370602	07-19-93	1100	9.83	0.020	8.10	0.180	0.30	<0.010
453145093370603	07-19-93	1115	14.25	0.010	14.0	0.040	<0.20	<0.010
453146093370201	07-18-93	0200	6.00	<0.010	<0.050	0.130	0.20	<0.010
453146093370202	07-18-93	0600	6.00	0.020	3.80	0.120	0.20	<0.010
453146093370401	07-15-93	1950	6.00	0.010	4.50	0.060	0.30	<0.010
453147093370101	07-18-93	0330	6.00	0.200	2.20	0.040	0.40	<0.010

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

STEVENS COUNTY

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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)
452711095570801	09-29-93	1045	23.50	1480	7.1		9.0	0.4	<0.010	<0.050	0.680
<0.010											
452811095582801	09-29-93	1235	40.00	2020	6.9		9.5	0.1	<0.010	<0.050	0.060
0.020											

STATION NUMBER	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	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-CHLO BENZE WAT, WH REC (UG/L) (77613)
452711095570801	09-29-93	1045	23.50	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20
452811095582801	09-29-93	1235	40.00	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20

DATE	BENZENE 1,2,4-TRI-CHLORO-WAT UNF REC (UG/L) (34551)	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)
09-29-93	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2	<0.20	<0.2	<0.20	<0.2	<0.2
09-29-93	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2	<0.20	<0.2	<0.20	<0.2	<0.2

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)	DI-BROMO-METHANE TOTAL (UG/L) (32105)	CHLORO-ETHANE TOTAL (UG/L) (34311)
09-29-93	<1.0	<20	<20	<0.2	<0.2	<0.2	<0.2	<0.20	<0.2	<0.2
09-29-93	<1.0	<20	<20	<0.2	<0.2	<0.2	<0.2	<0.20	<0.2	<0.2

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

STEVENS COUNTY--Contiued

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)	FREON-113 WATER UNFLTRD REC (UG/L) (77652)	HEXA-CHLORO-BUT-ADIENE TOTAL (UG/L) (39702)	MESIT-YLENE WATER UNFLTRD REC (UG/L) (77226)
09-29-93	<0.2	<0.2	<0.2	<1.0	<0.2	<0.2	<0.2	<0.5	<0.2	<0.20
09-29-93	<0.2	<0.2	<0.2	<1.0	<0.2	<0.2	<0.2	<0.5	<0.2	<0.20

DATE	METHYL-BROMIDE TOTAL (UG/L) (34413)	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)	PSEUDO-CUMENE WATER UNFLTRD REC (UG/L) (77222)
09-29-93	<0.2	<0.2	<0.2	<0.20	<0.20	<0.2	<0.2	<0.20	<0.20	<0.20
09-29-93	<0.2	<0.2	<0.2	<0.20	<0.20	<0.2	<0.2	<0.20	<0.20	<0.20

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)
09-29-93	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20
09-29-93	<0.20	<0.2	<0.20	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.20

CHEMICAL QUALITY OF PRECIPITATION

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN

WATER-QUALITY RECORDS

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 1992 TO SEPTEMBER 1993

WEEKLY COMPOSITE

DATE	TIME	TOTAL PRECIP-ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUC-TANCE CK.SOL. ATM DEP WET TOT (US/CM) (83152)	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 06-13	1930	0.12	22.4	9.3	6.0	4.80	5.71	0.140
OCT 13-20	2030	0.60	22.8	6.6	6.0	5.10	5.39	0.160
OCT 27-NOV 03	2030	1.35	--	--	--	--	--	--
NOV 03-10	1715	0.24	--	--	34.3	--	4.62	0.530
NOV 17-24	2030	0.25	--	--	10.9	--	5.65	0.160
NOV 24-DEC 01	2100	0.05	--	--	5.5	--	6.17	0.120
DEC 08-15	2030	0.40	22.2	13.1	11.5	4.90	4.76	0.070
DEC 22-29	2030	0.19	21.4	6.6	5.9	5.10	5.57	0.180
JAN 05-12	2030	0.17	21.3	6.3	4.4	5.80	5.21	0.020
JAN 12-19	1700	0.20	--	--	8.8	--	6.33	0.070
JAN 19-26	2100	0.95	22.5	11.1	9.7	4.60	4.74	0.050
FEB 09-16	2100	0.07	--	--	3.1	--	6.04	<0.010
FEB 16-23	2100	0.17	--	--	21.5	--	6.87	--

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN--Continued

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
OCT 06-13	0.018	0.060	0.050	0.89	0.08	0.54	0.060	<0.020
OCT 13-20	0.021	0.023	<0.003	0.48	<0.03	0.82	0.170	<0.020
OCT 27-NOV 03	--	--	--	--	--	--	--	--
NOV 03-10	0.045	0.063	0.051	3.62	0.24	6.60	2.06	<0.020
NOV 17-24	0.023	1.10	0.059	2.55	0.36	1.93	2.55	<0.070
NOV 24-DEC 01	0.016	0.259	0.025	0.54	0.20	0.53	0.270	<0.020
DEC 08-15	0.010	0.089	0.016	0.76	0.11	1.37	0.220	<0.020
DEC 22-29	0.026	0.030	0.067	0.29	0.10	1.18	0.180	<0.020
JAN 05-12	0.004	0.015	<0.003	0.12	0.03	0.80	0.060	<0.020
JAN 12-19	0.031	0.075	<0.013	0.44	0.18	0.93	0.400	<0.090
JAN 19-26	0.005	0.014	0.005	0.37	0.04	1.29	0.100	<0.020
FEB 09-16	<0.003	0.099	<0.003	<0.03	0.06	0.23	0.130	<0.020
FEB 16-23	--	--	--	--	--	--	--	--

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN--Continued

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

WEEKLY COMPOSITE

DATE	TIME	TOTAL PRECIP-ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUC-TANCE CK.SOL. ATM DEP WET TOT (US/CM) (83152)	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 02-09	2145	0.16	22.6	3.2	3.0	5.10	5.78	0.030
MAR 09-16	2115	0.12	22.6	8.0	7.1	5.10	5.01	0.070
MAR 23-30	2100	0.10	23.0	23.6	24.3	4.30	4.64	0.200
MAR 30-APR 06	2030	0.40	22.4	22.4	19.0	4.30	4.45	0.060
APR 06-13	1930	0.56	22.6	16.4	15.3	4.40	4.59	0.050
APR 20-27	1915	0.50	22.7	17.4	14.9	5.00	5.99	0.620
APR 27-MAY 04	2100	0.82	22.2	5.8	4.7	5.30	5.42	0.020
MAY 04-11	1700	1.35	22.4	15.3	13.8	4.90	4.87	0.250
MAY 11-18	1930	0.02	--	--	30.1	--	6.77	1.53
MAY 18-25	1930	4.52	23.2	3.1	2.4	5.30	5.58	0.030
MAY 25-JUN 01	1930	2.42	23.1	5.9	5.6	5.80	5.66	0.100
JUN 01-08	1930	0.58	22.7	14.8	10.1	4.80	5.93	0.290
JUN 08-15	1930	0.67	22.4	9.3	8.5	5.20	5.63	0.180
JUN 15-22	2000	1.52	22.2	8.6	7.8	4.50	4.99	0.080
JUN 22-29	1930	1.67	23.0	5.8	6.2	5.80	5.68	0.190
JUN 29-JUL 06	1930	1.28	22.0	6.6	6.4	5.30	5.72	0.200
JUL 06-13	2200	2.53	21.5	6.7	7.3	5.10	5.12	0.070

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN--Continued

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
MAR 02-09	0.006	0.017	0.012	0.14	<0.03	0.22	0.120	<0.020
MAR 09-16	0.010	0.013	0.003	0.57	0.03	1.03	0.280	<0.020
MAR 23-30	0.040	0.038	0.261	3.44	0.29	1.74	0.970	<0.020
MAR 30-APR 06	0.013	0.028	0.015	2.06	0.06	0.98	0.330	<0.020
APR 06-13	0.007	0.025	0.008	1.59	0.04	0.88	0.390	<0.020
APR 20-27	0.079	0.054	0.035	2.11	0.07	2.57	1.09	<0.020
APR 27-MAY 04	0.004	0.009	0.006	0.47	<0.03	0.65	0.280	<0.020
MAY 04-11	0.039	0.065	0.043	1.92	0.10	1.39	0.620	<0.020
MAY 11-18	0.374	0.181	0.097	2.65	0.21	3.57	1.51	<0.080
MAY 18-25	0.007	0.016	<0.003	0.17	<0.03	0.24	0.110	<0.020
MAY 25-JUN 01	0.015	0.016	0.009	0.63	<0.03	0.83	0.420	<0.020
JUN 01-08	0.036	0.075	0.041	1.36	0.12	1.44	0.670	<0.020
JUN 08-15	0.024	0.032	0.020	1.11	0.07	1.26	0.560	<0.020
JUN 15-22	0.011	0.044	0.016	0.62	0.06	1.01	0.250	<0.020
JUN 22-29	0.024	0.018	0.016	0.63	0.05	1.05	0.430	<0.020
JUN 29-JUL 06	0.027	0.065	0.017	0.75	0.07	0.99	0.320	<0.020
JUL 06-13	0.012	0.036	0.013	0.59	0.06	1.00	0.270	<0.020

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN--Continued

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

WEEKLY COMPOSITE

DATE	TIME	TOTAL PRECIP-ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUC-TANCE CK.SOL. ATM DEP WET TOT (US/CM) (83152)	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)
JUL 13-20	1930	0.28	21.3	22.6	26.7	4.40	4.49	0.540
JUL 20-27	1930	0.13	21.1	17.2	19.5	6.10	6.87	1.41
JUL 27-AUG 03	1930	0.03	--	--	15.4	--	6.66	0.620
AUG 03-10	1930	0.56	21.2	9.0	9.0	5.30	6.23	0.370
AUG 10-17	1930	0.72	20.9	9.8	9.0	4.90	5.16	0.180
AUG 17-24	2000	2.97	21.6	5.1	4.7	4.80	5.40	0.060
AUG 24-31	1930	3.05	22.1	7.1	7.0	4.90	5.36	0.140
AUG 31-SEP 07	1930	0.09	21.7	11.7	13.8	5.40	6.65	0.500
SEP 07-14	1930	0.57	21.3	7.8	7.9	4.90	5.83	0.320
SEP 14-21	1930	0.75	21.4	16.5	15.8	4.40	4.57	0.030
SEP 21-28	1945	0.24	21.9	11.7	13.9	5.40	6.66	0.610

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN--Continued

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1992 TO SEPTEMBER 1993

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)
JUL 13-20	0.118	0.080	0.027	3.21	0.14	3.29	0.250	<0.020
JUL 20-27	0.470	0.182	0.077	1.72	0.16	2.26	0.650	<0.020
JUL 27-AUG 03	0.135	0.464	0.102	1.12	0.28	1.70	0.870	0.300
AUG 03-10	0.050	0.066	0.026	1.12	0.07	1.20	0.550	<0.020
AUG 10-17	0.024	0.042	0.019	0.95	0.07	1.33	0.450	<0.020
AUG 17-24	0.009	0.026	0.007	0.45	0.06	0.61	0.180	<0.020
AUG 24-31	0.014	0.041	0.014	0.83	0.05	0.91	0.380	<0.020
AUG 31-SEP 07	0.103	0.206	0.075	1.09	0.13	1.62	0.900	0.030
SEP 07-14	0.060	0.069	0.056	1.15	0.08	1.09	0.370	<0.020
SEP 14-21	0.006	0.029	0.007	1.67	0.04	0.88	0.300	<0.020
SEP 21-28	0.147	0.115	0.050	1.32	0.10	1.60	1.05	<0.020

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
	Length	
inch (in.)	2.54×10^{1}	millimeter
	2.54×10^{-2}	meter
foot (ft)	3.048×10^{-1}	meter
mile (mi)	1.609×10^{0}	kilometer
	Area	
acre	4.047×10^{3}	square meter
	4.047×10^{-1}	square hectometer
	4.047×10^{-3}	square kilometer
square mile (mi^2)	2.590×10^{0}	square kilometer
	Volume	
gallon (gal)	3.785×10^{0}	liter
	3.785×10^{0}	cubic decimeter
	3.785×10^{-3}	cubic meter
million gallons (Mgal)	3.785×10^{3}	cubic meter
	3.785×10^{-3}	cubic hectometer
cubic foot (ft^3)	2.832×10^{1}	cubic decimeter
	2.832×10^{-2}	cubic meter
cubic–foot–per–second day [(ft^3/s) d]	2.447×10^{3}	cubic meter
	2.447×10^{-3}	cubic hectometer
acre–foot (acre–ft)	1.233×10^{3}	cubic meter
	1.233×10^{-3}	cubic hectometer
	1.233×10^{-6}	cubic kilometer
	Flow	
cubic foot per second (ft^3/s)	2.832×10^{1}	liter per second
	2.832×10^{1}	cubic decimeter per second
	2.832×10^{-2}	cubic meter per second
gallon per minute (gal/min)	6.309×10^{-2}	liter per second
	6.309×10^{-2}	cubic decimeter per second
	6.309×10^{-5}	cubic meter per second
million gallons per day (Mgal/d)	4.381×10^{1}	cubic decimeter per second
	4.381×10^{-2}	cubic meter per second
	Mass	
ton (short)	9.072×10^{-1}	megagram or metric ton

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 for the first–order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

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