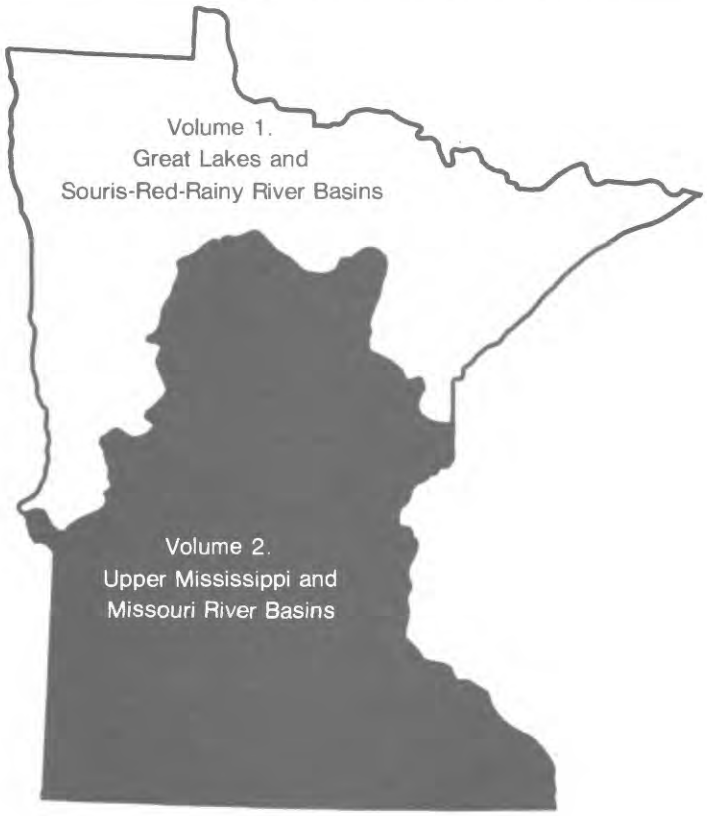
Water Resources Data Minnesota Water Year 1990

Volume 2. Upper Mississippi and Missouri River Basins



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MN-90-1
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 1990

1989

OCTOBER

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

NOVEMBER

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

DECEMBER

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

1990

JANUARY

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

FEBRUARY

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28			

MARCH

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

APRIL

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

MAY

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

JUNE

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

JULY

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

AUGUST

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

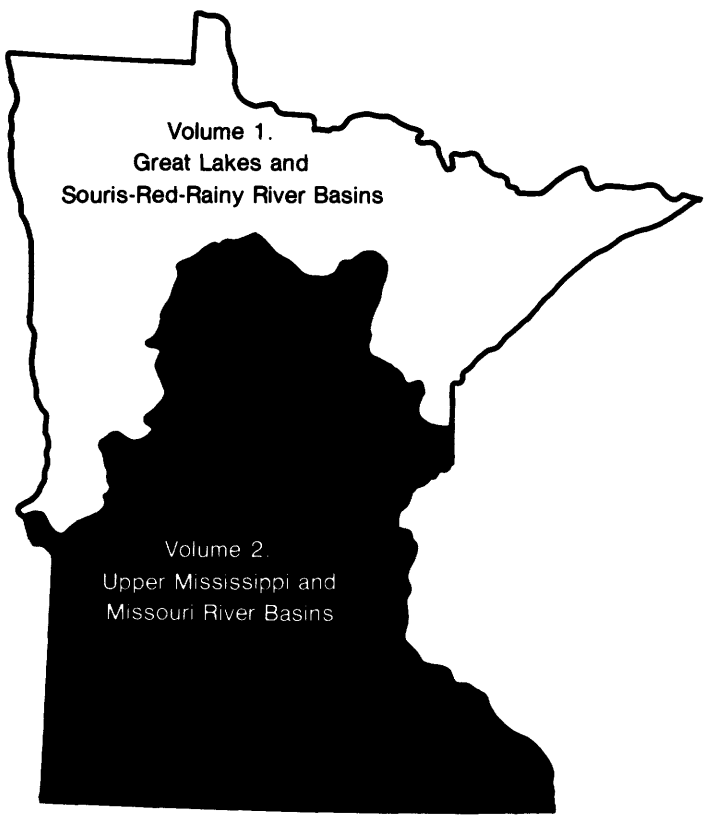
SEPTEMBER

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

Water Resources Data Minnesota Water Year 1990

Volume 2. Upper Mississippi and Missouri River Basins

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



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MN-90-2
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

MANUEL LUJAN, JR, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information write to:

District Chief, Water Resources Division
U.S. Geological Survey
702 Post Office Building
St. Paul, Minnesota 55101

1991

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:

Lan H. Tornes, Water-Quality Specialist, Minnesota District
Alex Brietkrietz, Ground-Water Network Project Chief, Minnesota District

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

St. Paul District Office

Allan D. Arntson
George H. Carlson
Mark R. Have
Joan M. Helms
Rebecca A. Miller
Gregory B. Mitton
George A. Roach
Charles J. Smith
Gregory W. Stratton
Jeff Trionfante
Duane A. Wicklund
Thomas A. Winterstein

Grand Rapids Field Headquarters

Howard D. Braden
William A. Gothard
Gregory R. Melhus

Montevideo Field Headquarters

Roderick L. Johnson

This report was prepared in cooperation with the State of Minnesota and with other agencies under the general supervision of William J. Herb, District Chief, Minnesota.

REPORT DOCUMENTATION PAGE	1. Report No. USGS/WRD/HD-91/302	2.	3. Recipient's Accession No.

4. Title and Subtitle

Water Resources for Minnesota, Water Year 1990
Volume 2, Upper Mississippi and Missouri River Basin

5. Report
July 1991

6.

7. Author(s) Kurt T. Gunard, Joseph H. Hess, James L. Zirbel, and Charles E. Cornelius

8. Performing Organization Rept. No.
USGS-WDR-MN-90-2

9. Performing Organization Name and Address

U.S. Geological Survey, Water Resources Division
702 Post Office Building
St. Paul, Minnesota 55101

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address

U.S. Geological Survey, Water Resources Division
702 Post Office Building
St. Paul, Minnesota 55101

13. Type of Report & Period Covered
Annual Oct. 1, 1989
Sept. 30, 1990

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 1990 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 for 14 stream stations, 1 lake station, 38 miscellaneous sites, 1 precipitation station, 236 wells; quality of organic deposits at 9 sites in a wetland; and water levels for 124 observation wells. Also included are 60 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 or low-flow investigations. 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

c. COSATI Field/Group

18. Availability Statement:	19. Security Class (This Report)	21. No. of Pages
No restriction on distribution. This report may be purchased from: National Technical Information Service Springfield, VA 22161	UNCLASSIFIED	361
	20. Security Class (This Page) UNCLASSIFIED	22. Price

CONTENTS

ILLUSTRATIONS

ILLUSTRATIONS--Continued

TABLES

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 mictro-biological; (p) physical (water temperature, sediment, or specific conductance)]

GAGING STATIONS, IN DOWNSTREAM ORDER--Continued

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

GROUND-WATER LEVELS

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

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

COUNTIES WITH QUALITY OF GROUND WATER RECORDS

PRECIPITATION SITES, FOR WHICH CHEMICAL QUALITY RECORDS ARE PUBLISHED

WATER RESOURCES DATA FOR MINNESOTA, 1990

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 1990 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 14 stream stations, 1 lake station, 38 miscellaneous sites, 1 precipitation station, 236 wells; quality of organic deposits at 9 sites in a wetlands; and water levels for 124 observation wells. Also included are 60 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 Distribution Branch, Text Products Section, U.S. Geological Survey, 604 Pickett Street, Alexandria, VA 22304

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-90-2. 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.

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) 229 2600.

COOPERATION

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

Minnesota Department of Natural Resources, Division of Waters, Ronald N. Nargang, director.

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

Metropolitan Waste Control Commission of the Twin Cities Area, L. Baker-Kent, chairperson

Beltrami Soil and Water Conservation District, John Cronemiller, chairperson.

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

Leech Lake Reservation Business Committee, Daniel Brown, chairperson.

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

Rochester Public Utilities, Robert Pawelski, General Manager.

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

SUMMARY OF HYDROLOGIC CONDITIONS

PRECIPITATION

Precipitation during the 1990 water year ranged from more than 8 in. (inches) below normal (based on record period 1951-80) in small areas of northwestern and north-central Minnesota to more than 8 in. above normal in parts of central, east-central, south-central, and southeastern Minnesota (fig. 1). Normal annual precipitation in Minnesota ranges from 19 in. in the northwest to 32 in. in the southeast. Precipitation during water year 1990 ranged from less than 13 in. in the west and northwest to 44 in. in the east central and southeast.

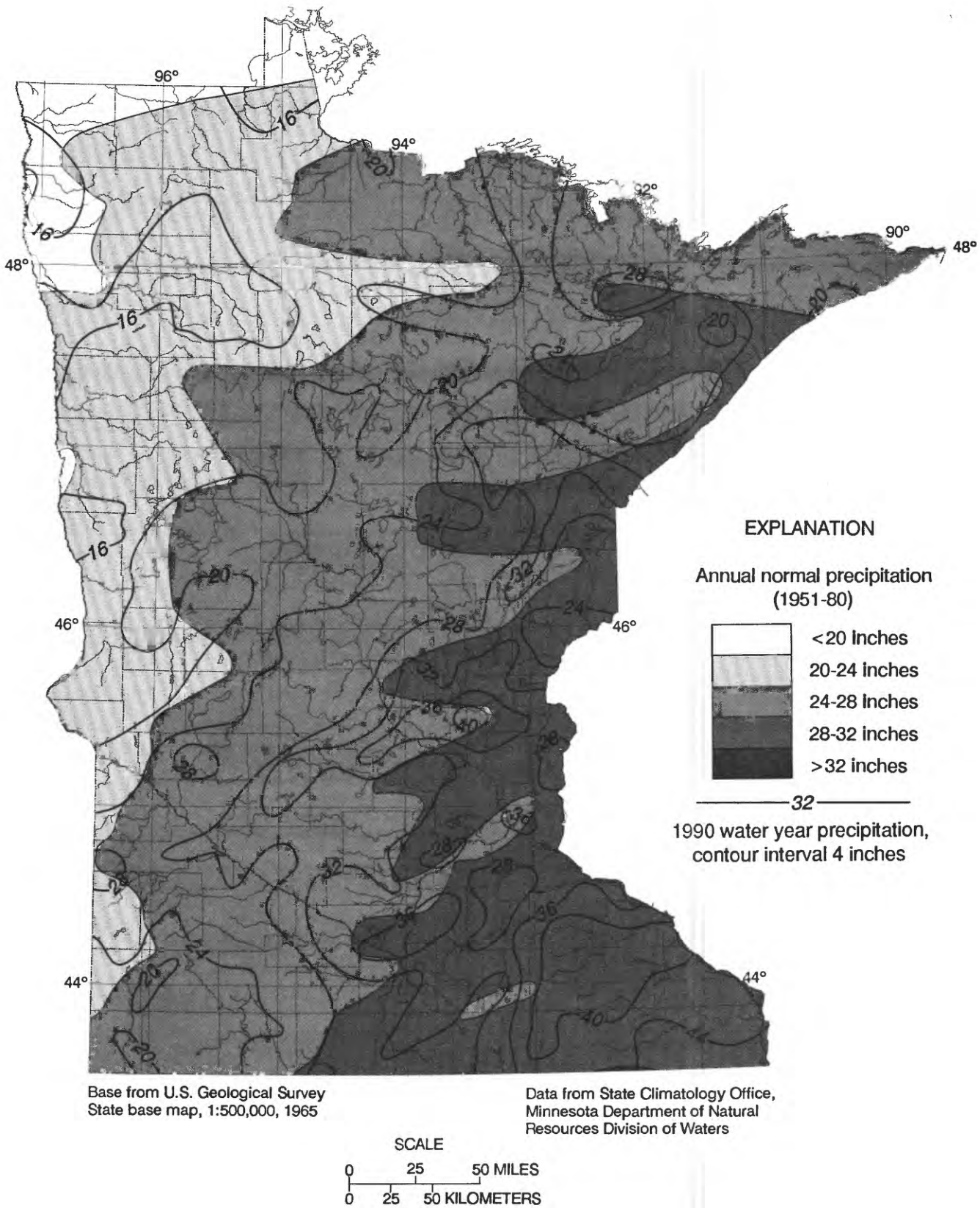


Figure 1.--Precipitation, in inches, during 1990 water year compared to normal annual precipitation in Minnesota.

The water year began with a 4- to 8-in. precipitation deficit in much of southern Minnesota and small areas in northwestern Minnesota, and a 4- to 8-in. precipitation excess in much of north-central and parts of northeastern Minnesota. The following is a summary of precipitation that occurred during water year 1990:

October - below normal statewide.

November - below normal statewide except in the northeast and southwest where it was above normal.

December - below normal statewide.

January - below normal statewide.

February - below normal statewide.

March - above normal statewide.

April - below normal statewide except in the south-central and east where it was above normal.

May - below normal statewide except in the central and south where it was above normal.

June - above normal statewide.

July - below normal in the north and west and above normal in the south.

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

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

Because of the precipitation pattern and abnormally high temperatures, the south-central and southwest one-third of the State was practically without snow cover at the end of January, and soil moisture was deficient statewide. January, which is normally the coldest month of the year, had temperatures 13 to 18 degrees Fahrenheit above normal statewide. In subsequent months, the amount of soil moisture increased in most of southern and central Minnesota, but by the end of May it was still extremely deficient in the northwest. In June, 9.82 in. of precipitation was recorded at the Minneapolis-St. Paul Airport by the U.S. Weather Service, breaking a 100-year record for precipitation in June. The previous record was 9.0 in. set in 1897 (modern-day record-keeping began in 1891). The total normal precipitation for the 3 months of June, July, and August in this area is only 1.4 in. more than the 9.82 in. that fell in June. In contrast, precipitation in June 1988 measured only 0.22 in. at the Minneapolis-St. Paul Airport -- the lowest precipitation ever recorded since 1891. During the remaining months of the 1990 water year, precipitation was again below normal in much of the State. By the end of the water year, most of northern and western Minnesota had below normal annual precipitation with small areas more than 8 in. below normal. Conversely, most of southern and eastern Minnesota had above normal precipitation with some areas more than 20 in. above normal.

STREAMFLOW

Average annual runoff in Minnesota ranges from 1 in. in the west to 14 in. in the northeast. Annual runoff in water year 1990 ranged from 0.06 in. in a small part of northwestern Minnesota to 12.2 in. in southeastern Minnesota (table 1). This translates to a low of 3 percent of average in northwestern Minnesota to a high of 182 percent of average in southeastern Minnesota. Runoff at almost every streamflow station in the western one-third of Minnesota was considerably less than one-half the long-term average, whereas runoff at stations in the eastern one-third was above one-half the long-term average and runoff at a few stations in southeastern Minnesota was even greater than the long-term average.

Precipitation in central and southern Minnesota varied from as low as 8 in. below normal in the southwest to as high as 20 in. above normal in the southeast. As a result, runoff was much below average in the west to much above average in the east. Runoff ranged from as low as 13 percent of average in 05311000 Minnesota River at Ortonville and 05293000 Yellow Bank River near Odessa in west-central Minnesota to as high as 182 percent of average in 05457000 Cedar River near Austin in southeastern Minnesota.

In east-central Minnesota, runoff in the Mississippi River at Aitkin was 4.72 in.--73 percent of the 45-year average (1946-90) of 6.44 in. and almost 1 1/2 in. less than in the previous year when runoff was 6.19 in. and 96 percent of the average.

Runoff in the Crow River at Rockford, in the southern part of central Minnesota, was 3.34 in. or 86 percent of the station's 65-year average (1910-17, 1931, 1935-90) annual runoff of 3.89 in. This is more than 3.5 times the runoff that occurred in either 1988 or 1989 when 0.95 in. and 0.91 in., respectively, were recorded.

In west-central Minnesota, runoff in the Chippewa River near Milan was 1.03 in., 46 percent of the station's 53-year average (1938-90) of 2.25 in. It was close to the 1.08 in. of runoff that occurred the previous water year.

In southwestern Minnesota, runoff in the Des Moines River at Jackson was 0.64 in., 18 percent of the station's 55-year average (1936-90) of 3.54 in. This is slightly above last year's runoff of 0.55 in. Figure 2 shows how the 1990 annual- and monthly-mean discharges for the above stations compared to the median of their mean discharges for a 30-year base period.

No records of peak discharge were established during the 1990 water year for any station published in this volume. However, near-record high and low monthly volumes were recorded, with low flows occurring in the west and high flows in the east as could be expected based on the precipitation pattern.

The combined storage in the six Mississippi River Headwater Reservoirs (Winnibigoshish, Leech, Pokegama, Pine, Sandy, and Gull), in northern and central Minnesota, was 1,452,668 acre-feet at the close of the 1990 water year--a decrease of 64,834 acre-feet from the close of last year.

WATER QUALITY

Figure 3 shows the concentrations of dissolved solids measured during the 1990 water year compared to the historical median monthly concentrations at four stations sampled for national water-quality monitoring programs administered by the U.S. Geological Survey. Dissolved-solids concentrations for the streams in southern Minnesota were not substantially different from their median concentrations.

Nitrite plus nitrate nitrogen concentrations, an indicator of input from agricultural or human sources are shown in figure 4. Concentrations ranged from the detection limit of 0.1 mg/L (milligrams per liter) in the Mississippi River near Royalton and the Minnesota River near Jordan to more than 8 mg/L in the Mississippi River at Nininger. None of the concentrations exceeded the 10 mg/L limit for domestic consumption established by the Minnesota Pollution Control Agency. Nitrite plus nitrate nitrogen concentrations in samples collected in 1990 showed some notable differences from historical monthly medians. For example, concentrations in the Minnesota and Whitewater Rivers were sometimes much less than the median early in water year 1990, but were more than the median late in the year. Nitrite plus nitrate concentrations in the Mississippi River near Royalton were at or larger than the median, but all were less than 0.4 mg/L. Concentrations in the Mississippi River at Nininger were less than 3 mg/L except in September when nearly 9 mg/L were found.

Table 1.--Runoff at streamflow stations in 1990 compared with long-term average for river basins in Minnesota

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

Station no.	Station name	Drainage area (mi^2)	Runoff (inches)		Maximum runoff		Minimum runoff		Years of record
			1990 Water year	Average	Inches	Water year	Inches	Water year	
05201500	Mississippi River at Winnibigoshish Dam near Deer River	1,442	2.95	4.90	11.61	1898*	0.85	1937*	106
05206500	Leech Lake River at Federal Dam	1,163	3.71	4.33	9.52	1899*	.40	1936*	106
05211000	Mississippi River at Grand Rapids	3,370	3.36	4.80	9.78	1906	.77	1934	107
05216860	Swan River near Calumet	114	6.08	7.72	12.75	1966	3.57	1977	26
05219000	Sandy River at Sandy Lake Dam at Libby	421	7.89	7.16	17.43	1986	.42	1931*	95
05227500	Mississippi River at Aitkin	6,140	4.72	6.44	11.03	1966	1.76	1977	45
05231000	Pine River at Cross Lake Dam at Cross Lake	562	5.19	5.32	13.48	1905*	.48	1931*	104
05245100	Long Prairie River at Long Prairie	432	2.21	4.84	11.51	1972	.79	1977	19
05247000	Gull River at Gull Lake Dam near Brainerd	287	4.30	5.16	10.79	1972	.76	1931*	79
05267000	Mississippi River near Royalton	11,600	4.27	5.37	10.44	1986	1.42	1934	66
05280000	Crow River at Rockford	2,520	3.34	3.89	14.84	1986	.35	1931	65§
05286000	Rum River near St. Francis	1,360	4.75	6.21	15.10	1986	.66	1934	58§
05287890	Elm Creek near Champlin	84.9	3.93	4.81	12.01	1986	.73	1988	12
05288500	Mississippi River near Anoka	19,100	4.54	5.61	12.62	1986	1.14	1934	59
05291000	Whetstone River near Big Stone City	389	.29	1.71	6.32	1986	.05	1934	59
05292000	Minnesota River at Ortonville	1,160	.16	1.24	4.26	1986	.03	1977, 1981	52
05293000	Yellow Bank River near Odessa	398	.26	1.98	7.68	1986	.14	1981	51
05294000	Pomme de Terre River at Appleton	905	.70	1.67	5.45	1986	.32	1977	55
05300000	Lac qui Parle River near Lac qui Parle	983	.72	1.80	6.42	1986	.00	1934	59§
05301000	Minnesota River near Lac qui Parle	4,050	.66	2.25	8.41	1986	.25	1959	48
05304500	Chippewa River near Milan	1,870	1.03	2.25	9.49	1986	.33	1940	53

Table 1.--Runoff at streamflow stations in 1990 compared with long-term average for river basins in Minnesota--Continued

Station no.	Station name	Drainage area (mi^2)	Runoff (inches)		Maximum runoff		Minimum runoff		Years of record
			1990 Water year	Average	Inches	Water year	Inches	Water year	
05311000	Minnesota River at Montevideo	6,180	.57	1.62	6.51	1986	.01	1934	69§
05313500	Yellow Medicine River near Granite Falls	653	1.56	2.52	9.98	1984	.17	1959	54§
05315000	Redwood River near Redwood Falls	699	1.33	2.66	9.21	1983	.23	1959	56§
05317000	Cottonwood River near New Ulm	1,280	1.47	3.32	12.63	1969	.44	1940	56§
05317200	Little Cottonwood River near Courtland	230	3.27	3.22	9.45	1983	.64	1977	17
05319500	Watonwan River near Garden City	812	2.10	5.10	13.83	1983	.86	1977	19§
05320000	Blue Earth River near Rapidan	2,430	2.94	5.00	16.08	1983	.59	1940, 1977	47§
05320500	Le Sueur River near Rapidan	1,100	4.81	5.63	16.53	1983	.63	1977	47§
05325000	Minnesota River at Mankato	14,900	1.95	2.70	8.44	1986	.12	1934	69§
05327000	High Island Creek near Henderson	237	2.59	4.70	13.54	1986	.53	1976	17
05330000	Minnesota River near Jordan	16,200	2.08	3.11	8.94	1986	.58	1940	56
05331000	Mississippi River at St. Paul	36,800	3.40	4.11	11.05	1986	.71	1934	92§
05336700	Kettle River below Sandstone	863	8.26	11.11	21.87	1972	4.00	1977	23
05337400	Knife River near Mora	102	4.80	8.12	17.97	1986	2.25	1988	16
05340500	St. Croix River at St. Croix Falls	6,240	7.35	9.35	18.65	1986	3.82	1934	88
05344500	Mississippi River at Prescott	44,800	4.05	5.18	11.68	1986	1.86	1931	62
05345000	Vermillion River near Empire	110	5.14	6.64	13.72	1986	2.91	1977	18§
05353800	Straight River near Fairbault	442	7.36	7.80	18.59	1983	1.35	1977	25
05374900	Zumbro River at Kellogg	1,400	9.96	8.54	14.93	1983	4.02	1977	15
05376000	North Fork Whitewater River near Elba	101	5.57	6.36	12.54	1974	2.61	1968	25§
05378500	Mississippi River at Winona	59,200	5.75	6.35	13.04	1986	2.23	1934	62
05384000	Root River near Lanesboro	615	10.15	7.82	17.80	1983	2.32	1964	54§
05457000	Cedar River near Austin	425	12.23	6.74	18.15	1983	1.98	1958	51§
05476000	Des Moines River at Jackson	1,220	.64	3.54	13.35	1983	.17	1956	55

* Calendar year
§ Noncontinuous period

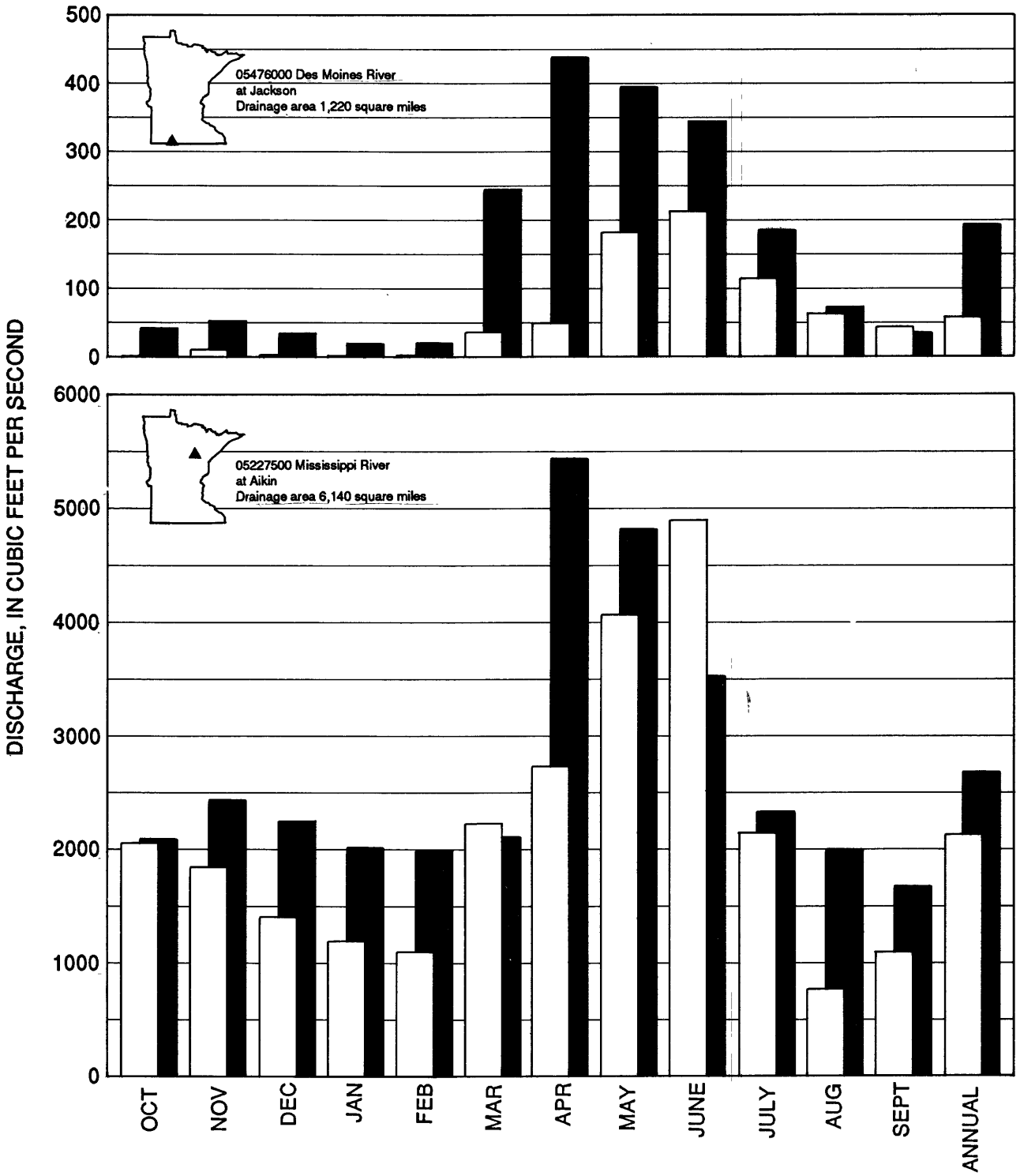
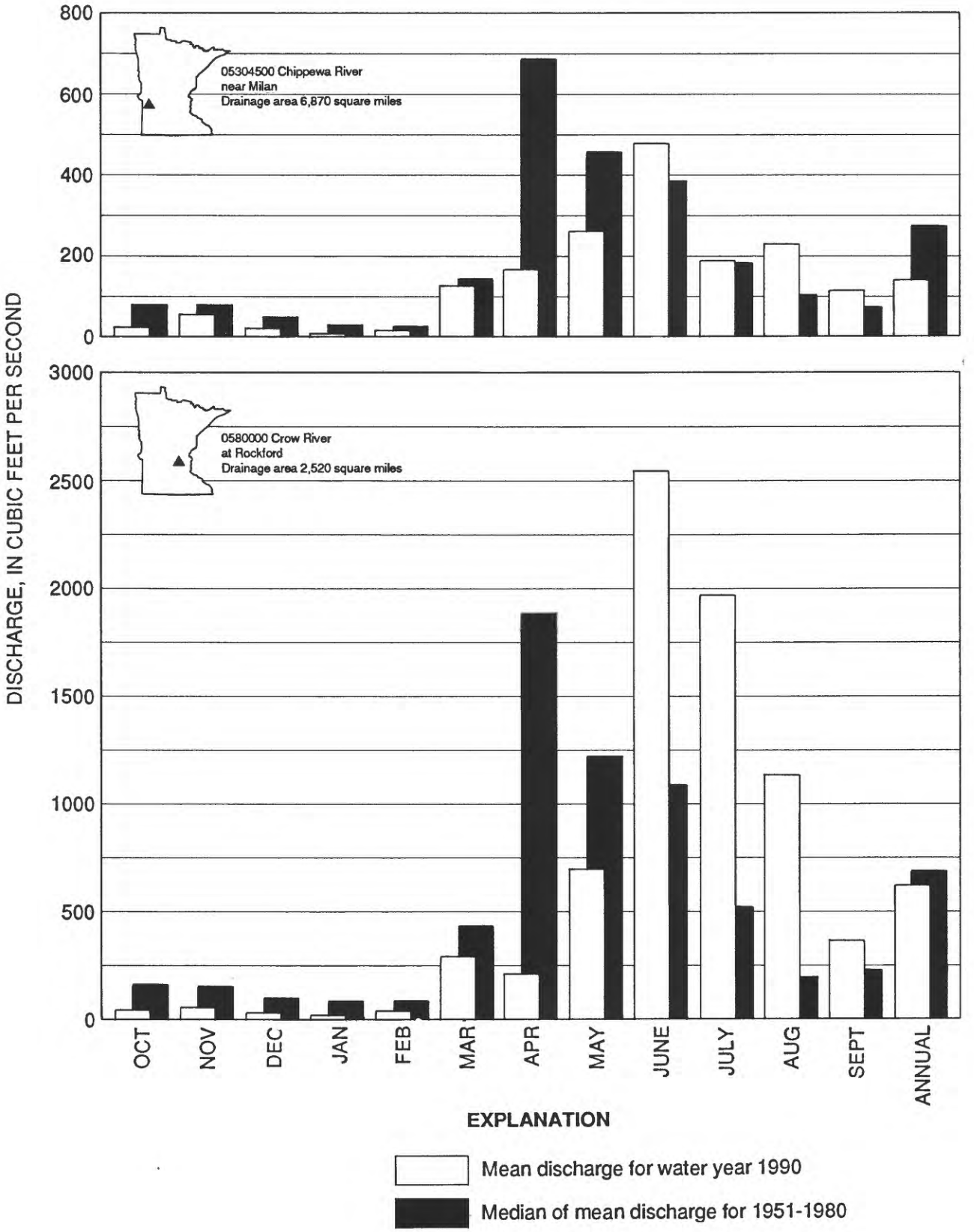


Figure 2.--Comparison of mean discharge for the 1990 water year with median



of mean discharge for 1951-80 at four long-term representative gaging stations.

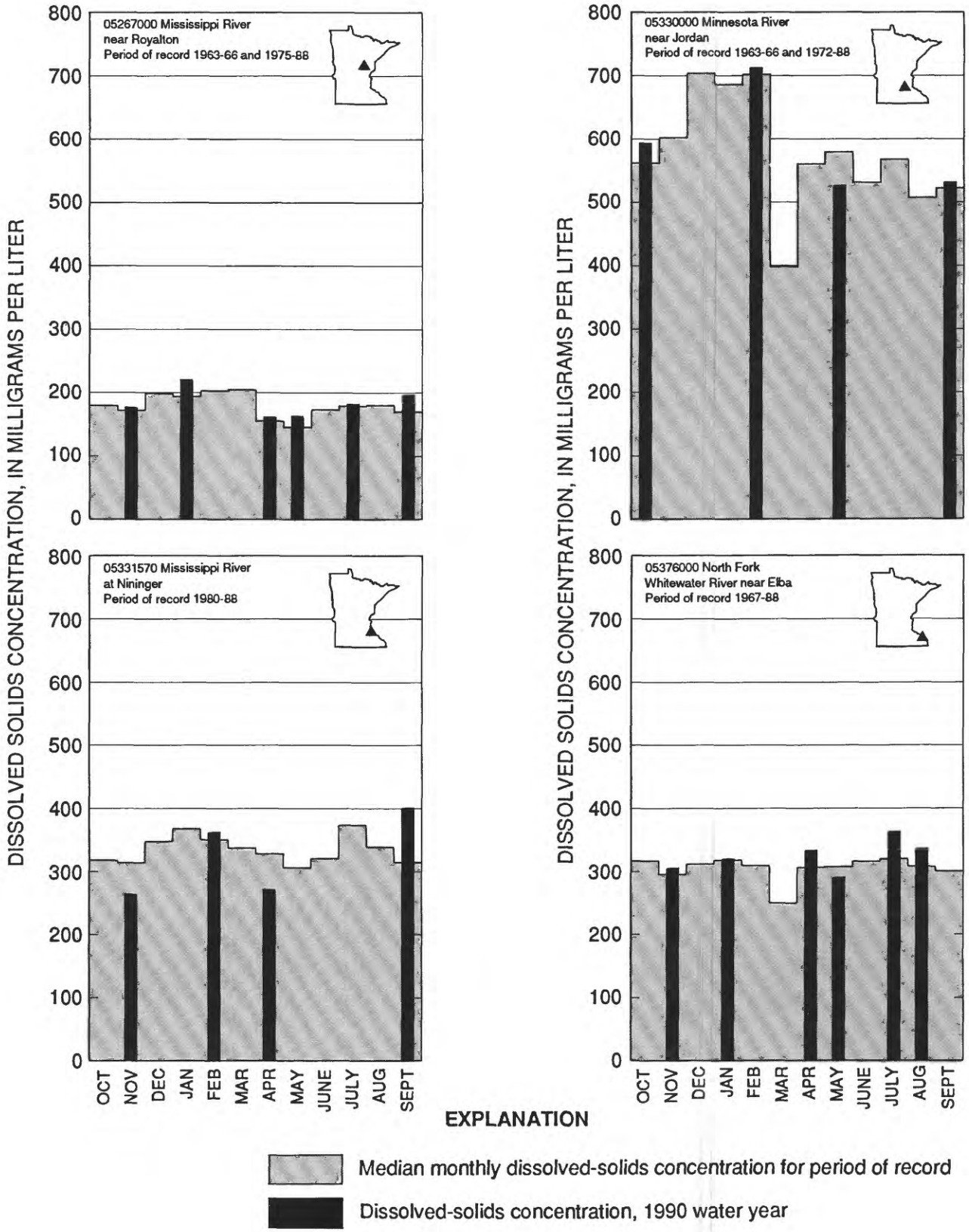


Figure 3.--Comparison of dissolved-solids concentrations in water year 1990 with median for period of record at representative gaging stations.

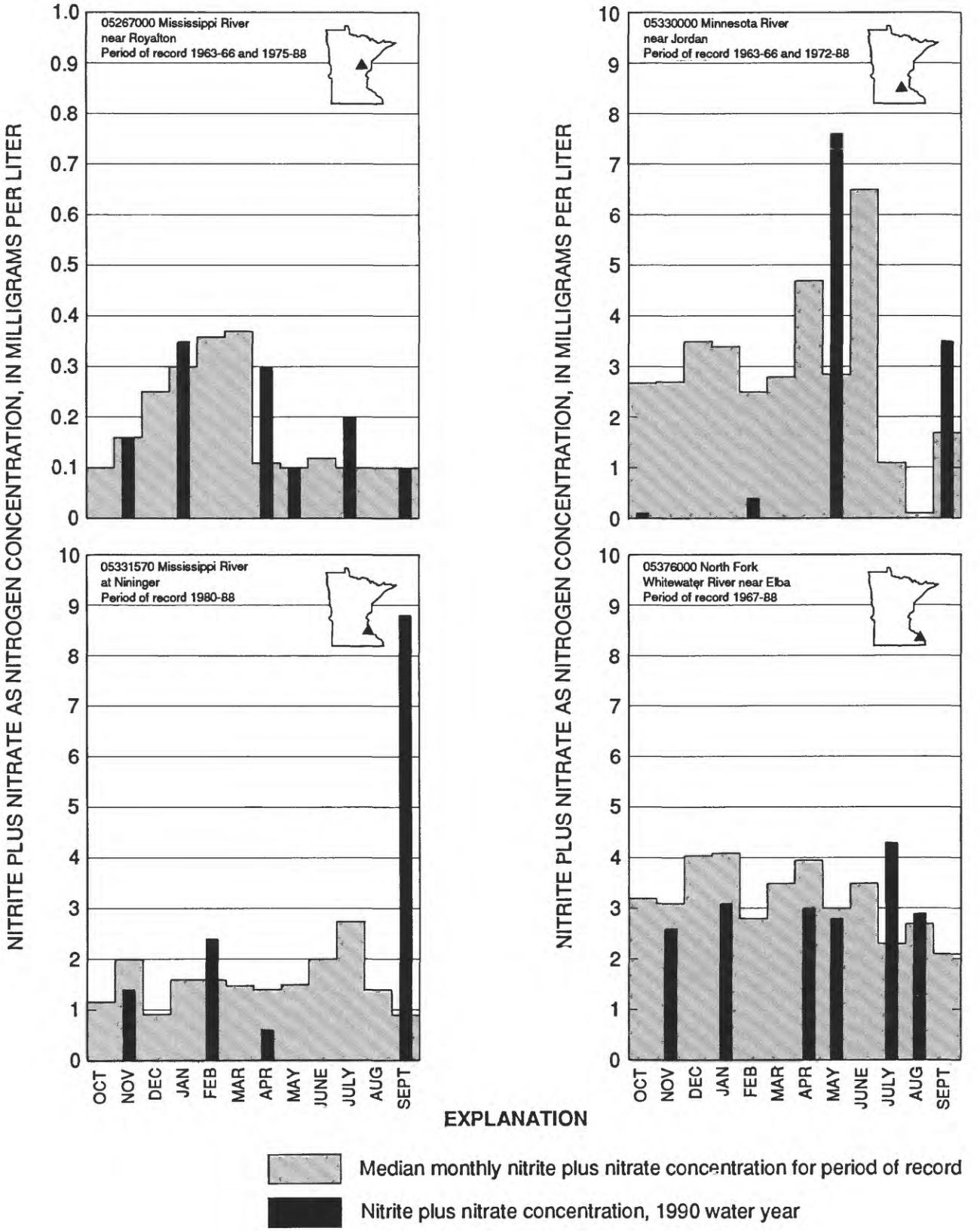


Figure 4.--Comparison of nitrite plus nitrate concentrations in water year 1990 with median for period of record at representative gaging stations.

Samples of ground water were collected from numerous wells throughout the part of Minnesota described in this report. Although most wells sampled by the U.S. Geological Survey are selected to represent ambient water-quality conditions, some wells were selected to detect or define areas of contamination within limited study areas. Some of the analytical results indicate local contamination, but the contamination cannot be assumed to be widespread.

Nitrite plus nitrate nitrogen concentrations in ground water ranged from less than detectable (0.1 mg/L) to 26 mg/L with a median of 0.2 mg/L. Samples from 23 wells had nitrate concentrations that exceeded the 10 mg/L standard for domestic consumption; most of these wells were in Dakota and Sherburne Counties. Atrazine was detected in two of four wells sampled for atrazine; the maximum concentration was 2.5 micrograms per liter. Elevated chloride concentrations in some wells suggest contamination from salt. Chloride exceeded 100 mg/L in wells sampled in Anoka, Beltrami, and Ramsey Counties, and a sample from one surficial well in Ramsey County had a chloride concentration of 580 mg/L.

GROUND-WATER LEVELS

Data for 21 wells completed in surficial sand aquifers, 18 in buried sand and gravel drift aquifers, 10 in the Upper Carbonate Aquifer, 6 in the St. Peter Aquifer, 35 in the Prairie du Chien-Jordan Aquifer, 13 in the Franconia-Ironton-Galesville Aquifer, 15 in the Mount Simon-Hinckley-Fond du Lac Aquifer, 4 in the Cretaceous Aquifer and 2 in the Sioux Quartzite Aquifer are published in this volume.

Surficial Sand Aquifers

Fourteen of the 19 wells completed in surficial aquifers located in north-central and northern east-central Minnesota had higher than average water levels at the end of water year 1990, whereas 5 wells had lower water levels.

A well (440037094372601) with 24 years of record (1966-90), near the city of St. James, in south-central Minnesota, had record monthly lows from October through May. A record low occurred in March at 16.22 feet below the datum. This surpassed the previous low of 15.10 feet below datum set in 1989. Water levels in this well rose from June to September to 12.98 feet below datum in response to above-normal rainfall; however, water levels were still 3 to 5 feet below their monthly averages. Water levels in a well(460444094212501) in central Minnesota were below the monthly average throughout the water year (fig. 5a). Water levels in the well had been below monthly averages for 29 months prior to this period. Two wells in north-central Minnesota had water levels below average for the entire water year, in response to a nine-month period (January-September) of deficient precipitation. One well (473023094570901) had a record low in March, whereas the other (465142094433201) well had a record low in September (fig. 5a). Both wells have 20 years of record.

In areas of adequate precipitation, water levels in wells were substantially higher than in 1989. The water level in one well (450631095562201) in west-central Minnesota rose 5 feet, whereas another well (451542094322301) in central Minnesota rose 3 feet.

Buried Sand and Gravel Aquifers

Water levels in four of eighteen wells completed in buried sand and gravel aquifers had record low levels during March through July. These lows were in wells in east-central Minnesota. A steady water-level decline of 9 feet has occurred in one of these wells (444815093194901) since 1979. The well, located in Hennepin County, is in an area where pumping from the Prairie du Chien-Jordan aquifer has contributed to a decline in water levels in the overlying buried-drift aquifer. Another well (450414093012701), located in neighboring Ramsey County, also has had a gradual water-level decline of 11 feet since 1986. Another well (455236093172301) in east-central Minnesota had new monthly low levels during October through March and May, and a record low in March (22-year period of record) (fig. 5b). Water levels in this well also were below the monthly average from June through September. In west-central Minnesota, a well (453330096420201) located in an area of irrigation has had a water level decline of 5 feet since 1987. The annual high water levels in this well have been progressively lower each year since 1987 (see hydrograph on page 227).

Upper Carbonate Aquifer

Ten wells in the upper carbonate aquifer in southeastern and south central Minnesota had water levels from 2 to 9 feet higher than in the previous the water year. The highest water levels occurred later in the year when precipitation was above normal (see hydrograph on page 238). Two wells had record high levels in June (445538092232601) and September (433846093220601). The amount of infiltration from precipitation to this aquifer depends partly on the thickness of the overlying glacial drift. For example, a well (445538092232601) with 25 feet of overlying drift had a water level rise of 9 feet, whereas another well (435742093164001) with 101 feet of overlying drift had a water level rise of only 2 feet. The former well had a record low level during the second quarter of the water year when drought conditions were still prevalent.

St. Peter Aquifer

Three of six production wells completed in the St. Peter aquifer in the Twin Cities Metropolitan Area had record-low levels in September. These wells each have 19 years of record. Water level declines have been observed in these same three wells since record highs in 1987 (see hydrograph for one of these wells 450134092583101 on page 270). Drought conditions and an increasing demand for ground water have affected water levels in the Metropolitan Area (fig. 5d). A well (434558093540001) in south-central Minnesota near a public-supply well, had record monthly low levels for most of the water year.

Prairie du Chien-Jordan Aquifer

Ground-water withdrawal from the Prairie du Chien-Jordan aquifer in the Twin Cities Metropolitan Area was less this year than in previous years due to cooler temperatures and adequate precipitation. Consequently, water levels in wells completed in these aquifers did not approach the record low levels of 1987-89 (fig. 5c). In areas of intense withdrawals such as downtown St. Paul and downtown Minneapolis, the yearly change in measured water levels was 50 feet in St. Paul and 64 feet in Minneapolis. Water levels rose in September from 32 feet in St. Paul to 47 feet in Minneapolis. Water levels at the end of September were 7 feet above average in St. Paul and 9 feet above average in Minneapolis. Water levels in many suburban public-supply wells also reflect reduced pumping for the year. Low levels in July and August in production wells were 0.6 foot to 3 feet above levels during the same period a year ago. Water levels in a well (435920092273801) in Rochester, in southeastern Minnesota, showed significant declines from 1985-90 (hydrograph on page 256). This well, is surrounded by 23 municipal supply wells. Its hydrograph shows a net decline of 9 feet. Several wells in areas far from pumping centers had annual water-level fluctuations of 1/2 to about 5 feet, and reflect normal seasonal changes in water levels.

Franconia-Ironton-Galesville Aquifer

Water levels measured in five of thirteen wells completed in the Franconia-Ironton-Galesville aquifer declined to record monthly lows during the water year. In one well (440050094102801) in south-central Minnesota, the record-low level occurred in October. In three wells (445539092462401, 452305093141501, 451938093223101) in east-central Minnesota, it occurred in January or March, and in one well (433935091252001) in southeastern Minnesota, it occurred in July. These five wells also had record-low water levels during the 1989 water year. In one well (444427093353902) in the Twin Cities Metropolitan Area, equipped with a continuous recorder, water levels were below the average throughout the water year. A well (435746092034202) in southeastern Minnesota had water levels near the monthly average throughout the year, except for the month of April when a record monthly low level was recorded (fig. 5d).

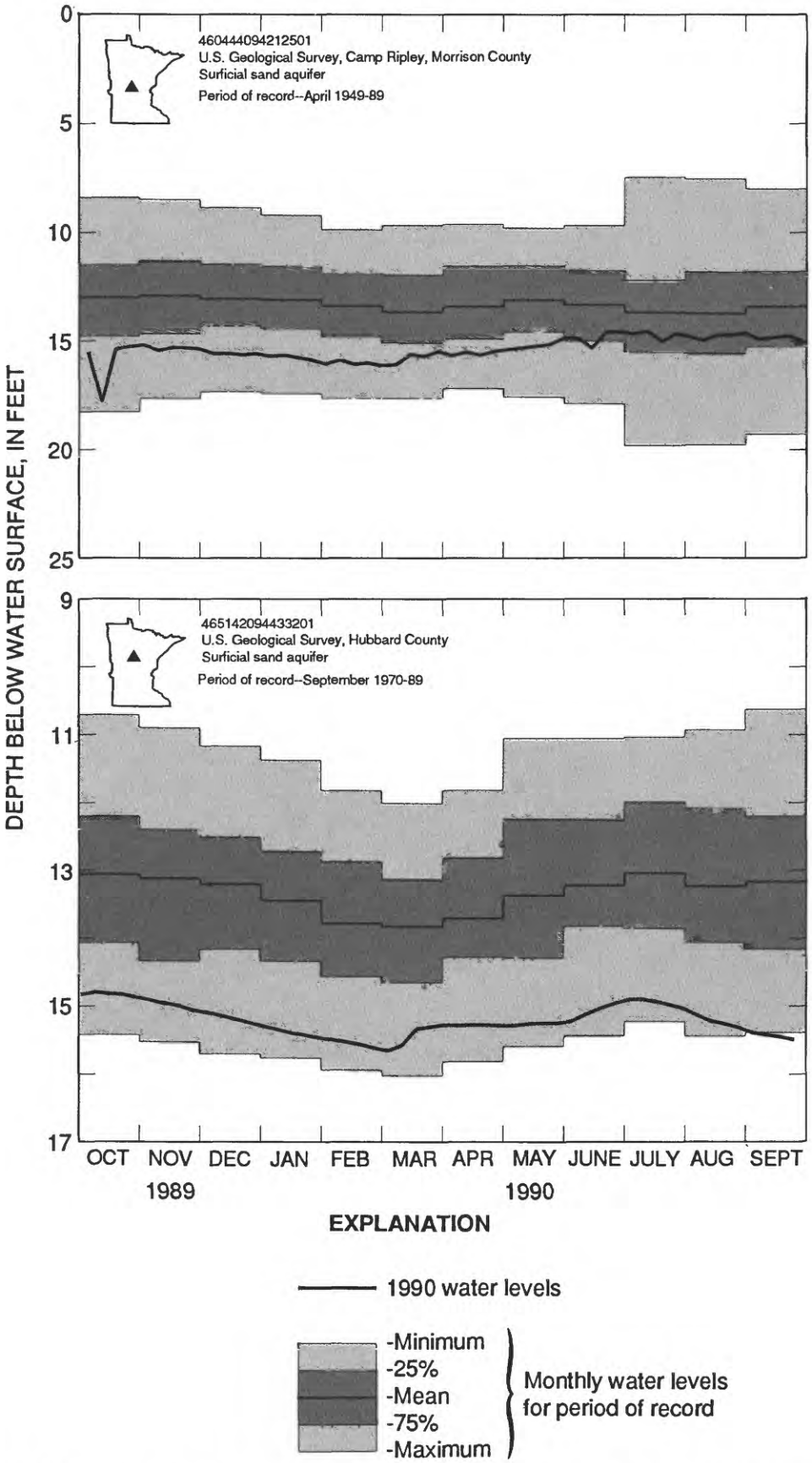


Figure 5a.--Comparison of water levels during 1990 to long-term levels in two representative wells in surficial sand aquifers.

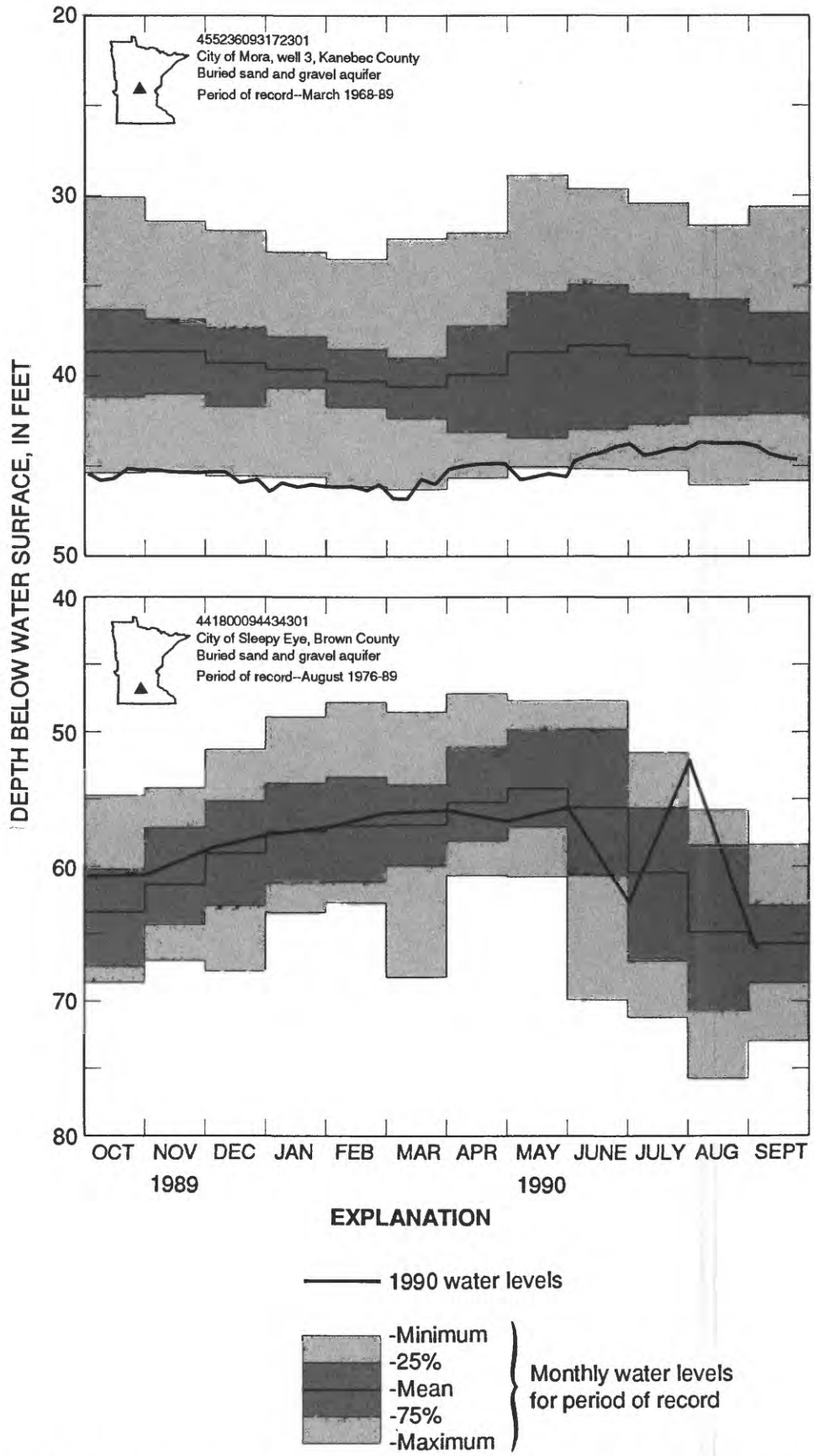


Figure 5b.--Comparison of water levels during 1990 to long-term levels in two representative wells in buried sand and gravel aquifers.

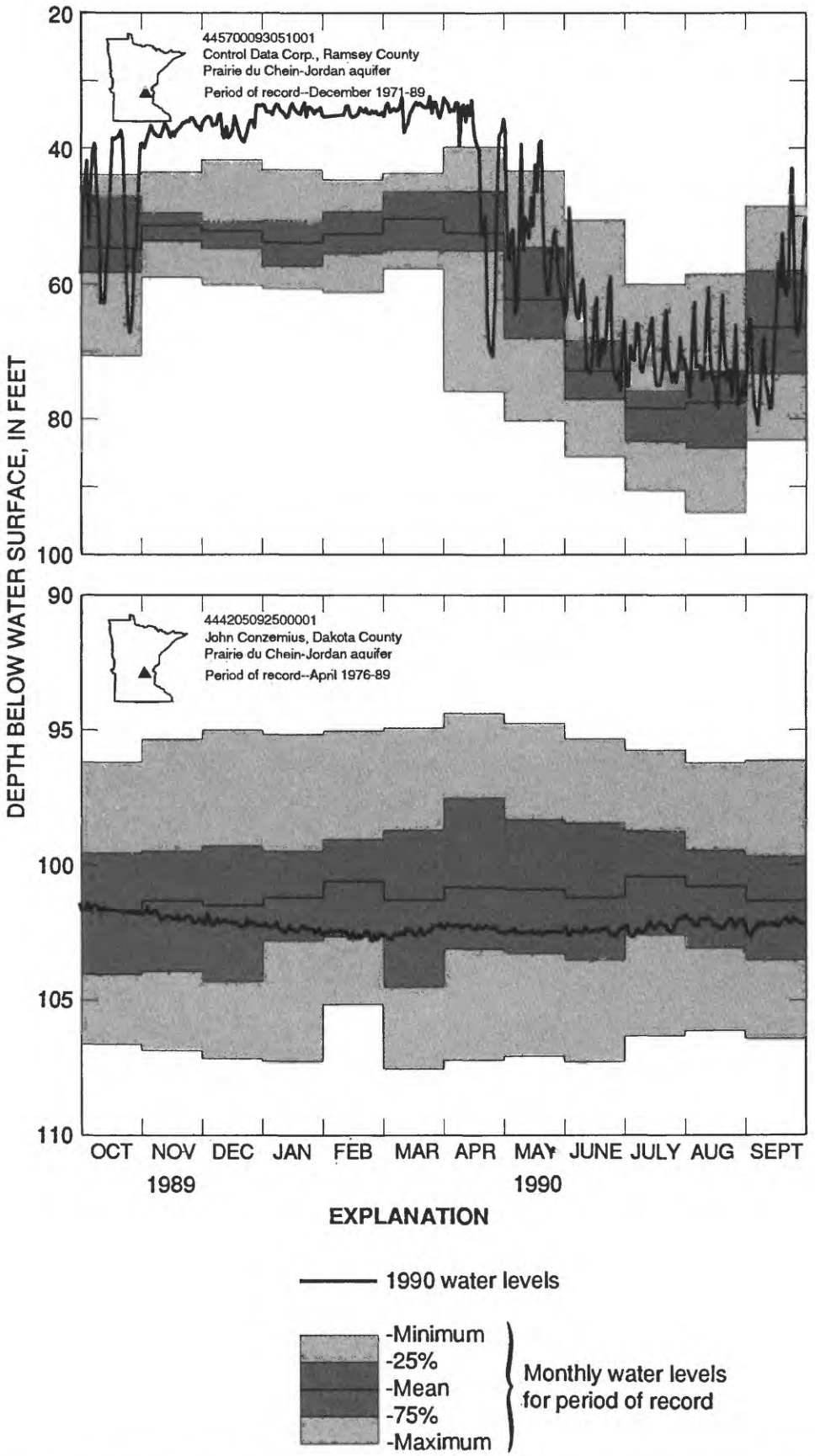


Figure 5c.--Comparison of water levels during 1990 to long-term levels in two representative bedrock wells in the Prairie du Chien-Jordan aquifer.

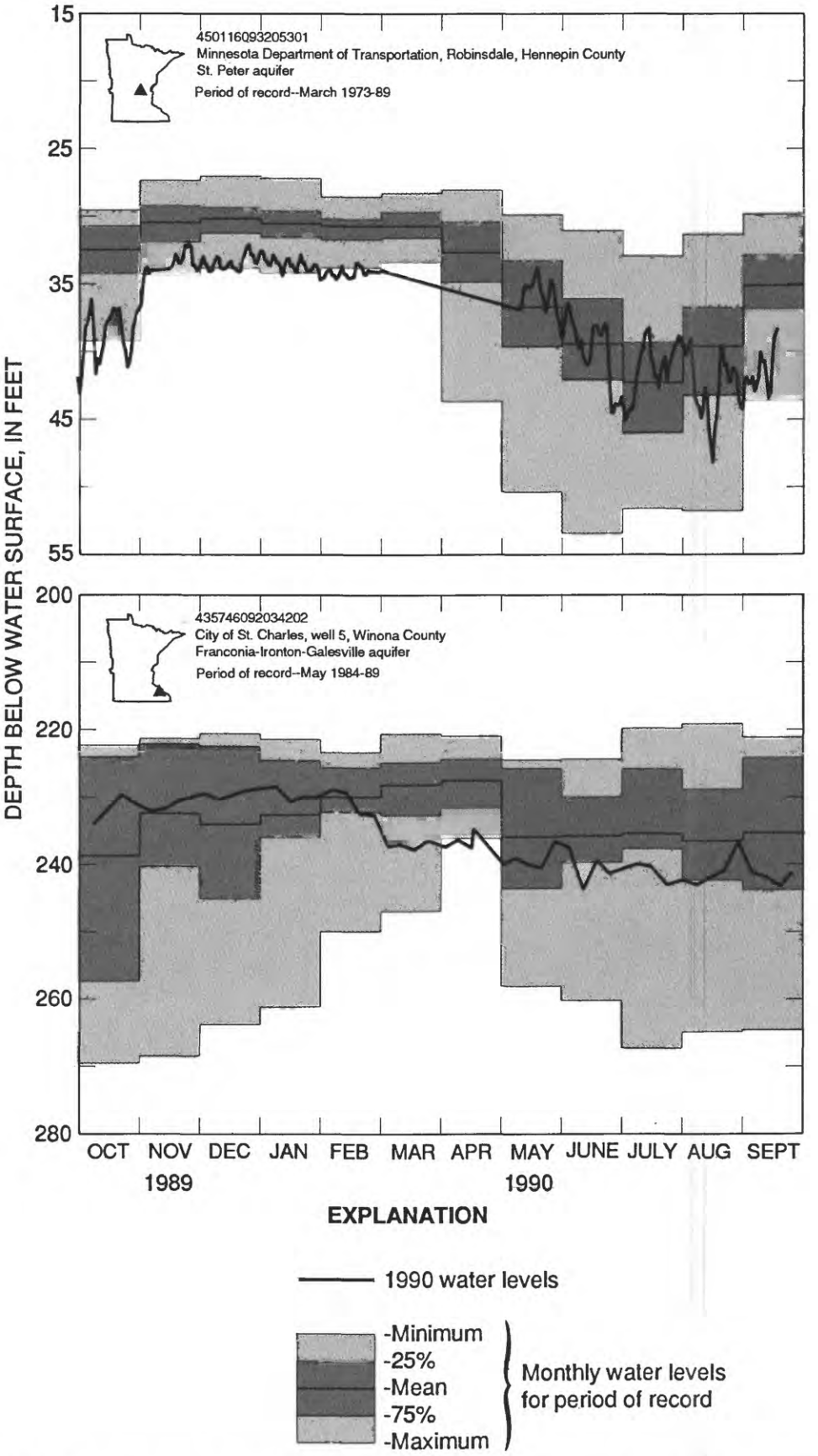


Figure 5d.--Comparison of water levels during 1990 to long-term levels in two representative bedrock wells in the St. Peter and Franconia-Ironton-Galesville aquifers.

Mount Simon-Hinckley-Fond du Lac Aquifer

Four of fifteen wells completed in the Mount Simon-Hinckley-Fond du Lac aquifer had record low-water levels during the first quarter of the water year. Three of these wells are located in east-central Minnesota and the other well is in the southeast. These wells also had record-low levels during the previous water year. Large water-level declines within the Twin Cities Metropolitan Area have been observed in wells in areas of intensive withdrawals. Since about 1980, a well (445829093162901) in Minneapolis (see hydrograph on page 243) has had a decline of 78 feet or about 8 feet per year. A well (445751093072301) in St. Paul has had a decline of 50 feet or 5 feet per year. There is some indication that this downward trend in water levels is being reversed (fig. 5e). At the end of the water year, water levels in these wells, located in St. Paul and Minneapolis, were 13 to 15 feet higher than a year ago. Levels were, however, 18 feet below average in St. Paul and 23 feet below average in Minneapolis at the end of the water year. A well (444427093353903) near Shakopee, distant from areas of intensive pumping, had a rise in water level of 3 feet during water year 1990; this same well had a water level decline of 13 feet during 1986-90.

SPECIAL NETWORKS AND PROGRAMS

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

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

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).

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 1990 water year that began October 1, 1989, and ended September 30, 1990. 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 7, 8, 9, and 10. The following sections of the introductory text are presented to provide users with a more detailed explanation of how the hydrologic data published in this report were collected, analyzed, computed, and arranged for presentation.

STATION IDENTIFICATION NUMBERS

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

Downstream Order System and Station Number

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

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

Latitude-Longitude System for Wells and Miscellaneous Sites

The 8-digit downstream order station numbers are not assigned to wells and miscellaneous sites where only random water-quality samples or discharge measurements are taken.

The well and miscellaneous site numbering system of the U.S. Geological Survey is based on the grid system of latitude and longitude. The system provides the geographic location of the well or miscellaneous site and a unique number for each site. The number consists of 15 digits. The first 6 digits denote the degrees, minutes, and seconds of latitude, the next 7 digits denote degrees, minutes, and seconds of longitude, and the last 2 digits (assigned sequentially) identify the wells or other sites within a 1-second grid. See figure 6. 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.

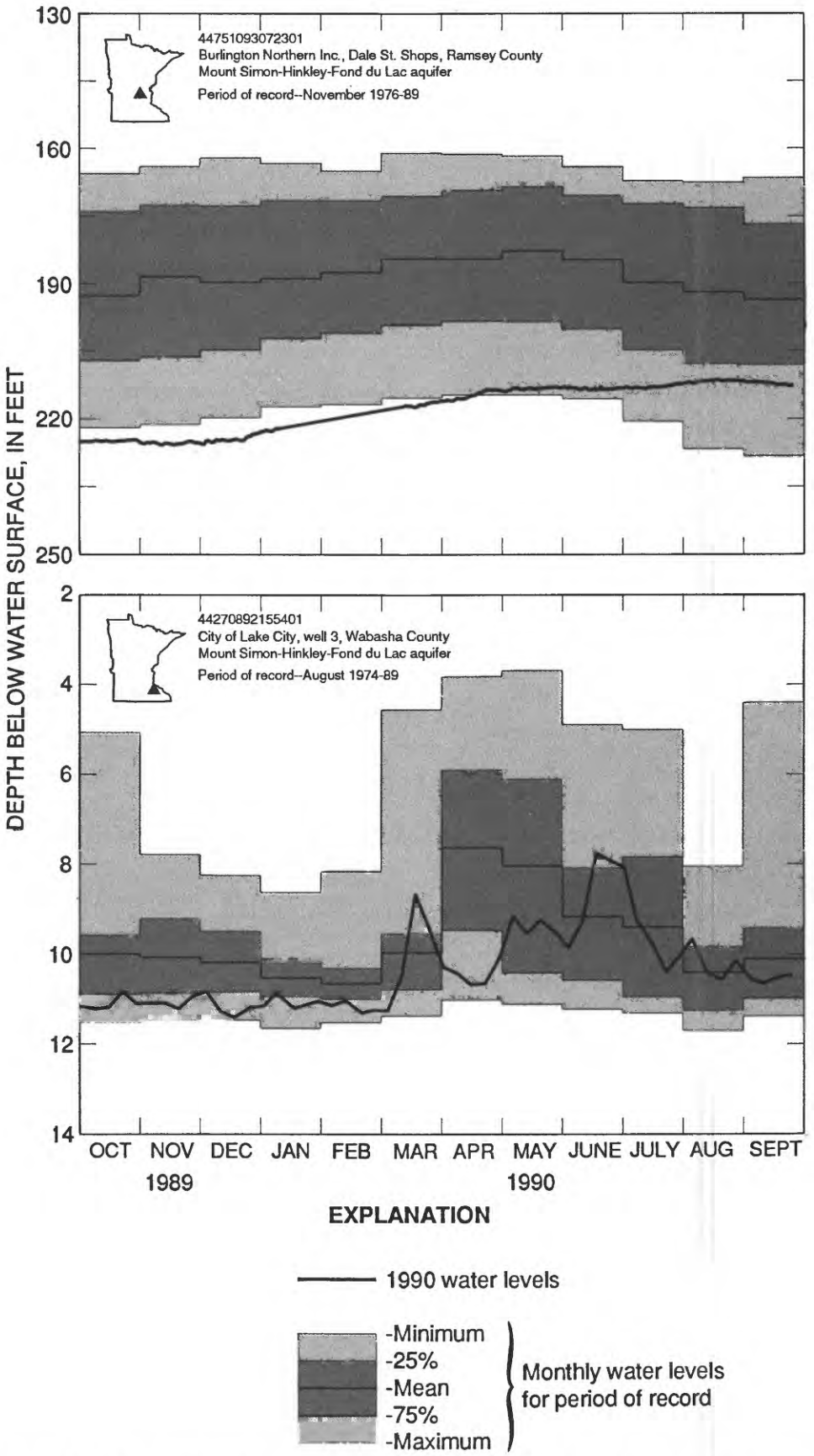


Figure 5e.--Comparison of water levels during 1990 to long-term levels in two representative wells in the Mount Simon-Hinkley-Fond du Lac aquifer.

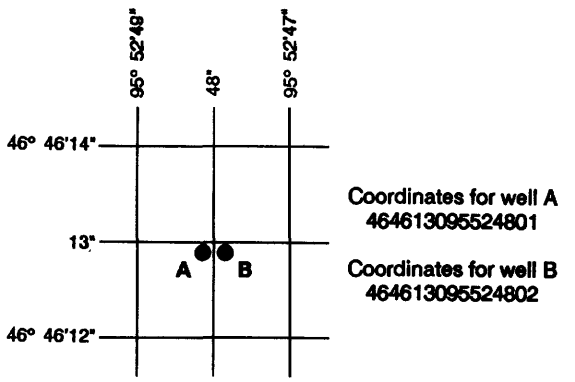


Figure 6.--Example of system for numbering wells and miscellaneous sites

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 7 and 9.

Data Collection and Computation

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

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

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

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

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

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

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

Data Presentation

The records published for each gaging station consist of two parts, the manuscript or station description and the data table for the current water year. The manuscript provides, under various headings, descriptive information, such as station location; period of record; average discharge; historical extremes; 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 did not include daily, monthly, or annual figures of discharge, that fact is noted after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" that only the instantaneous minimum was revised; and "(P)" that only peak discharges were revised. If the drainage area has been revised, the report in which the most recently revised figure was first published is given.

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

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

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

AVERAGE DISCHARGE.--The discharge value given is the arithmetic mean of the water-year mean discharges. It is computed only for stations having at least 5 water years of complete record, and only water years of complete record are included in the computation. It is not computed for stations where diversions, storage, or other water-use practices cause the value to be meaningless. If water developments significantly altering flow at a station are put into use after the station has been in operation for a period of years, a new average is computed as soon as 5 water years of record have accumulated following the development. The median of yearly mean discharges also is given under this heading for stations having 10 or more water years of record, if the median differs from the average given by more than 10 percent.

EXTREMES FOR PERIOD OF RECORD.--Extremes may include maximum and minimum stages and maximum and minimum discharges or content. Unless otherwise qualified, the maximum discharge or content is the instantaneous maximum corresponding to the highest stage that occurred. The highest stage may have been obtained from a graphic or digital recorder, a crest-stage gage, or by direct observation of a nonrecording gage. If the maximum stage did not occur on the same day as the maximum discharge or content, it is given separately. Similarly, the minimum is the instantaneous minimum discharge, unless otherwise qualified, and was determined and is reported in the manner as the maximum.

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.

EXTREMES FOR THE CURRENT YEAR.--Extremes given here are similar to those for the period of record, except the peak discharge listing which may include secondary peaks. For stations meeting certain criteria, all peak discharges and stages occurring during the water year and greater than a selected base discharge are presented under this heading. The peaks greater than the base discharge, excluding the highest one, are referred to as secondary peaks. Peak discharges are not published for canals, ditches, drains, or streams for which the peaks are subject to substantial control by man. The time of occurrence for peaks is expressed in 24-hour local standard time. For example, 12:30 a.m. is 0030, and 1:30 p.m. is 1330. The minimum for the current water year appears below the table of peak data.

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 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.

For most gaging stations on lakes and reservoirs the data presented comprise a description of the station and a monthly summary table of stage and contents. For some reservoirs a table showing daily contents or stage is given.

The daily table for stream-gaging stations gives mean discharge for each day and is followed by monthly and yearly summaries. In the monthly summary below the daily table, the line headed "TOTAL" gives the sum of the daily figures. The line headed "MEAN" gives the average flow in cubic feet per second during the month. The lines headed "MAX" and "MIN" give the maximum and minimum daily discharges, respectively, for the 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 are omitted if there is extensive regulation or diversion or if the drainage area includes large noncontributing areas. In the yearly summary below the monthly summary, the figures shown are the appropriate discharges for the calendar and water years. At some stations monthly and (or) yearly observed discharges are adjusted for reservoir storage or diversion, or diversions or reservoir contents are given. These figures are identified by a symbol and corresponding footnote.

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 Geological Survey. Information on records available at specific sites can be obtained upon request.

RECORDS OF SURFACE-WATER QUALITY

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

Classification of Records

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

A careful distinction needs to be made between "continuing records" as used in this report and "continuous recordings," which refers to a continuous graph or a series of discrete values punched at short intervals on a paper tape. Some records of water quality, such as temperature and specific conductance, may be obtained through continuous recordings; however, because of costs, most data are obtained only monthly or less frequently. Locations of stations for which records on the quality of surface water appear in this report are shown in figure 8.

Arrangement of Records

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

Onsite Measurement and Collection

In obtaining water quality data, a major concern needs to be assuring that the data obtained represents the in situ quality of water. To assure this, certain measurements, such as water temperature, pH, and dissolved oxygen need to be made onsite when the samples are taken. To assure that measurements made in the laboratory also represent the in situ water, carefully prescribed procedures need to be followed in collecting the samples, in treating the samples to prevent changes in quality pending analysis, and in shipping the samples to the laboratory. Procedures for onsite measurements and for collecting, treating, and shipping samples are given in publications on "Techniques of Water-Resources Investigations," Book 1, Chap. D2; Book 3, Chap. C2; Book 5 Chap. A1, A3, and A4. All of these references are listed on p. 17 of this report. Also, detailed information on collecting, treating, and shipping samples may be obtained from the Geological Survey district office.

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

Accounting Network (see definitions) are obtained from at least several verticals. Whether samples are obtained from the centroid of flow or from several verticals, depends on flow conditions and other factors which must be evaluated by the collector.

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

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

Water Temperature

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

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

Sediment

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

During periods of rapidly changing flow or rapidly changing concentration, samples may have been collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided-day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided-day method. For periods when no samples were collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

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

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

Laboratory Measurements

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

Data Presentation

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

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

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

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

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

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

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

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

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

REVISIONS.--If errors in published water-quality records are discovered after publication, appropriate updates are made to the Water-Quality File in the U.S. Geological Survey's computerized data system, WATSTORE, and subsequently by monthly transfer of update transactions to the U.S. Environmental Protection Agency's STORET system. Because the usual volume of updates makes it impractical to document individual changes in the State data-report series or elsewhere, potential users of U.S. Geological Survey water-quality data are encouraged to obtain all required data from the appropriate computer file to insure the most recent updates.

The surface-water-quality records for partial-record stations and miscellaneous sampling sites are published in separate tables following the table of discharge measurements at miscellaneous sites.

No descriptive statements are given for these records. Each station is published with its own station number and name in the regular downstream-order sequence.

Remark Codes

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

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

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 10.

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 20 representative wells; 7 in surficial-sand aquifers, 3 in buried-sand aquifers, and 10 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. 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.

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) National Geodetic Vertical Datum of 1929 (NGVD of 1929); it is reported with a precision depending on the method of determination.

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

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

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

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

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 National WATer Data STOrage and REtrieval System (WATSTORE) was established for handling water data collected through the activities of the U.S. Geological Survey and to provide for more effective and efficient means of releasing the data to the public. The system is operated and maintained on the central computer facilities of the Survey at its National Center in Reston, Virginia.

WATSTORE can provide a variety of useful products ranging from simple data tables to complex statistical analyses. A minimal fee, plus the actual computer cost incurred in producing a desired product, is charged to the requester. Information about the availability of specific types of data, the acquisition of data or products, and user charges can be obtained locally from each of the Water Resources Division's district offices (see address given on back of the title page).

General inquires about WATSTORE may be directed to:

Chief Hydrologist
U.S. Geological Survey
437 National Center
Reston, Virginia 22092

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 sheet within 24 hours when incubated at 35°C ±1.0°C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

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

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

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

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

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

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

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

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

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

Bottom material: See Bed Material.

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

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

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

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

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

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

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

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

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

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

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 the element 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	0.00024 - 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 3.7×10^{10} 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 radioisotopes. 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.

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 quantity and intensity of 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 of 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 miltiplate 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 um membrane filter has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all the particulate matter is not achieved by the digestion treatment and thus the determination represents something less than the "total" amount (that is, less than 95 percent) of the constituent present in the sample. To achieve comparability of analytical data, equivalent digestion procedures would be required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

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

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

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

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchical scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common. For example, the taxonomy of a particular mayfly, Hexagenia limbata is the following:

Kingdom.....Animal
Phylum.....Arthropoda
Class.....Insects
Order.....Ephemeroptera
Family.....Ephermeridae
Genus.....Hexageria
Species.....Hexagenia limbata

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. This 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, 1990, is called the "1990 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.

PUBLICATION OF 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-resources 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 of 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. Ficke, 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. S. Keys and L. M. MacCary: USGS--TWRI Book 2, Chapter E1. 1971. 126 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.

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 Antonius 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. Rathbun, 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.

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS--Continued

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-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.

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.

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.

DISCONTINUED GAGING STATIONS

The following continuous-record streamflow or stage stations in Minnesota have been discontinued or converted to partial-record stations. Daily streamflow or stage records were collected and published for the period of record shown for each station.

Station number	Station name	Drainage area (mi^2)	Period of record
	Upper Mississippi River basin		
05210000	Mississippi River near Deer River, MN	a3,190	1945-50
05212700	Prairie River near Taconite, MN	a360	1967-83
*05213000	Prairie River near Grand Rapids, MN	485	1909†, 1925-49
05216800	O'Brien Creek near Pengilly, MN	-	1963-68
05216820	Initial tailings basin outflow near Keewatin, MN	2.5	1982-85
05217000	Swan River near Warba, MN	254	1954-69
05217500	Swan River near Swan River, MN	a290	1929
05218000	Mississippi River above Sandy River near Libby (above Sandy River), MN	4,560	1895-1915, 1925-29
05221000	Willow River near Palisade, MN	442	1929
05226200	Ripple (Mud) River near Wealthwood, MN	-	1937-39
05232000	Pelican Brook (Long Lake) near Pequot Lakes, MN	-	1938-42, 1943-47
05241500	Rabbit River near Crosby, MN	8.38	1945-63
05242700	Little Sand Lake outlet (Sand Lake outlet) near Dorset, MN	a74	1930-41
*05244000	Crow Wing River at Nimrod, MN	a1,010	1910-14, 1930-81
05244500	Crow Wing River at Motley, MN	a2,140	1909† 1913-17, 1930-31
05244980	Diversion from Long Prairie River near Osakis, MN	-	1939-47
05245000	Long Prairie River near Osakis, MN	-	1949-54
05245500	Long Prairie River near Motley, MN	973	1909-17, 1930-31
05246000	Crow Wing River at Pillager, MN	a3,230	1903†, 1909-13, 1925-50
*05261000	Mississippi River near Fort Ripley, MN	a11,010	1906, 1909-10, 1929
05261500	Nokasippi River near Fort Ripley, MN	210	1929
*05268000	Platte (Platt) River at Royalton, MN	338	1929-36
05269000	Mississippi River near Sauk Rapids, MN	a12,400	1903-06
05270000	Mississippi River at Sartell, MN	a12,450	1929, 1943-47†
05270500	Sauk River near St. Cloud, MN	925	1909-12, 1913, 1929, 1930, 1931, 1932, 1933, 1934-81
05273500	Clearwater River at Clearwater, MN	-	1937, 1940-42
05274500	Elk River above St. Francis River near Big Lake, MN	384	1929

"See footnotes at end of table."

DISCONTINUED GAGING STATIONS

Station number	Station name	Drainage area (mi^2)	Period of record
	Upper Mississippi River basin--Continued		
05275000	Elk River near Big Lake	615	1911-17, 1931, 1932, 1933, 1934-87
05274700	St. Francis River at Santiago, MN	-	1965-70, 1980-81
05274750	St. Francis River above Zimmerman, MN	-	1980-84
05274900	St. Francis River near Big Lake, MN	-	1965-70
05275500	Mississippi River at Elk River, MN	a14,500	1915-56
05276000	North Fork Crow River near Regal, MN	215	1943-54
05277000	Middle Fork Crow River at New London, MN	-	1939-42, 1943-47
05277500	Middle Fork Crow River (Calhoun Lake Diversion) near Spicer, MN	-	1939, 1940-46
05278000	Middle Fork Crow River near Spicer, MN	179	1949-87
05278400	North Fork Crow River near Rockford, MN	-	1909-10
05278500	South Fork Crow River at Cosmos, MN	221	1945-64
05278930	Buffalo Creek near Glencoe, MN	374	1972-80
*05279000	South Fork Crow River near Mayer, MN	a1,170	1934-79
05279500	South Fork Crow River near Rockford, MN	a1,250	1909-12
05283500	Mississippi River at Anoka, MN	a17,100	1897, 1905-13
05284500	Rum River at Onamia, MN	414	1910-12
05284750	Rum River at Spencer Brook MN	-	1960-64
05285000	Rum River at Cambridge, MN	a1,160	1909-14
05285500	Rum River at St. Francis, MN	-	1903
05286500	Rum River near Anoka, MN	1,430	1905-06, 1909
05289000	Minnetonka Lake (head of Minnehaha Creek) near Wayzata (at Excelsior), MN	-	1938-64
05289500	Minnehaha Creek at Minnetonka Mills, MN	130	1953-64
	Minnesota River basin		
05292500	Minnesota River near Odessa, MN	a1,340	1909-12, 1944-63
05293500	Pomme de Terre River near Morris, MN	-	1937-39, 1940-47
05299500	Canby Creek at Canby, MN	-	1938-39, 1940-46
05300500	Ten Mile Creek near Boyd, MN	82.8	1949-51
05302000	Little Chippewa River near Lowry, MN	a54	1941
*05302500	Little Chippewa River near Starbuck, MN	111	1938-39
05303000	Chippewa River at diversion dam near Hancock, MN	-	1930-39, 1940-46

"See footnotes at end of table."

DISCONTINUED GAGING STATIONS

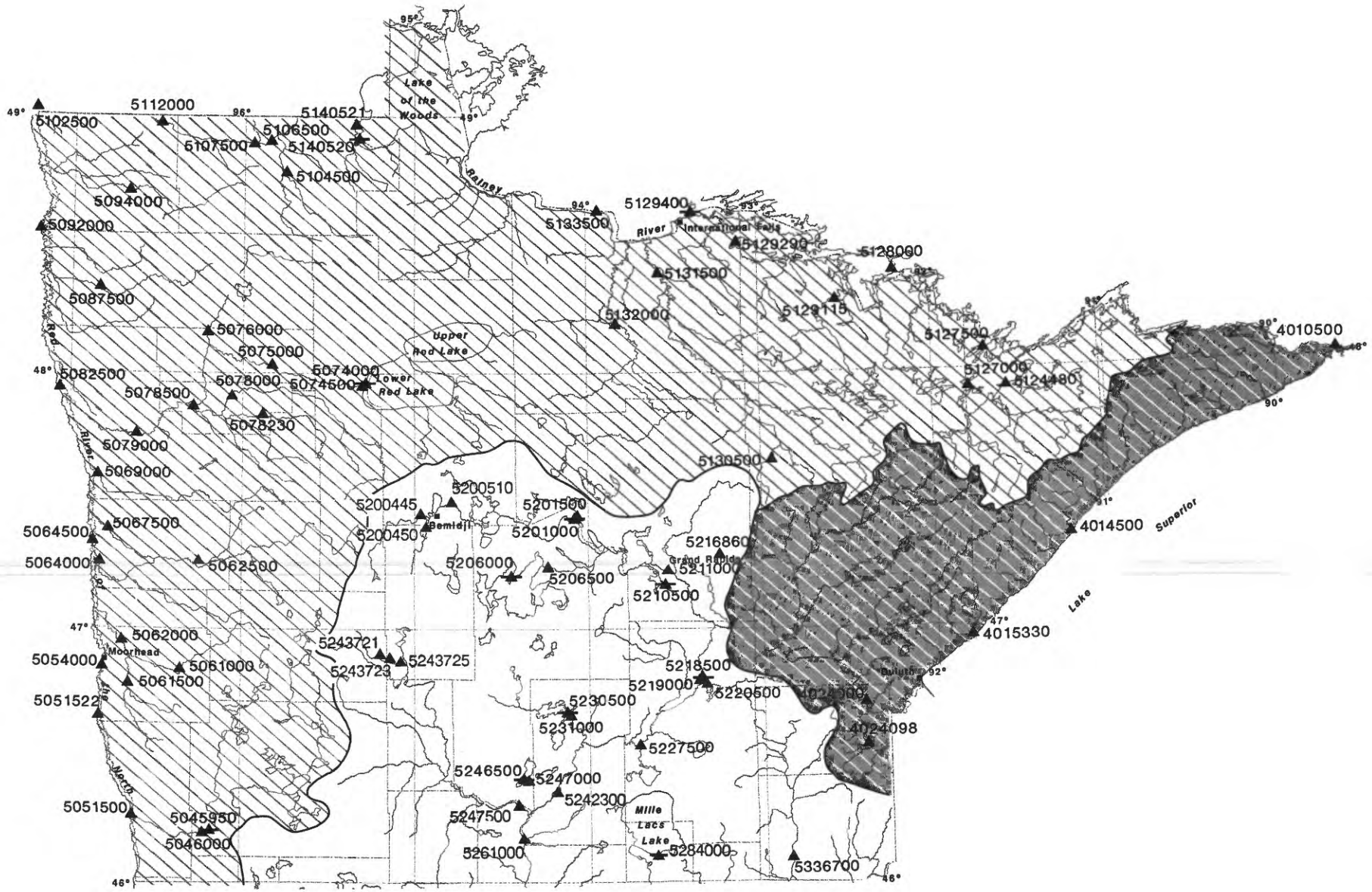
Station number	Station name	Drainage area (mi^2)	Period of record
	Minnesota River basin--Continued		
05303500	Chippewa River at Benson, MN	a1,270	1949-51
05304000	Shakopee Creek near Benson, MN	352	1949-54
05305000	Chippewa River near Watson, MN	a2,050	1910-17, 1931-36
05311400	South Branch Yellow Medicine River at Minneota	111	1960-81, 1983-87
05311500	Yellow Medicine River near Cottonwood, MN	465	1945-46
05312000	Spring Creek near Clarkfield, MN	a89	1945-46
05312500	Spring Creek near Hazel Run, MN	101	1945-48
05313000	Yellow Medicine River near Hanley Falls, MN	606	1945-47
05313521	Hawk Creek at outlet of Eagle Lake near Willmar, MN	-	1972-73
05313560	Eagle Lake tributary No. 7 near Willmar, MN	-	1972-73
05313570	Eagle Lake tributary No. 8 near Willmar, MN	-	1972-73
05314000	Chetomba Creek near Maynard, MN	a200	1949-51
*05314500	Hawk Creek near Maynard, MN	474	1949-54
*05315200	Prairie Ravine near Marshall, MN	5.63	1959-64
05315500	Redwood River near Green Valley, MN	436	1945-57
05316000	Redwood River near Seaforth, MN	573	1945-46
05316770	Minnesota River at New Ulm, MN	9,536	1968-76
05316900	Dry Creek near Jeffers, MN	3.13	1982-85
05317500	Minnesota River at Judson, MN	a11,200	1938-50
*05318000	East Branch (East Fork) Blue Earth River near Bricelyn, MN	132	1951-70
05319000	South Fork Watonwan River at diversion dam near St. James, MN	-	1939, 1940-46
05321000	Blue Earth River at Mankato, MN	a3,550	1938-39, 1940-42
05330400	Sand Creek at diversion dam near Jordan, MN	-	1938-39, 1940-46
05330800	Purgatory Creek at Eden Prairie, MN	-	1975-80
05330900	Nine Mile Creek at Bloomington, MN	-	1963-73
	St. Croix River basin		
*05336200	Glaisby Brook near Kettle River, MN	24.2	1959-70
05336500	Kettle River near Sandstone, MN	825	1908-16
05337000	Grindstone River at Hinckley, MN	-	1940-47
05337500	Snake River at Mora, MN	422	1909-13
05338000	Snake River at Sanatorium Bridge near Pine City, MN	-	1937-38
*05338500	Snake River near Pine City, MN	958	1913-17, 1951-81
05339500	St. Croix River near Rush City, MN	a5,120	1923-61
05340000	Sunrise River near Stacy, MN	167	1949-65
05340050	Sunrise River near Lindstrom	231	1965-85

"See footnotes at end of table."

DISCONTINUED GAGING STATIONS

Station number	Station name	Drainage area (mi^2)	Period of record
	Lower Mississippi River basin		
05345500	Vermillion River at Empire (Empire City), MN	124	1942-44
05346000	Vermillion River at Hastings, MN	195	1942-47
*05355200	Cannon River at Welch, MN	a1,320	1909-14, 1930-71
05371500	Mississippi River at Wabasha, MN	a56,600	1934
*05372800	South Fork Zumbro River on Belt Line at Rochester, MN	155	1981
*05372930	Bear Creek at Rochester, MN	80.0	1981
*05372950	Silver Creek at Rochester, MN	17.3	1981
*05372990	Cascade Creek at Rochester, MN	35.8	1981
05373000	South Fork Zumbro River near Rochester, MN	304	1952-81
05373500	Zumbro River (South Branch) near Zumbro Falls, MN	821	1911-17
05374000	Zumbro River at Zumbro Falls, MN	-	1909-17, 1929-80
05374500	Zumbro River at Theilman, MN	a1,320	1938-56
*05376500	South Fork Whitewater River near Altura, MN	76.8	1939-71
05376800	Whitewater River near Beaver, MN	271	1975-85
05377000	Beaver Creek at Beaver, MN	15.4	1939-40
05377500	Whitewater River at Beaver, MN	288	1936-38 1939-56
05378230	Stockton Valley Creek at Stockton	-	1982-85
05378300	Straight Valley Creek near Rollingstone	5.16	1970-85
05379000	Gilmore Creek at Winona, MN	8.95	1939-63
05380500	Mississippi River at Lamoile, MN	a60,000	1930-31
05383500	Mississippi River at LaCrosse, WI	-	1929-55
05383600	North Branch Root River tributary near Stewartville, MN	0.73	1959-64
*05384500	Rush Creek near Rushford, MN	129	1942-79
b05385000	Root River near Houston, MN	a1,270	1909-17 1929 1930-83
b05385500	South Fork Root River near Houston, MN	275	1953-83
05386000	Root River below South Fork near Houston, MN	a1,560	1938-61
05456500	Turtle Creek near Austin, MN	144	1947-51
05475000	Heron Lake outlet near Heron Lake, MN		1930-43
	Big Sioux River basin		
*06483000	Rock River at Luverne, MN	440	1911-14
06603000	Little Sioux River near Lakefield, MN	17.1	1948-63
06603500	Jackson County ditch No. 11 near Lakefield, MN	7.69	1948-61

* Presently operated as a high-flow partial-record station.
† Stage records only.
a Approximately.
b Discharge measurements made to maintain a current rating.


Lake of the Woods
Rainy River
Upper Red Lake
Lower Red Lake
Red River of the North
International Falls
Bemidji
Grand Rapids
Moorhead
Duluth
Superior
Lake
Mille Lacs Lake
5102500
5112000
5140521
5106500
5107500
5140526
5104500
5094000
5092000
5087500
5076000
5075000
5074000
5074500
5082500
5078000
5078500
5078230
5079000
5069000
5064500
5067500
5064000
5062500
5062000
5054000
5061000
5061500
5051522
5051500
5045950
5046000
5133500
5129400
5129290
5128000
5131500
5132000
5129115
5127500
5127000
5124480
4010500
4014500
4015330
4024098
5130500
5200510
5200445
5200450
5201500
5201000
5206000
5206500
5210500
5216860
5211000
5243721
5243725
5243723
5218500
5219000
5220500
5230500
5231000
5227500
5246500
5247000
5242300
5247500
5261000
5284000
5336700

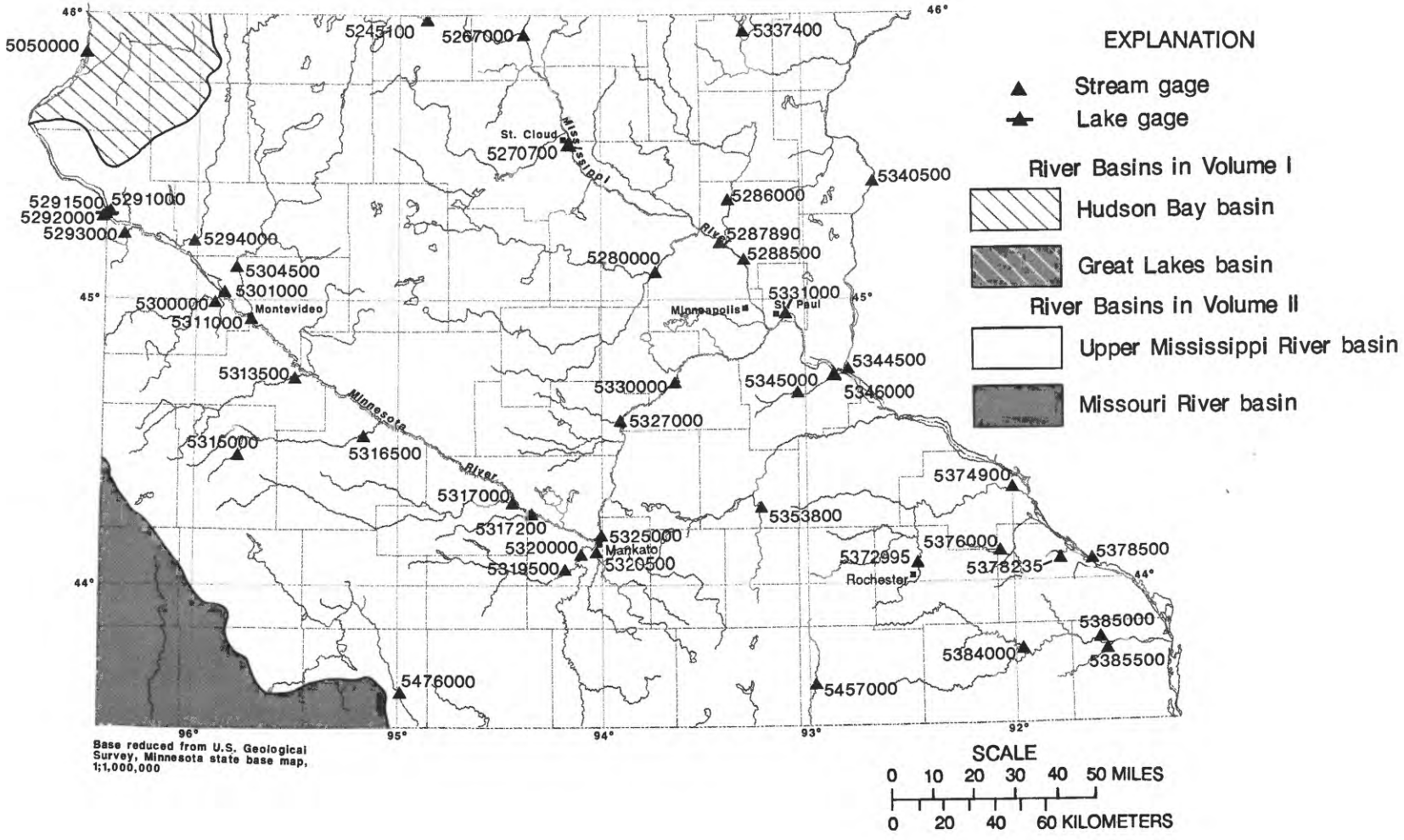
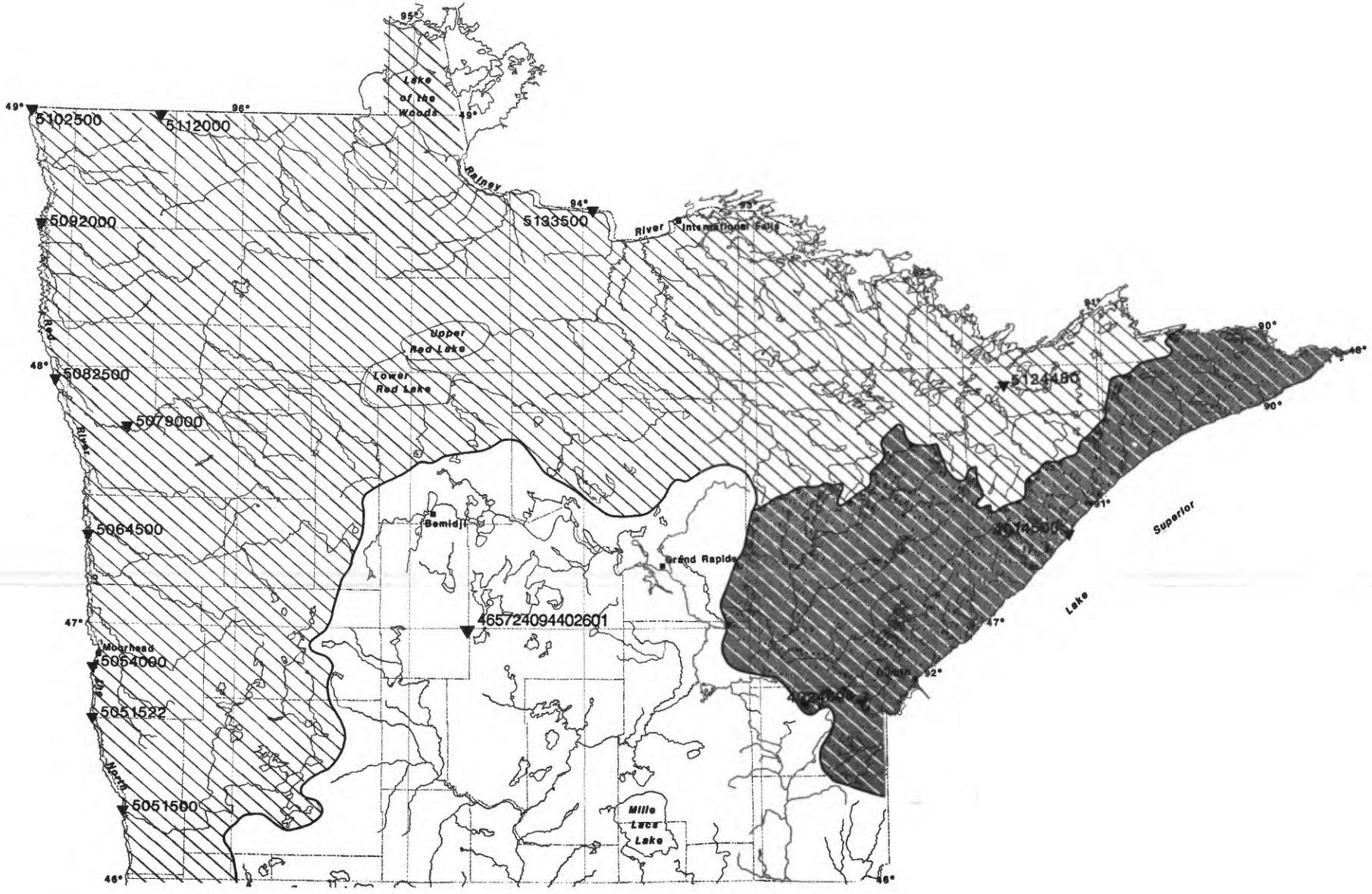


Figure 7.--Location of lake and stream-gaging stations


Lake of the Woods
Rainy River
International Falls
Upper Red Lake
Lower Red Lake
Red River
Bemidji
Grand Rapids
Moorhead
Mille Lacs Lake
Superior
Lake
5102500
5112000
5092000
5133500
5082500
5124430
5079000
5064500
465724094402601
5054000
5051522
5051500

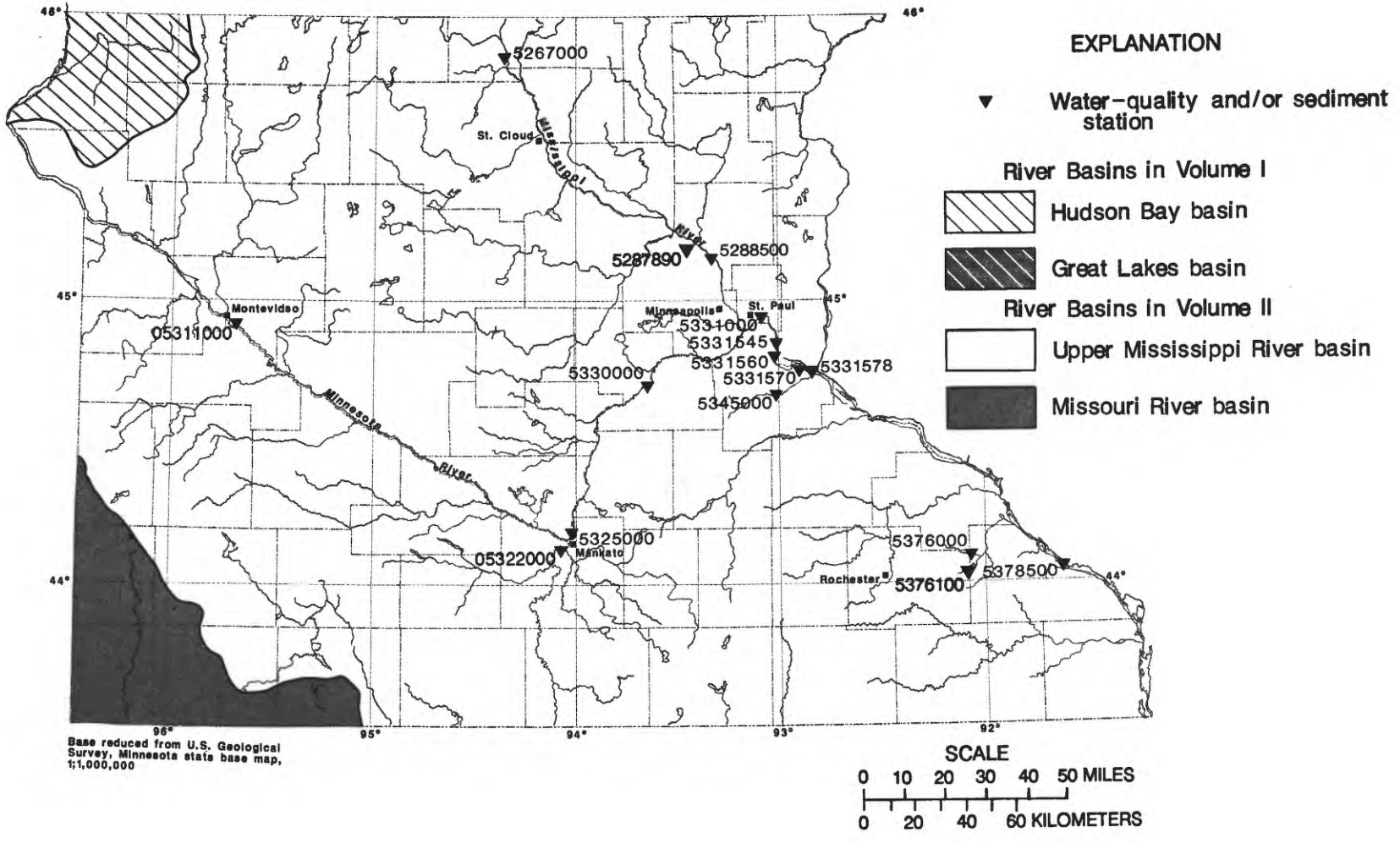


Figure 8.--Location of surface-water-quality stations

Root River below South Fork near Houston, Minnesota
August 13, 1959

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 mi^2, approximately.

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

GAGE.--Water-stage recorder. Elevation of gage is 1,315 ft above National Geodetic Vertical Datum of 1929, from topographic map.

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

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 887 ft^3/s, Apr. 27, 1989, gage height, 4.87 ft; minimum, 16 ft^3/s, Sept. 26, 1988, gage height 2.02 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 428 ft^3/s, June 20, gage height, 3.92 ft; minimum, 31 ft^3/s, Oct. 9, gage height, 2.21 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	88	---	---	---	---	---	167	262	206	182	119	73
2	91	---	---	---	---	---	168	290	208	192	105	68
3	94	---	---	---	---	---	169	289	210	190	103	66
4	93	---	---	---	---	---	170	293	208	190	109	68
5	93	---	---	---	---	---	174	293	211	187	106	68
6	96	---	---	---	---	---	175	296	213	148	103	71
7	97	---	---	---	---	---	174	289	215	132	100	69
8	98	---	---	---	---	---	173	299	219	142	99	69
9	100	---	---	---	---	---	174	315	220	185	98	68
10	117	---	---	---	---	---	176	324	220	186	97	66
11	84	---	---	---	---	---	179	323	221	187	95	66
12	81	---	---	---	---	---	177	317	313	187	93	66
13	78	---	---	---	---	---	174	315	366	185	92	64
14	78	---	---	---	---	---	171	315	364	185	91	68
15	78	---	---	---	---	---	174	311	366	184	88	65
16	79	---	---	---	---	---	178	311	366	136	87	60
17	80	---	---	---	---	---	181	336	345	119	86	57
18	80	---	---	---	---	---	178	317	366	129	85	58
19	79	---	---	---	---	316	174	298	364	127	81	61
20	78	---	---	---	---	244	170	297	382	131	80	59
21	78	---	---	---	---	210	170	296	421	135	76	61
22	79	---	---	---	---	292	166	295	420	135	72	62
23	101	---	---	---	---	291	169	296	416	122	73	57
24	113	---	---	---	---	279	202	291	412	116	75	55
25	109	---	---	---	---	278	214	305	406	117	76	55
26	107	---	---	---	---	227	218	329	402	120	77	53
27	105	---	---	---	---	160	218	327	279	120	77	54
28	e105	---	---	---	---	163	223	326	194	123	77	54
29	e100	---	---	---	---	167	227	325	196	124	75	54
30	e120	---	---	---	---	168	230	315	195	123	74	55
31	e150	---	---	---	---	168	---	274	---	122	73	---
TOTAL	2929	---	---	---	---	---	5513	9469	8924	4661	2742	1870
MEAN	94.5	---	---	---	---	---	184	305	297	150	88.5	62.3
MAX	150	---	---	---	---	---	230	336	421	192	119	73
MIN	78	---	---	---	---	---	166	262	194	116	72	53
AC-FT	5810	---	---	---	---	---	10940	18780	17700	9250	5440	3710
CFSM	.15	---	---	---	---	---	.30	.50	.49	.25	.15	.10
IN.	.18	---	---	---	---	---	.34	.58	.54	.28	.17	.11

e Estimated

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 mi^2.

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 National Geodetic Vertical Datum of 1929 (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 National Geodetic Vertical Datum of 1929.

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, 726,710 acre-ft, June 3, elevation, 1,298.60 ft; minimum, 632,210 acre-ft, Nov. 26, elevation, 1,297.16 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1,297.60	661,080	
Oct. 31	1,297.28	640,080	-21,000
Nov. 30	1,297.19	634,180	-5,900
Dec. 31	1,297.25	638,110	+3,930
CAL YR 1989			-46,600
Jan. 31	1,297.36	645,320	+7,210
Feb. 28	1,297.45	651,230	+5,910
Mar. 31	1,297.80	674,210	+22,980
Apr. 30	1,298.24	703,090	+28,880
May 31	1,298.32	708,350	+5,260
June 30	1,298.48	718,840	+10,490
July 31	1,298.08	692,590	-26,250
Aug. 31	1,297.82	675,520	-17,070
Sept. 30	1,297.42	649,260	-26,260
WTR YR 1990			-11,820

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 mi^2.

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 National Geodetic Vertical Datum of 1929 (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).--106 years, 520 ft^3/s, 4.90 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 4,370 ft^3/s, Aug. 6, 1905; no flow at times in several years.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,260 ft^3/s, July 1; minimum daily, 100 ft^3/s, Apr. 7-19, June 2-4, July 17, 20-23, Aug. 3 to Sept. 12.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	494	495	301	290	290	252	152	101	102	1260	101	100
2	494	446	301	290	290	201	152	101	100	1250	101	100
3	494	396	301	290	290	205	101	101	100	1160	100	100
4	494	348	301	290	290	205	101	102	100	1070	100	100
5	493	349	301	290	290	205	101	102	153	971	100	100
6	494	349	301	290	294	205	101	102	154	971	100	100
7	495	300	301	290	294	205	100	102	154	875	100	100
8	494	301	301	290	294	205	100	102	256	783	100	100
9	494	301	301	290	294	206	100	153	356	783	100	100
10	494	301	301	290	294	206	100	204	459	783	100	100
11	544	302	301	290	294	206	100	255	459	688	100	100
12	591	302	301	290	294	206	100	305	505	590	100	100
13	590	302	301	290	294	206	100	305	506	495	100	200
14	590	301	301	290	294	206	100	305	506	397	100	200
15	590	301	301	290	294	206	100	254	605	300	100	300
16	590	301	301	290	294	206	100	204	701	200	100	300
17	590	301	301	290	294	303	100	205	796	100	100	300
18	590	301	301	290	294	303	100	153	794	101	100	300
19	590	301	301	290	294	303	100	153	793	101	100	400
20	541	301	301	290	294	304	101	153	794	100	100	500
21	541	301	301	290	294	304	101	153	793	100	100	600
22	541	301	301	290	294	304	101	102	843	100	100	700
23	541	301	301	290	294	304	101	102	893	100	100	700
24	541	301	301	290	294	198	101	102	985	101	100	700
25	541	301	301	290	294	198	101	102	985	101	100	800
26	541	301	301	290	294	198	101	102	982	101	100	800
27	541	301	301	290	252	198	101	102	980	101	100	800
28	541	301	301	290	252	198	101	102	980	101	100	900
29	541	301	301	290	---	150	101	102	1080	101	100	900
30	542	301	301	290	---	150	101	102	1160	101	100	900
31	542	---	301	290	---	151	---	102	---	101	100	---
TOTAL	16699	9609	9331	8990	8128	6897	3119	4635	18074	14086	3102	11500
MEAN	539	320	301	290	290	222	104	150	602	454	100	383
MAX	591	495	301	290	294	304	152	305	1160	1260	101	900
MIN	493	300	301	290	252	150	100	101	100	100	100	100
AC-FT	33120	19060	18510	17830	16120	13680	6190	9190	35850	27940	6150	22810
CFSM	.37	.22	.21	.20	.20	.15	.07	.10	.42	.32	.07	.27
IN.	.43	.25	.24	.23	.21	.18	.08	.12	.47	.36	.08	.30

CAL YR 1989 TOTAL 203131 MEAN 557 MAX 1460 MIN 100 AC-FT 402900 CFSM .39 IN. 5.24
WTR YR 1990 TOTAL 114170 MEAN 313 MAX 1260 MIN 100 AC-FT 226500 CFSM .22 IN. 2.95

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 mi^2.

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. Elevation of gage is 1,385 ft above National Geodetic Vertical datum of 1929, from topographic map.

EXTREMES FOR CURRENT YEAR--Maximum gage height, 1.15 ft, part or all of each day Apr. 30 to May 2; minimum, 0.08 ft, Sept. 30.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.05	.87	.85	.87	.88	.93	1.08	1.15	.96	1.01	.65	.35
2	1.08	.86	.85	.87	.89	.93	1.10	1.14	1.00	1.00	.63	.33
3	1.05	.85	.85	.87	.89	.92	1.10	1.14	1.06	1.00	.62	.31
4	1.04	.85	.85	.86	.89	.92	1.10	1.13	1.07	.98	.61	.31
5	1.04	.85	.85	.86	.89	.92	1.10	1.13	1.10	.95	.58	.30
6	1.02	.84	.83	.86	.89	.91	1.10	1.11	1.09	.93	.56	.30
7	1.01	.84	.84	.86	.89	.91	1.10	1.11	1.09	.91	.56	.29
8	1.01	.84	.84	.87	.89	.91	1.10	1.10	1.08	.94	.54	.29
9	1.02	.85	.85	.87	.89	.94	1.10	1.09	1.07	.95	.52	.27
10	1.01	.87	.83	.86	.88	.94	1.09	1.07	1.07	.93	.50	.26
11	1.01	.86	.83	.86	.88	.94	1.09	1.05	1.07	.93	.48	.25
12	1.01	.85	.83	.85	.88	1.00	1.09	1.05	1.08	.91	.48	.24
13	1.00	.85	.83	.85	.88	1.02	1.09	1.04	1.10	.89	.46	.23
14	1.00	.84	.83	.86	.88	1.01	1.09	1.03	1.07	.88	.44	.24
15	1.00	.84	.83	.86	.88	.98	1.09	1.04	1.06	.87	.43	.22
16	.98	.83	.84	.86	.90	.99	1.07	1.04	1.06	.85	.42	.20
17	.97	.83	.84	.86	.91	.99	1.07	1.02	1.07	.85	.41	.18
18	.96	.83	.83	.88	.91	.99	1.07	1.01	1.08	.85	.40	.16
19	.96	.85	.83	.89	.91	1.00	1.06	1.01	1.08	.84	.40	.18
20	.94	.83	.82	.90	.91	1.01	1.07	1.00	1.08	.81	.38	.17
21	.95	.82	.82	.90	.91	1.01	1.08	1.00	1.11	.80	.37	.18
22	.94	.83	.83	.90	.91	1.02	1.08	1.00	1.10	.78	.36	.16
23	.94	.84	.83	.88	.91	.99	1.07	1.02	1.10	.76	.36	.14
24	.94	.83	.84	.88	.92	1.00	1.07	1.03	1.08	.75	.39	.13
25	.93	.83	.87	.88	.93	1.01	1.08	1.02	1.07	.74	.38	.13
26	.91	.83	.86	.88	.93	1.00	1.10	1.01	1.07	.71	.41	.12
27	.88	.84	.88	.88	.93	1.00	1.10	1.01	1.07	.71	.41	.11
28	.87	.86	.88	.89	.93	1.02	1.11	1.01	1.07	.72	.40	.10
29	.88	.86	.87	.89	---	1.04	1.12	1.00	1.04	.70	.38	.09
30	.89	.85	.87	.88	---	1.04	1.14	.98	1.03	.68	.37	.09
31	.88	---	.87	.88	---	1.06	---	.97	---	.66	.36	---
MEAN	.97	.84	.84	.87	.90	.98	1.09	1.05	1.07	.85	.46	.21
MAX	1.08	.87	.88	.90	.93	1.06	1.14	1.15	1.11	1.01	.65	.35
MIN	.87	.82	.82	.85	.88	.91	1.06	.97	.96	.66	.36	.09

CAL YR 1989 MEAN 1.00 MAX 1.32 MIN .56
WTR YR 1990 MEAN .85 MAX 1.15 MIN .09

LEECH LAKE RIVER BASIN

465724094402601 WILLIAMS LAKE NEAR AKELEY, MN

LOCATION.--Lat°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 mi^2.

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 1988 TO SEPTEMBER 1989

DATE	TIME	SAMPLING DEPTH (M) (00098)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH 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)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
OCT										
11...	1300	0.10	--	--	--	--	--	--	--	--
11...	1315	1.0	175	8.3	23	7.9	1.4	1.0	92	1.2
11...	1320	2.0	--	--	--	--	--	--	--	--
11...	1330	4.0	--	--	--	--	--	--	--	--
11...	1340	6.0	--	--	--	--	--	--	--	--
11...	1355	8.0	176	8.4	23	7.9	1.4	1.0	92	1.2
11...	1400	--	--	--	--	--	--	--	--	--
NOV										
08...	0920	0.10	--	--	--	--	--	--	--	--
08...	0925	1.0	183	8.7	24	8.0	1.3	1.1	95	1.5
08...	0930	2.0	--	--	--	--	--	--	--	--
08...	0940	4.0	--	--	--	--	--	--	--	--
08...	0950	6.0	--	--	--	--	--	--	--	--
08...	0955	8.0	180	8.3	24	8.1	1.3	1.0	94	1.0
08...	1000	--	--	--	--	--	--	--	--	--
DEC										
12...	1140	0.10	--	--	--	--	--	--	--	--
12...	1145	1.0	193	8.2	26	8.2	1.5	1.2	100	1.5
12...	1155	2.0	--	--	--	--	--	--	--	--
12...	1205	4.0	--	--	--	--	--	--	--	--
12...	1210	6.0	--	--	--	--	--	--	--	--
12...	1220	8.0	196	7.8	27	8.0	1.4	1.1	101	1.3
12...	1530	--	--	--	--	--	--	--	--	--
JAN										
12...	1120	0.10	--	--	--	--	--	--	--	--
12...	1130	1.0	195	8.0	27	8.5	1.5	1.2	102	1.5
12...	1135	2.0	--	--	--	--	--	--	--	--
12...	1145	4.0	--	--	--	--	--	--	--	--
12...	1150	6.0	--	--	--	--	--	--	--	--
12...	1200	8.0	200	7.5	27	8.1	1.4	1.1	103	1.4
12...	1700	--	--	--	--	--	--	--	--	--
FEB										
14...	1110	0.10	--	--	--	--	--	--	--	--
14...	1115	1.0	199	7.7	27	8.3	1.5	1.1	103	1.5
14...	1130	2.0	--	--	--	--	--	--	--	--
14...	1140	4.0	--	--	--	--	--	--	--	--
14...	1155	6.0	203	7.4	27	8.1	1.4	1.2	104	1.5
14...	1530	--	--	--	--	--	--	--	--	--
MAR										
14...	1020	0.10	--	--	--	--	--	--	--	--
14...	1025	1.0	205	7.9	28	8.7	1.6	1.2	106	1.0
14...	1035	2.0	--	--	--	--	--	--	--	--
14...	1040	4.0	--	--	--	--	--	--	--	--
14...	1045	6.0	--	--	--	--	--	--	--	--
14...	1050	8.0	209	8.4	29	8.4	1.6	1.2	108	1.0
14...	1430	--	--	--	--	--	--	--	--	--
APR										
05...	0950	0.10	--	--	--	--	--	--	--	--
05...	1000	1.0	163	7.8	25	7.8	1.5	1.0	83	<1.0
05...	1005	2.0	--	--	--	--	--	--	--	--
05...	1010	4.0	--	--	--	--	--	--	--	--
05...	1020	6.0	--	--	--	--	--	--	--	--
05...	1030	8.0	211	7.6	29	8.3	1.4	1.1	108	<1.0
05...	1330	--	--	--	--	--	--	--	--	--
27...	1525	0.10	--	--	--	--	--	--	--	--
27...	1530	1.0	170	7.8	23	6.6	1.2	0.70	87	<1.0
27...	1535	2.0	--	--	--	--	--	--	--	--
27...	1540	4.0	--	--	--	--	--	--	--	--
27...	1545	6.0	--	--	--	--	--	--	--	--
27...	1550	8.0	212	7.5	29	8.3	1.5	0.90	109	<1.0
27...	1600	--	--	--	--	--	--	--	--	--

LEECH LAKE RIVER BASIN

465724094402601 - WILLIAMS LAKE NEAR AKELEY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	SAMPLING DEPTH (M) (00098)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH 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)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
MAY										
17...	0920	0.10	--	--	--	--	--	--	--	--
17...	0922	1.0	188	8.3	26	7.7	1.5	1.1	99	<1.0
17...	0925	2.0	--	--	--	--	--	--	--	--
17...	0930	4.0	--	--	--	--	--	--	--	--
17...	0935	6.0	--	--	--	--	--	--	--	--
17...	0940	8.0	189	8.0	27	7.7	1.4	0.90	99	<1.0
17...	0950	--	--	--	--	--	--	--	--	--
JUN										
01...	1200	0.10	--	--	--	--	--	--	--	--
01...	1215	1.0	194	8.4	27	7.6	1.4	0.90	97	<1.0
01...	1220	2.0	--	--	--	--	--	--	--	--
01...	1230	4.0	--	--	--	--	--	--	--	--
01...	1240	6.0	--	--	--	--	--	--	--	--
01...	1255	8.0	193	8.2	26	7.4	1.3	1.2	98	<1.0
01...	1300	--	--	--	--	--	--	--	--	--
16...	1000	0.10	--	--	--	--	--	--	--	--
16...	1015	1.0	181	8.7	25	7.5	1.3	0.80	95	<1.0
16...	1020	2.0	--	--	--	--	--	--	--	--
16...	1030	4.0	--	--	--	--	--	--	--	--
16...	1040	6.0	--	--	--	--	--	--	--	--
16...	1055	8.0	--	--	--	--	--	--	--	--
16...	1155	8.5	193	7.9	27	7.6	1.4	1.0	99	<1.0
16...	1200	--	--	--	--	--	--	--	--	--
28...	1000	0.10	--	--	--	--	--	--	--	--
28...	1015	1.0	170	8.5	23	7.2	1.3	0.80	91	<1.0
28...	1020	2.0	--	--	--	--	--	--	--	--
28...	1030	4.0	--	--	--	--	--	--	--	--
28...	1040	6.0	--	--	--	--	--	--	--	--
28...	1055	8.0	192	7.7	27	6.4	1.4	1.0	99	<1.0
28...	1100	--	--	--	--	--	--	--	--	--
JUL										
12...	1000	0.10	--	--	--	--	--	--	--	--
12...	1005	2.0	--	--	--	--	--	--	--	--
12...	1015	1.0	159	8.9	21	7.3	1.3	0.90	84	<1.0
12...	1020	4.0	--	--	--	--	--	--	--	--
12...	1030	6.0	--	--	--	--	--	--	--	--
12...	1040	8.0	--	--	--	--	--	--	--	--
12...	1055	8.5	196	7.9	27	7.7	1.4	1.2	102	<1.0
12...	1100	--	--	--	--	--	--	--	--	--
27...	0900	0.10	--	--	--	--	--	--	--	--
27...	0915	1.0	151	8.4	19	7.4	1.3	0.70	79	<1.0
27...	0920	2.0	--	--	--	--	--	--	--	--
27...	0930	4.0	--	--	--	--	--	--	--	--
27...	0940	6.0	--	--	--	--	--	--	--	--
27...	0955	8.0	197	7.4	27	7.6	1.4	1.0	101	<1.0
27...	1000	--	--	--	--	--	--	--	--	--
AUG										
09...	0900	0.10	--	--	--	--	--	--	--	--
09...	0915	1.0	155	8.4	20	7.6	1.5	0.90	80	<1.0
09...	0920	2.0	--	--	--	--	--	--	--	--
09...	0930	4.0	--	--	--	--	--	--	--	--
09...	0940	6.0	--	--	--	--	--	--	--	--
09...	0955	8.0	198	7.2	28	7.7	1.4	1.1	102	<1.0
09...	1020	--	--	--	--	--	--	--	--	--
24...	1000	0.10	--	--	--	--	--	--	--	--
24...	1015	1.0	158	7.5	19	7.2	1.3	0.90	81	<1.0
24...	1020	2.0	--	--	--	--	--	--	--	--
24...	1030	4.0	--	--	--	--	--	--	--	--
24...	1040	6.0	--	--	--	--	--	--	--	--
24...	1055	8.0	201	7.0	29	7.7	1.3	1.5	103	<1.0
24...	1100	--	--	--	--	--	--	--	--	--
SEP										
08...	0900	0.10	--	--	--	--	--	--	--	--
08...	0915	1.0	158	8.3	20	7.2	1.2	0.60	82	<1.0
08...	0920	2.0	--	--	--	--	--	--	--	--
08...	0930	4.0	--	--	--	--	--	--	--	--
08...	0940	6.0	--	--	--	--	--	--	--	--
08...	0955	8.0	200	7.3	28	7.5	1.3	0.90	104	<1.0
08...	1000	--	--	--	--	--	--	--	--	--
22...	1000	0.10	--	--	--	--	--	--	--	--
22...	1015	1.0	160	8.1	21	7.3	1.3	0.90	83	<1.0
22...	1020	2.0	--	--	--	--	--	--	--	--
22...	1030	4.0	--	--	--	--	--	--	--	--
22...	1040	6.0	--	--	--	--	--	--	--	--
22...	1055	8.0	175	7.6	22	7.4	1.3	0.90	90	<1.0
22...	1100	--	--	--	--	--	--	--	--	--

LEECH LAKE RIVER BASIN

465724094402601 - WILLIAMS LAKE NEAR AKELEY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	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 TOTAL (MG/L AS N) (00615)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)
OCT									
11...	--	--	--	--	--	--	--	--	--
11...	0.50	--	0.07	--	--	--	--	--	--
11...	--	--	--	--	--	--	--	--	--
11...	--	--	--	--	--	--	--	--	--
11...	--	--	--	--	--	--	--	--	--
11...	0.50	--	0.07	--	--	--	--	--	--
11...	--	--	--	--	--	<0.100	<0.010	0.010	0.021
NOV									
08...	--	--	--	--	--	--	--	--	--
08...	0.50	--	0.25	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--
08...	0.50	--	0.26	--	--	--	--	--	--
08...	--	--	--	--	--	<0.100	<0.010	0.020	0.042
DEC									
12...	--	--	--	--	--	--	--	--	--
12...	0.50	--	0.30	111	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	0.50	--	0.93	101	--	--	--	--	--
12...	--	--	--	--	--	<0.100	0.015	0.130	0.138
JAN									
12...	--	--	--	--	--	--	--	--	--
12...	0.60	--	0.22	101	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	0.50	--	0.59	104	--	--	--	--	--
12...	--	--	--	--	--	<0.100	0.032	0.200	0.160
FEB									
14...	--	--	--	--	--	--	--	--	--
14...	0.50	--	0.25	111	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--
14...	0.50	--	1.1	113	--	--	--	--	--
14...	--	--	--	--	--	0.200	0.220	0.100	0.094
MAR									
14...	--	--	--	--	--	--	--	--	--
14...	0.50	--	0.46	120	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--
14...	0.40	--	1.1	121	--	--	--	--	--
14...	--	--	--	--	--	0.300	0.307	0.040	0.032
APR									
05...	--	--	--	--	--	--	--	--	--
05...	0.50	--	0.42	99	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	--	--	--	--	--	--	--	--	--
05...	0.50	--	1.1	115	--	--	--	--	--
05...	--	--	--	--	--	0.300	0.267	0.110	0.085
27...	--	--	--	--	--	--	--	--	--
27...	0.40	--	0.56	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	0.50	--	0.97	--	--	--	--	--	--
27...	--	--	--	--	--	0.200	0.174	<0.010	<0.002
MAY									
17...	--	--	--	--	--	--	--	--	--
17...	0.40	--	0.36	--	--	--	--	--	--
17...	--	--	--	--	--	--	--	--	--
17...	--	--	--	--	--	--	--	--	--
17...	--	--	--	--	--	--	--	--	--
17...	0.40	--	0.64	--	--	--	--	--	--
17...	--	--	--	--	--	<0.100	0.040	0.030	0.003

LEECH LAKE RIVER BASIN

465724094402601 - WILLIAMS LAKE NEAR AKELEY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	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 TOTAL (MG/L AS N) (00615)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)
JUN									
01...	--	--	--	--	--	--	--	--	--
01...	0.40	--	0.21	--	--	--	--	--	--
01...	--	--	--	--	--	--	--	--	--
01...	--	--	--	--	--	--	--	--	--
01...	--	--	--	--	--	--	--	--	--
01...	0.50	--	0.60	--	--	--	--	--	--
01...	--	--	--	--	--	<0.100	0.014	0.020	0.030
16...	--	--	--	--	--	--	--	--	--
16...	0.40	--	0.22	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--
16...	0.50	--	0.63	--	--	--	--	--	--
16...	--	--	--	--	--	<0.100	0.053	0.010	0.018
28...	--	--	--	--	--	--	--	--	--
28...	0.40	--	0.42	--	--	0.100	0.154	0.090	0.104
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--
28...	0.50	--	0.24	--	--	--	--	--	--
28...	--	--	--	--	--	<0.100	0.015	0.010	0.017
JUL									
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	0.40	--	0.72	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
12...	0.40	--	0.28	--	--	--	--	--	--
12...	--	--	--	--	--	<0.100	0.012	0.030	0.028
27...	--	--	--	--	--	--	--	--	--
27...	0.40	--	1.0	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	0.50	--	0.30	--	--	--	--	--	--
27...	--	--	--	--	--	<0.100	0.020	0.010	0.010
AUG									
09...	--	--	--	--	--	--	--	--	--
09...	0.50	--	1.0	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--
09...	0.50	--	0.46	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--
24...	--	--	--	--	--	--	--	--	--
24...	0.40	--	0.84	--	--	--	--	--	--
24...	--	--	--	--	--	--	--	--	--
24...	--	--	--	--	--	--	--	--	--
24...	--	--	--	--	--	--	--	--	--
24...	0.60	--	0.70	--	--	--	--	--	--
24...	--	--	--	--	--	<0.100	0.016	<0.010	0.014
SEP									
08...	--	--	--	--	--	--	--	--	--
08...	0.40	--	0.77	--	--	2.70	2.70	0.010	0.020
08...	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--
08...	0.50	--	0.90	--	--	--	--	--	--
08...	--	--	--	--	--	<0.100	0.051	0.070	0.109
22...	--	--	--	--	--	--	--	--	--
22...	0.40	--	0.67	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
22...	0.40	--	0.73	--	--	--	--	--	--
22...	--	--	--	--	--	<0.100	0.022	0.050	0.143

LEECH LAKE RIVER BASIN

465724094402601 - WILLIAMS LAKE NEAR AKELEY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	SILVER, DISSOLVED (UG/L AS AG) (01075)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
OCT									
11...	--	0.009	--	--	--	--	--	--	--
11...	--	--	--	--	<3	<1	--	--	--
11...	--	0.014	--	--	--	--	--	--	--
11...	--	0.010	--	--	--	--	--	--	--
11...	--	0.011	--	--	--	--	--	--	--
11...	--	0.006	--	--	<3	<1	--	--	--
11...	0.70	0.005	--	0.008	--	--	--	6.60	<0.100
NOV									
08...	--	0.007	--	--	--	--	--	--	--
08...	--	--	--	--	3	1	--	--	--
08...	--	0.008	--	--	--	--	--	--	--
08...	--	0.008	--	--	--	--	--	--	--
08...	--	0.009	--	--	--	--	--	--	--
08...	--	0.007	--	--	7	3	--	--	--
08...	0.60	0.009	--	<0.001	--	--	--	5.40	0.100
DEC									
12...	--	0.006	--	--	--	--	--	--	--
12...	--	--	--	--	11	2	--	--	--
12...	--	0.004	--	--	--	--	--	--	--
12...	--	0.004	--	--	--	--	--	--	--
12...	--	0.005	--	--	--	--	--	--	--
12...	--	0.008	--	--	52	59	--	--	--
12...	0.80	0.006	--	<0.001	--	--	--	1.20	<0.100
JAN									
12...	--	0.013	--	--	--	--	--	--	--
12...	--	--	--	--	16	2	--	--	--
12...	--	0.005	--	--	--	--	--	--	--
12...	--	0.004	--	--	--	--	--	--	--
12...	--	0.005	--	--	--	--	--	--	--
12...	--	0.006	--	--	48	7	--	--	--
12...	0.90	0.005	--	0.003	--	--	--	0.400	<0.100
FEB									
14...	--	0.006	--	--	--	--	--	--	--
14...	--	0.006	--	--	22	2	--	--	--
14...	--	0.004	--	--	--	--	--	--	--
14...	--	0.012	--	--	--	--	--	--	--
14...	--	0.015	--	--	69	30	--	--	--
14...	0.80	0.007	--	0.002	--	--	--	0.500	<0.100
MAR									
14...	--	0.012	--	--	--	--	--	--	--
14...	--	--	--	--	12	2	--	--	--
14...	--	0.013	--	--	--	--	--	--	--
14...	--	0.009	--	--	--	--	--	--	--
14...	--	0.002	--	--	--	--	--	--	--
14...	--	0.011	--	--	41	33	--	--	--
14...	0.70	0.017	--	0.002	--	--	--	0.400	<0.100
APR									
05...	--	0.006	--	--	--	--	--	--	--
05...	--	--	--	--	13	<1	--	--	--
05...	--	0.004	--	--	--	--	--	--	--
05...	--	0.006	--	--	--	--	--	--	--
05...	--	0.009	--	--	--	--	--	--	--
05...	--	0.007	--	--	32	72	--	--	--
05...	0.90	0.012	--	<0.001	--	--	--	1.30	0.200
27...	--	0.008	--	--	--	--	--	--	--
27...	--	--	--	--	82	5	--	--	--
27...	--	0.011	--	--	--	--	--	--	--
27...	--	0.008	--	--	--	--	--	--	--
27...	--	0.011	--	--	--	--	--	--	--
27...	--	0.011	--	--	9	3	--	--	--
27...	0.50	0.013	--	<0.001	--	--	--	4.50	0.600
MAY									
17...	--	0.007	--	--	--	--	--	--	--
17...	--	--	--	--	8	5	--	--	--
17...	--	0.009	--	--	--	--	--	--	--
17...	--	0.007	--	--	--	--	--	--	--
17...	--	0.007	--	--	--	--	--	--	--
17...	--	0.008	--	--	9	5	--	--	--
17...	0.60	0.011	--	0.001	--	--	--	4.70	0.500

LEECH LAKE RIVER BASIN

465724094402601 - WILLIAMS LAKE NEAR AKELEY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	SILVER, DISSOLVED (UG/L AS AG) (01075)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
JUN									
01...	--	0.010	--	--	--	--	--	--	--
01...	--	--	--	--	7	5	--	--	--
01...	--	0.009	--	--	--	--	--	--	--
01...	--	0.014	--	--	--	--	--	--	--
01...	--	0.016	--	--	--	--	--	--	--
01...	--	0.009	--	--	17	16	--	--	--
01...	0.60	0.009	--	<0.001	--	--	--	4.90	0.200
16...	--	0.007	--	--	--	--	--	--	--
16...	--	--	--	--	12	4	--	--	--
16...	--	0.007	--	--	--	--	--	--	--
16...	--	0.007	--	--	--	--	--	--	--
16...	--	0.013	--	--	--	--	--	--	--
16...	--	0.020	--	--	--	--	--	--	--
16...	--	--	--	--	23	34	--	--	--
16...	0.50	0.007	--	<0.001	--	--	--	4.70	0.100
28...	--	0.008	--	--	--	--	--	--	--
28...	0.60	0.011	--	0.012	26	5	--	--	--
28...	--	0.008	--	--	--	--	--	--	--
28...	--	0.007	--	--	--	--	--	--	--
28...	--	0.009	--	--	--	--	--	--	--
28...	--	0.008	--	--	22	30	--	--	--
28...	0.50	0.005	--	0.001	--	--	--	4.80	0.400
JUL									
12...	--	0.003	--	--	--	--	--	--	--
12...	--	0.013	--	--	--	--	--	--	--
12...	--	--	--	--	9	11	--	--	--
12...	--	0.010	--	--	--	--	--	--	--
12...	--	0.004	--	--	--	--	--	--	--
12...	--	0.005	--	--	--	--	--	--	--
12...	--	--	--	--	18	98	--	--	--
12...	0.80	0.015	--	<0.001	--	--	--	4.90	0.600
27...	--	0.005	--	--	--	--	--	--	--
27...	--	--	--	--	10	8	--	--	--
27...	--	0.003	--	--	--	--	--	--	--
27...	--	0.006	--	--	--	--	--	--	--
27...	--	0.007	--	--	--	--	--	--	--
27...	--	0.012	--	--	18	120	--	--	--
27...	0.70	0.008	--	<0.001	--	--	--	5.00	0.300
AUG									
09...	--	0.006	--	--	--	--	--	--	--
09...	--	--	--	--	51	11	--	--	--
09...	--	0.003	--	--	--	--	--	--	--
09...	--	0.005	--	--	--	--	--	--	--
09...	--	0.010	--	--	--	--	--	--	--
09...	--	0.009	--	--	28	260	--	--	--
09...	--	--	--	--	--	--	--	6.20	0.300
24...	--	0.008	--	--	--	--	--	--	--
24...	--	--	--	--	25	9	--	--	--
24...	--	0.048	--	--	--	--	--	--	--
24...	--	0.003	--	--	--	--	--	--	--
24...	--	0.005	--	--	--	--	--	--	--
24...	--	0.034	--	--	50	140	--	--	--
24...	0.50	0.008	--	<0.001	--	--	--	3.30	<0.100
SEP									
08...	--	0.006	--	--	--	--	--	--	--
08...	0.20	0.005	--	0.004	24	21	--	--	--
08...	--	0.005	--	--	--	--	--	--	--
08...	--	0.007	--	--	--	--	--	--	--
08...	--	0.012	--	--	--	--	--	--	--
08...	--	0.013	--	--	21	480	--	--	--
08...	0.70	0.014	--	<0.001	--	--	--	4.60	0.100
22...	--	0.008	--	--	--	--	--	--	--
22...	--	--	--	--	9	33	--	--	--
22...	--	0.007	--	--	--	--	--	--	--
22...	--	0.008	--	--	--	--	--	--	--
22...	--	0.006	--	--	--	--	--	--	--
22...	--	0.008	--	--	16	45	--	--	--
22...	0.70	0.009	--	0.002	--	--	--	4.00	0.100

LEECH LAKE RIVER BASIN

465724094402601 - WILLIAMS LAKE NEAR AKELEY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	SAMPLING DEPTH (M) (00098)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH 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)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
OCT										
06...	0900	0.10	--	--	--	--	--	--	--	--
06...	0915	1.0	171	8.0	23	7.4	1.4	0.90	87	<1.0
06...	0920	2.0	--	--	--	--	--	--	--	--
06...	0930	4.0	--	--	--	--	--	--	--	--
06...	0940	6.0	--	--	--	--	--	--	--	--
06...	0955	8.0	172	8.1	23	7.4	1.4	0.90	87	<1.0
06...	1000	--	--	--	--	--	--	--	--	--
19...	0900	0.10	--	--	--	--	--	--	--	--
19...	0915	1.0	171	7.9	23	7.4	1.4	0.90	88	<1.0
19...	0920	2.0	--	--	--	--	--	--	--	--
19...	0930	4.0	--	--	--	--	--	--	--	--
19...	0940	6.0	--	--	--	--	--	--	--	--
19...	0955	8.0	172	8.1	23	7.3	1.4	0.90	88	<1.0
19...	1000	--	--	--	--	--	--	--	--	--
NOV										
08...	0900	0.10	--	--	--	--	--	--	--	--
08...	0915	1.0	176	7.9	22	7.3	1.3	0.90	89	<1.0
08...	0920	2.0	--	--	--	--	--	--	--	--
08...	0930	4.0	--	--	--	--	--	--	--	--
08...	0940	6.0	--	--	--	--	--	--	--	--
08...	0955	8.0	176	8.0	23	7.6	1.3	0.90	90	<1.0
08...	1000	--	--	--	--	--	--	--	--	--
DEC										
07...	1200	0.10	--	--	--	--	--	--	--	--
07...	1215	1.0	193	8.1	26	8.1	1.5	1.1	97	<1.0
07...	1220	2.0	--	--	--	--	--	--	--	--
07...	1230	4.0	--	--	--	--	--	--	--	--
07...	1240	6.0	--	--	--	--	--	--	--	--
07...	1255	8.0	188	8.2	25	7.7	1.4	1.0	95	<1.0
07...	1300	--	--	--	--	--	--	--	--	--
JAN										
04...	1015	1.0	203	7.9	29	8.3	1.6	1.1	102	<1.0
04...	1030	0.10	--	--	--	--	--	--	--	--
04...	1040	2.0	--	--	--	--	--	--	--	--
04...	1055	6.0	206	7.6	27	8.3	1.6	0.90	107	<1.0
04...	1100	--	--	--	--	--	--	--	--	--
FEB										
07...	1000	0.10	--	--	--	--	--	--	--	--
07...	1015	1.0	205	8.0	28	8.6	1.6	0.80	104	<1.0
07...	1020	2.0	--	--	--	--	--	--	--	--
07...	1030	4.0	--	--	--	--	--	--	--	--
07...	1040	6.0	--	--	--	--	--	--	--	--
07...	1055	8.0	214	7.8	30	8.8	1.7	1.3	108	<1.0
07...	1100	--	--	--	--	--	--	--	--	--
MAR										
08...	1000	0.10	--	--	--	--	--	--	--	--
08...	1015	1.0	205	7.8	28	8.5	1.5	1.1	106	<1.0
08...	1020	2.0	--	--	--	--	--	--	--	--
08...	1030	4.0	--	--	--	--	--	--	--	--
08...	1040	6.0	--	--	--	--	--	--	--	--
08...	1055	8.0	207	8.3	29	8.4	1.6	1.1	106	<1.0
08...	1100	--	--	--	--	--	--	--	--	--
APR										
26...	1000	0.10	--	--	--	--	--	--	--	--
26...	1015	1.0	181	8.0	26	7.1	1.3	0.90	92	<1.0
26...	1020	2.0	--	--	--	--	--	--	--	--
26...	1030	4.0	--	--	--	--	--	--	--	--
26...	1040	6.0	--	--	--	--	--	--	--	--
26...	1055	8.0	190	7.7	26	7.6	1.4	0.90	97	<1.0
26...	1100	--	--	--	--	--	--	--	--	--
MAY										
10...	1100	0.10	--	--	--	--	--	--	--	--
10...	1115	1.0	184	8.3	26	7.4	1.3	0.90	95	<1.0
10...	1120	2.0	--	--	--	--	--	--	--	--
10...	1130	4.0	--	--	--	--	--	--	--	--
10...	1140	6.0	--	--	--	--	--	--	--	--
10...	1155	8.0	186	8.0	25	7.3	1.3	0.80	96	<1.0
10...	1200	--	--	--	--	--	--	--	--	--
23...	1000	0.10	--	--	--	--	--	--	--	--
23...	1015	1.0	184	8.4	26	7.3	1.3	0.80	95	<1.0
23...	1020	2.0	--	--	--	--	--	--	--	--
23...	1030	4.0	--	--	--	--	--	--	--	--
23...	1040	6.0	--	--	--	--	--	--	--	--
23...	1055	8.0	186	8.0	26	7.4	1.4	0.90	96	<1.0
23...	1100	--	--	--	--	--	--	--	--	--

LEECH LAKE RIVER BASIN

465724094402601 - WILLIAMS LAKE NEAR AKELEY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	SAMPLING DEPTH (M) (00098)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH 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)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
JUN										
07...	1000	0.10	--	--	--	--	--	--	--	--
07...	1015	1.0	176	8.6	24	7.3	1.3	0.80	93	<1.0
07...	1020	2.0	--	--	--	--	--	--	--	--
07...	1030	4.0	--	--	--	--	--	--	--	--
07...	1040	6.0	--	--	--	--	--	--	--	--
07...	1055	8.0	186	7.9	25	7.4	1.3	0.90	97	<1.0
07...	1100	--	--	--	--	--	--	--	--	--
21...	1000	0.10	--	--	--	--	--	--	--	--
21...	1015	1.0	171	8.5	15	7.0	1.2	0.70	91	<1.0
21...	1020	2.0	--	--	--	--	--	--	--	--
21...	1030	4.0	--	--	--	--	--	--	--	--
21...	1040	6.0	--	--	--	--	--	--	--	--
21...	1055	8.0	188	7.9	26	7.2	1.3	0.80	97	<1.0
21...	1100	--	--	--	--	--	--	--	--	--
JUL										
06...	1000	0.10	--	--	--	--	--	--	--	--
06...	1015	1.0	161	8.3	22	7.5	1.3	0.70	87	<1.0
06...	1020	2.0	--	--	--	--	--	--	--	--
06...	1030	4.0	--	--	--	--	--	--	--	--
06...	1040	6.0	--	--	--	--	--	--	--	--
06...	1055	8.0	190	7.7	27	7.7	1.5	1.0	100	<1.0
06...	1100	--	--	--	--	--	--	--	--	--
19...	1000	0.10	--	--	--	--	--	--	--	--
19...	1015	1.0	157	8.7	20	7.6	1.3	0.80	84	<1.0
19...	1020	2.0	--	--	--	--	--	--	--	--
19...	1030	4.0	--	--	--	--	--	--	--	--
19...	1040	6.0	--	--	--	--	--	--	--	--
19...	1055	8.0	189	7.5	27	7.9	1.3	1.0	98	<1.0
19...	1100	--	--	--	--	--	--	--	--	--
AUG										
02...	1000	0.10	--	--	--	--	--	--	--	--
02...	1015	1.0	160	8.6	20	7.2	1.3	0.80	84	<1.0
02...	1020	2.0	--	--	--	--	--	--	--	--
02...	1030	4.0	--	--	--	--	--	--	--	--
02...	1040	6.0	--	--	--	--	--	--	--	--
02...	1055	8.0	201	7.6	27	7.4	1.3	1.1	102	<1.0
02...	1100	--	--	--	--	--	--	--	--	--
16...	1000	0.10	--	--	--	--	--	--	--	--
16...	1015	1.0	158	8.6	20	7.4	1.4	0.80	84	<1.0
16...	1020	2.0	--	--	--	--	--	--	--	--
16...	1030	4.0	--	--	--	--	--	--	--	--
16...	1040	6.0	--	--	--	--	--	--	--	--
16...	1055	8.0	192	7.5	27	7.5	1.3	1.0	102	<1.0
16...	1100	--	--	--	--	--	--	--	--	--
30...	1000	0.10	--	--	--	--	--	--	--	--
30...	1015	1.0	159	8.5	20	7.2	1.3	0.80	83	<1.0
30...	1020	2.0	--	--	--	--	--	--	--	--
30...	1030	4.0	--	--	--	--	--	--	--	--
30...	1040	6.0	--	--	--	--	--	--	--	--
30...	1055	8.0	191	7.3	27	7.5	1.3	1.0	99	<1.0
30...	1100	--	--	--	--	--	--	--	--	--
SEP										
13...	1000	0.10	--	--	--	--	--	--	--	--
13...	1015	1.0	162	8.5	21	7.5	1.3	0.80	87	<1.0
13...	1020	2.0	--	--	--	--	--	--	--	--
13...	1030	4.0	--	--	--	--	--	--	--	--
13...	1040	6.0	--	--	--	--	--	--	--	--
13...	1055	8.0	198	7.2	29	7.7	1.4	1.1	105	<1.0
13...	1100	--	--	--	--	--	--	--	--	--
27...	1000	0.10	--	--	--	--	--	--	--	--
27...	1015	1.0	171	8.1	22	7.4	1.3	0.90	91	<1.0
27...	1020	2.0	--	--	--	--	--	--	--	--
27...	1030	4.0	--	--	--	--	--	--	--	--
27...	1040	6.0	--	--	--	--	--	--	--	--
27...	1055	8.0	173	7.8	22	7.6	1.4	0.90	91	<1.0
27...	1100	--	--	--	--	--	--	--	--	--

LEECH LAKE RIVER BASIN

465724094402601 - WILLIAMS LAKE NEAR AKELEY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	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 TOTAL (MG/L AS N) (00615)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)
OCT									
06...	--	--	--	--	--	--	--	--	--
06...	0.40	--	0.79	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	0.50	--	0.81	--	--	--	--	--	--
06...	--	--	--	--	--	<0.100	0.047	0.030	0.042
19...	--	--	--	--	--	--	--	--	--
19...	0.50	--	0.76	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--
19...	0.40	--	0.76	--	--	--	--	--	--
19...	--	--	--	--	--	<0.100	0.083	0.030	0.044
NOV									
08...	--	--	--	--	--	--	--	--	--
08...	0.50	--	0.60	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--
08...	0.40	--	0.60	--	--	--	--	--	--
08...	--	--	--	--	--	<0.100	0.026	0.040	0.054
DEC									
07...	--	--	--	--	--	--	--	--	--
07...	0.70	--	0.54	--	--	--	--	--	--
07...	--	--	--	--	--	--	--	--	--
07...	--	--	--	--	--	--	--	--	--
07...	--	--	--	--	--	--	--	--	--
07...	0.60	--	0.49	--	--	--	--	--	--
07...	--	--	--	--	--	<0.100	0.019	0.110	0.086
JAN									
04...	<0.10	--	1.1	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--
04...	0.60	--	0.52	--	--	--	--	--	--
04...	--	--	--	--	--	<0.100	0.021	0.320	0.173
FEB									
07...	--	--	--	--	--	--	--	--	--
07...	0.40	--	0.47	--	--	--	--	--	--
07...	--	--	--	--	--	--	--	--	--
07...	--	--	--	--	--	--	--	--	--
07...	--	--	--	--	--	--	--	--	--
07...	0.50	--	1.4	--	--	--	--	--	--
07...	--	--	--	--	--	<0.100	0.060	0.170	0.204
MAR									
08...	--	--	--	--	--	--	--	--	--
08...	<0.50	--	0.55	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--
08...	<0.50	--	1.4	--	--	--	--	--	--
08...	--	--	--	--	--	0.200	0.158	0.150	0.144
APR									
26...	--	--	--	--	--	--	--	--	--
26...	2.0	--	<0.50	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--
26...	2.0	--	0.50	--	--	--	--	--	--
26...	--	--	--	--	--	<0.100	0.058	<0.010	0.014
MAY									
10...	--	--	--	--	--	--	--	--	--
10...	1.8	<0.10	0.33	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--	--
10...	1.7	<0.10	0.46	--	--	--	--	--	--
10...	--	--	--	--	--	<0.100	0.019	0.010	0.025
23...	--	--	--	--	--	--	--	--	--
23...	1.9	--	0.17	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--
23...	2.0	--	0.27	--	--	--	--	--	--
23...	--	--	--	--	--	<0.100	0.011	0.010	0.037

LEECH LAKE RIVER BASIN

465724094402601 - WILLIAMS LAKE NEAR AKELEY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	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 TOTAL (MG/L AS N) (00615)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)
JUN									
07...	--	--	--	--	--	--	--	--	--
07...	0.70	--	0.20	--	--	--	--	--	--
07...	--	--	--	--	--	--	--	--	--
07...	--	--	--	--	--	--	--	--	--
07...	--	--	--	--	--	--	--	--	--
07...	0.70	--	0.21	--	--	--	--	--	--
07...	--	--	--	--	--	<0.100	0.012	0.010	0.283
21...	--	--	--	--	--	--	--	--	--
21...	0.30	--	<0.50	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--
21...	0.70	--	0.70	--	--	--	--	--	--
21...	--	--	--	--	--	<0.100	0.018	<0.010	0.033
JUL									
06...	--	--	--	--	--	--	--	--	--
06...	0.30	--	0.60	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--
06...	0.40	--	0.70	--	--	--	--	--	--
06...	--	--	--	--	--	<0.100	<0.010	0.020	0.009
19...	--	--	--	--	--	--	--	--	--
19...	<0.10	--	0.70	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--
19...	0.30	--	0.80	--	--	--	--	--	--
19...	--	--	--	--	--	<0.100	0.034	0.030	0.031
AUG									
02...	--	--	--	--	--	--	--	--	--
02...	<0.10	--	1.5	--	--	--	--	--	--
02...	--	--	--	--	--	--	--	--	--
02...	--	--	--	--	--	--	--	--	--
02...	--	--	--	--	--	--	--	--	--
02...	0.20	--	1.6	--	--	--	--	--	--
02...	--	--	--	--	--	<0.100	0.012	<0.010	0.072
16...	--	--	--	--	--	--	--	--	--
16...	0.20	--	0.90	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--
16...	1.3	--	1.1	--	--	--	--	--	--
16...	--	--	--	--	--	<0.100	<0.010	0.040	0.045
30...	--	--	--	--	--	--	--	--	--
30...	1.6	--	1.2	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
30...	1.9	--	1.5	--	--	--	--	--	--
30...	--	--	--	--	--	<0.100	0.016	0.130	0.107
SEP									
13...	--	--	--	--	--	--	--	--	--
13...	1.6	--	1.1	--	--	--	--	--	--
13...	--	--	--	--	--	--	--	--	--
13...	--	--	--	--	--	--	--	--	--
13...	--	--	--	--	--	--	--	--	--
13...	1.9	--	2.4	--	--	--	--	--	--
13...	--	--	--	--	--	0.100	0.133	0.020	0.027
27...	--	--	--	--	--	--	--	--	--
27...	<0.10	<0.10	1.1	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	--	--	--	--	--	--	--	--	--
27...	0.10	<0.10	1.4	--	--	--	--	--	--
27...	--	--	--	--	<0.010	<0.100	0.096	0.040	0.041

LEECH LAKE RIVER BASIN

465724094402601 - WILLIAMS LAKE NEAR AKELEY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	SILVER, DISSOLVED (UG/L AS AG) (01075)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
OCT									
06...	--	0.007	--	--	--	--	--	--	--
06...	--	--	--	--	25	4	--	--	--
06...	--	0.008	--	--	--	--	--	--	--
06...	--	0.008	--	--	--	--	--	--	--
06...	--	0.008	--	--	--	--	--	--	--
06...	--	0.009	--	--	26	5	--	--	--
06...	0.70	0.010	--	0.002	--	--	--	8.70	0.300
19...	--	0.009	--	--	--	--	--	--	--
19...	--	--	--	--	24	4	--	--	--
19...	--	0.008	--	--	--	--	--	--	--
19...	--	0.008	--	--	--	--	--	--	--
19...	--	0.008	--	--	--	--	--	--	--
19...	--	0.007	--	--	28	4	--	--	--
19...	0.90	0.008	--	0.001	--	--	--	2.40	<0.100
NOV									
08...	--	0.009	--	--	--	--	--	--	--
08...	--	--	--	--	21	5	--	--	--
08...	--	0.016	--	--	--	--	--	--	--
08...	--	0.013	--	--	--	--	--	--	--
08...	--	0.016	--	--	--	--	--	--	--
08...	--	0.011	--	--	23	5	--	--	--
08...	0.60	0.014	--	<0.001	--	--	--	2.30	<0.100
DEC									
07...	--	0.004	--	--	--	--	--	--	--
07...	--	--	--	--	20	4	--	--	--
07...	--	0.010	--	--	--	--	--	--	--
07...	--	0.012	--	--	--	--	--	--	--
07...	--	0.006	--	--	--	--	--	--	--
07...	--	0.006	--	--	33	7	--	--	--
07...	0.50	0.010	--	0.001	--	--	--	1.00	<0.100
JAN									
04...	--	--	--	--	75	39	--	--	--
04...	--	0.008	--	--	--	--	--	--	--
04...	--	0.009	--	--	--	--	--	--	--
04...	--	0.013	--	--	29	6	--	--	--
04...	1.0	0.017	--	0.003	--	--	--	1.50	<0.100
FEB									
07...	--	0.010	--	--	--	--	--	--	--
07...	--	--	--	--	23	3	--	--	--
07...	--	0.011	--	--	--	--	--	--	--
07...	--	0.006	--	--	--	--	--	--	--
07...	--	0.009	--	--	--	--	--	--	--
07...	--	0.021	--	--	84	82	--	--	--
07...	0.80	0.016	--	0.003	--	--	--	0.700	<0.100
MAR									
08...	--	0.009	--	--	--	--	--	--	--
08...	--	--	--	--	10	2	--	--	--
08...	--	0.013	--	--	--	--	--	--	--
08...	--	0.006	--	--	--	--	--	--	--
08...	--	0.010	--	--	--	--	--	--	--
08...	--	0.010	--	--	18	15	--	--	--
08...	<0.20	0.014	--	0.003	--	--	--	1.10	<0.100
APR									
26...	--	0.009	--	--	--	--	--	--	--
26...	--	--	--	--	8	2	--	--	--
26...	--	0.014	--	--	--	--	--	--	--
26...	--	0.010	--	--	--	--	--	--	--
26...	--	0.005	--	--	--	--	--	--	--
26...	--	0.038	--	--	15	<1	--	--	--
26...	0.50	0.017	--	0.003	--	--	--	4.40	<0.100
MAY									
10...	--	0.011	--	--	--	--	--	--	--
10...	--	--	--	--	15	3	--	--	--
10...	--	0.015	--	--	--	--	--	--	--
10...	--	0.013	--	--	--	--	--	--	--
10...	--	0.021	--	--	--	--	--	--	--
10...	--	0.022	--	--	16	2	--	--	--
10...	0.50	0.027	--	0.002	--	--	--	5.90	<0.100
23...	--	0.004	--	--	--	--	--	--	--
23...	--	--	--	--	13	3	--	--	--
23...	--	0.011	--	--	--	--	--	--	--
23...	--	0.011	--	--	--	--	--	--	--
23...	--	0.018	--	--	--	--	--	--	--
23...	--	0.011	--	--	14	5	--	--	--
23...	0.80	0.004	--	<0.001	--	--	--	3.00	<0.100

LEECH LAKE RIVER BASIN

465724094402601 - WILLIAMS LAKE NEAR AKELEY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	SILVER, DISSOLVED (UG/L AS AG) (01075)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
JUN									
07...	--	0.003	--	--	--	--	--	--	--
07...	--	--	--	--	7	5	--	--	--
07...	--	0.002	--	--	--	--	--	--	--
07...	--	0.004	--	--	--	--	--	--	--
07...	--	0.005	--	--	--	--	--	--	--
07...	--	0.009	--	--	8	7	--	--	--
07...	1.0	0.010	--	0.013	--	--	--	3.80	<0.100
21...	--	0.002	--	--	--	--	--	--	--
21...	--	--	--	--	15	2	<1.0	--	--
21...	--	0.001	--	--	--	--	--	--	--
21...	--	0.002	--	--	--	--	--	--	--
21...	--	0.003	--	--	--	--	--	--	--
21...	--	0.005	--	--	19	19	<1.0	--	--
21...	0.40	0.004	--	0.006	--	--	--	2.40	<0.100
JUL									
06...	--	0.007	--	--	--	--	--	--	--
06...	--	--	--	--	13	2	--	--	--
06...	--	0.005	--	--	--	--	--	--	--
06...	--	0.003	--	--	--	--	--	--	--
06...	--	0.010	--	--	--	--	--	--	--
06...	--	0.017	--	--	41	77	--	--	--
06...	0.70	0.012	--	<0.001	--	--	--	1.60	<0.100
19...	--	0.003	--	--	--	--	--	--	--
19...	--	--	--	--	7	3	--	--	--
19...	--	0.003	--	--	--	--	--	--	--
19...	--	0.006	--	--	--	--	--	--	--
19...	--	0.016	--	--	--	--	--	--	--
19...	--	0.009	--	--	35	75	--	--	--
19...	0.60	0.011	--	0.002	--	--	--	1.70	<0.100
AUG									
02...	--	0.002	--	--	--	--	--	--	--
02...	--	--	--	--	<3	24	--	--	--
02...	--	0.004	--	--	--	--	--	--	--
02...	--	0.011	--	--	--	--	--	--	--
02...	--	0.014	--	--	--	--	--	--	--
02...	--	0.008	--	--	17	380	--	--	--
02...	0.70	0.006	--	0.009	--	--	--	2.60	<0.100
16...	--	<0.001	--	--	--	--	--	--	--
16...	--	--	--	--	5	6	--	--	--
16...	--	0.006	--	--	--	--	--	--	--
16...	--	<0.001	--	--	--	--	--	--	--
16...	--	0.006	--	--	--	--	--	--	--
16...	--	0.003	--	--	24	83	--	--	--
16...	0.60	0.011	--	0.007	--	--	--	5.20	0.200
30...	--	0.004	--	--	--	--	--	--	--
30...	--	--	--	--	<3	32	--	--	--
30...	--	0.004	--	--	--	--	--	--	--
30...	--	0.006	--	--	--	--	--	--	--
30...	--	0.006	--	--	--	--	--	--	--
30...	--	0.009	--	--	10	110	--	--	--
30...	0.70	0.008	--	0.001	--	--	--	5.80	0.600
SEP									
13...	--	0.004	--	--	--	--	--	--	--
13...	--	--	--	--	5	32	--	--	--
13...	--	0.004	--	--	--	--	--	--	--
13...	--	0.004	--	--	--	--	--	--	--
13...	--	0.006	--	--	--	--	--	--	--
13...	--	0.017	--	--	26	830	--	--	--
13...	0.60	0.009	--	0.002	--	--	--	3.10	0.100
27...	--	0.012	--	--	--	--	--	--	--
27...	--	--	--	--	<3	4	--	--	--
27...	--	0.004	--	--	--	--	--	--	--
27...	--	0.008	--	--	--	--	--	--	--
27...	--	0.012	--	--	--	--	--	--	--
27...	--	0.011	--	--	30	9	--	--	--
27...	0.60	0.007	0.020	0.003	--	--	--	2.90	<0.100

LEECH LAKE RIVER BASIN

05206000 LEECH LAKE AT FEDERAL DAM, MN

LOCATION.--Lat 47°12'23", long 94°18'31", in lot 2, sec.14, T.143 N., R.29 W., Cass County, Hydrologic Unit 07010102, on Leech Lake Indian Reservation, at head of Leech Lake River on Waboose Bay, 5 mi southwest of town of Federal Dam.

DRAINAGE AREA.--1,163 mi^2.

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 National Geodetic Vertical Datum of 1929 (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, 640,590 acre-ft, June 21, elevation, 1,295.15 ft; minimum, 475,650 acre-ft, Feb. 14, elevation, 1,293.83 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1989 to SEPTEMBER 1990

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1,294.40	545,770	
Oct. 31	1,294.38	543,240	-2,530
Nov. 30	1,294.12	510,380	-32,860
Dec. 31	1,293.95	489,240	-21,140
CAL YR 1989			-21,140
Jan. 31	1,293.87	480,000	-9,240
Feb. 28	1,293.89	482,180	+2,180
Mar. 31	1,294.24	525,560	+43,380
Apr. 30	1,294.72	586,230	+60,670
May 31	1,294.83	600,140	+13,910
June 30	1,294.97	617,840	+17,700
July 31	1,294.43	549,570	-68,270
Aug. 31	1,294.19	519,240	-30,330
Sept. 30	1,293.98	492,820	-26,420
WTR YR 1990			-52,950

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 mi^2.

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 National Geodetic Vertical Datum of 1929 (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).--106 years, 371 ft^3/s, 4.33 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 2,520 ft^3/s, June 7, 1957 (result of dam failure); no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 840 ft^3/s, June 26-28, 30, July 1; minimum daily, 92 ft^3/s, Aug. 11-16.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	485	475	478	458	396	110	115	106	104	840	99.0	107
2	494	475	478	458	396	110	115	104	104	820	99.0	107
3	485	475	478	458	396	110	102	104	106	820	99.0	107
4	485	475	478	458	396	110	102	104	106	820	99.0	103
5	485	475	478	458	396	110	107	104	162	820	99.0	103
6	494	475	468	458	396	110	107	106	205	820	99.0	107
7	485	488	468	458	396	110	107	106	260	800	99.0	107
8	485	497	468	458	396	110	107	108	304	800	99.0	107
9	485	488	468	458	404	112	102	106	296	800	99.0	107
10	485	497	468	458	396	112	107	106	289	800	96.0	107
11	485	488	468	478	396	110	107	106	289	800	92.0	107
12	485	478	468	410	396	112	107	104	346	780	92.0	103
13	485	478	477	458	336	112	107	106	396	780	96.0	168
14	485	478	477	458	343	118	107	106	396	780	92.0	210
15	485	478	477	458	343	103	107	106	396	780	92.0	206
16	485	478	468	458	307	107	111	103	429	760	92.0	206
17	475	478	458	458	234	107	107	108	449	656	107	206
18	475	468	458	458	234	107	107	108	449	559	98.0	206
19	485	478	458	458	234	107	107	104	495	470	103	206
20	475	478	458	458	234	107	107	104	550	364	103	206
21	475	478	458	458	234	107	107	106	600	324	106	270
22	475	478	458	458	234	112	107	106	648	308	106	265
23	475	478	458	458	176	112	107	106	752	308	106	265
24	475	478	458	458	176	112	111	106	836	244	106	265
25	475	478	458	458	176	112	111	109	836	192	106	306
26	475	478	458	396	172	112	119	109	840	183	106	306
27	494	478	458	396	110	112	112	109	840	183	106	306
28	475	478	458	396	110	112	119	109	840	192	106	300
29	475	478	458	396	---	112	119	109	780	132	106	300
30	475	478	458	388	---	112	122	106	840	132	106	300
31	475	---	458	396	---	112	---	106	---	99.0	106	---
TOTAL	14932	14380	14435	13790	8413	3421	3279	3290	13943	17166.0	3120.0	5769
MEAN	482	479	466	445	300	110	109	106	465	554	101	192
MAX	494	497	478	478	404	118	122	109	840	840	107	306
MIN	475	468	458	388	110	103	102	103	104	99	92	103
AC-FT	29620	28520	28630	27350	16690	6790	6500	6530	27660	34050	6190	11440
CFSM	.41	.41	.40	.38	.26	.09	.09	.09	.40	.48	.09	.17
IN.	.48	.46	.46	.44	.27	.11	.10	.11	.45	.55	.10	.18

CAL YR 1989 TOTAL 147464 MEAN 404 MAX 800 MIN 92 AC-FT 292500 CFSM .35 IN. 4.72
WTR YR 1990 TOTAL 115938.0 MEAN 318 MAX 840 MIN 92 AC-FT 230000 CFSM .27 IN. 3.71

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 mi^2.

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 National Geodetic Vertical Datum of 1929 (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, 104,040 acre-ft, June 7, elevation, 1,273.79 ft; minimum, 70,820 acre-ft, Feb. 9, elevation, 1,271.57 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1,273.02	91,880	
Oct. 31	1,272.48	83,810	-8,070
Nov. 30	1,271.98	76,660	-7,150
Dec. 31	1,271.64	71,810	-4,850
CAL YR 1989			-4,130
Jan. 31	1,271.63	71,670	-140
Feb. 28	1,271.78	73,800	+2,130
Mar. 31	1,272.86	89,490	+15,690
Apr. 30	1,273.77	103,700	+14,210
May 31	1,273.53	99,680	-4,020
June 30	1,273.29	95,900	-3,780
July 31	1,273.53	99,680	+3,780
Aug. 31	1,273.59	100,690	+1,010
Sept. 30	1,273.14	93,660	-7,030
WTR YR 1990			+1,780

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 mi^2, 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 National Geodetic Vertical Datum of 1929. 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.

AVERAGE DISCHARGE.--107 years, 1,191 ft^3/s; median of yearly mean discharges, 1,070 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,500 ft^3/s, Sept. 3, 1948, gage height, 15.2 ft, from floodmark, caused by dam failure at gage, from rating curve extended above 4,500 ft^3/s; maximum daily, 5,250 ft^3/s, Sept. 5, 8, 1905; no flow at times in several years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,040 ft^3/s, July 5, gage height, 6.37 ft; minimum daily discharge, 188 ft^3/s, Apr. 21; minimum gage height, 2.04 ft, Aug. 13.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1490	1170	794	839	817	580	750	1200	378	1450	584	282
2	1440	1170	844	827	825	550	857	1230	420	1420	501	312
3	1450	1150	853	825	817	546	e1000	1160	424	1640	489	312
4	1310	1180	869	792	785	501	e1200	1000	483	1690	512	319
5	1210	1140	823	855	804	499	e1250	927	647	1490	484	312
6	1200	1150	834	818	791	499	e1200	986	830	1420	512	360
7	1190	1160	899	829	765	508	e1200	963	1070	1370	496	308
8	1210	1160	860	785	758	457	e1150	957	1300	1520	520	296
9	1230	1050	837	804	759	e420	e1100	924	1590	1450	493	318
10	1200	998	814	787	720	e410	e860	903	1440	1530	516	310
11	1180	958	822	784	746	e415	e750	727	1600	1580	508	290
12	1190	1010	855	812	702	e430	e660	666	1500	1550	509	426
13	1210	931	844	815	733	e490	e560	644	1260	1590	356	448
14	1190	1010	869	821	765	e520	e540	587	1050	1580	265	419
15	1190	938	878	759	778	e600	e540	550	1060	1600	236	458
16	1170	950	895	822	739	726	527	562	1180	1450	243	470
17	1190	963	866	759	605	724	511	592	1220	1370	196	514
18	1160	937	875	814	664	730	501	544	1160	1330	228	564
19	1180	983	875	763	643	730	472	565	1120	1320	253	539
20	1150	871	903	789	649	729	350	560	1180	1350	350	610
21	1160	787	929	786	643	742	188	560	1400	1310	353	838
22	1160	821	903	781	616	744	191	567	1450	1310	353	804
23	1160	817	922	779	660	678	195	562	1630	1290	353	833
24	1160	797	889	760	627	803	221	574	1750	1200	341	625
25	1160	846	930	800	654	766	213	616	1760	1080	327	576
26	1160	798	891	775	638	727	222	612	1670	1130	327	541
27	1170	822	847	774	627	785	396	599	1600	1090	273	591
28	1130	820	881	807	616	745	782	607	1360	1170	329	533
29	1170	857	883	801	---	752	1040	499	1140	1020	288	559
30	1170	839	845	791	---	774	1220	429	1290	860	320	567
31	1160	---	849	829	---	756	---	427	---	641	325	---
TOTAL	37500	29083	26878	24782	19946	19336	20646	22299	35962	41801	11840	14334
MEAN	1210	969	867	799	712	624	688	719	1199	1348	382	478
MAX	1490	1180	930	855	825	803	1250	1230	1760	1690	584	838
MIN	1130	787	794	759	605	410	188	427	378	641	196	282
AC-FT	74380	57690	53310	49160	39560	38350	40950	44230	71330	82910	23480	28430
CFSM	.36	.29	.26	.24	.21	.19	.20	.21	.36	.40	.11	.14
IN.	.41	.32	.30	.27	.22	.21	.23	.25	.40	.46	.13	.16

CAL YR 1989 TOTAL 495443 MEAN 1357 MAX 2470 MIN 470 AC-FT 982700 CFSM .40 IN. 5.47
WTR YR 1990 TOTAL 304407 MEAN 834 MAX 1760 MIN 188 AC-FT 603800 CFSM .25 IN. 3.36

e Estimated

SWAN RIVER BASIN

05216860 SWAN RIVER NEAR CALUMET, MN

LOCATION.--Lat 47°17'20", long 93°13'54", in NW¼SW¼ sec.35, T.56 N., R.23 W., Itasca County, Hydrologic Unit 07010103, on left bank 1.0 mi downstream from Snowball Creek, 2.1 mi downstream from bridge on U.S. Highway 65 outlet of Swan Lake and 3.1 mi southeast of Calumet.

DRAINAGE AREA.--114 mi^2.

PERIOD OF RECORD.--January 1964 to September 1990 (discontinued).

GAGE.--Water-stage recorder. Steel sheet piling weir since Sept. 1966. On Oct. 9, 1985, the weir was lowered 0.5 ft and the 1.0 ft pipe that allowed minimum flows to pass through the weir was capped. Datum of gage is 1,331.19 ft above National Geodetic Vertical Datum of 1929. Prior to June 5, 1964, reference point at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Natural flow of stream affected by continually changing iron-mining activities that include diversions for iron-ore processing, storage in tailing ponds and Swan Lake, and mine pit dewatering.

AVERAGE DISCHARGE.--26 years, 64.8 ft^3/s, 7.72 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 773 ft^3/s, Apr. 15, 1969, gage height, 5.83 ft; maximum gage height, 5.96 ft, Apr. 23, 1979; no flow July 18 to Aug. 5, 1988; minimum gage height, 3.75 ft, July 31, 1988.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 216 ft^3/s, May 1, gage height, 4.77 ft; minimum, 6.0 ft^3/s, Sept. 1, 4, 5, gage height, 4.00 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	e31	27	19	20	17	95	209	e80	e78	27	7.5
2	73	e31	27	19	19	16	107	212	e88	e73	26	7.2
3	70	e31	26	19	19	16	110	208	e100	e69	25	7.2
4	67	e32	27	19	19	16	111	201	e130	e65	25	6.7
5	66	e33	27	20	19	17	110	e190	e150	e61	24	6.8
6	61	e34	27	20	18	16	109	e180	e170	e59	22	7.9
7	59	e35	26	20	18	16	107	e170	e180	e57	21	8.4
8	57	e36	25	21	18	16	103	e170	e180	e57	19	7.9
9	55	e37	25	21	18	16	103	e160	e180	e60	19	8.0
10	55	e38	26	21	17	16	95	e150	e180	e60	18	8.2
11	52	e39	27	21	17	17	90	e140	e150	e57	18	7.9
12	48	e39	27	21	17	23	87	e140	e125	55	17	9.8
13	49	e39	25	21	16	27	84	e130	e110	50	15	12
14	46	e38	25	21	16	31	83	e130	e100	48	14	16
15	44	e37	24	19	16	41	83	e130	e93	45	14	16
16	42	e37	22	20	17	55	79	e120	e88	43	12	16
17	42	e36	22	21	18	61	75	e120	e86	44	12	16
18	42	e35	21	21	18	65	74	e120	e86	43	14	15
19	40	e34	21	21	18	67	73	e120	e88	41	12	14
20	38	e33	20	20	18	67	77	e120	e90	39	10	15
21	37	e32	19	20	18	69	77	e110	e94	37	9.2	14
22	35	32	18	20	18	68	78	e110	e98	35	8.6	14
23	34	29	17	21	18	74	81	e110	e100	34	9.1	14
24	35	29	17	22	18	72	88	e105	e102	32	9.2	13
25	35	28	18	21	19	72	94	e100	e104	33	8.7	12
26	34	29	18	21	19	69	107	e96	e100	35	11	12
27	33	30	18	22	18	69	136	e93	e96	36	11	12
28	33	29	19	22	18	69	163	e90	e92	33	10	12
29	e32	28	19	21	---	69	194	e86	e88	32	9.0	13
30	e32	27	19	20	---	70	206	e83	e84	31	8.1	13
31	e31	---	19	20	---	77	---	e80	---	29	7.9	---
TOTAL	1450	998	698	635	502	1394	3079	4183	3412	1471	465.8	342.5
MEAN	46.8	33.3	22.5	20.5	17.9	45.0	103	135	114	47.5	15.0	11.4
MAX	73	39	27	22	20	77	206	212	180	78	27	16
MIN	31	27	17	19	16	16	73	80	80	29	7.9	6.7
AC-FT	2880	1980	1380	1260	996	2760	6110	8300	6770	2920	924	679
CFSM	.41	.29	.20	.18	.16	.39	.90	1.18	1.00	.42	.13	.10
IN.	.47	.33	.23	.21	.16	.45	1.00	1.36	1.11	.48	.15	.11

CAL YR 1989 TOTAL 24145 MEAN 66.2 MAX 351 MIN 12 AC-FT 47890 CFSM .58 IN. 7.88
WTR YR 1990 TOTAL 18630.3 MEAN 51.0 MAX 212 MIN 6.7 AC-FT 36950 CFSM .45 IN. 6.08

e Estimated

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 mi^2.

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 National Geodetic Vertical Datum of 1929 (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, 68,050 acre-ft, May 4, elevation, 1,216.95 ft; minimum, 47,620 acre-ft, Mar. 7, elevation, 1,214.70 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1,216.20	60,880	
Oct. 31	1,215.96	58,670	-2,210
Nov. 30	1,215.73	56,570	-2,100
Dec. 31	1,215.01	50,240	-6,330
CAL YR 1989			-7,600
Jan. 31	1,214.83	48,690	-1,550
Feb. 28	1,214.75	48,020	-670
Mar. 31	1,215.84	57,560	+9,540
Apr. 30	1,216.84	66,960	+9,400
May 31	1,216.42	62,950	-4,010
June 30	1,216.29	61,710	-1,240
July 31	1,216.41	62,860	+1,150
Aug. 31	1,216.34	62,190	-670
Sept. 30	1,216.44	63,140	+950
WTR YR 1990			+2,260

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 mi^2.

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 Raservoir" 1893-1916.

GAGE.--Water-stage recorders on headwater and tailwater. Datum of gages is National Geodetic Vertical Datum of 1929 (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).--95 years (water years 1896-1990), 222 ft^3/s, 7.16 in/yr.

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

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,900 ft^3/s, June 3; minimum daily, 15 ft^3/s, Sept. 8.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	120	97.0	194	174	43.0	45.0	108	1410	594	273	98.0	20.0
2	120	96.0	190	172	43.0	45.0	108	1340	550	279	101	20.0
3	120	134	188	172	43.0	45.0	223	1340	1900	276	103	20.0
4	120	134	190	170	43.0	46.0	220	1340	1300	273	104	20.0
5	120	134	190	170	43.0	46.0	215	1340	1250	270	24.0	20.0
6	121	134	190	86.0	43.0	46.0	261	1320	1270	137	24.0	20.0
7	122	134	188	86.0	43.0	46.0	261	1340	1250	138	24.0	18.0
8	124	136	188	86.0	43.0	18.0	264	1340	912	140	24.0	15.0
9	124	134	188	86.0	43.0	18.0	264	1320	992	140	24.0	16.0
10	124	190	186	43.0	43.0	18.0	264	420	812	141	24.0	17.0
11	150	190	186	44.0	43.0	19.0	270	486	812	141	24.0	19.0
12	152	192	186	43.0	43.0	19.0	279	720	858	143	24.0	20.0
13	152	196	184	43.0	43.0	18.0	288	729	848	143	24.0	20.0
14	154	196	186	44.0	44.0	18.0	300	747	928	144	20.0	20.0
15	152	196	184	44.0	44.0	17.0	300	756	1250	146	20.0	20.0
16	152	195	184	44.0	44.0	17.0	300	595	720	146	20.0	20.0
17	152	198	184	44.0	44.0	385	202	623	840	97.0	20.0	20.0
18	154	204	184	44.0	44.0	370	155	372	864	98.0	20.0	20.0
19	154	202	182	44.0	45.0	370	158	384	900	100	20.0	20.0
20	154	202	182	44.0	45.0	370	106	388	913	20.0	20.0	20.0
21	155	192	182	44.0	45.0	380	54.0	392	938	21.0	20.0	58.0
22	155	186	180	44.0	45.0	385	55.0	396	963	21.0	20.0	58.0
23	155	186	180	44.0	45.0	390	56.0	400	963	21.0	20.0	57.0
24	97.0	190	180	43.0	44.0	200	57.0	396	950	21.0	20.0	55.0
25	95.0	194	178	43.0	44.0	205	57.0	490	937	21.0	20.0	55.0
26	95.0	194	178	43.0	44.0	210	57.0	490	798	21.0	20.0	84.0
27	98.0	190	176	43.0	44.0	102	432	490	684	22.0	20.0	86.0
28	98.0	188	176	43.0	44.0	103	1140	490	693	98.0	20.0	172
29	97.0	188	176	43.0	---	107	1820	490	400	96.0	20.0	170
30	97.0	192	176	43.0	---	108	1490	588	258	96.0	20.0	170
31	97.0	---	174	43.0	---	108	---	582	---	96.0	20.0	---
TOTAL	3980.0	5194.0	5690	2159.0	1224.0	4274.0	9764.0	23514	27347	3779.0	982.0	1350.0
MEAN	128	173	184	69.6	43.7	138	325	759	912	122	31.7	45.0
MAX	155	204	194	174	45	390	1820	1410	1900	279	104	172
MIN	95	96	174	43	43	17	54	372	258	20	20	15
AC-FT	7890	10300	11290	4280	2430	8480	19370	46640	54240	7500	1950	2680
CFSM	.30	.41	.44	.17	.10	.33	.77	1.80	2.17	.29	.08	.11
IN.	.35	.46	.50	.19	.11	.38	.86	2.08	2.42	.33	.09	.12

CAL YR 1989 TOTAL 80661.0 MEAN 221 MAX 1400 MIN 18 AC-FT 160000 CFSM .52 IN. 7.13
WTR YR 1990 TOTAL 89257.0 MEAN 245 MAX 1900 MIN 15 AC-FT 177000 CFSM .58 IN. 7.89

MISSISSIPPI RIVER MAIN STEM

05220500 MISSISSIPPI RIVER BELOW SANDY RIVER, NEAR LIBBY, MN

LOCATION.--Lat 46°47'23", long 93°19'43", in SE¼NE¼ sec.25, T.50 N., R.24 W., Aitkin County, Hydrologic Unit 07010103, on right bank 600 ft downstream from Sandy River, 0.8 mi northwest of Libby, and at mile 1,106 upstream from Ohio River.

DRAINAGE AREA.--5,060 mi^2, approximately.

PERIOD OF RECORD.--April 1930 to September 1990 (discontinued).

REVISED RECORDS.--WSP 1914: 1958. WDR MN-90-2: 1989 (m).

GAGE.--Water-stage recorder. Datum of gage is 1,204.06 ft above National Geodetic Vertical Datum of 1929. Prior to July 28, 1931, nonrecording gage at site 600 ft upstream at datum 3.16 ft higher.

REMARKS.--Records good except for those for estimated daily discharges, which are fair. Flow regulated by Winnibigoshish Lake (station 05201000), Leech Lake (station 05206000), Pokegama Lake (station 05210500), and Sandy Lake (station 05218500).

AVERAGE DISCHARGE.--60 years, 2,089 ft^3/s, 5.61 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,000 ft^3/s, May 17, 1950, gage height, 20.02 ft; minimum, 83 ft^3/s, Nov. 16, 1936, gage height, 1.44 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,540 ft^3/s, June 12, 13, gage height, 9.83 ft; minimum, 389 ft^3/s, Aug. 21, gage height, 2.21 ft.

REVISION.--The minimum discharge for water year 1989 has been revised to 697 ft^3/s, Aug. 24, 25, gage height, 2.88 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2170	1740	e1300	e1150	e1100	e850	2130	4400	1540	2190	1170	483
2	2160	1770	e1300	e1150	e1100	e850	2210	4480	1810	2240	1030	475
3	2170	1780	e1250	e1150	e1100	e800	2240	4490	3920	2300	939	454
4	2140	1760	e1250	e1150	e1100	e800	2410	4500	4410	2290	852	453
5	2120	1760	e1250	e1150	e1100	e800	2470	4420	4270	2310	778	468
6	2030	1760	e1250	e1150	e1100	e750	2390	4320	4260	2250	729	970
7	1930	1740	e1250	e1150	e1100	e750	2370	4240	4240	2130	702	2580
8	1900	1770	e1230	e1150	e1100	e700	2360	4160	4130	2130	704	2420
9	1920	1830	e1220	e1150	e1100	e700	2370	3720	4150	2120	705	1860
10	1950	1850	e1200	e1150	e1050	e700	2330	3060	4230	2130	708	1360
11	1930	1760	e1200	e1150	e1050	e700	2150	2980	4360	2090	686	1060
12	1890	1690	e1200	e1150	e1050	e850	1940	2940	4510	2080	686	884
13	1850	1630	e1200	e1150	e1050	e1000	1800	2740	4520	2030	676	761
14	1860	1630	e1200	e1150	e1000	e1300	1670	2620	4420	2000	672	839
15	1850	1630	e1200	e1150	e1000	e1600	1590	2500	4200	1970	582	952
16	1850	1630	e1200	e1150	e1000	e2000	1560	2330	3620	1940	470	916
17	1810	1430	e1200	e1150	e1000	e2500	1480	2190	3390	1920	446	920
18	1780	1420	e1200	e1150	e1000	e2700	1420	1980	3370	1820	470	917
19	1750	1520	e1200	e1150	e950	e2700	1360	1900	3320	1720	406	931
20	1730	1680	e1200	e1150	e950	2710	1320	1800	3180	1630	415	1000
21	1720	e1650	e1200	e1130	e950	2640	1260	1730	3040	1610	412	1000
22	1700	e1600	e1200	e1110	e950	2610	1160	1710	3020	1600	475	1100
23	1680	e1550	e1200	e1100	e900	2530	1060	1730	3070	1530	442	1310
24	1660	e1500	e1200	e1100	e900	2310	1080	1790	3110	1460	432	1290
25	1660	e1450	e1200	e1100	e900	2190	1140	1830	3090	1400	447	1230
26	1660	e1400	e1150	e1100	e900	2290	1310	1830	3070	1310	452	1060
27	1650	e1400	e1150	e1100	e900	2240	1800	1850	3090	1300	450	958
28	1650	e1350	e1150	e1100	e900	2150	2740	1840	2950	1390	470	967
29	1700	e1350	e1150	e1100	---	2090	3690	1810	2660	1450	452	972
30	1720	e1300	e1150	e1100	---	2040	4170	1800	2350	1450	484	936
31	1740	---	e1150	e1100	---	2050	---	1670	---	1340	484	---
TOTAL	57330	48330	37400	35140	28300	50900	58980	85360	105300	57130	18826	31526
MEAN	1849	1611	1206	1134	1011	1642	1966	2754	3510	1843	607	1051
MAX	2170	1850	1300	1150	1100	2710	4170	4500	4520	2310	1170	2580
MIN	1650	1300	1150	1100	900	700	1060	1670	1540	1300	406	453
AC-FT	113700	95860	74180	69700	56130	101000	117000	169300	208900	113300	37340	62530
CFSM	.37	.32	.24	.22	.20	.32	.39	.54	.69	.36	.12	.21
IN.	.42	.36	.27	.26	.21	.37	.43	.63	.77	.42	.14	.23

CAL YR 1989 TOTAL 833528 MEAN 2284 MAX 6360 MIN 697 AC-FT 1653000 CFSM .45 IN. 6.13
WTR YR 1990 TOTAL 614522 MEAN 1684 MAX 4520 MIN 406 AC-FT 1219000 CFSM .33 IN. 4.52

e Estimated

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 mi^2, approximately.

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

GAGE.--Water-stage recorder. Datum of gage is 1,182.41 ft above National Geodetic Vertical Datum of 1929 (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 National Geodetic Vertical Datum of 1929. 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.

AVERAGE DISCHARGE.--45 years, 2,912 ft^3/s, 6.44 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 20,000 ft^3/s, May 20, 1959, 22.49 ft, present datum; minimum 151 ft^3/s, Sept. 1, 1961, gage height, 0.60 ft.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 6,660 ft^3/s, May 5; minimum, 459 ft^3/s, Aug. 22, gage height, 1.54 ft. River gage: Maximum discharge, 4,360 ft^3/s, May 5, gage height, 11.20 ft, from observer reading. Diversion channel: Maximum discharge, 2,320 ft^3/s, May 5, gage height, 10.34 ft; from graph based on gage readings.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2430	1990	e1500	e1300	e1150	e1000	e2800	6010	2280	2980	1610	531
2	2430	1990	e1500	e1300	e1150	e950	e2900	6120	2170	2730	1490	527
3	2290	1990	e1500	e1300	e1150	e950	e3100	6400	3160	2650	1340	518
4	2390	2000	e1450	e1300	e1150	e950	e3300	6620	5300	2650	1240	515
5	2390	2010	e1450	e1250	e1150	e950	e3400	6660	6090	2590	1120	497
6	2360	2000	e1450	e1250	e1150	e910	e3500	6550	6250	2550	1010	499
7	2280	2000	e1400	e1250	e1150	e900	e3500	6400	6240	2480	933	804
8	2150	2000	e1400	e1200	e1150	e900	e3500	6120	6180	2470	880	1960
9	2160	2020	e1400	e1200	e1150	e900	3520	5900	6090	2480	854	2270
10	2160	2070	e1400	e1200	e1100	e900	3470	5340	5980	2460	843	2000
11	2170	2100	e1400	e1200	e1100	e950	3160	4660	6050	2450	826	1600
12	2160	2030	e1400	e1200	e1100	e1100	2860	4330	6500	2400	802	1320
13	2130	1940	e1400	e1200	e1100	e1300	2600	4100	6600	2360	776	1080
14	2100	1880	e1400	e1200	e1100	e1800	2410	3910	6470	2300	762	973
15	2070	1800	e1400	e1200	e1100	e2500	2270	3730	6220	2250	750	919
16	2040	1270	e1400	e1200	e1100	e3500	2180	3550	5840	2200	704	977
17	2010	1350	e1400	e1200	e1100	e3700	2130	3340	5340	2170	604	1010
18	1940	1460	e1400	e1200	e1100	e3800	2050	3140	5060	2120	552	1010
19	1800	1770	e1400	e1150	e1100	e3800	1960	2910	4860	2030	565	1030
20	1900	1960	e1400	e1150	e1100	e3800	1890	2760	4660	1930	526	1030
21	1870	e1950	e1400	e1150	e1050	e3700	1830	2610	4460	1830	479	1080
22	1860	e1950	e1400	e1150	e1050	e3600	1770	2480	4300	1780	462	1110
23	1850	e1900	e1400	e1150	e1050	e3500	1700	2470	4170	1750	489	1150
24	1840	e1850	e1400	e1150	e1050	e3300	1670	2490	4110	1700	504	1300
25	1820	e1800	e1400	e1150	e1050	e3100	1730	2500	4080	1620	493	1370
26	1800	e1750	e1350	e1150	e1000	e2900	1900	2500	3950	1580	537	1350
27	1800	e1700	e1350	e1150	e1000	e2800	2290	2540	3830	1580	557	1260
28	1780	e1650	e1350	e1150	e1000	e2700	3080	2590	3780	1580	547	1160
29	1840	e1600	e1350	e1150	---	e2700	4250	2540	3620	1630	553	1120
30	1910	e1550	e1350	e1150	---	e2700	5250	2480	3330	1670	528	1100
31	1970	---	e1350	e1150	---	e2700	---	2400	---	1670	521	---
TOTAL	63700	55330	43550	37100	30700	69260	81970	126150	146970	66640	23857	33070
MEAN	2055	1844	1405	1197	1096	2234	2732	4069	4899	2150	770	1102
MAX	2430	2100	1500	1300	1150	3800	5250	6660	6600	2980	1610	2270
MIN	1780	1270	1350	1150	1000	900	1670	2400	2170	1580	462	497
AC-FT	126300	109700	86380	73590	60890	137400	162600	250200	291500	132200	47320	65590
CFSM	.33	.30	.23	.19	.18	.36	.45	.66	.80	.35	.13	.18
IN.	.39	.34	.26	.22	.19	.42	.50	.76	.89	.40	.14	.20

CAL YR 1989 TOTAL 1003474 MEAN 2749 MAX 8810 MIN 720 AC-FT 1990000 CFSM .45 IN. 6.08
WTR YR 1990 TOTAL 778297 MEAN 2132 MAX 6660 MIN 462 AC-FT 1544000 CFSM .35 IN. 4.72

e Estimated

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 mi^2.

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 National Geodetic Vertical Datum of 1929 (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, 106,120 acre-ft, April 27, elevation, 1,229.67 ft; minimum, 88,800 acre-ft, Jan. 14, elevation, 1,228.39 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1,229.28	100,790	
Oct. 31	1,229.05	97,680	-3,110
Nov. 30	1,229.00	97,000	-680
Dec. 31	1,228.45	89,610	-7,390
CAL YR 1989			-2,410
Jan. 31	1,228.51	90,410	+800
Feb. 28	1,228.68	92,690	+2,280
Mar. 31	1,229.25	100,380	+7,690
Apr. 30	1,229.61	105,290	+4,910
May 31	1,229.45	103,110	-2,180
June 30	1,229.28	100,790	-2,320
July 31	1,229.40	102,440	+1,650
Aug. 31	1,229.28	100,790	-1,650
Sept. 30	1,229.13	98,760	-2,030
WTR YR 1990			-2,030

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 mi^2.

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 National Geodetic Vertical Datum of 1929 (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, nonrecording gage in tailwater at datum 1.60 ft (0.49 m) 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).--104 years, 220 ft^3/s, 5.32 in/yr.

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

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 800 ft^3/s, Apr. 29 to May 2; minimum daily, 30 ft^3/s, June 30 to July 12, July 18 to Sept. 20.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	370	150	300	180	140	140	270	800	250	30.0	30.0	30.0
2	370	150	300	180	140	140	270	800	250	30.0	30.0	30.0
3	370	150	300	180	140	140	333	617	407	30.0	30.0	30.0
4	370	150	300	180	140	140	350	600	500	30.0	30.0	30.0
5	300	150	300	180	140	140	397	600	450	30.0	30.0	30.0
6	250	150	300	180	140	140	425	600	400	30.0	30.0	30.0
7	250	150	300	180	140	140	425	600	500	30.0	30.0	30.0
8	250	150	300	180	140	140	425	696	600	30.0	30.0	30.0
9	250	150	300	180	140	140	425	400	600	30.0	30.0	30.0
10	250	150	300	180	140	140	425	400	600	30.0	30.0	30.0
11	250	150	300	180	140	140	425	400	600	30.0	30.0	30.0
12	250	150	300	180	140	140	425	400	600	30.0	30.0	30.0
13	250	150	300	180	140	140	425	400	600	110	30.0	30.0
14	250	150	300	180	140	140	425	400	600	100	30.0	30.0
15	250	150	300	180	140	195	425	373	600	100	30.0	30.0
16	250	150	300	180	140	280	425	350	538	100	30.0	30.0
17	208	150	300	180	140	500	425	350	500	56.0	30.0	30.0
18	150	150	300	180	140	500	425	338	500	30.0	30.0	30.0
19	150	150	300	180	140	500	425	325	500	30.0	30.0	30.0
20	150	150	300	167	140	500	350	325	438	30.0	30.0	30.0
21	150	150	300	140	140	500	225	325	400	30.0	30.0	56.0
22	150	150	300	140	140	500	100	278	400	30.0	30.0	100
23	150	150	300	140	140	500	100	250	400	30.0	30.0	100
24	150	150	300	140	140	425	100	250	400	30.0	30.0	100
25	150	150	300	140	140	350	100	250	400	30.0	30.0	100
26	150	150	300	140	140	350	100	250	275	30.0	30.0	100
27	150	150	220	140	140	350	250	250	200	30.0	30.0	100
28	150	250	180	140	140	300	593	250	200	30.0	30.0	100
29	150	300	180	140	---	270	800	250	117	30.0	30.0	100
30	150	300	180	140	---	270	800	250	30.0	30.0	30.0	100
31	150	---	180	140	---	270	---	250	---	30.0	30.0	---
TOTAL	6838	4900	8740	5127	3920	8520	11088	12627	12855.0	1246.0	930.0	1556.0
MEAN	221	163	282	165	140	275	370	407	428	40.2	30.0	51.9
MAX	370	300	300	180	140	500	800	800	600	110	30	100
MIN	150	150	180	140	140	140	100	250	30	30	30	30
AC-FT	13560	9720	17340	10170	7780	16900	21990	25050	25500	2470	1840	3090
CFSM	.39	.29	.50	.29	.25	.49	.66	.72	.76	.07	.05	.09
IN.	.45	.32	.58	.34	.26	.56	.73	.84	.85	.08	.06	.10

CAL YR 1989 TOTAL 81668 MEAN 224 MAX 745 MIN 30 AC-FT 162000 CFSM .40 IN. 5.41
WTR YR 1990 TOTAL 78347.0 MEAN 215 MAX 800 MIN 30 AC-FT 155400 CFSM .38 IN. 5.19

MISSISSIPPI RIVER MAIN STEM

05242300 MISSISSIPPI RIVER AT BRAINERD, MN

LOCATION.--Lat 46°22'40", long 94°10'59", in SE¼SW¼ sec. 18, T.45 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 mi^2, approximately.

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

GAGE.--Water-stage recorder. Datum of gage is 1,146.96 ft above National Geodetic Vertical Datum of 1929.

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 9,250 ft^3/s, June 14, gage height, 11.31 ft; minimum, 510 ft^3/s, Aug. 24, gage height, 4.66 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2890	2370	2430	1590	1440	1280	3230	7420	3070	4220	1940	628
2	3130	2360	2170	1870	1370	1280	3280	7540	3130	3530	1960	616
3	3200	2350	2140	1870	1370	1280	3540	7970	3180	3410	1810	652
4	3080	2640	2040	1870	1380	1280	3990	8290	5040	3710	1590	688
5	3060	2580	2060	1870	1380	1070	4190	8120	6840	3030	1530	693
6	2930	2380	2200	1870	1370	1200	4410	7950	7410	2910	1310	688
7	2770	2380	2180	1870	1370	1140	4840	8070	7700	2990	1130	591
8	2700	2350	2080	1510	1500	1120	4910	7620	7300	3030	1010	817
9	2570	2370	2030	1960	1540	1120	4830	7390	7550	3000	1050	2300
10	2620	2390	2020	1960	1370	1070	4450	6940	7540	3030	844	2080
11	2440	2510	1830	1960	1350	1380	4340	5970	7840	3100	675	1930
12	2490	2550	1830	1960	1370	1540	3840	5550	7870	2910	1050	1640
13	2460	2530	1700	1960	1470	2070	3390	4960	8490	2730	987	1050
14	2300	2450	1670	1960	1370	2270	3390	5230	8890	2820	591	1360
15	2360	2330	e1680	1960	1370	2960	3120	4780	8070	2820	836	918
16	2430	2010	1690	1590	1370	3470	2780	4570	7650	2990	879	1000
17	2390	1510	1670	1590	1280	4170	2770	4590	7260	2780	813	944
18	2360	1310	1750	1590	1280	4600	2730	4100	7010	3040	830	1020
19	2330	1420	1740	1440	1280	4830	2480	4150	6750	2730	556	1220
20	2190	2080	1670	1440	1280	4600	2400	3750	6150	2560	620	1060
21	2160	2090	1590	1440	1380	4310	2520	3560	5850	2610	658	1110
22	2130	1950	1720	1510	1380	4490	1990	3480	5580	2220	601	1140
23	2150	2140	1670	1430	1280	4700	1860	3110	5310	1930	571	1250
24	2120	2110	1870	1440	1280	4080	1950	3250	5240	1990	551	1180
25	2130	2230	1810	1440	1280	3990	2030	3880	5080	1960	559	1470
26	2130	2060	1660	1440	1280	3640	2330	3490	4990	1880	623	1480
27	2010	2060	1660	1460	1280	3260	2430	3400	4770	2080	685	1490
28	2050	2080	1660	1480	1280	3270	3110	3190	4780	1890	673	1400
29	2290	1990	1660	1430	---	3030	5070	3300	4950	1920	681	1280
30	2360	1930	e1660	1430	---	3080	5800	3090	4700	2040	682	1290
31	2350	---	1590	1440	---	3100	---	2900	---	2020	686	---
TOTAL	76580	65510	56930	51630	37950	84680	102000	161610	185790	83880	28981	34985
MEAN	2470	2184	1836	1665	1355	2732	3400	5213	6193	2706	935	1186
MAX	3200	2640	2430	1960	1540	4830	5800	8290	8890	4220	1960	2300
MIN	2010	1310	1590	1430	1280	1070	1860	2900	3070	1880	551	591
AC-FT	151900	129900	112900	102400	75270	168000	202300	320600	368500	166400	57480	69390
CFSM	.34	.30	.25	.23	.19	.37	.46	.71	.85	.37	.13	.16
IN.	.39	.33	.29	.26	.19	.43	.52	.82	.94	.43	.15	.18

CAL YR 1989 TOTAL 1229040 MEAN 3367 MAX 10700 MIN 731 AC-FT 2438000 CFSM .46 IN. 6.25
WTR YR 1990 TOTAL 970526 MEAN 2659 MAX 8890 MIN 551 AC-FT 1925000 CFSM .36 IN. 4.93

e Estimated

CROW WING RIVER BASIN

05243721 STRAIGHT RIVER AT COUNTY HIGHWAY 125 NEAR OSAGE, MN

LOCATION.--Lat 46°54'15", long 95°12'15", in NW¼NW¼ sec.35, T.140 N., R.36 W., Becker County, Hydrologic Unit 07010106, on downstream side of culverts on County Highway 125, 2.7 mi southest of Osage.

PERIOD OF RECORD.--October to November 1986, March 1987 to October 1989, June 1990 to current year. Records of hourly water temperature, available in files of the Geological Survey.

GAGE.--Water-stage recorder. Elevation of gage is 1,435 ft above National Geodetic Vertical Datum of 1929, from topographic map.

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

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 69 ft^3/s, Sept. 4, 1989, gage height, 7.86 ft; minimum, 21 ft^3/s, July 19, 21, 22, 23, 26, 1988; minimum gage height, 7.18 ft, Aug. 10, 1990.

EXTREMES FOR CURRENT PERIOD (October and June to September).--Maximum discharge during period, 54 ft^3/s, June 3, gage height, 7.59 ft; minimum, 22 ft^3/s, Aug. 10, 16, Sept. 11, 15; minimum gage height, 7.18 ft, Aug. 10.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33	---	---	---	---	---	---	---	33	33	27	28
2	39	---	---	---	---	---	---	---	38	32	26	27
3	35	---	---	---	---	---	---	---	50	31	26	27
4	34	---	---	---	---	---	---	---	45	32	28	26
5	36	---	---	---	---	---	---	---	46	31	27	27
6	36	---	---	---	---	---	---	---	45	29	25	26
7	35	---	---	---	---	---	---	---	40	29	25	28
8	34	---	---	---	---	---	---	---	38	35	24	27
9	35	---	---	---	---	---	---	---	38	35	24	27
10	38	---	---	---	---	---	---	---	36	34	25	27
11	38	---	---	---	---	---	---	---	35	38	26	26
12	36	---	---	---	---	---	---	---	37	37	26	27
13	38	---	---	---	---	---	---	---	37	35	26	26
14	37	---	29	---	---	---	---	---	35	34	25	26
15	37	---	---	---	---	---	---	---	35	34	25	24
16	38	---	---	---	---	---	---	---	35	33	24	25
17	37	---	---	---	---	---	---	---	36	34	25	25
18	35	---	---	34	---	---	---	---	38	34	28	26
19	34	---	---	---	---	---	---	---	38	34	27	28
20	35	---	---	---	---	---	---	---	39	33	26	30
21	35	---	---	---	---	---	---	---	42	32	26	29
22	35	---	---	---	---	---	---	---	42	32	25	30
23	36	---	---	---	---	---	---	---	41	31	27	28
24	36	---	---	---	---	---	---	---	39	30	28	28
25	38	---	---	---	---	---	---	---	37	30	29	30
26	e38	---	---	---	---	---	---	---	35	33	33	30
27	e37	---	---	---	---	---	---	---	36	30	32	28
28	e37	---	---	---	---	---	---	---	36	29	31	28
29	e36	---	---	---	---	---	---	---	35	30	29	27
30	e35	---	---	22	---	---	---	---	35	30	28	28
31	e35	---	---	---	---	---	---	33	---	28	28	---
TOTAL	1118	---	---	---	---	---	---	---	1152	1002	831	819
MEAN	36.1	---	---	---	---	---	---	---	38.4	32.3	26.8	27.3
MAX	39	---	---	---	---	---	---	---	50	38	33	30
MIN	33	---	---	---	---	---	---	---	33	28	24	24
AC-FT	2220	---	---	---	---	---	---	---	2280	1990	1650	1620

e Estimated

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 mi^2.

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1970-71, 1973, 1975-76. October to November 1986, March 1987 to October 1989, June 1990 to current year. Records of hourly water temperature, available in files of the Geological Survey.

GAGE.--Water-stage recorder. Elevation of gage is 1,400 ft above National Geodetic Vertical Datum of 1929, from topographic map.

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

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 89 ft^3/s, Aug. 31, 1989, gage height, 2.24 ft; maximum gage height, 2.66 ft, Mar. 11, 1989 (backwater from ice); minimum discharge, 28 ft^3/s, July 22, 23, 1988, Aug. 11, 1990; minimum gage height, 0.96 ft, July 22, 1988.

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 35 ft^3/s was measured Aug. 4, 1976.

EXTREMES FOR CURRENT PERIOD (October and June to September).--Maximum discharge during period, 75 ft^3/s, June 4, gage height, 1.67 ft; minimum, 28 ft^3/s, Aug. 11, gage height, 1.14 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	51	---	---	---	---	---	---	---	52	47	37	38
2	55	---	---	---	---	---	---	---	55	44	37	37
3	56	---	---	---	---	---	---	---	72	44	36	37
4	53	---	---	---	---	---	---	---	70	43	36	37
5	54	---	---	---	---	---	---	---	68	43	35	37
6	54	---	---	---	---	---	---	---	65	42	35	38
7	54	---	---	---	---	---	---	---	61	44	33	40
8	53	---	---	---	---	---	---	---	59	46	33	40
9	53	---	---	---	---	---	---	---	57	45	33	39
10	54	---	---	---	---	---	---	---	56	47	33	40
11	56	---	---	---	---	---	---	---	56	50	34	39
12	55	---	---	---	---	---	---	---	53	50	36	39
13	54	---	---	---	---	---	---	---	53	49	35	41
14	56	---	42	---	---	---	---	---	53	47	34	40
15	55	---	---	---	---	---	---	---	53	46	32	39
16	55	---	---	---	---	---	---	---	52	44	32	38
17	55	---	---	---	---	---	---	---	54	46	33	38
18	54	---	---	---	---	---	---	---	52	47	36	40
19	53	---	---	---	---	---	---	---	54	44	36	41
20	52	---	---	---	---	---	---	---	54	46	35	40
21	53	---	---	---	---	---	---	---	54	44	34	41
22	53	---	---	---	---	---	---	---	55	43	34	40
23	53	---	---	---	---	---	---	---	54	43	37	39
24	54	---	---	---	---	---	---	---	53	41	38	38
25	54	---	---	---	---	---	---	---	51	42	37	38
26	e54	---	---	---	---	---	---	---	49	42	42	38
27	e54	---	---	---	---	---	---	---	51	43	42	38
28	e53	---	---	---	---	---	---	---	50	39	41	37
29	e53	---	---	---	---	---	---	---	48	39	40	37
30	e52	---	---	---	---	---	---	---	48	39	39	37
31	e52	---	---	52	---	---	---	53	---	39	39	---
TOTAL	1667	---	---	---	---	---	---	---	1662	1368	1114	1161
MEAN	53.8	---	---	---	---	---	---	---	55.4	44.1	35.9	38.7
MAX	56	---	---	---	---	---	---	---	72	50	42	41
MIN	51	---	---	---	---	---	---	---	48	39	32	37
AC-FT	3310	---	---	---	---	---	---	---	3300	2710	2210	2300
CFSM	1.01	---	---	---	---	---	---	---	1.04	.83	.68	.73
IN.	1.17	---	---	---	---	---	---	---	1.16	.96	.78	.81

e Estimated

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 07010106, on right bank 90 ft upstream from bridge on First Avenue at Long Prairie and 400 ft downstream from Venewitz Creek.

DRAINAGE AREA.--432 mi^2.

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

GAGE.--Water-stage recorder. Datum of gage is 1,281.74 ft above National Geodetic Vertical Datum of 1929.

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

AVERAGE DISCHARGE.--19 years, 154 ft^3/s, 4.84 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,270 ft^3/s, July 22, 1972, gage height, 9.37 ft; minimum daily, 0.64 ft^3/s, Jan. 12-18, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 460 ft^3/s, Mar. 13, gage height, 4.95 ft; minimum daily, 2.8 ft^3/s, Jan. 28 (backwater from ice).

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	47	e26	e6.1	e3.0	e3.0	192	257	74	138	63	38
2	25	50	e26	e6.1	e3.0	e3.2	163	247	80	124	62	37
3	22	46	e26	e6.0	e3.0	e3.7	155	233	105	106	63	70
4	21	40	e26	e6.0	e3.0	e3.7	147	215	138	92	64	71
5	21	45	e25	e5.9	e3.0	e4.2	135	197	172	83	61	61
6	20	45	e24	e5.8	e3.0	e5.0	123	183	195	80	58	57
7	19	45	e22	e5.7	e3.0	e5.7	119	165	177	76	55	61
8	19	45	e20	e5.6	e3.0	e5.7	116	141	153	84	53	59
9	19	45	e19	e5.3	e3.0	e5.7	110	128	127	79	51	57
10	18	45	e18	e4.9	e3.0	e6.0	107	117	102	75	49	56
11	20	45	e16	e4.6	e3.0	e37	103	106	136	117	47	54
12	22	45	e13	e4.3	e3.0	e257	100	96	190	138	47	52
13	24	40	e11	e4.0	e3.0	438	100	88	195	137	46	49
14	23	39	e10	e3.7	e3.0	319	100	88	193	110	45	47
15	24	39	e9.6	e3.6	e3.0	185	96	89	198	93	42	46
16	26	37	e9.0	e3.6	e3.0	145	97	98	201	84	40	44
17	25	35	e8.4	e3.7	e3.0	229	95	102	209	79	37	42
18	26	34	e8.0	e3.7	e3.0	245	92	97	209	76	51	42
19	27	32	e7.6	e3.4	e3.0	235	89	92	209	76	52	44
20	26	31	e7.3	e3.3	e3.0	254	86	90	210	77	51	46
21	26	e31	e7.0	e3.2	e3.0	211	84	88	207	73	47	51
22	26	e30	e6.8	e3.2	e3.0	223	88	90	191	71	45	51
23	26	e30	e6.6	e3.2	e3.0	137	114	97	171	69	43	48
24	25	e30	e6.5	e3.2	e3.0	231	143	95	157	65	44	48
25	25	e29	e6.4	e3.1	e3.0	228	164	95	152	63	44	45
26	25	e29	e6.4	e3.0	e3.0	222	198	100	134	71	55	42
27	27	e29	e6.3	e3.0	e3.0	176	243	107	121	78	50	41
28	28	e28	e6.2	e2.8	e3.0	171	234	110	166	86	47	40
29	44	e27	e6.2	e3.0	---	164	244	110	191	76	44	38
30	45	e26	e6.2	e3.0	---	178	252	94	170	70	41	36
31	46	---	e6.2	e3.0	---	216	---	80	---	66	41	---
TOTAL	795	1119	402.7	129.0	84.0	4546.9	4089	3895	4933	2712	1538	1473
MEAN	25.6	37.3	13.0	4.16	3.00	147	136	126	164	87.5	49.6	49.1
MAX	46	50	26	6.1	3.0	438	252	257	210	138	64	71
MIN	18	26	6.2	2.8	3.0	3.0	84	80	74	63	37	36
AC-FT	1580	2220	799	256	167	9020	8110	7730	9780	5380	3050	2920
CFSM	.06	.09	.03	.01	.01	.34	.32	.29	.38	.20	.11	.11
IN.	.07	.10	.03	.01	.01	.39	.35	.34	.42	.23	.13	.13

CAL YR 1989 TOTAL 23234.6 MEAN 63.7 MAX 666 MIN 4.9 AC-FT 46090 CFSM .15 IN. 2.00
WTR YR 1990 TOTAL 25716.6 MEAN 70.5 MAX 438 MIN 2.8 AC-FT 51010 CFSM .16 IN. 2.21

e Estimated

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 mi^2.

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 National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Aug. 10, 1949, nonrecording gage 800 ft north of present site at same datum. Aug. 11, 1949, to June 30, 1973, water-stage recorder at present site and at datum 1,188.14 ft, adjustment of 1912.

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

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

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

EXTREMES FOR CURRENT YEAR.--Maximum contents, 63,370 acre-ft, June 7, elevation, 1,194.18 ft; minimum, 52,190 acre-ft, Feb. 9, elevation, 1,193.32 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1,193.70	57,100	
Oct. 31	1,193.68	56,840	-260
Nov. 30	1,193.65	56,460	-380
Dec. 31	1,193.43	53,610	-2,850
CAL YR 1989			-2,450
Jan. 31	1,193.36	52,710	-900
Feb. 28	1,193.39	53,100	+390
Mar. 31	1,193.78	58,150	+5,050
Apr. 30	1,194.03	61,410	+3,260
May 31	1,193.94	60,240	-1,170
June 30	1,193.94	60,240	0
July 31	1,193.88	59,460	-780
Aug. 31	1,193.71	57,240	-2,220
Sept. 30	1,193.54	55,030	-2,210
WTR YR 1990			-2,070

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 mi^2.

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

GAGE.--Water-stage recorder on headwater and nonrecording gage on tailwater. Datum of gages is National Geodetic Vertical Datum of 1929 (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 Leke (station 05246500).

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

AVERAGE DISCHARGE (unadjusted).--79 years, 109 ft^3/s, 5.16 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,120 ft^3/s, May 15, 1938; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 504 ft^3/s, Mar. 18; minimum daily, 18 ft^3/s, Aug. 28-30, Sept. 27-30.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	101	30.0	98.0	74.0	75.0	42.0	49.0	367	44.0	143	19.0	20.0
2	102	30.0	98.0	74.0	75.0	42.0	114	345	44.0	67.0	19.0	20.0
3	101	46.0	96.0	74.0	75.0	42.0	153	345	45.0	21.0	19.0	19.0
4	102	54.0	97.0	74.0	75.0	42.0	155	286	217	21.0	19.0	19.0
5	74.0	53.0	97.0	74.0	75.0	42.0	155	210	202	21.0	19.0	20.0
6	52.0	53.0	96.0	74.0	75.0	42.0	155	206	151	21.0	19.0	20.0
7	52.0	53.0	96.0	74.0	77.0	42.0	155	205	151	21.0	19.0	20.0
8	52.0	53.0	96.0	74.0	77.0	42.0	155	108	307	21.0	19.0	19.0
9	52.0	53.0	96.0	75.0	62.0	43.0	155	50.0	396	21.0	19.0	19.0
10	52.0	53.0	96.0	75.0	54.0	50.0	111	50.0	392	20.0	19.0	19.0
11	43.0	53.0	96.0	75.0	54.0	54.0	85.0	50.0	389	20.0	19.0	19.0
12	43.0	53.0	96.0	75.0	54.0	54.0	85.0	92.0	235	20.0	19.0	19.0
13	43.0	53.0	96.0	75.0	54.0	73.0	85.0	192	214	20.0	19.0	19.0
14	30.0	53.0	96.0	75.0	54.0	86.0	134	194	250	20.0	19.0	19.0
15	30.0	53.0	96.0	75.0	54.0	249	206	97.0	308	20.0	19.0	19.0
16	30.0	53.0	96.0	75.0	54.0	439	205	50.0	343	20.0	19.0	19.0
17	29.0	53.0	96.0	75.0	54.0	495	125	50.0	345	20.0	19.0	19.0
18	29.0	53.0	96.0	75.0	54.0	504	85.0	50.0	347	20.0	19.0	19.0
19	29.0	53.0	96.0	74.0	54.0	498	85.0	87.0	345	20.0	19.0	19.0
20	29.0	53.0	96.0	74.0	54.0	480	72.0	160	338	20.0	19.0	19.0
21	29.0	53.0	96.0	74.0	54.0	483	91.0	160	334	20.0	19.0	19.0
22	29.0	53.0	95.0	74.0	54.0	372	202	83.0	209	20.0	19.0	19.0
23	30.0	53.0	95.0	75.0	54.0	294	202	44.0	145	20.0	19.0	19.0
24	29.0	53.0	96.0	75.0	54.0	232	99.0	44.0	145	20.0	19.0	19.0
25	30.0	53.0	96.0	75.0	54.0	195	48.0	44.0	145	20.0	19.0	19.0
26	30.0	53.0	96.0	75.0	54.0	194	50.0	95.0	68.0	20.0	19.0	19.0
27	29.0	53.0	86.0	75.0	47.0	175	227	194	22.0	20.0	19.0	18.0
28	30.0	77.0	75.0	75.0	42.0	151	398	196	99.0	20.0	18.0	18.0
29	30.0	96.0	75.0	75.0	---	134	500	95.0	144	20.0	18.0	18.0
30	30.0	97.0	75.0	75.0	---	124	441	43.0	144	20.0	18.0	18.0
31	30.0	---	74.0	75.0	---	77.0	---	43.0	---	20.0	20.0	---
TOTAL	1401.0	1649.0	2885.0	2313.0	1673.0	5792.0	4782.0	4235.0	6518.0	797.0	587.0	571.0
MEAN	45.2	55.0	93.1	74.6	59.7	187	159	137	217	25.7	18.9	19.0
MAX	102	97	98	75	77	504	500	367	396	143	20	20
MIN	29	30	74	74	42	42	48	43	22	20	18	18
AC-FT	2780	3270	5720	4590	3320	11490	9490	8400	12930	1580	1160	1130
CFSM	.16	.19	.32	.26	.21	.65	.56	.48	.76	.09	.07	.07
IN.	.18	.21	.37	.30	.22	.75	.62	.55	.84	.10	.08	.07

CAL YR 1989 TOTAL 37899.0 MEAN 104 MAX 500 MIN 17 AC-FT 75170 CFSM .36 IN. 4.91
WTR YR 1990 TOTAL 33203.0 MEAN 91.0 MAX 504 MIN 18 AC-FT 65860 CFSM .32 IN. 4.30

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.

PERIOD OF RECORD.--October 1968 to September 1986, 1988-1989. Records for August 1924 to September 1968 available in files of the Minnesota District Office.

REMARKS.--Records poor. Discharge computed on basis of powerplant records. 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, in connection with a Federal Power Commission project.

AVERAGE DISCHARGE.--21 years, 1,310 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 16,600 ft^3/s, Apr. 12, 13, 1969; minimum daily, 60 ft^3/s, Aug. 10, 11, 13, 14, 1976.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum daily discharge since 1924, 18,300 ft^3/s, Apr. 14, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 4,270 ft^3/s, Mar. 18; minimum daily, 106 ft^3/s, Aug. 8.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	844	637	663	402	460	409	2310	2590	1180	1110	461	403
2	802	476	661	402	469	462	2360	2560	1150	1110	461	362
3	756	606	660	384	460	463	2430	2330	1810	1050	462	290
4	800	682	649	392	460	463	2610	2340	1920	932	461	386
5	828	793	637	461	461	463	2840	2340	2530	651	460	402
6	859	1040	635	246	439	463	2370	1660	2640	579	371	402
7	628	933	464	337	431	463	2030	1820	2440	794	363	372
8	490	800	452	419	462	462	1940	1730	2330	793	106	381
9	720	825	454	461	462	461	1830	1570	2340	735	335	381
10	509	832	462	462	461	461	1600	1440	2340	718	321	382
11	644	792	539	470	461	561	1530	1340	2210	850	321	381
12	644	793	435	474	461	1200	1530	1510	2330	742	321	381
13	643	697	394	472	461	2310	1530	1570	2400	1010	321	351
14	642	679	358	470	461	3020	1530	1560	1920	1010	320	322
15	642	770	463	424	460	3920	1400	1380	1830	1010	292	364
16	642	510	464	457	460	3970	1470	1100	1990	817	245	405
17	643	329	464	373	460	4190	1330	1140	1990	798	245	363
18	720	360	464	370	410	4270	1250	1400	2040	599	246	323
19	718	484	463	441	401	4190	1110	1490	2060	598	246	357
20	718	886	463	461	401	3410	1320	1580	2060	625	300	431
21	716	796	452	433	401	3140	1440	1620	2010	680	322	643
22	717	649	391	450	400	3160	1370	1590	1950	604	321	565
23	693	421	362	461	402	2760	1290	1400	1600	605	321	411
24	679	455	381	462	403	2500	1500	1350	1600	510	334	331
25	665	676	382	463	462	2310	1650	1450	1440	434	363	352
26	645	635	403	461	506	2020	1660	1540	1310	434	400	403
27	644	459	382	461	469	2040	1940	1660	1060	447	391	402
28	625	483	396	462	401	2040	2310	1830	1080	448	362	358
29	492	575	403	462	---	1890	2530	1890	1150	432	352	321
30	744	616	402	523	---	1810	2610	1690	1210	451	321	321
31	799	---	402	452	---	1030	---	1400	---	460	343	---
TOTAL	21315	19689	14600	13468	12447	60311	54620	51870	55920	22036	10488	11546
MEAN	688	656	471	434	445	1946	1621	1673	1864	711	338	385
MAX	859	1040	663	523	508	4270	2840	2590	2640	1110	462	643
MIN	490	329	358	246	400	409	1110	1100	1060	432	106	290
AC-FT	42280	39050	28960	26710	24690	119600	108300	102900	110900	43710	20800	22900
CFSM	.21	.20	.14	.13	.13	.59	.55	.51	.56	.22	.10	.12
IN.	.24	.22	.16	.15	.14	.68	.62	.58	.63	.25	.12	.13

CAL YR 1989 TOTAL 363631 MEAN 996 MAX 6370 MIN 92 AC-FT 721300 CFSM .30 IN. 4.10
WTR YR 1990 TOTAL 348310 MEAN 954 MAX 4270 MIN 106 AC-FT 690900 CFSM .29 IN. 3.93

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 upstsream from Nokasippi River, 1.0 mile north of Fort Ripley, and at mile 982.1 upstream from Ohio River.

DRAINAGE AREA.--11,010 mi^2, 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 ft above National Geodetic Vertical Datum of 1929. Aug. 1904 to June 1987 nonrecording gages at different datums.

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).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 15,300 ft^3/s, Apr. 15, 1989, gage height, 9.54 ft; minimum, 528 ft^3/s, July 30, 1988, gage height, 2.91 ft.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 12,700 ft^3/s, Mar. 19, 20; maximum gage height, 10.30 ft, Mar. 18; minimum, 1,080 ft^3/s, Sept. 3, gage height, 3.48 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3720	3260	e2590	e1720	e1590	e1370	e6300	10100	4460	5170	2470	1300
2	3770	3100	e2620	e1720	e1560	e1410	e6250	10400	4430	4790	2460	1230
3	3710	3070	e2590	e1690	e1530	e1430	e6200	10800	4950	4400	2450	1100
4	3710	3320	e2590	e1630	e1530	e1440	6610	11200	6210	4200	2140	1200
5	3690	3630	e2590	e1730	e1560	e1320	7130	10900	8770	3960	2180	1280
6	3620	3510	e2590	e1840	e1560	e1310	7020	10500	10100	3700	1930	1270
7	3540	3510	e2490	e1780	e1550	e1400	6880	10300	10300	3940	1740	1240
8	3190	3400	e2470	e1800	e1590	e1410	6950	9770	9700	3970	1540	1230
9	3200	3360	e2390	e1690	e1790	e1410	6860	9220	9750	3840	1570	2470
10	3160	3440	e2390	e1730	e1780	e1400	6230	8680	9830	3700	1560	3180
11	3210	3450	e2270	e1790	e1690	e1500	5990	7850	9790	3900	1310	2650
12	3140	3630	e2090	e1860	e1640	e2580	5630	7280	9960	3860	1440	2690
13	3140	3560	e1990	e1850	e1560	e4290	5140	6780	10800	3710	1600	1920
14	3050	3420	e1940	e1840	e1550	e6560	5100	6870	10500	3750	1400	1790
15	2960	3390	e1890	e1800	e1500	e7860	4960	6440	9990	3790	1230	1530
16	3020	3270	e1890	e1700	e1500	e10300	4570	5980	9830	3510	1460	1490
17	2990	2560	e1890	e1720	e1530	e11400	4530	5880	9390	3480	1380	1550
18	2980	1790	e1890	e1680	e1460	e12600	4400	5650	8960	3380	1410	1620
19	3010	2250	e1840	e1700	e1390	e12700	4180	5500	8580	3300	1250	1680
20	2920	e2490	e1760	e1560	e1400	e12700	3860	5470	8290	2960	1110	1880
21	2790	e2390	e1700	e1500	e1410	e11500	4320	5120	8000	3030	1190	1830
22	2790	e2390	e1850	e1520	e1460	e10000	4040	5270	7670	2890	1210	1930
23	2810	e2390	e1800	e1740	e1430	e9800	3620	4950	7260	2690	1130	1840
24	2810	e2390	e1760	e1820	e1310	e9000	3840	4610	6840	2870	1130	1790
25	2820	e2390	e1850	e1670	e1350	e8600	4160	4890	6660	2710	1200	1840
26	2780	e2390	e1700	e1590	e1410	e7800	4460	4930	6410	2650	1290	2130
27	2830	e2390	e1760	e1570	e1620	e7400	4780	4970	6000	2810	1340	2110
28	2720	e2440	e1760	e1720	e1370	e7000	5590	5230	5800	2740	1300	1970
29	2980	e2490	e1790	e1720	---	e6800	7230	5350	5760	2550	1300	1670
30	3080	e2590	e1790	e1630	---	e6600	8460	5260	5630	2610	1210	1660
31	3280	---	e1730	e1690	---	e6400	---	4660	---	2540	1210	---
TOTAL	97420	87660	64250	53000	42620	187290	165290	220810	240620	107400	47140	53070
MEAN	3143	2922	2073	1710	1522	6042	5510	7123	8021	3465	1521	1769
MAX	3770	3630	2620	1860	1790	12700	8460	11200	10800	5170	2470	3180
MIN	2720	1790	1700	1500	1310	1310	3620	4610	4430	2540	1110	1100
AC-FT	193200	173900	127400	105100	84540	371500	327900	438000	477300	213000	93500	105300
CFSM	.29	.27	.19	.16	.14	.55	.50	.65	.73	.31	.14	.16
IN.	.33	.30	.22	.18	.14	.63	.56	.75	.81	.36	.16	.18

CAL YR 1989 TOTAL 1585270 MEAN 4343 MAX 15000 MIN 1070 AC-FT 3144000 CFSM .39 IN. 5.36
WTR YR 1990 TOTAL 1366570 MEAN 3744 MAX 12700 MIN 1100 AC-FT 2711000 CFSM .34 IN. 4.62

e Estimated

MISSISSIPPI RIVER MAIN STEM

05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN

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

DRAINAGE AREA.--11,600 mi^2, approximately.

WATER-DISCHARGE RECORDS

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

REMARKS.--No estimated daily discharges. Records poor. Discharge computed based on powerplant records. 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).

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

AVERAGE DISCHARGE.--66 years, 4,591 ft^3/s, 5.37 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 37,700 ft^3/s, Apr. 16, 1965; minimum daily, 254 ft^3/s, Nov. 25, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 11,600 ft^3/s, May 4; minimum daily, 853 ft^3/s, Aug. 21.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3620	3180	2720	1960	1960	1790	5980	10700	4080	5260	2270	997
2	3720	3120	2820	1900	1850	1940	6110	11000	4230	4390	2230	989
3	3700	2850	2180	1960	1820	1740	6010	11400	4710	4200	2240	1020
4	3410	3180	2410	2010	1790	1990	6740	11600	5920	3850	2080	883
5	3400	3590	2700	1920	1780	2070	7050	11200	8440	3830	1620	999
6	3420	3210	2760	2190	1760	1460	7460	11000	10600	3410	1840	1250
7	3550	3140	2700	1870	1780	1680	6690	10500	10200	3610	1630	974
8	3130	3060	2520	2060	1750	1620	6930	10300	10200	3660	1500	972
9	3170	2990	2410	1900	1740	1550	7190	9370	9870	3400	1140	1610
10	2990	3000	2360	1850	2120	1490	6460	8790	10100	2930	1340	2940
11	3270	3350	2260	2060	1930	2240	5750	8230	10300	3410	1180	2270
12	2980	3280	2500	2080	1730	4200	5250	7100	10500	3520	973	2430
13	3270	3390	2230	2070	1860	4980	5320	6900	11300	3390	1360	1770
14	3140	3160	2160	2060	1840	6830	4670	6760	11100	3570	1220	1310
15	2820	3100	1910	1870	1860	7710	4540	6450	10600	3700	979	1700
16	2800	2690	2090	1810	1920	8530	4540	6090	10400	3400	1090	1050
17	3000	1940	2080	1680	1720	9100	3990	5920	10200	3350	1150	1250
18	2840	1220	2140	2030	1790	9150	3960	5610	9780	3100	1310	1340
19	2960	1540	2170	1690	1610	9100	4000	5190	9010	3170	1070	1470
20	2910	2540	2040	1980	1660	8830	3530	5630	8710	2690	922	1750
21	2730	2580	1880	1970	1630	7840	4010	4610	6330	2720	853	1540
22	2590	2290	2080	1900	1660	7150	4000	5120	8060	2850	1100	1930
23	2680	2050	2150	2010	1610	6940	3740	5010	7360	2570	965	1570
24	2760	2060	2030	2110	1590	6170	3780	4270	7060	2550	963	1550
25	2810	2540	1920	1900	1490	5710	4180	4490	6900	2710	1030	1590
26	2690	3010	1930	2030	1620	5910	4410	4780	6280	2490	1090	1970
27	2630	2740	2040	1930	1950	5600	5160	4620	6190	2530	1050	1720
28	2710	1890	2140	1960	1920	5630	5520	5080	5650	2680	1240	1810
29	3140	1990	1970	2120	---	6260	6960	5030	5850	2340	951	1670
30	2870	2560	2160	1940	---	5420	9030	5120	5560	2340	938	1320
31	3160	---	1990	2050	---	5910	---	4330	---	2430	984	---
TOTAL	94870	81240	69450	60870	49740	156540	162960	222200	247490	100050	40308	45644
MEAN	3060	2708	2240	1964	1776	5050	5432	7168	8250	3227	1300	1521
MAX	3720	3590	2820	2190	2120	9150	9030	11600	11300	5260	2270	2940
MIN	2590	1220	1880	1680	1490	1460	3530	4270	4080	2340	853	883
AC-FT	188200	161100	137800	120700	98660	310500	323200	440700	490900	198400	79950	90530
CFSM	.26	.23	.19	.17	.15	.44	.47	.62	.71	.28	.11	.13
IN.	.30	.26	.22	.20	.16	.50	.52	.71	.79	.32	.13	.15

CAL YR 1989 TOTAL 1588837 MEAN 4353 MAX 16100 MIN 894 AC-FT 3151000 CFSM .38 IN. 5.10
WTR YR 1990 TOTAL 1331362 MEAN 3648 MAX 11600 MIN 853 AC-FT 2641000 CFSM .31 IN. 4.27

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 1989 TO SEPTEMBER 1990

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	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 (STAND-ARD UNITS) (00400)	PH 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)
NOV												
06...	1645	--	3700	291	302	8.2	8.2	4.0	1.7	730	11.9	39
JAN												
31...	1245	--	2030	355	367	7.6	7.7	0.0	2.0	730	8.4	77
APR												
04...	1030	6740	--	220	262	7.7	7.8	1.5	2.0	760	7.6	K2
MAY												
22...	1030	5120	--	255	259	8.2	8.3	14.0	1 3	736	10.2	E13
JUL												
18...	1130	--	3570	290	293	7.4	8.2	26.0	7.0	734	7.2	K4
SEP												
06...	1045	--	1540	320	332	8.2	8.3	24.5	20	728	6.9	K2

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)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
NOV												
06...	21	38	13	6.5	1.7	146	143	0	178	10	4.8	0.10
JAN												
31...	25	46	15	7.0	1.9	163	171	0	199	13	4.5	0.10
APR												
04...	K12	33	10	4.7	3.0	114	117	0	139	8.4	3.9	1.8
MAY												
22...	32	35	11	4.8	1.5	124	123	0	151	7.6	5.5	0.10
JUL												
18...	550	40	13	5.7	1.4	142	142	0	173	7.5	5.7	<0.10
SEP												
06...	K18	41	15	7.7	1.6	156	161	0	190	10	7.6	<0.10

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV												
06...	4.7	177	<0.01	0.16	0.01	0.01	0.6	0.02	0.01	0.01	6	95
JAN												
31...	12	221	0.02	0.35	0.13	0.13	0.6	0.03	<0.01	<0.01	12	100
APR												
0...	9.4	162	<0.01	0.30	0.11	0.11	0.8	0.06	0.04	0.01	4	100
MAY												
22...	5.2	163	0.03	0.10	0.01	0.01	0.8	0.03	0.02	<0.01	8	94
JUL												
18...	10	182	<0.01	0.20	0.03	0.02	0.7	0.06	0.03	<0.01	11	99
SEP												
06...	9.5	197	<0.01	<0.10	0.06	0.06	0.7	0.05	0.02	0.01	8	88

MISSISSIPPI RIVER MAIN STEM

05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)
NOV											
06...	1645	<10	<1	42	<0.5	<1.0	<1	<3	1	46	<1
MAY											
22...	1030	10	1	41	<0.5	<1.0	<1	<3	1	130	<1
JUL											
18...	1130	<10	1	47	<0.5	<1.0	<1	<3	4	38	1
SEP											
06...	1045	10	1	50	<0.5	<1.0	<1	<3	2	6	<1

DATE	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
NOV										
06...	<4	11	<0.1	<10	1	<1	<1.0	85	<6	8
MAY										
22...	6	21	<0.1	<10	<1	<1	<1.0	70	<6	7
JUL										
18...	5	19	<0.1	<10	2	<1	<1.0	87	<6	13
SEP										
06...	5	9	<0.1	<10	1	<1	<1.0	90	<6	4

MISSISSIPPI RIVER MAIN STEM

05270700 MISSISSIPPI 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 mi^2, approximately.

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

GAGE.--Water-stage recorder. Datum of gage is 958.49 ft above National Geodatic Vertical Datum of 1929.

REMARKS.--Records 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).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 16,700 ft^3/s, Mar. 16, 20, gage height, 7.27 ft, result of regulation; maximum daily discharge, 14,100 cfs, Mar. 17; minimum daily discharge, 1,330 ft^3/s, Aug. 12.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4370	3450	e2850	2020	2040	e1840	7440	11700	5410	7280	3370	1980
2	4300	3600	e2750	2000	1880	e1840	7310	12600	5910	6760	3150	1830
3	4210	3210	e2700	1880	e1800	e1840	6950	13100	6480	6030	2980	1530
4	4000	3200	e2730	1980	1760	e1860	7630	13300	7090	5820	3460	1890
5	4270	3800	e3200	2020	1760	e1890	7820	13000	9770	5520	2430	1630
6	4120	3890	e3150	2360	1900	e1900	8450	12600	12000	4950	2560	2010
7	3840	3900	e2900	1890	1760	e1950	7690	12100	12500	4580	2520	2060
8	4020	4050	e2850	2230	1800	e1980	7960	12100	12100	5630	2190	1340
9	3570	4250	e2800	2020	1820	e2100	8330	11100	11500	5090	2180	1790
10	3650	3810	e2700	1890	2010	e2600	7260	10500	11300	4810	1980	3430
11	3500	3840	e2450	2020	2010	e4000	6800	9870	11300	5480	2020	3870
12	4000	3700	e2530	2080	1880	e7000	6620	8830	11800	5750	1330	3010
13	3630	3960	e2450	2020	1900	e10000	6370	8600	12500	5240	1630	3290
14	3130	3770	e2430	2280	2020	10400	5910	8360	12700	5070	1910	2110
15	3420	3550	e2380	2020	2040	11900	5830	8260	12300	5180	1910	2160
16	3510	3310	e2280	2020	1900	13300	5840	8030	12500	5000	1380	1830
17	3560	2510	e2200	1760	1770	14100	5070	7510	12200	4500	1720	1850
18	3270	1990	e2160	2190	2040	13800	5030	7350	12200	4770	2200	2150
19	3450	1700	e2100	1890	1640	13900	4970	7180	11600	4510	2190	2140
20	3530	e2600	e2010	2020	1630	13700	4970	7050	11200	4110	1810	2170
21	3310	e3000	e1950	1890	1690	12800	4630	6960	10400	3880	1380	2640
22	3190	e2800	2160	1760	1690	11300	5060	6740	10500	4110	1730	2200
23	3500	2580	1940	1760	1630	10100	4540	6990	9480	3640	1870	2630
24	3700	2510	1860	2260	1630	10400	5020	6470	9140	3630	1750	2120
25	3320	e2500	2140	1760	1630	9330	5120	6140	8710	3970	2060	2310
26	3080	e2600	1760	1900	1630	8850	6060	6650	8140	4100	1890	2660
27	3170	e2550	1940	1760	1670	8440	6370	6700	7930	3890	2230	2920
28	2960	2340	2150	1820	1900	8160	7000	6480	7970	4020	2010	2520
29	3380	e2600	2020	2370	---	8260	8440	6820	8410	3760	2150	2660
30	3170	e2800	2020	1900	---	7690	10800	6550	7840	3430	1470	2180
31	3220	---	2360	1960	---	7050	---	6220	---	3390	1660	---
TOTAL	111350	94370	73920	61730	50830	234280	197290	275860	302880	147900	65120	68910
MEAN	3592	3146	2385	1991	1815	7557	6576	8899	10100	4771	2101	2297
MAX	4370	4250	3200	2370	2040	14100	10800	13300	12700	7280	3460	3870
MIN	2960	1700	1760	1760	1630	1840	4540	6140	5410	3390	1330	1340
AC-FT	220900	187200	146600	122400	100800	464700	391300	547200	600800	293400	129200	136700
CFSM	.27	.24	.18	.15	.14	.57	.49	.67	.76	.36	.16	.17
IN.	.31	.26	.21	.17	.14	.65	.55	.77	.85	.41	.18	.19

CAL YR 1989 TOTAL 1844110 MEAN 5052 MAX 18900 MIN 1010 AC-FT 3658000 CFSM .38 IN. 5.15
WTR YR 1990 TOTAL 1684440 MEAN 4615 MAX 14100 MIN 1330 AC-FT 3341000 CFSM .35 IN. 4.70

e Estimated

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 mi^2, 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 National Geodetic Vertical Datum of 1929. 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.

AVERAGE DISCHARGE.--65 years (water years 1910-17, 1931, 1935-90), 722 ft^3/s, 3.89 in/yr; median of yearly mean discharges, 535 ft^3/s, 2.88 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 22,400 ft^3/s, Apr. 16, 1965, gage height, 19.27 ft, from floodmark; minimum, 1.8 ft^3/s, Nov. 15, 1936, gage height, 1.05 ft, caused by ice jam upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,390 ft^3/s, June 25, gage height, 9.48 ft; minimum daily discharge, 18 ft^3/s, Dec. 24-31; minimum gage height, 1.59 ft, Dec. 27, 28, 29.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	50	54	42	e19	e33	e40	380	425	1240	3450	2260	561
2	45	54	43	e19	e37	e39	360	463	1170	3200	2260	517
3	43	57	42	e20	e40	e39	346	479	1210	2980	2340	496
4	43	63	41	e20	e41	e39	323	468	1230	2780	2460	478
5	44	65	43	e20	e40	e39	282	495	1370	2600	2500	483
6	40	65	e41	e20	e38	e39	245	430	1480	2420	2420	481
7	41	65	e41	e22	e38	e39	222	364	1550	2290	2220	503
8	41	66	e40	e22	e36	e40	208	332	1630	2240	1910	507
9	42	64	e40	e22	e36	e45	197	310	1680	2170	1660	487
10	42	63	e39	e22	e38	e56	188	294	1690	2090	1460	463
11	43	63	e38	e22	e38	e75	177	286	1710	2060	1180	449
12	45	62	e37	e22	e40	e82	169	274	1670	2040	954	424
13	46	61	e36	e22	e42	e102	164	264	1530	1960	810	398
14	47	62	e34	e23	e43	e179	160	294	1400	1900	723	378
15	44	63	e31	e24	e46	e292	155	326	1290	1840	676	355
16	43	52	e30	e23	e46	e366	151	429	1410	1780	637	328
17	43	50	e29	e23	e45	e404	148	516	1800	1720	582	317
18	43	47	e28	e24	e45	e487	147	656	2070	1670	551	313
19	43	48	e26	e23	e45	e532	146	775	2340	1630	537	304
20	44	53	e23	e24	e46	e526	145	884	2600	1560	519	297
21	43	54	e21	e24	e47	e555	143	980	2940	1460	518	291
22	43	52	e19	e24	e44	e584	140	1040	3610	1340	528	280
23	42	51	e19	e24	e43	e543	140	1100	4520	1220	538	274
24	45	49	e18	e24	e42	e590	156	1080	5180	1120	544	262
25	49	47	e18	e26	e41	e549	170	1080	5370	1040	594	247
26	50	47	e18	e26	e39	491	172	1090	5250	1210	621	239
27	50	49	e18	e26	e39	478	184	1170	4880	1440	617	225
28	48	48	e18	e27	e40	488	240	1290	4560	1680	625	212
29	54	41	e18	e27	---	465	306	1350	4170	1850	636	202
30	53	44	e18	e28	---	439	369	1360	3770	2100	630	193
31	54	---	e18	e30	---	408	---	1310	---	2230	601	---
TOTAL	1403	1659	927	722	1148	9050	6335	21614	76320	61070	35111	10964
MEAN	45.3	55.3	29.9	23.3	41.0	292	211	697	2544	1970	1133	365
MAX	54	66	43	30	47	590	380	1360	5370	3450	2500	561
MIN	40	41	18	19	33	39	140	264	1170	1040	518	193
AC-FT	2780	3290	1840	1430	2280	17950	12570	42870	151400	121100	69640	21750
CFSM	.02	.02	.01	.01	.02	.12	.08	.28	1.01	.78	.45	.15
IN.	.02	.02	.01	.01	.02	.13	.09	.32	1.13	.90	.52	.16

CAL YR 1989 TOTAL 61599 MEAN 169 MAX 1830 MIN 18 AC-FT 122200 CFSM .07 IN. .91
WTR YR 1990 TOTAL 226323 MEAN 620 MAX 5370 MIN 18 AC-FT 448900 CFSM .25 IN. 3.34

e Estimated

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 September 1941, but converted to gage datum at Garrison for publication).

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

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

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

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,251.86 ft, June 15, affected by wind action and seiche action; maximum daily, 1,251.22 ft, June 22; minimum observed, 1,249.67 ft, Jan. 26; minimum daily observed, 1,249.81 ft, Jan. 23, 24, 28, Feb. 14.

MONTHEND ELEVATION, IN FEET NGVD, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

Oct. 31 ..... 1,250.03	Feb. 28 ..... 1,249.86	June 30 ..... 1,251.16
Nov. 30 ..... 1,249.88	Mar. 31 ..... 1,250.15	July 31 ..... 1,251.06
Dec. 07 ..... 1,249.90	Apr. 30 ..... 1,250.57	Aug. 31 ..... 1,250.76
Jan. 31 ..... 1,249.82	May 31 ..... 1,250.65	Sept. 30 ..... 1,250.44

NOTE.--Elevations other than those shown are available.

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 mi^2, 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 National Geodetic Vertical Datum of 1929 (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.

AVERAGE DISCHARGE.--58 years (water years 1931, 1934-90), 622 ft^3/s, 6.21 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,100 ft^3/s, Apr. 20, 1965, Apr. 13, 1969; maximum gage height, 11.63 ft, Apr. 13, 1969; minimum discharge, 29 ft^3/s, Aug. 18, 1934, gage height, 1.91 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,840 ft^3/s, June 11, gage height, 6.17 ft; minimum daily discharge, 64 ft^3/s, Dec. 21; minimum gage height, 1.94 ft, Oct. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	92	127	132	e70	e73	e76	424	902	671	1020	1300	721
2	90	130	e139	e70	e71	e82	412	1000	638	973	1260	655
3	87	133	e140	e70	e79	e80	400	1100	771	919	1100	599
4	86	138	e143	e70	e80	e79	395	1180	982	860	923	555
5	86	143	139	e70	e80	e78	376	1220	1180	777	779	521
6	86	146	e145	e70	e78	e78	366	1160	1330	686	663	489
7	86	143	e145	e70	e77	e78	353	1030	1550	630	580	473
8	86	142	e145	e71	e76	e78	337	906	1920	611	515	450
9	85	145	145	e73	e76	e80	319	799	2310	578	465	433
10	89	145	145	e74	e75	e90	303	699	2640	546	423	413
11	91	145	e140	e75	e74	e147	291	617	2800	550	385	396
12	92	150	e128	e75	e80	e251	280	552	2700	552	356	380
13	95	152	e118	e75	e100	e321	266	496	2370	520	331	359
14	98	146	e105	e75	e76	e394	255	491	1880	512	312	358
15	96	147	e96	e75	e74	e562	249	495	1490	517	296	342
16	93	145	e90	e75	e82	e838	244	534	1430	504	282	325
17	95	130	e84	e75	e81	e1060	242	559	1660	482	276	306
18	101	136	e77	e75	e78	e1320	235	581	1850	471	484	300
19	93	120	e71	e75	e77	e1480	230	609	1960	447	604	299
20	93	124	e65	e75	e76	e1800	229	655	2000	420	796	300
21	96	128	e64	e75	e75	e1820	227	681	2130	397	796	304
22	99	129	e65	e75	e75	e1940	227	675	2380	373	734	306
23	101	e129	e66	e75	e80	1630	229	698	2590	357	667	302
24	103	e129	e67	e75	e86	1230	259	711	2670	340	604	287
25	106	130	e68	e75	e85	869	268	700	2530	331	581	278
26	114	139	e69	e75	e78	692	301	704	2180	457	681	269
27	113	127	e70	e75	e76	602	344	731	1740	714	752	256
28	119	e133	e70	e75	e76	555	428	735	1410	1030	824	246
29	133	e135	e70	e75	---	510	567	719	1200	1160	852	236
30	141	e136	e70	e75	---	476	746	713	1080	1250	836	226
31	140	---	e70	e75	---	447	---	710	---	1310	787	---
TOTAL	3085	4102	3141	2283	2194	19743	9800	23362	54042	20294	20244	11384
MEAN	99.5	137	101	73.6	78.4	637	327	754	1801	655	653	379
MAX	141	152	145	75	100	1940	746	1220	2800	1310	1300	721
MIN	85	120	64	70	71	76	227	491	638	331	276	226
AC-FT	6120	8140	6230	4530	4350	39160	19440	46340	107200	40250	40150	22580
CFSM	.07	.10	.07	.05	.06	.47	.24	.55	1.32	.48	.48	.28
IN.	.08	.11	.09	.06	.06	.54	.27	.64	1.48	.56	.55	.31

CAL YR 1989 TOTAL 96572 MEAN 265 MAX 1740 MIN 64 AC-FT 191600 CFSM .19 IN. 2.64
WTR YR 1990 TOTAL 173674 MEAN 476 MAX 2800 MIN 64 AC-FT 344500 CFSM .35 IN. 4.75

e Estimated

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 mi^2.

WATER DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 850.71 ft above National Geodetic Vertical Datum of 1929. Prior to March 15, 1979, nonrecording gage at present site and datum.

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

AVERAGE DISCHARGE.--12 years, 30.1 ft^3/s, 4.81 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 597 ft^3/s, Mar. 27, 1986, gage height, 9.93 ft; minimum, 0.29 ft^3/s, July 9, 1989; minimum gage height, 2.86 ft, Feb. 24, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 225 ft^3/s, Aug. 1, gage height, 7.70 ft; minimum daily discharge, 0.84 ft^3/s, Oct. 18, Dec. 20, 21, Feb. 28, Mar. 1-8; minimum recorded gage height, 3.59 ft, May 13, Sept. 20.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.1	e1.2	e.92	e.97	e.96	e.84	15	18	21	98	222	15
2	1.1	e1.2	e.92	e.98	e.96	e.84	14	16	25	89	218	14
3	1.5	e1.2	e.92	e.98	e.96	e.84	13	15	46	82	201	14
4	1.3	e1.2	e.92	e.99	e.95	e.84	12	14	50	74	177	15
5	1.2	e1.2	e.92	e.99	e.95	e.84	11	12	51	66	157	14
6	1.1	e1.2	e.92	e.99	e.95	e.84	9.9	11	49	59	139	13
7	1.0	e1.2	e.92	e1.0	e.94	e.84	9.0	9.6	45	53	123	13
8	1.2	e1.2	e.92	e1.0	e.94	e.84	8.4	8.0	42	48	105	12
9	1.1	e1.1	e.92	e1.0	e.94	e2.0	9.1	7.3	38	43	91	12
10	1.2	e1.1	e.92	e1.0	e.93	e3.7	9.2	6.9	34	38	81	11
11	1.1	1.0	e.92	e1.0	e.93	e8.0	9.7	6.7	33	37	70	10
12	1.1	1.0	e.92	e1.0	e.92	e14	10	6.3	34	40	60	9.3
13	1.1	e.98	e.91	e1.0	e.92	e24	11	6.1	33	37	51	7.9
14	1.1	e.98	e.91	e1.0	e.91	e40	11	10	30	33	45	6.8
15	.99	e.97	e.90	e1.0	e.91	e60	11	15	27	30	38	6.0
16	.90	e.97	e.90	e1.0	e.90	e115	11	22	47	26	34	5.2
17	.89	e.96	e.89	e1.0	e.90	e100	11	23	102	24	30	4.3
18	.84	e.96	e.88	e1.0	e.90	e88	11	22	125	21	29	3.9
19	.88	e.95	e.86	e1.0	e.89	e74	11	26	150	21	27	3.8
20	.94	e.95	e.84	e1.0	e.88	e64	11	39	179	20	25	3.1
21	.98	e.94	e.84	e1.0	e.88	e56	11	41	197	19	23	3.6
22	1.0	e.94	e.89	e.99	e.87	e49	10	40	198	16	21	3.1
23	1.2	e.94	e.92	e.99	e.87	41	11	41	184	14	19	3.1
24	1.3	e.93	e.94	e.98	e.86	38	10	39	163	13	18	2.4
25	1.3	e.93	e.95	e.98	e.86	33	7.4	39	144	12	18	1.8
26	1.4	e.93	e.95	e.98	e.85	30	8.3	39	126	42	21	1.9
27	1.3	e.92	e.95	e.98	e.85	26	8.1	38	111	110	21	2.1
28	1.2	e.92	e.95	e.98	e.84	24	10	35	112	152	21	2.1
29	1.3	e.92	e.96	e.97	---	21	13	31	115	173	20	2.4
30	e1.3	e.92	e.96	e.97	---	18	18	27	109	183	18	2.6
31	e1.2	---	e.96	e.96	---	16	---	24	---	206	17	---
TOTAL	35.12	30.81	28.40	30.68	25.42	951.42	325.1	687.9	2620	1879	2140	218.4
MEAN	1.13	1.03	.92	.99	.91	30.7	10.8	22.2	87.3	60.6	69.0	7.28
MAX	1.5	1.2	.96	1.0	.96	115	18	41	198	206	222	15
MIN	.84	.92	.84	.96	.84	.84	7.4	6.1	21	12	17	1.8
AC-FT	70	61	56	61	50	1890	645	1360	5200	3730	4240	433
CFSM	.01	.01	.01	.01	.01	.36	.13	.26	1.03	.71	.81	.09
IN.	.02	.01	.01	.01	.01	.42	.14	.30	1.15	.82	.94	.10

CAL YR 1989 TOTAL 2969.68 MEAN 8.14 MAX 158 MIN .40 AC-FT 5890 CFSM .10 IN. 1.30
WTR YR 1990 TOTAL 8972.25 MEAN 24.6 MAX 222 MIN .84 AC-FT 17800 CFSM .29 IN. 3.93

e Estimated

05287890 ELM CREEK NEAR CHAMPLIN, MN--Continued

WATER QUALITY RECORDS

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

INSTRUMENTATION.--Stage-activated automatic pumping sampler since July 1988.

REMARKS.--* indicates automatic sample.

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L) (00340)
OCT								
18...	1130	0.84	734	7.7	5.5	--	--	<10
NOV								
29...	1228	0.92	743	8.0	0.5	739	7.6	16
JAN								
09...	1515	1.0	684	7.7	0.5	736	7.2	<10
MAR								
01...	1317	0.84	655	7.9	0.5	738	10.7	18
MAY								
04...	1147	13	598	7.7	14.0	741	11.0	66
JUN								
06...	1000	48	500	7.6	17.0	734	6.1	80
06...	1005*	48	--	--	--	--	--	--
07...	0239*	46	--	--	--	--	--	--
07...	1918*	45	--	--	--	--	--	--
29...	1330	115	447	7.1	24.0	736	3.9	82
29...	1335*	115	--	--	--	--	--	--
JUL								
31...	1000	200	368	7.4	21.5	765	4.1	55
31...	1005*	200	368	7.4	21.5	765	4.1	--
31...	1200*	205	--	--	--	--	--	--
AUG								
01...	0439*	221	--	--	--	--	--	--
01...	2118*	223	--	--	--	--	--	--
02...	1357*	218	--	--	--	--	--	--
03...	2315*	191	--	--	--	--	--	--
06...	0112*	146	--	--	--	--	--	--
19...	0533*	27	--	--	--	--	--	--
SEP								
12...	1230	8.9	513	7.6	21.0	737	5.6	--

DATE	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)	SOLIDS, VOLATILE ON IGNITION, TOTAL (MG/L) (00505)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)
OCT							
18...	419	139	<0.100	0.020	0.30	0.140	0.090
NOV							
29...	468	172	<0.100	0.080	0.40	0.080	0.020
JAN							
09...	420	235	0.100	0.170	0.50	0.090	0.050
MAR							
01...	434	253	<0.100	0.060	<0.20	0.030	0.030
MAY							
04...	384	257	0.400	0.020	1.6	0.190	0.150
JUN							
06...	350	202	0.600	0.030	1.4	0.300	0.260
06...	349	--	--	--	--	0.310	--
07...	353	--	--	--	--	0.470	--
07...	318	--	--	--	--	0.480	--
29...	327	184	3.40	0.170	2.0	0.910	0.750
29...	328	--	--	--	--	0.890	--
JUL							
31...	289	--	<0.100	0.070	1.7	0.540	0.510
31...	277	--	--	--	--	0.550	--
31...	247	--	--	--	--	0.380	--
AUG							
01...	255	--	--	--	--	0.370	--
01...	245	--	--	--	--	0.410	--
02...	253	--	--	--	--	0.460	--
03...	128	--	--	--	--	0.500	--
06...	417	--	--	--	--	0.530	--
19...	328	--	--	--	--	0.540	--
SEP							
12...	328	229	0.300	0.060	1.4	0.370	0.180

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 mi^2, 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 National Geodetic Vertical Datum of 1929. 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, Dec. 7 to Jan. 15, 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 water works. Flow slightly regulated by six reservoirs on headwaters; total usable capacity, 1,640,600 acre-ft. Diurnal regulation caused by dam above station.

AVERAGE DISCHARGE.--59 years, 7,892 ft^3/s, 5.61 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 91,000 ft^3/s, Apr. 17, 1965, gage height, 19.53 ft; minimum, 529 ft^3/s, Aug. 29, 1976, gage height, 0.04 ft, result of regulation; minimum daily, 602 ft^3/s, Sept. 10, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 21,000 ft^3/s, June 24, gage height, 7.32 ft; minimum, 1,320 ft^3/s, Sept. 18, gage height, 0.98 ft, result of regulation; minimum daily, 1,730 ft^3/s, Dec. 15.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4470	3640	3480	2890	2980	2460	8160	12000	8690	14200	8590	3940
2	4650	3880	3320	2840	2940	2390	8390	13800	8290	13300	8550	4080
3	4610	4100	3330	2950	2670	2180	8170	14600	9600	12300	8260	4130
4	4450	3720	4240	3080	2400	2280	7960	15200	10100	11400	8010	3690
5	4350	3720	4210	2850	2300	2230	8780	15300	12000	10600	8050	3750
6	4650	4320	3780	2610	2300	2260	8900	14900	14700	10100	6900	3560
7	4370	4330	3000	2850	2270	2330	9260	14200	16800	9270	6800	3790
8	4080	4410	2840	3300	2320	2390	8530	13600	17500	9020	6200	3760
9	4260	4520	3300	2950	2280	2410	8760	12900	17500	9530	5480	3210
10	3910	4600	3610	2920	2290	2460	8970	12100	17500	8870	5040	3290
11	3830	4210	2890	2910	2400	3500	7820	11100	18400	8720	4510	4980
12	3920	4200	2400	2630	2510	4390	7630	10500	18500	9300	4310	5120
13	4120	4060	3070	2580	2410	7930	7170	9440	18000	9060	3490	4350
14	3950	4350	2560	2930	2360	10700	7070	9640	17800	8510	3290	4580
15	3430	4190	1730	3160	3160	11500	6550	9390	16800	8090	3460	3590
16	3670	3790	2610	2790	2790	14700	6530	9440	17200	8110	3380	3380
17	3680	3230	2710	2590	3020	14900	6470	9150	19200	7890	2870	3030
18	3690	3090	2890	2400	3010	15600	5720	8940	19200	7390	3910	3040
19	3430	2960	2350	2470	2370	15500	5640	9140	19500	7440	4520	3310
20	3660	2840	2050	2430	2460	16500	5600	9170	19000	7090	5150	3180
21	3690	3050	2580	2370	2290	16700	5550	9180	18700	6490	4900	3260
22	3520	3310	1840	2430	2400	15800	5290	8950	18500	6140	4240	3670
23	3990	3220	1840	2320	2340	13500	5600	9070	19600	6150	4290	3210
24	4090	2740	2230	2350	2260	12900	5300	9190	19800	5620	4420	3540
25	4440	2920	2920	2260	2360	11800	5820	8760	19800	5490	4270	3190
26	3650	3270	2690	2640	2660	10800	5990	8560	19100	7330	5080	3550
27	3330	4310	2430	2420	2170	10200	7000	9110	17500	7770	4800	3060
28	3410	3600	2670	2340	2150	9700	7690	9120	16800	8260	5080	3440
29	3400	3050	3080	2370	---	9310	8510	9170	16200	8580	4920	2960
30	3790	3490	3000	2500	---	9320	10400	9410	15300	8560	4840	3320
31	3970	---	3000	2650	---	8590	---	9160	---	8620	4150	---
TOTAL	122460	111120	88650	82780	69870	267230	219230	334190	497580	269200	161760	108960
MEAN	3950	3704	2860	2670	2495	8620	7308	10780	16590	8684	5218	3632
MAX	4650	4600	4240	3300	3160	16700	10400	15300	19800	14200	8590	5120
MIN	3330	2740	1730	2260	2150	2180	5290	8560	8290	5490	2870	2960
AC-FT	242900	220400	175800	164200	138600	530100	434800	662900	986900	534000	320900	216100
CFSM	.21	.19	.15	.14	.13	.45	.38	.56	.87	.45	.27	.19
IN.	.24	.22	.17	.16	.14	.52	.43	.65	.97	.52	.32	.21

CAL YR 1989 TOTAL 2149620 MEAN 5889 MAX 22300 MIN 1380 AC-FT 4264000 CFSM .31 IN. 4.19
WTR YR 1990 TOTAL 2333030 MEAN 6392 MAX 19800 MIN 1730 AC-FT 4628000 CFSM .33 IN. 4.54

MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

WATER-QUALITY RECORDS

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

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

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

PERIOD OF RECORD.--
WATER TEMPERATURES: October 1975 to current year.
SUSPENDED SEDIMENT DISCHARGE: August 1975 to current year.

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

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES (water years 1976-77, 1979-80, 1982-90): Maximum daily, 31.0°C, Aug. 25, 26, 1976, July 19, 1977; minimum daily, 0.0°C several days during winter period.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 210 mg/L Apr. 3, 1982; minimum daily mean, 1 mg/L on several days in 1978, 1980, 1981, 1982, and 1984.
SEDIMENT LOADS: Maximum daily, 17,400 tons Apr. 20, 1982; minimum daily, 3.9 tons Feb. 2, 1981.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum daily, 29.0°C, July 3, 18; minimum daily, 0.0°C several days during winter period.
SEDIMENT CONCENTRATION: Maximum daily mean, 110 mg/L, Mar. 16; minimum daily mean, 4 mg/L, most days from Oct. to Mar.
SEDIMENT LOADS: Maximum daily, 4,370 tons, Mar. 16; minimum daily, 19 tons, Dec. 15.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19.0	6.0	---	---	---	5.0	5.0	10.0	22.0	26.0	25.0	25.0
2	13.0	---	---	---	---	5.0	5.0	12.0	21.0	27.0	24.0	27.0
3	13.0	---	---	---	---	3.0	6.0	14.0	15.0	29.0	26.0	23.0
4	11.0	5.0	---	---	---	3.0	8.0	15.0	17.0	27.0	24.0	26.0
5	13.0	5.0	---	---	---	3.0	6.0	13.0	19.0	25.0	24.0	27.0
6	12.0	5.0	---	---	3.0	3.0	5.0	15.0	20.0	25.0	25.0	27.0
7	10.0	6.0	---	---	4.0	1.0	4.0	16.0	20.0	24.0	25.0	25.0
8	10.0	5.0	---	---	4.0	1.0	7.0	17.0	18.0	26.0	25.0	23.0
9	11.0	---	---	---	3.0	3.0	7.0	15.0	---	26.0	26.0	24.0
10	11.0	3.0	---	---	1.0	---	6.0	14.0	---	25.0	26.0	---
11	13.0	4.0	---	---	2.0	5.0	5.0	16.0	20.0	22.0	---	25.0
12	15.0	4.0	---	---	5.0	9.0	7.0	15.0	24.0	23.0	23.0	---
13	15.0	4.0	---	---	---	9.0	8.0	17.0	25.0	24.0	24.0	26.0
14	14.0	4.0	---	---	---	8.0	---	16.0	24.0	25.0	25.0	22.0
15	13.0	3.0	---	---	---	1.0	---	15.0	23.0	26.0	25.0	19.0
16	10.0	---	---	---	---	1.0	---	15.0	21.0	26.0	27.0	18.0
17	10.0	---	---	---	---	1.0	---	14.0	21.0	27.0	26.0	17.0
18	9.0	---	---	---	---	---	---	14.0	22.0	29.0	24.0	16.0
19	9.0	---	---	---	---	2.0	11.0	12.0	---	27.0	22.0	18.0
20	9.0	---	---	---	---	4.5	14.0	14.0	23.0	26.0	20.0	18.0
21	6.0	---	---	---	---	5.0	15.0	15.0	20.0	23.0	22.0	18.0
22	---	---	---	---	---	2.0	---	16.0	---	25.0	23.0	15.0
23	12.0	---	---	---	---	---	---	19.0	---	25.0	23.0	14.0
24	14.0	---	---	---	---	2.0	---	19.0	23.0	25.0	24.0	18.0
25	15.0	---	---	---	---	3.0	---	18.0	25.0	25.0	21.0	19.0
26	16.0	---	---	---	---	3.0	---	17.0	26.0	23.0	27.0	20.0
27	15.0	---	---	.0	---	5.0	---	17.0	25.0	23.0	28.0	18.0
28	10.0	---	---	---	---	5.0	14.0	19.0	24.0	22.0	25.0	18.0
29	---	---	---	---	---	5.0	---	21.0	27.0	25.0	---	17.0
30	10.0	---	---	---	---	6.0	12.0	21.0	26.0	---	27.0	17.0
31	9.0	---	---	---	---	7.0	---	22.0	---	24.0	27.0	---
MEAN	---	---	---	---	---	---	---	15.9	---	---	---	---
MAX	---	---	---	---	---	---	---	22.0	---	---	---	---
MIN	---	---	---	---	---	---	---	10.0	---	---	---	---

MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	OCTOBER MEAN CONCEN-TRATION (MG/L)	OCTOBER LOAD (TONS/ DAY)	NOVEMBER MEAN CONCEN-TRATION (MG/L)	NOVEMBER LOAD (TONS/ DAY)	DECEMBER MEAN CONCEN-TRATION (MG/L)	DECEMBER LOAD (TONS/ DAY)	JANUARY MEAN CONCEN-TRATION (MG/L)	JANUARY LOAD (TONS/ DAY)	FEBRUARY MEAN CONCEN-TRATION (MG/L)	FEBRUARY LOAD (TONS/ DAY)	MARCH MEAN CONCEN-TRATION (MG/L)	MARCH LOAD (TONS/ DAY)
1	7	84	15	147	4	38	4	31	4	32	6	40
2	8	100	8	84	4	36	4	31	4	32	6	39
3	7	87	8	89	4	36	4	32	4	29	8	47
4	7	84	5	50	4	46	4	33	4	26	7	43
5	6	70	6	60	4	45	4	31	4	25	5	30
6	6	75	10	117	4	41	4	28	4	25	4	24
7	6	71	7	82	4	32	4	31	4	25	5	31
8	5	55	8	95	4	31	4	36	4	25	20	129
9	5	58	8	98	4	36	4	32	4	25	19	124
10	6	63	6	75	4	39	4	32	4	25	10	66
11	5	52	4	45	4	31	4	31	4	26	25	236
12	5	53	4	45	4	26	4	28	4	27	30	356
13	6	67	4	44	4	33	4	26	4	26	75	1610
14	5	53	5	59	4	28	4	32	4	25	103	2980
15	4	37	4	45	4	19	4	34	4	34	61	2520
16	5	50	4	41	4	28	4	30	4	30	110	4370
17	4	40	4	35	4	29	4	28	4	33	99	3980
18	4	40	4	33	4	31	4	26	4	33	82	3450
19	4	37	4	32	4	25	4	27	4	26	63	2640
20	5	49	4	31	4	22	4	26	4	27	56	2490
21	4	40	4	33	4	28	4	26	4	25	60	2710
22	4	38	4	36	4	20	4	26	4	26	61	2600
23	5	54	4	35	4	20	4	25	4	25	46	1680
24	6	66	4	30	4	24	4	25	4	24	23	801
25	10	120	4	32	4	32	4	24	4	25	17	542
26	15	148	4	35	4	29	4	29	4	29	14	408
27	15	135	4	47	4	26	4	26	4	23	12	330
28	14	129	4	39	4	29	4	25	5	29	12	314
29	18	165	4	33	4	33	4	26	---	---	12	302
30	18	184	4	38	4	32	4	27	---	---	11	277
31	21	225	---	---	4	32	4	29	---	---	12	278
TOTAL	---	2529	---	1665	---	957	---	895	---	762	---	35447

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	14	308	30	972	15	352	26	997	20	464	13	138
2	11	249	28	1040	17	381	22	790	19	439	14	154
3	10	221	29	1140	28	726	21	697	18	401	18	201
4	9	193	32	1310	26	709	22	677	18	389	16	159
5	11	261	29	1200	32	1040	23	658	17	369	16	162
6	11	264	26	1050	44	1750	23	627	17	317	15	144
7	10	250	22	843	50	2270	25	626	16	294	14	143
8	13	299	20	734	38	1800	26	633	16	268	14	142
9	16	378	19	662	25	1160	25	643	15	222	14	121
10	16	388	18	588	19	698	23	551	14	191	15	133
11	13	274	17	509	27	1340	22	518	13	158	23	309
12	11	227	19	539	36	1800	24	603	13	151	18	249
13	11	213	18	459	30	1460	22	538	12	113	13	153
14	12	229	15	390	30	1440	17	391	12	107	12	148
15	11	195	14	355	30	1360	16	349	11	103	10	97
16	13	229	12	306	40	1860	16	350	11	100	9	82
17	12	210	14	346	46	2380	14	296	11	85	8	65
18	11	170	15	362	42	2180	14	279	16	169	10	82
19	10	152	17	420	40	2110	15	301	14	171	13	116
20	10	151	18	446	38	1950	14	268	17	236	12	103
21	11	165	19	471	34	1720	12	210	14	185	10	88
22	11	157	18	435	37	1850	14	232	10	114	9	89
23	13	197	14	343	39	2060	14	232	11	127	6	69
24	16	229	11	273	40	2140	12	182	13	155	8	76
25	18	283	12	284	34	1820	20	296	14	161	6	69
26	18	291	13	300	29	1500	34	673	14	192	8	77
27	17	321	14	344	28	1320	22	462	15	194	7	58
28	32	664	15	369	26	1160	18	401	14	192	6	56
29	33	758	14	347	26	1140	21	486	14	186	6	48
30	32	899	14	356	26	1160	22	508	14	163	5	45
31	---	---	16	396	---	---	21	489	13	146	---	---
TOTAL	---	8825	---	17589	---	44876	---	14965	---	6582	---	3576
YEAR		138668										

MISSISSIPPI RIVER MAIN STEM

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN--Continued

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	DISCHARGE, IN CUBIC FEET PER SECOND (00060)	SEDIMENT, SUSPENDED (MG/L) (80154)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343)	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344)	SED. SUSP. FALL DIAM. % FINER THAN .500 MM (70345)
JUN 28...	1230	16800	24	86	88	97	100

PARTICLE-SIZE DISTRIBUTION OF SURFACE BED MATERIAL, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	NUMBER OF SAMPLING POINTS (COUNT) (00063)	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	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)
SEP 19...	1200	3	17600	2	31	68	84	91	94

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 mi^2.

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 National Geodetic Vertical Datum of 1929. 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.

AVERAGE DISCHARGE.--43 years, 42.7 ft^3/s, 1.30 in/yr, 30,940 acre-ft/yr; median of yearly mean discharges, 30 ft^3/s, 0.91 in/yr, 21,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,730 ft^3/s, Apr. 8, 1952, gage height, 12.16 ft; maximum gage height, 13.35 ft, Mar. 25, 1943, from floodmark (backwater from ice); no flow at times in 1940, 1942, 1950, 1954, 1957, 1959, 1963, 1968, 1976, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 450 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 13	1100	*339	*a5.12	No peak greater than base discharge.			

a Backwater from ice.

Minimum discharge, 0.12 ft^3/s, Sept. 30, gage height, 2.05 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.6	2.9	e2.0	e.41	e.41	e.59	13	27	7.1	4.0	.52	.35
2	2.0	2.9	e2.0	e.41	e.46	e.83	11	27	7.3	3.7	.48	.33
3	1.9	2.9	e1.9	e.41	e.53	e.76	11	23	6.6	3.7	.45	.42
4	1.9	2.9	e1.8	e.41	e.66	e.76	10	20	5.8	3.5	.39	.45
5	1.9	3.7	e1.8	e.41	e.60	e3.7	9.0	16	6.1	2.8	.37	.39
6	1.9	3.7	e1.7	e.41	e.60	e16	8.1	14	6.9	2.6	.37	.38
7	1.9	3.7	e1.6	e.41	e.67	e61	7.9	12	6.9	2.3	.35	.38
8	1.9	3.9	e1.5	e.42	e.54	e62	7.6	11	6.7	2.9	.33	.37
9	1.7	3.5	e1.5	e.42	e.45	e62	7.3	9.9	6.0	2.2	.30	.34
10	1.9	2.9	e1.4	e.42	e.44	e65	6.8	9.1	5.8	1.9	.32	.32
11	2.0	2.7	e1.3	e.42	e.44	e65	6.6	8.4	5.5	1.9	.31	.29
12	2.0	2.7	e1.2	e.41	e.60	e100	6.6	7.9	4.7	1.6	.35	.27
13	2.0	2.7	e1.1	e.41	e.46	e173	6.4	9.6	4.1	1.4	.37	.27
14	2.0	2.7	e1.0	e.41	e.42	e136	6.3	8.7	3.6	1.1	.32	.33
15	1.9	e2.6	e1.0	e.41	e.41	e82	5.9	7.9	4.4	.90	.30	.31
16	1.9	e2.5	e.89	e.41	e.41	e77	5.8	8.3	5.6	.83	.30	.25
17	1.7	e2.4	e.81	e.41	e.41	e60	5.6	8.1	5.2	.90	.29	.22
18	1.5	e2.4	e.74	e.41	e.41	e29	5.6	8.3	4.8	.83	.78	.32
19	1.5	e2.4	e.69	e.41	e.41	e25	5.8	10	19	.98	.62	.39
20	1.7	e2.7	e.63	e.41	e.41	e21	6.0	10	13	.90	.58	.34
21	1.9	e2.7	e.59	e.41	e.41	e20	6.4	9.8	10	.76	.54	.41
22	2.4	e2.7	e.53	e.41	e.41	e16	6.4	13	9.0	.70	.50	.30
23	3.5	e2.7	e.50	e.41	e.76	e16	6.8	14	9.2	.64	.67	.28
24	3.7	e2.6	e.48	e.41	e.83	e16	6.8	12	7.4	.59	.56	.26
25	3.5	e2.5	e.47	e.41	e.50	e16	7.2	12	6.2	.64	.53	.25
26	3.3	e2.5	e.46	e.41	e.50	e16	9.0	14	5.3	.70	.62	.20
27	3.1	e2.4	e.45	e.41	e.50	e15	10	12	5.0	.64	.48	.22
28	2.7	e2.2	e.44	e.41	e.50	16	19	11	5.3	.64	.50	.24
29	2.9	e2.1	e.43	e.41	---	14	23	11	5.5	.59	.44	.20
30	2.9	e2.0	e.42	e.41	---	12	25	9.3	4.6	.59	.41	.16
31	2.7	---	e.41	e.41	---	13	---	8.0	---	.54	.38	---
TOTAL	70.4	83.2	31.74	12.75	14.15	1210.64	271.9	382.3	202.6	47.97	13.73	9.24
MEAN	2.27	2.77	1.02	.41	.51	39.1	9.06	12.3	6.75	1.55	.44	.31
MAX	3.7	3.9	2.0	.42	.83	173	25	27	19	4.0	.78	.45
MIN	1.5	2.0	.41	.41	.41	.59	5.6	7.9	3.6	.54	.29	.16
AC-FT	140	165	63	25	28	2400	539	758	402	95	27	18
CFSM	.01	.01	.00	.00	.00	.09	.02	.03	.02	.00	.00	.00
IN.	.01	.01	.00	.00	.00	.10	.02	.03	.02	.00	.00	.00

WTR YR 1990 TOTAL 2350.62 MEAN 6.44 MAX 173 MIN .16 AC-FT 4660 CFSM .01 IN. .20

e Estimated

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 mi^2.

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 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 downstream at present datum.
REMARKS.--Records good except those for estimated daily discharges, which are fair.
AVERAGE DISCHARGE.--59 years (water years 1932-90), 49.1 ft^3/s, 1.71 in/yr, 35,570 acre-ft/yr; median of yearly mean discharges, 34 ft^3/s, 1.19 in/yr, 24,600 acre-ft/yr.
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,870 ft^3/s, Apr. 8, 1969, gage height, 14.32 ft from floodmark; no flow at times in most years.
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 ft^3/s.
EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 14	1215	*286	*a4.19	No other peak greater than base discharge.			

a Backwater from ice.

Minimum discharge, 0.27 ft^3/s, Aug. 13, 14, gage height, 0.76 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.1	4.6	e3.3	e1.4	e1.5	e5.5	14	20	8.2	5.3	5.1	2.7
2	1.2	4.5	e3.0	e1.3	e1.4	e13	13	22	8.5	4.5	4.0	2.5
3	1.8	4.4	e3.3	e1.3	e1.6	e18	12	21	7.1	4.1	3.0	3.3
4	2.2	4.2	e3.6	e1.3	e1.9	e15	12	18	7.1	3.7	2.5	6.3
5	2.3	4.7	e3.6	e1.3	e2.1	e9.9	12	17	7.1	3.3	2.3	6.5
6	2.2	4.7	e3.8	e1.3	e2.4	e6.8	11	16	5.9	3.1	2.3	4.7
7	2.3	4.5	e3.7	e1.3	e2.6	e7.1	10	15	6.9	3.8	1.4	3.1
8	2.3	4.0	e3.7	e1.3	e2.7	e21	9.5	15	6.2	3.1	.89	2.4
9	2.4	3.9	e3.7	e1.3	e2.8	e58	8.6	14	5.2	2.6	.61	2.9
10	2.3	e5.0	e3.7	e1.3	e2.7	e62	8.4	13	4.4	2.7	.62	2.7
11	2.3	e5.4	e3.5	e1.3	e2.5	e54	8.4	12	3.9	5.7	.56	2.5
12	2.3	e5.2	e3.5	e1.4	e2.5	e85	7.8	12	4.0	11	.44	2.5
13	2.4	e5.0	e3.2	e1.4	e2.5	e153	7.8	11	3.4	7.0	.29	2.4
14	2.3	e5.0	e2.9	e1.4	e2.4	e217	8.9	10	2.6	5.9	.33	2.2
15	2.3	e5.0	e2.7	e1.4	e2.4	e99	9.1	9.9	5.1	4.0	.34	2.3
16	2.4	e4.8	e2.6	e1.4	e2.3	e49	8.7	10	17	2.8	.35	2.3
17	2.4	e4.4	e2.5	e1.4	e2.2	e38	8.3	9.0	22	2.6	.66	2.3
18	2.5	e4.1	e2.4	e1.4	e2.2	e31	7.1	7.8	15	2.5	35	3.2
19	2.6	e4.0	e2.3	e1.4	e2.1	e26	6.9	12	15	3.8	24	3.4
20	2.5	3.6	e2.2	e1.4	e2.4	e25	7.1	14	18	3.4	16	4.2
21	2.5	3.3	e2.1	e1.5	e2.8	e18	7.6	15	17	3.6	13	4.1
22	2.5	e3.3	e2.0	e1.5	e3.1	e17	7.8	17	14	3.7	9.7	3.0
23	2.5	e3.0	e2.0	e1.5	e3.3	e18	8.0	17	13	2.9	7.4	2.4
24	2.9	e3.0	e1.9	e1.5	s3.6	e18	8.3	15	11	2.5	5.8	2.4
25	2.6	3.3	e1.8	e1.5	e3.9	e18	8.1	17	9.9	2.4	7.1	2.3
26	4.6	3.0	e1.8	e1.5	e4.3	e17	9.4	16	8.1	2.4	10	2.2
27	6.3	e3.6	e1.7	e1.5	e4.6	e15	10	14	6.9	2.4	8.6	2.1
28	4.6	e3.3	e1.6	e1.5	e4.8	14	12	13	7.7	3.2	8.5	2.0
29	7.2	e3.0	e1.6	e1.6	---	13	15	11	6.9	2.8	6.4	1.7
30	6.6	e3.3	e1.5	e1.6	---	13	20	9.7	8.0	3.4	4.6	2.3
31	5.7	---	e1.4	e1.6	---	13	---	6.0	---	5.7	3.6	---
TOTAL	93.1	123.1	82.6	43.8	75.6	1167.3	296.8	431.4	273.1	119.9	185.39	88.9
MEAN	3.00	4.10	2.66	1.41	2.70	37.7	9.89	13.9	9.10	3.87	5.98	2.96
MAX	7.2	5.4	3.8	1.6	4.8	217	20	22	22	11	35	6.5
MIN	1.2	3.0	1.4	1.3	1.4	5.5	6.9	7.8	2.6	2.4	.29	1.7
AC-FT	185	244	164	87	150	2320	589	856	542	238	368	176
CFSM	.01	.01	.01	.00	.01	.10	.03	.04	.02	.01	.02	.01
IN.	.01	.01	.01	.00	.01	.11	.03	.04	.03	.01	.02	.01

CAL YR 1989 TOTAL 20052.63 MEAN 54.9 MAX 2950 MIN .47 AC-FT 39770 CFSM .14 IN. 1.92
WTR YR 1990 TOTAL 2980.99 MEAN 8.17 MAX 217 MIN .29 AC-FT 5910 CFSM .02 IN. .29

e Estimated

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 National Geodetic Vertical Datum of 1929. 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, 7.60 ft, Oct. 2, Apr. 1; minimum observed, 6.58 ft, Sept. 30.

GAGE HEIGHT, IN FEET, OCTOBER 1989 TO SEPTEMBER 1990

Oct. 31	7.08	Feb. 28	7.20	June 30	7.30
Nov. 30	7.08	Mar. 31	7.42	July 31	6.93
Dec. 31	7.15	Apr. 30	7.32	Aug. 31	6.80
Jan. 31	7.15	May 31	7.18	Sept. 30	6.58

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

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 mi^2, 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 National Geodetic Vertical Datum of 1929. 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).

AVERAGE DISCHARGE.--52 years, 106 ft^3/s, 76,800 acre-ft/yr; median of yearly mean discharges, 76 ft^3/s, 55,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,060 ft^3/s, Apr. 13, 1952, gage height, 12.92 ft; no flow Dec. 13, 1940.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 257 ft^3/s, Aug. 19, gage height, 4.02 ft; minimum, 0.84 ft^3/s, Aug. 17, gage height, 1.11 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40	5.3	e6.9	e4.4	e4.9	e5.8	29	11	18	17	4.9	8.5
2	36	5.6	e6.7	e4.3	e4.9	e5.7	27	10	22	16	4.5	7.6
3	31	5.6	e6.7	e4.3	e4.9	e5.7	27	10	22	17	3.2	7.3
4	29	5.6	6.7	e4.3	e4.9	e5.7	28	10	17	18	1.5	6.9
5	28	6.3	6.7	e4.2	e4.6	e5.7	28	10	18	19	1.7	7.1
6	24	5.7	6.5	e4.2	e4.8	e5.7	19	10	19	17	1.5	7.5
7	20	6.2	e6.5	e4.2	e4.4	e5.7	14	11	17	13	1.6	8.4
8	19	6.6	e6.4	e4.2	e4.3	e5.7	14	11	16	19	1.6	7.7
9	20	6.7	e6.4	e4.2	e4.2	e6.4	14	11	14	18	1.4	6.8
10	17	6.9	e6.4	e4.4	e4.2	e6.2	14	10	12	16	1.3	6.2
11	17	7.1	e6.4	e4.5	e4.1	e6.9	14	9.6	9.7	19	1.2	6.2
12	15	6.9	e6.3	e4.8	e3.9	30	13	9.3	11	17	1.1	6.2
13	15	6.6	e6.3	e4.9	e3.9	119	13	8.7	12	14	1.1	6.2
14	13	e6.6	e6.2	e5.0	e3.7	179	14	8.7	13	13	1.0	9.4
15	12	e6.8	e6.2	e5.0	e3.4	202	13	8.2	15	12	1.0	8.9
16	9.2	e6.9	e6.2	e5.0	e3.3	198	14	8.7	18	11	.97	8.9
17	7.2	e6.9	e6.2	e5.0	e3.3	187	13	8.9	14	12	1.0	7.8
18	6.3	e6.9	e6.2	e5.0	e3.6	135	13	13	13	12	14	7.9
19	6.2	e7.0	e6.2	e5.0	e3.8	92	13	22	20	13	37	6.3
20	6.7	e7.0	e6.0	e5.0	e3.9	64	13	22	25	12	16	4.9
21	8.6	e7.1	e5.8	e5.2	e4.3	61	13	22	22	12	8.9	5.1
22	11	e7.1	e5.6	e5.4	e4.5	57	13	22	21	10	10	6.0
23	10	e7.0	e5.3	e5.5	e4.8	60	12	23	18	8.4	10	6.6
24	7.1	e6.9	e4.9	e6.0	e4.9	28	12	22	17	6.0	9.9	5.9
25	6.1	e6.8	e4.8	e5.7	e5.0	28	12	23	17	4.5	13	5.3
26	7.6	e6.7	e4.7	e5.1	e5.3	27	13	23	17	4.0	12	4.8
27	5.8	e6.6	e4.6	e4.9	e5.3	28	14	23	16	3.8	11	4.3
28	5.6	e6.6	e4.5	e4.9	e5.6	28	15	22	17	4.8	11	3.9
29	7.2	e6.8	e4.5	e5.0	---	28	14	21	16	7.0	10	3.5
30	5.7	e7.3	e4.5	e5.0	---	28	13	21	17	7.0	9.8	2.9
31	5.0	---	e4.4	e4.9	---	27	---	20	---	5.6	9.1	---
TOTAL	451.5	198.1	181.7	149.5	122.7	1671.2	478	465.1	503.7	378.1	212.27	195.0
MEAN	14.6	6.60	5.86	4.82	4.38	53.9	15.9	15.0	16.8	12.2	6.85	6.50
MAX	40	7.3	6.9	6.0	5.6	202	29	23	25	19	37	9.4
MIN	5.0	5.3	4.4	4.2	3.3	5.7	12	8.2	9.7	3.8	.97	2.9
AC-FT	896	393	360	297	243	3310	948	923	999	750	421	387
CFSM	.01	.01	.01	.00	.00	.05	.01	.01	.01	.01	.01	.01
IN.	.01	.01	.01	.00	.00	.05	.02	.01	.02	.01	.01	.01

CAL YR 1989 TOTAL 29869.4 MEAN 81.8 MAX 2460 MIN 1.1 AC-FT 59250 CFSM .07 IN. .96
WTR YR 1990 TOTAL 5006.87 MEAN 13.7 MAX 202 MIN .97 AC-FT 9930 CFSM .01 IN. .16

e Estimated

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 mi^2.

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 National Geodetic Vertical Datum of 1929 (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.

AVERAGE DISCHARGE.--51 years, 58.0 ft^3/s, 1.98 in/yr, 42,020 acre-ft/yr; median of yearly mean discharges, 46 ft^3/s, 1.57 in/yr, 33,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,970 ft^3/s, Apr. 9, 1969, gage height, 19.07 ft, from floodmark; no flow at times in several years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 300 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 15	2300	--	*a4.96	No peak greater than base discharge.			
Mar. 16	1245	*220	*a4.96				

a Backwater from ice.

Minimum discharge, no flow part of each day, Aug. 10, 12; minimum gage height, 1.71 ft, Aug 10, 11, 12, 16, 17.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.25	1.1	e1.3	e.55	e.65	e3.4	24	10	5.8	14	.67	1.4
2	.33	1.2	e1.3	e.55	e.64	e8.2	21	13	6.7	12	.50	1.6
3	.42	1.4	e1.2	e.55	e.67	e11	19	13	5.2	9.5	.33	1.6
4	.42	1.5	e1.2	e.55	e.72	e11	19	13	4.2	7.1	.33	1.6
5	.42	1.7	e1.2	e.55	e.77	e11	17	12	4.7	5.7	.25	1.6
6	.42	1.7	e1.1	e.55	e.80	e10	16	11	5.8	4.9	.25	1.3
7	.42	1.8	e1.1	e.55	e.84	e9.7	14	9.7	4.0	3.8	.25	1.3
8	.42	1.6	e1.0	e.55	e.87	e11	13	8.4	5.1	3.0	.25	1.3
9	.33	1.7	e.94	e.56	e.90	e14	13	7.4	4.2	2.4	.17	1.0
10	.33	1.7	e.90	e.58	e.96	e21	11	6.4	3.1	2.1	.17	1.0
11	.25	1.6	e.84	e.59	e.98	e23	10	6.0	2.9	2.4	.08	1.0
12	.25	1.6	e.81	e.60	e1.0	e25	8.8	5.5	3.4	2.7	.17	1.0
13	.25	1.7	e.79	e.60	e1.0	e34	8.0	4.6	3.1	2.0	.25	.83
14	.25	1.8	e.76	e.60	e.98	e75	7.3	4.5	2.5	1.6	.25	.58
15	.17	e1.8	e.74	e.60	e.96	e145	7.0	4.3	3.0	1.3	.25	.75
16	.17	e1.8	e.73	e.60	e.94	e192	7.3	4.4	7.1	.96	.17	.75
17	.17	e1.8	e.71	e.60	e.90	e126	6.6	3.7	17	.82	.17	.75
18	.17	e1.8	e.70	e.60	e.88	e77	6.1	4.9	41	.75	7.9	1.0
19	.17	e1.8	e.68	e.60	e.86	e64	5.6	8.3	85	1.6	4.6	1.1
20	.17	e1.8	e.66	e.60	e.90	e50	5.6	6.1	78	1.0	5.3	.75
21	.17	e1.8	e.65	e.60	e.95	e46	5.2	4.6	64	.83	4.0	.57
22	.25	e1.7	e.63	e.60	e.92	e44	5.1	4.1	47	.75	2.4	.65
23	.25	e1.6	e.61	e.60	e.94	e46	4.8	5.2	39	.67	2.2	.68
24	.33	e1.6	e.59	e.60	e1.0	e45	4.8	9.5	35	.67	3.2	.82
25	.64	e1.5	e.58	e.62	e1.2	e34	4.7	9.4	31	.75	5.5	.94
26	.88	e1.5	e.57	e.64	e1.1	e29	5.1	9.5	28	.92	4.8	1.1
27	.84	e1.5	e.56	e.64	e1.3	e19	4.9	9.8	24	.67	4.6	1.2
28	.98	e1.4	e.56	e.64	e1.4	e24	6.9	8.5	21	.83	4.8	1.2
29	1.3	e1.4	e.56	e.66	---	e23	8.1	7.4	19	.75	4.2	1.3
30	1.3	e1.3	e.56	e.68	---	e22	9.7	7.3	17	.67	3.4	1.5
31	1.3	---	e.55	e.68	---	e23	---	6.3	---	.67	1.8	---
TOTAL	14.02	48.2	25.08	18.49	26.03	1276.3	298.6	237.8	616.8	87.81	63.21	32.17
MEAN	.45	1.61	.81	.60	.93	41.2	9.95	7.67	20.6	2.83	2.04	1.07
MAX	1.3	1.8	1.3	.68	1.4	192	24	13	85	14	7.9	1.6
MIN	.17	1.1	.55	.55	.64	3.4	4.7	3.7	2.5	.67	.08	.57
AC-FT	28	96	50	37	52	2530	592	472	1220	174	125	64
CFSM	.00	.00	.00	.00	.00	.10	.03	.02	.05	.01	.01	.00
IN.	.00	.00	.00	.00	.00	.12	.03	.02	.06	.01	.01	.00

CAL YR 1989 TOTAL 14623.09 MEAN 40.1 MAX 1970 MIN .17 AC-FT 29000 CFSM .10 IN. 1.37
WTR YR 1990 TOTAL 2744.51 MEAN 7.52 MAX 192 MIN .08 AC-FT 5440 CFSM .02 IN. .26

e Estimated

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 mi^2, 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 National Geodetic Vertical Datum of 1929. Prior to Dec. 22, 1952, nonrecording gage at site 4 mi upstream at datum 25.17 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow affected by lakes above station. Occasional regulation at low flow by old milldam 500 ft upstream.

AVERAGE DISCHARGE.--55 years (water years 1936-90), 111 ft^3/s, 1.67 in/yr, 80,420 acre-ft/yr; median of yearly mean discharge, 93 ft^3/s, 1.40 in/yr, 67,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,520 ft^3/s, Apr. 11, 1969, gage height, 13.78 ft; maximum gage height, 14.58 ft, Apr. 9, 1969 (backwater from ice); no flow for several periods.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 29	1600	*206	*5.42	No other peak greater than base discharge.			

No flow on Aug. 17 (due to regulation).

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	43	e31	e5.0	e10	e26	116	115	79	92	26	15
2	20	41	e30	e5.4	e9.4	e26	111	113	78	84	24	13
3	21	39	e27	e5.7	e10	e27	108	109	78	79	23	15
4	21	38	e27	e6.0	e14	e27	107	104	82	74	20	12
5	24	40	e27	e6.3	e18	e28	106	102	94	71	19	12
6	24	41	e27	e6.8	e23	e29	105	99	87	67	19	12
7	21	41	e26	e7.4	e25	e29	102	97	79	64	19	19
8	20	41	e25	e7.9	e25	e30	98	94	77	60	18	39
9	20	41	e24	e8.3	e24	e31	95	90	75	55	16	58
10	21	40	e22	e8.5	e24	e32	94	91	72	53	13	54
11	20	40	e19	e9.0	e25	e39	92	90	75	55	11	49
12	19	39	e17	e9.3	e26	e54	91	89	97	57	7.8	44
13	19	38	e15	e9.6	e26	e68	90	84	79	56	5.6	39
14	19	37	e13	e10	e25	e127	87	82	79	55	4.9	35
15	19	32	e11	e11	e24	e135	85	84	82	52	2.5	32
16	19	e17	e10	e12	e20	e99	86	86	96	49	.58	29
17	19	e19	e9.4	e12	e16	e104	87	87	108	47	.28	27
18	20	e20	e8.4	e11	e18	e94	88	88	113	46	27	26
19	21	22	e7.4	e12	e19	e91	86	99	110	47	35	23
20	22	28	e5.9	e14	e20	e94	82	98	103	46	23	23
21	21	e29	e4.5	e16	e20	98	80	96	102	47	20	18
22	21	e30	e3.6	e18	e20	102	81	95	98	47	18	15
23	21	e31	e3.0	e19	e20	110	82	95	95	46	21	14
24	22	e32	e2.8	e19	e20	108	83	93	90	45	18	12
25	22	e34	e3.5	e19	e20	91	85	94	86	44	24	11
26	23	e35	e3.1	e20	e22	107	91	94	83	43	29	11
27	33	e35	e3.2	e20	e24	111	93	94	83	41	25	8.9
28	36	e31	e3.7	e20	e25	127	99	91	89	39	23	7.8
29	39	e29	e4.0	e22	---	145	109	88	97	38	21	6.4
30	40	e28	e4.4	e20	---	155	116	85	100	35	20	6.1
31	43	---	e4.6	e17	---	138	---	82	---	27	17	---
TOTAL	730	1011	422.5	387.2	572.4	2482	2835	2908	2666	1661	550.66	686.2
MEAN	23.5	33.7	13.6	12.5	20.4	80.1	94.5	93.8	88.9	53.6	17.8	22.9
MAX	43	43	31	22	26	155	116	115	113	92	35	58
MIN	19	17	2.8	5.0	9.4	26	80	82	72	27	.28	6.1
AC-FT	1450	2010	838	768	1140	4920	5620	5770	5290	3290	1090	1360
CFSM	.03	.04	.02	.01	.02	.09	.10	.10	.10	.06	.02	.03
IN.	.03	.04	.02	.02	.02	.10	.12	.12	.11	.07	.02	.03

CAL YR 1989 TOTAL 26776.14 MEAN 73.4 MAX 787 MIN .00 AC-FT 53110 CFSM .08 IN. 1.10
WTR YR 1990 TOTAL 16911.96 MEAN 46.3 MAX 155 MIN .28 AC-FT 33540 CFSM .05 IN. .70

e Estimated

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 mi^2.

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 National Geodetic Vertical Datum of 1929 (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.

AVERAGE DISCHARGE.--59 years (water years 1913, 1932, 1934-90), 130 ft^3/s, 1.80 in/yr, 94,180 acre-ft/yr; median of yearly mean discharges, 94 ft^3/s, 1.30 in/yr, 68,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,100 ft^3/s, Apr. 10, 1969, gage height, 18.94 ft, from floodmark; maximum gage height, 19.37 ft, Apr. 9, 1965, from floodmark (backwater from ice); no flow at times in several years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,050 ft^3/s, June 19, gage height, 5.14 ft; minimum daily discharge, 0.14 ft^3/s, Oct. 3-5, 9, 10, 14-16; minimum gage height, 1.03 ft, Oct. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.32	5.8	e2.8	e1.9	e2.7	e2.4	88	12	98	138	228	85
2	.29	4.3	e2.7	e2.0	e2.7	e3.2	80	13	87	124	223	77
3	.14	3.7	e2.1	e2.0	e2.7	e3.6	70	27	75	111	199	68
4	.14	3.3	e2.0	e2.1	e2.7	e4.1	62	34	62	98	173	54
5	.14	4.0	e2.2	e2.1	e2.8	e4.0	55	32	55	89	155	48
6	.20	4.1	e2.3	e2.2	e2.9	e3.9	46	28	41	84	142	40
7	.20	3.0	e2.2	e2.2	e2.9	e3.7	39	21	38	79	129	37
8	.20	3.1	e2.2	e2.4	e3.0	e3.7	34	15	43	73	118	32
9	.14	2.5	e2.1	e2.6	e2.9	e4.8	30	11	30	65	110	28
10	.14	1.8	e2.1	e2.7	e2.8	e6.5	26	7.0	24	56	100	21
11	.20	.91	e2.1	e2.8	e2.8	e9.0	21	5.2	23	52	91	16
12	.20	1.0	e2.0	e2.8	e2.9	e14	19	4.8	25	51	84	13
13	.20	1.7	e2.0	e2.8	e2.8	e19	15	3.3	74	45	75	9.2
14	.14	e2.0	e1.9	e2.8	e2.4	e21	12	3.5	47	38	65	6.3
15	.14	e2.0	e1.9	e2.8	e2.1	e17	9.4	4.1	54	33	51	3.7
16	.14	e2.5	e1.9	e2.8	e1.7	e23	9.1	7.1	201	30	42	1.7
17	.29	e2.0	e1.8	e2.8	e1.3	e24	6.8	7.9	510	26	36	1.1
18	.96	e2.2	e1.7	e2.7	e1.2	e25	7.4	5.8	662	23	58	1.6
19	1.2	e2.7	e1.7	e2.7	e1.2	e28	5.6	10	988	29	85	2.0
20	1.7	e3.0	e1.7	e2.7	e1.4	e28	5.4	44	969	36	98	2.1
21	1.6	e3.2	e1.7	e2.7	e1.4	e29	6.0	62	899	35	83	2.2
22	1.8	e2.7	e1.7	e2.7	e1.5	e31	4.5	68	765	135	95	1.3
23	2.6	e2.2	e1.7	e2.7	e1.5	e50	3.4	105	563	150	124	1.5
24	1.9	e2.0	e1.7	e2.7	e1.6	e63	3.2	117	434	141	140	1.3
25	.81	e2.0	e1.7	e2.7	e1.6	e65	2.6	121	361	138	164	1.3
26	1.7	e2.2	e1.7	e2.7	e1.7	e70	3.1	125	300	159	148	1.9
27	2.3	e2.5	e1.8	e2.7	e1.8	e87	3.4	123	249	178	132	2.8
28	1.8	e2.5	e1.8	e2.8	e1.9	e87	6.5	134	212	207	123	4.1
29	7.9	e2.5	e1.9	e3.0	---	e97	14	142	177	219	114	4.2
30	12	e2.7	e1.9	e2.9	---	97	14	131	156	219	106	5.1
31	8.9	---	e1.9	e2.8	---	94	---	113	---	226	96	---
TOTAL	50.39	80.11	60.9	80.3	60.9	1017.9	701.4	1536.7	8222	3087	3587	572.4
MEAN	1.63	2.67	1.96	2.59	2.17	32.8	23.4	49.6	274	99.6	116	19.1
MAX	12	5.8	2.8	3.0	3.0	97	88	142	988	226	228	85
MIN	.14	.91	1.7	1.9	1.2	2.4	2.6	3.3	23	23	36	1.1
AC-FT	100	159	121	159	121	2020	1390	3050	16310	6120	7110	1140
CFSM	.00	.00	.00	.00	.00	.03	.02	.05	.28	.10	.12	.02
IN.	.00	.00	.00	.00	.00	.04	.03	.06	.31	.12	.14	.02

CAL YR 1989 TOTAL 25650.36 MEAN 70.3 MAX 2530 MIN .00 AC-FT 50880 CFSM .07 IN. .97
WTR YR 1990 TOTAL 19057.00 MEAN 52.2 MAX 988 MIN .14 AC-FT 37800 CFSM .05 IN. .72

e Estimated

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 northwest of city of Lac qui Parle, and 3.5 mi west of Watson.

DRAINAGE AREA.--4,050 mi^2, approximately.

PERIOD OF RECORD.--October 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft above National Geodetic Vertican Datum of 1929 (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 mi^2, 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.

AVERAGE DISCHARGE.--48 years, 672 ft^3/s, 486,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 29,400 ft^3/s, Apr. 12, 1969, gage height, 39.75 ft; no flow Nov. 17, 1942, Sept. 29, 1947, Oct. 19 to Nov. 18, 1951, Nov. 24, 1952, Dec. 9-11, 1976, Feb. 28 to Mar. 5, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,230 ft^3/s, June 22, gage height, 25.51 ft; minimum discharge, 3.1 ft^3/s, Oct. 17, gage height, 20.23 ft, due to regulation; minimum gage height, 20.22 ft, Aug. 7.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.8	21	29	e55	32	24	349	206	331	1040	127	340
2	7.3	21	e29	e55	e32	26	310	208	325	878	127	338
3	7.8	21	e29	e55	e32	27	308	227	311	834	126	335
4	7.8	21	e29	e55	e32	27	303	240	313	773	124	306
5	7.5	20	e29	e55	31	28	304	242	324	756	124	239
6	6.9	20	e29	e55	30	30	296	247	332	734	123	200
7	3.8	21	e35	55	30	33	297	279	342	720	111	166
8	4.6	21	e45	54	31	37	296	324	350	714	105	146
9	5.8	22	e45	53	31	41	289	351	351	637	104	146
10	6.5	22	e45	49	31	47	265	367	355	474	102	118
11	5.4	21	e49	43	31	50	283	407	358	369	102	73
12	5.4	22	e54	45	28	89	284	407	352	255	102	30
13	6.9	22	e54	46	27	155	283	410	350	181	94	30
14	8.1	22	e54	45	e27	209	279	410	392	152	75	30
15	9.2	e22	e54	44	e27	233	278	382	465	150	67	29
16	9.2	e21	e54	43	27	266	270	356	510	150	29	30
17	6.2	e20	e54	41	27	327	265	347	672	148	43	30
18	6.9	e18	e54	42	25	332	270	341	980	147	47	29
19	13	15	e54	35	25	342	267	344	1060	145	52	29
20	17	11	e54	30	25	347	261	346	1130	143	146	28
21	18	13	e54	30	24	350	260	332	1170	141	323	28
22	20	18	e54	31	25	344	259	293	1210	139	352	27
23	18	23	e54	e32	25	349	251	294	1200	138	395	28
24	12	26	e54	e33	e25	341	247	297	1180	138	553	27
25	13	28	e54	e33	e25	339	246	298	1160	136	615	27
26	16	28	e54	33	25	340	229	299	1140	135	613	27
27	17	e28	e55	33	24	340	208	300	1100	132	693	26
28	19	e28	e55	34	23	340	204	301	1090	132	887	27
29	20	e28	e55	34	---	338	205	322	1080	130	988	27
30	21	29	e55	34	---	338	206	327	1060	129	806	27
31	21	---	e55	34	---	338	---	328	---	128	393	---
TOTAL	347.1	653	1478	1316	777	6427	8092	9832	20993	10878	8548	2943
MEAN	11.2	21.8	47.7	42.5	27.7	207	270	317	700	351	276	98.1
MAX	21	29	55	55	32	350	349	410	1210	1040	988	340
MIN	3.8	11	29	30	23	24	204	206	311	128	29	26
AC-FT	688	1300	2930	2610	1540	12750	16050	19500	41640	21580	16950	5840
CFSM	.00	.01	.01	.01	.01	.05	.07	.08	.17	.09	.07	.02
IN.	.00	.01	.01	.01	.01	.06	.07	.09	.19	.10	.08	.03

CAL YR 1989 TOTAL 124186.3 MEAN 340 MAX 3700 MIN 3.8 AC-FT 246300 CFSM .08 IN. 1.14
WTR YR 1990 TOTAL 72284.1 MEAN 198 MAX 1210 MIN 3.8 AC-FT 143400 CFSM .05 IN. .66

e Estimated

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 mi^2, 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 National Geodetic Vertical Datum of 1929. 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.

AVERAGE DISCHARGE.--53 years, 310 ft^3/s, 2.25 in/yr, 224,600 acre-ft/yr; median of yearly mean discharges, 225 ft^3/s, 1.63 in/yr, 163,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,400 ft^3/s, Apr. 9, 1969, gage height, 15.45 ft; no flow at times during 1940.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 400 ft^3/s, and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 23	0845	546	a3.91	June 29	1930	550	3.07
June 13	0230	806	3.70	Aug. 18	2315	925	3.66
June 18	0845	*1,040	*4.11	Aug. 26	0930	752	3.37

a Backwater from ice.

Minimum daily discharge, 5.8 ft^3/s, Jan. 8, gage height, 1.28 ft (backwater from ice); minimum gage height, 0.97 ft, Oct. 18.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	70	e30	e7.3	e12	e20	291	334	200	437	99	237
2	27	66	e30	e6.8	e12	e22	266	347	190	387	95	200
3	28	60	e29	e6.5	e12	e22	235	338	182	348	92	177
4	26	54	e28	e6.2	e12	e22	215	319	189	315	87	163
5	22	62	e28	e6.0	e13	e22	203	307	197	279	83	154
6	21	63	e28	e6.0	e14	e23	187	288	185	261	78	142
7	20	67	e27	e5.9	e14	e22	173	268	193	243	71	142
8	22	64	e27	e5.8	e14	e22	169	253	183	234	67	146
9	21	64	e27	e5.9	e15	e24	163	243	173	215	60	145
10	20	66	e26	e6.0	e15	e25	161	224	164	198	55	139
11	19	62	e26	e6.7	e15	e28	158	218	176	188	50	130
12	18	63	e25	e7.2	e16	e38	149	210	420	187	46	119
13	17	61	e24	e7.5	e16	e66	142	204	725	178	43	110
14	17	62	e24	e7.7	e16	e138	135	203	552	170	41	99
15	17	e62	e23	e7.8	e17	e125	129	209	450	160	38	93
16	16	e56	e22	e8.1	e17	e114	125	219	483	151	34	86
17	15	54	e22	e8.2	e17	e104	123	215	791	141	30	79
18	13	56	e21	e8.3	e17	e112	123	221	1030	133	366	79
19	14	53	e21	e8.7	e17	e130	112	236	995	142	772	86
20	16	49	e20	e8.9	e17	e145	113	248	987	139	524	87
21	17	49	e20	e9.0	e18	e156	112	271	887	138	419	94
22	17	48	e19	e9.3	e18	e185	112	278	759	133	321	94
23	22	45	e18	e9.7	e18	e308	114	272	671	128	272	95
24	29	46	e17	e9.9	e18	e224	119	275	599	123	267	91
25	32	46	e16	e10	e19	e224	131	295	531	119	317	87
26	22	43	e14	e10	e19	e231	146	295	480	122	709	85
27	18	e46	12	e11	e19	e242	164	295	438	121	588	81
28	24	e38	10	e11	e19	e249	188	283	472	122	474	80
29	51	e33	9.9	e11	---	e283	245	265	541	120	406	77
30	64	e32	e8.4	e12	---	e325	293	240	511	115	342	73
31	59	---	e7.8	e12	---	291	---	220	---	108	280	---
TOTAL	754	1640	660.1	256.4	446	3942	4996	8093	14354	5855	7126	3470
MEAN	24.3	54.7	21.3	8.27	15.9	127	167	261	478	189	230	116
MAX	64	70	30	12	19	325	293	347	1030	437	772	237
MIN	13	32	7.8	5.8	12	20	112	203	164	108	30	73
AC-FT	1500	3250	1310	509	885	7820	9910	16050	28470	11610	14130	6880
CFSM	.01	.03	.01	.00	.01	.07	.09	.14	.26	.10	.12	.06
IN.	.01	.03	.01	.01	.01	.08	.10	.16	.29	.12	.14	.07

CAL YR 1989 TOTAL 55208.1 MEAN 151 MAX 2410 MIN 7.8 AC-FT 109500 CFSM .08 IN. 1.10
WTR YR 1990 TOTAL 51592.5 MEAN 141 MAX 1030 MIN 5.8 AC-FT 102300 CFSM .08 IN. 1.03
e Estimated

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 mi^2, 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 National Geodetic Vertical Datum of 1929. 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.

AVERAGE DISCHARGE.--69 years (water years 1910-17, 1930-90), 736 ft^3/s, 533,200 acre-ft/yr; median of yearly mean discharges, 570 ft^3/s, 413,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 35,100 ft^3/s, Apr. 12, 1969, gage height, 21.68 ft, from high-water mark; no flow for several days in 1933-34, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,690 ft^3/s, June 22, gage height, 7.72 ft; minimum, 11 ft^3/s, Oct. 17, 18, 19, 20, gage height, 0.79 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	30	e34	e52	e45	e41	433	269	409	1470	171	466
2	13	30	e34	e52	e44	e41	427	269	421	1350	172	440
3	16	31	e34	e52	e44	e41	403	276	392	1200	158	442
4	16	32	e34	e52	e44	e41	394	303	376	1090	149	438
5	16	36	e34	e52	e44	e41	390	307	375	1040	145	366
6	15	33	e34	e54	e44	e41	386	309	385	955	146	276
7	15	32	e34	e54	e44	e41	384	324	382	931	146	268
8	16	31	e34	e56	e43	e43	387	421	394	920	134	187
9	17	30	e38	e58	e43	e51	385	488	392	885	130	173
10	16	30	e45	e58	e42	e59	376	473	391	680	130	172
11	16	30	e53	e57	e41	e74	371	499	402	548	127	143
12	16	30	e56	e56	e41	e82	370	520	425	407	127	113
13	15	29	e57	e55	e40	e100	373	516	423	260	127	91
14	15	29	e57	e55	e36	e220	371	523	441	182	113	86
15	14	29	e57	e55	e39	e400	360	519	511	168	100	85
16	12	e29	e56	e54	e40	e415	358	482	796	167	91	85
17	12	e28	e56	e54	e40	e425	351	454	1140	164	68	86
18	11	e28	e55	e54	e40	e420	352	441	1230	163	103	89
19	11	e28	e54	e53	e41	e420	356	462	1450	178	111	89
20	15	e28	e52	e50	e41	e445	352	454	1570	165	195	86
21	25	28	e50	e46	e42	454	346	449	1600	163	355	88
22	27	26	e50	e46	e42	442	342	398	1520	162	461	83
23	27	28	e50	e48	e42	411	336	375	1540	161	470	83
24	28	e30	e50	e49	e42	433	325	374	1640	161	583	84
25	26	e31	e50	e48	e41	425	307	390	1600	171	709	82
26	28	e32	e50	e47	e40	427	313	390	1570	169	715	81
27	26	e33	e52	e47	e40	433	281	388	1520	167	720	81
28	26	e34	e52	e46	e40	447	275	386	1520	167	945	79
29	43	e34	e52	e46	---	442	278	385	1530	166	1120	78
30	35	e34	e52	e46	---	446	274	408	1510	165	1140	78
31	31	---	e52	e46	---	440	---	406	---	169	705	---
TOTAL	616	913	1468	1598	1165	8241	10656	12658	27857	14744	10566	5000
MEAN	19.9	30.4	47.4	51.5	41.6	266	355	408	929	476	341	167
MAX	43	36	57	58	45	454	433	523	1640	1470	1140	466
MIN	11	26	34	46	36	41	274	269	375	161	68	78
AC-FT	1220	1810	2910	3170	2310	16350	21140	25110	55250	29240	20960	9920
CFSM	.00	.00	.01	.01	.01	.04	.06	.07	.15	.08	.06	.03
IN.	.00	.01	.01	.01	.01	.05	.06	.08	.17	.09	.06	.03

CAL YR 1989 TOTAL 141952 MEAN 389 MAX 3640 MIN 11 AC-FT 281600 CFSM .06 IN. .85
WTR YR 1990 TOTAL 95482 MEAN 262 MAX 1640 MIN 11 AC-FT 189400 CFSM .04 IN. .57

e Estimated

MINNESOTA RIVER BASIN

05311000 MINNESOTA RIVER AT MONTEVIDEO, MINN--Continued

WATER QUALITY RECORDS

PERIOD OF RECORD.--Water years 1962-67, 1972-76, August 1989 to current year.

REMARKS.--Letter K indicates non-ideal colony count.

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (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)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)
OCT												
26...	1730	29	981	8.4	15.5	734	11.3	140	5.1	K25	82	66
NOV												
29...	1630	34	1090	8.2	0.5	741	15.7	45	2.3	K2300	1000	14
DEC												
21...	1030	50	1180	8.4	0.0	759	5.5	54	5.3	K6000	K2700	3
JAN												
18...	1015	54	1160	7.7	0.0	748	9.8	38	1.5	K1600	630	41
31...	1415	42	1130	7.8	0.5	740	7.6	--	1.6	2600	950	--
FEB												
21...	1100	42	1080	8.4	0.0	735	19.4	51	5.3	5600	K1000	8
MAR												
06...	0945	41	1000	8.7	0.0	749	17.6	55	--	<1	K120	19
12...	1700	86	750	8.4	3.0	728	13.4	40	6.3	K70	--	9
16...	1700	501	950	8.6	0.0	728	14.6	44	7.1	K590	K130	3
21...	1000	455	869	8.4	2.5	723	15.1	50	>8.2	260	--	<1
28...	1115	440	800	9.0	4.5	740	15.4	74	14	K18000	310	3
APR												
03...	1200	388	762	8.6	5.0	741	11.8	55	12	K710	64	35
12...	1715	356	826	8.6	7.5	738	13.2	43	3.8	96	44	18
18...	0930	332	830	8.6	8.0	744	10.8	54	4.4	<1	96	77
25...	1000	283	852	8.6	18.0	730	8.3	65	5.2	84	240	108
MAY												
02...	1200	243	640	8.6	9.5	741	10.8	39	4.0	K17	77	7
09...	1115	450	823	8.3	16.5	733	7.5	45	3.9	76	140	30
18...	1115	448	819	8.3	13.0	740	10.2	46	2.6	560	210	24
23...	1230	381	842	8.4	16.5	737	7.8	42	3.6	K6600	600	17
JUN												
01...	0830	418	925	8.4	19.5	731	7.6	48	5.4	K68	120	49
07...	0930	385	901	8.3	18.5	736	7.0	55	3.9	230	--	55
14...	1030	453	627	8.3	24.0	740	5.9	45	>2.3	K11000	360	19
20...	0815	1570	586	8.0	22.5	732	6.4	42	3.0	47000	K22000	123
28...	1030	1510	--	8.5	24.0	730	7.5	49	2.0	>6000	K2800	23
JUL												
06...	1015	956	766	8.5	24.5	760	6.7	57	2.2	88	250	52
10...	0915	694	734	8.6	25.0	739	6.5	47	3.8	200	130	62
20...	0940	154	798	8.4	22.0	739	8.0	50	7.0	410	5600	52
26...	1030	157	874	8.3	22.5	737	8.2	39	6.4	K250	2000	41
AUG												
15...	0830	100	814	8.5	21.5	739	7.2	52	7.8	250	320	42
SEP												
18...	1045	88	866	8.5	16.5	736	9.9	49	2.1	590	1400	63

05311000 MINNESOTA RIVER AT MONTEVIDEO, MINN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	RESIDUE VOLATILE, SUSPENDED (MG/L) (00535)	NITROGEN, NITRITE TOTAL (MG/L AS N) (00615)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN,NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN,NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
OCT												
26...	--	--	--	0.30	0.30	--	--	--	--	--	--	--
NOV												
29...	14	--	--	0.70	0.67	--	0.77	0.75	--	1.8	1.8	--
DEC												
21...	3	--	--	0.70	0.70	--	1.1	0.94	--	2.7	2.4	--
JAN												
18...	9	--	--	0.90	0.90	--	0.71	0.71	--	2.1	2.1	--
31...	--	--	--	--	--	--	--	--	--	--	--	--
FEB												
21...	8	--	--	0.40	0.30	--	0.12	0.12	--	1.9	1.4	--
MAR												
06...	19	--	--	0.30	0.30	--	0.06	0.04	--	1.8	0.9	--
12...	9	--	--	0.40	0.30	--	0.13	0.13	--	1.6	0.9	--
16...	3	--	--	0.10	0.10	--	0.03	0.02	--	1.6	1.1	--
21...	<1	--	--	0.20	0.20	--	0.07	0.06	--	1.4	1.1	--
28...	3	--	--	0.10	0.10	--	0.04	0.03	--	1.5	1.1	--
APR												
03...	21	--	--	<0.10	<0.10	--	0.01	0.01	--	1.5	0.7	--
12...	18	--	--	<0.10	<0.10	--	0.04	0.04	--	1.3	1.1	--
18...	46	--	--	<0.10	<0.10	--	0.03	0.02	--	1.3	0.8	--
25...	51	--	--	<0.10	<0.10	--	0.02	0.01	--	1.6	0.8	--
MAY												
02...	7	--	--	<0.10	<0.10	--	0.02	<0.01	--	1.5	0.5	--
09...	13	--	--	<0.10	<0.10	--	0.08	0.07	--	1.2	0.8	--
18...	8	--	--	0.10	0.10	--	0.19	0.19	--	1.4	1.0	--
23...	17	--	--	0.20	0.20	--	0.21	0.21	--	1.4	1.1	--
JUN												
01...	25	--	--	<0.10	<0.10	--	0.03	0.02	--	1.6	1.3	--
07...	33	--	--	0.20	0.20	--	0.10	0.10	--	1.5	1.1	--
14...	<1	--	--	0.50	0.50	--	0.15	0.14	--	1.5	0.9	--
20...	53	--	--	2.8	2.7	--	0.18	0.17	--	1.4	0.7	--
28...	3	--	--	1.4	1.4	--	0.14	0.14	--	1.5	1.1	--
JUL												
06...	1	--	--	0.80	0.80	--	0.05	0.04	--	1.2	1.2	--
10...	27	--	--	0.40	0.40	--	0.08	0.06	--	1.5	1.1	--
20...	14	--	--	<0.10	<0.10	--	0.04	0.01	--	2.4	0.9	--
26...	17	--	--	<0.10	<0.10	--	0.06	0.04	--	2.0	0.9	--
AUG												
15...	4	--	--	<0.10	<0.10	<2.0	0.02	0.02	44	1.6	0.7	2000
SEP												
18...	8	0.01	<0.01	0.10	0.10	--	0.02	0.02	--	0.9	0.9	--

05311000 MINNESOTA RIVER AT MONTEVIDEO, MINN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	PHOS-PHORUS TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CARBON, INORG + ORGANIC TOT. IN BOT MAT (GM/KG AS C) (00693)	CARBON, INOR-GANIC, TOT IN BOT MAT (G/KG AS C) (00686)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
OCT												
26...	0.25	--	--	--	--	11	1.8	--	--	30	17.0	<0.40
NOV												
29...	0.24	0.19	0.18	0.16	--	10	0.4	--	--	56	1.0	<0.20
DEC												
21...	0.31	0.25	0.25	0.25	--	13	0.4	--	--	49	2.6	<0.10
JAN												
18...	0.22	0.19	0.22	0.19	--	11	0.4	--	--	95	1.0	<0.10
31...	--	--	--	--	--	--	--	--	--	--	--	--
FEB												
21...	0.21	0.09	0.11	0.08	--	10	1.7	--	--	38	13.0	<0.40
MAR												
06...	0.22	0.09	0.11	0.07	--	10	1.4	--	--	7	1.8	<0.40
12...	0.24	0.10	0.13	0.10	--	11	1.2	--	--	22	23.0	<0.40
16...	0.12	0.06	0.06	0.04	--	9.8	1.7	--	--	158	15.0	<0.40
21...	0.40	0.34	0.36	0.34	--	11	2.8	--	--	47	26.0	0.70
28...	0.13	0.07	0.08	0.07	--	11	1.4	--	--	9	11.0	<0.50
APR												
03...	0.15	0.04	0.05	0.02	--	9.6	1.6	--	--	39	5.4	<1.0
12...	0.11	0.05	0.05	0.04	--	9.5	0.7	--	--	--	2.7	<0.60
18...	0.09	0.05	0.05	0.03	--	9.7	0.9	--	--	50	9.4	<0.60
25...	0.21	0.04	0.04	<0.01	--	9.2	1.8	--	--	--	31.0	<1.0
MAY												
02...	0.14	0.04	0.05	0.02	--	9.2	--	--	--	31	9.9	<0.50
09...	0.12	0.06	0.06	0.05	--	10	0.8	--	--	59	4.6	<0.50
18...	0.11	0.08	0.08	0.07	--	10	1.0	--	--	52	2.5	<0.50
23...	0.15	0.08	0.10	0.07	--	9.8	1.2	--	--	42	2.0	<0.50
JUN												
01...	0.17	0.05	0.06	0.05	--	10	2.1	--	--	73	15.0	<0.70
07...	0.18	0.06	0.08	0.05	--	9.9	1.9	--	--	71	11.0	<1.0
14...	0.15	0.08	0.09	0.08	--	9.5	1.7	--	--	45	8.6	0.70
20...	0.18	0.11	0.13	0.09	--	6.8	2.9	--	--	170	0.90	<0.50
28...	0.24	0.13	0.11	0.11	--	9.9	2.1	--	--	274	4.1	<0.50
JUL												
06...	0.16	0.12	0.11	0.09	--	10	2.8	--	--	114	15.0	0.90
10...	0.23	0.10	0.12	0.09	--	11	2.1	--	--	84	16.0	<1.1
20...	0.13	0.13	0.07	0.04	--	10	4.9	--	--	216	39.0	<1.1
26...	0.16	0.07	0.10	0.06	--	9.0	2.9	--	--	132	34.0	1.0
AUG												
15...	0.25	0.20	0.18	0.18	1100	10	>5.0	42	18	213	22.0	<1.0
SEP												
18...	0.13	0.09	0.09	0.08	--	8.5	--	--	--	110	17.0	<1.2

05311000 MINNESOTA RIVER AT MONTEVIDEO, MINN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)	2,4-D, TOTAL (UG/L) (39730)	CHLORDYRIFOS TOTAL RECOVER (UG/L) (38932)	DEF TOTAL (UG/L) (39040)	DIAZINON, TOTAL (UG/L) (39570)	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L) (82052)	DISYSTON TOTAL (UG/L) (39011)	ETHION, TOTAL (UG/L) (39398)	FONOFOS (DYFONATE) WATER WHOLE TOT.REC (UG/L (82614)	MALATHION, TOTAL (UG/L) (39530)
AUG 15...	<0.01	<0.01	0.05	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.0	<0.01

DATE	METHOMYL TOTAL (UG/L) (39051)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOTAL (UG/L) (39790)	PARATHION, TOTAL (UG/L) (39540)	PHORATE TOTAL (UG/L) (39023)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	PROPHAM TOTAL (UG/L) (39052)	SEVIN, TOTAL (UG/L) (39750)	SILVEX, TOTAL (UG/L) (39760)	TOTAL TRITHION (UG/L) (39786)
AUG 15...	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.5	<0.50	<0.01	<0.01

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 mi^2.

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 National Geodetic Vertical Datum of 1929. 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.

AVERAGE DISCHARGE.--54 years (water years 1936-38, 1940-90), 121 ft^3/s, 2.52 in/yr, 87,660 acre-ft/yr; median of yearly mean discharges, 79 ft^3/s, 1.64 in/yr, 57,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,200 ft^3/s, Apr. 10, 1969, gage height, 14.90 ft; no flow at times in 1931, 1933, 1948, 1959.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1919 reached a stage of 17.5 ft, from information by local residents, discharge, 25,200 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 300 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 28	0115	452	3.89	July 30	1400	844	4.58
June 19	0445	*1,090	*4.99				

Minimum discharge, 1.0 ft^3/s, Oct. 1, 2, gage height, 2.14 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.2	1.9	2.5	e2.8	e2.4	e3.0	55	25	184	267	442	36
2	1.1	1.8	e2.5	e2.9	e2.4	e3.2	49	28	167	217	355	31
3	1.3	1.8	e2.6	e3.0	e2.4	e2.9	45	35	162	183	306	27
4	1.3	1.8	2.6	e3.1	e2.4	e2.8	42	31	159	162	259	25
5	1.4	2.1	2.7	e3.0	e2.5	e2.7	39	28	151	140	208	22
6	1.4	1.7	e2.6	e2.8	e2.5	e2.7	34	26	137	127	169	22
7	1.4	2.5	e2.4	e2.5	e2.6	e2.8	31	23	123	120	142	21
8	1.3	3.6	e2.3	e3.0	e2.5	e2.9	30	22	112	110	116	19
9	1.3	4.0	2.3	e3.0	e2.5	e3.5	28	20	100	99	103	18
10	1.5	3.2	2.3	e2.8	e2.5	e4.2	26	19	90	90	92	21
11	1.5	2.9	e2.3	e3.0	e2.5	e6.0	24	18	82	86	79	27
12	1.5	2.8	e2.3	e3.0	e2.5	e11	23	18	80	83	68	19
13	1.5	2.8	e2.3	e3.0	e2.6	e17	22	17	80	81	63	12
14	1.6	2.9	e2.3	e3.0	e2.7	e22	21	24	78	77	57	12
15	1.4	2.6	e2.3	e3.0	e2.7	e32	20	26	74	74	51	11
16	1.4	e2.5	e2.3	e3.0	e2.7	e26	19	37	570	70	46	9.9
17	1.4	e2.4	e2.3	e3.0	e2.7	e28	18	69	979	65	42	9.4
18	1.5	2.2	e2.3	e3.0	e2.8	e28	18	165	1010	59	39	8.5
19	1.8	2.1	e2.3	e2.9	e2.8	e27	17	171	1050	161	39	9.0
20	2.0	2.2	e2.3	e2.8	e2.8	e26	17	149	889	188	59	8.8
21	1.9	e2.2	e2.3	e2.7	e2.8	e26	16	232	775	248	56	8.9
22	1.9	e2.2	e2.3	e2.7	e2.9	e32	15	326	667	279	62	9.0
23	1.8	e2.2	e2.3	e2.7	e2.9	e31	17	285	578	250	72	9.7
24	1.8	e2.2	e2.4	e2.7	e2.8	e30	15	261	480	195	68	10
25	1.8	2.3	e2.5	e2.7	e2.7	e64	14	331	412	171	66	7.3
26	1.7	2.5	e2.5	e2.4	e2.8	e93	15	321	355	159	62	5.6
27	1.5	e2.5	e2.6	e2.5	e2.8	e84	17	382	312	172	57	4.7
28	1.8	e2.5	e2.7	e2.3	e2.9	e93	19	424	320	355	51	4.7
29	4.0	e2.5	e2.7	e2.3	---	e80	25	351	338	542	47	5.4
30	2.2	2.6	e2.7	e2.4	---	65	27	287	299	810	44	6.4
31	1.8	---	e2.7	e2.4	---	59	---	230	---	642	41	---
TOTAL	51.0	73.5	75.5	86.4	74.1	910.7	758	4381	10813	6282	3361	440.3
MEAN	1.65	2.45	2.44	2.79	2.65	29.4	25.3	141	360	203	108	14.7
MAX	4.0	4.0	2.7	3.1	2.9	93	55	424	1050	810	442	36
MIN	1.1	1.7	2.3	2.3	2.4	2.7	14	17	74	59	39	4.7
AC-FT	101	146	150	171	147	1810	1500	8690	21450	12460	6670	873
CFSM	.00	.00	.00	.00	.00	.04	.04	.22	.55	.31	.17	.02
IN.	.00	.00	.00	.00	.00	.05	.04	.25	.62	.36	.19	.03

CAL YR 1989 TOTAL 19436.59 MEAN 53.3 MAX 2220 MIN .76 AC-FT 38550 CFSM .08 IN. 1.11
WTR YR 1990 TOTAL 27306.5 MEAN 74.8 MAX 1050 MIN 1.1 AC-FT 54160 CFSM .11 IN. 1.56

e Estimated

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 mi^2.

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 National Geodetic Vertical Datum of 1929. 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 National Geodetic Vertical Datum of 1929.

REMARKS.--Records 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.

AVERAGE DISCHARGE.--50 years, 55.4 ft^3/s, 2.90 in/yr, 40,140 acre-ft/yr; median of yearly mean discharges, 39 ft^3/s, 2.04 in/yr, 28,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--River only, maximum discharge, 5,370 ft^3/s, June 17, 1957, gage height, 10.14 ft; maximum gage height, 11.05 ft, Apr. 6, 1951, from floodmark; no flow at times.

Diversion only, maximum discharge, 4,440 ft^3/s, Apr. 10, 1969, gage height, 78.45 ft; no flow on many days.

Combined flow, maximum discharge, 5,590 ft^3/s, Apr. 10, 1969; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 731 ft^3/s, June 17, gage height, 11.76 ft; minimum discharge, 2.1 ft^3/s, May. 8, gage height, 6.52 ft (backwater from beaver activity); minimum gage height, 6.52 ft, May 8, 9, 10.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.5	5.7	e8.2	e3.9	e4.0	e10	e15	9.6	38	75	49	e14
2	4.5	6.0	e8.2	e3.9	e4.0	e10	14	8.9	47	71	46	e13
3	5.1	6.0	e8.2	e3.9	e4.4	e11	e13	7.6	53	64	44	e12
4	5.1	6.3	e8.4	e3.8	e4.7	e11	12	6.6	53	58	e41	e12
5	5.4	7.1	e8.5	e3.8	e5.2	e11	12	5.6	50	53	e37	e11
6	5.1	7.4	e8.5	e3.8	e5.7	e11	10	4.5	47	50	e34	e11
7	4.2	7.7	e8.5	e3.8	e6.2	e12	8.6	3.7	44	49	e32	e11
8	4.2	8.2	e8.4	e3.8	e6.7	e12	7.7	3.5	47	46	e30	e11
9	4.2	8.8	e8.4	e3.8	e7.2	e13	7.6	3.2	44	44	e28	e11
10	4.8	10	e8.4	e3.7	e7.6	e15	7.4	3.2	37	e43	e27	e11
11	5.1	11	e8.3	e3.7	e7.8	e17	7.2	3.0	35	e42	e24	e9.4
12	5.1	12	e8.3	e3.7	e8.0	e20	8.1	2.8	37	e45	e23	e8.4
13	5.1	11	e8.0	e3.7	e8.0	e21	6.1	2.8	36	e44	e22	e8.0
14	5.4	10	e7.0	e3.7	e8.2	e22	5.7	14	43	e35	e21	e7.5
15	5.4	e9.3	e6.6	e3.7	e8.4	e23	6.1	16	44	e31	e19	e7.3
16	5.6	e8.6	e6.4	e3.8	e8.4	e24	5.9	44	143	26	e18	e7.1
17	5.6	e8.0	e6.1	e3.8	e8.4	e25	6.2	44	637	e20	e18	e7.1
18	5.6	e7.7	e5.8	e3.8	e8.4	e25	5.1	30	660	24	e17	e7.6
19	5.6	e7.6	e5.7	e3.8	e8.6	e26	5.0	44	477	47	e20	e8.1
20	5.6	e7.7	e5.6	e3.8	e8.8	e27	4.9	94	303	97	e27	e8.0
21	5.7	e7.7	e5.4	e3.8	e8.9	e27	5.2	87	208	106	e30	e7.3
22	5.6	e7.7	e5.2	e3.8	e9.1	e27	4.7	68	174	78	e28	e6.0
23	5.6	e7.7	e4.9	e3.8	e9.3	e27	4.3	107	157	60	e26	e5.3
24	4.5	e7.6	e4.8	e3.9	e9.4	e27	4.2	101	145	49	e24	e4.8
25	5.4	e7.5	e4.6	e3.9	e9.6	e26	3.9	88	132	47	e22	e4.7
26	6.1	e7.5	e4.4	e3.9	e9.7	e24	3.7	110	117	77	e21	4.8
27	6.6	e7.5	e4.3	e3.9	e9.9	e23	3.8	95	103	68	e19	4.8
28	6.4	e7.8	e4.3	e3.9	e10	e22	4.5	76	98	64	e17	5.1
29	6.6	e8.1	e4.1	e4.0	---	e20	10	63	96	56	e16	5.1
30	6.6	e8.2	e4.0	e4.0	---	e18	11	51	83	54	e15	5.1
31	6.0	---	e4.0	e4.0	---	e17	---	45	---	51	e14	---
TOTAL	166.3	243.4	201.5	118.6	214.6	604	220.9	1242.0	4188	1674	809	248.5
MEAN	5.36	8.11	6.50	3.83	7.66	19.5	7.36	40.1	140	54.0	26.1	8.28
MAX	8.6	12	8.5	4.0	10	27	15	110	660	106	49	14
MIN	4.2	5.7	4.0	3.7	4.0	10	3.7	2.8	35	20	14	4.7
AC-FT	330	483	400	235	426	1200	438	2460	8310	3320	1600	493
CFSM	.02	.03	.03	.01	.03	.08	.03	.15	.54	.21	.10	.03
IN.	.02	.03	.03	.02	.03	.09	.03	.18	.60	.24	.12	.04

CAL YR 1989 TOTAL 8219.8 MEAN 22.5 MAX 614 MIN 2.3 AC-FT 16300 CFSM .09 IN. 1.18
WTR YR 1990 TOTAL 9930.8 MEAN 27.2 MAX 660 MIN 2.8 AC-FT 19700 CFSM .11 IN. 1.43

e Estimated

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 mi^2.

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 National Geodetic Vertical Datum of 1929. 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 poor. Natural discharge affected by unknown amount of interbasin flow between Yellow Medicine, Redwood, and Cottonwood River basins during extreme floods.

AVERAGE DISCHARGE.--56 years (water years 1912, 1936-90), 123 ft^3/s, 2.66 in/yr, 89,110 acre-ft/yr; median of yearly mean discharges, 77 ft^3/s, 1.66 in/yr, 55,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,700 ft^3/s, June 18, 1957, gage height, 15.92 ft, from floodmark; no flow for several days in January 1940 and for part of each day Aug. 19, 20, 1959.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 400 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 17	1300	*1,450	*5.08	July 26	0300	714	3.68

Minimum discharge, 2.6 ft^3/s, Oct. 4, 5, gage height, 1.29 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.0	13	12	e4.2	e4.1	e12	53	58	118	133	185	30
2	5.8	14	e12	e4.1	e4.1	e12	51	56	107	116	167	27
3	4.5	13	e12	e4.1	e4.4	e12	49	52	102	103	152	26
4	2.9	15	e13	e4.1	e5.2	e12	44	45	95	94	137	24
5	3.1	16	e13	e4.1	e5.8	e13	44	38	97	84	117	22
6	3.3	19	e13	e4.1	e6.2	e13	42	36	89	76	101	22
7	3.0	18	e12	e4.1	e6.9	e13	39	31	78	74	88	22
8	3.4	22	e12	e4.1	e7.8	e13	36	29	69	71	78	22
9	3.9	19	e11	e4.1	e8.2	e14	35	27	57	68	71	22
10	3.7	19	e11	e4.1	e8.3	e15	33	28	51	65	63	23
11	3.8	16	e11	e4.1	e8.3	e19	31	25	41	62	58	20
12	3.0	14	e11	e4.1	e8.4	e22	30	25	37	62	53	17
13	3.0	14	e10	e4.1	e9.0	e25	29	23	50	87	49	16
14	3.1	e12	e9.5	e4.1	e9.0	e30	29	33	40	63	46	15
15	4.0	e11	e8.5	e4.1	e9.0	e34	29	45	33	58	42	12
16	3.9	e8.8	e7.7	e4.1	e9.0	e37	27	95	131	52	39	12
17	4.8	e8.8	e7.3	e4.1	e9.0	e38	27	137	1180	49	37	12
18	4.7	e8.3	e6.8	e4.1	e9.0	e39	27	135	1220	45	34	13
19	8.0	e7.8	e6.6	e4.1	e9.0	e39	26	124	1030	57	33	14
20	7.0	e7.8	e6.2	e4.1	e9.4	e40	26	146	1020	82	63	15
21	5.6	e8.3	e5.9	e4.1	e9.8	e41	25	175	1010	93	73	15
22	6.4	e8.3	e5.7	e4.1	e10	e44	24	184	872	137	77	14
23	9.5	e8.3	e5.5	e4.1	e10	e46	24	165	542	131	65	13
24	8.6	e8.3	e5.2	e4.1	e10	e47	22	182	395	107	58	12
25	8.1	e7.8	e5.1	e4.1	e10	54	22	212	315	100	52	12
26	8.6	e7.8	e4.8	e4.1	e10	59	22	221	256	330	48	12
27	11	e8.8	e4.7	e4.1	e11	64	23	242	212	236	45	10
28	17	e11	e4.6	e4.1	e11	65	27	235	204	198	44	9.5
29	15	e12	e4.4	e4.1	---	65	33	208	176	218	41	8.2
30	13	e12	e4.3	e4.1	---	62	39	173	152	219	37	8.4
31	12	---	e4.2	e4.1	---	60	---	141	---	199	33	---
TOTAL	198.7	369.1	260.0	127.2	231.9	1059	968	3326	9779	3449	2186	500.1
MEAN	6.41	12.3	8.39	4.10	8.28	34.2	32.3	107	326	111	70.5	16.7
MAX	17	22	13	4.2	11	65	53	242	1220	330	185	30
MIN	2.9	7.8	4.2	4.1	4.1	12	22	23	33	45	33	8.2
AC-FT	394	732	516	252	460	2100	1920	6600	19400	6840	4340	992
CFSM	.01	.02	.01	.01	.01	.05	.05	.17	.52	.18	.11	.03
IN.	.01	.02	.02	.01	.01	.06	.06	.20	.58	.20	.13	.03

CAL YR 1989 TOTAL 19076.5 MEAN 52.3 MAX 2800 MIN 1.0 AC-FT 37840 CFSM .08 IN. 1.13
WTR YR 1990 TOTAL 22454.0 MEAN 61.5 MAX 1220 MIN 2.9 AC-FT 44540 CFSM .10 IN. 1.33
e Estimated

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 mi^2, approximately.

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 National Geodetic Vertical Datum of 1929. 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.

AVERAGE DISCHARGE.--56 years (water years 1912-13, 1936-37, 1939-90), 313 ft^3/s, 3.32 in/yr, 226,800 acre-ft/yr; median of yearly mean discharges, 224 ft^3/s, 2.38 in/yr, 162,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 28,700 ft^3/s, Apr. 10, 1969, gage height, 19.15 ft; maximum gage height, 20.86 ft, Apr. 8, 1965, from floodmark (backwater from ice); minimum discharge observed, 0.5 ft^3/s, Nov. 27, 1952; minimum gage height, 0.72 ft, Nov. 20, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,300 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 19	1730	1,710	6.30	July 28	0530	*2,630	*7.99

Minimum daily discharge, 5.0 ft^3/s, Dec. 25; minimum recorded gage height. 0.86 ft, Oct. 5, but may have been lower during period of no gage height record Dec. 13 to Mar. 14.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.9	10	e12	e6.2	e9.5	e10	69	71	268	437	574	196
2	8.7	9.9	e12	e6.4	e9.2	e13	68	75	323	361	464	181
3	7.3	10	e11	e6.8	e8.8	e16	66	75	449	309	389	171
4	6.9	10	e11	e7.0	e8.5	e20	67	74	367	267	335	161
5	7.1	12	e11	e7.3	e8.4	e19	66	71	329	238	284	144
6	7.7	12	e12	e7.6	e8.4	e19	63	66	276	211	247	130
7	8.2	20	e12	e8.0	e8.6	e21	59	61	236	268	218	117
8	8.0	17	e12	e8.2	e8.8	e23	56	58	202	267	194	108
9	7.6	18	e12	e8.5	e8.9	e26	54	58	178	217	174	99
10	7.6	e20	e12	e8.8	e9.2	e28	52	54	157	197	160	92
11	8.4	e20	e11	e9.0	e9.5	e35	49	50	148	211	149	86
12	9.2	20	e11	e9.2	e9.9	e47	47	48	147	266	139	79
13	9.3	19	e11	e9.2	e10	e68	46	47	201	202	130	73
14	8.8	18	e10	e9.3	e11	e122	44	57	154	179	123	76
15	9.2	e15	e10	e9.5	e11	150	46	58	122	166	115	75
16	10	10	e9.5	e9.8	e11	149	48	59	129	154	109	67
17	10	12	e9.2	e9.9	e11	117	48	58	550	141	103	63
18	10	12	e8.8	e10	e11	110	46	63	1410	131	100	61
19	9.2	12	e8.2	e10	e11	105	44	123	1670	153	138	63
20	8.7	13	e7.8	e10	e11	99	43	189	1620	166	407	61
21	8.9	13	e7.2	e10	e10	99	45	197	1470	166	409	59
22	9.0	13	e6.5	e10	e10	96	44	327	1300	163	397	56
23	9.5	13	e6.0	e10	e9.8	88	47	416	1110	170	515	53
24	9.5	e13	e5.4	e10	e9.4	73	51	353	877	166	463	52
25	9.2	e13	e5.0	e10	e9.1	76	51	378	732	177	393	51
26	9.5	e13	e5.1	e10	e9.0	75	50	373	660	453	336	49
27	9.6	e13	e5.2	e10	e8.8	80	55	352	541	616	297	47
28	10	e13	e5.4	e10	e8.8	78	64	377	602	1990	269	45
29	11	e13	e5.6	e10	---	77	76	396	864	1480	247	43
30	9.2	e12	e5.7	e9.9	---	72	78	365	579	950	228	40
31	8.8	---	e5.9	e9.8	---	68	---	313	---	710	209	---
TOTAL	275.0	418.9	276.5	280.4	269.6	2079	1642	5262	17671	11582	8315	2598
MEAN	8.87	14.0	8.92	9.05	9.63	67.1	54.7	170	589	374	268	86.6
MAX	11	20	12	10	11	150	78	416	1670	1990	574	196
MIN	6.9	9.9	5.0	6.2	8.4	10	43	47	122	131	100	40
AC-FT	545	831	548	556	535	4120	3260	10440	35050	22970	16490	5150
CFSM	.01	.01	.01	.01	.01	.05	.04	.13	.46	.29	.21	.07
IN.	.01	.01	.01	.01	.01	.06	.05	.15	.51	.34	.24	.08

CAL YR 1989 TOTAL 37385.6 MEAN 102 MAX 3870 MIN 5.0 AC-FT 74150 CFSM .08 IN. 1.09
WTR YR 1990 TOTAL 50669.4 MEAN 139 MAX 1990 MIN 5.0 AC-FT 100500 CFSM .11 IN. 1.47

e Estimated

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 mi^2, 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 National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair.

AVERAGE DISCHARGE.--17 years, 54.5 ft^3/s, 3.22 in/yr, 39,490 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 951 ft^3/s, July 7, 1983, gage height, 7.80 ft; maximum gage height, 8.29 ft, Mar. 26, 1979, (backwater from ice); minimum discharge, 0.01 ft^3/s, Sept. 17, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 180 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 13	0700	433	5.98	July 29	0200	*931	*7.57
June 17	0130	615	6.85	Aug. 20	1800	740	6.85

Minimum daily discharge, 0.61 ft^3/s, Oct. 3; minimum gage height, 2.39 ft, Sept. 30.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e.78	e.90	e.82	e.62	e.74	e.72	e7.0	31	45	146	350	106
2	e.65	e.90	e.82	e.62	e.74	e.73	e7.0	26	52	130	282	98
3	e.61	e.91	e.82	e.63	e.74	e.74	e13	23	103	110	228	92
4	e.62	e.91	e.81	e.64	e.73	e.74	e12	19	91	91	186	88
5	e.63	e.91	e.81	e.68	e.72	e.75	e11	14	77	78	156	82
6	e.64	e.92	e.81	e.68	e.73	e.76	e9.5	9.9	81	67	135	77
7	e.88	e.92	e.81	e.70	e.77	e.68	e8.5	7.9	83	85	119	72
8	e.68	e.92	e.81	e.71	e.83	e2.0	e7.8	6.9	77	83	107	67
9	e.70	e.92	e.81	e.73	e.92	e3.3	e7.0	6.5	67	71	98	64
10	e.71	e.91	e.81	e.74	e1.0	e3.2	e6.3	5.7	56	63	89	60
11	e.73	e.90	e.81	e.75	e.98	e22	e6.0	5.6	51	61	85	56
12	e.74	e.89	e.81	e.76	e.94	e21	e5.6	4.9	65	142	80	53
13	e.75	e.89	e.80	e.77	e.84	e14	e5.4	4.6	326	112	75	50
14	e.76	e.89	e.78	e.78	e.74	e40	e5.2	6.8	248	84	71	46
15	e.78	e.88	e.76	e.78	e.65	e39	e5.1	8.1	179	69	68	43
16	e.80	e.88	e.75	e.80	e.64	e40	e5.0	8.6	174	58	64	41
17	e.81	e.87	e.73	e1.0	e.64	e33	4.9	9.0	478	51	62	38
18	e.82	e.86	e.72	e.85	e.65	e30	7.6	10	405	46	59	37
19	e.83	e.86	e.71	e.80	e.66	e18	9.0	22	345	52	176	37
20	e.84	e.86	e.70	e.79	e.66	e18	9.2	46	321	61	684	36
21	e.84	e.86	e.68	e.79	e.68	e9.4	11	59	344	56	612	33
22	e.85	e.85	e.66	e.79	e.68	e5.0	8.5	73	369	53	450	31
23	e.86	e.85	e.64	e.79	e.69	e4.0	9.6	98	360	48	364	27
24	e.86	e.84	e.63	e.79	e.70	e5.0	12	83	320	43	307	26
25	e.87	e.84	e.62	e.79	e.70	e8.5	11	76	273	70	260	24
26	e.88	e.84	e.62	e.78	e.70	e9.0	8.5	80	232	171	218	22
27	e.88	e.84	e.62	e.78	e.70	e8.8	9.5	79	189	310	186	21
28	e.89	e.83	e.62	e.77	e.71	e8.6	13	73	169	646	165	19
29	e.90	e.82	e.62	e.76	---	e8.2	20	65	196	766	147	17
30	e.90	e.82	e.62	e.76	---	e7.2	34	58	168	552	131	16
31	e.90	---	e.62	e.75	---	e4.0	---	51	---	432	116	---
TOTAL	24.17	26.29	22.65	23.36	20.88	366.32	289.2	1070.5	5944	4807	6130	1479
MEAN	.78	.88	.73	.75	.75	11.8	9.64	34.5	198	155	198	49.3
MAX	.90	.92	.82	1.0	1.0	40	34	98	478	766	684	106
MIN	.61	.82	.62	.62	.64	.68	4.9	4.6	45	43	59	16
AC-FT	48	52	45	46	41	727	574	2120	11790	9530	12160	2930
CFSM	.00	.00	.00	.00	.00	.05	.04	.15	.86	.67	.86	.21
IN.	.00	.00	.00	.00	.00	.06	.05	.17	.96	.78	.99	.24

CAL YR 1989 TOTAL 3333.50 MEAN 9.13 MAX 242 MIN .41 AC-FT 6610 CFSM .04 IN. .54
WTR YR 1990 TOTAL 20203.37 MEAN 55.4 MAX 766 MIN .61 AC-FT 40070 CFSM .24 IN. 3.27

e Estimated

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 mi^2.

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-76-2: 1977.

GAGE.--Water-stage recorder. Datum of gage is 905.05 ft above National Geodetic Vertical Datum of 1929. 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.

AVERAGE DISCHARGE.--19 years (water years 1941-45, 1977-90), 305 ft^3/s, 5.10 in/yr, 221,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,620 ft^3/s, May 21, 1944, gage height 9.84 ft, datum then in use; minimum daily, 1.9 ft^3/s, Jan. 20 to Feb. 8, 1977; minimum gage height, 0.27 ft, July 23, 1940, datum then in use.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1965, reached a stage of 16.89 ft at datum 0.17 ft higher, from floodmarks, discharge, 19,000 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 900 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 20	1730	1,270	4.50	July 26	0400	*1,910	*5.74

Minimum daily discharge, 1.8 ft^3/s, Dec. 24, 25; minimum recorded gage height, 0.47 ft, Oct. 3, 4, but may have been less during period of no gage-height record Nov. 24 to Apr. 16.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.7	6.9	e6.6	e3.1	e6.0	e7.0	e31	61	233	432	854	135
2	3.4	6.7	e6.6	e3.3	e5.8	e7.1	e29	79	220	354	695	127
3	2.7	6.4	e6.6	e3.6	e5.8	e7.3	e29	72	350	293	587	122
4	2.8	6.9	e6.6	e3.9	e5.7	e7.7	e28	66	482	242	507	114
5	3.8	9.1	e6.5	e4.1	e5.7	e8.2	e28	59	560	207	431	106
6	4.2	9.8	e6.4	e4.3	e5.8	e8.7	e28	53	473	176	364	99
7	4.6	13	e6.1	e4.4	e6.1	e10	e27	48	386	173	310	90
8	5.0	11	e5.8	e4.5	e6.5	e12	e27	43	330	163	263	83
9	4.7	11	e5.4	e4.7	e7.0	e14	e27	45	267	157	224	75
10	4.8	10	e4.8	e4.9	e7.4	e16	e27	46	246	142	194	76
11	6.1	9.0	e4.3	e5.0	e7.4	e20	e27	47	220	132	178	84
12	4.4	7.9	e3.9	e5.1	e7.4	e25	e26	50	199	185	161	80
13	4.1	7.6	e3.5	e5.2	e7.4	e40	e26	47	183	301	144	74
14	4.6	7.5	e3.3	e5.2	e7.4	e80	e26	51	199	252	132	69
15	4.9	7.5	e3.1	e5.2	e7.4	e155	e26	53	301	203	123	63
16	4.6	6.9	e2.9	e5.2	e7.4	e120	e26	62	240	167	122	57
17	5.4	7.3	e2.8	e5.2	e7.4	e88	e26	67	269	141	121	51
18	9.3	7.2	e2.6	e5.3	e7.4	e70	23	69	524	123	113	46
19	5.8	7.1	e2.4	e5.6	e7.3	e52	21	84	836	194	112	49
20	4.2	7.4	e2.2	e5.8	e7.3	e43	21	169	1190	320	204	46
21	4.0	7.0	e2.1	e6.2	e7.3	e43	21	260	1190	333	250	49
22	4.9	e7.0	e2.0	e8.4	e7.2	e41	20	316	1050	273	267	43
23	5.7	e7.0	e1.9	e6.4	e7.2	e40	23	384	863	225	264	43
24	5.8	e7.0	e1.8	e6.4	e7.1	e40	47	382	700	189	249	43
25	6.2	e6.9	e1.8	e6.5	e7.0	e39	81	385	581	172	249	38
26	6.1	e6.9	e1.9	e6.3	e7.0	e38	57	414	511	652	244	35
27	7.0	e6.8	e2.2	e6.2	e7.0	e38	51	439	502	1070	220	32
28	11	e6.6	e2.5	e6.2	e7.0	e37	53	431	423	1610	200	30
29	7.0	e6.8	e2.6	e6.1	---	e36	56	364	420	1410	176	26
30	7.1	e6.7	e2.7	e6.1	---	e36	74	326	495	1260	161	27
31	8.3	---	e2.8	e6.0	---	e33	---	276	---	1060	146	---
TOTAL	166.6	235.1	116.7	162.4	192.4	1212.0	1012	5310	14483	12611	6265	2018
MEAN	5.37	7.84	3.76	5.24	6.67	39.1	33.7	171	483	407	267	67.3
MAX	11	13	6.6	6.5	7.4	155	81	439	1190	1610	854	135
MIN	2.7	6.4	1.8	3.1	5.7	7.0	20	43	163	123	112	27
AC-FT	330	466	231	322	382	2400	2010	10530	28730	25010	16390	4000
CFSM	.01	.01	.00	.01	.01	.05	.04	.21	.59	.50	.33	.08
IN.	.01	.01	.01	.01	.01	.06	.05	.24	.66	.58	.38	.09

CAL YR 1989 TOTAL 15475.6 MEAN 42.4 MAX 1900 MIN 1.8 AC-FT 30700 CFSM .05 IN. .71
WTR YR 1990 TOTAL 45784.2 MEAN 125 MAX 1610 MIN 1.8 AC-FT 90810 CFSM .15 IN. 2.10

e Estimated

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 mi^2, 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 National Geodetic Vertical Datum of 1929. 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.

AVERAGE DISCHARGE.--47 years (water years 1940-45, 1950-90), 895 ft^3/s, 5.00 in/yr, 648,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 43,100 ft^3/s, Apr. 9, 1965, gage height, 21.36 ft, from floodmark; minimum, 6.9 ft^3/s, Oct. 12, 1955, gage height, 1.04 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,170 ft^3/s, July 28, gage height, 7.00 ft, due to regulation; minimum, 9.2 ft^3/s, Dec. 25, 26, 27, gage height, 1.02 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	37	35	14	27	33	142	570	1050	1410	3680	800
2	30	34	35	15	25	34	119	535	1100	1320	2790	679
3	21	33	30	16	25	35	119	526	1270	1090	2430	655
4	18	35	29	17	24	38	119	488	1710	909	2130	658
5	19	38	33	18	24	39	112	327	1930	1020	1900	500
6	19	42	e33	18	25	38	107	336	1930	740	1630	568
7	19	43	e32	19	26	41	107	336	1620	704	1430	397
8	20	43	31	20	27	47	106	350	1480	671	1340	470
9	22	42	31	20	28	53	105	322	1280	702	1170	433
10	24	41	31	21	29	55	106	323	1200	468	1010	556
11	23	40	27	21	29	83	106	331	1260	558	900	566
12	29	39	22	22	32	112	101	763	1220	600	855	507
13	25	39	e20	22	33	125	95	980	1020	687	742	458
14	23	39	21	22	32	156	101	872	1080	569	715	370
15	24	39	e18	22	32	167	100	664	1350	590	682	341
16	24	24	e17	23	32	212	95	665	1300	546	543	344
17	22	35	e16	23	29	173	94	664	1440	590	566	309
18	26	29	e15	24	31	171	94	664	2050	266	450	291
19	31	33	e14	25	30	300	96	735	2770	562	513	292
20	39	38	13	26	30	167	88	923	3270	682	656	279
21	36	35	11	26	30	214	90	1660	3400	1530	695	220
22	32	36	11	26	30	206	89	2100	3330	1440	991	221
23	30	30	11	27	31	203	91	1970	3260	1180	1010	224
24	30	35	10	27	30	202	98	1860	2560	1000	881	230
25	30	e35	9.2	28	29	182	163	1750	2440	852	878	237
26	30	e35	9.2	28	29	157	238	1580	2070	1710	1170	234
27	29	e35	11	28	28	145	1180	1840	1860	2410	1750	199
28	33	e35	12	28	30	145	936	1870	1790	4630	1470	167
29	43	e35	12	28	---	145	699	1600	1470	4720	1160	162
30	44	34	13	28	---	147	671	1370	1430	4520	940	162
31	40	---	14	27	---	148	---	1300	---	4120	865	---
TOTAL	857	1088	626.4	709	807	3973	6367	30274	54940	42796	37942	11529
MEAN	27.6	36.3	20.2	22.9	28.8	128	212	977	1831	1381	1224	384
MAX	44	43	35	28	33	300	1180	2100	3400	4720	3680	800
MIN	18	24	9.2	14	24	33	88	322	1020	266	450	162
AC-FT	1700	2160	1240	1410	1600	7880	12630	60050	109000	84890	75260	22870
CFSM	.01	.01	.01	.01	.01	.05	.09	.40	.75	.57	.50	.16
IN.	.01	.02	.01	.01	.01	.06	.10	.46	.84	.66	.58	.18

CAL YR 1989 TOTAL 64527.4 MEAN 177 MAX 3220 MIN 9.2 AC-FT 128000 CFSM .07 IN. .99
WTR YR 1990 TOTAL 191908.4 MEAN 526 MAX 4720 MIN 9.2 AC-FT 380700 CFSM .22 IN. 2.94

e Estimated

MINNESOTA RIVER BASIN

05320500 LE SUEUR RIVER NEAR RAPIDAN, MN

LOCATION.--Lat 44°06'40", long 94°02'28", in SW¼ 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 mi^2, approximately.

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 National Geodetic Vertical Datum of 1929. Prior to Nov. 15, 1939, nonrecording gage at same site and datum.

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

AVERAGE DISCHARGE.--47 years (water years 1940-45, 1950-90), 456 ft^3/s, 5.63 in/yr, 330,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 24,700 ft^3/s, Apr. 8, 1965, gage height, 22.10 ft, from floodmark; maximum gage height, 22.72 ft, May 22, 1960, from floodmark; minimum daily discharge, 1.6 ft^3/s, Feb. 9-25, 1959; minimum gage height, 0.63 ft, Oct. 2, 1989.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,300 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 21	2200	1,610	4.30	July 22	1230	1,560	4.21
June 5	1700	1,310	3.86	July 31	1530	*4,360	*7.51
June 20	2100	2,880	6.06				

Minimum discharge, 4.8 ft^3/s, Oct. 2, gage height, 0.63 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.8	8.6	e11	e6.6	e9.5	e13	42	240	575	860	3880	447
2	5.1	9.5	e11	e6.8	e8.6	e14	41	212	537	685	3190	384
3	5.3	10	e11	e7.0	e7.4	e15	37	187	579	569	2640	346
4	5.7	10	e11	e7.2	e7.0	e16	36	167	820	490	2200	314
5	6.5	12	e11	e7.4	e7.0	e17	36	147	1240	409	1830	294
6	6.1	14	e11	e7.6	e7.2	e18	34	134	1230	359	1550	283
7	6.6	14	e11	e7.8	e7.4	e19	31	120	1120	400	1280	260
8	6.3	13	e10	e8.0	e7.8	e20	32	111	994	393	1040	265
9	6.4	12	e10	e8.1	e8.2	e22	35	127	858	663	843	258
10	7.1	12	e9.7	e8.2	e8.5	e50	36	151	748	613	711	351
11	7.5	12	e9.0	e8.3	e9.0	e77	34	265	1040	508	591	333
12	7.1	11	e8.6	e8.4	e11	e95	34	548	1850	526	497	289
13	7.3	12	e8.0	e8.6	e12	104	33	568	2090	648	446	242
14	7.6	12	e7.6	e8.8	e12	241	33	518	1940	702	403	202
15	7.3	e12	e7.2	e8.9	e12	251	34	469	1880	654	366	175
16	7.5	e12	e6.8	e9.0	e11	249	35	479	1950	561	328	155
17	7.3	e12	e6.4	e9.1	e11	248	37	555	2220	481	307	139
18	7.1	e12	e6.2	e9.2	e11	236	34	561	2250	407	266	130
19	7.1	e12	e6.0	e9.3	e12	187	32	631	2290	431	262	124
20	7.1	e12	e5.7	e9.4	e12	151	34	1370	2830	610	388	115
21	7.8	e12	e5.4	e9.4	e12	160	32	1570	2700	1310	928	115
22	8.7	e12	e5.4	e9.5	e12	133	31	1540	2430	1530	937	104
23	8.6	e12	e5.4	e9.6	e12	105	35	1370	2080	1490	844	95
24	8.6	e12	e5.3	e9.6	e12	84	84	1170	1790	1300	710	88
25	9.1	e12	e5.2	e9.7	e12	74	113	997	1580	1100	633	83
26	9.5	e12	e5.2	e9.8	e12	64	85	990	1360	1450	618	75
27	8.5	e12	e5.4	e9.8	e11	56	153	1010	1120	1680	777	70
28	8.9	e12	e5.7	e9.9	e12	48	236	935	988	2720	808	66
29	9.2	e12	e6.0	e9.9	---	47	265	862	1110	2920	727	61
30	8.3	e12	e6.2	e10	---	43	245	739	1070	3540	615	58
31	8.6	---	e6.4	e10	---	41	---	641	---	4210	529	---
TOTAL	229.6	354.1	239.8	270.9	286.6	2898	1979	19384	45269	34219	31144	5921
MEAN	7.41	11.8	7.74	8.74	10.2	93.5	66.0	625	1509	1104	1005	197
MAX	9.5	14	11	10	12	251	265	1570	2830	4210	3880	447
MIN	5.1	8.6	5.2	6.6	7.0	13	31	111	537	359	262	58
AC-FT	455	702	476	537	568	5750	3930	38450	89790	67870	61770	11740
CFSM	.01	.01	.01	.01	.01	.08	.06	.57	1.37	1.00	.91	.18
IN.	.01	.01	.01	.01	.01	.10	.07	.66	1.53	1.16	1.05	.20

CAL YR 1989 TOTAL 39082.2 MEAN 107 MAX 2970 MIN 5.1 AC-FT 77520 CFSM .10 IN. 1.32
WTR YR 1990 TOTAL 142195.0 MEAN 390 MAX 4210 MIN 5.1 AC-FT 282000 CFSM .35 IN. 4.81

e Estimated

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 mi^2, 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 National Geodetic Vertical Datum of 1929. 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.

AVERAGE DISCHARGE.--69 years (water years 1905, 1911-17, 1930-90), 2,959 ft^3/s, 2.70 in/yr, 2,144,000 acre-ft/yr; median of yearly mean discharges, 2,540 ft^3/s, 2.31 in/yr, 1,840,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 94,100 ft^3/s, Apr. 10, 1965, gage height, 29.09 ft; minimum observed, 26 ft^3/s, Aug. 4, 1934.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage since Apr. 26, 1881, 29.9 ft, present site and datum, from floodmark, discharge, 110,000 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 17,100 ft^3/s, July 30, gage height, 15.05 ft; minimum daily discharge, 100 ft^3/s, Dec. 24-31; minimum gage height recorded, 1.75 ft, Oct.12, but may have been lower during periods of no gage height record.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	145	164	189	e101	e180	190	1100	1560	3520	8510	14900	3370
2	136	165	e210	e102	e181	204	1090	1520	3370	7710	12000	3170
3	140	164	e207	e104	179	235	1040	1470	3890	6780	9920	3000
4	131	176	e195	e105	177	233	1030	1440	4940	5930	8270	2690
5	127	219	186	e107	169	e240	1010	1280	5570	5480	6900	2320
6	127	225	e195	e109	166	e230	934	1160	5420	4720	6040	2280
7	130	223	e200	e112	169	220	883	1110	4670	4500	5090	2090
8	126	219	e190	e114	172	279	843	1090	4310	4300	4500	1950
9	124	216	e170	e117	174	286	822	1100	3780	4170	3920	1900
10	124	209	e160	e120	e186	290	802	1090	3500	3890	3480	1930
11	125	206	e145	e125	185	447	775	1120	3760	3600	3040	1930
12	123	207	e138	e127	190	557	749	1590	4510	3840	2810	1780
13	128	207	e132	e130	e197	581	731	2170	5130	3930	2510	1640
14	128	207	e128	e134	e202	753	723	2180	5260	3640	2370	1480
15	130	208	e123	e137	e207	910	705	1940	4960	3370	2260	1380
16	133	184	e120	e142	e210	1040	703	1980	5190	3020	2000	1300
17	133	176	e117	e146	e207	1110	692	2090	6600	2720	1970	1220
18	130	e180	e113	e149	e200	1060	660	2170	8730	2290	1820	1150
19	130	176	e110	e152	e195	1000	632	2430	11300	2390	2020	1100
20	133	e182	e107	e154	e190	1070	634	3430	13300	2440	5260	1050
21	143	185	e105	e157	188	1070	626	4340	14100	3700	5180	974
22	139	186	e103	e159	185	1180	604	5050	14900	4140	4790	918
23	138	e188	e101	e160	188	1190	638	5080	16000	3940	4650	885
24	140	e188	e100	e162	e194	1090	706	4900	16300	3640	4340	859
25	140	182	e100	e165	e193	1100	744	4660	15800	3300	4100	850
26	138	186	e100	e168	190	1120	792	4520	14400	4680	3990	815
27	135	e195	e100	e170	190	1060	1580	4630	12800	6790	4780	773
28	141	e200	e100	e174	185	1040	1900	4780	11100	13900	4520	681
29	152	e200	e100	e175	---	1050	1670	4480	9910	16300	4160	641
30	160	e195	e100	e177	---	1070	1650	4170	9310	16900	3780	610
31	166	---	e100	e178	---	1070	---	3890	---	16500	3450	---
TOTAL	4195	5818	4244	4332	5249	22975	27468	84420	246330	181020	148820	46736
MEAN	135	194	137	140	187	741	916	2723	8211	5839	4801	1558
MAX	166	225	210	178	210	1190	1900	5080	16300	16900	14900	3370
MIN	123	164	100	101	166	190	604	1090	3370	2290	1820	610
AC-FT	8320	11540	8420	8590	10410	45570	54480	167400	488600	359100	295200	92700
CFSM	.01	.01	.01	.01	.01	.05	.06	.18	.55	.39	.32	.10
IN.	.01	.01	.01	.01	.01	.06	.07	.21	.61	.45	.37	.12

CAL YR 1989 TOTAL 392926 MEAN 1077 MAX 13700 MIN 100 AC-FT 779400 CFSM .07 IN. .98
WTR YR 1990 TOTAL 781607 MEAN 2141 MAX 16900 MIN 100 AC-FT 1550000 CFSM .14 IN. 1.95

e Estimated

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1963-66, 1968 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1967 to September 30, 1981, October 1982 to current year (fragmentary records).
SUSPENDED-SEDIMENT DISCHARGE: October 1967 to current year.

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

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum daily, 31.0°C, July 4-9, 1990; minimum daily, 0.0°C on many days each year.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 2,850 mg/L, Aug. 7, 1968; minimum daily mean, 13 mg/L, Nov. 24, 1974, Feb. 18, 19, 1979.
SEDIMENT LOADS: Maximum daily, 247,000 tons, Apr. 9, 1969; minimum daily, 5.2 tons, Nov. 6, 1976.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum daily observed, 28.0°C, July 2; minimum daily observed, 0.5°C, Dec. 13.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 841 mg/L, July 28; minimum daily mean, 24 mg/L, Mar. 29.
SEDIMENT LOADS: Maximum daily, 31,600 tons, July 28; minimum daily, 11 tons, Oct. 7.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	6.5	---	---	---	2.0	8.5	16.0	20.0	25.0	23.5	---
2	---	6.0	---	---	---	1.5	9.5	16.0	16.0	28.0	23.0	---
3	14.0	4.0	---	---	---	1.0	9.5	16.0	18.0	26.5	24.0	24.0
4	14.0	6.0	---	---	---	---	11.0	18.5	18.5	27.0	23.0	24.0
5	14.0	7.0	---	---	---	---	8.5	19.0	19.5	27.5	23.0	25.0
6	13.5	7.0	---	---	---	1.5	8.5	19.5	19.5	26.0	23.5	25.5
7	13.0	6.5	---	---	---	1.5	9.5	21.5	18.0	26.0	24.5	24.5
8	12.5	6.0	---	---	---	1.0	11.0	19.0	19.5	26.5	24.5	25.0
9	13.0	5.5	---	---	---	2.0	9.5	---	21.5	24.5	25.0	24.5
10	13.5	5.5	---	---	2.5	---	9.0	17.0	23.5	24.5	23.5	26.0
11	---	5.0	---	---	2.5	2.0	---	15.0	23.5	---	23.0	25.5
12	14.5	---	---	---	2.0	2.0	---	---	24.0	22.0	23.0	25.0
13	16.0	---	.5	---	---	---	9.5	16.0	25.0	23.5	24.0	25.0
14	15.0	4.0	---	---	---	4.0	10.0	16.5	24.5	---	---	20.5
15	14.5	4.0	---	---	---	3.5	10.0	---	24.5	26.0	24.5	---
16	12.5	3.5	---	---	---	3.5	10.0	15.0	---	27.0	25.5	---
17	11.5	---	---	---	---	---	13.0	15.0	25.0	26.5	25.5	18.0
18	10.0	---	---	---	---	---	13.0	15.5	24.5	27.0	23.0	17.0
19	9.5	3.5	---	---	---	---	12.5	14.5	23.0	25.5	22.0	17.5
20	9.0	3.0	---	---	---	7.0	16.0	14.5	22.0	25.5	20.5	16.5
21	11.5	2.5	---	---	1.5	8.0	12.0	14.5	21.5	25.0	20.0	16.0
22	11.5	---	---	---	2.0	5.0	---	---	21.0	24.0	21.0	15.0
23	13.0	---	---	2.0	---	4.0	---	16.5	22.5	24.0	21.0	15.0
24	14.5	---	---	---	---	5.0	---	17.0	23.0	24.5	22.5	18.5
25	16.5	3.0	---	---	---	5.0	---	17.0	---	24.0	23.5	19.5
26	16.5	---	---	---	2.0	5.0	---	17.5	26.5	22.5	26.0	17.0
27	16.5	---	---	---	2.0	6.0	16.0	17.0	26.5	---	25.0	17.0
28	13.5	---	---	---	2.0	6.0	13.0	19.0	26.0	22.0	25.0	17.5
29	10.0	---	---	---	---	6.0	12.0	19.5	23.0	22.0	23.0	18.0
30	9.5	---	---	---	---	8.5	12.5	21.0	25.0	22.5	25.0	15.0
31	9.0	---	---	---	---	7.5	---	20.5	---	23.0	22.0	---
MEAN	---	---	---	---	---	---	---	---	---	---	---	---
MAX	---	---	---	---	---	---	---	---	---	---	---	---
MIN	---	---	---	---	---	---	---	---	---	---	---	---

MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

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	45	18	29	13	45	23	52	14	62	30	25	13
2	45	17	28	12	46	26	52	14	70	34	24	13
3	44	17	31	14	45	25	52	15	78	38	44	28
4	48	17	41	19	45	24	52	15	86	41	57	36
5	60	21	42	25	45	23	52	15	95	43	47	30
6	45	15	35	21	45	24	52	15	102	46	35	22
7	31	11	42	25	46	25	52	16	109	50	37	22
8	44	15	69	41	46	24	52	16	116	54	36	27
9	50	17	97	57	46	21	52	16	127	60	24	19
10	42	14	79	45	46	20	52	17	166	83	33	26
11	36	12	63	35	48	19	52	18	145	72	110	133
12	44	15	61	34	50	19	52	18	164	84	70	105
13	57	20	57	32	52	19	52	18	181	96	92	144
14	43	15	54	30	52	18	52	19	175	95	166	337
15	58	20	44	25	52	17	52	19	140	78	112	275
16	110	40	32	16	52	17	52	20	103	58	88	247
17	76	27	30	14	52	16	52	20	91	51	54	162
18	58	20	35	17	52	16	52	21	85	46	40	114
19	64	22	44	21	52	15	52	21	79	42	30	81
20	65	23	47	23	52	15	52	22	73	37	62	179
21	60	23	41	20	52	15	60	25	66	34	51	147
22	64	24	38	19	52	14	80	34	85	42	61	194
23	78	29	36	18	52	14	67	29	87	44	56	180
24	80	30	35	18	52	14	60	26	100	52	64	188
25	72	27	33	16	52	14	60	27	84	44	64	190
26	55	20	35	18	52	14	60	27	67	34	60	181
27	57	21	50	26	52	14	60	28	47	24	59	169
28	60	23	45	24	52	14	60	28	32	16	65	183
29	57	23	45	24	52	14	60	28	---	---	62	176
30	45	19	45	24	52	14	60	29	---	---	69	199
31	35	16	---	---	52	14	60	29	---	---	88	254
TOTAL	---	631	---	726	---	561	---	659	---	1428	---	4074
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	93	276	41	173	130	1240	188	4320	420	16900	95	864
2	86	253	38	156	135	1230	130	2710	282	9140	95	813
3	65	183	51	202	160	1680	141	2580	204	5460	95	769
4	75	209	61	237	175	2330	170	2720	202	4510	90	654
5	71	194	63	218	181	2720	189	2800	191	3560	71	445
6	56	141	57	179	145	2120	230	2930	180	2940	70	431
7	59	141	55	165	110	1390	240	2920	172	2360	65	367
8	55	125	54	159	110	1280	195	2260	132	1600	59	311
9	50	111	50	148	130	1330	185	2080	123	1300	67	344
10	44	95	40	118	120	1130	210	2210	129	1210	67	349
11	38	80	60	181	555	5910	170	1650	96	788	61	318
12	36	73	160	687	795	9680	182	1890	94	713	91	437
13	43	85	129	756	650	9000	135	1430	110	745	78	345
14	52	102	80	471	538	7640	130	1280	101	646	50	200
15	55	105	76	398	446	5970	138	1260	89	543	43	160
16	76	144	75	401	402	5630	140	1140	86	464	41	144
17	65	121	86	485	764	13600	125	918	108	574	39	128
18	52	93	111	650	552	13000	110	680	82	403	42	130
19	60	102	347	2320	492	15000	150	968	89	485	50	148
20	79	135	505	4680	500	18000	343	2260	784	11100	50	142
21	78	132	460	5390	380	14500	400	4000	640	8950	55	145
22	71	116	382	5210	318	12800	222	2480	410	5300	41	102
23	74	127	268	3680	274	11800	215	2290	220	2760	47	112
24	75	143	169	2240	205	9020	192	1890	260	3050	66	153
25	80	161	123	1550	178	7590	84	748	205	2270	61	140
26	98	210	142	1730	155	6030	258	3260	170	1830	111	244
27	121	506	150	1880	130	4490	510	9350	120	1550	146	305
28	74	380	132	1700	138	4140	841	31600	89	1090	112	206
29	51	230	160	1940	181	4840	610	26800	121	1360	60	104
30	43	192	170	1910	202	5080	465	21200	132	1350	45	74
31	---	---	155	1630	---	---	450	20000	105	978	---	---
TOTAL	---	4965	---	41644	---	200170	---	164624	---	95929	---	9084
YEAR		524495										

05325000 MINNESOTA RIVER AT MANKATO, MN--Continued

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SED. SUSP. FALL DIAM. % FINER THAN .002 MM (70337)	SED. SUSP. FALL DIAM. % FINER THAN .004 MM (70338)	SED. SUSP. FALL DIAM. % FINER THAN .008 MM (70339)	SED. SUSP. FALL DIAM. % FINER THAN .016 MM (70340)
JUN							
15...	0830	4800	313	31	39	47	55
20...	1220	13400	531	50	59	70	80

DATE	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343)	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344)	SED. SUSP. FALL DIAM. % FINER THAN .500 MM (70345)	SED. SUSP. FALL DIAM. % FINER THAN 1.00 MM (70346)	SED. SUSP. SIEVE DIAM. % FINER THAN 2.00 MM (70336)
JUN						
15...	66	68	73	90	97	100
20...	95	98	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 mi^2.

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 National Geodetic Vertical Datum of 1929.

REMARKS.--Records good.

AVERAGE DISCHARGE.--17 years, 82.0 ft^3/s, 4.70 in/yr, 59,410 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,760 ft^3/s, Aug. 25, 1981, gage height, 9.09 ft; minimum discharge, 0.20 ft^3/s, Jan. 4, 1981, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 300 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 13	0800	359	3.54	July 7	0800	303	3.03
June 17	0600	*892	*6.00	July 28	1300	419	3.67
June 20	0100	404	3.78				

Minimum discharge, 0.90 ft^3/s, Oct. 24, Nov. 15; minimum gage height, 0.65 ft, Sept. 29.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	1.4	2.0	1.7	1.7	1.5	6.6	22	71	159	220	14
2	1.3	1.5	2.1	1.7	1.7	1.4	7.2	23	73	130	250	13
3	1.6	1.6	2.1	1.7	1.7	1.4	6.5	25	77	107	269	20
4	1.3	1.6	2.1	1.7	1.7	1.1	6.3	23	70	90	270	15
5	1.6	1.8	2.2	1.7	1.7	1.5	6.3	21	69	73	251	13
6	1.6	2.2	1.7	1.7	1.6	1.3	5.9	18	86	57	229	13
7	1.4	2.4	1.8	1.7	1.6	1.5	5.3	17	138	190	197	12
8	1.2	2.9	1.8	1.7	1.6	2.0	5.0	17	202	243	160	11
9	1.5	2.5	1.5	1.3	1.6	5.2	5.1	19	254	224	111	10
10	1.6	2.4	1.6	1.4	1.3	5.7	5.1	17	280	163	85	9.7
11	1.5	2.3	1.6	1.4	1.2	92	4.5	16	285	126	70	9.2
12	1.4	1.9	1.6	1.4	1.5	57	4.3	15	254	128	58	7.6
13	1.6	1.9	1.6	1.4	1.6	33	4.0	14	276	113	52	7.4
14	1.6	2.0	1.6	1.3	1.5	42	3.7	20	209	98	45	12
15	1.9	2.1	1.6	1.3	1.4	32	3.9	22	155	87	38	8.6
16	2.0	2.0	1.6	1.3	1.4	28	4.3	31	133	75	33	6.2
17	2.1	1.9	1.6	1.3	1.3	20	4.7	27	633	70	30	5.8
18	1.5	2.0	1.6	1.3	1.3	15	4.3	27	394	64	27	6.1
19	1.6	2.0	1.7	1.7	1.3	12	4.2	35	311	67	24	7.2
20	1.4	2.1	1.7	1.4	1.3	11	4.3	56	373	62	26	5.6
21	1.5	2.2	1.7	1.4	1.3	11	5.5	49	326	59	23	5.4
22	1.9	2.3	1.5	1.4	1.3	8.7	4.3	49	321	55	23	5.2
23	1.5	2.3	1.4	1.5	1.3	6.3	4.0	58	335	52	23	4.2
24	1.4	2.3	1.7	1.6	1.4	5.5	4.4	61	346	49	23	4.2
25	1.2	2.3	1.7	1.6	1.4	5.2	5.6	63	346	49	21	4.1
26	1.3	2.1	1.7	1.6	1.4	4.6	7.0	167	336	118	21	3.6
27	1.3	2.6	1.7	1.6	1.4	4.5	7.4	175	318	162	19	3.4
28	1.6	2.3	1.5	1.6	1.4	4.1	17	123	285	316	18	3.0
29	1.3	2.3	1.7	1.6	---	4.5	18	95	245	255	17	2.6
30	1.3	2.2	1.7	1.6	---	4.3	26	82	200	199	16	2.2
31	1.3	---	1.7	1.6	---	4.5	---	74	---	195	16	---
TOTAL	46.7	63.4	52.7	47.2	40.9	427.8	200.7	1461	7401	3835	2665	244.3
MEAN	1.51	2.11	1.70	1.52	1.46	13.8	6.69	47.1	247	124	86.0	8.14
MAX	2.1	2.9	2.2	1.7	1.7	92	26	175	633	316	270	20
MIN	1.2	1.4	1.4	1.3	1.2	1.1	3.7	14	69	49	16	2.2
AC-FT	93	126	105	94	81	849	398	2900	14680	7610	5290	485
CFSM	.01	.01	.01	.01	.01	.06	.03	.20	1.04	.52	.36	.03
IN.	.01	.01	.01	.01	.01	.07	.03	.23	1.16	.60	.42	.04

CAL YR 1989 TOTAL 4013.6 MEAN 11.0 MAX 279 MIN 1.1 AC-FT 7960 CFSM .05 IN. .63
WTR YR 1990 TOTAL 16485.7 MEAN 45.2 MAX 633 MIN 1.1 AC-FT 32700 CFSM .19 IN. 2.59

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 upstream from Mississippi River.

DRAINAGE AREA.--16,200 mi^2, 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.

AVERAGE DISCHARGE.--56 years, 3,708 ft^3/s, 3.11 in/yr, 2,686,000 acre-ft/yr; median of yearly mean discharges, 3,140 ft^3/s, 2.63 in/yr, 2,280,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 117,000 ft^3/s, Apr. 11, 1965; maximum gage height, 35.07 ft, Apr. 12, 1965 (backwater from Mississippi River); minimum discharge, 79 ft^3/s, Nov. 17, 1955; minimum gage height, 2.66 ft, Nov. 22, 1935.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 17,000 ft^3/s, Aug. 2, gage height, 20.23 ft; minimum daily discharge, 169 ft^3/s, Dec. 28; minimum recorded gage height, 3.08 ft, Nov. 18.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	241	233	296	e175	e285	e290	1140	1890	4370	11500	16100	3810
2	250	239	300	e180	e278	e300	1140	1830	4120	10100	16700	3630
3	236	239	266	e185	e265	e310	1160	1740	3870	9160	16800	3540
4	230	241	241	e190	e260	e320	1160	1670	4120	8220	15600	3400
5	237	261	257	e195	e260	e320	1110	1620	5060	7370	12500	3120
6	239	270	e260	e200	e270	e325	1090	1540	5710	6700	9480	2850
7	228	282	e255	e205	e278	e330	1060	1390	5820	6300	7720	2590
8	225	309	e255	e210	e278	e340	1010	1290	5400	6270	6470	2510
9	225	310	e250	e215	e278	e345	980	1230	4970	6080	5670	2290
10	224	299	e245	e220	e278	e380	956	1230	4530	5740	4990	2200
11	222	302	e240	e225	e278	e490	917	1220	4240	5370	4440	2100
12	222	290	e235	e230	e278	e635	893	1210	4920	4940	3960	2140
13	221	292	e225	e235	e280	e785	880	1280	6350	4920	3610	2030
14	220	287	e215	e240	e285	e915	870	1870	7790	4990	3290	1920
15	221	293	e210	e245	e270	968	847	2240	7550	4790	3010	1760
16	226	291	e205	e250	257	1080	847	2270	6830	4400	2800	1600
17	221	274	e200	e255	e261	1150	826	2210	7740	3990	2600	1490
18	217	211	e195	e260	e265	1180	818	2240	9970	3590	2470	1420
19	217	250	e190	e265	e280	1140	806	2390	11100	3300	2350	1350
20	218	e270	e185	e270	e290	1090	795	2700	12200	3020	2360	1280
21	216	e265	e180	e272	e295	1110	780	3340	13200	3050	4670	1220
22	217	e264	e175	e274	e295	1130	777	4150	13900	3560	5590	1140
23	222	259	e175	e278	e300	1150	763	4890	14400	4410	5340	1050
24	229	249	e170	e280	e300	1210	790	5200	14800	4410	5120	1000
25	228	276	e170	e282	e290	1200	852	5190	15200	4250	4890	988
26	223	297	e170	e284	e275	1130	869	5170	15500	4420	4660	965
27	225	e310	e170	e284	e272	1140	909	5380	15700	6160	4420	936
28	224	276	e169	e284	e275	1150	1070	5300	15700	8260	4770	900
29	231	262	e170	e285	---	1120	1810	5270	15100	11500	4790	854
30	230	285	e170	e285	---	1100	1970	5040	13400	13900	4530	792
31	226	---	e170	e285	---	1110	---	4700	---	15200	4170	---
TOTAL	7011	8186	6614	7543	7776	25243	29895	88690	273560	199870	195870	56875
MEAN	226	273	213	243	278	814	996	2861	9119	6447	6318	1896
MAX	250	310	300	285	300	1210	1970	5380	15700	15200	16800	3810
MIN	216	211	169	175	257	290	763	1210	3870	3020	2350	792
AC-FT	13910	16240	13120	14960	15420	50070	59300	175900	542600	396400	388500	112800
CFSM	.01	.02	.01	.02	.02	.05	.06	.18	.56	.40	.39	.12
IN.	.02	.02	.02	.02	.02	.06	.07	.20	.63	.46	.45	.13

CAL YR 1989 TOTAL 460580 MEAN 1262 MAX 14000 MIN 169 AC-FT 913600 CFSM .08 IN. 1.06
WTR YR 1990 TOTAL 907133 MEAN 2485 MAX 16800 MIN 169 AC-FT 1799000 CFSM .15 IN. 2.08

e Estimated

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. Letter E indicates estimated value.

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	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 (STAND-ARD UNITS) (00400)	PH 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												
26...	1449	--	230	995	982	8.2	8.0	15.0	15	742	13.3	K6
FEB												
27...	1237	--	272	915	1090	8.4	8.1	0.5	12	759	20.3	K4
MAY												
02...	1220	--	1840	801	794	8.2	8.3	11.5	20	749	12.0	K400
SEP												
05...	1015	312	--	900	791	8.5	8.3	24.5	12	744	7.3	K33

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)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
OCT												
26...	K7	91	42	61	5.8	295	274	0	360	150	68	0.30
FEB												
27...	K6	97	48	69	6.3	320	310	0	390	180	75	0.20
MAY												
02...	E48	84	34	33	6.1	197	198	6	228	120	43	0.30
SEP												
05...	220	82	41	27	5.9	210	205	11	234	150	36	<0.10

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT												
26...	13	594	0.03	<0.10	0.05	0.02	1.4	0.16	0.04	0.01	68	94
FEB												
27...	8.3	712	0.01	0.40	0.02	0.02	2.0	0.26	0.02	<0.01	22	68
MAY												
02...	12	526	0.16	7.60	0.01	<0.01	1.7	0.21	0.05	0.04	79	96
SEP												
05...	16	531	0.03	3.50	0.02	0.02	1.1	0.11	0.02	0.01	87	74

05330000 MINNESOTA RIVER NEAR JORDAN, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)
OCT											
26...	1449	<10	3	89	<0.5	<1.0	7	<3	1	12	1
FEB											
27...	1237	<10	<1	69	<0.5	<1.0	<5	<3	<10	4	<10
MAY											
02...	1220	<10	2	83	<0.5	<1.0	<1	<3	2	29	1
SEP											
05...	1015	<10	4	86	<0.5	<1.0	<1	<3	4	6	1

DATE	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
OCT										
26...	34	10	<0.1	10	3	<1	<1.0	440	<6	15
FEB										
27...	38	120	0.2	<10	<10	<1	<1.0	490	<6	<3
MAY										
02...	25	12	<0.1	<10	4	2	<1.0	320	<6	<3
SEP										
05...	35	1	<0.1	<10	4	2	<1.0	330	<6	5

RADIOCHEMICAL, ANALYSES, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90) (80060)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)
OCT									
26...	1449	2.6	0.6	8.6	0.8	7.4	0.6	0.15	2.0
MAY									
02...	1220	5.4	2.8	10	3.0	7.6	2.4	0.16	5.4

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 mi^2, approximately.

WATER-DISCHARGE RECORDS

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 National Geodetic Vertical Datum of 1929. Prior to Mar. 18, 1925, nonrecording gage at several sites within 300 ft of present site at present datum. Mar. 18, 1925, to Mar. 10, 1933, water-stage recorder and Mar. 11, 1933, to Sept. 14, 1939, nonrecording gage, at present site and datum. Since September 1938, auxiliary water-stage recorder 5.6 mi downstream.
REMARKS.--Records good. Slight regulation except during extreme floods by reservoirs on headwaters and by power plants. Beginning July 20, 1938, sewage from Minneapolis and St. Paul, which formerly entered above station, was diverted to a sewage-disposal plant, thence to river below station. Figures of daily discharge do not include this diversion.
COOPERATION.--Records of Mississippi River at Twin City lock and dam computed and furnished by Ford Motor Co. Diversion through sewage disposal plant furnished by Metropolitan Waste Control Commission.
AVERAGE DISCHARGE (ADJUSTED FOR DIVERSION).--92 years (water years 1895, 1897, 1901-90), 11,132 ft^3/s, 4.11 in/yr; median of yearly mean discharges, 9,954 ft^3/s, 3.67 in/yr.
EXTREMES FOR PERIOD OF RECORD (1867-70, 1872-1990).--Maximum discharge, 171,000 ft^3/s, Apr. 16, 1965, gage height, 26.01 ft, from floodmark. Maximum flood known since at least 1851, that of 1965. Flood of Apr. 11, 1870 reached a stage of 19.4 ft, discharge, 100,000 ft^3/s.
EXTREMES FOR PERIOD OF RECORD (1897,1917-90).--Minimum daily discharge, 632 ft^3/s, Aug. 26, 1934.
EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 35,500 ft^3/s, June 26; mimimum daily, 1,980 ft^3/s, Dec. 16, 23.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5200	4060	3710	3100	2910	2390	9640	11200	13900	29300	24400	8310
2	4610	3740	3620	2980	3190	2690	9190	13200	13100	26200	25300	7920
3	4820	3960	3550	2940	3180	2580	9390	15700	12400	23700	26000	7870
4	4790	4180	3580	3050	2930	2390	9180	16400	13600	21700	25800	7740
5	4640	3820	4480	3160	2660	2510	8990	16900	14300	19800	24300	7220
6	4510	3820	4440	2940	2480	2450	9830	16900	17100	18100	21100	7110
7	4810	4400	4020	2680	2480	2490	9960	16500	20500	16900	16700	6690
8	4520	4420	3240	2910	2450	2570	10300	15700	22700	15700	14700	6590
9	4240	4510	3110	3370	2540	2580	9550	15000	23000	15400	12800	6310
10	4400	4630	3560	3020	2480	2600	9750	14300	22500	15700	11200	6680
11	4070	4700	3870	2980	2510	2640	9920	13400	22000	14700	10100	5480
12	3950	4310	3140	2980	2620	3680	8760	12300	22700	14100	8970	7090
13	4040	4330	2630	2690	2710	4560	8540	11600	23600	14300	8520	7160
14	4250	4150	3320	2640	2610	8130	8050	10600	24600	14000	7450	6320
15	4080	4480	2830	3010	2560	11000	7920	10800	25900	13500	6870	6640
16	3590	4280	1980	3240	3350	11800	7370	10500	24500	12900	6680	5560
17	3870	3940	2790	2920	2970	15000	7330	11200	24200	12600	6300	5210
18	3820	3450	2870	2720	3190	15200	7250	11400	27200	12100	5580	4680
19	3820	3320	3030	2530	3180	16100	6480	11100	29600	11400	6470	4540
20	3630	3210	2490	2610	2560	16500	6380	11300	31000	11000	6970	4710
21	3800	3110	2200	2580	2660	17600	6340	11500	31700	10300	7440	4540
22	3820	3230	2730	2540	2470	17900	6240	11800	32500	9450	8400	4570
23	3640	3500	1980	2560	2630	16900	5940	12700	32900	9120	9890	4930
24	4080	3460	1990	2440	2590	14500	6270	14000	34600	10200	9710	4400
25	4180	2960	2370	2560	2520	13900	5980	14500	35200	10100	9610	4640
26	4540	3120	3060	2360	2620	12900	6460	14100	35500	9810	9220	4210
27	3710	3450	2820	2810	2920	11900	6630	13900	35100	11800	9770	4480
28	3390	4520	2560	2640	2420	11400	7680	14600	33800	14100	9270	3970
29	3510	3850	2780	2560	---	10800	8360	14500	33100	16800	9880	4320
30	3480	3290	3190	2560	---	10300	9230	14500	31900	20500	9760	3840
31	3880	---	3100	2710	---	10400	---	14500	---	23000	9380	---
TOTAL	127690	116200	95040	86790	76390	278360	242910	416600	764700	478280	378540	173730
MEAN	4119	3873	3066	2800	2728	8979	8097	13440	25490	15430	12210	5791
MAX	5200	4700	4480	3370	3350	17900	10300	16900	35500	29300	26000	8310
MIN	3390	2960	1980	2360	2420	2390	5940	10500	12400	9120	5580	3840
AC-FT	253300	230500	188500	172100	151500	552100	481800	826300	1517000	948700	750800	344600
CFSM	.11	.11	.08	.08	.07	.24	.22	.37	.69	.42	.33	.16
IN.	.13	.12	.10	.09	.08	.28	.25	.42	.77	.48	.38	.18
†	319	310	308	310	307	363	333	353	453	408	394	358
MEAN‡	4438	4183	3374	3110	3035	9342	8430	13793	25943	15838	12604	6149
CFSM‡	.12	.11	.09	.08	.08	.25	.23	.37	.70	.43	.34	.17
IN‡	.14	.13	.11	.10	.09	.29	.26	.43	.79	.50	.40	.19

CAL YR 1989 TOTAL 2580900 MEAN 7071 MAX 29200 MIN 1640 MEAN‡ 7412 CFSM‡ .20 IN‡ 2.74
WTR YR 1990 TOTAL 3235230 MEAN 8864 MAX 35500 MIN 1980 MEAN‡ 9216 CFSM‡ .25 IN‡ 3.40
† Diversion equivalent in cubic feet per second through sewage disposal plant.
‡ Adjusted for diversion.

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1956 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1956 to current year.

INSTRUMENTATION.--Temperature recorder since October 1956.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 31.0°C, July 24-28, 1964, July 31, 1975, July 19, 21, 1977, Aug. 17, 1988; minimum, 0.0°C many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum 28.0°C, July 4, 5, 18, 19; minimum, 0.0°C, Nov. 26-28, Dec. 1-11, 16, 17, 25, 29, 31.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	17.5	16.5	17.0	12.0	11.0	11.5	1.0	.0	.5	1.0	.5	.5
2	17.5	15.5	16.5	11.0	9.5	10.0	1.0	.0	.5	1.0	.5	.5
3	16.0	15.0	15.5	9.5	7.5	8.5	1.0	.0	.5	2.0	1.0	1.5
4	15.0	13.5	14.5	7.0	6.5	7.0	1.0	.0	.5	2.0	1.0	1.5
5	13.5	12.5	13.0	6.5	6.0	6.5	1.0	.0	.5	2.0	1.0	1.5
6	13.0	12.5	12.5	6.0	5.5	6.0	.5	.0	.0	2.0	1.0	1.0
7	12.5	12.0	12.5	6.5	6.0	6.0	.5	.0	.0	1.5	.5	1.0
8	12.5	12.0	12.0	7.5	6.5	7.0	.5	.0	.5	2.5	1.5	2.0
9	12.5	11.5	12.0	7.0	6.5	7.0	.5	.0	.0	2.5	1.5	2.0
10	12.5	11.5	12.0	6.5	5.5	6.0	.5	.0	.0	3.0	1.0	1.5
11	12.5	11.5	12.0	5.5	5.5	5.5	1.0	.0	.5	4.5	2.5	3.0
12	12.5	12.0	12.5	5.0	4.5	5.0	1.5	.5	1.0	3.0	1.5	2.0
13	13.0	12.0	12.5	5.5	4.0	5.0	1.5	.5	1.0	2.0	1.0	1.5
14	14.0	13.0	13.5	5.5	5.0	5.0	1.0	.5	.5	2.0	.5	1.0
15	14.5	13.0	14.0	6.0	5.5	5.5	1.5	.5	1.0	1.5	.5	1.0
16	14.0	13.5	13.5	5.5	4.5	5.0	1.0	.0	.5	1.5	.5	1.0
17	13.0	12.0	12.5	4.5	3.5	4.0	1.0	.0	.5	2.5	1.0	2.0
18	12.0	11.0	11.5	3.5	1.5	2.5	1.0	.5	1.0	3.0	1.5	2.5
19	11.0	10.0	10.5	2.0	1.0	1.5	1.0	.5	1.0	2.5	1.5	1.5
20	10.0	10.0	10.0	4.0	2.0	3.0	1.0	1.0	1.0	2.0	1.0	1.5
21	10.0	9.0	9.5	4.0	2.5	3.0	1.5	.5	1.0	2.5	1.5	2.0
22	10.5	9.0	9.5	2.0	1.0	1.5	1.5	.5	1.0	3.0	1.5	2.0
23	10.5	9.0	10.0	1.0	.5	1.0	1.5	.5	1.0	2.5	1.5	2.0
24	11.5	10.0	10.5	1.5	.5	1.0	1.0	.5	.5	3.0	2.0	2.5
25	13.0	11.5	12.0	1.5	.5	1.0	.5	.0	.0	3.5	2.0	2.5
26	14.0	13.0	13.5	.5	.0	.5	1.0	.5	.5	2.5	1.5	2.0
27	14.5	13.5	14.0	1.0	.0	.5	1.0	.5	.5	3.0	2.0	2.0
28	14.5	14.0	14.5	1.0	.0	.5	1.0	.5	.5	2.5	1.5	1.5
29	15.0	14.5	14.5	2.0	.5	1.0	.5	.0	.5	2.5	1.0	1.5
30	14.5	13.0	14.0	1.5	.5	1.0	.5	.5	.5	3.0	2.0	2.5
31	13.0	12.0	12.5	---	---	---	.5	.0	.5	2.0	1.0	1.5
MONTH	17.5	9.0	12.7	12.0	.0	4.3	1.5	.0	.6	4.5	.5	1.7

MISSISSIPPI RIVER BASIN

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

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	2.0	1.5	1.5	4.0	2.5	3.5	7.0	7.0	7.0	12.5	12.0	12.5
2	1.5	1.0	1.5	5.0	3.5	4.0	7.5	7.0	7.0	12.5	11.5	12.0
3	1.5	1.0	1.0	5.0	4.0	4.5	7.5	6.5	7.0	13.5	12.0	13.0
4	2.5	1.5	1.5	6.0	4.5	5.5	8.5	7.0	7.5	14.5	13.5	14.0
5	3.5	2.0	3.0	6.5	5.0	6.0	8.5	8.0	8.0	15.0	14.5	14.5
6	3.5	2.5	3.0	5.5	4.5	5.0	8.0	7.0	7.5	15.0	14.5	15.0
7	4.0	2.0	3.0	5.0	4.0	4.5	7.0	6.5	6.5	16.5	15.0	16.0
8	5.0	3.0	4.0	5.0	4.0	4.0	7.5	6.0	7.0	17.5	16.5	17.0
9	5.5	4.5	5.0	5.5	5.0	5.0	8.5	7.5	8.0	17.5	16.5	17.5
10	6.0	5.0	5.0	5.5	5.0	5.5	8.5	8.0	8.0	16.5	15.5	16.0
11	5.5	4.5	5.0	5.5	4.0	5.0	7.5	7.0	7.5	16.0	15.0	15.5
12	5.5	4.5	5.0	7.0	5.0	6.0	7.5	6.5	7.0	16.5	16.0	16.0
13	5.0	3.0	4.5	7.5	6.0	6.5	9.0	7.0	8.0	17.0	16.5	17.0
14	3.5	2.0	3.0	7.0	5.0	6.0	10.0	8.5	9.0	17.0	16.5	16.5
15	4.0	2.0	2.5	5.5	3.5	4.5	10.5	9.5	10.0	17.0	16.0	16.5
16	2.0	1.5	1.5	3.5	2.0	3.0	10.5	10.0	10.0	16.5	16.0	16.0
17	1.5	1.5	1.5	3.0	2.0	2.5	10.0	9.5	10.0	16.0	15.0	15.0
18	2.5	1.0	1.5	3.0	2.0	2.5	10.5	9.0	10.0	15.0	14.5	14.5
19	2.5	1.5	2.0	2.5	2.0	2.0	11.0	10.0	10.5	14.5	13.5	14.0
20	2.5	1.5	2.0	3.5	2.0	3.0	12.5	11.0	11.5	14.0	13.5	14.0
21	4.5	2.0	3.0	4.5	3.5	4.0	14.0	12.0	13.0	15.0	14.0	14.5
22	5.0	3.0	4.0	5.0	3.5	4.5	16.0	14.0	14.5	16.5	15.0	16.0
23	4.5	2.5	3.5	4.0	3.0	3.5	17.5	16.0	16.5	17.0	16.0	16.5
24	4.5	3.0	3.5	3.0	2.0	2.5	19.0	17.5	18.5	18.5	17.0	18.0
25	3.5	2.5	3.0	3.5	2.0	3.0	21.0	19.0	19.5	18.5	18.0	18.0
26	3.5	2.0	2.5	4.5	3.0	3.5	21.5	20.5	21.0	18.0	18.0	18.0
27	3.5	2.5	3.0	5.5	3.5	4.5	21.0	20.0	20.5	18.0	17.5	18.0
28	3.5	2.0	2.5	6.5	5.0	5.5	20.0	17.5	18.5	19.0	18.0	18.5
29	---	---	---	7.0	5.5	6.5	17.0	14.5	16.0	20.0	19.0	19.5
30	---	---	---	7.5	6.0	7.0	14.5	12.5	13.5	20.5	20.0	20.0
31	---	---	---	7.0	6.0	6.5	---	---	---	21.0	20.0	20.5
MONTH	6.0	1.0	2.9	7.5	2.0	4.5	21.5	6.0	11.3	21.0	11.5	16.1
		JUNE			JULY			AUGUST			SEPTEMBER	
1	21.5	20.5	21.0	27.5	26.5	27.0	24.5	23.5	24.0	26.5	25.5	26.0
2	22.0	20.0	21.5	27.5	26.5	27.0	24.5	23.5	24.0	26.5	25.5	26.0
3	20.5	18.5	19.5	27.5	26.5	27.0	24.5	24.0	24.5	26.5	25.5	26.0
4	18.5	17.5	17.5	28.0	27.0	27.5	24.5	24.0	24.5	26.0	25.5	25.5
5	18.5	17.5	17.5	28.0	27.0	27.5	24.5	23.5	24.0	26.5	26.0	26.0
6	19.5	18.0	18.5	27.0	26.0	26.5	24.0	23.0	23.5	27.0	26.0	26.5
7	20.0	19.5	20.0	26.0	25.0	25.5	24.5	23.5	24.0	27.0	26.0	26.5
8	20.0	19.5	20.0	25.5	25.0	25.5	24.5	23.5	24.0	26.5	25.5	26.0
9	20.5	20.0	20.5	26.0	25.0	26.0	24.5	23.5	24.0	25.5	25.0	25.5
10	22.0	20.5	21.0	26.0	25.5	26.0	25.0	23.5	24.5	25.5	25.0	25.5
11	22.0	21.0	21.5	26.0	24.5	25.0	25.0	24.0	24.5	25.0	24.5	25.0
12	22.5	21.5	22.0	24.5	23.5	24.0	25.0	23.5	24.5	26.0	24.5	25.0
13	24.0	22.5	23.5	23.5	23.0	23.5	24.0	23.0	23.5	25.5	24.5	25.0
14	24.5	23.5	24.0	23.5	23.0	23.5	24.5	23.5	24.0	25.5	24.0	24.5
15	24.5	23.5	24.0	24.0	23.0	23.5	25.0	24.0	24.5	24.0	23.0	23.5
16	24.0	22.0	23.0	25.5	24.0	24.5	25.5	25.0	25.0	23.0	21.5	22.0
17	22.0	21.5	21.5	26.5	25.5	26.0	27.0	25.5	26.0	21.5	20.0	21.0
18	23.0	21.5	22.0	28.0	26.0	27.0	26.5	25.0	26.0	20.0	19.0	19.5
19	23.0	22.0	23.0	26.0	27.0	27.5	25.5	23.5	24.5	19.0	18.0	18.5
20	23.5	23.0	23.0	27.5	27.0	27.0	23.5	22.0	23.0	18.5	17.5	18.0
21	23.5	23.0	23.5	27.0	26.0	26.5	22.5	21.5	21.5	18.5	17.5	18.0
22	23.0	22.5	23.0	26.0	25.5	26.0	22.5	21.0	21.5	18.0	17.0	17.5
23	23.0	22.5	23.0	26.0	24.5	25.5	22.5	21.5	22.0	17.0	16.0	16.5
24	23.5	22.5	23.0	26.5	25.0	25.5	23.5	22.0	22.5	16.0	15.5	16.0
25	24.5	23.0	24.0	26.0	25.0	25.5	24.5	23.0	23.5	16.5	15.5	16.0
26	25.5	24.5	25.0	25.5	24.0	24.5	26.0	24.0	24.5	17.5	16.0	17.0
27	26.0	25.5	25.5	24.0	23.5	23.5	26.5	25.0	26.0	18.0	17.5	18.0
28	25.5	24.5	25.0	24.0	23.0	23.5	27.0	26.0	26.5	18.5	17.5	18.0
29	26.5	25.0	25.5	25.0	23.5	24.5	26.5	25.5	26.0	18.5	16.0	18.0
30	27.0	26.0	26.5	25.0	24.0	24.5	27.0	25.5	26.0	18.5	17.5	18.0
31	---	---	---	24.5	24.0	24.5	27.0	25.5	26.0	---	---	---
MONTH	27.0	17.5	22.3	28.0	23.0	25.5	27.0	21.0	24.3	27.0	15.5	21.8
YEAR	28.0	.0	12.4									

MISSISSIPPI RIVER MAIN STEM

05331545 MISSISSIPPI RIVER AT FIFTH STREET AT NEWPORT, MN

WATER-QUALITY RECORDS

LOCATION.--Lat 44°51'37", long 93°00'24", in NE¼NE¼ sec.2, T.27 N., R.22 W., Washington County, Hydrologic Unit 07010206, on left bank at the end of Fifth Street, and at mile 830.6 upstream from Ohio River.

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: December 1978 to current year.
pH: December 1978 to current year.
WATER TEMPERATURES: December 1978 to current year.
DISSOLVED OXYGEN: December 1978 to current year.

INSTRUMENTATION.--Water-quality monitor since December 1978.

REMARKS.-Water is pumped to a monitor that is inside a heated shelter. Extremes are published for those years with 80 percent or more daily record. Values not corrected for instrument drift between calibrations.

COOPERATION.--Water-quality monitor is operated by the Metropolitan Waste Control Commission, St. Paul, Minn.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water year 1981, 1983-90): Maximum, 964 microsiamens, June 3, 1990; minimum, 201 microsiemens, Mar. 22, 1985.
pH (water year 1981, 1983-90): Maximum, 8.9 units, Aug. 15-16, 1990; minimum, 7.0 units, Mar. 22, 1990.
WATER TEMPERATURES (water year 1981, 1983-90): Maximum, 30.5 °C, Aug. 3, 1987; minimum, 0.0 °C on many days during winter period.
DISSOLVED OXYGEN (water year 1981, 1983-85, 88-90): Maximum, 15.7 mg/L, Mar. 25, 1981; minimum, 2.6 mg/L, June 6, 1988.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 964 microsiemens, June 3; minimum, 226 microsiemens, May 7.
pH: Maximum, 8.9 units, Aug. 15-16; minimum, 7.0, Mar. 22.
WATER TEMPERATURES: Maximum, 24.0 °C, July 20; minimum, 0.5 °C several days during winter.
DISSOLVED OXYGEN; Maximum, 14.7 mg/L, Dec. 27-28 and Mar. 3; minimum, 5.1 mg/L, Aug. 20-21.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	17.2	16.8	16.9	11.1	10.3	10.7	1.7	1.4	1.6	0.9	0.8	0.8
2	17.1	14.7	15.9	10.3	9.6	10.0	1.4	0.6	1.0	1.0	0.7	0.9
3	15.2	14.6	14.8	9.6	8.9	9.3	0.9	0.6	0.9	1.1	0.9	1.0
4	14.7	14.4	14.6	8.9	8.5	8.8	1.4	0.8	1.1	1.1	0.8	1.0
5	14.5	14.1	14.3	8.5	8.2	8.4	1.7	1.2	1.5	1.2	0.9	1.1
6	---	---	---	8.4	7.7	7.9	1.5	0.8	1.2	1.3	0.9	1.0
7	11.9	11.7	11.8	7.8	7.6	7.7	1.0	0.8	0.9	1.5	1.2	1.3
8	12.1	11.6	11.8	7.7	6.0	6.8	1.1	0.8	1.0	1.6	1.2	1.4
9	12.8	11.7	12.4	6.3	6.1	6.1	1.2	0.9	1.1	1.4	1.1	1.3
10	13.1	12.4	12.7	6.2	6.0	6.1	1.1	0.9	1.0	1.6	1.1	1.4
11	12.6	11.0	11.8	6.1	5.6	6.0	0.9	0.7	0.8	1.5	0.7	1.1
12	11.5	11.0	11.3	5.7	5.3	5.5	1.1	0.8	0.9	1.1	0.7	0.9
13	11.7	11.2	11.4	5.5	5.1	5.3	1.0	0.6	0.8	1.3	0.9	1.1
14	11.8	11.2	11.5	5.3	5.1	5.2	0.8	0.5	0.7	1.6	1.1	1.3
15	11.9	11.6	11.7	5.2	3.2	4.1	0.8	0.5	0.6	1.7	1.2	1.4
16	11.8	11.4	11.6	3.2	2.7	3.0	0.7	0.5	0.6	1.6	1.3	1.5
17	11.4	11.1	11.3	2.9	2.4	2.7	0.8	0.6	0.7	1.5	0.7	1.2
18	11.2	10.8	11.0	2.4	2.0	2.2	0.8	0.6	0.7	1.0	0.7	0.8
19	10.8	10.4	10.6	2.7	2.3	2.5	0.8	0.5	0.7	1.1	0.8	1.0
20	10.4	10.1	10.3	2.6	1.7	2.2	0.7	0.4	0.6	1.2	0.9	1.1
21	10.3	9.8	10.1	1.8	1.6	1.7	0.6	0.4	0.5	1.1	0.9	1.0
22	10.1	9.8	9.9	1.9	1.7	1.8	0.6	0.4	0.5	1.2	0.8	1.0
23	10.5	9.8	10.0	1.7	1.3	1.6	0.8	0.5	0.6	1.3	1.0	1.2
24	10.4	9.9	10.1	1.4	1.1	1.3	0.7	0.5	0.6	1.3	1.1	1.2
25	10.9	10.2	10.6	1.5	1.2	1.4	0.8	0.6	0.7	1.1	0.9	1.0
26	11.8	10.9	11.4	1.7	1.3	1.5	0.7	0.6	0.6	---	---	---
27	12.1	11.6	11.9	1.6	1.1	1.4	0.7	0.5	0.6	---	---	---
28	12.0	11.7	11.9	1.1	0.7	0.9	1.1	0.6	0.8	1.0	0.7	0.8
29	12.3	12.0	12.2	1.2	0.7	0.9	1.0	0.9	1.0	1.2	0.8	1.0
30	12.2	11.5	11.8	1.5	1.0	1.3	1.1	0.9	1.0	1.2	0.5	0.8
31	11.5	11.1	11.4	---	---	---	0.9	0.8	0.9	---	---	---
MONTH	17.2	9.8	12.0	11.1	0.7	4.5	1.7	0.4	0.8	1.7	0.5	1.1

MISSISSIPPI RIVER MAIN STEM

05331545 MISSISSIPPI RIVER AT FIFTH STREET AT NEWPORT, MN

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.2	0.9	1.0	2.3	1.7	2.0	3.6	3.4	3.5	10.9	10.2	10.5
2	1.2	0.9	1.0	2.4	1.9	2.1	3.6	3.2	3.4	10.6	10.0	10.3
3	1.5	1.1	1.3	2.0	1.5	1.7	3.7	3.1	3.4	10.9	10.1	10.5
4	1.6	1.1	1.3	2.4	1.8	2.1	4.0	3.4	3.7	11.5	10.6	11.0
5	1.8	1.3	1.5	2.5	2.0	2.2	4.0	3.6	3.8	11.9	11.2	11.5
6	1.9	1.4	1.6	---	---	---	3.8	3.3	3.5	12.2	11.2	11.7
7	2.2	1.7	1.9	---	---	---	3.6	3.1	3.3	12.7	11.6	12.1
8	2.3	1.9	2.1	---	---	---	3.7	3.0	3.3	13.3	12.4	12.7
9	2.4	1.9	2.1	2.4	2.2	2.3	5.6	3.5	4.7	13.0	12.6	12.8
10	2.3	1.8	2.0	2.8	2.3	2.6	5.8	5.3	5.5	12.6	12.1	12.3
11	2.5	2.0	2.2	2.8	2.5	2.7	5.4	4.9	5.1	12.4	11.8	12.1
12	2.8	2.2	2.5	3.3	2.5	2.9	5.4	4.7	5.0	12.6	12.2	12.3
13	2.5	1.8	2.0	3.4	3.0	3.1	5.6	4.9	5.2	12.8	12.2	12.5
14	1.8	1.6	1.7	3.8	3.0	3.5	6.4	5.4	5.8	14.2	12.6	13.6
15	1.8	1.5	1.6	3.0	2.2	2.5	6.8	6.0	6.3	14.1	13.9	14.0
16	---	---	---	2.2	1.5	1.8	6.6	6.3	6.5	14.0	13.7	13.8
17	---	---	---	1.5	1.1	1.2	6.7	6.0	6.3	13.7	13.0	13.3
18	---	---	---	1.3	1.1	1.2	6.8	6.2	6.5	13.2	12.7	13.0
19	---	---	---	1.3	0.9	1.1	6.7	6.5	6.6	13.1	12.4	12.7
20	---	---	---	---	---	---	7.8	6.7	7.1	12.8	12.2	12.5
21	---	---	---	---	---	---	8.5	7.6	8.0	12.9	12.4	12.6
22	---	---	---	2.3	1.9	2.1	9.2	8.3	8.7	13.7	12.7	13.2
23	---	---	---	1.9	1.5	1.7	12.2	9.2	10.9	14.4	13.6	13.9
24	---	---	---	1.6	1.3	1.4	13.1	12.2	12.6	15.0	14.0	14.5
25	---	---	---	---	---	---	14.0	13.1	13.6	14.9	14.8	14.8
26	---	---	---	2.1	1.5	1.8	14.5	13.9	14.2	15.0	14.7	14.8
27	---	---	---	2.4	1.9	2.1	16.4	14.4	15.6	15.1	14.7	14.8
28	---	---	---	2.6	2.2	2.4	16.2	15.2	15.7	15.5	14.7	15.0
29	---	---	---	3.1	2.6	2.8	15.2	13.6	14.5	16.0	15.2	15.5
30	---	---	---	3.6	3.1	3.3	13.6	10.9	12.1	16.5	15.5	15.9
31	---	---	---	3.5	3.3	3.4	---	---	---	16.5	15.8	16.2
MONTH	---	---	---	3.8	0.9	2.2	16.4	3.0	7.5	16.5	10.0	13.1
		JUNE			JULY			AUGUST			SEPTEMBER	
1	17.0	16.2	16.5	---	---	---	20.4	20.1	20.2	21.2	20.1	20.8
2	16.9	16.4	16.8	23.4	22.1	23.2	---	---	---	21.0	19.5	20.7
3	16.4	15.2	15.7	23.8	23.1	23.4	---	---	---	20.7	20.3	20.5
4	15.2	14.8	14.9	23.8	23.5	23.6	---	---	---	20.9	20.3	20.6
5	15.0	14.4	14.6	23.6	23.2	23.4	---	---	---	20.9	20.4	20.7
6	15.6	14.7	15.0	23.7	20.7	23.2	---	---	---	21.2	20.8	21.0
7	15.8	15.3	15.6	23.3	22.8	23.0	---	---	---	21.0	20.6	20.8
8	16.0	15.6	15.8	23.3	22.8	23.0	20.6	20.2	20.4	20.8	20.4	20.5
9	16.5	15.7	16.1	23.0	21.8	22.3	20.6	19.6	20.3	20.8	20.3	20.5
10	17.0	16.1	16.5	22.3	21.8	22.0	20.7	20.2	20.4	20.5	20.1	20.2
11	17.2	16.8	16.9	22.0	21.3	21.6	20.7	20.2	20.5	20.4	19.8	20.1
12	17.7	17.0	17.3	21.3	20.7	21.0	20.6	20.2	20.4	20.7	20.0	20.2
13	18.9	17.4	18.1	21.0	20.3	20.6	20.5	19.8	20.1	20.6	19.9	20.3
14	19.4	18.6	18.9	20.8	20.3	20.6	20.7	20.0	20.3	20.2	19.3	19.7
15	20.8	18.9	20.0	21.1	20.4	20.7	20.5	19.7	20.1	19.5	19.0	19.2
16	20.5	20.1	20.3	21.6	20.7	21.0	20.6	20.0	20.3	19.0	18.3	18.6
17	20.1	19.5	19.8	22.2	21.3	21.7	20.9	20.4	20.6	18.3	16.1	17.0
18	20.2	19.4	19.7	22.7	21.9	22.2	20.9	20.4	20.7	16.1	15.6	15.7
19	20.1	19.8	20.0	22.9	22.5	22.7	20.4	20.0	20.3	15.9	15.3	15.5
20	20.4	19.9	20.1	24.0	22.4	23.3	20.0	18.3	19.0	15.4	15.0	15.1
21	20.6	20.1	20.3	23.8	23.4	23.6	18.4	18.0	18.1	15.1	14.7	14.9
22	20.4	20.1	20.2	23.4	22.9	23.2	18.0	17.1	17.5	14.7	14.2	14.4
23	20.4	19.8	20.1	23.1	22.8	22.9	17.5	17.2	17.3	14.6	13.9	14.2
24	20.5	19.9	20.2	23.1	22.7	22.9	17.8	17.2	17.5	---	---	---
25	20.9	20.1	20.5	22.9	22.1	22.5	18.4	17.7	18.0	---	---	---
26	21.5	20.4	21.0	22.1	21.5	21.8	19.0	18.3	18.6	---	---	---
27	21.6	21.3	21.4	21.5	20.2	20.7	20.6	18.8	19.8	---	---	---
28	---	---	---	20.5	20.1	20.2	21.0	20.4	20.7	---	---	---
29	---	---	---	---	---	---	21.0	20.5	20.7	---	---	---
30	---	---	---	20.8	20.4	20.6	20.9	20.3	20.6	---	---	---
31	---	---	---	20.7	20.2	20.4	20.9	20.4	20.6	---	---	---
MONTH	21.6	14.4	18.2	24.0	20.1	22.1	21.0	17.1	19.7	---	---	---
YEAR	24.0	0.4	10.2									

MISSISSIPPI RIVER MAIN STEM

05331545 MISSISSIPPI RIVER AT FIFTH STREET AT NEWPORT, MN

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	400	375	387	520	459	482	636	498	571	496	462	480
2	462	408	432	510	466	492	561	473	513	479	460	470
3	543	373	440	537	445	492	620	501	552	545	469	512
4	405	361	390	497	441	463	675	531	580	554	527	539
5	448	366	383	468	430	446	624	526	557	702	542	614
6	---	---	---	472	430	442	681	471	556	667	610	632
7	454	392	418	490	433	460	522	442	472	692	639	658
8	423	387	405	591	425	454	502	438	480	698	599	638
9	---	---	---	537	443	480	500	453	475	719	628	684
10	---	---	---	521	456	485	488	441	466	779	553	645
11	419	398	406	478	379	442	519	468	484	591	526	549
12	437	394	415	420	386	406	580	486	515	606	538	561
13	454	406	421	470	395	414	543	496	523	607	548	571
14	420	370	393	470	418	450	591	541	568	603	554	575
15	456	370	391	495	445	461	581	544	558	592	560	568
16	426	366	394	478	452	467	565	534	548	590	567	579
17	510	428	479	502	448	476	533	502	513	636	554	598
18	503	444	480	502	484	494	609	515	562	616	595	609
19	469	419	434	573	502	523	599	568	579	629	591	611
20	454	418	431	560	502	523	651	556	615	623	586	608
21	465	431	444	554	470	507	690	603	645	607	575	589
22	480	434	447	555	495	530	700	622	659	623	590	605
23	510	452	475	567	475	523	700	638	658	663	589	623
24	489	446	465	530	501	516	645	611	627	640	600	615
25	453	413	433	597	499	540	678	634	651	610	573	593
26	456	417	439	675	562	629	729	649	666	---	---	---
27	464	428	444	670	517	600	690	655	669	---	---	---
28	534	455	478	523	470	490	771	657	683	616	596	604
29	553	487	521	525	458	494	772	527	641	645	587	607
30	537	451	490	552	496	533	620	531	570	639	590	612
31	541	446	493	---	---	---	606	462	494	---	---	---
MONTH	553	361	436	675	379	490	772	438	569	779	460	591
		FEBRUARY			MARCH			APRIL			MAY	
1	658	618	641	761	695	724	472	437	452	495	449	465
2	662	644	649	774	657	708	492	454	463	483	284	387
3	662	648	655	668	617	641	463	441	454	501	254	352
4	680	626	647	668	608	641	479	459	469	476	243	286
5	687	652	672	656	603	630	525	473	489	271	236	251
6	674	640	657	---	---	---	500	462	477	428	228	274
7	699	669	686	---	---	---	459	434	446	334	226	275
8	699	673	681	---	---	---	484	439	449	374	292	311
9	706	651	678	701	615	661	453	427	439	396	297	346
10	685	655	673	740	699	726	454	423	434	429	393	407
11	724	655	676	764	595	707	450	420	433	---	---	---
12	723	666	684	592	544	566	463	440	448	469	391	422
13	672	645	656	596	566	578	490	450	468	424	358	389
14	656	626	644	584	443	505	505	456	480	439	377	422
15	663	618	639	442	387	422	494	465	473	469	372	427
16	---	---	---	387	343	367	480	457	469	---	---	---
17	---	---	---	354	329	339	542	458	492	419	376	398
18	---	---	---	364	348	355	534	511	522	---	---	---
19	---	---	---	360	318	336	568	530	550	455	408	430
20	---	---	---	---	---	---	578	492	526	---	---	---
21	---	---	---	---	---	---	556	526	541	520	442	469
22	---	---	---	364	344	355	567	546	553	575	506	535
23	---	---	---	367	357	361	575	495	526	627	553	584
24	---	---	---	379	358	366	508	466	487	663	600	625
25	---	---	---	---	---	---	552	474	523	678	556	609
26	---	---	---	399	378	387	587	539	564	753	568	628
27	---	---	---	428	397	406	603	383	479	668	541	590
28	---	---	---	435	412	419	---	---	---	601	549	576
29	---	---	---	455	433	443	---	---	---	668	584	630
30	---	---	---	487	447	455	675	493	560	687	650	666
31	---	---	---	456	416	440	---	---	---	668	626	643
MONTH	---	---	---	774	318	501	675	383	488	753	226	459

MISSISSIPPI RIVER MAIN STEM

05331545 MISSISSIPPI RIVER AT FIFTH STREET AT NEWPORT, MN

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	760	639	663	---	---	---	573	475	514	---	---	---
2	821	739	777	552	507	536	---	---	---	---	---	---
3	964	620	763	547	528	536	---	---	---	---	---	---
4	648	577	626	572	530	549	---	---	---	657	627	641
5	599	538	567	587	566	576	---	---	---	684	606	637
6	630	552	572	629	570	606	---	---	---	727	677	700
7	613	518	551	672	578	618	768	646	688	720	558	631
8	618	481	506	691	575	623	754	633	698	661	556	621
9	486	448	463	731	570	653	750	592	672	734	645	686
10	470	439	452	750	688	726	647	516	566	714	665	698
11	528	422	463	733	650	687	638	495	541	744	615	694
12	489	421	454	---	---	---	774	574	658	731	609	674
13	541	456	490	---	---	---	702	539	590	781	643	716
14	562	514	546	---	---	---	693	512	621	772	523	638
15	599	532	558	---	---	---	857	685	752	660	483	594
16	641	541	606	---	---	---	778	683	715	736	576	612
17	601	460	536	640	594	622	932	616	781	---	---	---
18	518	454	490	712	587	612	624	602	612	---	---	---
19	511	464	484	663	610	631	622	594	608	608	510	550
20	498	441	461	644	602	622	684	565	617	609	467	515
21	491	457	477	644	620	630	670	590	624	---	---	---
22	492	464	475	649	622	636	628	602	613	---	---	---
23	468	443	452	758	608	677	619	526	591	574	478	526
24	479	454	469	628	471	511	751	590	667	---	---	---
25	543	439	479	654	472	560	813	701	752	---	---	---
26	608	514	560	642	504	593	---	---	---	---	---	---
27	609	511	560	572	505	538	---	---	---	---	---	---
28	---	---	---	619	559	585	765	494	707	---	---	---
29	---	---	---	610	558	580	875	744	814	---	---	---
30	---	---	---	611	501	528	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---
MONTH	934	421	537	---	---	---	---	---	---	---	---	---
YEAR	964	226	544									

OXYGEN, DISSOLVED (DO), MG/L, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	9.5	9.2	9.4	9.7	7.6	8.4	13.0	12.6	12.8	12.8	12.7	12.8
2	9.6	8.8	9.2	8.3	7.9	8.0	14.1	13.0	13.6	12.9	12.5	12.7
3	9.6	8.5	9.2	8.9	8.3	8.6	14.1	13.7	13.8	12.7	12.1	12.3
4	9.5	9.1	9.3	9.3	8.9	9.1	13.8	13.1	13.4	12.5	12.0	12.3
5	9.7	9.3	9.5	9.7	9.3	9.4	13.3	12.6	12.9	12.2	10.9	11.4
6	---	---	---	10.3	9.7	10.0	13.7	12.8	13.3	11.1	10.7	11.0
7	10.9	10.5	10.7	10.4	10.3	10.3	13.9	13.6	13.7	10.9	10.6	10.7
8	11.1	10.4	10.8	11.6	10.3	10.9	13.8	13.5	13.6	11.8	10.7	11.3
9	11.0	8.8	9.7	11.6	11.4	11.5	13.8	13.5	13.6	12.0	11.7	11.9
10	9.2	8.8	9.1	11.7	11.6	11.6	13.9	13.6	13.7	12.0	11.4	11.7
11	9.2	8.4	8.9	12.0	11.5	11.7	14.1	13.9	14.0	12.3	11.6	12.0
12	9.0	8.5	8.8	12.5	12.0	12.2	14.1	13.7	13.9	12.4	12.0	12.2
13	8.8	8.4	8.7	12.6	11.7	12.1	14.0	13.5	13.8	12.3	12.0	12.1
14	8.9	8.4	8.6	12.2	11.8	12.0	13.9	13.6	13.7	12.2	11.8	12.0
15	8.6	8.2	8.4	12.2	11.9	12.0	14.0	13.7	13.9	12.0	11.6	11.8
16	8.9	8.3	8.7	12.8	12.2	12.4	14.1	13.8	13.9	11.9	11.7	11.8
17	9.2	8.9	9.0	12.8	12.1	12.5	14.0	13.7	13.9	12.0	11.5	11.7
18	9.4	9.0	9.2	13.1	12.7	12.8	14.1	13.7	13.9	12.0	11.7	11.9
19	9.6	9.3	9.5	12.8	12.4	12.6	14.3	13.9	14.0	12.1	11.8	11.9
20	9.9	9.6	9.8	12.6	12.2	12.4	14.3	13.2	14.1	12.2	11.9	12.0
21	10.2	9.7	10.0	12.7	12.4	12.6	14.4	14.1	14.2	12.4	12.1	12.2
22	10.3	10.0	10.2	12.5	12.3	12.4	14.5	14.2	14.3	12.4	11.7	12.1
23	10.4	9.7	10.1	12.9	12.5	12.7	14.5	14.3	14.4	11.8	11.5	11.7
24	10.5	9.7	10.0	13.2	12.9	13.1	14.6	14.4	14.5	11.8	11.6	11.7
25	9.9	9.4	9.7	13.2	12.8	13.0	14.5	14.3	14.4	12.0	11.5	11.8
26	9.4	8.9	9.2	13.1	12.6	12.9	14.6	14.4	14.5	---	---	---
27	9.0	8.6	8.8	13.3	12.7	12.9	14.7	14.4	14.6	---	---	---
28	9.0	8.9	8.9	13.9	13.3	13.6	14.7	14.1	14.4	12.2	11.7	11.9
29	8.9	8.6	8.7	13.7	13.2	13.4	14.3	12.5	13.2	12.0	11.6	11.8
30	9.0	8.6	8.8	13.4	12.7	13.1	12.7	12.4	12.6	12.2	11.7	12.0
31	9.4	9.0	9.2	---	---	---	12.9	12.6	12.8	---	---	---
MONTH	11.1	8.2	9.3	13.9	7.6	11.7	14.7	12.4	13.8	12.9	10.6	11.9

MISSISSIPPI RIVER MAIN STEM

05331545 MISSISSIPPI RIVER AT FIFTH STREET AT NEWPORT, MN

OXYGEN, DISSOLVED (DO), MG/L, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	13.4	13.0	13.2	12.9	12.1	12.5	11.3	11.0	11.1	7.2	6.8	7.0
2	13.3	12.9	13.1	14.1	12.4	13.3	11.6	10.8	11.1	9.0	7.2	8.2
3	13.0	12.5	12.8	14.7	13.9	14.3	11.5	10.7	11.1	9.2	8.5	8.7
4	13.0	12.5	12.7	14.4	13.4	13.9	13.6	10.9	12.2	8.6	8.0	8.3
5	12.8	12.3	12.6	14.1	13.5	13.9	13.3	12.4	12.9	8.2	7.7	7.9
6	12.7	12.1	12.4	---	---	---	13.4	12.4	12.9	8.2	7.5	7.9
7	12.3	11.7	12.0	---	---	---	13.6	12.8	13.2	8.8	7.6	7.9
8	12.0	11.5	11.7	---	---	---	13.8	12.8	13.3	7.9	7.3	7.6
9	13.9	11.7	12.9	14.1	13.7	13.9	13.2	12.5	12.9	8.3	7.5	7.9
10	14.0	13.3	13.7	13.8	13.3	13.5	13.0	12.1	12.6	8.7	8.3	8.5
11	13.6	12.9	13.3	14.1	13.5	13.7	13.3	12.7	13.0	8.9	8.3	8.6
12	13.4	12.9	13.1	14.1	11.2	12.4	13.7	12.5	13.1	8.6	8.2	8.5
13	14.0	13.2	13.6	11.6	11.2	11.4	13.4	12.5	12.9	8.6	8.1	8.3
14	14.1	13.7	13.9	11.5	10.9	11.1	12.9	11.6	12.3	8.6	8.0	8.1
15	14.3	13.9	14.1	12.8	11.6	12.3	12.3	11.2	11.8	8.3	8.1	8.2
16	---	---	---	13.8	12.7	13.3	13.0	11.5	12.4	8.8	7.9	8.2
17	---	---	---	14.3	13.7	14.0	13.5	11.9	12.8	8.7	8.2	8.5
18	---	---	---	14.3	13.9	14.1	12.9	11.9	12.4	9.0	8.5	8.7
19	---	---	---	14.4	12.1	13.1	12.6	12.1	12.3	9.3	8.6	9.0
20	---	---	---	---	---	---	12.5	11.3	11.9	9.4	8.8	9.1
21	---	---	---	---	---	---	11.7	10.8	11.2	9.3	8.4	8.8
22	---	---	---	12.3	11.8	12.1	11.1	10.2	10.7	8.7	7.8	8.3
23	---	---	---	12.7	12.3	12.5	10.3	9.7	10.0	8.1	7.6	7.9
24	---	---	---	13.1	12.6	12.8	9.8	8.8	9.3	8.0	7.5	7.7
25	---	---	---	---	---	---	8.9	8.3	8.6	8.5	7.6	8.1
26	---	---	---	13.3	12.5	12.7	8.5	7.9	8.2	8.6	8.3	8.4
27	---	---	---	12.7	12.0	12.4	7.9	7.7	7.8	8.6	8.2	8.4
28	---	---	---	12.6	12.0	12.2	8.6	7.9	8.2	8.7	7.9	8.3
29	---	---	---	12.1	11.4	11.7	9.7	8.6	9.1	8.3	7.6	8.0
30	---	---	---	11.5	10.9	11.2	10.2	6.4	7.9	8.0	7.2	7.6
31	---	---	---	11.3	11.0	11.2	---	---	---	8.2	7.4	7.6
MONTH	---	---	---	14.7	10.9	12.8	13.8	6.4	11.3	9.4	6.8	8.2
		JUNE			JULY			AUGUST			SEPTEMBER	
1	7.9	7.2	7.6	---	---	---	7.1	6.5	6.6	7.1	6.5	7.0
2	7.8	7.5	7.5	6.9	6.5	6.7	---	---	---	7.0	6.1	6.8
3	8.6	7.8	8.3	6.8	6.6	6.7	---	---	---	6.9	6.6	6.7
4	8.9	8.3	8.7	6.6	6.5	6.5	---	---	---	7.4	6.6	7.0
5	9.1	8.6	8.8	6.7	6.3	6.4	---	---	---	7.5	7.3	7.4
6	8.7	8.3	8.5	6.8	6.0	6.3	---	---	---	7.3	7.1	7.2
7	8.6	8.2	8.3	6.5	6.2	6.3	---	---	---	7.5	7.2	7.3
8	8.5	8.0	8.4	6.4	6.1	6.3	7.6	7.4	7.4	7.6	7.2	7.4
9	8.6	7.8	8.3	6.4	5.8	6.0	7.4	7.0	7.2	7.5	7.1	7.3
10	8.3	7.6	8.0	6.0	5.8	5.9	8.1	7.2	7.7	7.5	6.1	6.6
11	7.9	6.9	7.3	7.1	5.9	6.5	8.3	8.0	8.1	6.7	6.3	6.4
12	7.2	6.9	7.0	7.4	7.1	7.3	8.3	7.9	8.1	6.9	6.3	6.5
13	7.9	6.9	7.3	7.7	7.4	7.5	8.6	8.1	8.2	6.8	6.6	6.7
14	7.6	7.3	7.4	7.7	7.4	7.5	8.4	8.0	8.1	7.2	6.7	7.0
15	8.2	7.3	7.8	7.6	7.3	7.5	8.5	7.7	8.0	7.4	6.8	7.1
16	8.4	8.2	8.3	7.5	7.1	7.3	8.1	7.8	7.9	7.5	7.1	7.3
17	8.7	8.4	8.6	7.1	6.7	7.0	8.8	7.7	8.3	7.7	6.3	6.8
18	8.9	7.4	7.9	6.8	6.4	6.6	9.3	8.8	8.9	7.0	6.6	6.8
19	7.5	7.3	7.3	6.5	6.2	6.3	9.4	9.2	9.3	7.2	6.9	7.0
20	7.4	6.9	7.1	6.7	6.3	6.4	5.1	5.1	5.1	7.4	7.1	7.3
21	7.1	6.8	6.9	6.6	6.4	6.5	7.0	5.1	5.9	7.5	7.3	7.4
22	7.0	6.8	7.0	6.7	6.5	6.6	9.3	6.6	8.1	7.9	7.5	7.7
23	7.2	6.9	7.0	6.9	6.7	6.7	9.2	9.0	9.0	8.3	7.7	8.0
24	7.1	6.8	7.0	6.9	6.7	6.8	9.3	7.3	8.1	---	---	---
25	7.0	6.2	6.5	7.4	6.7	7.0	7.6	7.3	7.4	---	---	---
26	6.5	5.7	5.9	7.8	7.4	7.5	7.3	7.0	7.2	---	---	---
27	7.0	5.7	6.4	7.9	6.2	6.9	7.2	6.9	6.9	---	---	---
28	---	---	---	6.5	6.3	6.4	6.9	6.5	6.6	---	---	---
29	---	---	---	---	---	---	7.7	6.6	7.1	---	---	---
30	---	---	---	6.6	6.4	6.4	7.7	7.3	7.5	---	---	---
31	---	---	---	6.8	6.4	6.6	7.5	7.1	7.2	---	---	---
MONTH	9.1	5.7	7.6	7.9	5.8	6.7	9.4	5.1	7.3	---	---	---
YEAR	14.7	5.1	10.0									

MISSISSIPPI RIVER MAIN STEM

05331545 MISSISSIPPI RIVER AT FIFTH STREET AT NEWPORT, MN

PH (STANDARD UNITS), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	8.2	8.1	8.1	7.9	7.6	7.8	8.1	7.8	8.0	7.8	7.7	7.8
2	8.1	7.9	8.0	8.0	7.9	8.0	8.0	7.8	7.9	7.8	7.6	7.8
3	8.0	7.7	7.9	8.0	7.9	8.0	8.0	7.9	8.0	7.9	7.7	7.8
4	8.1	7.8	8.0	8.1	7.9	8.0	8.1	7.9	8.0	7.8	7.7	7.8
5	8.1	7.9	8.0	8.2	8.0	8.1	8.1	7.8	8.0	7.9	7.7	7.8
6	---	---	---	8.2	8.0	8.1	8.0	7.8	8.0	7.8	7.6	7.7
7	8.1	7.9	8.0	8.2	8.1	8.1	8.0	7.8	7.9	7.9	7.7	7.8
8	8.0	7.9	8.0	8.2	8.0	8.1	7.9	7.8	7.8	7.8	7.7	7.8
9	8.1	7.9	8.0	8.1	7.9	8.0	7.9	7.7	7.8	7.8	7.7	7.8
10	8.2	7.8	8.0	8.1	7.9	8.0	7.9	7.7	7.8	7.8	7.7	7.8
11	8.2	8.0	8.1	8.2	7.9	8.0	8.0	7.8	7.9	8.0	7.8	7.9
12	8.1	7.9	8.0	8.1	7.9	8.0	8.0	7.8	7.9	8.0	7.9	8.0
13	8.0	7.9	8.0	8.1	8.0	8.0	8.1	7.8	8.0	7.9	7.8	7.9
14	8.0	7.9	8.0	8.2	8.0	8.1	8.0	7.9	7.9	7.9	7.8	7.8
15	8.0	7.9	8.0	8.2	8.0	8.1	8.0	7.8	7.9	7.9	7.7	7.8
16	8.0	7.9	8.0	8.2	8.0	8.1	8.0	7.9	7.9	7.9	7.8	7.9
17	8.0	7.8	7.9	8.1	8.0	8.0	8.0	7.8	7.9	8.0	7.8	7.9
18	7.9	7.8	7.9	8.2	8.0	8.1	8.0	7.8	7.9	7.9	7.8	7.8
19	8.0	7.8	7.9	8.2	8.0	8.1	8.0	7.9	7.9	7.9	7.8	7.9
20	8.0	7.9	8.0	8.2	8.1	8.1	8.0	7.3	7.9	7.9	7.7	7.8
21	8.1	7.9	8.0	8.3	8.0	8.1	8.0	7.8	7.9	7.9	7.7	7.8
22	8.1	8.0	8.0	8.2	8.0	8.1	8.0	7.8	7.9	7.9	7.7	7.8
23	8.1	8.0	8.1	8.2	8.0	8.1	7.9	7.7	7.8	7.9	7.8	7.8
24	8.1	8.0	8.1	8.3	8.0	8.1	7.9	7.8	7.8	7.9	7.8	7.8
25	8.2	8.0	8.1	8.3	8.1	8.2	7.9	7.8	7.8	8.0	7.8	7.9
26	8.1	8.0	8.0	8.3	8.2	8.2	7.9	7.7	7.8	---	---	---
27	8.0	7.9	8.0	8.3	7.9	8.1	7.8	7.7	7.8	---	---	---
28	8.0	7.8	7.9	8.1	7.9	8.0	7.9	7.7	7.8	8.1	7.9	8.0
29	7.8	7.6	7.7	8.1	7.9	8.0	7.8	7.7	7.8	8.0	7.9	7.9
30	7.7	7.6	7.6	8.1	7.9	8.0	7.8	7.7	7.8	8.1	7.8	8.0
31	7.7	7.6	7.7	---	---	---	7.8	7.6	7.7	---	---	---
MONTH	8.2	7.6	8.0	8.3	7.6	8.1	8.1	7.3	7.9	8.1	7.6	7.8
		FEBRUARY			MARCH			APRIL			MAY	
1	8.1	7.9	8.1	8.4	8.3	8.3	8.1	7.9	8.0	8.1	7.7	7.9
2	8.1	7.9	8.0	8.4	8.2	8.3	8.6	7.9	8.2	8.1	7.7	7.9
3	8.2	8.0	8.1	8.4	8.2	8.4	8.6	8.2	8.4	7.8	7.7	7.7
4	8.2	8.0	8.1	8.4	8.2	8.3	8.5	8.1	8.3	7.9	7.6	7.7
5	8.2	8.1	8.1	8.3	8.2	8.3	8.6	8.1	8.3	7.8	7.6	7.7
6	8.2	8.0	8.1	---	---	---	8.5	8.2	8.4	7.8	7.5	7.6
7	8.2	8.0	8.1	---	---	---	8.5	8.1	8.3	7.7	7.5	7.6
8	8.2	8.1	8.1	---	---	---	8.4	8.1	8.2	8.0	7.6	7.7
9	8.2	8.0	8.1	8.3	8.1	8.2	8.3	7.9	8.1	7.9	7.6	7.7
10	8.3	8.1	8.2	8.2	8.1	8.2	8.1	7.7	7.9	7.9	7.5	7.7
11	8.3	8.1	8.2	8.2	7.8	8.0	8.0	7.7	7.9	7.9	7.7	7.8
12	8.4	8.2	8.3	7.9	7.8	7.8	8.1	7.7	7.9	7.9	7.7	7.8
13	8.4	8.2	8.3	7.8	7.7	7.7	8.0	7.7	7.9	7.9	7.7	7.8
14	8.5	8.3	8.4	7.7	7.5	7.6	8.1	7.7	7.9	7.8	7.7	7.8
15	8.4	8.2	8.3	7.5	7.2	7.4	8.1	7.7	7.9	7.8	7.7	7.8
16	---	---	---	7.4	7.2	7.3	8.1	7.8	8.0	7.9	7.5	7.8
17	---	---	---	7.3	7.2	7.3	8.3	7.8	8.0	8.0	7.8	7.9
18	---	---	---	7.5	7.3	7.4	8.3	7.9	8.1	8.1	8.0	8.0
19	---	---	---	---	---	---	8.2	8.0	8.1	8.1	8.0	8.0
20	---	---	---	---	---	---	8.3	8.0	8.2	8.1	7.9	8.0
21	---	---	---	---	---	---	8.3	8.0	8.1	8.2	8.1	8.1
22	---	---	---	7.2	7.0	7.1	8.3	7.9	8.2	8.3	8.1	8.2
23	---	---	---	7.3	7.1	7.2	8.4	8.1	8.3	8.2	8.1	8.1
24	---	---	---	7.4	7.2	7.3	8.3	8.0	8.1	8.1	7.9	8.0
25	---	---	---	---	---	---	8.1	7.9	8.0	8.0	7.9	8.0
26	---	---	---	7.7	7.3	7.5	8.0	7.8	7.9	8.0	7.9	7.9
27	---	---	---	7.8	7.5	7.6	7.9	7.7	7.8	8.0	7.9	8.0
28	---	---	---	8.2	7.4	7.8	7.8	7.5	7.6	8.1	7.9	8.0
29	---	---	---	8.2	7.9	8.1	7.8	7.7	7.7	8.1	8.0	8.0
30	---	---	---	8.2	7.9	8.1	7.9	7.6	7.8	8.2	8.1	8.1
31	---	---	---	8.2	7.9	8.1	---	---	---	8.2	8.1	8.2
MONTH	---	---	---	---	---	---	8.6	7.5	8.0	8.3	7.5	7.9

MISSISSIPPI RIVER MAIN STEM

05331545 MISSISSIPPI RIVER AT FIFTH STREET AT NEWPORT, MN

PH (STANDARD UNITS), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	8.3	8.1	8.2	---	---	---	8.4	8.3	8.3	8.7	8.2	8.6
2	8.2	8.1	8.2	8.0	7.5	7.9	---	---	---	8.8	8.1	8.6
3	8.1	8.0	8.1	8.1	7.9	8.0	---	---	---	8.7	8.6	8.7
4	8.2	8.0	8.1	8.1	8.0	8.0	---	---	---	8.6	8.5	8.5
5	8.2	8.1	8.1	8.0	8.0	8.0	---	---	---	8.5	8.3	8.4
6	8.3	8.2	8.2	8.2	8.0	8.0	---	---	---	8.5	8.3	8.4
7	8.2	8.0	8.1	8.2	8.2	8.2	---	---	---	8.4	8.2	8.3
8	8.0	7.9	8.0	8.2	8.2	8.2	8.7	8.5	8.6	8.3	8.1	8.2
9	8.0	7.9	8.0	8.4	8.1	8.2	8.7	8.3	8.5	8.2	8.2	8.2
10	7.9	7.8	7.9	8.4	8.3	8.3	8.6	8.5	8.5	8.4	8.1	8.2
11	7.9	7.8	7.8	8.4	8.3	8.3	8.6	8.5	8.6	8.6	8.3	8.4
12	7.9	7.8	7.8	8.4	8.3	8.3	8.8	8.6	8.7	8.7	8.4	8.5
13	7.9	7.8	7.8	8.4	8.4	8.4	8.7	8.5	8.6	8.8	8.4	8.6
14	7.9	7.7	7.7	8.4	8.4	8.4	8.7	8.5	8.6	8.6	8.4	8.4
15	7.7	7.6	7.6	8.6	8.4	8.5	8.9	8.5	8.6	8.5	8.3	8.4
16	7.7	7.6	7.7	8.6	8.5	8.5	8.9	8.6	8.8	8.4	8.2	8.3
17	7.7	7.6	7.7	8.6	8.5	8.5	8.8	8.7	8.7	8.4	8.2	8.2
18	7.8	7.7	7.7	8.6	8.4	8.5	8.6	8.3	8.5	8.4	8.3	8.3
19	7.7	7.6	7.7	8.6	8.5	8.5	8.5	8.3	8.4	8.4	8.2	8.3
20	7.8	7.6	7.7	8.6	8.4	8.4	8.3	8.3	8.3	8.4	8.2	8.3
21	7.8	7.7	7.7	8.4	8.4	8.4	8.4	8.2	8.3	8.3	8.2	8.3
22	7.8	7.7	7.8	8.4	8.4	8.4	8.4	8.3	8.3	8.3	7.9	8.2
23	7.8	7.7	7.7	8.4	8.3	8.3	8.3	8.0	8.2	8.2	8.0	8.1
24	7.8	7.7	7.7	8.4	8.3	8.4	8.1	8.0	8.0	---	---	---
25	7.9	7.7	7.8	8.4	8.2	8.3	8.2	8.1	8.1	---	---	---
26	8.0	7.8	7.9	8.2	8.0	8.1	8.3	8.2	8.2	---	---	---
27	8.0	7.9	7.9	8.4	7.9	8.2	8.4	8.2	8.3	---	---	---
28	---	---	---	8.4	8.3	8.4	8.4	8.3	8.4	---	---	---
29	---	---	---	---	---	---	8.6	8.3	8.4	---	---	---
30	---	---	---	8.4	8.0	8.3	8.7	8.4	8.5	---	---	---
31	---	---	---	8.3	8.3	8.3	8.8	8.5	8.6	---	---	---
MONTH	8.3	7.6	7.9	8.6	7.5	8.3	8.9	8.0	8.4	---	---	---
YEAR	8.9	7.0	8.0									

MISSISSIPPI RIVER MAIN STEM

05331560 MISSISSIPPI RIVER AT GREY CLOUD ISLAND NEAR COTTAGE GROVE, MN

WATER-QUALITY RECORDS

LOCATION.--Lat 44°48'13", long 93°00'43", in NW¼NE¼ sec.26, T.27 N., R.22 W., Washington County, Hydrologic Unit 07010206, on left bank at the J. L. Shiely Co. loading dock, and at mile 826.2 upstream from Ohio River.

PERIOD OF RECORD.--February 1977 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: September 1977 to current year.
pH: September 1977 to current year.
WATER TEMPERATURES: September 1977 to current year.
DISSOLVED OXYGEN: September 1977 to current year.

INSTRUMENTATION.--Water-quality monitor since September 1977.

REMARKS.--Extremes are published for years with 80 percent or more daily record. Values not corrected for instrument drift between calibrations.

COOPERATION.--Samples collected and water-quality monitor operated by the Metropolitan Waste Control Commission, St. Paul, MN.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water year 1981-90): Maximum, 773 microsiemens, Feb. 23, 1985; minimum, 243 microsiemens, Mar. 19, 1985.
pH (water year 1981, 1984-90): Maximum, 9.1 units, Oct. 12, 1989; minimum, 7.0 units, Oct. 10, 1983, Aug. 15, 1985.
WATER TEMPERATURES (water year 1981-89): Maximum, 29.0 °C, Aug. 7, 1982 and July 10, 12, and 28, 1989; minimum, 0.0 °C several days during winter period.
DISSOLVED OXYGEN (water year 1981-82, 1984-87): Maximum, 16.0 mg/L, Jan. 18, 1985; minimum, 1.1 mg/L, June 30, 1986.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 703 microsiemens, Aug. 12; minimum, 333 microsiemens, Mar. 22.
pH: Maximum, 9.1 units, Oct. 12; minimum, 7.2 units, May 14.
WATER TEMPERATURES: Maximum, 24.2 °C, July 3; minimum, 0.0 °C several days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	16.2	14.9	15.5	12.1	9.6	10.8	1.7	1.0	1.3	0.4	0.2	0.3
2	15.3	13.7	14.5	9.6	8.1	9.0	1.8	0.1	0.8	0.4	0.2	0.3
3	14.0	13.1	13.6	8.4	7.1	7.7	0.3	0.0	0.1	0.7	0.3	0.5
4	13.7	13.0	13.3	7.1	6.7	6.9	0.8	0.0	0.3	0.8	0.6	0.7
5	13.5	13.0	13.2	6.8	5.7	6.3	1.7	0.8	1.2	0.7	0.4	0.6
6	---	---	---	7.9	5.5	6.8	1.8	0.0	0.9	0.7	0.2	0.4
7	11.9	10.8	11.2	7.7	7.1	7.3	0.1	0.0	0.1	1.3	0.5	0.9
8	11.2	10.4	10.9	7.3	6.0	6.5	0.4	0.1	0.2	1.4	1.1	1.3
9	11.2	10.7	11.0	6.3	5.8	6.0	0.7	0.1	0.4	1.4	0.7	1.1
10	11.2	10.6	11.0	6.3	5.9	6.1	0.8	0.4	0.6	1.1	0.5	0.9
11	11.8	10.9	11.3	6.4	5.9	6.2	0.4	0.1	0.2	1.1	0.1	0.9
12	11.7	11.1	11.4	5.9	5.2	5.4	0.2	0.0	0.1	1.0	0.0	0.6
13	12.1	11.4	11.7	5.2	4.6	4.9	0.3	0.0	0.1	1.0	0.8	0.9
14	12.3	11.7	11.9	4.8	4.3	4.5	0.4	0.0	0.2	1.6	0.7	1.2
15	12.4	11.8	12.1	4.6	2.8	3.6	0.2	0.0	0.1	1.9	1.5	1.7
16	12.2	11.3	11.8	2.8	1.9	2.2	0.3	0.1	0.2	2.0	1.7	1.9
17	11.3	10.8	11.1	1.9	1.3	1.6	0.4	0.2	0.3	1.1	0.8	0.9
18	11.0	10.5	10.8	1.3	0.7	0.9	0.3	0.0	0.2	0.8	0.3	0.5
19	10.8	10.0	10.3	1.4	0.7	0.9	0.0	0.0	0.0	0.5	0.2	0.4
20	10.1	9.5	9.8	1.8	1.4	1.6	0.1	0.0	0.1	0.9	0.4	0.7
21	9.7	9.1	9.4	1.3	0.5	1.0	0.1	0.0	0.0	0.9	0.6	0.8
22	9.4	8.9	9.1	1.3	0.4	0.9	0.3	0.0	0.1	1.0	0.4	0.7
23	10.5	8.9	9.8	1.4	0.9	1.1	0.2	0.0	0.1	1.0	0.8	1.0
24	11.1	10.2	10.5	1.0	0.0	0.5	0.4	0.1	0.3	1.5	1.0	1.2
25	11.7	10.5	11.1	0.6	0.4	0.5	0.5	0.2	0.3	0.9	0.5	0.7
26	13.3	11.4	12.3	1.0	0.5	0.6	0.3	0.0	0.1	---	---	---
27	13.7	13.2	13.5	1.2	0.5	1.0	0.2	0.0	0.1	---	---	---
28	13.8	13.7	13.7	0.5	0.0	0.3	0.4	0.1	0.3	0.7	0.2	0.4
29	14.3	13.7	14.0	0.4	0.1	0.2	0.4	0.0	0.3	0.9	0.1	0.5
30	---	---	---	1.0	0.2	0.6	0.4	0.1	0.3	0.9	0.3	0.6
31	12.5	12.1	12.3	---	---	---	0.6	0.2	0.5	---	---	---
MONTH	16.2	8.9	11.8	12.1	0.0	3.7	1.8	0.0	0.3	2.0	0.0	0.8

MISSISSIPPI RIVER MAIN STEM

05331560 MISSISSIPPI RIVER AT GREY CLOUD ISLAND NEAR COTTAGE GROVE, MN

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	0.5	0.2	0.3	2.2	1.2	1.7	4.4	3.9	4.3	9.6	8.3	8.8
2	0.9	0.0	0.5	2.4	1.8	2.1	4.3	3.5	3.9	8.9	7.7	8.4
3	1.7	1.0	1.3	1.8	1.1	1.5	4.7	3.7	4.2	9.5	8.1	8.8
4	1.8	1.4	1.7	2.0	1.4	1.7	4.8	3.8	4.4	10.6	9.1	9.7
5	2.3	1.5	2.1	1.9	1.0	1.6	4.9	4.0	4.4	11.4	10.1	10.7
6	2.5	2.0	2.3	---	---	---	4.4	3.5	4.0	11.9	10.3	11.0
7	3.1	2.4	2.6	---	---	---	4.3	3.4	3.9	13.3	10.3	12.0
8	3.6	3.1	3.4	---	---	---	4.3	3.2	3.7	14.1	12.6	13.3
9	3.5	1.8	2.4	---	---	---	4.8	4.1	4.4	13.9	13.2	13.5
10	2.0	1.6	1.8	---	---	---	5.3	4.3	4.7	13.2	12.2	12.6
11	2.4	1.7	2.1	---	---	---	5.0	4.0	4.3	12.5	11.8	12.2
12	2.5	1.9	2.3	---	---	---	4.6	3.5	4.0	12.9	12.2	12.5
13	2.4	1.0	1.8	3.4	3.0	3.2	4.8	3.6	4.3	13.4	12.3	12.9
14	1.0	0.6	0.7	4.5	3.4	4.1	6.3	4.5	5.3	13.7	12.2	13.4
15	0.7	0.1	0.4	3.8	1.7	2.4	6.9	5.6	6.3	13.7	13.2	13.4
16	---	---	---	1.7	0.1	0.9	6.9	6.3	6.6	13.3	12.9	13.1
17	---	---	---	0.1	0.0	0.1	6.8	5.6	6.2	13.0	11.6	12.2
18	---	---	---	0.0	0.0	0.0	7.3	6.2	6.7	12.0	11.0	11.5
19	---	---	---	1.1	0.0	0.5	7.0	6.6	6.7	11.8	10.6	11.1
20	---	---	---	---	---	---	7.9	6.5	7.3	11.1	10.1	10.6
21	---	---	---	---	---	---	9.6	7.9	8.7	10.9	7.9	10.1
22	---	---	---	2.4	1.5	1.9	11.0	9.3	10.0	11.5	9.8	10.6
23	---	---	---	1.5	0.7	1.1	12.6	10.6	11.8	12.8	11.4	12.0
24	---	---	---	0.9	0.3	0.6	14.5	12.6	13.7	13.9	12.2	13.0
25	---	---	---	---	---	---	16.2	14.5	15.3	13.9	13.7	13.8
26	---	---	---	1.8	0.5	1.2	16.9	16.1	16.4	14.0	13.5	13.8
27	---	---	---	2.5	1.6	2.0	17.1	16.9	17.0	14.2	13.5	13.6
28	---	---	---	2.6	1.6	2.3	16.8	15.4	16.2	14.9	13.4	14.1
29	---	---	---	3.4	2.3	2.9	15.4	12.6	14.2	15.7	12.5	14.9
30	---	---	---	4.5	3.3	3.8	12.5	9.7	10.9	16.5	14.9	15.7
31	---	---	---	4.5	3.8	4.1	---	---	---	16.7	15.6	16.2
MONTH	---	---	---	---	---	---	17.1	3.2	7.8	16.7	7.7	12.2
		JUNE			JULY			AUGUST			SEPTEMBER	
1	17.4	16.0	16.7	23.4	22.7	23.0	20.6	18.4	19.6	20.6	19.5	20.1
2	17.3	17.0	17.1	23.5	22.7	23.0	20.4	19.5	20.0	20.5	19.7	20.2
3	---	---	---	24.2	22.8	23.4	20.9	19.6	20.2	---	---	---
4	---	---	---	24.1	23.4	23.8	21.0	20.1	20.4	---	---	---
5	---	---	---	23.9	23.1	23.5	20.6	19.7	20.1	---	---	---
6	---	---	---	23.1	22.5	22.6	20.1	18.3	19.2	20.7	20.1	20.5
7	---	---	---	22.5	21.5	21.9	19.4	18.3	18.8	20.4	19.8	20.1
8	16.4	15.4	15.8	22.5	21.4	21.8	19.4	18.5	18.9	20.1	19.4	19.8
9	17.2	15.6	16.3	22.1	20.4	21.1	19.5	18.7	19.1	20.1	19.3	19.7
10	18.1	16.4	17.2	21.3	20.5	20.9	20.0	18.8	19.4	20.6	19.1	19.9
11	17.8	17.4	17.6	21.0	19.8	20.4	19.9	18.8	19.4	20.3	19.4	19.8
12	18.8	17.4	17.9	19.8	18.7	19.2	19.5	18.7	19.1	20.5	19.2	19.8
13	20.1	18.2	19.1	20.3	17.9	19.3	19.3	18.4	18.9	20.0	19.4	19.8
14	---	---	---	20.1	19.2	19.7	19.4	18.4	18.9	20.0	18.3	19.0
15	---	---	---	20.3	19.3	19.8	19.8	18.7	19.2	18.5	17.5	18.1
16	19.9	19.3	19.6	21.3	19.7	20.4	20.5	19.2	19.7	17.5	16.5	16.8
17	19.2	18.1	18.6	22.4	20.9	21.5	20.8	19.5	20.3	16.4	15.9	16.1
18	19.3	17.8	18.4	23.4	22.0	22.6	20.7	20.2	20.4	15.9	14.5	15.1
19	19.0	18.5	18.8	23.5	19.1	23.2	---	---	---	15.2	14.2	14.6
20	19.7	18.7	19.1	23.5	22.7	23.1	---	---	---	14.6	13.6	14.0
21	20.1	19.0	19.4	23.1	22.4	22.8	---	---	---	13.6	13.0	13.3
22	19.5	18.9	19.2	22.5	21.7	22.1	---	---	---	13.1	11.4	12.1
23	19.6	18.6	19.1	---	---	---	---	---	---	11.7	10.8	11.2
24	20.0	18.7	19.3	21.9	19.1	21.4	---	---	---	11.7	10.6	11.1
25	20.5	19.1	19.7	21.5	20.4	20.9	---	---	---	12.6	11.1	11.6
26	21.5	20.1	20.7	20.3	19.1	19.8	---	---	---	12.1	11.2	11.5
27	21.7	21.2	21.3	19.2	18.8	18.9	---	---	---	11.7	11.1	11.4
28	21.4	20.9	21.1	19.4	18.5	18.8	---	---	---	11.8	10.5	11.3
29	22.3	20.9	21.5	20.0	18.8	19.3	---	---	---	11.9	11.2	11.5
30	23.4	22.2	22.7	19.8	18.8	19.3	---	---	---	11.9	11.0	11.4
31	---	---	---	19.7	18.5	19.1	21.0	19.2	20.1	---	---	---
MONTH	---	---	---	24.2	17.9	21.2	---	---	---	20.7	10.5	15.9
YEAR	24.2	0.0	9.7									

MISSISSIPPI RIVER MAIN STEM

05331560 MISSISSIPPI RIVER AT GREY CLOUD ISLAND NEAR COTTAGE GROVE, MN

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	400	384	395	500	454	477	552	522	535	615	609	611
2	406	385	394	486	437	481	557	543	548	617	606	613
3	418	381	401	491	475	482	544	535	539	610	604	607
4	422	385	397	484	469	474	551	537	543	613	607	611
5	395	366	391	473	457	463	566	551	558	610	576	603
6	---	---	---	467	446	457	582	554	570	603	596	602
7	396	381	389	461	446	454	568	548	554	607	594	598
8	389	378	382	461	444	450	549	521	532	618	603	611
9	409	380	396	452	412	446	524	522	523	614	608	611
10	421	393	411	462	450	455	532	523	528	617	603	612
11	424	406	413	460	447	452	556	505	543	618	598	610
12	430	409	422	450	441	446	556	541	547	605	598	603
13	429	422	425	452	436	449	552	545	550	605	599	603
14	425	405	417	451	436	444	562	551	557	609	598	604
15	425	351	403	487	445	471	567	562	564	603	600	601
16	418	345	391	476	468	471	568	567	568	606	596	603
17	438	400	418	471	451	458	570	558	567	647	606	630
18	439	430	435	461	453	458	592	556	578	638	630	634
19	439	417	426	471	461	466	589	584	587	632	585	603
20	417	411	413	548	472	520	591	585	587	598	585	594
21	416	413	415	541	526	536	596	588	594	595	590	593
22	420	413	416	532	501	516	600	594	596	598	589	593
23	462	417	445	513	498	505	600	592	595	598	592	596
24	473	458	465	508	503	505	599	592	596	623	593	610
25	468	458	462	507	503	505	595	591	593	609	595	605
26	463	425	457	520	506	515	593	587	593	---	---	---
27	464	460	462	550	520	537	600	572	596	---	---	---
28	473	460	467	535	518	523	603	595	601	621	604	612
29	490	473	481	519	511	517	609	595	603	606	603	605
30	490	455	472	521	509	517	616	609	614	610	601	607
31	455	434	448	---	---	---	626	610	620	---	---	---
MONTH	490	345	423	550	412	481	626	505	570	647	576	606
		FEBRUARY			MARCH			APRIL			MAY	
1	605	593	599	660	646	654	405	397	402	470	437	462
2	610	592	603	649	640	644	431	401	422	478	455	468
3	613	608	610	655	644	652	429	425	427	477	465	472
4	614	610	613	645	636	641	430	418	423	473	464	468
5	618	609	615	641	635	638	430	419	424	469	460	464
6	621	603	619	---	---	---	427	420	424	460	454	458
7	624	612	616	---	---	---	421	413	418	458	369	405
8	631	624	627	---	---	---	416	411	414	381	362	379
9	646	625	630	---	---	---	426	413	421	381	369	375
10	647	635	642	---	---	---	428	423	425	376	356	374
11	644	640	642	---	---	---	428	418	422	378	374	375
12	652	621	643	---	---	---	430	424	426	380	376	378
13	646	629	637	584	564	580	431	424	427	385	378	381
14	628	626	627	580	510	543	434	424	429	418	365	401
15	628	616	625	510	491	499	440	433	436	421	392	407
16	---	---	---	491	467	478	439	404	430	453	421	436
17	---	---	---	467	461	463	429	424	426	455	442	448
18	---	---	---	470	467	468	433	425	431	455	442	449
19	---	---	---	---	---	---	437	420	431	468	445	453
20	---	---	---	---	---	---	451	437	445	467	415	433
21	---	---	---	---	---	---	462	446	455	515	354	477
22	---	---	---	337	333	335	466	460	463	534	508	523
23	---	---	---	365	335	354	464	434	449	555	505	544
24	---	---	---	371	365	368	452	434	446	562	533	555
25	---	---	---	---	---	---	487	442	464	556	547	552
26	---	---	---	378	369	375	507	484	497	568	555	560
27	---	---	---	386	379	382	545	492	518	580	569	574
28	---	---	---	390	384	386	532	505	520	590	576	582
29	---	---	---	395	389	393	519	500	513	642	535	618
30	---	---	---	400	394	398	507	470	484	654	642	647
31	---	---	---	401	397	399	---	---	---	674	632	658
MONTH	---	---	---	---	---	---	545	397	443	674	354	477

MISSISSIPPI RIVER MAIN STEM

05331560 MISSISSIPPI RIVER AT GREY CLOUD ISLAND NEAR COTTAGE GROVE, MN

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	676	661	672	579	546	569	569	563	565	650	644	648
2	678	674	676	579	572	576	587	569	577	679	649	664
3	---	---	---	578	512	574	596	584	590	---	---	---
4	---	---	---	581	574	577	617	596	608	---	---	---
5	---	---	---	583	513	578	628	616	623	---	---	---
6	---	---	---	635	574	610	632	621	628	664	659	663
7	---	---	---	628	619	624	837	628	632	668	655	662
8	540	517	526	622	507	585	693	636	671	661	637	651
9	517	402	497	670	482	606	696	687	692	645	638	643
10	502	402	494	670	625	663	698	684	693	641	625	632
11	525	496	512	660	647	651	698	690	694	633	608	627
12	533	482	518	649	604	638	703	688	694	622	578	603
13	535	491	513	637	628	633	694	633	681	577	570	572
14	---	---	---	634	616	627	682	670	677	580	570	574
15	---	---	---	628	622	626	690	610	684	570	548	563
16	504	489	496	642	624	633	688	674	683	556	542	550
17	489	473	479	644	584	638	693	668	685	557	554	556
18	506	476	493	642	624	630	693	687	689	557	543	549
19	504	484	497	646	629	643	---	---	---	546	522	537
20	497	435	461	651	628	641	---	---	---	540	528	533
21	464	446	457	654	645	650	---	---	---	537	526	530
22	463	452	456	652	646	648	---	---	---	537	508	516
23	453	444	446	---	---	---	---	---	---	515	506	511
24	452	439	446	---	---	---	---	---	---	648	642	646
25	469	451	460	682	668	676	---	---	---	654	644	649
26	490	442	475	675	601	652	---	---	---	652	625	637
27	511	486	499	601	555	572	---	---	---	637	614	631
28	539	507	524	585	564	574	---	---	---	666	635	653
29	555	526	540	591	576	583	---	---	---	669	657	661
30	553	533	542	613	590	601	---	---	---	668	662	665
31	---	---	---	593	566	579	670	649	658	---	---	---
MONTH	---	---	---	682	482	616	---	---	---	679	506	605
YEAR	703	333	534									

OXYGEN, DISSOLVED (DO), MG/L, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	9.8	8.7	9.2	9.5	5.9	7.8	14.2	12.8	13.2	12.6	12.4	12.5
2	9.1	8.6	8.8	11.1	9.3	10.3	13.2	12.7	13.0	13.4	12.4	12.9
3	9.5	7.6	8.7	11.2	10.3	10.9	13.0	12.3	12.7	13.1	11.7	12.2
4	9.9	8.5	9.1	11.8	11.1	11.4	13.7	12.3	13.2	11.9	9.6	10.5
5	10.1	9.0	9.5	12.6	11.6	12.1	13.6	12.5	13.2	11.6	9.4	10.8
6	---	---	---	13.4	11.5	12.6	14.1	12.3	13.3	11.4	11.0	11.2
7	10.9	10.2	10.5	13.3	12.1	12.7	15.6	12.9	14.6	11.4	11.0	11.3
8	11.3	10.5	10.8	15.0	12.1	13.1	15.5	13.9	14.5	13.4	11.0	12.4
9	11.0	9.5	10.3	13.7	11.0	12.3	14.1	13.6	13.8	13.4	12.9	13.1
10	11.0	9.2	9.9	11.3	10.6	11.0	13.7	13.3	13.5	13.0	12.1	12.7
11	---	---	---	11.2	10.4	10.8	14.1	13.2	13.5	13.0	12.0	12.5
12	---	---	---	11.9	10.7	11.4	13.5	12.7	13.0	12.8	12.4	12.6
13	10.3	8.8	9.5	13.5	11.5	12.6	14.1	12.9	13.4	12.5	12.0	12.4
14	11.2	9.1	9.5	15.1	12.4	13.5	14.3	13.5	13.9	12.2	11.6	11.8
15	---	---	---	13.7	12.1	12.7	14.4	13.8	14.2	11.9	11.6	11.7
16	8.9	8.3	8.6	12.9	12.0	12.5	14.0	13.6	13.8	13.2	11.6	12.4
17	8.9	8.1	8.5	12.5	11.9	12.2	13.6	13.2	13.3	13.5	12.4	12.9
18	9.8	9.1	9.3	11.9	11.5	11.7	13.9	13.3	13.6	14.3	13.0	13.8
19	10.8	8.9	9.8	11.8	11.4	11.6	14.3	13.9	14.0	14.2	13.6	13.9
20	---	---	---	13.0	11.2	12.3	14.2	13.7	13.9	13.9	13.3	13.5
21	---	---	---	14.9	12.4	13.9	13.8	13.5	13.7	13.7	13.2	13.5
22	---	---	---	14.8	12.4	13.3	13.8	13.4	13.6	13.8	13.4	13.5
23	11.3	9.3	10.3	13.0	12.3	12.6	13.7	13.1	13.5	13.8	13.6	13.7
24	---	---	---	13.5	12.1	12.6	13.1	12.4	12.8	13.0	11.1	12.0
25	10.8	8.5	9.7	13.2	12.1	12.5	12.7	12.4	12.5	14.5	11.8	13.3
26	11.0	8.5	9.8	12.7	11.8	12.2	12.7	10.8	12.0	---	---	---
27	10.1	7.9	9.2	13.4	11.5	12.6	---	---	---	---	---	---
28	---	---	---	13.5	12.6	13.1	11.8	11.5	11.6	---	---	---
29	---	---	---	13.3	12.7	12.9	12.5	11.5	12.1	16.0	13.3	14.4
30	---	---	---	15.5	12.5	14.0	12.5	12.2	12.4	15.0	13.3	14.4
31	8.9	6.6	7.7	---	---	---	12.6	12.0	12.2	---	---	---
MONTH	---	---	---	15.5	5.9	12.2	15.6	10.8	13.3	16.0	9.4	12.7

MISSISSIPPI RIVER MAIN STEM

05331560 MISSISSIPPI RIVER AT GREY CLOUD ISLAND NEAR COTTAGE GROVE, MN

OXYGEN, DISSOLVED (DO), MG/L, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	14.7	14.2	14.4	14.0	12.6	13.3	12.3	7.4	10.3
2	---	---	---	15.7	14.2	15.0	12.6	10.9	11.9	12.0	9.7	11.0
3	16.8	14.4	15.7	16.3	15.1	15.5	12.8	11.6	12.1	10.7	9.9	10.4
4	---	---	---	16.2	15.1	15.5	15.6	11.7	13.9	10.3	9.3	9.9
5	---	---	---	16.6	14.3	15.4	14.7	13.1	13.9	10.1	8.8	9.1
6	---	---	---	---	---	---	14.5	12.9	13.7	9.3	8.2	8.8
7	---	---	---	---	---	---	15.2	13.3	14.0	10.1	7.7	9.1
8	---	---	---	---	---	---	15.5	13.7	14.6	9.2	7.4	8.2
9	---	---	---	---	---	---	14.9	13.6	14.2	9.0	6.8	8.2
10	---	---	---	---	---	---	16.0	12.2	14.4	8.9	7.8	8.4
11	---	---	---	---	---	---	15.4	12.3	13.8	9.5	8.0	8.7
12	---	---	---	---	---	---	14.5	12.3	13.1	9.3	8.3	8.7
13	---	---	---	13.8	12.3	12.7	13.9	12.4	13.1	9.0	8.4	8.7
14	---	---	---	14.0	10.3	13.1	13.4	12.3	12.9	9.2	7.2	8.5
15	---	---	---	14.9	14.0	14.4	12.9	11.5	12.2	9.0	8.5	8.8
16	---	---	---	14.9	14.0	14.3	14.1	11.6	13.1	9.0	7.8	8.5
17	---	---	---	14.9	14.6	14.8	14.9	13.4	14.0	9.7	8.4	9.0
18	---	---	---	15.0	14.6	14.8	15.7	13.7	14.5	10.2	9.1	9.6
19	---	---	---	14.7	13.0	13.7	14.9	13.6	14.0	9.9	8.2	9.3
20	---	---	---	---	---	---	14.5	12.1	13.2	8.4	7.9	8.1
21	---	---	---	---	---	---	14.2	12.2	13.1	10.8	10.0	10.5
22	---	---	---	13.6	12.8	13.1	14.6	12.0	13.3	10.9	10.0	10.4
23	---	---	---	13.3	12.4	12.9	13.6	11.6	12.6	10.4	9.1	9.7
24	---	---	---	13.7	13.0	13.4	11.9	6.2	9.2	10.2	8.9	9.6
25	---	---	---	---	---	---	9.1	6.1	7.4	9.4	8.2	8.8
26	---	---	---	15.4	13.3	14.2	8.9	6.8	8.0	8.6	7.8	8.2
27	---	---	---	15.8	14.5	14.8	7.9	5.3	6.4	8.7	7.9	8.3
28	---	---	---	15.6	13.8	14.8	6.3	5.3	5.8	8.9	7.6	8.2
29	---	---	---	15.0	13.6	14.1	7.1	5.8	6.3	10.6	7.4	9.2
30	---	---	---	15.0	13.1	13.8	7.6	6.4	7.1	10.7	9.1	9.8
31	---	---	---	14.4	13.4	13.9	---	---	---	10.8	8.9	9.8
MONTH	---	---	---	---	---	---	16.0	5.3	12.0	12.3	6.8	9.1
		JUNE			JULY			AUGUST			SEPTEMBER	
1	10.1	8.7	9.4	---	---	---	6.9	6.6	6.7	8.4	6.5	7.2
2	8.9	8.1	8.3	7.4	4.9	6.4	6.8	6.3	6.5	---	---	---
3	---	---	---	8.1	6.8	7.3	6.3	6.0	6.1	---	---	---
4	---	---	---	7.5	6.4	7.2	6.0	5.7	5.8	8.9	8.7	8.7
5	---	---	---	7.4	6.2	6.9	5.8	5.3	5.6	8.8	8.7	8.8
6	---	---	---	7.4	6.2	7.1	7.8	5.3	7.3	8.2	7.3	7.8
7	---	---	---	7.6	7.0	7.3	8.7	7.5	7.9	7.3	6.6	6.9
8	9.7	8.7	9.2	7.6	6.8	7.1	9.4	7.8	8.5	---	---	---
9	9.4	8.5	8.9	7.4	6.5	7.1	8.8	7.9	8.3	---	---	---
10	9.1	8.0	8.6	7.5	6.9	7.2	8.8	7.0	8.0	6.4	4.4	5.9
11	8.0	6.6	7.2	7.3	6.7	7.0	8.0	7.1	7.5	8.2	6.7	7.4
12	9.8	6.5	8.4	8.0	6.3	7.1	7.4	6.4	6.8	8.3	6.2	7.2
13	9.3	7.9	8.8	8.0	7.6	7.8	10.8	6.3	8.8	8.8	6.2	7.3
14	---	---	---	7.8	7.1	7.5	11.1	8.8	9.8	8.3	6.6	7.3
15	---	---	---	7.1	6.2	6.6	12.8	8.0	10.7	---	---	---
16	7.0	6.2	6.6	9.5	5.5	7.8	12.9	10.8	11.5	5.6	4.8	5.1
17	6.5	5.8	6.1	8.8	7.2	7.9	12.0	9.1	10.9	7.4	4.5	6.7
18	8.5	5.6	7.4	7.7	6.6	7.1	---	---	---	6.8	6.2	6.4
19	9.3	7.7	8.5	8.2	6.0	7.3	---	---	---	7.5	6.2	6.6
20	7.9	6.3	6.9	8.0	6.4	7.2	---	---	---	9.2	8.0	8.4
21	6.5	5.7	6.1	7.0	5.3	6.0	---	---	---	9.7	7.9	8.6
22	---	---	---	---	---	---	---	---	---	8.6	8.0	8.2
23	---	---	---	---	---	---	---	---	---	8.9	7.6	8.1
24	---	---	---	---	---	---	---	---	---	11.2	7.9	9.5
25	7.1	6.2	6.4	8.5	6.2	7.4	---	---	---	12.8	9.7	10.9
26	6.8	5.8	6.1	7.6	5.5	6.5	---	---	---	13.0	10.4	11.5
27	7.3	5.3	6.6	7.2	4.9	6.2	---	---	---	12.0	10.0	11.2
28	7.1	6.3	6.7	7.1	6.1	6.5	---	---	---	12.3	10.4	11.2
29	6.9	6.0	6.5	6.1	5.2	5.6	---	---	---	11.1	9.8	10.3
30	---	---	---	6.7	4.9	5.9	---	---	---	10.2	8.8	9.3
31	---	---	---	6.9	6.0	6.4	9.7	8.0	8.9	---	---	---
MONTH	---	---	---	9.5	4.9	6.9	---	---	---	13.0	4.4	8.3
YEAR	---	---	---									

MISSISSIPPI RIVER MAIN STEM

05331560 MISSISSIPPI RIVER AT GREY CLOUD ISLAND NEAR COTTAGE GROVE, MN

PH (STANDARD UNITS), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	8.4	8.0	8.2	8.0	7.6	7.8	8.1	8.0	8.1	8.1	8.1	8.1
2	8.3	7.6	8.0	8.1	7.8	8.0	8.2	8.0	8.1	8.1	8.1	8.1
3	8.3	7.9	8.0	8.2	8.1	8.1	8.3	8.1	8.2	8.1	7.9	8.0
4	8.4	7.8	8.1	8.2	8.0	8.1	8.2	8.1	8.2	8.0	7.9	7.9
5	8.5	7.9	8.1	8.3	8.0	8.2	8.2	8.0	8.1	8.0	7.7	7.9
6	---	---	---	8.3	7.8	8.1	8.4	8.1	8.2	7.8	7.8	7.8
7	8.5	8.1	8.3	8.3	7.9	8.1	8.4	8.3	8.3	7.8	7.8	7.8
8	8.5	8.2	8.3	8.3	7.9	8.1	8.3	8.3	8.3	7.9	7.8	7.9
9	8.5	7.9	8.2	8.3	7.9	8.2	8.3	8.2	8.3	8.0	7.9	7.9
10	8.4	7.8	8.1	8.3	8.0	8.2	8.2	8.1	8.2	8.0	7.8	7.9
11	8.8	8.0	8.3	8.4	8.3	8.3	8.3	8.1	8.2	8.0	7.8	7.9
12	9.1	8.1	8.4	8.4	8.4	8.4	8.3	8.2	8.3	8.1	8.0	8.1
13	8.7	8.0	8.3	8.4	8.1	8.3	8.3	8.2	8.2	8.1	8.0	8.0
14	8.4	8.1	8.3	8.4	8.1	8.3	8.2	8.2	8.2	8.0	7.9	7.9
15	8.4	8.1	8.2	8.4	7.9	8.3	8.2	8.2	8.2	7.9	7.9	7.9
16	8.5	8.0	8.2	8.4	8.3	8.4	8.2	8.1	8.2	7.9	7.8	7.9
17	8.5	7.8	8.1	8.4	8.4	8.4	8.1	8.1	8.1	7.9	7.9	7.9
18	8.4	7.9	8.0	8.4	8.4	8.4	8.3	8.1	8.2	8.0	7.9	7.9
19	8.4	7.8	8.2	8.4	8.3	8.4	8.3	8.2	8.2	8.1	7.9	8.0
20	8.4	7.8	8.1	8.4	8.2	8.3	8.3	8.2	8.2	8.1	8.0	8.1
21	8.5	8.2	8.3	8.4	8.3	8.4	8.2	8.0	8.2	8.1	8.0	8.1
22	8.6	8.1	8.3	8.4	8.1	8.2	8.2	8.1	8.1	8.1	8.0	8.1
23	8.5	7.8	8.2	8.2	8.0	8.1	8.1	8.1	8.1	8.1	8.1	8.1
24	9.0	7.9	8.3	8.2	8.1	8.2	8.1	8.0	8.1	8.1	7.9	8.0
25	8.8	8.0	8.4	8.2	8.1	8.2	8.1	8.0	8.1	8.0	7.9	8.0
26	---	---	---	8.2	8.1	8.2	8.1	8.0	8.0	---	---	---
27	---	---	---	8.3	8.1	8.2	8.0	8.0	8.0	---	---	---
28	---	---	---	8.4	8.3	8.3	8.0	7.9	7.9	8.1	8.0	8.0
29	---	---	---	8.4	8.1	8.3	8.1	7.9	8.0	8.2	7.9	8.0
30	7.9	7.6	7.8	8.1	8.0	8.1	8.1	8.1	8.1	7.9	7.8	7.9
31	7.9	7.6	7.8	---	---	---	8.1	8.0	8.1	---	---	---
MONTH	9.1	7.6	8.2	8.4	7.6	8.2	8.4	7.9	8.2	8.2	7.7	8.0
		FEBRUARY			MARCH			APRIL			MAY	
1	8.2	8.1	8.2	8.3	8.1	8.2	8.0	7.9	8.0	7.9	7.6	7.8
2	8.3	8.2	8.3	8.2	8.0	8.1	8.2	7.9	8.0	8.1	7.8	7.9
3	8.4	8.3	8.3	8.1	8.0	8.0	8.2	8.0	8.1	8.1	8.0	8.0
4	8.3	8.3	8.3	8.1	8.0	8.1	8.1	7.7	8.0	8.1	8.0	8.0
5	8.3	8.3	8.3	8.1	8.0	8.1	8.1	7.8	7.9	8.0	7.9	8.0
6	8.3	8.3	8.3	---	---	---	8.1	7.9	8.0	8.0	7.8	7.9
7	8.4	8.3	8.3	---	---	---	8.1	7.8	8.0	7.9	7.4	7.8
8	8.4	8.2	8.3	---	---	---	8.1	7.9	8.0	7.8	7.5	7.7
9	8.4	8.2	8.3	---	---	---	8.0	7.9	7.9	7.7	7.5	7.6
10	8.3	8.2	8.3	---	---	---	8.0	7.8	7.9	7.8	7.5	7.7
11	8.4	8.3	8.3	---	---	---	8.0	7.8	7.9	7.8	7.6	7.7
12	8.4	7.9	8.2	---	---	---	8.0	7.8	7.9	7.8	7.6	7.7
13	8.3	8.1	8.2	7.7	7.5	7.7	7.9	7.8	7.8	7.8	7.7	7.7
14	8.3	8.2	8.3	7.7	7.5	7.6	7.9	7.8	7.9	7.8	7.2	7.6
15	8.3	8.2	8.3	7.7	7.6	7.7	7.9	7.8	7.9	7.5	7.4	7.4
16	---	---	---	7.7	7.6	7.6	7.9	7.7	7.9	8.0	7.3	7.7
17	---	---	---	7.7	7.6	7.7	8.0	7.8	7.9	8.2	8.0	8.1
18	---	---	---	7.7	7.7	7.7	8.1	7.9	8.0	8.3	8.1	8.2
19	---	---	---	7.7	7.4	7.5	8.0	7.7	7.9	8.2	8.1	8.2
20	---	---	---	---	---	---	8.0	7.8	7.9	8.2	8.1	8.2
21	---	---	---	---	---	---	8.0	7.9	7.9	8.2	8.0	8.1
22	---	---	---	7.4	7.3	7.4	8.0	7.8	7.9	8.2	8.0	8.1
23	---	---	---	7.8	7.4	7.6	8.2	7.9	8.1	8.1	7.7	8.1
24	---	---	---	7.9	7.7	7.8	8.1	7.8	8.0	8.1	7.9	8.1
25	---	---	---	---	---	---	7.9	7.6	7.8	8.1	8.0	8.0
26	---	---	---	8.1	7.9	8.0	7.7	7.5	7.6	8.0	7.9	8.0
27	---	---	---	8.1	8.0	8.0	7.6	7.4	7.5	8.1	7.9	8.0
28	---	---	---	8.1	7.9	8.0	7.5	7.4	7.4	8.1	8.0	8.0
29	---	---	---	8.1	7.9	8.0	7.4	7.4	7.4	8.2	7.9	8.1
30	---	---	---	8.1	7.9	8.0	7.7	7.4	7.5	8.3	8.0	8.2
31	---	---	---	8.1	8.0	8.0	---	---	---	8.3	8.0	8.2
MONTH	---	---	---	---	---	---	8.2	7.4	7.9	8.3	7.2	7.9

MISSISSIPPI RIVER MAIN STEM

05331560 MISSISSIPPI RIVER AT GREY CLOUD ISLAND NEAR COTTAGE GROVE, MN

PH (STANDARD UNITS), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	8.2	8.1	8.2	7.8	7.8	7.8	8.2	8.1	8.1	8.6	8.5	8.5
2	8.2	8.1	8.1	7.9	7.8	7.8	8.2	8.2	8.2	8.5	8.4	8.4
3	---	---	---	7.9	7.7	7.8	8.2	8.2	8.2	---	---	---
4	---	---	---	7.9	7.8	7.9	8.3	8.2	8.2	---	---	---
5	---	---	---	7.9	7.7	7.9	8.3	8.3	8.3	---	---	---
6	---	---	---	8.3	7.9	8.1	8.3	8.2	8.2	8.3	8.2	8.2
7	---	---	---	8.4	8.3	8.3	8.3	8.2	8.2	8.3	8.2	8.2
8	8.1	8.0	8.0	8.4	8.3	8.3	8.4	8.3	8.3	8.2	8.0	8.1
9	8.0	8.0	8.0	8.4	8.1	8.2	8.5	8.4	8.5	8.1	8.0	8.0
10	8.0	7.9	7.9	8.3	7.9	8.2	8.5	8.2	8.3	8.3	7.9	8.1
11	7.9	7.7	7.8	8.4	8.2	8.3	8.4	8.2	8.3	8.4	8.2	8.2
12	8.0	7.7	7.8	8.5	8.4	8.4	8.4	8.2	8.3	8.5	8.3	8.3
13	7.9	7.8	7.8	8.5	8.2	8.2	8.5	8.3	8.4	8.5	8.4	8.4
14	---	---	---	8.2	8.1	8.2	8.5	8.4	8.4	8.5	8.3	8.3
15	---	---	---	8.3	8.1	8.2	8.6	8.3	8.4	8.3	8.2	8.3
16	7.7	7.7	7.7	8.3	8.2	8.2	8.6	8.5	8.5	8.2	8.1	8.2
17	7.8	7.7	7.7	8.3	8.0	8.3	8.6	8.3	8.5	8.3	8.0	8.1
18	7.8	7.8	7.8	8.3	8.2	8.2	8.5	8.4	8.4	8.2	8.1	8.1
19	7.8	7.6	7.7	8.3	8.2	8.2	---	---	---	8.4	8.1	8.2
20	7.7	7.5	7.5	8.3	8.2	8.2	---	---	---	8.5	8.3	8.3
21	7.5	7.5	7.5	8.3	8.2	8.2	---	---	---	8.5	8.3	8.4
22	7.6	7.5	7.5	8.2	8.2	8.2	---	---	---	8.4	8.3	8.4
23	7.5	7.5	7.5	---	---	---	---	---	---	8.5	8.4	8.4
24	7.5	7.5	7.5	---	---	---	---	---	---	8.4	8.1	8.2
25	7.7	7.5	7.6	8.2	8.2	8.2	---	---	---	8.5	8.2	8.2
26	7.7	7.5	7.6	8.2	7.9	8.1	---	---	---	8.7	8.2	8.4
27	7.8	7.6	7.7	8.4	7.8	8.1	---	---	---	8.6	8.3	8.5
28	7.8	7.6	7.7	8.3	8.2	8.3	---	---	---	8.7	8.4	8.5
29	7.8	7.7	7.7	8.3	8.2	8.2	---	---	---	8.6	8.5	8.5
30	7.8	7.8	7.8	8.3	8.2	8.2	---	---	---	8.7	8.5	8.6
31	---	---	---	8.2	8.1	8.1	8.6	8.5	8.5	---	---	---
MONTH	---	---	---	8.5	7.7	8.1	---	---	---	8.7	7.9	8.3
YEAR	9.1	7.2	8.1									

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 mi^2 (95,000 km^2), 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 1989 TO SEPTEMBER 1990

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH (STAND-ARD UNITS) (00400)	PH 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												
06...	1230	4620	481	476	8.2	8.1	6.0	6.0	742	10.5	420	110
FEB												
27...	1130	2870	580	594	8.5	8.9	1.0	7.0	759	17.2	K8	K6
APR												
24...	1130	6560	418	433	9.1	8.7	17.5	6.5	736	15.6	K8	K15
SEP												
07...	0930	7760	631	618	8.3	8.3	25.5	13	741	6.6	K28	K8

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												
06...	47	17	25	3.5	178	165	0	217	28	29	0.20	5.8
FEB												
27...	61	23	35	3.8	193	204	2	230	42	43	0.20	9.1
APR												
24...	45	17	20	3.8	160	145	28	139	41	26	0.10	2.0
SEP												
07...	66	26	21	4.4	218	188	3	258	73	33	0.20	13

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV											
06...	265	0.04	1.40	0.40	0.40	1.3	0.38	0.28	0.27	--	--
FEB											
27...	363	0.09	2.40	0.16	0.16	1.4	0.35	0.23	0.23	3	100
APR											
24...	272	0.03	0.60	0.02	0.01	1.4	0.15	0.09	0.06	22	94
SEP											
07...	401	0.07	8.80	0.23	0.19	1.7	0.28	0.18	0.17	61	75

MISSISSIPPI RIVER MAIN STEM

05331570 MISSISSIPPI RIVER AT NININGER, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)
NOV											
06...	1230	<10	<1	49	<0.5	2.0	<1	<3	<1	19	1
FEB											
27...	1130	<10	<1	57	<0.5	<1.0	<5	<3	<10	19	<10
APR											
24...	1130	10	2	50	<0.5	<1.0	10	<3	4	26	<1
SEP											
07...	0930	20	2	73	<0.5	<1.0	<1	<3	4	7	1

DATE	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
NOV										
06...	9	13	<0.1	<10	2	<1	<1.0	120	<6	16
FEB										
27...	11	45	0.1	<10	<10	<1	<1.0	150	<6	14
APR										
24...	9	4	<0.1	<10	2	<1	<1.0	120	<6	41
SEP										
07...	18	4	<0.1	<10	2	1	<1.0	210	<6	12

MISSISSIPPI RIVER MAIN STEM

05331578 MISSISSIPPI RIVER AT LOCK AND DAM 2 AT HASTINGS, MN

LOCATION.--Lat 44°45'37", long 92°52'02", in SE¼SW¼ sec.16, T.115 N., R.17 W., Dakota County, Hydrologic unit 07010206, in old lock house at lock and dam and at mile 815.2 upstream from Ohio River.

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to current year.
pH: October 1974 to current year.
WATER TEMPERATURES: October 1974 to current year.
DISSOLVED OXYGEN: October 1974 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1974.

REMARKS.--Extremes are published for those years with 80 percent or more daily record. Values not corrected for instrument drift between calibrations.

COOPERATION.--Water-quality monitor operated by the Metropolitan Waste Control Commission, St. Paul, MN.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1980, 1982, 1987-88, 1990): Maximum, 799 microsiemens, June 27, July 6, 20, 1980; minimum, (more than 20 percent missing record), 268 microsiemens, Sep. 20, 1986.
pH (water years 1980, 1982, 1987-88, 1990): Maximum, 9.5 units, June 13, 1988, Feb. 12, 1990; minimum, 6.0 units, Apr. 30, 1990.
WATER TEMPERATURES (water years 1980, 1983-84, 1987-90): Maximum, 32.5 °C, July 10, 1980; minimum, 0.0 °C several days during winter period.
DISSOLVED OXYGEN (water years 1980, 1982, 1987-88, 1990): Maximum, 20.0 mg/L, Feb. 10-14, 1990; minimum, 1.7 mg/L, June 4, 1980.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 698 microsiemans, Aug. 14; minimum, 304 microsiemans, Mar. 18.
pH: Maximum, 9.5 units, Feb. 12; minimum, 6.0 units, Apr. 30.
WATER TEMPERATURES: Maximum, 23.0 °C, July 18; minimum, 0 °C several days during winter.
DISSOLVED OXYGEN: Maximum, 20.0 mg/L, Feb 10-14; minimum, 3.3 mg/L, Apr. 30.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	17.4	17.0	17.1	10.3	9.4	9.8	1.0	0.9	1.0	0.1	0.0	0.0
2	17.3	16.0	16.4	9.6	8.9	9.2	1.0	0.7	0.8	0.2	0.0	0.1
3	16.1	13.6	14.5	9.1	8.5	8.8	0.6	0.5	0.5	0.3	0.2	0.2
4	13.6	13.4	13.5	8.9	8.5	8.6	0.7	0.5	0.6	0.3	0.2	0.2
5	14.1	13.5	13.7	9.0	8.6	8.8	0.8	0.2	0.4	0.3	0.2	0.2
6	---	---	---	8.9	8.5	8.7	0.4	0.3	0.3	---	---	---
7	13.5	13.2	13.4	8.8	6.6	7.5	0.3	0.3	0.3	---	---	---
8	13.7	13.2	13.4	6.8	6.4	6.7	0.4	0.3	0.4	0.3	0.3	0.3
9	13.5	13.3	13.4	6.5	5.9	6.2	0.5	0.4	0.4	0.5	0.3	0.4
10	13.3	10.6	11.6	6.0	5.6	5.7	0.5	0.3	0.4	0.6	0.5	0.5
11	11.4	10.7	10.9	6.0	5.7	5.8	0.3	0.2	0.2	0.6	0.6	0.6
12	11.3	11.0	11.1	5.8	5.5	5.7	0.3	0.2	0.2	0.6	0.6	0.6
13	11.6	11.2	11.3	5.8	5.5	5.7	0.4	0.3	0.3	0.6	0.6	0.6
14	11.9	11.2	11.5	5.8	3.2	4.4	0.3	0.2	0.3	0.6	0.6	0.6
15	11.7	11.5	11.6	3.6	3.3	3.5	0.3	0.2	0.3	0.7	0.6	0.6
16	---	---	---	3.3	2.5	2.8	0.3	0.2	0.2	0.7	0.6	0.6
17	10.7	10.4	10.5	2.8	1.9	2.3	0.3	0.2	0.2	0.6	0.6	0.6
18	10.5	10.0	10.2	2.0	1.9	2.0	0.3	0.2	0.2	0.7	0.6	0.6
19	10.0	9.7	9.8	2.2	2.0	2.1	0.3	0.1	0.2	0.8	0.7	0.7
20	9.9	9.5	9.7	2.4	2.2	2.3	0.2	0.1	0.1	0.8	0.8	0.8
21	10.9	9.7	10.0	2.4	0.8	1.3	0.2	0.1	0.1	0.8	0.7	0.7
22	10.3	10.0	10.1	0.8	0.7	0.8	0.2	0.1	0.2	0.9	0.7	0.7
23	10.8	10.2	10.5	0.8	0.6	0.7	0.2	0.1	0.1	0.8	0.8	0.8
24	11.1	10.2	10.8	0.9	0.8	0.8	0.2	0.1	0.1	0.9	0.8	0.8
25	11.6	10.9	11.2	0.9	0.8	0.9	0.2	0.1	0.1	0.9	0.7	0.8
26	11.9	11.4	11.6	1.1	0.9	1.0	0.1	0.1	0.1	---	---	---
27	12.0	11.7	11.8	1.2	1.0	1.1	0.1	0.1	0.1	---	---	---
28	12.0	11.7	11.8	1.0	0.7	0.9	0.1	0.1	0.1	0.8	0.7	0.7
29	11.9	11.7	11.7	0.8	0.7	0.7	0.1	0.0	0.1	0.8	0.7	0.7
30	11.8	10.9	11.3	0.9	0.8	0.9	0.0	0.0	0.0	0.9	0.7	0.8
31	11.1	10.2	10.6	---	---	---	0.0	0.0	0.0	---	---	---
MONTH	17.4	9.5	11.9	10.3	0.6	4.2	1.0	0.0	0.3	0.9	0.0	0.5

MISSISSIPPI RIVER MAIN STEM

05331578 MISSISSIPPI RIVER AT LOCK AND DAM 2 AT HASTINGS, MN

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	0.7	0.6	0.7	0.5	0.4	0.4	2.9	2.4	2.8	11.6	9.9	10.6
2	0.8	0.7	0.8	0.7	0.4	0.5	2.4	2.0	2.2	10.7	9.8	10.2
3	0.8	0.7	0.7	0.8	0.6	0.7	2.6	1.7	2.1	11.0	10.3	10.6
4	0.7	0.6	0.6	0.9	0.8	0.9	3.1	2.3	2.7	11.2	10.6	10.9
5	0.6	0.6	0.6	1.0	0.9	1.0	2.9	2.3	2.6	11.6	10.9	11.2
6	0.6	0.6	0.6	---	---	---	2.3	1.6	2.0	11.8	11.0	11.3
7	0.8	0.6	0.7	---	---	---	2.6	1.6	2.0	12.2	11.3	11.7
8	1.0	0.8	0.9	---	---	---	3.2	2.1	2.7	12.3	11.7	12.0
9	1.1	1.0	1.0	---	---	---	3.3	3.0	3.1	12.0	11.3	11.7
10	1.2	1.0	1.1	---	---	---	3.1	2.6	2.8	11.3	10.6	11.0
11	1.3	1.1	1.2	---	---	---	2.6	2.0	2.3	11.8	10.8	11.3
12	1.3	1.0	1.2	---	---	---	2.9	1.9	2.3	11.7	11.4	11.5
13	1.1	0.9	1.0	---	---	---	3.1	2.5	2.8	11.9	11.3	11.6
14	1.1	0.7	0.9	2.2	1.9	2.0	3.6	2.8	3.1	11.9	11.6	11.7
15	1.1	0.3	0.6	2.5	1.9	2.1	3.7	3.1	3.4	12.9	10.3	12.4
16	---	---	---	2.1	1.6	1.8	3.7	3.2	3.5	12.9	12.6	12.7
17	---	---	---	1.6	1.1	1.3	5.4	2.6	4.3	12.7	11.8	12.2
18	---	---	---	1.1	0.8	1.0	5.8	5.0	5.3	12.8	11.5	12.0
19	---	---	---	1.4	0.7	0.9	5.8	5.4	5.7	12.6	11.8	12.2
20	---	---	---	---	---	---	7.3	5.7	6.1	12.1	11.5	11.8
21	---	---	---	---	---	---	7.6	6.5	6.9	12.7	11.8	12.2
22	---	---	---	2.1	1.2	1.6	8.0	7.2	7.5	13.1	12.3	12.6
23	---	---	---	1.1	0.5	0.7	8.4	7.8	8.1	14.1	12.7	13.2
24	---	---	---	1.4	0.4	0.8	13.4	8.3	11.4	14.3	13.5	14.0
25	---	---	---	---	---	---	13.9	13.2	13.5	14.2	13.7	13.9
26	---	---	---	1.5	0.6	1.0	14.0	13.8	13.9	13.9	13.6	13.8
27	---	---	---	1.7	0.9	1.2	14.0	13.8	13.9	14.3	13.7	13.9
28	---	---	---	2.2	1.4	1.8	13.8	12.9	13.4	15.4	13.9	14.4
29	---	---	---	2.8	1.9	2.2	12.9	12.2	12.6	14.8	14.2	14.5
30	---	---	---	2.9	2.2	2.4	12.2	11.6	12.0	15.2	14.2	14.5
31	---	---	---	3.0	2.5	2.7	---	---	---	15.3	14.5	14.8
MONTH	---	---	---	---	---	---	14.0	1.6	5.9	15.4	9.8	12.3
		JUNE			JULY			AUGUST			SEPTEMBER	
1	15.5	14.8	15.0	21.3	20.8	21.0	19.9	19.3	19.6	20.4	19.5	19.8
2	15.5	14.7	15.3	21.4	20.7	21.0	19.7	19.2	19.5	20.0	19.6	19.8
3	14.7	13.2	13.7	22.6	20.8	21.7	19.9	19.4	19.6	19.9	19.4	19.6
4	14.4	13.1	13.7	22.5	22.0	22.2	19.8	19.5	19.7	20.2	19.3	19.6
5	14.6	14.0	14.2	22.1	21.4	21.8	19.5	19.1	19.3	20.1	19.6	19.8
6	14.9	14.1	14.5	21.9	21.3	21.6	19.8	19.0	19.4	20.6	19.7	20.1
7	15.0	14.7	14.8	21.7	21.0	21.2	20.0	19.2	19.5	20.1	19.6	19.8
8	15.4	14.8	15.0	21.8	21.2	21.4	19.8	19.2	19.5	19.6	19.3	19.4
9	15.6	14.9	15.2	21.6	21.3	21.5	19.8	19.2	19.5	19.6	19.2	19.4
10	16.2	15.4	15.7	21.7	21.1	21.3	20.8	19.5	19.9	19.9	19.3	19.5
11	16.0	15.5	15.6	21.5	20.8	21.1	20.0	19.4	19.7	19.5	19.1	19.2
12	17.5	15.4	16.5	20.9	20.3	20.6	19.7	19.1	19.3	19.7	19.1	19.4
13	17.9	17.2	17.5	21.4	20.1	20.6	20.5	18.9	19.4	19.6	19.2	19.4
14	18.3	17.6	17.8	21.0	20.4	20.8	20.1	19.3	19.5	19.5	18.3	18.7
15	18.1	17.7	17.9	21.2	20.4	20.8	21.0	19.6	20.0	18.3	17.8	18.1
16	17.8	17.4	17.6	21.3	20.6	20.9	20.5	19.8	20.2	17.8	17.3	17.5
17	17.6	17.3	17.5	21.6	20.9	21.2	20.4	20.1	20.2	17.4	17.0	17.2
18	17.7	16.9	17.2	23.0	21.2	21.8	20.3	19.8	20.1	17.0	13.4	14.6
19	17.6	17.2	17.4	22.6	21.7	22.0	19.8	19.0	19.4	13.7	13.1	13.4
20	17.7	17.3	17.5	22.2	21.5	21.9	19.0	18.5	18.7	13.6	13.5	13.6
21	18.0	17.2	17.6	22.1	21.6	21.8	18.6	16.4	17.5	13.6	13.3	13.5
22	17.9	17.4	17.6	21.9	21.4	21.6	17.9	16.8	17.1	13.3	12.2	12.7
23	17.8	17.0	17.4	21.9	21.0	21.4	17.3	16.9	17.0	12.3	11.8	12.1
24	18.1	17.4	17.8	21.6	21.2	21.4	17.2	16.7	16.9	12.5	12.0	12.1
25	18.4	17.6	18.0	21.4	21.1	21.2	17.7	16.8	17.2	12.5	10.5	11.5
26	20.7	18.0	19.6	21.2	20.7	20.9	18.3	17.3	17.6	11.2	10.8	10.9
27	20.6	20.1	20.3	20.9	20.5	20.7	18.6	17.7	18.0	11.2	11.0	11.1
28	20.3	19.9	20.1	21.2	20.6	20.9	19.8	17.8	19.1	11.2	10.9	11.0
29	21.1	20.3	20.6	21.4	20.7	21.0	20.2	19.4	19.7	11.0	10.7	10.8
30	21.4	20.6	21.0	21.1	20.6	20.9	19.9	19.3	19.6	10.8	10.6	10.7
31	---	---	---	20.8	19.3	20.0	19.8	19.4	19.6	---	---	---
MONTH	21.4	13.1	17.0	23.0	19.3	21.2	21.0	16.4	19.1	20.6	10.5	16.1
YEAR	23.0	0.0	10.0									

MISSISSIPPI RIVER MAIN STEM

05331578 MISSISSIPPI RIVER AT LOCK AND DAM 2 AT HASTINGS, MN

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	395	390	393	461	434	444	556	541	547	587	579	583
2	391	389	390	466	444	456	543	527	537	612	585	600
3	406	388	399	457	448	451	524	512	516	616	601	610
4	404	400	402	449	446	447	539	516	527	606	598	601
5	437	396	415	452	440	444	570	533	555	605	596	601
6	---	---	---	458	449	452	565	557	561	---	---	---
7	441	430	436	452	440	447	569	556	562	---	---	---
8	435	415	427	443	436	440	585	566	576	607	579	590
9	424	413	419	442	436	439	581	573	577	597	587	592
10	428	417	420	449	441	446	582	572	578	588	576	581
11	422	416	418	449	429	442	572	558	566	580	576	578
12	426	416	421	445	432	437	569	553	560	575	567	570
13	430	418	423	447	439	443	566	559	563	588	570	579
14	433	422	428	462	446	454	573	561	567	595	587	591
15	434	425	429	478	457	462	602	573	583	601	591	596
16	---	---	---	470	458	461	607	595	603	607	595	603
17	444	430	438	461	454	457	601	596	599	605	600	602
18	445	438	442	462	457	459	621	596	608	601	583	592
19	444	427	435	464	458	461	627	591	605	586	582	583
20	439	427	430	461	449	454	606	596	600	592	585	588
21	455	436	448	470	453	463	599	590	594	590	575	583
22	468	447	457	475	468	471	596	590	593	576	558	566
23	451	439	446	507	473	487	592	584	587	572	543	564
24	450	429	444	516	503	511	595	584	590	571	567	570
25	448	437	442	520	507	514	599	594	597	569	565	567
26	454	441	447	521	512	519	598	589	595	---	---	---
27	459	448	450	525	517	521	592	587	589	---	---	---
28	450	440	445	527	520	523	591	580	585	582	572	578
29	441	427	436	546	527	538	582	579	580	576	565	568
30	431	421	426	563	543	550	588	580	584	638	567	601
31	450	430	435	---	---	---	589	582	586	---	---	---
MONTH	468	388	429	563	429	469	627	512	576	638	543	586
		FEBRUARY			MARCH			APRIL			MAY	
1	628	610	619	597	593	595	403	395	398	461	456	459
2	619	605	610	601	589	595	405	398	402	460	450	455
3	624	615	621	590	582	586	450	398	426	452	439	444
4	620	613	616	609	582	596	452	443	448	440	418	433
5	623	618	620	606	588	597	454	448	451	427	405	415
6	625	600	610	---	---	---	459	451	454	405	385	396
7	606	598	603	---	---	---	468	459	463	392	369	383
8	606	599	602	---	---	---	466	457	461	395	375	384
9	609	594	604	---	---	---	459	450	455	390	379	384
10	604	594	599	---	---	---	452	444	447	384	373	378
11	608	593	601	---	---	---	449	444	447	380	375	378
12	608	582	601	---	---	---	449	441	446	389	376	383
13	597	583	590	---	---	---	456	441	447	396	384	390
14	599	587	593	532	497	516	456	442	452	394	388	391
15	596	477	520	498	439	473	459	450	454	405	392	399
16	---	---	---	453	384	418	457	450	453	411	395	403
17	---	---	---	404	345	368	461	435	457	443	404	425
18	---	---	---	361	304	330	462	459	461	453	422	438
19	---	---	---	341	328	336	470	441	465	470	446	463
20	---	---	---	---	---	---	475	463	469	472	455	464
21	---	---	---	---	---	---	476	463	470	478	469	473
22	---	---	---	345	335	340	489	474	481	517	474	492
23	---	---	---	338	331	334	501	487	496	543	501	528
24	---	---	---	350	333	342	500	417	451	554	543	549
25	---	---	---	---	---	---	436	422	430	570	554	564
26	---	---	---	358	350	355	435	430	432	586	569	577
27	---	---	---	372	358	364	446	429	436	596	587	592
28	---	---	---	388	368	377	472	440	455	602	589	598
29	---	---	---	392	375	386	473	444	456	610	600	606
30	---	---	---	396	385	391	461	454	459	617	605	611
31	---	---	---	402	391	396	---	---	---	632	612	622
MONTH	---	---	---	---	---	---	501	395	450	632	369	467

MISSISSIPPI RIVER MAIN STEM

05331578 MISSISSIPPI RIVER AT LOCK AND DAM 2 AT HASTINGS, MN

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	635	618	630	648	636	643	528	487	503	673	645	660
2	646	626	638	662	640	654	492	484	488	671	659	667
3	646	628	635	663	644	652	519	492	505	676	662	668
4	645	585	615	648	638	642	538	517	528	681	633	652
5	603	544	595	644	636	638	568	525	552	636	629	634
6	611	600	605	647	635	644	585	544	574	634	608	627
7	609	598	605	651	644	648	632	583	613	630	624	627
8	599	563	582	653	645	649	636	628	633	644	628	636
9	566	523	540	653	646	650	655	636	647	653	629	646
10	528	500	514	652	607	647	662	644	656	652	628	650
11	505	486	496	647	639	643	669	655	661	643	632	637
12	489	462	476	643	636	639	677	658	668	637	630	634
13	478	462	470	641	626	632	679	662	673	634	627	632
14	505	477	489	629	615	619	698	674	681	630	585	605
15	519	500	512	621	614	616	696	637	681	601	579	588
16	512	487	497	635	607	629	682	651	671	580	576	579
17	492	483	488	638	621	635	673	668	670	584	579	580
18	486	446	475	636	619	629	680	669	674	579	541	573
19	504	484	497	629	601	615	674	666	670	576	573	574
20	495	474	480	628	604	614	672	650	669	580	576	578
21	513	482	502	611	601	607	684	656	670	578	566	570
22	526	512	520	620	612	616	672	641	658	572	567	569
23	520	503	510	623	604	616	652	631	638	573	568	571
24	504	495	499	639	608	627	675	640	660	586	570	578
25	517	499	506	653	633	644	667	577	628	603	569	588
26	549	517	535	660	641	650	613	558	576	606	600	602
27	559	546	554	654	604	639	586	573	578	602	593	597
28	576	546	562	601	561	573	604	576	594	597	585	592
29	609	576	592	584	561	575	618	601	606	593	581	586
30	635	609	624	601	584	593	641	617	632	588	579	584
31	---	---	---	602	526	563	666	627	650	---	---	---
MONTH	646	446	541	663	526	627	698	484	623	681	541	610
YEAR	698	304	534									

OXYGEN, DISSOLVED (DO), MG/L, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	9.1	7.1	7.6	9.4	8.3	8.9	17.5	16.6	16.9	10.3	10.2	10.3
2	8.6	7.3	7.8	9.3	7.8	8.4	17.0	15.3	16.3	12.4	10.1	11.6
3	10.9	7.2	9.1	8.0	7.6	7.8	15.1	13.6	14.1	12.3	11.8	12.0
4	11.7	9.6	10.0	7.8	7.4	7.6	15.9	13.8	14.7	12.2	11.8	11.9
5	10.6	9.3	9.7	8.3	7.5	7.8	17.6	14.7	16.2	12.2	11.9	12.0
6	---	---	---	7.9	7.3	7.7	17.9	16.4	17.2	---	---	---
7	10.0	8.7	9.3	11.4	7.6	9.7	17.7	16.5	17.2	---	---	---
8	11.2	9.1	10.0	11.2	10.6	10.8	17.7	16.7	17.1	---	---	---
9	10.9	8.7	9.4	10.8	10.2	10.4	17.8	16.6	17.1	14.8	9.0	12.5
10	12.2	8.3	10.5	10.9	10.2	10.5	17.9	17.0	17.3	14.1	13.6	13.7
11	13.6	11.1	11.8	11.2	10.4	10.8	19.4	15.6	17.4	14.1	13.4	13.8
12	11.8	10.4	11.1	10.8	10.3	10.5	18.6	14.5	15.9	14.5	13.9	14.1
13	12.9	10.6	11.5	11.9	10.4	11.1	15.2	13.9	14.6	15.2	14.4	14.7
14	13.7	11.4	12.1	12.7	10.8	11.9	14.1	13.5	13.8	15.4	14.7	15.1
15	12.8	11.1	11.9	12.7	11.7	12.2	14.9	13.5	14.1	15.6	15.2	15.4
16	---	---	---	12.0	11.4	11.7	15.0	13.9	14.3	15.8	14.0	14.8
17	12.0	9.9	11.1	11.9	11.3	11.6	14.4	12.9	13.7	14.2	13.2	13.6
18	11.6	10.4	10.9	12.1	9.1	11.5	13.6	12.7	13.0	13.5	12.7	13.1
19	11.9	10.4	11.1	12.7	11.6	12.1	14.1	12.3	13.1	14.0	13.2	13.5
20	12.0	10.4	11.1	12.7	12.0	12.2	13.4	12.3	12.7	14.3	13.4	13.9
21	12.4	10.2	11.1	14.4	12.0	13.3	12.4	11.9	12.2	14.2	13.2	13.6
22	11.0	9.7	10.3	14.3	13.2	13.7	12.3	12.0	12.1	13.7	12.8	13.1
23	13.2	10.1	11.0	13.7	13.1	13.4	12.2	12.0	12.1	13.7	12.9	13.3
24	11.8	10.1	11.0	14.6	13.4	14.0	12.1	11.6	11.9	13.6	12.4	12.8
25	11.7	10.5	11.0	14.5	13.9	14.1	11.9	11.1	11.4	12.8	11.9	12.2
26	11.4	10.3	10.7	15.0	13.8	14.6	11.1	10.7	10.9	---	---	---
27	10.6	9.6	10.0	15.8	14.7	15.3	10.7	10.3	10.5	---	---	---
28	10.2	9.3	9.7	15.4	14.2	14.8	11.0	10.1	10.6	12.2	11.4	11.8
29	9.5	8.9	9.2	15.7	14.0	14.8	10.8	10.6	10.7	14.3	11.6	13.2
30	9.1	8.1	8.5	16.9	15.1	16.0	10.6	10.4	10.5	14.2	12.7	13.4
31	10.4	7.7	9.2	---	---	---	10.5	10.2	10.3	---	---	---
MONTH	13.7	7.1	10.3	16.9	7.3	11.6	19.4	10.1	13.9	15.8	9.0	13.2

MISSISSIPPI RIVER MAIN STEM

05331578 MISSISSIPPI RIVER AT LOCK AND DAM 2 AT HASTINGS, MN

OXYGEN, DISSOLVED (DO), MG/L, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	13.5	12.0	12.7	18.9	17.3	18.0	17.9	12.6	15.1	10.8	7.2	9.0
2	13.1	12.2	12.6	19.9	17.9	18.5	14.4	12.1	13.1	12.6	9.5	10.8
3	13.0	12.4	12.6	19.9	17.1	18.5	18.1	12.9	15.2	13.2	10.5	11.6
4	12.8	12.1	12.3	19.9	16.8	18.3	17.5	15.5	16.4	19.7	10.7	14.7
5	12.4	11.8	12.1	18.8	16.3	17.7	15.7	13.2	14.2	18.2	15.1	16.9
6	16.0	11.9	14.4	---	---	---	15.5	12.6	13.9	16.7	13.9	15.4
7	17.4	15.2	16.2	---	---	---	18.3	13.8	15.6	15.8	12.8	14.7
8	17.7	15.8	16.7	---	---	---	19.7	15.8	17.6	13.9	8.6	10.8
9	17.7	16.0	17.3	---	---	---	18.7	15.8	17.3	9.7	7.8	8.8
10	20.0	17.7	19.6	---	---	---	16.3	13.9	15.0	8.4	7.1	7.7
11	20.0	18.5	19.9	---	---	---	15.6	13.0	14.1	9.0	7.2	8.0
12	20.0	19.6	19.7	---	---	---	16.9	13.4	14.9	8.6	7.1	7.9
13	20.0	19.8	19.9	---	---	---	16.6	14.5	15.6	8.5	7.2	7.8
14	20.0	18.0	19.4	13.9	13.2	13.6	17.2	13.8	15.5	8.0	6.4	7.1
15	19.7	17.2	18.6	13.7	12.8	13.4	14.6	12.3	13.5	12.9	6.2	10.0
16	---	---	---	14.0	12.8	13.4	14.3	11.2	12.9	11.4	10.2	10.8
17	---	---	---	14.3	13.2	13.8	13.7	10.4	12.0	10.7	9.7	10.2
18	---	---	---	15.0	12.7	14.5	13.8	12.0	12.8	15.3	9.0	12.1
19	---	---	---	15.3	14.6	14.9	13.4	11.3	11.9	13.8	10.8	11.7
20	---	---	---	---	---	---	19.9	10.6	14.0	12.8	10.4	11.5
21	---	---	---	---	---	---	19.9	17.2	18.6	13.3	10.9	12.0
22	---	---	---	13.5	12.9	13.2	19.4	17.1	18.1	13.7	11.2	12.3
23	---	---	---	13.9	12.7	13.4	17.2	13.7	14.9	14.0	10.5	11.9
24	---	---	---	14.3	13.7	13.9	15.9	11.8	13.4	12.2	10.7	11.4
25	---	---	---	---	---	---	14.8	11.6	12.9	11.2	7.9	9.1
26	---	---	---	15.5	14.2	14.7	11.5	8.7	9.7	8.3	7.1	7.7
27	---	---	---	15.0	13.6	14.5	10.1	7.2	8.9	9.7	6.7	7.9
28	---	---	---	16.1	14.2	15.0	8.9	6.3	7.6	15.6	8.5	10.7
29	---	---	---	18.1	14.2	15.9	7.8	6.1	6.5	17.2	10.1	13.3
30	---	---	---	17.2	15.0	16.2	7.8	5.8	6.9	19.2	13.4	15.9
31	---	---	---	18.3	15.7	16.9	---	---	---	17.6	13.5	15.4
MONTH	---	---	---	---	---	---	19.9	5.8	13.6	19.7	6.2	11.1
		JUNE			JULY			AUGUST			SEPTEMBER	
1	15.8	10.8	12.5	7.1	5.5	6.3	8.1	5.6	5.8	13.4	7.0	9.0
2	13.5	7.2	9.0	7.8	5.6	6.7	5.9	5.4	5.7	10.7	6.7	8.3
3	8.0	6.8	7.4	8.0	6.1	7.0	5.8	4.9	5.1	---	---	---
4	9.3	6.4	7.8	7.0	5.4	6.1	5.8	4.7	5.2	10.1	6.8	8.0
5	10.6	7.2	9.0	6.5	5.4	5.9	6.1	4.9	5.6	8.0	6.6	7.2
6	12.4	9.3	10.7	10.9	5.0	7.5	7.9	5.5	6.7	7.5	5.8	6.4
7	12.0	10.2	11.2	10.0	7.5	8.1	8.9	6.6	7.4	---	---	---
8	10.2	8.4	9.2	8.6	6.8	7.4	8.2	6.7	7.3	---	---	---
9	8.5	7.0	7.7	7.7	6.7	7.1	7.6	6.1	6.7	---	---	---
10	8.8	7.4	8.2	9.5	6.2	7.7	10.7	5.8	7.2	---	---	---
11	7.7	5.6	6.3	8.3	6.0	6.7	8.2	5.1	6.5	6.5	4.6	5.5
12	9.4	5.7	7.6	6.8	5.6	6.2	8.1	6.0	6.9	6.5	5.3	5.8
13	8.7	7.1	8.0	8.1	5.6	6.2	---	---	---	6.1	4.6	5.3
14	8.2	6.7	7.5	6.8	5.5	6.1	13.7	10.8	11.9	5.3	4.5	4.7
15	6.8	5.1	5.7	7.2	5.7	6.3	13.8	9.3	10.8	---	---	---
16	5.5	5.0	5.3	10.1	5.4	7.8	14.7	8.2	10.5	4.3	3.3	3.8
17	5.1	4.8	4.9	9.6	7.4	8.1	10.0	6.5	7.8	---	---	---
18	---	---	---	10.0	5.9	7.4	6.4	4.2	5.1	6.3	5.6	5.8
19	8.0	7.4	7.7	9.8	6.3	7.2	---	---	---	6.6	5.3	5.8
20	7.5	6.5	6.9	11.6	5.1	8.4	---	---	---	5.9	5.1	5.6
21	7.0	6.2	6.5	9.8	7.1	8.1	9.5	4.1	6.1	6.3	5.3	5.8
22	6.4	5.9	6.1	8.1	5.7	6.6	9.9	6.1	7.6	6.0	5.5	5.8
23	6.1	5.2	5.6	7.7	4.5	6.0	8.1	6.3	6.7	6.7	5.3	6.0
24	5.2	4.4	4.8	10.5	5.2	7.8	6.5	5.2	5.7	9.2	7.6	8.3
25	---	---	---	9.3	6.5	7.1	5.9	4.6	5.2	9.7	7.9	8.7
26	7.9	6.8	7.3	6.8	4.9	5.7	6.4	4.5	5.1	9.2	7.2	7.8
27	7.2	6.2	6.6	---	---	---	8.7	5.0	5.9	9.1	7.5	8.2
28	6.6	6.1	6.3	---	---	---	8.7	5.2	7.0	8.8	6.8	7.8
29	6.3	5.4	5.8	---	---	---	12.7	7.3	9.2	9.4	7.1	8.2
30	6.9	5.4	6.1	7.4	5.2	6.0	9.9	7.5	8.5	9.1	7.3	7.9
31	---	---	---	6.7	6.0	6.3	9.2	6.6	7.8	---	---	---
MONTH	15.8	4.4	7.4	11.6	4.5	6.9	14.7	4.1	7.0	---	---	---
YEAR	20.0	3.3	10.9									

MISSISSIPPI RIVER MAIN STEM

05331578 MISSISSIPPI RIVER AT LOCK AND DAM 2 AT HASTINGS, MN

PH (STANDARD UNITS), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	8.2	7.9	8.0	8.0	7.6	7.9	8.6	8.5	8.5	7.8	7.7	7.8
2	8.2	7.9	8.1	8.1	7.5	7.8	8.6	8.3	8.4	7.8	7.8	7.8
3	8.6	7.9	8.3	7.7	7.5	7.6	8.3	8.1	8.1	7.8	7.8	7.8
4	8.8	8.4	8.5	7.6	7.4	7.5	8.3	8.1	8.2	7.8	7.8	7.8
5	8.6	8.1	8.3	7.8	7.5	7.6	8.5	8.1	8.2	7.8	7.8	7.8
6	---	---	---	7.6	7.4	7.5	8.5	8.2	8.4	---	---	---
7	8.4	8.1	8.2	8.3	7.5	7.9	8.5	8.3	8.4	---	---	---
8	8.8	8.3	8.5	8.2	8.0	8.1	8.5	8.3	8.4	---	---	---
9	8.8	8.3	8.5	8.3	8.0	8.1	8.6	8.3	8.4	7.8	7.5	7.7
10	8.5	8.2	8.4	8.4	8.1	8.3	8.6	8.4	8.5	7.9	7.8	7.8
11	8.8	8.3	8.5	8.4	8.1	8.3	8.5	8.3	8.3	7.9	7.9	7.9
12	8.5	8.1	8.3	8.3	8.1	8.2	8.3	8.0	8.1	8.1	8.0	8.0
13	8.6	8.2	8.4	8.6	8.2	8.4	8.1	8.0	8.1	8.4	8.1	8.2
14	8.7	8.3	8.4	8.5	8.0	8.2	8.0	7.8	7.9	8.4	8.3	8.4
15	8.7	8.2	8.5	8.3	8.0	8.2	8.0	7.8	7.9	8.5	8.4	8.4
16	---	---	---	8.3	8.1	8.2	8.0	7.8	7.9	8.5	8.4	8.4
17	8.4	8.1	8.1	8.5	8.2	8.3	8.0	7.7	7.9	8.4	8.2	8.3
18	8.3	7.9	8.1	8.5	8.3	8.4	7.9	7.7	7.8	8.3	8.2	8.2
19	8.4	7.9	8.1	8.5	8.3	8.4	8.2	7.6	8.0	8.4	8.2	8.3
20	8.4	8.0	8.2	8.5	8.3	8.4	8.1	7.9	8.0	8.4	8.3	8.4
21	8.2	7.9	8.1	8.4	8.1	8.3	7.9	7.8	7.9	8.4	8.3	8.4
22	8.1	7.7	7.9	8.3	8.1	8.2	7.9	7.8	7.9	8.4	8.3	8.3
23	8.3	7.7	7.9	8.2	8.1	8.1	7.9	7.8	7.8	8.5	8.4	8.4
24	8.1	7.6	8.0	8.3	8.1	8.1	7.9	7.8	7.8	8.5	8.3	8.3
25	8.3	7.9	8.1	8.2	8.1	8.1	7.8	7.6	7.7	8.3	8.2	8.2
26	8.2	7.9	8.1	8.3	8.1	8.2	7.6	7.6	7.6	---	---	---
27	8.2	7.9	8.0	8.3	8.2	8.2	7.6	7.5	7.5	---	---	---
28	8.2	7.9	8.0	8.3	8.1	8.2	7.9	7.4	7.7	8.4	8.2	8.3
29	8.1	7.9	7.9	8.4	8.2	8.3	7.9	7.9	7.9	8.5	8.4	8.4
30	8.0	7.8	7.9	8.5	8.3	8.4	7.9	7.8	7.8	8.6	8.2	8.3
31	8.2	7.8	8.0	---	---	---	7.8	7.8	7.8	---	---	---
MONTH	8.8	7.6	8.2	8.6	7.4	8.1	8.6	7.4	8.0	8.6	7.5	8.1
		FEBRUARY			MARCH			APRIL			MAY	
1	8.5	8.2	8.4	8.5	8.3	8.4	8.8	8.1	8.4	7.4	6.3	6.9
2	8.5	8.3	8.4	8.7	8.4	8.5	8.6	8.1	8.3	7.8	7.0	7.4
3	8.5	8.4	8.5	8.9	8.5	8.6	8.8	8.0	8.4	7.9	7.2	7.5
4	8.5	8.4	8.4	9.0	8.6	8.8	8.8	8.4	8.6	8.0	7.3	7.7
5	8.5	8.3	8.4	9.0	8.6	8.8	8.8	8.3	8.6	8.0	7.4	7.8
6	8.5	8.3	8.4	---	---	---	8.8	8.4	8.6	8.0	7.3	7.7
7	8.7	8.3	8.5	---	---	---	9.2	8.4	8.7	7.9	7.2	7.6
8	8.8	8.5	8.6	---	---	---	9.1	8.6	8.9	7.7	7.1	7.4
9	9.3	8.8	8.8	---	---	---	9.0	8.5	8.8	7.5	6.9	7.2
10	9.3	8.7	8.9	---	---	---	8.8	8.2	8.6	7.1	6.5	6.8
11	9.3	8.8	9.1	---	---	---	8.8	8.3	8.5	7.4	6.6	6.9
12	9.5	8.8	9.1	---	---	---	8.5	8.1	8.4	7.3	6.7	7.0
13	9.4	9.1	9.2	---	---	---	8.4	7.9	8.2	7.4	6.7	7.0
14	9.3	9.0	9.1	7.3	7.0	7.1	8.5	7.9	8.2	7.3	6.6	6.9
15	9.3	8.8	9.0	6.9	6.7	6.8	8.2	7.6	8.0	7.8	6.9	7.4
16	---	---	---	6.9	6.7	6.8	8.3	7.8	8.0	7.5	7.1	7.3
17	---	---	---	6.9	6.7	6.8	8.4	7.3	7.9	7.5	7.1	7.3
18	---	---	---	7.1	6.6	6.7	8.4	7.9	8.2	8.5	7.3	7.8
19	---	---	---	6.8	6.7	6.8	8.4	8.0	8.2	8.1	7.5	7.8
20	---	---	---	---	---	---	8.9	8.1	8.4	8.1	7.5	7.8
21	---	---	---	---	---	---	8.8	8.4	8.6	8.1	7.5	7.8
22	---	---	---	8.7	6.4	6.5	8.8	8.5	8.6	8.2	7.6	7.9
23	---	---	---	6.9	6.7	6.8	8.7	8.2	8.5	8.3	7.7	8.0
24	---	---	---	6.9	6.7	6.8	8.5	7.9	8.3	8.2	7.7	8.0
25	---	---	---	---	---	---	8.3	7.7	8.0	8.1	7.4	7.6
26	---	---	---	7.5	7.1	7.3	8.0	7.4	7.7	7.5	7.2	7.4
27	---	---	---	8.0	7.2	7.6	7.7	7.0	7.3	7.8	7.1	7.4
28	---	---	---	8.5	7.8	8.1	7.3	6.2	8.9	8.5	7.3	7.7
29	---	---	---	8.9	7.8	8.3	7.0	8.1	6.3	8.3	7.6	7.9
30	---	---	---	8.8	8.1	8.4	6.6	6.0	6.3	8.6	7.9	8.2
31	---	---	---	8.9	8.3	8.6	---	---	---	8.6	7.9	8.2
MONTH	---	---	---	---	---	---	9.2	6.0	8.1	8.6	6.3	7.5

MISSISSIPPI RIVER MAIN STEM

05331578 MISSISSIPPI RIVER AT LOCK AND DAM 2 AT HASTINGS, MN

PH (STANDARD UNITS), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	8.5	7.9	8.1	7.8	7.5	7.7	7.5	7.4	7.5	9.1	8.2	8.5
2	8.4	7.6	7.9	7.9	7.6	7.7	7.6	7.4	7.5	8.6	8.2	8.4
3	7.8	7.4	7.6	7.9	7.7	7.7	7.5	7.4	7.5	8.4	7.9	8.1
4	8.0	7.4	7.7	7.9	7.6	7.8	7.7	7.4	7.6	8.5	7.8	8.0
5	7.9	7.5	7.6	8.0	7.7	7.8	7.9	7.6	7.8	8.3	8.0	8.1
6	8.2	7.6	7.9	8.4	7.7	7.9	8.1	7.8	7.9	8.5	7.2	8.1
7	8.2	7.8	8.0	8.3	7.8	8.0	8.3	7.9	8.0	8.0	7.7	7.8
8	7.8	7.6	7.7	8.2	7.9	8.0	8.4	8.0	8.2	7.9	7.5	7.7
9	7.8	7.4	7.6	8.1	7.9	8.0	8.6	8.1	8.3	8.0	7.4	7.5
10	7.7	7.4	7.6	8.3	7.8	8.0	9.3	8.4	8.6	7.9	7.1	7.4
11	7.5	7.0	7.2	8.1	7.8	7.9	8.9	8.4	8.6	7.8	7.2	7.5
12	7.5	6.9	7.1	8.3	7.8	8.0	8.8	8.4	8.6	7.8	7.6	7.7
13	7.3	7.0	7.2	8.6	8.0	8.2	9.4	8.5	8.9	7.7	7.5	7.6
14	7.4	7.0	7.2	8.4	8.0	8.2	9.1	8.0	8.3	7.6	7.5	7.6
15	7.1	6.7	6.9	8.3	8.0	8.2	8.7	7.9	8.2	7.9	7.5	7.6
16	6.8	6.6	6.7	8.5	8.0	8.3	8.4	7.8	8.1	7.7	7.5	7.6
17	6.8	6.6	6.7	8.5	8.1	8.2	8.2	7.9	8.1	7.7	7.4	7.6
18	6.9	6.7	6.8	8.7	8.1	8.3	8.0	7.8	7.9	8.3	7.5	7.8
19	7.3	6.8	7.1	8.6	8.0	8.2	7.8	7.5	7.7	8.1	7.8	7.9
20	7.3	7.0	7.1	8.6	7.9	8.3	7.5	7.2	7.4	7.9	7.7	7.8
21	7.2	7.1	7.2	8.6	8.1	8.3	8.3	7.1	7.5	8.1	7.8	7.9
22	7.4	7.1	7.2	8.4	8.0	8.2	8.2	7.6	7.8	8.2	7.8	8.0
23	7.3	7.2	7.2	8.8	8.0	8.3	7.9	7.5	7.6	8.6	8.1	8.3
24	7.2	7.1	7.1	8.8	8.3	8.5	7.5	7.3	7.3	8.9	8.3	8.5
25	7.3	7.0	7.1	8.7	8.3	8.4	7.3	7.1	7.2	8.9	8.4	8.6
28	7.6	7.2	7.3	8.5	8.2	8.3	7.6	7.1	7.2	8.8	8.2	8.4
27	7.6	7.4	7.5	8.2	7.9	8.1	7.9	7.1	7.3	8.9	8.5	8.7
28	7.6	7.5	7.8	7.9	7.6	7.7	7.6	7.1	7.3	9.0	8.4	8.7
29	7.5	7.3	7.4	7.9	7.5	7.7	8.3	7.4	7.7	9.1	8.5	8.8
30	7.8	7.3	7.5	7.9	7.8	7.8	8.3	7.7	8.0	9.1	8.6	8.8
31	---	---	---	7.7	7.5	7.6	8.4	8.0	8.2	---	---	---
MONTH	8.5	6.6	7.4	8.8	7.5	8.0	9.4	7.1	7.9	9.1	7.1	8.0
YEAR	9.5	6.0	7.9									

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 mi^2.

PERIOD OF RECORD.--October 1967 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 931.50 ft above National Geodetic Vertical Datum of 1929. (Minnesota Department of Transportation bench mark).

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

AVERAGE DISCHARGE.--23 years, 706 ft^3/s, 11.11 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,200 ft^3/s, July 23, 1972, gage height, 15.38 ft; minimum, 25 ft^3/s, Nov. 11, 12, 1977, gage height, 3.37 ft, result of freezeup.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in April 1965 reached a stage of 12.96 ft, from flood marks, discharge, 13,400 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 3,600 ft^3/s and maximum (*)

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 1	0300	*5,390	*8.71	No other peak greater than base discharge.			

Minimum discharge, 104 ft^3/s, Mar. 6, 7, 8, gage height, 3.91 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	173	157	120	125	e115	110	657	5200	500	408	376	657
2	176	156	120	125	e115	108	696	4590	479	376	336	571
3	218	e152	121	125	115	110	759	3850	618	351	309	482
4	233	e150	e120	125	115	109	840	3150	1050	323	281	424
5	251	144	123	125	114	e109	790	2560	1090	291	254	394
6	265	143	122	e127	110	106	740	2110	1050	264	232	825
7	255	142	122	128	109	105	700	1730	952	285	210	1190
8	254	142	122	128	109	109	654	1430	826	522	191	1060
9	247	e140	123	128	109	112	626	1240	787	1050	175	1180
10	238	134	e120	125	111	114	561	1100	732	945	166	1190
11	232	e140	e120	125	109	152	527	994	665	780	157	1050
12	227	e140	e120	e125	109	346	520	885	774	649	156	882
13	223	e140	120	e125	e109	1080	473	782	869	549	153	740
14	203	e143	118	125	e110	1700	463	748	766	461	150	1010
15	180	e143	e118	122	110	2250	438	817	646	399	149	1220
16	193	e140	e118	120	e110	2590	422	873	590	371	143	1030
17	190	e139	e118	117	e110	2480	404	949	746	346	137	896
18	203	e138	e118	117	e110	1910	386	908	1120	315	142	772
19	183	e139	e115	117	e110	1660	376	842	1190	283	134	744
20	190	e142	e114	117	e110	1480	383	775	1040	259	135	643
21	177	e138	e112	117	111	1310	399	723	917	236	141	602
22	177	e130	e112	116	109	1100	425	654	840	225	134	633
23	180	e125	e112	114	109	793	464	723	794	212	132	625
24	179	e122	e112	115	e110	761	533	869	729	204	137	551
25	180	e125	e113	115	e110	686	899	817	641	192	277	497
26	187	e124	e113	e115	e110	580	2340	740	592	218	1010	448
27	171	e122	e115	116	113	534	3600	748	540	378	1540	408
28	173	e121	e117	e116	113	530	3940	756	501	542	1470	376
29	171	121	e119	115	---	480	4440	700	475	518	1210	349
30	170	120	e121	e115	---	456	4960	625	442	464	949	345
31	167	---	e123	e115	---	518	---	553	---	417	717	---
TOTAL	6266	4112	3661	3740	3104	24488	33415	43441	22961	12833	11703	21794
MEAN	202	137	118	121	111	790	1114	1401	765	414	378	726
MAX	265	157	123	128	115	2590	4960	5200	1190	1050	1540	1220
MIN	167	120	112	114	109	105	376	553	442	192	132	345
AC-FT	12430	8160	7260	7420	6160	48570	66280	86170	45540	25450	23210	43230
CFSM	.23	.16	.14	.14	.13	.92	1.29	1.62	.89	.48	.44	.84
IN.	.27	.18	.16	.16	.13	1.06	1.44	1.87	.99	.55	.50	.94

CAL YR 1989 TOTAL 167910 MEAN 460 MAX 4710 MIN 86 AC-FT 333000 CFSM .53 IN. 7.24
WTR YR 1990 TOTAL 191518 MEAN 525 MAX 5200 MIN 105 AC-FT 379900 CFSM .61 IN. 8.26

e Estimated

ST. CROIX RIVER BASIN

05337400 KNIFE RIVER NEAR MORA, MN

LOCATION.--Lat 45°55'12", long 93°18'26", in SW¼SW¼S 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 mi^2.

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 National Geodetic Vertical Datum of 1929. (Kanabec County bench mark).

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

AVERAGE DISCHARGE.--16 years, 61.0 ft^3/s, 8.12 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,840 ft^3/s, May 10, 1979, gage height, 6.31 ft; maximum gage height, 6.69 ft, Nov. 24, 1977, from floodmark (backwater from ice); minimum discharge, 0.74 ft^3/s, July 6, 7, 28, 29, 1988, gage height, 1.28 ft; minimum gage height, 1.27 ft, Nov. 10, 11, 1989.

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 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 4	1530	*569	*4.42	No other peak greater than base discharge.			

Minimum daily discharge, 1.0 ft^3/s, Oct. 8, Dec. 20 to Jan. 4, Feb. 17-20, 24-27; minimum recorded gage height, 1.27 ft, Nov. 11, 12, but may have been less during period of no gage height record Dec. 3 and Dec. 9 to Mar. 22.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	1.2	e1.4	e1.0	e1.1	e2.2	27	303	43	35	38	17
2	32	1.2	e1.4	e1.0	e1.1	e2.7	24	268	45	30	30	13
3	20	1.3	e1.4	e1.0	e1.1	e2.5	20	225	230	25	27	12
4	2.2	1.3	e1.4	e1.0	e1.1	e2.0	21	187	516	23	27	14
5	1.4	1.8	e1.3	e1.1	e1.3	e2.0	19	154	509	21	21	11
6	1.1	1.6	e1.3	e1.2	e1.4	e1.9	18	122	434	16	14	11
7	1.1	1.5	e1.3	e1.3	e1.4	e3.4	16	108	339	19	11	10
8	1.0	1.5	e1.3	e1.5	e1.4	e5.4	15	92	253	30	8.5	8.4
9	1.1	1.4	e1.3	e1.6	e1.4	e10	16	82	197	29	7.8	8.1
10	1.2	1.4	e1.3	e1.5	e1.4	e27	14	71	148	25	7.7	9.1
11	1.2	1.5	e1.3	e1.4	e1.4	e44	12	56	137	26	7.1	7.1
12	1.1	1.2	e1.2	e1.4	e1.3	e68	10	54	151	26	5.5	6.0
13	1.2	1.3	e1.2	e1.3	e1.2	e112	9.9	45	146	21	5.5	6.4
14	1.2	1.3	e1.2	e1.3	e1.2	e240	9.4	56	134	18	5.6	11
15	1.1	1.3	e1.2	e1.3	e1.1	e210	9.5	62	116	16	7.7	7.5
16	1.1	e1.3	e1.2	e1.3	e1.1	e180	9.8	62	122	16	7.7	6.6
17	1.2	1.3	e1.2	e1.3	e1.0	e158	8.3	61	158	22	10	3.8
18	1.2	1.4	e1.2	e1.3	e1.0	e148	6.2	62	179	26	30	2.9
19	1.2	1.4	e1.1	e1.3	e1.0	e169	5.4	69	164	24	30	4.1
20	1.2	1.3	e1.0	e1.2	e1.0	e137	7.1	74	135	20	39	4.3
21	1.6	1.3	e1.0	e1.2	e1.1	e105	7.4	67	113	17	23	4.8
22	1.3	e1.3	e1.0	e1.2	e1.1	e92	6.5	65	101	15	17	4.4
23	1.2	e1.3	e1.0	e1.2	e1.1	e78	6.4	76	89	13	21	5.0
24	1.2	e1.4	e1.0	e1.2	e1.0	e62	8.8	77	73	11	17	3.5
25	1.2	e1.4	e1.0	e1.2	e1.0	56	21	71	61	9.3	27	3.1
26	1.2	e1.5	e1.0	e1.2	e1.0	47	53	70	55	40	43	3.6
27	1.1	1.5	e1.0	e1.2	e1.0	41	124	70	48	78	38	3.9
28	1.1	e1.5	e1.0	e1.2	e1.3	36	174	73	45	75	34	4.0
29	2.0	e1.4	e1.0	e1.1	---	33	227	67	47	78	27	3.3
30	1.5	e1.4	e1.0	e1.1	---	30	288	57	42	66	29	3.7
31	1.4	---	e1.0	e1.1	---	27	---	49	---	51	23	---
TOTAL	122.6	41.5	36.2	38.2	32.6	2132.1	1193.7	2955	4830	921.3	639.1	212.6
MEAN	3.95	1.38	1.17	1.23	1.16	68.8	39.8	95.3	161	29.7	20.6	7.09
MAX	35	1.8	1.4	1.6	1.4	240	288	303	516	78	43	17
MIN	1.0	1.2	1.0	1.0	1.0	1.9	5.4	45	42	9.3	5.5	2.9
AC-FT	243	82	72	76	65	4230	2370	5860	9580	1830	1270	422
CFSM	.04	.01	.01	.01	.01	.67	.39	.93	1.58	.29	.20	.07
IN.	.04	.02	.01	.01	.01	.78	.44	1.08	1.76	.34	.23	.08

CAL YR 1989 TOTAL 17264.25 MEAN 47.3 MAX 515 MIN .95 AC-FT 34240 CFSM .46 IN. 6.30
WTR YR 1990 TOTAL 13154.9 MEAN 36.0 MAX 516 MIN 1.0 AC-FT 26090 CFSM .35 IN. 4.80

e Estimated

ST. CROIX RIVER BASIN

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

LOCATION.--Lat 45 24'25", long 92 38'49", in SW 1/4 NW 1/4 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 mi^2.

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 National Geodetic Vertical Datum of 1929. 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.--No estimated daily discharges. Records good. Diurnal fluctuation caused by St. Croix Falls Powerplant 1,500 ft upstream. Data-collection platform at station.

AVERAGE DISCHARGE.--88 years, 4,298 ft^3/s, 9.35 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 54,900 ft^3/s, May 8, 1950, gage height, 25.19 ft; minimum daily, 75 ft^3/s, July 17, 1910.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 15,900 ft^3/s, May 2, gage height, 8.09 ft; minimum daily, 1,040 ft^3/s, Dec. 21.

RATING TABLE (gage height, in feet, and discharge, in cubic feet per second).

2.2	964	4.0	4,950
2.5	1,400	6.0	10,700
3.0	2,350	8.0	15,700

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1650	2210	1790	1200	1630	1560	3870	14800	3810	4150	3730	3130
2	1710	2140	1930	1590	1640	1260	4020	15700	3800	4420	3360	2700
3	1620	2470	1630	1720	1390	1660	4130	15100	4680	4060	3040	2560
4	1750	1960	1540	1430	1820	1710	4560	13700	5310	3380	2720	2800
5	2020	2370	2040	1790	1530	1590	4420	11800	5200	3310	2670	2720
6	1750	2280	1380	1460	1600	1630	3970	10200	6220	3130	2230	2290
7	1630	2500	1580	1720	1560	1640	3930	9100	6560	2370	2480	3090
8	1640	2560	1980	1380	1510	1730	3520	7620	6360	3410	2020	4080
9	1690	2570	1230	1830	1950	1720	3720	6810	6030	3570	1930	4200
10	1690	2560	1670	1640	1630	1800	3280	6330	5840	4760	2100	4150
11	1700	2650	1550	1540	1630	3380	3070	5620	5540	4480	1790	4400
12	1720	2670	1640	1670	1540	4160	3460	5510	6040	3860	1750	4520
13	2040	2410	1470	1600	1720	5290	3060	4660	5120	3660	1640	3590
14	1750	2420	1510	1470	1610	6550	2890	4480	5300	2880	1590	3730
15	1700	2220	1560	1710	1580	7990	2660	4630	5260	3030	1570	4050
16	1690	2400	1260	1640	1690	9640	2640	4990	5070	2580	1440	4450
17	1680	1530	1450	1490	1750	11000	2630	4830	6450	2940	1510	4040
18	1690	1140	1530	1640	1500	12200	2610	5220	8200	2660	2440	4140
19	1710	1460	1430	1970	1820	12900	2520	5030	8050	2390	2640	3900
20	1710	1910	1730	1540	1660	12700	2630	5120	7900	2450	2610	4000
21	1640	2050	1040	1410	1490	12300	2540	5160	7420	1860	2160	3600
22	1690	2260	1520	1670	1650	10900	2610	4930	7060	1950	2660	3560
23	1730	1240	1270	1570	1590	8910	2960	5110	6410	2290	1690	3210
24	1730	1710	1330	1580	1710	8140	2720	4790	5740	1810	2070	3220
25	1730	1970	1320	1600	1650	7530	4010	5040	5510	1850	2050	3160
26	1730	2080	1650	1620	1680	6830	3920	5080	4700	2260	2350	2840
27	1730	2260	1270	1730	1640	6180	5280	5040	4820	3410	4000	2690
28	1860	1910	1330	1650	1790	5890	8180	4970	4570	3900	4440	2680
29	1930	1880	1480	1630	---	5280	10100	4900	4360	4610	4200	2670
30	1940	1860	1500	1660	---	4460	12700	4550	4400	4230	4060	2190
31	2440	---	1590	1650	---	4070	---	4080	---	4140	3480	---
TOTAL	54690	63650	47200	49800	45960	182600	122610	214900	171730	99800	78420	102360
MEAN	1764	2122	1523	1606	1641	5890	4087	6932	5724	3219	2530	3412
MAX	2440	2670	2040	1970	1950	12900	12700	15700	8200	4760	4440	4520
MIN	1620	1140	1040	1200	1390	1260	2520	4080	3800	1810	1440	2190
CFSM	.28	.34	.24	.26	.26	.94	.65	1.11	.92	.52	.41	.55
IN.	.33	.38	.28	.30	.27	1.09	.73	1.28	1.02	.59	.47	.61

CAL YR 1989 TOTAL 1243500 MEAN 3407 MAX 17900 MIN 1040 CFSM .55 IN. 7.41
WTR YR 1990 TOTAL 1233720 MEAN 3380 MAX 15700 MIN 1040 CFSM .54 IN. 7.35

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 mi^2, 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 National Geodetic Vertical Datum of 1929. Prior to Aug. 2, 1932, nonrecording gage at railroad bridge 300 ft upstream at following datums: June 3, 1928, to Sept. 30, 1929, 19.27 ft higher; Oct. 1, 1929, to Sept. 30, 1930, 17.68 ft higher; Oct. 1, 1930, to Aug. 1, 1932, 19.28 ft higher. Aug. 2, 1932, to Oct. 30, 1938, water-stage recorder at present site at datum 19.28 ft higher; Nov. 1, 1938, to Sept. 7, 1971, water-stage recorder at present site at datum 50.00 ft lower.

REMARKS.--Records good. Some regulation by reservoirs, navigation dams, and powerplants at low and medium stages. Flood flow not materially affected by artificial storage.

AVERAGE DISCHARGE.--62 years, 17,090 ft^3/s, 5.18 in/yr; median of yearly mean discharges, 15,300 ft^3/s, 4.64 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 228,000 ft^3/s, Apr. 18, 1965, gage height, 43.11 ft; minimum daily, 1,380 ft^3/s, July 13, 1940; minimum gage height, 15.08 ft, Aug. 29, 1934, present datum.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 42,900 ft^3/s, June 26; maximum gage height, 29.84 ft, June 20; minimum daily discharge, 3,830 ft^3/s, Dec. 22; minimum gage height, 24.49 ft, Nov. 19, result of freeze up.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7690	7090	5900	5350	4980	4860	15600	23700	20000	38400	28800	14300
2	7590	7000	6290	4950	5220	4730	14700	28000	19100	35400	29800	12700
3	7090	6580	6310	5260	5500	4630	14300	31000	18600	32600	30500	11800
4	7220	7190	5870	5290	5230	4900	14500	32900	18700	29500	30700	11600
5	7300	6910	5840	5240	5380	4730	15000	32100	20700	26700	30100	11700
6	7400	6940	7290	5640	4880	4910	14500	30600	21300	24600	28500	11100
7	6990	6860	6470	5060	4750	4880	14900	28800	25300	22600	24800	10400
8	7150	7710	6260	5040	4690	4850	15000	27200	29000	20700	20400	10800
9	6860	7850	5950	4990	4680	5160	14900	24900	31100	20500	17900	11600
10	6640	7940	5060	5990	5180	5170	14300	23200	31000	20400	15800	11500
11	6790	8000	5910	5290	4770	5370	14100	22000	30200	22000	14400	11900
12	6460	8170	6120	5210	4770	7370	14000	20400	29600	20700	12900	10900
13	6360	7740	5400	5340	4830	9270	13200	19100	30800	19400	11600	12600
14	6770	7560	4720	4950	5110	11300	12500	17500	30700	19200	11200	11800
15	6690	7360	5490	4750	4850	16500	11800	16300	31800	18200	9980	11000
16	6460	7500	5030	5430	4790	21100	11400	16800	33200	17800	9350	11600
17	5970	7520	3850	5550	5700	23400	11000	16800	31700	16700	8980	10900
18	6240	6200	4900	5060	5370	28200	10800	17300	32800	16700	8750	10100
19	6210	5210	5080	5110	5370	29600	10900	17900	37700	15900	8890	9740
20	6220	5420	5060	5180	5730	31200	9900	17600	40200	14900	10200	9320
21	6030	5900	4810	4800	4910	31400	9910	17700	41400	14600	10900	9690
22	6090	5910	3830	4630	4810	32200	9740	18000	41500	13200	11400	9010
23	6190	6220	4880	4860	4850	30700	9690	18200	42000	12400	13100	9060
24	6070	5340	3840	4820	4900	27400	9950	19300	41600	12400	13500	9050
25	6520	5800	3900	4690	4940	24200	9940	20300	42600	13000	13300	8530
26	6600	5620	4290	4830	4750	23000	11000	21100	42900	13100	13200	8650
27	6980	5930	5390	4610	4950	21100	11600	20600	42400	13600	13000	7870
28	6110	6610	4740	5260	5310	19400	13200	20400	42200	16600	15400	7940
29	5970	7160	4550	4930	---	18600	17300	21200	41700	19400	15300	7400
30	6100	6400	4870	4860	---	17300	20100	20900	39600	23000	15700	7790
31	6130	---	5360	4920	---	15900	---	20500	---	26400	15300	---
TOTAL	204890	203640	163260	157890	141200	493330	389730	682300	981400	630600	513650	312350
MEAN	6609	6788	5266	5093	5043	15910	12990	22010	32710	20340	16570	10410
MAX	7690	8170	7290	5990	5730	32200	20100	32900	42900	38400	30700	14300
MIN	5970	5210	3830	4610	4680	4630	9690	16300	18600	12400	8750	7400
AC-FT	406400	403900	323800	313200	280100	978500	773000	1353000	1947000	1251000	1019000	619500
CFSM	.15	.15	.12	.11	.11	.36	.29	.49	.73	.45	.37	.23
IN.	.17	.17	.14	.13	.12	.41	.32	.57	.81	.52	.43	.26

CAL YR 1989 TOTAL 4177360 MEAN 11440 MAX 49000 MIN 3830 AC-FT 8286000 CFSM .26 IN. 3.47
WTR YR 1990 TOTAL 4874240 MEAN 13350 MAX 42900 MIN 3830 AC-FT 9668000 CFSM .30 IN. 4.05

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 mi^2.

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 National Geodetic Vertical Datum of 1929 (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.

AVERAGE DISCHARGE.--18 years (water years 1943, 1974-90), 53.8 ft^3/s, 6.64 in/yr, 38,980 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,030 ft^3/s, Sept. 18, 1942; maximum gage height, 8.30 ft, Sept. 22, 1986; minimum daily discharge, 8.4 ft^3/s, Jan. 15, 1975; minimum gage height, 1.63 ft, Oct. 14, 1976.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in April 1965, reached a stage of 7.5 ft, from information by local resident, discharge 6,200 ft^3/s, from rating extended above 2,100 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 12	2200	*401	*6.04	June 29	1630	227	5.33
June 18	1000	237	5.40				

Minimum discharge, 14 ft^3/s, Feb. 24, gage height, 1.82 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	21	21	22	18	19	37	47	43	92	88	27
2	20	21	20	22	18	20	38	42	49	74	73	25
3	19	21	20	22	17	19	36	39	70	67	68	28
4	20	21	22	21	18	18	35	37	64	61	59	31
5	21	24	21	21	19	19	34	35	70	57	52	31
6	20	25	20	21	18	18	32	33	78	54	48	30
7	19	24	19	21	18	18	32	34	68	57	45	29
8	20	22	19	22	19	26	31	33	62	62	43	28
9	21	22	19	20	18	32	31	38	56	57	42	28
10	21	22	20	20	18	58	30	46	51	56	39	27
11	21	21	19	21	18	146	29	40	55	55	36	27
12	19	21	20	21	19	336	28	36	66	68	35	26
13	20	22	18	20	18	306	27	34	139	63	35	26
14	19	21	e17	20	18	231	27	47	160	58	34	27
15	20	22	e17	21	18	181	27	55	107	54	32	26
16	21	21	e16	20	18	129	29	78	86	50	31	25
17	21	21	e17	20	19	92	30	66	150	47	31	26
18	21	20	e17	20	18	74	29	55	229	44	31	27
19	21	21	e19	19	18	62	28	63	187	44	32	29
20	21	21	e21	20	18	57	27	104	160	43	33	29
21	21	22	e21	19	18	54	27	87	126	40	33	29
22	22	21	e20	20	18	51	28	78	100	38	31	28
23	23	21	e20	20	18	47	30	76	86	37	30	27
24	22	20	e21	19	18	45	52	66	74	36	30	28
25	21	21	e21	19	e18	43	55	60	68	37	28	28
26	21	20	e22	19	18	42	52	61	63	52	30	28
27	21	23	22	19	18	41	50	58	58	66	31	27
28	20	23	23	18	18	39	65	54	103	107	29	28
29	21	21	22	19	---	38	59	51	209	171	29	27
30	22	22	22	19	---	37	55	48	178	163	29	28
31	21	---	22	18	---	37	---	45	---	113	28	---
TOTAL	638	648	618	623	507	2335	1090	1646	3015	2023	1215	830
MEAN	20.6	21.6	19.9	20.1	18.1	75.3	36.3	53.1	100	65.3	39.2	27.7
MAX	23	25	23	22	19	336	65	104	229	171	88	31
MIN	18	20	16	18	17	18	27	33	43	36	28	25
AC-FT	1270	1290	1230	1240	1010	4630	2160	3260	5980	4010	2410	1650

CAL YR 1989 TOTAL 15935 MEAN 43.7 MAX 1300 MIN 16 AC-FT 31610
WTR YR 1990 TOTAL 15188 MEAN 41.6 MAX 336 MIN 16 AC-FT 30130

e Estimated

VERMILLION RIVER BASIN

05345000 VERMILLION RIVER NEAR EMPIRE, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1973 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1974 to current year.
pH: February 1974 to current year.
WATER TEMPERATURES: February 1974 to current year.
DISSOLVED OXYGEN: February 1974 to current year.

INSTRUMENTATION.--Water quality monitor since February 1974.

REMARKS.--Water is pumped to a monitor that is inside a heated shelter; water temperature during the winter may be affected. Extremes are for those years with 80 percent or more record.

COOPERATION.--Water-quality monitor is operated by the Metropolitan Waste Control Commission, St. Paul, MN.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1979-82, 1984-90): Maximum, 1,345 microsiemens, Feb. 12, 1990; minimum, 184 microsiemens, Mar. 28, 1989.
pH (water years 1979-82, 1986, 1988, 1990): Maximum, 9.3 units, Nov. 11, 1978; minimum, 6.3 units, Apr. 26, 1988.
WATER TEMPERATURES (water years 1979-82, 1984-90): Maximum, 30.0 °C, July 13, 1984 and Aug. 17, 1988; minimum, 0.0 °C many days during winter.
DISSOLVED OXYGEN (water years 1979-82, 1984-85, 1987-90): Maximum, 19.6 mg/L, Feb. 2, 1989; minimum, 1.5 mg/L, Nov. 14, 1979.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 1,345 microsiemens, Feb. 12; minimum, 359 microsiemens, Mar. 13.
pH: Maximum, 8.4 units, Mar. 11-13; minimum, 7.0 units, June 26.
WATER TEMPERATURES: Maximum, 18.7 °C, Oct. 1; minimum, 0 °C several days during winter.
DISSOLVED OXYGEN: Maximum, 16.4 mg/L, Feb. 14; minimum, 4.0 mg/L, June 28.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	18.7	14.1	16.0	7.1	5.2	6.4	4.0	3.4	3.7	1.0	0.5	0.8
2	16.0	10.0	12.3	6.8	3.5	5.0	3.9	2.4	2.9	2.2	0.7	1.5
3	11.8	7.8	9.7	3.9	2.0	2.9	3.0	2.5	2.7	2.4	2.0	2.2
4	11.4	7.1	9.3	7.1	3.7	5.0	4.0	2.9	3.6	2.2	1.7	1.9
5	14.0	10.9	12.2	8.5	6.5	7.6	3.9	2.6	3.4	2.0	1.5	1.8
6	---	---	---	7.9	6.1	6.9	3.2	1.9	2.4	1.9	1.3	1.6
7	11.8	8.2	9.7	9.0	6.6	8.0	2.0	1.5	1.7	2.4	1.8	2.1
8	11.9	7.6	9.6	8.7	5.9	7.2	2.0	1.4	1.7	2.9	2.3	2.5
9	11.4	7.9	9.7	5.9	4.7	5.2	2.5	1.9	2.2	2.8	2.0	2.3
10	11.6	8.3	10.2	6.4	4.8	5.5	2.3	1.7	2.1	2.4	1.6	2.0
11	14.2	9.3	11.5	8.4	5.6	6.9	2.0	1.3	1.7	2.2	1.4	1.7
12	13.1	9.3	11.3	6.3	4.8	5.6	1.6	1.2	1.3	1.4	0.9	1.1
13	13.6	9.9	11.6	7.4	5.2	5.9	1.8	1.2	1.5	1.5	0.9	1.2
14	14.2	10.0	12.0	5.6	2.9	4.0	---	---	---	2.2	1.3	1.7
15	13.5	11.1	12.0	4.1	2.1	3.1	1.2	1.1	1.1	2.5	1.7	2.0
16	11.7	8.3	10.0	---	---	---	1.8	1.1	1.4	2.4	1.6	1.9
17	8.8	7.0	7.8	---	---	---	1.8	1.3	1.6	2.4	2.2	2.3
18	7.9	5.3	6.5	3.4	2.6	3.0	1.3	1.1	1.2	2.2	1.7	1.9
19	7.8	4.4	6.0	4.3	3.2	3.7	1.1	0.7	1.1	2.0	1.2	1.6
20	7.9	4.1	5.9	4.8	3.9	4.4	0.0	0.0	0.0	1.9	1.6	1.8
21	9.3	5.0	6.9	4.1	3.7	3.9	0.0	0.0	0.0	2.0	1.8	1.9
22	10.6	6.5	8.3	4.0	3.1	3.6	0.0	0.0	0.0	2.6	2.0	2.2
23	12.9	9.1	10.8	3.5	2.9	3.1	0.0	0.0	0.0	2.4	2.0	2.2
24	13.3	8.8	11.0	3.7	2.6	3.2	0.0	0.0	0.0	2.6	2.2	2.4
25	15.9	11.1	13.3	4.2	3.5	3.8	0.9	0.0	0.5	2.2	1.6	1.8
26	16.6	13.3	14.7	4.3	3.6	3.9	0.1	0.0	0.1	---	---	---
27	14.9	12.0	13.5	4.4	3.3	4.1	1.1	0.1	0.8	---	---	---
28	12.3	10.9	11.5	3.3	2.7	2.9	1.3	1.0	1.1	2.1	1.0	1.5
29	14.1	11.9	12.6	3.5	2.5	3.0	1.1	0.7	0.8	2.4	1.4	1.8
30	12.0	7.5	9.2	3.9	3.1	3.5	0.9	0.6	0.8	2.1	1.1	1.5
31	8.7	6.2	7.3	---	---	---	1.3	0.8	1.1	---	---	---
MONTH	18.7	4.1	10.4	9.0	2.0	4.7	4.0	0.0	1.4	2.9	0.5	1.8

VERMILLION RIVER BASIN

05345000 VERMILLION RIVER NEAR EMPIRE, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.5	1.1	1.3	2.3	0.5	1.3	---	---	---	10.9	6.0	8.4
2	1.5	0.7	1.1	2.3	1.0	1.6	---	---	---	8.1	6.0	6.9
3	2.3	1.4	1.7	1.5	0.2	0.8	---	---	---	8.7	6.7	7.7
4	2.6	1.4	1.8	2.1	0.6	1.2	3.9	2.5	3.2	8.9	7.2	8.0
5	3.0	1.9	2.3	1.8	0.6	1.0	3.4	2.0	2.6	9.0	7.5	8.2
6	2.3	0.6	1.5	---	---	---	3.0	1.2	2.1	9.1	6.9	8.0
7	1.7	0.6	1.1	---	---	---	3.6	1.4	2.4	9.9	7.5	8.7
8	1.7	1.2	1.4	---	---	---	4.0	1.9	2.9	9.8	8.2	8.9
9	1.4	0.6	0.9	1.5	0.9	1.2	4.0	2.9	3.5	8.6	7.1	7.8
10	1.1	0.1	0.6	1.0	0.6	0.8	3.5	2.2	2.8	8.2	6.6	7.3
11	1.7	0.7	1.0	0.5	0.0	0.2	3.0	1.6	2.2	8.5	6.6	7.6
12	1.9	0.8	1.3	1.8	0.0	1.2	4.6	1.7	3.1	8.1	7.5	7.8
13	1.5	0.0	0.6	1.3	0.3	0.7	4.5	2.8	3.7	8.6	6.9	7.8
14	0.1	0.0	0.1	1.4	0.9	1.1	5.4	3.0	4.1	8.1	7.5	7.8
15	0.1	0.0	0.0	1.1	0.5	0.9	5.2	3.3	4.2	9.0	7.5	8.3
16	---	---	---	0.6	0.3	0.4	4.1	3.0	3.6	9.1	8.6	8.8
17	---	---	---	0.7	0.3	0.5	4.6	2.3	3.3	8.8	8.2	8.4
18	---	---	---	0.8	0.1	0.4	5.2	2.9	3.9	9.6	7.8	8.7
19	---	---	---	1.4	0.0	0.6	4.3	3.8	4.0	9.1	8.1	8.5
20	---	---	---	---	---	---	6.2	3.7	4.8	9.0	7.8	8.3
21	---	---	---	---	---	---	6.7	4.4	5.5	9.5	8.4	8.9
22	---	---	---	3.3	1.7	2.8	7.1	4.8	5.9	10.2	8.5	9.4
23	---	---	---	2.2	0.8	1.5	6.9	5.4	6.1	10.5	8.5	9.8
24	---	---	---	2.6	1.1	1.8	14.2	5.5	10.5	10.8	9.5	10.1
25	---	---	---	---	---	---	14.7	13.0	13.8	10.1	9.4	9.7
26	---	---	---	2.8	1.3	2.0	14.0	13.4	13.7	9.7	9.2	9.4
27	---	---	---	3.3	1.6	2.5	13.4	12.6	12.9	10.4	9.1	9.6
28	---	---	---	3.4	2.3	2.9	12.5	11.4	11.9	11.2	9.2	10.1
29	---	---	---	4.0	2.5	3.2	11.4	10.7	11.0	11.1	9.5	10.3
30	---	---	---	---	---	---	11.6	10.2	10.9	11.5	9.3	10.4
31	---	---	---	---	---	---	---	---	---	11.2	9.6	10.4
MONTH							14.7	1.2	5.9	11.5	6.0	8.7
		JUNE			JULY			AUGUST			SEPTEMBER	
1	11.8	10.1	10.9	---	---	---	---	---	---	14.5	13.3	13.8
2	11.3	10.2	10.9	---	---	---	---	---	---	14.3	13.0	13.6
3	10.1	8.8	9.2	---	---	---	---	---	---	14.1	13.1	13.6
4	10.2	8.4	9.3	---	---	---	---	---	---	14.8	13.6	14.1
5	10.8	9.4	10.0	---	---	---	---	---	---	14.8	13.7	14.1
6	11.4	10.0	10.6	16.7	14.2	15.1	---	---	---	14.9	13.9	14.4
7	10.7	10.2	10.5	15.4	14.3	14.8	---	---	---	14.3	13.6	14.0
8	11.4	10.1	10.7	15.9	15.0	15.4	---	---	---	14.3	13.4	13.8
9	12.0	10.2	11.1	15.3	14.5	14.8	---	---	---	14.5	13.1	13.8
10	12.3	10.4	11.3	14.5	12.5	13.4	---	---	---	14.4	13.5	13.9
11	11.6	10.6	11.0	12.7	12.1	12.3	---	---	---	13.6	11.9	13.0
12	15.3	10.9	13.1	13.1	11.8	12.4	---	---	---	13.7	12.3	12.9
13	15.7	14.4	15.0	13.1	11.8	12.5	---	---	---	13.7	12.5	13.0
14	15.5	14.7	15.1	12.9	12.0	12.5	13.3	12.0	12.8	13.0	11.6	12.2
15	15.0	14.3	14.6	13.3	12.0	12.7	13.5	12.2	12.8	12.3	11.0	11.5
16	14.5	13.8	14.1	13.8	12.3	13.0	13.5	12.1	12.8	11.4	11.0	11.2
17	15.1	13.9	14.5	15.1	12.8	13.9	13.7	12.5	13.0	11.5	10.5	11.0
18	---	---	---	15.2	13.8	14.5	13.1	12.6	12.9	11.1	10.9	10.9
19	---	---	---	14.5	13.9	14.2	12.6	11.9	12.1	12.0	10.8	11.3
20	---	---	---	14.6	13.3	13.9	11.9	11.7	11.8	11.6	10.9	11.3
21	---	---	---	14.4	13.3	13.9	12.2	10.8	11.6	11.8	11.2	11.5
22	---	---	---	14.4	13.2	13.7	12.2	10.9	11.5	11.2	10.4	10.7
23	---	---	---	14.1	12.9	13.6	11.7	11.4	11.5	11.1	10.0	10.5
24	---	---	---	14.2	13.0	13.6	12.3	11.3	11.8	11.5	10.1	10.8
25	---	---	---	14.3	13.4	13.8	13.3	11.6	12.3	12.2	10.8	11.5
26	16.1	14.9	15.7	13.9	13.5	13.7	13.3	12.1	12.7	12.0	10.8	11.4
27	15.4	14.6	14.9	14.1	13.5	13.8	13.5	12.7	13.0	11.5	11.2	11.4
28	15.5	14.6	14.9	---	---	---	14.5	12.1	13.4	11.8	10.7	11.2
29	16.7	15.4	15.9	---	---	---	14.4	13.1	13.7	11.3	10.7	11.0
30	---	---	---	---	---	---	14.5	12.9	13.6	11.2	10.1	10.6
31	---	---	---	---	---	---	14.5	13.4	13.8	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	14.9	10.0	12.3
YEAR	18.7	0.0										

VERMILLION RIVER BASIN

05345000 VERMILLION RIVER NEAR EMPIRE, MN--Continued

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	862	774	832	1088	997	1060	1092	1032	1064	1098	1023	1074
2	867	740	803	1094	1025	1063	1092	1005	1049	1318	1090	1209
3	1167	745	991	1061	991	1035	1127	1014	1072	1300	1237	1273
4	1180	1066	1128	1084	1009	1036	1106	1040	1078	1294	1237	1273
5	1195	1120	1158	1106	994	1062	1109	1038	1069	1289	1225	1267
6	---	---	---	1071	1009	1045	1102	1008	1062	1294	1214	1256
7	1154	1061	1122	1079	1012	1049	1074	1022	1056	1332	1231	1289
8	1159	1081	1136	1080	1012	1052	1071	1030	1052	1337	1269	1308
9	1171	1102	1146	1062	999	1038	1080	1026	1057	1319	1262	1292
10	1153	987	1075	1061	992	1037	1103	1018	1073	1305	1238	1270
11	1085	974	1036	1078	999	1050	1138	1024	1072	1290	1234	1265
12	1091	1009	1052	1095	988	1054	1067	995	1039	1271	1220	1253
13	1090	1012	1056	1080	1016	1057	1074	1014	1046	1299	1219	1252
14	1076	1000	1037	1064	1004	1038	---	---	---	1316	1231	1277
15	1082	981	1055	1077	976	1041	1070	1015	1038	1315	1256	1289
16	1070	996	1049	1046	969	1009	1087	1019	1050	1309	1236	1277
17	1146	985	1080	1040	971	1005	1094	1016	1063	1305	1238	1282
18	1148	1022	1102	1045	966	1002	1088	1021	1064	1299	1247	1276
19	1137	1059	1100	1059	993	1028	1078	1029	1054	1295	1238	1268
20	1109	1049	1087	1090	921	1046	1083	1026	1058	1294	1216	1261
21	1120	1052	1097	1104	1025	1059	1103	1038	1071	1308	1226	1281
22	1144	1067	1116	1085	1030	1062	1095	1033	1069	1331	1260	1298
23	1180	1108	1154	1097	1002	1055	1092	1012	1060	1308	1228	1278
24	1182	1100	1143	1094	1017	1062	1086	1012	1058	1319	1257	1287
25	1203	1119	1161	1113	1008	1066	1084	1020	1052	1307	1238	1275
26	1211	1140	1175	1107	1027	1080	1066	1023	1048	---	---	---
27	1189	1113	1158	1137	1015	1080	1109	1022	1081	---	---	---
28	1163	1090	1139	1068	1016	1039	1101	1033	1072	1315	1211	1274
29	1189	1088	1157	1086	1022	1050	1088	1030	1067	1324	1254	1284
30	1156	1069	1131	1087	1022	1055	1091	1017	1065	1288	1213	1255
31	1111	1035	1082	---	---	---	1103	1020	1074	---	---	---
MONTH	1211	740	1085	1137	921	1047	1138	995	1061	1337	1023	1265
		FEBRUARY			MARCH			APRIL			MAY	
1	1287	1211	1259	1241	1167	1203	---	---	---	902	810	859
2	1313	1219	1262	1237	1143	1191	---	---	---	901	819	850
3	1284	1223	1259	1194	1135	1162	---	---	---	921	840	875
4	1316	1229	1283	1232	1152	1198	974	909	930	914	864	886
5	1342	1270	1304	1245	1180	1203	948	894	915	925	888	892
6	1327	1255	1291	---	---	---	940	874	904	930	869	898
7	1338	1257	1294	---	---	---	966	888	913	971	901	925
8	1337	1271	1305	---	---	---	959	900	928	961	889	922
9	1305	1243	1278	1195	1091	1151	964	908	942	911	801	870
10	1294	1237	1268	1097	1002	1052	955	904	923	882	817	842
11	1334	1235	1294	1014	923	963	945	884	908	913	834	863
12	1345	1287	1314	922	906	912	975	896	927	900	842	872
13	1296	1221	1269	931	359	608	961	905	932	908	865	885
14	1287	1226	1258	418	388	406	984	925	947	900	809	858
15	1275	1106	1194	428	414	422	970	911	948	845	815	833
16	---	---	---	452	429	439	947	885	923	825	778	807
17	---	---	---	480	448	463	984	893	920	825	787	812
18	---	---	---	495	466	481	1010	902	934	862	807	831
19	---	---	---	538	488	507	976	909	942	863	762	819
20	---	---	---	---	---	---	1016	922	963	798	784	781
21	---	---	---	---	---	---	1025	945	982	824	782	803
22	---	---	---	923	865	898	1020	973	999	868	801	827
23	---	---	---	904	858	874	1031	970	1002	842	697	800
24	---	---	---	909	863	883	1000	893	939	831	773	796
25	---	---	---	---	---	---	954	908	928	816	762	790
26	---	---	---	941	876	909	971	901	930	798	761	780
27	---	---	---	968	872	917	954	894	927	810	768	789
28	---	---	---	973	902	932	918	864	893	844	783	806
29	---	---	---	990	915	946	904	861	882	848	797	824
30	---	---	---	---	---	---	917	872	887	915	813	859
31	---	---	---	---	---	---	---	---	---	926	870	891
MONTH	---	---	---	---	---	---	1031	861	932	971	697	843

VERMILLION RIVER BASIN

05345000 VERMILLION RIVER NEAR EMPIRE, MN--Continued

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	927	875	899	---	---	---	---	---	---	1058	1004	1034
2	932	814	893	---	---	---	---	---	---	1057	1008	1027
3	837	788	816	---	---	---	---	---	---	1048	997	1018
4	863	809	834	---	---	---	---	---	---	1084	1009	1049
5	854	693	768	---	---	---	---	---	---	1046	995	1029
6	757	680	721	840	813	827	---	---	---	1075	1004	1042
7	751	721	738	840	780	811	---	---	---	1062	1000	1035
8	780	717	749	835	805	821	---	---	---	1049	999	1022
9	798	750	772	839	792	816	---	---	---	1059	1008	1032
10	804	756	781	826	797	810	---	---	---	1085	1013	1050
11	802	734	770	828	780	805	---	---	---	1074	1005	1036
12	815	754	780	802	778	790	---	---	---	1083	1021	1051
13	777	660	701	798	773	789	---	---	---	1107	954	1051
14	724	693	709	806	777	792	962	903	938	1072	971	1019
15	762	724	745	815	783	800	968	926	946	1032	970	995
16	778	738	761	853	806	828	974	916	948	1036	974	1010
17	772	646	689	939	831	886	977	934	959	1041	975	1014
18	---	---	---	946	899	924	978	917	948	1040	950	998
19	---	---	---	934	895	916	948	884	921	1027	949	992
20	---	---	---	922	897	906	943	899	921	1034	970	1006
21	---	---	---	929	890	910	1023	908	971	1034	975	1009
22	---	---	---	926	881	910	1030	982	1009	1013	946	988
23	---	---	---	937	890	917	1043	979	1011	1017	948	986
24	---	---	---	938	898	918	1042	994	1017	1035	975	1004
25	---	---	---	942	890	918	1075	1011	1035	1065	974	1017
26	853	810	832	926	831	881	1072	1013	1045	1052	982	1016
27	838	807	823	870	836	854	1064	1010	1037	1049	973	1014
28	811	672	752	---	---	---	1066	999	1034	1043	991	1015
29	703	675	686	---	---	---	1044	996	1020	1025	967	1003
30	---	---	---	---	---	---	1060	995	1025	1020	954	997
31	---	---	---	---	---	---	1052	1007	1030	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	1107	946	1019
YEAR	1345	359										

OXYGEN, DISSOLVED (DO), MG/L, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	10.8	7.4	8.6	11.9	8.7	10.1	11.8	9.2	10.3	12.5	10.5	11.4
2	12.1	7.4	9.3	14.0	10.3	11.8	12.2	9.2	10.5	11.9	9.9	10.9
3	11.7	9.0	10.1	14.0	10.9	12.0	11.4	9.3	10.4	11.3	9.7	10.3
4	11.8	8.8	9.9	13.5	10.0	11.5	10.5	8.8	9.6	11.6	9.4	10.4
5	11.1	8.1	9.2	10.3	8.7	9.5	12.2	9.0	10.3	12.0	9.8	10.7
6	---	---	---	12.4	9.1	10.4	12.9	9.5	11.1	12.1	9.8	10.8
7	12.0	8.4	9.7	10.9	8.4	9.6	13.2	11.2	12.0	11.5	9.1	10.1
8	12.0	8.7	10.0	10.1	8.2	9.0	13.2	11.3	11.9	10.9	8.7	9.5
9	11.9	8.6	9.7	10.7	8.8	9.6	12.9	10.7	11.6	11.0	8.7	9.7
10	12.0	8.2	9.5	11.4	9.1	9.9	12.6	10.0	11.1	11.8	9.7	10.4
11	11.3	7.9	9.0	10.9	8.4	9.5	13.0	10.4	11.5	12.0	9.6	10.6
12	12.2	7.8	9.4	11.5	8.8	9.9	13.2	11.3	12.0	12.5	10.2	11.2
13	12.3	7.9	9.3	11.4	8.8	9.8	13.1	11.0	11.9	12.2	10.2	11.1
14	12.5	7.5	9.2	11.2	9.0	9.8	---	---	---	11.5	9.2	10.2
15	12.4	7.3	9.0	11.6	8.9	10.0	13.0	10.9	11.9	11.6	9.0	9.9
16	11.9	7.2	8.9	12.5	9.6	10.9	13.1	10.7	11.8	10.9	9.0	9.9
17	13.9	8.0	10.4	12.6	10.2	11.2	12.5	10.3	11.3	11.4	8.7	9.8
18	15.7	9.6	11.5	12.7	10.4	11.3	12.6	10.3	11.2	12.4	9.6	10.9
19	15.8	11.1	12.9	12.1	9.6	10.7	12.9	10.3	11.5	12.5	9.9	11.1
20	15.5	11.0	12.7	11.5	8.8	10.0	12.7	11.0	11.6	12.2	9.5	10.5
21	15.6	10.3	12.1	11.3	9.3	10.1	12.0	10.4	11.1	12.0	9.4	10.4
22	15.4	10.1	11.9	12.3	9.6	10.8	11.8	9.9	10.6	12.2	9.2	10.3
23	14.0	8.8	10.6	12.5	10.0	11.0	11.9	10.0	10.7	11.3	9.2	9.9
24	11.6	7.4	9.3	12.3	9.5	10.7	11.2	9.5	10.1	11.4	8.7	9.7
25	12.0	6.6	8.2	11.9	9.1	10.2	12.4	10.0	11.3	12.5	9.0	10.5
26	11.0	6.7	8.1	11.9	9.0	10.2	13.0	11.6	12.3	---	---	---
27	10.5	6.2	7.7	10.1	8.4	9.2	12.4	11.1	11.6	---	---	---
28	10.2	6.5	7.8	12.2	9.5	10.8	12.4	10.8	11.4	12.5	9.5	10.8
29	11.3	7.1	8.4	12.1	9.8	10.7	12.8	11.0	11.7	12.6	9.5	10.6
30	10.1	6.7	8.3	11.9	9.4	10.4	12.3	10.9	11.5	13.2	8.9	10.8
31	12.3	8.1	9.8	---	---	---	12.3	10.3	11.3	---	---	---
MONTH	15.8	6.2	9.7	14.0	8.2	10.4	13.2	8.8	11.2	13.2	8.7	10.4

VERMILLION RIVER BASIN

05345000 VERMILLION RIVER NEAR EMPIRE, MN--Continued

OXYGEN, DISSOLVED (DO), MG/L, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	13.7	9.7	11.3	15.4	8.8	11.3	---	---	---	11.0	9.2	10.2
2	13.5	10.0	11.4	14.6	8.3	10.7	---	---	---	11.2	8.6	9.8
3	14.0	9.9	11.5	15.1	9.0	11.5	---	---	---	11.0	8.1	9.3
4	13.6	9.3	11.0	14.2	8.4	10.8	12.2	10.5	11.2	11.1	7.7	9.1
5	13.6	8.9	10.6	15.2	8.8	11.4	12.8	10.7	11.6	10.7	7.4	8.8
6	15.1	9.1	11.4	---	---	---	13.3	11.3	12.2	10.8	7.2	8.7
7	14.8	9.6	11.4	---	---	---	13.3	11.0	12.2	10.9	6.6	8.5
8	15.1	9.1	11.4	---	---	---	12.8	10.6	11.5	11.1	5.8	8.0
9	15.6	9.9	12.2	11.2	8.4	9.4	12.0	9.8	10.8	9.2	6.8	7.9
10	16.0	10.5	12.6	9.3	8.6	8.9	13.0	10.6	11.8	11.4	7.9	9.3
11	16.1	10.0	12.4	9.9	8.7	9.4	14.1	11.4	12.6	11.3	8.0	9.4
12	15.3	9.6	11.7	9.1	6.4	8.0	12.3	9.5	11.3	11.0	7.3	8.9
13	15.6	9.5	12.0	8.3	8.4	7.5	11.5	9.0	10.0	11.1	7.7	9.1
14	16.4	11.1	13.2	8.5	7.8	8.1	11.6	8.5	9.8	9.3	7.3	8.2
15	14.0	11.3	12.3	9.4	7.9	8.6	11.9	7.8	9.6	9.6	7.5	8.4
16	---	---	---	9.9	9.4	9.7	12.0	8.1	9.8	8.4	7.4	8.0
17	---	---	---	10.4	9.9	10.1	12.7	9.5	10.8	10.1	7.8	8.8
18	---	---	---	10.7	10.1	10.4	12.8	9.1	10.6	10.0	8.2	9.1
19	---	---	---	10.8	9.9	10.5	11.3	8.0	9.6	9.1	7.8	8.4
20	---	---	---	---	---	---	12.4	7.6	9.8	9.4	8.4	8.8
21	---	---	---	---	---	---	11.4	6.7	8.6	9.4	8.2	8.7
22	---	---	---	9.7	8.0	8.8	11.1	5.9	8.1	9.5	7.2	8.5
23	---	---	---	11.1	9.8	10.7	10.5	5.7	7.3	9.7	6.9	8.3
24	---	---	---	11.5	10.7	11.2	9.0	5.3	6.8	9.8	7.8	8.6
25	---	---	---	---	---	---	9.1	6.8	7.7	9.3	7.6	8.3
26	---	---	---	12.3	10.9	11.5	8.8	6.6	7.7	9.8	8.0	8.9
27	---	---	---	11.8	10.0	11.0	9.4	6.9	8.1	10.4	8.2	9.0
28	---	---	---	10.5	9.7	10.2	10.0	7.6	8.7	10.3	7.7	9.0
29	---	---	---	10.4	9.5	10.0	10.5	9.0	9.8	10.4	7.6	8.8
30	---	---	---	---	---	---	12.2	9.9	10.9	11.0	7.8	9.2
31	---	---	---	---	---	---	---	---	---	11.2	8.0	9.3
MONTH	---	---	---	---	---	---	14.1	5.3	10.0	11.4	5.8	8.8
		JUNE			JULY			AUGUST			SEPTEMBER	
1	10.8	7.4	9.0	---	---	---	---	---	---	8.6	8.4	8.5
2	8.9	6.7	7.7	---	---	---	---	---	---	8.7	8.4	8.6
3	10.3	6.7	9.0	---	---	---	---	---	---	8.6	8.4	8.5
4	11.6	8.9	10.2	---	---	---	---	---	---	8.7	8.5	8.6
5	9.4	7.8	8.5	---	---	---	---	---	---	8.6	8.5	8.5
6	9.2	7.6	8.3	7.6	5.8	6.8	---	---	---	8.6	8.5	8.5
7	9.4	7.7	8.5	7.2	5.3	6.1	---	---	---	8.6	8.5	8.5
8	10.0	7.9	8.7	6.6	5.3	5.9	---	---	---	8.7	8.5	8.6
9	9.9	7.4	8.5	7.1	5.5	6.3	---	---	---	8.7	8.5	8.6
10	10.0	7.1	8.4	9.3	6.0	7.7	---	---	---	8.7	8.5	8.6
11	8.8	7.0	7.6	9.0	7.7	8.4	---	---	---	9.0	8.5	8.7
12	9.1	6.7	7.7	10.1	7.7	8.9	---	---	---	9.0	8.8	8.9
13	6.7	4.4	5.6	9.8	7.9	8.7	---	---	---	9.0	8.8	8.9
14	6.1	4.4	5.4	9.4	7.6	8.4	8.6	8.5	8.5	8.8	8.8	8.8
15	7.7	5.7	6.8	9.3	7.5	8.3	8.6	8.6	8.6	9.0	8.8	8.9
16	7.9	7.1	7.4	9.4	7.1	8.1	8.6	8.6	8.6	8.9	8.8	8.8
17	---	---	---	10.2	6.8	8.4	8.6	8.6	8.6	9.0	8.8	8.9
18	---	---	---	9.9	7.5	8.6	8.6	8.6	8.6	8.9	8.9	8.9
19	---	---	---	9.4	7.1	8.1	8.6	8.6	8.6	9.1	8.9	9.0
20	---	---	---	9.9	7.4	8.5	8.6	8.6	8.6	9.1	8.9	9.0
21	---	---	---	10.1	7.3	8.5	8.6	8.6	8.6	9.1	8.9	9.0
22	---	---	---	9.8	7.3	8.4	8.6	8.6	8.6	9.0	8.9	8.9
23	---	---	---	9.6	7.4	8.5	8.6	8.6	8.6	9.1	8.9	9.0
24	---	---	---	10.8	7.2	8.9	8.8	8.6	8.6	9.2	8.9	9.0
25	---	---	---	10.3	7.8	8.9	9.1	8.6	8.8	9.3	9.0	9.1
26	8.8	6.1	7.5	8.2	7.2	7.6	9.3	9.1	9.3	9.3	8.9	9.1
27	7.5	6.0	6.7	8.6	6.8	7.5	9.4	9.2	9.3	9.1	9.0	9.1
28	6.4	4.0	5.6	---	---	---	9.3	8.3	8.7	9.2	9.0	9.1
29	---	---	---	---	---	---	8.4	8.3	8.3	9.1	8.9	9.0
30	---	---	---	---	---	---	8.5	8.3	8.4	9.2	8.9	9.0
31	---	---	---	---	---	---	8.5	8.4	8.4	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	9.3	8.4	8.8
YEAR	16.4	4.0										

VERMILLION RIVER BASIN

05345000 VERMILLION RIVER NEAR EMPIRE, MN--Continued

PH (STANDARD UNITS), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	8.0	7.9	8.0	8.1	8.0	8.1	8.1	8.0	8.1	8.1	8.1	8.1
2	8.1	8.0	8.0	8.1	8.0	8.1	8.2	8.0	8.1	8.1	8.1	8.1
3	8.1	8.0	8.1	8.2	8.1	8.1	8.1	8.1	8.1	8.2	8.0	8.1
4	8.1	8.0	8.1	8.1	8.1	8.1	8.1	8.0	8.1	8.2	8.2	8.2
5	8.0	7.9	7.9	8.1	8.0	8.1	8.1	8.0	8.0	8.2	8.1	8.2
6	---	---	---	8.1	8.1	8.1	8.1	8.0	8.1	8.2	8.1	8.2
7	8.0	7.9	8.0	8.1	8.0	8.0	8.2	8.1	8.1	8.1	8.1	8.1
8	8.0	7.9	8.0	8.1	8.0	8.0	8.1	8.1	8.1	8.1	8.0	8.0
9	8.0	7.9	8.0	8.1	8.0	8.0	8.2	8.1	8.1	8.1	8.0	8.0
10	8.0	7.9	8.0	8.1	8.0	8.0	8.2	8.1	8.1	8.1	8.0	8.1
11	8.0	7.9	8.0	8.0	8.0	8.0	8.2	8.1	8.1	8.1	8.0	8.1
12	8.0	7.9	8.0	8.1	8.0	8.0	8.2	8.1	8.2	8.1	8.1	8.1
13	8.0	8.0	8.0	8.0	8.0	8.0	8.2	8.1	8.1	8.2	8.1	8.1
14	8.0	8.0	8.0	8.0	8.0	8.0	---	---	---	8.1	8.0	8.1
15	8.1	8.0	8.0	8.1	8.0	8.0	8.1	8.1	8.1	8.1	8.0	8.1
16	8.1	8.0	8.0	8.1	8.0	8.1	8.2	8.1	8.1	8.1	8.0	8.1
17	8.1	8.1	8.1	8.1	8.0	8.1	8.2	8.1	8.1	8.1	8.0	8.0
18	8.1	8.1	8.1	8.1	8.0	8.1	8.2	8.1	8.2	8.1	8.1	8.1
19	8.1	8.1	8.1	8.1	8.0	8.1	8.2	8.1	8.2	8.1	8.1	8.1
20	8.1	8.1	8.1	8.1	8.0	8.0	8.2	8.1	8.1	8.1	8.0	8.1
21	8.1	8.1	8.1	8.1	8.0	8.1	8.2	8.1	8.1	8.1	8.0	8.0
22	8.1	8.1	8.1	8.1	8.0	8.1	8.2	8.1	8.1	8.0	8.0	8.0
23	8.1	8.0	8.1	8.1	8.1	8.1	8.2	8.1	8.1	8.1	8.0	8.0
24	8.1	8.0	8.1	8.1	8.1	8.1	8.2	8.1	8.1	8.0	8.0	8.0
25	8.1	8.0	8.0	8.1	8.0	8.1	8.1	8.1	8.1	8.1	8.0	8.1
26	8.0	8.0	8.0	8.1	8.0	8.0	8.2	8.1	8.1	---	---	---
27	8.1	8.0	8.1	8.1	8.0	8.0	8.1	8.1	8.1	---	---	---
28	8.2	8.0	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.0	8.1
29	8.1	8.1	8.1	8.1	8.0	8.1	8.1	8.1	8.1	8.1	8.0	8.0
30	8.2	8.1	8.1	8.1	8.0	8.1	8.1	8.1	8.1	8.1	8.0	8.1
31	8.1	8.0	8.1	---	---	---	8.1	8.1	8.1	---	---	---
MONTH	8.2	7.9	8.0	8.2	8.0	8.1	8.2	8.0	8.1	8.2	8.0	8.1
		FEBRUARY			MARCH			APRIL			MAY	
1	8.1	8.0	8.1	8.1	8.1	8.1	---	---	---	7.7	7.6	7.7
2	8.1	8.0	8.1	8.1	8.0	8.1	---	---	---	7.7	7.6	7.7
3	8.3	8.0	8.1	8.2	8.1	8.1	---	---	---	7.6	7.6	7.6
4	8.2	8.1	8.2	8.1	8.1	8.1	7.6	7.4	7.5	7.7	7.6	7.6
5	8.1	8.1	8.1	8.1	8.1	8.1	7.7	7.6	7.7	7.7	7.6	7.6
6	8.1	8.1	8.1	---	---	---	7.7	7.7	7.7	7.7	7.6	7.6
7	8.1	8.1	8.1	---	---	---	7.7	7.7	7.7	7.6	7.5	7.6
8	8.1	8.1	8.1	---	---	---	7.7	7.7	7.7	7.6	7.4	7.5
9	8.1	8.1	8.1	8.2	8.1	8.1	7.7	7.6	7.7	7.6	7.5	7.5
10	8.1	8.1	8.1	8.3	8.2	8.2	7.7	7.7	7.7	7.6	7.5	7.6
11	8.1	8.0	8.1	8.4	8.3	8.4	7.7	7.7	7.7	7.6	7.5	7.5
12	8.1	8.0	8.1	8.4	8.4	8.4	7.7	7.7	7.7	7.5	7.5	7.5
13	8.1	8.1	8.1	8.4	7.8	8.0	7.7	7.7	7.7	7.6	7.5	7.6
14	8.2	8.1	8.1	7.8	7.8	7.8	7.7	7.7	7.7	7.6	7.5	7.6
15	8.2	8.1	8.2	7.8	7.8	7.8	7.7	7.7	7.7	7.6	7.5	7.6
16	---	---	---	7.8	7.8	7.8	7.7	7.7	7.7	7.6	7.6	7.6
17	---	---	---	7.8	7.8	7.8	7.7	7.7	7.7	7.6	7.6	7.6
18	---	---	---	7.8	7.8	7.8	7.7	7.7	7.7	7.6	7.8	7.6
19	---	---	---	7.8	7.7	7.7	7.7	7.7	7.7	7.7	7.6	7.6
20	---	---	---	---	---	---	7.7	7.7	7.7	7.7	7.6	7.6
21	---	---	---	---	---	---	7.7	7.6	7.7	7.6	7.6	7.6
22	---	---	---	7.8	7.7	7.7	7.7	7.6	7.7	7.6	7.6	7.6
23	---	---	---	7.9	7.8	7.9	7.7	7.6	7.7	7.6	7.5	7.6
24	---	---	---	7.9	7.8	7.8	7.7	7.5	7.6	7.6	7.5	7.6
25	---	---	---	---	---	---	7.6	7.6	7.6	7.6	7.8	7.6
26	---	---	---	7.8	7.8	7.8	7.6	7.6	7.6	7.6	7.6	7.6
27	---	---	---	7.8	7.7	7.8	7.7	7.6	7.6	7.6	7.6	7.6
28	---	---	---	7.8	7.7	7.7	7.7	7.6	7.7	7.6	7.6	7.6
29	---	---	---	7.8	7.7	7.7	7.7	7.7	7.7	7.6	7.6	7.6
30	---	---	---	---	---	---	7.7	7.6	7.7	7.6	7.6	7.6
31	---	---	---	---	---	---	---	---	---	7.6	7.6	7.6
MONTH	---	---	---	---	---	---	7.7	7.4	7.7	7.7	7.4	7.6

VERMILLION RIVER BASIN

05345000 VERMILLION RIVER NEAR EMPIRE, MN--Continued

PH (STANDARD UNITS), WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	7.6	7.6	7.6	---	---	---	---	---	---	8.2	8.1	8.1
2	7.7	7.5	7.6	---	---	---	---	---	---	8.2	8.1	8.1
3	7.7	7.7	7.7	---	---	---	---	---	---	8.2	8.1	8.1
4	7.7	7.7	7.7	---	---	---	---	---	---	8.2	8.1	8.1
5	7.7	7.6	7.6	---	---	---	---	---	---	8.1	8.1	8.1
6	7.7	7.6	7.7	7.6	7.4	7.5	---	---	---	8.1	8.1	8.1
7	7.7	7.6	7.6	7.8	7.6	7.7	---	---	---	8.2	8.1	8.1
8	7.7	7.6	7.6	7.8	7.7	7.7	---	---	---	8.2	8.1	8.2
9	7.6	7.6	7.6	7.8	7.7	7.7	---	---	---	8.2	8.2	8.2
10	7.6	7.6	7.6	7.8	7.7	7.7	---	---	---	8.2	8.2	8.2
11	7.7	7.6	7.6	7.8	7.7	7.8	---	---	---	8.2	8.0	8.0
12	7.6	7.6	7.6	7.8	7.8	7.8	---	---	---	8.0	8.0	8.0
13	7.7	7.6	7.6	7.8	7.8	7.8	---	---	---	8.0	8.0	8.0
14	7.6	7.6	7.6	7.8	7.8	7.8	7.7	7.7	7.7	8.1	8.0	8.0
15	7.6	7.6	7.6	7.8	7.8	7.8	7.7	7.7	7.7	8.1	8.0	8.1
16	7.7	7.6	7.6	7.9	7.6	7.8	7.8	7.7	7.7	8.1	8.0	8.0
17	7.7	7.6	7.7	7.8	7.7	7.7	7.8	7.7	7.8	8.1	8.0	8.1
18	---	---	---	7.8	7.7	7.7	7.8	7.7	7.8	8.1	8.0	8.0
19	---	---	---	7.8	7.7	7.7	7.8	7.8	7.8	8.1	8.1	8.1
20	---	---	---	7.8	7.7	7.8	7.8	7.8	7.8	8.1	8.1	8.1
21	---	---	---	7.8	7.7	7.8	8.1	7.8	7.9	8.1	8.1	8.1
22	---	---	---	7.8	7.8	7.8	8.1	8.1	8.1	8.1	8.1	8.1
23	---	---	---	7.8	7.8	7.8	8.1	8.1	8.1	8.2	8.1	8.1
24	---	---	---	7.8	7.7	7.7	8.2	8.1	8.1	8.1	8.1	8.1
25	---	---	---	7.8	7.7	7.8	8.2	8.1	8.1	8.1	8.1	8.1
26	7.5	7.0	7.4	7.8	7.8	7.8	8.1	8.1	8.1	8.2	8.1	8.1
27	7.8	7.5	7.7	7.8	7.8	7.8	8.2	8.1	8.1	8.2	8.1	8.1
28	8.0	7.8	7.9	---	---	---	8.2	8.1	8.1	8.2	8.1	8.2
29	8.0	7.9	7.9	---	---	---	8.2	8.1	8.2	8.2	8.1	8.2
30	---	---	---	---	---	---	8.2	8.1	8.2	8.2	8.2	8.2
31	---	---	---	---	---	---	8.2	8.1	8.1	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	8.2	8.0	8.1
YEAR	8.4	7.0										

VERMILLION RIVER BASIN

05346000 VERMILLION RIVER AT HASTINGS, MN

LOCATION.--Lat 44°43'12", long 92°51'57", in SE¼SW¼ sec.33, T.115 N., R.17 W., Dakota County, Hydrologic Unit 07040001, on left bank and 100 ft upstream from County Road 47, 3/4 mi west of junction with State Highway 61 in Hastings.

DRAINAGE AREA.--195 mi^2.

PERIOD OF RECORD.--April 1942 to September 1947, October, 1989 to current year. March 1969 to April 1975 miscellaneous discharge measurements only.

GAGE.--Water-stage recorder.

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

AVERAGE DISCHARGE.--6 years (water years 1943-47, 1990), 77.3 ft^3/s, 5.38 in/yr, 56,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,710 ft^3/s, Mar. 16, 1945; maximum gage height, 9.10 ft, Mar. 14, 1945; minimum daily discharge, 6.0 ft^3/s, Jan. 3, 4, 1947; minimum gage height, 1.65 ft, May 28, 29, 31, 1947.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 520 ft^3/s, Mar. 12; minimum daily discharge, 22 ft^3/s, Dec. 16.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e27	e31	e29	e29	e24	e26	e41	80	70	170	116	38
2	e27	e30	e29	e29	e24	e26	e41	72	73	112	97	38
3	e27	e31	e29	e29	e23	e25	42	66	95	99	93	38
4	e27	e33	e29	e29	e24	e25	42	62	98	89	85	40
5	e27	e34	e28	e29	e24	e26	41	59	96	81	76	39
6	e27	e34	e28	e29	e25	e27	42	58	109	76	67	39
7	e27	e33	e27	e29	e25	e32	42	58	105	70	61	39
8	e28	e32	e27	e28	e25	e50	42	56	93	78	57	38
9	e28	e31	e27	e27	e25	e75	43	64	81	72	51	38
10	e28	e30	e26	e27	e25	e150	44	85	71	70	51	38
11	e27	e30	e26	e27	e25	e450	43	80	72	69	50	38
12	e27	e30	e26	e27	e25	e520	43	73	86	80	49	e38
13	e26	e30	e26	e27	e25	e350	42	69	145	81	48	e37
14	e26	e29	e24	e27	e25	e270	43	78	257	77	47	e37
15	e27	e29	e23	e27	e25	e210	43	100	178	73	45	e37
16	e27	e28	e22	e27	e25	e180	45	116	121	68	42	e37
17	e28	e27	e23	e27	e25	e150	44	117	163	66	42	e38
18	e28	e28	e24	e26	e25	e120	44	98	261	63	42	e39
19	e29	e28	e27	e26	e25	e95	45	93	282	61	42	e41
20	e29	e29	e28	e26	e25	e80	43	145	229	61	43	e41
21	e30	e28	e29	e25	e25	e70	44	137	191	56	42	e41
22	e30	e27	e29	e25	e25	e62	44	118	149	51	42	e40
23	e31	e27	e29	e25	e25	e57	e65	110	122	50	41	e40
24	e31	e27	e29	e25	e25	e54	e80	101	103	48	41	e40
25	e30	e28	e30	e25	e25	e51	82	90	86	52	39	e40
26	e30	e30	e31	e25	e25	e48	77	89	77	68	39	e40
27	e29	e31	e31	e25	e25	e46	77	87	84	96	40	e39
28	e28	e31	e31	e25	e26	e44	96	80	107	126	39	e39
29	e29	e31	e31	e25	---	e42	103	75	210	164	38	e38
30	e30	e30	e31	e25	---	e41	90	71	276	194	38	e38
31	e31	---	e30	e25	---	e40	---	70	---	156	38	---
TOTAL	876	897	859	827	695	3442	1613	2657	4090	2677	1641	1163
MEAN	28.3	29.9	27.7	26.7	24.8	111	53.8	85.7	136	86.4	52.9	38.8
MAX	31	34	31	29	26	520	103	145	282	194	116	41
MIN	26	27	22	25	23	25	41	56	70	48	38	37
AC-FT	1740	1780	1700	1640	1380	6830	3200	5270	8110	5310	3250	2310
CFSM	.14	.15	.14	.14	.13	.57	.28	.44	.70	.44	.27	.20
IN.	.17	.17	.16	.16	.13	.66	.31	.51	.78	.51	.31	.22

WTR YR 1990 TOTAL 21437 MEAN 58.7 MAX 520 MIN 22 AC-FT 42520 CFSM .30 IN. 4.09

e Estimated

CANNON RIVER BASIN

05353800 STRAIGHT RIVER NEAR FARIBAULT, MN

LOCATION.--Lat 44°15'29", long 93°13'51", in W½SE¼ 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 mi^2.

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,034.58 ft above National Geodetic Vertical Datum of 1929.

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

AVERAGE DISCHARGE.--25 years, 254 ft^3/s, 7.80 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,030 ft^3/s, July 7, 1990, gage height, 11.31 ft; maximum gage height, 12.74 ft, Mar. 5, 1974 (backwater from ice); minimum discharge, 10 ft^3/s, Oct. 27, 1976; minimum gage height, 3.66 ft, Nov. 27, 1976.

EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 1,500 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 13	1300	2,870	8.73	July 28	1100	1,550	7.17
July 7	1700	*6,030	*11.31	Aug. 20	0300	1,810	7.50

Minimum discharge, 12 ft^3/s, Oct. 2, 3, gage height, 3.85 ft; minimum gage height, 3.82 ft, Nov. 23.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	35	e42	e17	e19	e21	82	221	233	233	878	222
2	13	36	e41	e17	e19	e23	82	197	270	206	647	194
3	13	37	e41	e18	e19	e24	80	174	520	185	572	207
4	15	38	e41	e18	e19	e25	79	154	523	162	463	250
5	16	41	e40	e18	e19	e27	78	142	468	143	394	272
6	18	44	e38	e18	e19	e30	74	130	383	129	317	226
7	19	44	e35	e19	e19	e70	70	120	321	3180	263	197
8	20	44	e34	e19	e20	e75	68	113	281	2310	226	180
9	21	44	e32	e19	e20	e380	72	273	243	1320	196	188
10	21	42	e30	e19	e19	e500	74	749	209	869	172	178
11	22	44	e28	e19	e19	e520	73	799	488	627	163	160
12	22	43	e27	e19	e18	e730	70	633	991	685	150	144
13	21	40	e25	e19	e18	e785	69	453	2330	632	135	131
14	23	41	e24	e19	e18	e790	67	465	1710	536	122	120
15	32	42	e22	e19	e18	e1030	67	520	1540	422	109	112
16	31	40	e21	e18	e18	1070	76	590	1320	336	100	104
17	28	35	e20	e18	e18	861	80	522	1170	282	96	99
18	25	e35	e19	e18	e18	608	76	402	1000	237	95	99
19	23	e38	e18	e18	e18	345	76	466	906	279	363	110
20	24	e37	e17	e18	e18	253	78	784	979	351	1410	101
21	26	e36	e17	e18	e18	208	76	758	788	383	1180	98
22	25	e35	e16	e18	e18	179	74	605	640	291	928	91
23	25	34	e15	e18	e18	146	78	686	493	234	602	86
24	28	e35	e16	e18	e18	121	285	528	395	200	447	83
25	29	e35	e16	e18	e18	117	436	442	332	183	428	81
26	32	e36	e16	e18	e18	107	417	434	291	219	489	78
27	32	e38	e16	e18	e19	99	299	427	266	487	559	74
28	33	e40	e16	e18	e20	92	259	383	326	1260	533	71
29	33	e42	e16	e18	---	87	249	332	352	1300	396	68
30	34	e43	e17	e18	---	85	248	288	276	1250	306	65
31	34	---	e17	e19	---	83	---	257	---	1100	254	---
TOTAL	753	1174	773	566	520	9491	3912	13047	20044	20031	12993	4089
MEAN	24.3	39.1	24.9	18.3	18.6	306	130	421	668	646	419	136
MAX	34	44	42	19	20	1070	436	799	2330	3180	1410	272
MIN	13	34	15	17	18	21	67	113	209	129	95	65
AC-FT	1490	2330	1530	1120	1030	18830	7760	25880	39760	39730	25770	8110
CFSM	.05	.09	.06	.04	.04	.69	.30	.95	1.51	1.46	.95	.31
IN.	.06	.10	.07	.05	.04	.80	.33	1.10	1.69	1.69	1.09	.34

CAL YR 1989 TOTAL 37849 MEAN 104 MAX 3400 MIN 13 AC-FT 75070 CFSM .23 IN. 3.19
WTR YR 1990 TOTAL 87393 MEAN 239 MAX 3180 MIN 13 AC-FT 173300 CFSM .54 IN. 7.36

e Estimated

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 mi^2.

PERIOD OF RECORD.--March 1981 to current year.

GAGE.--Water-stage recorder. Datum of gage is 950.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Slight regulation at times from Silver Lake.

AVERAGE DISCHARGE.--9 years (water years 1982-90), 207 ft^3/s, 9.28 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,450 ft^3/s, July 1, 1983, gage height, 14.93 ft; minimum discharge, 10 ft^3/s, Oct. 23, 1981, result of regulation; minimum gage height, 2.40 ft, Dec. 12, 1988.

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 ft^3/s. This is the highest known stage since at least 1908.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,300 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 24	0230	*2,260	*8.02	Aug. 3	0130	1,790	7.27
July 28	--	e1,520	--	Aug. 20	0700	1,680	7.10

e Estimated daily discharge.

Minimum daily discharge, e15 ft^3/s, Oct. 10, 11.

REVISIONS.--Revised figures of discharge for the water year 1989, superseding those published in the report for 1989 and given below.

Sept. 1 - - - - e120	Sept. 11 - - - - e60	Sept. 21 - - - - e29
2 - - - - e140	12 - - - - e55	22 - - - - e27
3 - - - - e130	13 - - - - e50	23 - - - - e26
4 - - - - e115	14 - - - - e46	24 - - - - e24
5 - - - - e105	15 - - - - e43	25 - - - - e22
6 - - - - e 95	16 - - - - e40	26 - - - - e21
7 - - - - e 85	17 - - - - e37	27 - - - - e20
8 - - - - e 78	18 - - - - e35	28 - - - - e19
9 - - - - e 71	19 - - - - e33	29 - - - - e18
10 - - - - e 66	20 - - - - e31	30 - - - - e17

	TOTAL	MEAN	MAX	MIN	CFSM	IN
September 1989	1658	55.3	140	17	.18	.20
WTR YR 1989	31864	87.3	3020	17	.29	3.91

ZUMBRO RIVER BASIN

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

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e16	e25	e21	e23	e22	e30	e64	368	218	e160	590	e220
2	e17	e26	e21	e23	e22	e35	e63	315	235	e140	545	e200
3	e18	e25	e21	e22	e22	e39	e63	280	925	e125	1220	e185
4	e19	e27	e21	e22	e22	e42	e62	256	747	e115	953	e175
5	e19	e27	e21	e22	e22	e50	e61	236	392	e125	624	e170
6	e18	e28	e21	e21	e22	e60	66	215	319	e180	516	e175
7	e17	e28	e21	e21	e23	e80	57	200	268	e240	456	e180
8	e16	e28	e21	e22	e25	e150	55	186	240	e210	413	e175
9	e16	e27	e21	e24	e25	e300	62	340	213	e175	397	e160
10	e15	e26	e21	e24	e25	e470	61	595	189	e160	368	e155
11	e15	e25	e21	e24	e25	e550	59	542	265	e170	340	e145
12	e16	e26	e21	e23	e27	e600	58	385	669	e165	324	e140
13	e17	e26	e21	e22	e27	e200	55	328	502	e150	311	e135
14	e19	e25	e21	e21	e26	e700	54	429	535	e138	299	e132
15	e20	e24	e21	e21	e25	e1000	60	531	e460	e125	289	e130
16	e21	e24	e21	e22	e24	e550	73	503	e590	e118	275	e128
17	e22	e23	e21	e22	e23	e250	61	466	e575	e138	334	e125
18	e21	e22	e21	e23	e23	e160	57	371	e575	e220	328	e120
19	e21	e22	e21	e23	e23	e130	56	477	e600	e270	551	e115
20	e21	e24	e21	e22	e23	e115	97	692	e475	e215	1340	e110
21	e22	e24	e21	e22	e23	e102	69	545	e370	e162	726	e108
22	e22	e23	e21	e22	e23	e93	64	437	e300	e140	558	e105
23	e21	e22	e21	e23	e23	e86	184	384	e250	e140	475	e102
24	e22	e22	e21	e24	e23	e82	1840	347	e220	e300	449	e100
25	e23	e22	e21	e24	e23	e78	1150	371	e215	e550	490	e99
26	e24	e24	e21	e23	e24	e74	516	398	e250	e800	496	e97
27	e24	e25	e21	e22	e25	e70	437	383	e280	e1300	467	e95
28	e23	e23	e21	e22	e27	e67	759	330	e240	e1520	415	e92
29	e24	e22	e21	e23	---	e66	698	291	e215	e1500	375	e90
30	e25	e21	e21	e23	---	e65	459	259	e190	e1200	e350	e88
31	e25	---	e22	e23	---	e64	---	235	---	747	e260	---
TOTAL	619	736	652	698	667	6358	7420	11695	11522	11698	15534	4051
MEAN	20.0	24.5	21.0	22.5	23.8	205	247	377	384	377	501	135
MAX	25	28	22	24	27	1000	1840	692	925	1520	1340	220
MIN	15	21	21	21	22	30	54	186	189	115	260	88
AC-FT	1230	1460	1290	1380	1320	12610	14720	23200	22850	23200	30810	8040
CFSM	.07	.08	.07	.07	.08	.68	.82	1.25	1.27	1.25	1.65	.45
IN.	.08	.09	.08	.09	.08	.78	.91	1.44	1.41	1.44	1.91	.50

CAL YR 1989 TOTAL 30984 MEAN 84.9 MAX 3020 MIN 15 AC-FT 61460 CFSM .28 IN. 3.80
WTR YR 1990 TOTAL 71650 MEAN 196 MAX 1840 MIN 15 AC-FT 142100 CFSM .65 IN. 8.80

e Estimated

ZUMBRO RIVER BASIN

05374900 ZUMBRO RIVER AT KELLOGG, MN

LOCATION.--Lat 44°18'43", long 92°00'14", in SW¼ sec.22, T.110 N., R.10 W., Wabasha County, Hydrologic Unit 07040004, on right bank at downstream side of bridge on U.S. Highway 61, and 4 mi above mouth.

DRAINAGE AREA.--1,400 mi^2.

PERIOD OF RECORD.--August 1975 to September 1990 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 669.47 ft above National Geodetic Vertical Datum of 1929.

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

AVERAGE DISCHARGE.--15 years, 880 ft^3/s, 8.54 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 22,300 ft^3/s, Sept. 23, 1986, gage height, 16.07 ft; minimum daily, 140 ft^3/s, Dec. 3, 1980; minimum gage height, 1.58 ft, Oct. 3, 1989.

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 33,000 ft^3/s, occurred on July 22, 1951, at station 05374500, 20 mi upstream; this was the greatest since 1938.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 3,500 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 11	2130	5,600	7.83	June 14	1000	6,820	9.39
Mar. 15	2030	4,360	6.88	July 9	2100	*11,300	*11.53
Apr. 25	2000	3,710	6.62	July 29	0600	6,560	8.79

Minimum daily discharge, 250 ft^3/s, Dec. 25; minimum gage height, 1.58 ft, Oct. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	281	329	e400	e270	e275	e340	538	1770	1120	2680	3350	1050
2	276	331	e380	e270	e275	e360	528	1500	1100	1840	2530	857
3	277	376	e370	e270	e275	e380	507	1310	1240	1460	2200	888
4	285	419	e360	e270	e275	e400	500	1130	1970	1220	2600	928
5	300	478	e340	e265	e270	e430	519	1050	2190	1050	2390	1000
6	309	487	e330	e265	e270	e480	486	993	1810	991	2010	878
7	297	481	e320	e265	e270	e490	474	903	1590	2510	1790	844
8	283	453	e310	e265	e270	e500	469	818	1340	7060	1540	777
9	297	443	e305	e270	e270	880	466	853	1140	9700	1340	808
10	307	401	e300	e275	e270	2800	463	932	1040	6870	1220	717
11	307	348	e300	e280	e270	4250	453	2180	960	2980	1170	689
12	315	354	e300	e280	e270	5250	445	2690	919	2330	1070	750
13	304	329	e290	e285	e270	3740	439	1990	4280	1930	971	714
14	301	339	e285	e285	e270	3750	432	1720	6180	1760	897	733
15	320	341	e280	e285	e270	4050	430	1650	4070	1540	1190	613
16	343	336	e280	e285	e270	3820	435	2030	2540	1390	966	557
17	321	325	e275	e285	e270	2560	415	2070	1970	1260	935	566
18	314	694	e270	e285	e270	1890	341	1950	1820	1180	769	575
19	316	1270	e270	e285	e270	1500	332	1700	1670	1060	908	568
20	321	425	e265	e285	e275	1280	367	1730	1580	1030	832	624
21	316	299	e265	e285	e275	1100	346	2500	1480	1010	1520	588
22	305	302	e260	e285	e280	979	386	2370	1380	935	2010	579
23	310	328	e260	e285	e285	974	429	1960	1230	934	1700	536
24	304	e370	e255	e285	e290	865	1450	1710	1120	859	1490	540
25	286	e390	e250	e285	e300	749	3190	1580	1010	825	1380	553
26	282	e410	e255	e280	e305	719	2870	1500	860	1430	1480	528
27	284	e420	e260	e280	e310	655	1920	1480	783	2880	1430	525
28	294	e430	e260	e280	e325	625	1720	1430	1330	5480	1400	527
29	283	434	e265	e280	---	595	2060	1360	2510	5970	1300	465
30	300	e420	e270	e275	---	588	2250	1260	2880	5460	1200	503
31	302	---	e270	e275	---	551	---	1150	---	4820	1100	---
TOTAL	9340	12762	9100	8620	7795	47550	25660	49269	55112	82444	46688	20480
MEAN	301	425	294	278	278	1534	855	1589	1837	2659	1506	683
MAX	343	1270	400	285	325	5250	3190	2690	6180	9700	3350	1050
MIN	276	299	250	265	270	340	332	818	783	825	769	465
AC-FT	18530	25310	18050	17100	15460	94320	50900	97730	109300	163500	92610	40620
CFSM	.22	.30	.21	.20	.20	1.10	.61	1.14	1.31	1.90	1.08	.49
IN.	.25	.34	.24	.23	.21	1.26	.68	1.31	1.46	2.19	1.24	.54

CAL YR 1989 TOTAL 231920 MEAN 635 MAX 11300 MIN 250 AC-FT 460000 CFSM .45 IN. 6.16
WTR YR 1990 TOTAL 374820 MEAN 1027 MAX 9700 MIN 250 AC-FT 743500 CFSM .73 IN. 9.96

e Estimated

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 South Fork.

DRAINAGE AREA.--101 mi^2.

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 National Geodetic Vertical Datum of 1929. 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 except those for estimated daily discharges, which are fair.

AVERAGE DISCHARGE.--25 years (water years 1940-41, 1968-90), 47.3 ft^3/s, 6.36 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,100 ft^3/s, June 21, 1974, gage height, 16.32 ft, from floodmark; minimum, 11 ft^3/s, Feb. 21, 1968.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 600 ft^3/s and maximum (*).

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 9	1900	859	6.52	July 7	1330	*3,420	*8.49
Mar. 11	1230	1,440	7.16	July 28	0430	2,670	8.05
Apr. 24	0830	827	6.40				

Minimum daily discharge, 18 ft^3/s, Dec. 9, 19-23, Feb. 28; minimum gage height recorded, 4.14 ft, Feb. 25.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	22	21	e20	21	41	22	33	22	35	72	32
2	20	21	20	e21	20	212	23	30	23	30	62	31
3	20	20	20	e21	20	108	22	28	23	29	190	31
4	20	20	20	e21	20	50	22	26	22	27	131	34
5	24	20	20	e21	20	34	22	25	22	27	81	34
6	22	20	20	e21	20	25	22	23	22	26	67	31
7	21	20	20	e21	20	20	22	22	22	887	61	30
8	21	21	19	e21	20	26	22	22	22	375	57	29
9	21	22	18	e21	21	432	22	27	21	88	52	29
10	21	22	19	e21	22	282	22	35	20	57	50	28
11	21	21	19	e21	22	637	22	33	21	54	49	27
12	21	21	e19	e21	47	295	22	28	22	74	48	27
13	22	21	e19	e21	146	74	22	25	25	46	46	26
14	22	21	e19	e21	42	226	22	27	23	42	45	26
15	22	21	e19	e21	34	122	22	35	21	41	44	25
16	23	20	e19	e21	29	64	22	34	23	38	42	24
17	21	20	e19	e21	24	38	22	32	25	37	41	24
18	21	20	e19	e21	23	31	22	29	25	34	40	25
19	21	20	e18	21	21	25	22	31	24	36	44	27
20	20	20	e18	21	20	24	23	43	25	37	45	27
21	20	20	e18	21	20	24	22	40	24	36	43	26
22	20	20	e18	21	21	22	21	35	26	33	38	24
23	20	20	e18	21	21	20	23	32	26	32	36	24
24	20	20	e19	22	20	21	302	30	25	32	36	23
25	20	20	e19	22	19	21	122	29	25	37	43	24
26	21	20	e19	21	19	20	61	28	24	57	57	23
27	21	24	e19	21	19	21	46	30	27	56	51	23
28	21	23	e19	21	18	21	47	26	161	622	42	23
29	21	22	e20	21	---	22	49	26	67	163	38	22
30	22	21	e20	21	---	21	38	24	45	150	35	22
31	23	---	e20	21	---	21	---	23	---	92	32	---
TOTAL	653	623	594	652	769	3000	1173	911	903	3330	1718	801
MEAN	21.1	20.8	19.2	21.0	27.5	96.8	39.1	29.4	30.1	107	55.4	26.7
MAX	24	24	21	22	146	637	302	43	161	887	190	34
MIN	20	20	18	20	18	20	21	22	20	26	32	22
AC-FT	1300	1240	1180	1290	1530	5950	2330	1810	1790	6610	3410	1590
CFSM	.21	.21	.19	.21	.27	.96	.39	.29	.30	1.06	.55	.26
IN.	.24	.23	.22	.24	.28	1.10	.43	.34	.33	1.23	.63	.30

CAL YR 1989 TOTAL 16238 MEAN 44.5 MAX 1510 MIN 18 AC-FT 32210 CFSM .44 IN. 5.98
WTR YR 1990 TOTAL 15127 MEAN 41.4 MAX 887 MIN 18 AC-FT 30000 CFSM .41 IN. 5.57
e Estimated

WHITEWATER RIVER BASIN

05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MN--Continued
(Hydrologic bench-mark station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967 to current year.

REMARKS.--Letter K indicates non-ideal colony count.

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

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 (STAND-ARD UNITS) (00400)	PH 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												
08...	1300	22	521	527	8.1	8.3	8.0	0.40	729	12.6	K5	K7
JAN												
18...	1300	21	540	538	8.2	8.2	3.0	0.30	740	6.7	K10	K14
APR												
03...	1400	22	556	555	8.3	8.2	8.0	1.2	743	13.0	K1	75
MAY												
10...	1250	50	535	544	8.4	8.3	10.0	3.6	736	11.5	260	100
JUL												
11...	1150	46	570	568	8.1	8.4	17.0	15	722	8.0	--	750
AUG												
30...	1400	34	552	564	8.3	8.3	19.5	1.8	--	12.8	230	56

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												
08...	72	26	4.8	1.0	256	257	0	312	15	8.2	0.1	14
JAN												
18...	72	27	5.3	1.0	243	256	0	296	15	7.5	<0.1	16
APR												
03...	70	26	8.9	1.6	254	256	0	310	16	17	<0.1	14
MAY												
10...	67	24	9.0	1.6	244	242	6	285	15	17	0.4	11
JUL												
11...	79	25	7.6	2.8	282	257	0	344	15	15	<0.1	18
AUG												
30...	78	26	6.6	3.1	266	270	0	325	19	15	0.3	14

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV											
08...	305	<0.01	2.6	0.01	0.01	0.5	0.06	0.05	0.05	6	73
JAN											
18...	320	<0.01	3.1	0.03	0.01	0.3	0.04	0.04	0.04	--	--
APR											
03...	333	0.01	3.0	0.02	0.02	0.2	0.16	0.15	0.14	--	--
MAY											
10...	290	0.02	2.8	<0.01	<0.01	0.8	0.15	0.11	0.11	30	61
JUL											
11...	363	0.02	4.3	0.03	0.03	0.9	0.23	0.17	0.17	82	65
AUG											
30...	336	0.01	2.9	0.02	0.02	0.5	0.13	0.13	0.10	22	23

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)
NOV											
08...	1300	<10	<1	51	<0.5	<1.0	2	<3	1	4	<1
MAY											
10...	1250	<10	<1	55	<0.5	<1.0	2	<3	1	10	<1
JUL											
11...	1150	10	2	84	<0.5	1.0	10	<3	1	4	<1
AUG											
30...	1400	<10	1	73	<0.5	<1.0	<1	<3	1	6	<1

DATE	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
NOV										
08...	8	4	0.2	<10	<1	<1	<1.0	67	<6	5
MAY										
10...	5	29	0.2	<10	<1	<1	<1.0	70	<6	10
JUL										
11...	7	19	0.5	<10	2	<1	<1.0	95	<6	5
AUG										
30...	8	27	<0.1	<10	1	<1	<1.0	87	<6	11

RADIOCHEMICAL ANALYSES, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90) (80060)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)
JAN									
18...	1300	1.7	<0.4	2.0	<0.4	1.5	<0.4	0.21	0.66
APR									
04...	1400	1.2	<0.4	1.9	<0.4	1.4	<0.4	0.10	0.73

GARVIN BROOK BASIN

05378235 GARVIN BROOK NEAR MINNESOTA CITY, MN

LOCATION.--Lat 44°04'16", long 91°45'51", in SE¼NE¼ sec. 15, T.107 N., R.8 W., Winona County, Hydrologic Unit 07040003, on left bank, 20 ft downstream from County 23 bridge, 1.8 mi south of Minnesota City, and 2.3 mi upstream from Rollingstone Creek.

PERIOD OF RECORD.--March 1982 to November 1983, January 1984 to current year (partial winter records in 1984).

GAGE.--Water stage recorder and broad-crested weir.

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

AVERAGE DISCHARGE.--7 years (water years 1983, 1985-90), 35.1 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge 1,580 ft^3/s, Sept. 21, 1986, gage height, 6.63 ft; minimum, 12 ft^3/s, Jan. 4, 1989; minimum gage height, 0.74 ft, May 15, 16, 1990.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,290 ft^3/s, Apr. 24, gage height, 5.96 ft; minimum discharge, 13 ft^3/s, Oct. 17, 18, gage height, 0.80 ft; minimum gage height, 0.74 ft, May 15, 16.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	27	26	e25	26	33	66	35	33	28	26	29
2	24	27	e26	e25	e26	39	67	33	35	27	25	29
3	23	27	e26	e25	e26	39	66	30	33	26	36	29
4	24	29	e26	e25	e27	38	68	29	30	26	26	29
5	27	29	e26	e25	e27	36	69	27	28	26	25	29
6	25	28	26	e25	27	35	69	24	27	25	24	28
7	25	28	e26	e25	e27	34	70	24	26	57	23	28
8	25	27	e26	e25	e28	34	72	23	27	30	23	28
9	25	25	e26	e25	e28	62	72	29	27	27	24	28
10	27	26	e25	e25	e28	70	74	25	26	27	29	27
11	26	26	e26	e25	28	312	78	20	27	26	31	28
12	26	26	e26	e25	47	140	77	18	29	26	34	28
13	25	26	e26	e25	57	41	79	16	30	25	34	28
14	25	26	e26	e25	36	305	81	16	26	26	33	28
15	25	26	e26	e25	36	87	82	15	27	26	33	28
16	32	25	e26	e25	36	42	85	37	29	25	33	28
17	24	25	e26	e25	35	38	86	60	28	26	32	28
18	20	e25	e26	25	35	38	87	58	26	25	32	29
19	24	25	e26	25	34	38	88	61	29	27	32	29
20	25	26	e26	25	34	38	90	59	50	25	32	29
21	25	25	e26	e25	28	38	91	55	29	25	32	29
22	25	26	e25	e26	28	35	93	51	28	25	32	29
23	25	e25	e25	26	28	40	174	49	27	25	31	29
24	25	e25	e25	e26	30	47	381	48	26	25	31	29
25	25	26	e25	26	32	42	59	45	26	25	31	29
26	25	25	e25	e26	32	42	49	44	36	24	31	29
27	25	e25	e25	26	29	44	51	41	28	24	30	29
28	25	e25	e25	e26	31	45	47	39	98	142	30	29
29	26	e25	e25	e26	---	47	41	37	32	43	30	29
30	28	26	e25	26	---	48	38	35	30	30	30	29
31	30	---	e25	e26	---	55	---	34	---	28	29	---
TOTAL	785	782	795	785	886	1982	2550	1117	953	972	924	857
MEAN	25.3	26.1	25.6	25.3	31.6	63.9	85.0	36.0	31.8	31.4	29.8	28.6
MAX	32	29	26	26	57	312	381	61	98	142	36	29
MIN	20	25	25	25	26	33	38	15	26	24	23	27
AC-FT	1560	1550	1580	1560	1760	3930	5060	2220	1890	1930	1830	1700

CAL YR 1989 TOTAL 11297 MEAN 31.0 MAX 416 MIN 17 AC-FT 22410
WTR YR 1990 TOTAL 13388 MEAN 36.7 MAX 381 MIN 15 AC-FT 26560

e Estimated

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 mi^2, 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 National Geodetic Vertical Datum of 1929. 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.

AVERAGE DISCHARGE.--62 years, 27,670 ft^3/s, 6.35 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 268,000 ft^3/s, Apr. 19, 1965, gage height, 20.77 ft, from floodmark; minimum, 1,940 ft^3/s, Dec. 12, 1980, gage height, 3.96 ft, result of ice jam; 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 ft^3/s, from information by U.S. Army Corps of Engineers.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 74,700 ft^3/s, Mar. 19, gage height, 9.43 ft; minimum daily discharge, 8,900 ft^3/s, Feb. 10-12; minimum gage height, 4.93 ft, Aug. 18.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12500	12300	12100	9400	10800	10000	26900	38800	34000	60000	43900	33700
2	12600	12200	12300	9400	10700	10000	25900	41100	33600	57600	43000	32400
3	12400	13000	11400	9400	10200	10000	24800	43000	33300	53300	40900	27200
4	11200	12500	11100	9500	10200	10000	22000	45700	33200	49200	41100	19900
5	11200	13400	10600	9500	10200	9900	20600	47700	34900	46200	42300	19200
6	10700	14800	10400	9500	9800	9900	21400	46500	38600	42600	43500	18400
7	11000	15500	10500	9600	9700	9800	23300	45500	40300	40500	41700	19400
8	11500	15400	10600	9700	9600	9900	24900	43000	41600	42600	36400	19700
9	11300	15700	10400	10200	9300	10300	24700	41900	42600	43900	34000	19500
10	11200	15800	10500	11300	8900	12300	23900	42800	43100	43100	30200	21400
11	11500	14600	10500	11500	8900	16400	23800	41500	42300	41900	29300	23200
12	10900	14300	10500	11900	8900	31700	23600	40100	42100	35600	25200	27400
13	11500	12900	10000	11500	9100	45000	22500	39700	44300	35000	20400	27100
14	11000	12600	9300	10500	9100	53900	21400	39000	55000	35200	19200	25000
15	11500	11900	9300	10300	9100	61300	21400	37300	61300	35200	16700	26700
16	11200	11600	9300	9600	9200	64900	20300	35600	66300	31900	15600	29500
17	11000	12800	9300	9500	10200	69300	18200	34600	71500	28600	16600	29400
18	11000	12900	9300	9500	10900	73200	16200	36900	71100	27100	12600	29200
19	10800	11700	9400	9600	10600	74300	15200	40800	68500	30200	12600	32100
20	10500	10900	9300	9600	10900	70400	15100	43700	66200	29400	19000	34700
21	11200	11800	9300	9600	10100	63300	17400	47800	65000	26400	31700	32100
22	11400	10500	9400	9500	10100	57500	19000	49000	64000	23800	38000	31900
23	11000	9500	9400	9600	10100	55100	18700	47300	60900	24100	42900	30300
24	11400	9100	9500	9800	10300	52200	23700	45300	58200	20400	43700	26200
25	11900	9800	9400	11100	10000	47400	25900	43700	56200	17400	37000	21100
26	11800	10000	9400	10800	10000	41000	28400	41900	54400	16100	38300	20400
27	11300	10700	9500	10900	10200	36200	31100	40500	53700	21200	31400	21600
28	11800	11900	9400	10800	10000	34300	32800	38700	55800	26700	31200	21500
29	11800	13300	9300	10800	---	33200	33800	36000	58400	37600	31200	21700
30	11800	12600	9300	10800	---	31300	36300	34400	60100	39200	34200	20200
31	11500	---	9300	10700	---	28800	---	33900	---	42100	34800	---
TOTAL	353400	376000	309300	315400	277100	1142800	703200	1283700	1550500	1104100	978600	762100
MEAN	11400	12530	9977	10170	9896	36860	23440	41410	51680	35620	31570	25400
MAX	12600	15800	12300	11900	10900	74300	36300	49000	71500	60000	43900	34700
MIN	10500	9100	9300	9400	8900	9800	15100	33900	33200	16100	12600	18400
AC-FT	701000	745800	613500	625600	549600	2267000	1395000	2546000	3075000	2190000	1941000	1512000
CFSM	.19	.21	.17	.17	.17	.62	.40	.70	.87	.60	.53	.43
IN.	.22	.24	.19	.20	.17	.72	.44	.81	.97	.69	.61	.48

CAL YR 1989 TOTAL 7416620 MEAN 20320 MAX 78800 MIN 5950 AC-FT 14710000 CFSM .34 IN. 4.66
WTR YR 1990 TOTAL 9156200 MEAN 25090 MAX 74300 MIN 8900 AC-FT 18160000 CFSM .42 IN. 5.75

MISSISSIPPI RIVER MAIN STEM

05378500 MISSISSIPPI RIVER AT WINONA, MN--Continued

WATER-QUALITY RECORDS

SUSPENDED SEDIMENT CONCENTRATIONS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SED SUSP. SIEVE DIAM. %FINER THAN .062MM (70331)
NOV							
08...	0800	15400	--	--	7.0	14	--
MAR							
07...	0830	--	14500	432	--	6	--
JUN							
22...	1300	--	64000	--	--	53	88

PARTICLE-SIZE DISTRIBUTION OF SURFACE BED MATERIAL, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

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)	BED MAT. SIEVE DIAM. % FINER THAN 16.0 MM (80172)
NOV											
08...	1000	1	1	1	9	58	90	94	97	99	100

ROOT RIVER BASIN

05384000 ROOT RIVER NEAR LANESBORO, MN

LOCATION.--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.

PERIOD OF RECORD.--February to November 1910, February 1911 to September 1914, July 1915 to September 1917, August 1940 to September 1985, October 1986 to present. Published as North Branch Root River near Lanesboro, 1910-17. High-flow partial-record station, October 1985 to September 1986.

REVISED RECORDS.--WSP 355: 1912. WSP 1308: 1911(M).

GAGE.--Water-stage recorder. Datum of gage is 791.32 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1917, nonrecording gage at site 0.5 mi downstream at datum about 1.5 ft higher.

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

AVERAGE DISCHARGE.--54 years (water years 1912-14, 1916-17, 1941-85, 1987-90), 354 ft^3/s, 7.82 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 22,100 ft^3/s, Mar. 29, 1962, gage height, 16.11 ft; maximum gage height, 17.83 ft, Mar. 1, 1965, from floodmark (backwater from ice); minimum discharge, 29 ft^3/s, Aug. 27, 1949, gage height, 1.08 ft; minimum gage height, 0.42 ft, Dec. 3, 1980.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 3,500 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 9	2000	4,430	7.43	Apr. 25	1730	*9,230	*11.75
Mar. 12	0900	5,110	8.12	June 29	1230	5,420	8.47
Mar. 15	0100	4,050	7.03				

Minimum daily discharge, 66 ft^3/s, Dec. 22; minumum recorded gage height, 0.56 ft, Oct. 4, 5, but may have been less during periods of no gage height record, Nov. 4-29 and Jan. 4 to Mar. 6.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	96	135	e80	e74	e105	e120	184	1270	349	1340	979	420
2	95	130	e81	e75	e100	e128	183	799	335	951	739	394
3	92	129	e82	e76	e99	e138	182	650	342	736	1020	383
4	87	e130	e83	e77	e98	e150	179	555	849	595	1340	376
5	91	e130	e83	e79	e99	e170	176	501	611	531	1140	370
6	104	e130	e80	e80	e100	e200	174	449	442	527	872	364
7	101	e130	e79	e80	e103	238	170	406	390	637	704	357
8	101	e130	e78	e82	e108	213	170	376	352	1390	598	352
9	104	e130	e77	e83	e108	1050	170	358	322	980	538	345
10	102	e130	e76	e85	e109	1680	168	398	296	643	554	340
11	101	e127	e75	e86	e112	1400	170	654	283	549	522	332
12	98	e125	e74	e88	e122	3240	170	811	425	544	504	328
13	96	e120	e73	e90	e129	1940	170	620	1610	540	496	320
14	96	e120	e72	e94	e124	1210	170	528	1940	536	485	316
15	100	e120	e72	e96	e121	2630	170	505	1290	532	480	309
16	116	e118	e71	e97	e118	2360	170	605	774	527	456	304
17	107	e115	e70	e98	e115	1270	172	659	692	523	437	297
18	107	e112	e69	e105	e110	807	172	728	765	519	430	302
19	103	e111	e68	e105	e107	559	172	560	698	515	963	296
20	101	e108	e68	e105	e105	435	172	736	791	511	2110	282
21	102	e105	e67	e105	e105	359	172	1210	900	507	1820	277
22	102	e100	e66	e105	e105	327	172	907	696	503	1180	274
23	103	e95	e67	e105	e105	297	172	709	607	498	878	272
24	104	e90	e67	e105	e105	265	2660	605	554	494	706	270
25	105	e86	e68	e105	e105	240	7560	542	488	490	730	269
26	105	e85	e69	e105	e105	226	3040	513	436	486	1080	268
27	102	e82	e70	e105	e110	218	1580	503	398	975	1050	266
28	105	e80	e70	e105	e115	209	1280	469	2710	1990	779	264
29	106	e80	e71	e105	---	206	2180	438	4340	2000	627	262
30	119	e80	e72	e105	---	198	1900	402	2950	1920	528	260
31	131	---	e73	e105	---	191	---	374	---	1510	459	---
TOTAL	3182	3363	2271	2910	3047	22674	24180	18840	27635	24999	25204	9469
MEAN	103	112	73.3	93.9	109	731	806	608	921	806	813	316
MAX	131	135	83	105	129	3240	7560	1270	4340	2000	2110	420
MIN	87	80	66	74	98	120	168	358	283	486	430	260
AC-FT	6310	6670	4500	5770	6040	44970	47960	37370	54810	49590	49990	18780
CFSM	.17	.18	.12	.15	.18	1.19	1.31	.99	1.50	1.31	1.32	.51
IN.	.19	.20	.14	.18	.18	1.37	1.46	1.14	1.67	1.51	1.52	.57

CAL YR 1989 TOTAL 73640 MEAN 202 MAX 4650 MIN 66 AC-FT 146100 CFSM .33 IN. 4.45
WTR YR 1990 TOTAL 167774 MEAN 460 MAX 7560 MIN 66 AC-FT 332800 CFSM .75 IN. 10.15

e Estimated

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 mi^2.

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 National Geodetic Vertical Datum of 1929. 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.

AVERAGE DISCHARGE.--51 years (water years 1910-14, 1945-90), 211 ft^3/s, 6.74 in/yr; median of yearly mean discharges, 192 ft^3/s, 6.13 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,400 ft^3/s, July 17, 1978, gage height, 20.35 ft, from floodmark in well; no flow for several days in 1911.

EXTREMES FOR CURRENT YEAR.--Peek discharges greater than base discharge of 1,400 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 12	0300	1,620	6.33	June 12	0630	2,290	7.36
Mar. 15	0830	2,360	7.73	July 29	1330	5,700	13.09
Apr. 24	1130	*7,580	*15.65	Aug. 4	0100	1,980	7.03
Apr. 28	1500	2,080	7.13	Aug. 17	2300	1,510	6.10
June 3	1230	2,240	7.29				

Minimum discharge, 31 ft^3/s, Feb. 2, 27, gage height, 2.17 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	51	72	63	47	47	e54	143	624	332	374	1150	239
2	56	74	55	e46	45	e58	143	507	419	314	859	216
3	53	69	59	45	45	e60	135	430	1780	281	1510	204
4	54	73	65	45	44	e65	134	383	1230	248	1550	204
5	75	80	59	45	46	e67	133	350	802	223	943	195
6	66	77	61	44	48	e69	126	316	583	202	640	181
7	59	82	57	42	48	69	120	290	481	240	493	277
8	57	80	55	45	51	212	115	271	426	435	405	385
9	57	80	55	57	51	548	122	402	379	518	343	289
10	59	80	53	51	50	585	128	1130	337	341	298	233
11	60	75	e52	49	53	988	120	1270	690	276	272	204
12	61	69	e51	45	e60	1440	114	914	2120	330	240	181
13	58	72	e50	e45	e58	761	114	662	1850	369	212	162
14	81	72	e49	e44	e56	1420	115	664	1980	330	193	152
15	62	74	e49	44	e55	2220	113	868	1210	279	177	139
16	71	66	e48	45	e53	1660	123	947	802	244	181	134
17	64	66	e47	51	e51	932	121	839	1050	224	690	126
18	63	63	e46	47	e50	550	115	639	1080	209	1130	131
19	64	61	e45	48	e48	344	111	831	928	317	768	136
20	65	69	e44	48	e48	296	115	1360	1090	660	1020	132
21	65	72	e43	45	48	261	113	1190	801	510	944	127
22	61	73	e43	48	50	244	111	868	748	338	657	121
23	69	64	e42	50	e49	202	425	688	611	266	511	116
24	67	66	e43	51	e49	183	5460	585	488	224	469	112
25	67	64	e43	48	e50	180	2000	531	425	255	1150	111
26	67	64	e43	49	e50	168	1010	525	377	2050	980	107
27	69	88	e44	48	49	156	682	518	380	5230	597	104
28	66	72	e44	46	e52	149	1580	489	510	4970	459	104
29	69	75	e44	48	---	145	1240	438	520	5260	368	101
30	80	65	e45	48	---	142	845	386	446	3590	311	98
31	78	---	45	52	---	138	---	354	---	1880	270	---
TOTAL	1974	2157	1542	1466	1404	14366	15926	20269	24875	30987	19790	5021
MEAN	63.7	71.9	49.7	47.3	50.1	463	531	654	829	1000	638	167
MAX	80	88	65	57	60	2220	5460	1360	2120	5260	1550	385
MIN	51	61	42	42	44	54	111	271	332	202	177	98
AC-FT	3920	4280	3060	2910	2780	28490	31590	40200	49340	61460	39250	9960
CFSM	.15	.17	.12	.11	.12	1.09	1.25	1.54	1.95	2.35	1.50	.39
IN.	.17	.19	.13	.13	.12	1.26	1.39	1.77	2.18	2.71	1.73	.44

CAL YR 1989 TOTAL 53875 MEAN 148 MAX 2900 MIN 37 AC-FT 106900 CFSM .35 IN. 4.72
WTR YR 1990 TOTAL 139777 MEAN 383 MAX 5460 MIN 42 AC-FT 277200 CFSM .90 IN. 12.23

e Estimated

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 mi^2, 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 National Geodetic Vertical Datum of 1929. 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.
AVERAGE DISCHARGE.--55 years (water years 1936-90), 318 ft^3/s, 3.54 in/yr; median of yearly mean discharges, 236 ft^3/s, 2.63 in/yr.
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 15,700 ft^3/s, Apr. 11, 1969, gage height, 19.45 ft; no flow at times.
EXTREMES FOR CURRENT YEAR.--Peak discharge greater than base discharge of 900 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 16	2345	*999	*7.08	No other peak greater than base discharge.			

Minimum discharge, 0.12 ft^3/s, Oct. 19, 20; minimum gage height, 2.33 ft, Oct. 19, 20, Sept. 29, 30.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

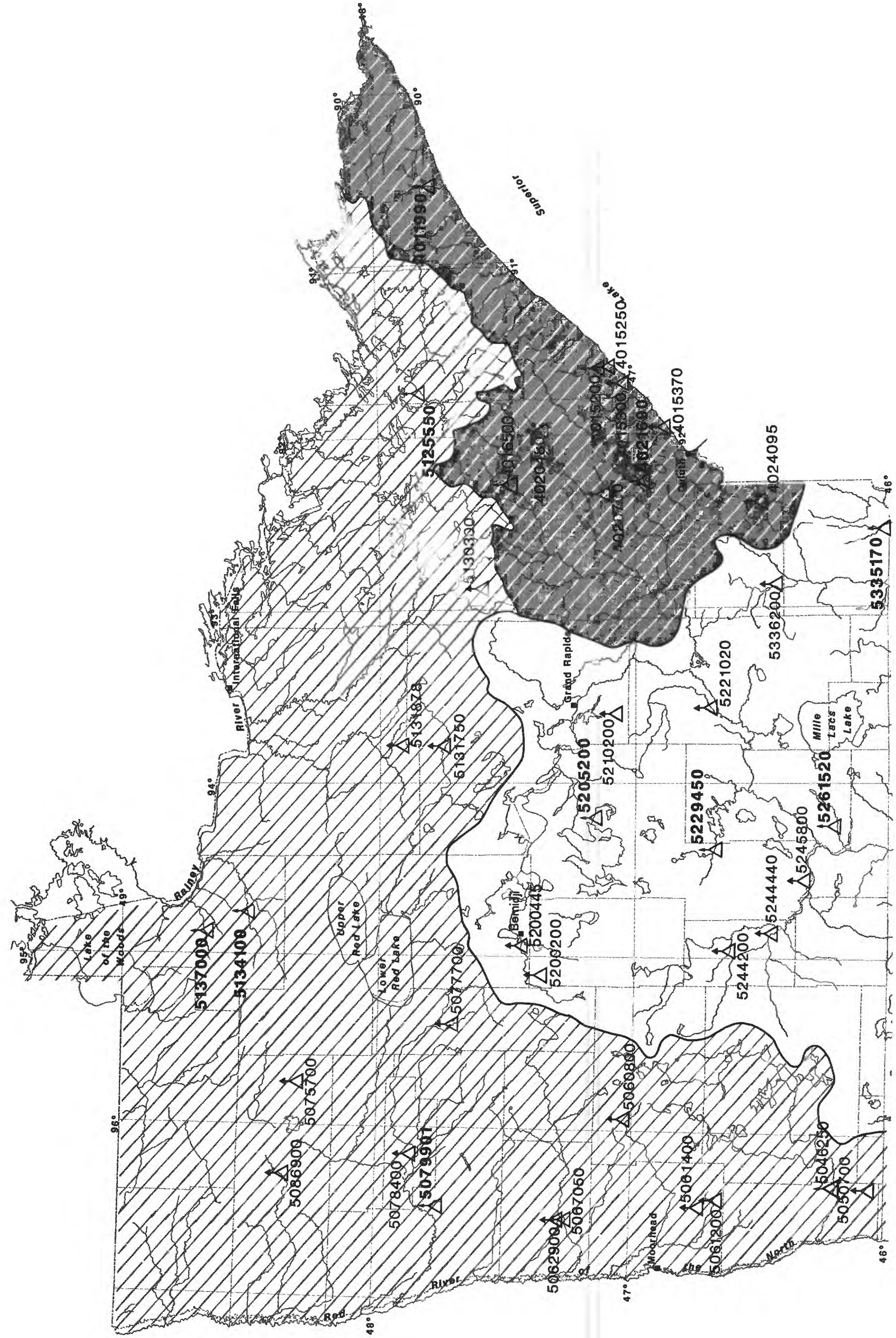
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.7	3.0	e9.4	e1.5	1.3	4.0	56	74	362	140	108	13
2	1.1	3.9	e8.0	1.4	1.1	4.8	59	69	367	123	98	11
3	.34	3.9	6.5	1.4	1.2	4.8	47	62	430	119	97	11
4	.54	4.1	6.9	1.2	1.5	6.4	37	60	427	122	94	10
5	1.9	7.5	e9.0	1.2	1.3	7.0	47	61	331	102	92	8.1
6	1.2	3.7	e6.5	1.3	1.5	7.1	46	58	275	90	88	7.9
7	.56	10	e5.4	1.2	2.1	7.0	42	52	245	100	81	8.1
8	.59	9.9	e5.0	1.6	2.0	8.7	36	49	205	109	75	6.4
9	1.8	7.0	e5.4	1.9	2.5	8.7	42	75	189	106	69	5.4
10	.77	4.0	e5.4	1.6	2.4	10	51	60	165	92	72	5.0
11	1.2	5.8	e4.5	2.0	3.1	24	59	55	136	95	77	4.1
12	.67	5.1	e2.3	1.8	5.1	43	49	44	129	112	69	3.7
13	.62	14	e2.4	e1.8	4.9	71	45	44	133	95	60	2.9
14	.76	e23	e2.5	1.8	5.0	114	42	63	104	88	57	2.6
15	1.6	e24	e2.2	1.8	4.7	67	45	73	88	90	55	1.4
16	.70	e12	e1.9	e2.0	4.3	e64	53	69	113	77	50	1.2
17	.35	e14	e1.7	e2.0	3.5	e42	48	68	308	72	48	1.2
18	.32	e13	e1.6	e2.0	3.1	e48	43	60	143	88	52	4.1
19	.18	e12	e1.5	e2.1	3.0	32	45	184	340	179	69	3.3
20	.17	e14	1.3	2.2	2.9	32	47	279	241	151	94	2.9
21	.38	e16	e1.1	2.0	3.2	38	50	252	223	127	87	3.7
22	.84	e16	e.75	2.0	3.5	66	47	263	200	127	76	2.9
23	1.3	e16	e.60	2.4	e3.7	63	46	266	172	107	57	2.0
24	1.4	e16	.28	e2.5	e3.7	46	48	268	173	107	43	3.7
25	1.4	e16	.33	e2.5	3.5	45	48	298	173	121	38	3.3
26	1.3	e15	.48	e2.5	2.8	43	43	404	164	122	34	2.0
27	1.8	e15	.62	e2.5	3.0	44	49	514	150	112	31	1.7
28	1.4	e12	1.1	2.3	3.0	40	53	500	152	125	28	1.2
29	3.5	e9.8	1.7	2.0	---	47	75	472	147	211	24	1.1
30	2.7	e10	1.4	1.9	---	49	80	447	149	150	18	.94
31	1.6	---	e1.5	1.6	---	52	---	403	---	127	16	---
TOTAL	34.69	335.7	99.26	58.0	82.9	1138.5	1478	5646	6434	3586	1957	135.84
MEAN	1.12	11.2	3.20	1.87	2.96	36.7	49.3	182	214	116	63.1	4.53
MAX	3.5	24	9.4	2.5	5.1	114	80	514	430	211	108	13
MIN	.17	3.0	.28	1.2	1.1	4.0	36	44	88	72	16	.94
AC-FT	69	666	197	115	164	2260	2930	11200	12760	7110	3880	269
CFSM	.00	.01	.00	.00	.00	.03	.04	.15	.18	.09	.05	.00
IN.	.00	.01	.00	.00	.00	.03	.05	.17	.20	.11	.06	.00

CAL YR 1989 TOTAL 17844.86 MEAN 48.9 MAX 889 MIN .17 AC-FT 35400 CFSM .04 IN. .54
WTR YR 1990 TOTAL 20985.89 MEAN 57.5 MAX 514 MIN .17 AC-FT 41630 CFSM .05 IN. .64

e Estimated

HIGH-FLOW PARTIAL-RECORD STATIONS

Sand Hill ditch overflow
April 20, 1950



Lake of the Woods
Rainey
River
International Falls
Upper Red Lake
Lower Red Lake
Bemidji
Grand Rapids
Mille Lacs Lake
Moorhead
Red River of the North
Lake Superior
5137000
5134100
5077700
5075700
5086900
5079901
5078400
5062900
5067050
5060800
5061400
5061200
5046250
5200445
5200200
5205200
5210200
5229450
5244440
5244200
5245800
5261520
5221020
5336200
5335170
5131878
5131750
5125550
4011990
4015250
4015370
4024095

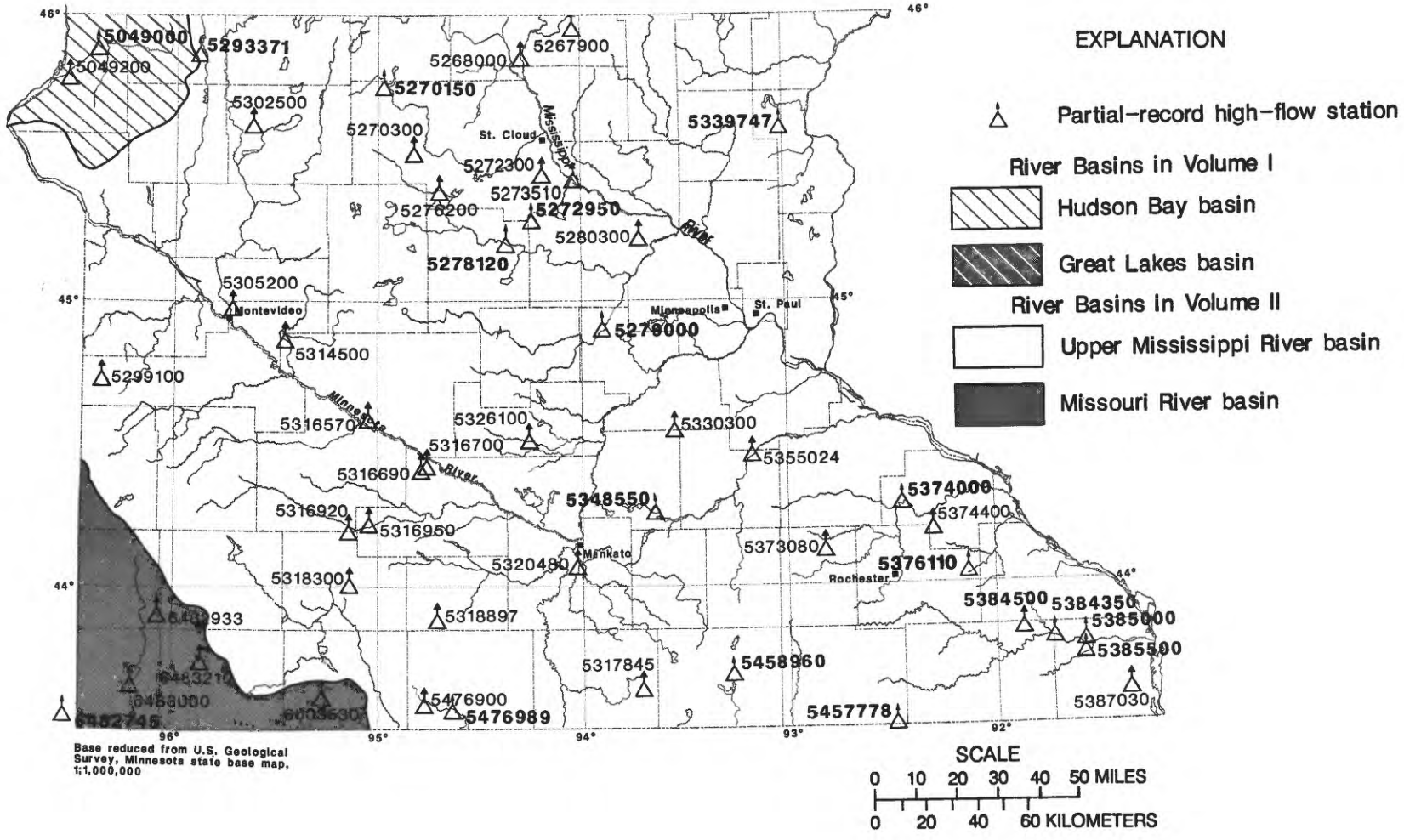


Figure 9.--Location of high-flow partial-record stations

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 three tables. The first is a table of discharge at high-flow partial-record stations, the second is a table of discharge measurements made at miscellaneous sites for both low flow and high flow, and the third is a table of low-flow discharge measurements made in the Straight River basin.

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 have been made for purposes of establishing the stage-discharge relation, but these are not published herein. The years given in the period of record represent water years for which the annual maximum has been determined.

Annual maximum discharge at high-flow partial-record stations during water year 1990

Station no.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Annual maximum Gage height (feet)	Annual maximum Discharge (ft^3/s)
		Mississippi River main stem					
05200200	Hennepin Creek near Becida, MN	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.	41.4	1979-90	3-31-90	ab11.08	c30
05200445	Mississippi River at Bemidji, MN	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.	b400	1973-87, 1988-89#, 1990	4-8-90	bd10.46	286
		Leech Lake River basin					
05205200	Boy River near Remer, MN	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.	310	1986-90	3-31-90	a11.46	c220
		Smith Creek basin					
05210200	Smith Creek near Hill City, MN	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.	8.00	1961-90	4-26-90	b4.81	40
		Willow River basin					
05221020	Willow River below Palisade, MN	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.	445	1972-90	4-29-90	b11.37	1,160

"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 1990--Continued

Station no.	Station name	Location	Drainage area (mi^2)	Period of record	Date	Annual maximum Gage height (feet)	Annual maximum Discharge (ft^3/s)
		Pine River basin					
05229450	Pine River near Pine River, MN	Lat 46°41'39", long 94°22'11", in NE¼SE¼ sec.8., T.137 N., R.29 W., Cass County, Hyrologic Unit 07010105, at bridge 2.3 miles southeast of Pine River, on U.S. Highway 371, 4.9 miles upstream of upper Whitefish Lake.	285	1986-90	4-1-90	a5.25	c1,100
		Crow Wing River basin					
05244200	Cat River near Nimrod, MN	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.	49.2	1961-90	4-1-90	a7.28	c185
05244440	Leaf River near Aldrich, MN	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.	860	1972-90	3-31-90	b11.13	930
05245800	Sevenmile Creek near Pillager, MN	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.	18.3	1979-90	3-13-90	12.73	220
		Nokasippi River basin					
05261520	Nokasippi River near Fort Ripley, MN	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.	178	1967-70+, 1974+, 1976+, 1986-90	3-15-90	a13.60	c490
		Platte River basin					
05267900	Hillman Creek near Pierz,	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.	46.7	1964-90	6-3-90	b14.01	740
05268000	Platte River above Royalton, MN	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.	335	1929-36, 1972-90	6-3-90	b10.85	1,220
		Sauk River basin					
05270150	Ashley Creek near Sauk Centre, MN	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.	113	1963-70+, 1974+, 1976+, 1986-88, 1989#, 1990	6-12-90	14.87	356
05270300	Sauk River tributary at Spring Hill, MN	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.	7.06	1960-90	3-15-90	ab11.16	c110

"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 1990--Continued

Station no.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Annual maximum Gage height (feet)	Annual maximum Discharge (ft^3/s)
		Johnson Creek basin					
05272300	Johnson Creek near St. Augusta, MN	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.	46.7	1964-90	6-16-90	13.85	395
		Clearwater River basin					
05272950	Clearwater River near South Haven, MN	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.	-	1985-90	6-18-90	16.79	890
		Mississippi River main stem					
05273510	Mississippi River at Clearwater, MN	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.	-	1972-90	3-18-90	b12.40	15,000
		Crow River basin					
05276200	North Fork Crow River at Paynesville, MN	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.	236	1973-90	3-14-90	a3.76	c495
05278120	North Fork Crow River near Kingston, MN	Lat 45°12'13", long 94°23'16", in SW¼SE¼ sec 13, T.120 N., R.30 W., Meeker County, Hydrologic Unit 07010204, at bridge on State Highway 24, 3.7 miles west of Kingston, 3.9 miles east of Forest City.	-	1986-90	6-18-90	d16.15	2,700
05279000	South Fork Crow River near Mayer, MN	Lat 44°54'20", long 93°53'05", in SW¼SW¼ sec.30, T.117 N., R.25 W., Carver County, Hydrologic Unit 07010205, at bridge on State Highway 7, 1.3 miles north of Mayer, 4.3 miles southwest of Watertown, 16 miles upstsream from confluence with North Fork.	1,170	1934-79#, 1980-84, 1987-90	6-24-90	12.28	4,300
05280300	School Lake Creek tributary near St. Michael, MN	Lat 45°12'09", long 93°41'31", in NW¼SE¼ sec.15, T.120 N., R.24 W., Wright County, Hydrologic Unit 07010204, at culvert on county highway, 0.2 mile upstream from mouth, 1.5 miles southwest of St. Michael.	2.04	1964-90	6-16-90	9.07	58
		Minnesota River basin					
05293371	Pomme de terre River near Elbow Lake, MN	Lat 46°57'47", long 95°53'07", in SE¼SW¼ sec.19, T.129 N., R.41 W., Grant County, Hydrologic Unit 07020002, at bridge on County Road 47, 4 miles southeast of Elbow Lake, 2.5 miles south of the outlet of Pomme de Terre Lake.	340	1986-90	3-22-90	b4.19	110

"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 1990--Continued

Station no.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Gage height (feet)	Discharge (ft^3/s)
		Minnesota River basin--Continued					
05299100	Lazarus Creek tributary near Canby, MN	Lat 44°43'04", long 96°19'42", in NE¼NW¼ sec.6, T.114 N., R.45 W., Yellow Medicine County, Hydrologic Unit 07020003, at culvert on State Highway 68, 2.7 miles west of Canby, 4.2 miles upstream from mouth.	2.97	1960-90	6-16-90	12.77	298
05302500	Little Chippewa River near Starbuck, MN	Lat 45°36'52", long 95°37'12", in NW¼NE¼ sec.30, T.125 N., R.39 W., Pope County, Hydrologic Unit 07020005, at culvert on State Highway 28, 4.4 miles west of Starbuck.	69.6	1979-90	6-12-90	be11.17	41
05305200	Spring Creek near Montevideo, MN	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.	16.0	1959-90	6-17-90	14.59	120
05314500	Hawk Creek near Maynard, MN	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.	474	1949-54#, 1981-90	6-17-90	20.25	3,700
05316570	Beaver Creek at Beaver Falls, MN	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.	194	1972-90	6-18-90	e11.63	965
05316690	Spring Creek tributary near Sleepy Eye, MN	Lat 44°23'54", long 94°45'35", in NW¼ sec.25, T.111 N., R.33 W., Brown County, Hydrologic Unit 07020007, at culvert on county highway, 0.1 mile upstream from mouth, 7.5 miles north of Sleepy Eye.	3.69	1966-90	7-26-90	6.34	87
05316700	Spring Creek near Sleepy Eye, MN	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.	31.3	1959-90	7-26-90	13.06	352
05316920	Cottonwood River tributary No. 2 near Sanborn, MN	Lat 44°10'34", long 95°07'15", in SW¼NW¼ sec.12, T.108 N., R.36 W., Cottonwood County, Hydrologic Unit 07020008, at culvert on U.S. Highway 71, 2.4 miles south of Sanborn.	.42	1966-90	6-16-90	4.57	24
05316950	Cottonwood River near Springfield, MN	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.	773	1973-90	6-18-90	16.49	1,070
05317845	East Branch Blue Earth River near Walters, MN	Lat 43°37'58", long 93°42'28", in SE¼SE¼ sec.16, T.102 N., R.24 W., Faribault County, Hydrologic Unit 07020009, at culvert on State Highway 22, 2.5 miles northwest of Walters.	29.6	1979-90	7-26-90	17.02	400

"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 1990--Continued

Station no.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Annual maximum Gage height (feet)	Annual maximum Discharge (ft^3/s)
		Minnesota River basin--Continued					
05318300	Watonwan River near Delft, MN	Lat 43°59'55", long 95°07'11", in NE¼SE¼ sec.11, T.106 N., R.36 W., Cottonwood County, Hydrologic Unit 07020010, at culvert on U.S. Highway 71, 1.7 miles northwest of Delft.	13.0	1960-90	6-19-90	14.10	19
05318897	South Fork Watonwan River near Ormsby, MN	Lat 43°53'08", long 94°41'27", in SE¼NW¼ sec.21, T.105 N., R.32 W., Watonwan County, Hydrologic Unit 07020010, at bridge on township road, 2.6 miles north of Ormsby, 5.0 miles upstream from Willow Creek.	109	1979-90	6-6-90	10.22	84
05320480	Maple River near Rapidan, MN	Lat 44°03'54", long 94°01'32", in SW¼ sec.13, T.107 N., R.27 W., Blue Earth County, Hydrologic Unit 07020011, at bridge on County Highway 35, 3.0 miles southeast of Rapidan, 3.3 miles upstream from mouth.	343	1972-90	7-28-90	10.82	2,540
05326100	Middle Branch Rush River near Gaylord, MN	Lat 44°30'27", long 94°15'00", in SW¼NW¼ sec.18, T.112 N., on line between R.28 W. and R.29 W., Sibley County, Hydrologic Unit 07020012, at bridge on township road, 3.0 miles southwest of Gaylord, 10.5 miles upstream from the main branch of Rush River.	68.5	1979-90	7-28-90	14.48	440
05330300	Sand Creek near New Prague, MN	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.	62.4	1960-90	7-28-90	10.99	314
		St. Croix River basin					
05335170	Crooked Creek near Hinckley, MN	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.	93	1966-70+, 1974-76+, 1979-80+, 1986-90	4-30-90	b11.70	380
05336200	Glaisby Brook near Kettle River, MN	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.	27.5	1960-70#, 1971-90	4-30-90	5.38	355
05339747	Goose Creek at Harris, MN	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.	f60	1986-90	6-17-90	5.87	150

"See footnotes at end of the table."

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Annual maximum discharge at high-flow partial-record stations during water year 1990--Continued

Station no.	Station name	Location	Drainage area (mi^2)	Period of record	Date	Annual maximum Gage height (feet)	Annual maximum Discharge (ft^3/s)
		Cannon River basin					
05348550	Cannon River below Sabre Lake near Kilkenny, MN	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.	-	1985-90	8-22-90	11.58	108
05355024	Cannon River at Northfield, MN	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.	934	1980-90	7-28-90	904.87	7,150
		Zumbro River basin					
05373080	Milliken Creek near Concord, MN	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.	22.2	1979-90	7-7-90	d14.32	560
05374000	Zumbro River at Zumbro Falls, MN	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 downstsream from Cold Creek, 0.7 mi upstream from bridge on U.S. Highway 63, and 6.3 mi downstream from North Fork.	f1,130	1909-17#, 1929-80#, 1990	7-8-90	18.32	10,700
05374400	Long Creek near Potsdam, MN	Lat 44°10'48", long 92°17'23", at quarter corner on north line of sec.8, T.108 N., R.12 W., Wabasha County, Hydrologic Unit 07040004, at culvert on county highway, 2.6 miles northeast of Potsdam.	4.46	1966-90	7-7-90	19.79	436
		Whitewater River basin					
05376110	Middle Fork Whitewater River near State Park Group Camp near St. Charles, MN	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.	-	1986-90	4-24-90	67.39	†
		Root River basin					
05384350	Root River at Rushford, MN	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.	-	1985-90	4-25-90	g<23.93	c9,000
05384500	Rush Creek near Rushford, MN	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.	129	1942-79#, 1980-90	4-25-90	5.21	1,130

"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 1990--Continued

Station no.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Gage height (feet)	Discharge (ft^3/s)
		Root River basin--Continued					
05385000	Root River near Houston, MN	Lat 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 mile north of Houston, 1.6 miles upstream of South Fork Root River, 18.2 miles upstream from mouth.	1,270	1909-17, 1929, 1930-84#, 1985-90	4-25-90	13.34	9,520
05385500	South Fork Root River near Houston, MN	Lat 43°44'19", long 91°33'50", in NE¼SW¼ sec.9, T.103 N., R.8 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.	275	1953-83#, 1985-90	8-26-90	10.96	2,150
		Crooked Creek basin					
05387030	Crooked Creek at Freeburg, MN	Lat 43°36'37", long 91°21'39", in SW¼NE¼ 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.	44.2	1979-90	7-28-90	13.37	955
		Iowa River basin					
05457778	Little Cedar River near Johnsburg, MN	Lat 43°30'52", long 92°45'19", in NW¼NE¼ sec.33, T.101 N., R.16 W., Mower County, Hydrologic Unit 07080201, at bridge on County Road 6, 1 mile northeast of Johnsburg, 1 mile north Minnesota-Iowa border.	46	1986-90	4-24-90	13.76	†
05458960	Bancroft Creek at Bancroft, MN	Lat 43°42'09", long 93°21'23", in SW¼SE¼ 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.	29.1	1985+, 1986-90	7-26-90	5.28	208
		Des Moines River basin					
05476900	Fourmile Creek near Dunnell, MN	Lat 43°34'57", long 94°46'26", in SW¼NW¼ sec.2, T.101 N., R.33 W., Martin County, Hydrologic Unit 07100003, at bridge on State Highway 4, 0.6 mile upstream from mouth, 1.6 miles north of Dunnell.	14.0	1960-90	6-17-90	e13.85	285
05476989	East Fork Des Moines River near Ceylon, MN	Lat 43°33'53", long 94°39'15", in NW¼SW¼ sec.11, T.101 N., R.32 W., Martin County, Hydrologic Unit 07010003, at bridge on County Road 23, 2.4 miles northwest of Ceylon.	154	1986-90	6-18-90	e18.16	470
		Big Sioux River basin					
06482745	Beaver Creek at Valley Springs, S.D.	Lat 43°35'10", long 96°28'20", in NW¼NW¼ sec.3, T.101 N., R.47 W., Minnehaha County, South Dakota Hydrologic Unit 10170203, at bridge on County Road 103 (Valley Drive), 1 mile west of South Dakota-Minnesota border, 2.5 miles south of Interstate 90.	104	1986-90	6-27-90	e16.41	205

"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 1990--Continued

Station no.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Gage height Date	Gage height (feet)	Discharge (ft^3/s)
		Big Sioux River basin--Continued					
06482933	Chanarambi Creek near Edgerton, MN	Lat 43°53'59", long 96°03'39", in NW¼SW¼ sec.18, T.105 N., R.43 W., near Murray and Pipestone County line, Hydrologic Unit 10170204, at bridge on township road, 3.8 miles northeast of Edgerton, 7.4 miles upstream from mouth.	56.1	1979-90	5-19-90	10.45	55
06483000	Rock River at Luverne, MN	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.	425	1911-14#, 1972-90	5-19-90	5.06	965
06483210	Kanaransi Creek tributary No. 2 near Wilmont, MN	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.	2.14	1966-90	6-19-90	g	c15
		Little Sioux River basin					
06603530	Little Sioux River near Spafford, MN	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.	41.1	1962-90	6-19-90	e10.05	815

< Less than, peak stage unknown, discharge estimated.
+ Operated as low flow site.
# Operated as a continuous-record gaging station.
† Discharge not determined.
a Backwater from ice.
b Not annual maximum gage height.
c Discharge estimated.
d Affected by shifting control.
e Backwater from aquatic growth or debris.
f Approximately.
g Peak stage did not reach bottom of pipe.

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 1990

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 SW¼ 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	†1884-90	1-18-90	252
Mississippi River	Gulf of Mexico	Lat 47°19'29", long 93°57'33", in NE¼NW¼ sec.3, T.144 N., R.26 W., Cass County, Hydrologic Unit 07010101 at bridge on Trunk Highway 2, 1 mile west of Ball Club.	-	1990	1-18-90	262
		Leech Lake River basin				
Boy River	Leech Lake River	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 (05205200).	310	+1986-90	1-19-90	65
Boy River	Leech Lake River	Lat 47°09'56", long 94°10'41", in NW¼NW¼ sec.36, T.143 N., R.28 W., Cass County, Hydrologic Unit 07010102, at bridge on County Road 8, 2.3 miles upstream of Leech Lake (Boy Bay), 6 miles south of Federal Dam.	-	1990	1-17-90	75
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	†1984-90	1-17-90	437
		Mississippi River main stem				
Mississippi River	Gulf of Mexico	Lat 47°18'08", long 93°54'04", in NW¼SW¼ sec.7, T.144 N., R.25 W., Cass County, Hydrologic Unit 07010102, at bridge on County Road 3, 2 miles southeast of Ball Club (05207600).	-	1945-48, 1957, 1990	1-19-90	722
Mississippi River	Gulf of Mexico	Lat 44°58'46", long 93°14'50", in SE¼SE¼ sec.23, T.29 N., R.24 W., Hennepin County, Hydrologic Unit 07010206, at lower St. Anthony Falls lock and dam in Minneapolis at River Mile 853.3 upstream from Ohio River. (Discharge measurements made between Hennepin Avenue and Franklin Avenue bridges over the Mississippi River are included). (05288920).	a19,700	1912 1938-39, 1941, 1943, 1953-54, 1957, 1963-85, 1990	9-17-90	3,890
		Minnesota River basin				
Minnesota River	Mississippi River	Lat 45°01'17", long 95°52'05", in NW¼NE¼ sec.24, T.118 N., R.42 W., Chippewa County, Hydrologic Unit 07020004, .25 mile downstream of Lac qui Parle Dam, at Lac qui Parle outlet, on County Highway 13, 2.4 miles northwest of Lac qui Parle, (05301000).	4,050	*1942-90	1-17-90 8-14-90	41 71

"See footnotes at end of the table."

Discharge measurements made at miscellaneous sites during water year 1990--Continued

Stream	Tributary	Location	Drainage area (mi^2)	Period of record	Date	Discharge (ft^3/s)
		Minnesota River basin--Continued				
Chippewa River	Minnesota River	Lat 44°56'53", long 95°43'50", in NE¼SE¼ sec.18, T.117 N., R.40 W., Chippewa County, Hydrologic Unit 07020005, at bridge on State Highway 7, at Montevideo (05305400).	-	1990	1-17-90 8-14-90	5.8 24
Chippewa River diversion	Minnesota River	Lat 45°01'30", long 95°48'00", in SE¼ sec.16, T.118 N., R.41 W., Chippewa County, Hydrologic Unit 07020001, 1 mile north of Watson.	-	1945-90	6-8-90	105
Chippewa River below diversion	Minnesota River	Lat 45°01'10", long 95°47'30", in NW¼ sec.22, T.118 N., R.41 W., Chippewa County, Hydrologic Unit 07020005, 1.4 miles northeast of Watson.	-	1945-90	3-21-90 6-8-90 8-17-90	87 95 105
Yellow Medicine River	Minnesota River	Lat 44°43'44", long 95°26'37", in NE¼NE¼ sec.32, T.115 N., R.38 W., Yellow Medicine County, Hydrologic Unit 0702004, at bridge on State Highway 67, 7 miles southeast of Granite Falls (05313510).	-	1990	1-22-90 6-19-90 8-15-90	2.4 1,040 48
Hawk Creek	Minnesota River	Lat 44°44'11", long 95°25'21", in NE¼SE¼ sec.28, T.115 N., R.38 W., Renville County, Hydrologic Unit 07020004, at mouth of Hawk Creek, 0.25 mile northwest of County Highway 10 bridge on Minnesota River near Sacred Heart (05314550).	-	1990	1-23-90 6-19-90 8-16-90	4.1 5,050 17
Minnesota River	Mississippi River	Lat 44°43'54", long 95°25'14", in SE¼SE¼ sec.27, T.115 N., R.38 W., Renville County, Hydrologic Unit 07020004, at bridge on County Highway 10, 4.5 miles southwest Sacred Heart (05314560).	-	1990	1-23-90 7-10-90 8-16-90	55 1,110 161
Minnesota River	Mississippi River	Lat 44°37'11", long 95°10'39", in NW¼SW¼ sec.3, T.113 N., R.36 W., Renville County, Hydrologic Unit 07020004, at bridge on County Highway 21, 3 miles north of Delhi (05314740).	-	1990	1-24-90 8-17-90	61 208
Redwood River	Minnesota River	Lat 44°33'03", long 95°07'28", in SE¼NE¼ sec.36, T.113 N., R.36 W., Redwood County, Hydrologic Unit 07020006, in city park below Ramsey Creek, at Redwood Falls (05316541).	-	1990	1-24-90 6-20-90 7-26-90 8-21-90	5.3 1,030 605 97
Minnesota River	Mississippi River	Lat 44°32'46", long 94°59'45", in NE¼SE¼ sec.36, T.113 N., R.35 W., Renville County, Hydrologic Unit 07020007, at bridge on State Highway 19 and Trunk Highway 71 at Morton (05316580).	-	1990	1-25-90 7-11-90 8-21-90	73 1,480 599
Minnesota River	Mississippi River	Lat 44°26'01", long 94°43'01", in NE¼SW¼ sec.8, T.111 N., R.32 W., Nicollet County, Hydrologic Unit 07020007, at bridge on State Highway 4, 4 miles south of Fairfax (05316685).	-	1990	1-25-90 8-23-90	80 816
Minnesota River	Mississippi River	Lat 44°21'43", long 94°29'50", in SW¼NE¼ sec.1, T.110 N., R.31 W., Nicollet County, Hydrologic Unit 07020007, at bridge on County Highway 35, 1 mile northwest of New Ulm (053106760).	-	1990	1-29-90 3-12-90 3-15-90 3-19-90 3-24-90 4-4-90 7-11-90 8-24-90	83 171 E480 E560 E660 737 1,760 859

"See footnotes at end of the table."

Discharge measurements made at miscellaneous sites during water year 1990--Continued

Stream	Tributary	Location	Drainage area (mi^2)	Period of record	Date	Discharge (ft^3/s)
		Minnesota River basin--Continued				
Minnesota River	Mississippi River	Lat 44°15'28", long 94°20'29", in NE¼SW¼ sec.8, T.109 N., R.29 W., Nicollet County, Hydrologic Unit 07020007, at bridge on County Highway 24 at Courtland (05317250).	a11,200	1938-50, 1990	1-30-90	95
					3-14-90	362
					7-11-90	1,960
					8-24-90	1,430
Minnesota River	Mississippi River	Lat 44°12'00", long 94°11'36", in NE¼SE¼ sec.33, T.109 N., R.28 W., Blue Earth County, Hydrologic Unit 07020007, at bridge on County Highway 42, 0.25 mile north of Judson (05317500).	-	1990	1-30-90	126
					8-25-90	1,960
Blue Earth River	Minnesota River	Lat 44°09'48", long 94°02'12", in SW¼NE¼ sec.13, T.108 N., R.27 W., Blue Earth County, Hydrologic Unit 07020009, at confluence with Minnesota River in Sibley Park above dam in Mankato (05322000).	-	1990	10-25-89	51
					11-28-89	78
					12-20-89	27
					1-16-90	44
					1-31-90	40
					2-20-90	50
					3-5-90	99
					3-11-90	216
					3-13-90	238
					3-14-90	363
					3-16-90	499
					3-19-90	408
					3-26-90	242
					4-2-90	177
					4-12-90	153
					4-18-90	139
					4-25-90	267
					5-1-90	713
					5-8-90	470
					5-17-90	1,240
					5-22-90	3,730
					5-30-90	2,170
					6-6-90	3,350
					6-12-90	3,560
					6-21-90	6,480
					6-27-90	3,440
					7-5-90	1,070
					7-11-90	1,170
					7-19-90	819
					7-25-90	2,040
					8-29-90	2,030
					9-17-90	e478
Minnesota River	Mississippi River	Lat 44°18'26", long 93°57'35", in SE¼NW¼ sec.28, T.110 N., R.26 W., Nicollet County, Hydrologic Unit 07020007, at bridge on State Highway 22 at St. Peter (05325200).	-	1990	2-6-90	200
					8-30-90	4,040
Rush River	Minnesota River	Lat 44°29'57", long 93°54'18" in NW¼NW¼ sec.24, T.112 N., R.26 W., Sibley County, Hydrologic Unit 07020007, at bridge on State Highway 93, 2 miles south of Henderson (05326400).	-	1990	2-2-90	1.3
					6-13-90	180
					6-14-90	234
					9-5-90	23
Minnesota River	Mississippi River	Lat 44°31'46", long 93°54'02", in SE¼SW¼ sec.1, T.112 N., R.26 W., Sibley County, Hydrologic Unit 07020012, at bridge on State Highway 19 at Henderson (05326450).	-	1990	2-6-90	245
					7-12-90	4,140
					8-31-90	3,540
Nine Mile Creek	Minnesota River	Lat 44°48'46", long 93°18'07", in NE¼NE¼ sec.20, T.116 N., R.21 W., Hennepin County, Hydrologic Unit 07010206, at bridge on Old Shakopee Road in Bloomington (05330900).	-	1963-73, 1990	9-5-90	5.3

Operated as a continuous record station.
+ Operated as a high-flow partial record station.
a Approximately.
e Estimated.

LOW-FLOW INVESTIGATIONS

Low-flow Investigations in the Straight River basin

Discharge measurements were made for the study of the variability of base-flow in the Straight River basin between Osage and Park Rapids, Minnesota. Base-flow conditions for the period September 19-20, 1990 were good. Precipitation for the month of September 1990 was 1.35 inches below normal. Total precipitation measured by the Park Rapids U.S. Weather Bureau observer for September 8-19 was .6 inch.

Discharge measurements made in Straight River basin September 19-20, 1990

Stream	Tributary	Location	Drainage area (mi^2)	Period of record	Date	Discharge (ft^3/s)
		Straight River basin				
Straight River	Crow Wing River	Lat 46°55'14", long 95°15'08", on line between secs.20 and 29, T.140 N., R. 36 W., Becker County, Hydrologic Unit 07010106, at outlet of Straight Lake at State Highway 34 at Osage (05243720).	-	1943, 1974-76, 1984, 1986-90	9-19-90 9-20-90	10.6 10.8
Straight River	Crow Wing River	Lat 46°55'03", long 96°15'18", in NW¼NE¼ sec.29, T.140 N., R.36 W., Becker County, Hydrologic Unit 07010106, in stream on south side of fish pond .25 mile downstream of dam at outlet of Straight Lake on State Highway 34 at Osage.	-	1990	9-19-90 9-20-90	26.1 16.9
Straight River	Crow Wing River	Lat 46°54'31", long 95°14'50", in SW¼SW¼ sec.28, T.140 N., R.36 W., Becker County, Hydrologic Unit 07010106, at double culverts on County Road 123, 1 mile southeast of Osage.	-	1990	9-19-90 9-20-90	21.1 19.6
Straight River	Crow Wing River	Lat 46°53'51", long 95°13'35", in NE¼SE¼ sec.33, T.140 N., R.36 W., Becker County, Hydrologic Unit 07010106, 1.3 miles downstream of County Road 123, no road access, 2 miles southeast of Osage.	-	1990	9-19-90 9-20-90	24.6 24.9
Straight River	Crow Wing River	Lat 46°54'15", long 95°12'15", in NW¼NW¼ sec.35, T.140 N., R.36 W., Becker County, Hydrologic Unit 07010106, on downstream side of culverts on County Road 125, 2.7 miles southeast of Osage (05243721).	-	*1987-90	9-19-90 9-20-90	25.5 29.0
Straight River	Crow Wing River	Lat 46°54'00", long 95°11'35, in SW¼NE¼ sec.35, T.140 N., R.36 W., Becker County, Hydrologic Unit 07010106, in stream .5 mile downstream of County Road 125, no road access, 3.2 miles southeast of Osage.	-	1990	9-19-90 9-20-90	28.7 31.8
Straight River	Crow Wing River	Lat 46°53'40", long 95°10'35", in SE¼SW¼ sec.36, T.140 N., R.36 W., Becker County, Hydrologic Unit 07010106, in stream, 2.1 miles downstream of County Road 125, no road access, 4.3 miles southeast of Osage.	-	1990	9-19-90 9-20-90	30.3 34.1
Straight River	Crow Wing River	Lat 46°53'15", long 95°09'44", in NW¼NW¼ sec.6, T.139 N., R.35 W., Hubbard County, Hydrologic Unit 07010106, at culverts on County Road 117, on Becker-Hubbard County line, 5 miles southwest of Park Rapids (05243722).	-	1986-90	9-19-90 9-20-90	33.6 36.1
Straight River	Crow Wing River	Lat 46°53'00", long 95°08'36", in NE¼SE¼ sec.6, T.139 N., R.35 W., Hubbard County, Hydrologic Unit 07010106, in stream, 1.3 miles downstream of County Road 117, 5.8 miles southeast of Osage at pipeline crossing.	-	1990	9-19-90 9-20-90	33.5 34.6

"See footnote at end of table."

Discharge measurements made in Straight River basin September 19-20, 1990--Continued

Streem	Tributary	Location	Drainage area (mi^2)	Period of record	Date	Discharge (ft^3/s)
		Straight River basin--Continued				
Straight River	Crow Wing River	Lat 46°52'45", long 95°06'12", in SW¼SW¼ sec.4, T.139 N., R.35 W., Hubbard County, Hydrologic Unit 07010106, downstream from culvert on County Highway 115, 4.7 miles southwest of Park Rapids (05243723).	-	1989-90	9-19-90 9-20-90	37.1 38.5
Straight River	Crow Wing River	Lat 46°52'35", long 95°05'57", in NE¼NE¼ sec.9, T.139 N., R.35 W., Hubbard County, Hydrologic Unit 07010106, at culvert on County Road 113, 1.6 miles west of U.S. Highway 71, 3.5 miles southwest of Park Rapids (05243724).	-	1986-90	9-19-90 9-20-90	38.2 38.6
Straight River	Crow Wing River	Lat 46°52'30", long 95°04'45", in NE¼NE¼ sec.10 T.139 N., R.35 W., Hubbard County, Hydrologic Unit 07010106, at county road, 0.7 mile west of U.S. Highway 71, 3 miles southwest of Park Rapids.	-	1990	9-19-90 9-20-90	37.4 39.4
Straight River	Crow Wing River	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 miles south of Park Rapids (05243725).	53.2	1970-71, 1973, 1975-76, *1987-90	9-19-90 9-20-90	41.4 38.9
Straight River	Crow Wing River	Lat 46°52'29", long 95°03'31", in SW¼NW¼ sec.12, T.139 N., R.35 W., Hubbard County, Hydrologic Unit 07010106, at county road 0.3 mile east of U.S. Highway 71, 3.2 miles south of Park Rapids.	-	1990	9-19-90 9-20-90	40.9 37.6

*Operated as a continuous-record gaging station.

SURFACE-WATER QUALITY SITES

July 1990

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 systemtically 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 1989 TO SEPTEMBER 1990

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (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)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)
OCT												
25...	1330	51	852	8.3	17.5	742	12.4	21	4.3	K19	K12	54
NOV												
28...	1430	78	988	7.9	1.5	751	13.7	24	2.4	K14	140	10
DEC												
20...	1415	27	1240	7.6	3.0	752	11.3	24	5.2	<1	<1	<1
JAN												
16...	1130	44	912	7.6	3.0	742	10.8	13	1.8	K4	K3	14
31...	1000	40	1050	7.7	3.0	740	11.6	19	0.3	<1	K2	14
FEB												
20...	1600	50	965	7.8	3.0	749	12.4	22	1.2	<1	28	<1
MAR												
05...	1530	99	873	8.0	2.5	750	13.0	27	--	<1	K2	11
11...	1545	216	593	8.0	3.5	734	11.4	52	10.0	K390	K4800	151
13...	1500	238	650	7.9	4.0	734	13.4	--	--	--	--	--
14...	1000	363	583	8.0	3.5	730	12.4	63	9.2	--	--	68
18...	1430	499	528	8.1	3.0	729	12.9	52	8.0	--	--	124
19...	1715	408	675	7.5	3.0	751	13.1	48	6.6	--	--	17
26...	1715	242	744	8.6	6.5	752	15.4	45	11.0	61	32	<1
APR												
02...	1745	177	768	8.6	11.5	747	15.0	47	11.0	<1	K4	<1
12...	1130	153	735	8.4	6.0	747	13.2	41	7.4	<1	K2	10
18...	1630	139	753	8.4	15.5	748	12.1	50	7.5	K2	44	14
25...	1630	267	743	8.6	24.5	735	12.0	46	10.0	K110	120	66
MAY												
01...	1415	713	732	8.2	12.0	744	11.2	26	4.0	480	86	17
08...	1345	470	742	8.8	20.5	736	15.9	47	8.0	K18	100	22
17...	1600	1240	829	8.5	15.5	737	11.8	40	3.5	110	150	52
22...	1415	3730	784	8.3	15.5	741	10.0	44	3.3	K680	430	119
30...	1345	2170	871	8.4	18.5	745	8.9	33	2.9	96	130	47
JUN												
06...	0845	3350	813	8.3	17.0	740	9.2	51	--	K97000	--	97
12...	1500	3560	729	8.2	23.0	732	11.7	79	2.5	>6000	4300	332
21...	1130	6480	668	8.1	21.5	738	8.2	60	1.3	2900	3700	286
27...	1040	3440	798	8.3	25.5	739	8.7	47	<1.0	170	210	107
JUL												
05...	1130	1070	769	8.5	26.0	750	9.9	45	2.5	240	300	48
11...	0900	1170	726	8.3	21.5	742	8.9	39	2.5	970	4300	82
19...	1015	819	704	8.3	24.5	740	9.2	35	3.8	2600	980	60
25...	1545	2040	708	8.3	22.5	741	8.0	36	2.0	250	70	93
AUG												
29...	1130	2030	669	8.4	25.5	739	8.3	40	5.3	380	120	61
SEP												
17...	1030	E478	627	8.8	17.0	750	--	54	6.4	K42	K100	44

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

05322000 BLUE EARTH RIVER AT MOUTH AT MANKATO

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN,NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
OCT												
25...	--	--	--	0.20	0.17	--	--	--	--	--	--	--
NOV												
28...	1	--	--	0.40	0.39	--	0.10	0.09	--	0.5	0.4	--
DEC												
20...	<1	--	--	1.00	1.00	--	0.31	0.31	--	0.9	0.8	--
JAN												
16...	7	--	--	0.80	0.80	--	0.64	0.63	--	1.4	0.9	--
31...	6	--	--	0.82	0.82	--	0.62	0.62	--	1.0	1.0	--
FEB												
20...	<1	--	--	1.0	0.90	--	0.53	0.51	--	1.2	0.9	--
MAR												
05...	11	--	--	0.90	0.80	--	0.46	0.46	--	1.0	0.8	--
11...	11	--	--	1.0	0.90	--	0.36	0.36	--	1.9	1.0	--
13...	--	--	--	--	--	--	--	--	--	--	--	--
14...	34	--	--	1.3	1.3	--	0.59	0.57	--	2.0	1.2	--
16...	73	--	--	2.9	2.9	--	0.58	0.56	--	2.6	1.5	--
19...	17	--	--	9.9	9.9	--	0.63	0.61	--	3.0	1.9	--
26...	<1	--	--	7.6	7.5	--	0.04	0.04	--	1.8	1.2	--
APR												
02...	<1	--	--	4.7	4.6	--	0.04	0.03	--	3.0	0.7	--
12...	10	--	--	1.1	1.1	--	0.05	0.05	--	1.2	0.7	--
18...	14	--	--	--	--	--	--	--	--	1.1	0.6	--
25...	66	--	--	0.30	0.30	--	0.03	0.03	--	1.4	0.5	--
MAY												
01...	10	--	--	15.0	15.0	--	0.10	0.05	--	1.6	0.7	--
08...	15	--	--	9.2	9.2	--	0.04	0.04	--	1.6	0.9	--
17...	28	--	--	19.0	19.0	--	0.01	0.01	--	2.0	1.1	--
22...	25	--	--	25.0	23.0	--	0.10	0.10	--	2.2	1.5	--
30...	26	--	--	23.0	23.0	--	0.01	<0.01	--	1.6	1.0	--
JUN												
06...	40	--	--	25.0	25.0	--	0.04	0.04	--	2.0	1.7	--
12...	45	--	--	24.0	24.0	--	1.20	0.03	--	1.4	1.4	--
21...	64	--	--	6.8	4.3	--	0.07	0.03	--	1.0	1.0	--
27...	3	--	--	4.6	4.4	--	0.05	0.02	--	1.2	1.1	--
JUL												
05...	4	--	--	18.0	17.0	--	<0.01	<0.01	--	2.1	2.1	--
11...	41	--	--	17.0	17.0	--	0.05	0.02	--	1.8	1.7	--
19...	18	--	--	14.0	6.7	--	0.02	<0.01	--	1.7	1.4	--
25...	13	--	--	18.0	<0.10	--	0.02	0.01	--	2.0	1.3	--
AUG												
29...	10	--	--	13.0	13.0	<2.0	0.02	0.02	64	1.4	1.2	1900
SEP												
17...	8	0.02	0.01	4.4	4.3	--	0.01	<0.01	--	0.9	0.8	--

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

05322000 BLUE EARTH RIVER AT MOUTH AT MANKATO

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	PHOS-PHORUS TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CARBON, INORG + ORGANIC TOT. IN BOT MAT (GM/KG AS C) (00693)	CARBON, INOR-GANIC, TOT IN BOT MAT (G/KG AS C) (00686)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
OCT												
25...	0.08	--	--	--	--	3.8	0.2	--	--	31	8.9	0.70
NOV												
28...	0.09	0.02	0.02	0.01	--	3.8	0.6	--	--	109	6.9	<0.20
DEC												
20...	0.09	0.07	0.03	0.02	--	3.7	0.4	--	--	81	1.4	<0.10
JAN												
16...	0.07	0.03	0.03	0.01	--	3.6	0.3	--	--	165	1.5	<0.10
31...	0.05	0.02	0.03	0.01	--	2.8	0.3	--	--	128	0.90	<0.10
FEB												
20...	0.11	0.05	0.06	0.03	--	3.4	0.4	--	--	37	2.1	<0.20
MAR												
05...	0.07	0.05	0.06	0.02	--	3.6	0.4	--	--	47	0.90	<0.40
11...	0.41	0.17	0.22	0.16	--	9.2	3.4	--	--	186	7.4	0.50
13...	--	--	--	--	--	--	--	--	--	--	--	--
14...	0.53	0.14	0.21	0.14	--	7.4	>5.0	--	--	420	--	--
16...	0.25	0.17	0.25	0.16	--	9.2	2.7	--	--	78	6.8	0.40
19...	0.29	0.15	0.22	0.14	--	9.2	1.4	--	--	46	6.8	0.50
26...	0.19	0.05	0.08	0.03	--	9.7	2.0	--	--	20	9.6	<0.90
APR												
02...	0.08	0.01	0.03	<0.01	--	7.2	4.4	--	--	40	7.1	0.70
12...	0.08	0.02	0.01	<0.01	--	6.6	2.0	--	--	12	11.0	<1.2
18...	<0.01	<0.01	--	--	--	6.6	2.5	--	--	19	11.0	<1.0
25...	0.10	0.03	0.03	<0.01	--	7.6	2.6	--	--	--	30.0	<1.0
MAY												
01...	0.16	0.09	0.10	0.08	--	9.1	--	--	--	180	5.1	<0.50
08...	0.10	0.01	0.01	<0.01	--	7.6	2.7	--	--	48	37.0	3.4
17...	0.12	0.05	0.07	0.05	--	7.4	1.6	--	--	167	15.0	<0.50
22...	0.28	0.11	0.12	0.10	--	9.6	1.9	--	--	--	3.5	<0.30
30...	0.15	0.07	0.08	0.07	--	7.0	1.3	--	--	115	7.6	<0.70
JUN												
06...	0.16	0.10	0.11	0.09	--	7.0	1.8	--	--	183	3.1	<0.60
12...	0.12	0.12	0.05	0.05	--	8.1	>4.9	--	--	--	11.0	0.50
21...	0.22	0.14	0.18	0.03	--	8.5	>10	--	--	420	1.8	<0.30
27...	0.22	0.13	0.16	0.12	--	7.2	2.0	--	--	126	6.3	<0.90
JUL												
05...	0.15	0.13	0.10	0.10	--	7.7	2.4	--	--	153	22.0	1.4
11...	0.23	0.11	0.17	0.11	--	7.0	2.5	--	--	158	14.0	<1.1
19...	0.07	0.07	0.07	0.07	--	6.5	3.7	--	--	260	19.0	2.2
25...	0.28	0.16	0.17	0.16	--	8.1	2.2	--	--	224	11.0	<1.0
AUG												
29...	0.22	0.19	0.18	0.16	390	8.4	2.5	36	16	193	13.0	0.80
SEP												
17...	0.07	0.05	0.01	<0.01	--	7.1	0.2	--	--	49	40.0	3.7

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

05322000 BLUE EARTH RIVER AT MOUTH AT MANKATO

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)	2,4-D, TOTAL (UG/L) (39730)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39333)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG) (39351)	CHLORDYRIFOS TOTAL RECOVER (UG/L) (38932)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG) (39363)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG) (39368)	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG) (39373)	DEF TOTAL (UG/L) (39040)	DIAZINON, TOTAL IN BOTTOM MATERIAL (UG/KG) (39571)	DIAZINON, TOTAL (UG/L) (39570)
AUG 29...	<0.01	<0.01	0.13	<0.1	2.0	<0.01	0.4	0.3	<0.1	<0.01	<0.1	<0.01

DATE	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L) (82052)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39383)	DISYSTON TOTAL (UG/L) (39011)	ENDOSULFAN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39389)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39393)	ETHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39399)	ETHION, TOTAL (UG/L) (39398)	FONOFOS (DYFONATE) WATER WHOLE TOT.REC (UG/L (82614)	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG) (39423)	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG) (39413)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG) (39343)
AUG 29...	0.01	1.1	<0.01	<0.1	<0.1	<0.1	<0.01	<0.0	<0.1	<0.1	<0.1

DATE	MALATHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39531)	MALATHION, TOTAL (UG/L) (39530)	METHOMYL TOTAL (UG/L) (39051)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG) (39481)	METHYL PARATHION, TOT. IN BOTTOM MATL. (UG/KG) (39601)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOT. IN BOTTOM MATL. (UG/KG) (39791)	METHYL TRITHION, TOTAL (UG/L) (39790)	MIREX, TOTAL IN BOTTOM MATERIAL (UG/KG) (39758)	PARATHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39541)	PARATHION, TOTAL (UG/L) (39540)
AUG 29...	<0.1	<0.01	<0.5	<0.1	<0.2	<0.01	<0.1	<0.01	<0.1	<0.1	<0.01

DATE	PCB, TOTAL IN BOTTOM MATERIAL (UG/KG) (39519)	PCN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39251)	PERTHANE IN BOTTOM MATERIAL (UG/KG) (81886)	PHORATE TOTAL (UG/L) (39023)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	PROPHAM TOTAL (UG/L) (39052)	SEVIN, TOTAL (UG/L) (39750)	SILVEX, TOTAL (UG/L) (39760)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG) (39403)	TRITHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39787)	TOTAL TRITHION (UG/L) (39786)
AUG 29...	<1	<1.0	<1.00	<0.01	<0.01	<0.5	<0.50	<0.01	<10	<0.1	<0.01

ANALYSIS 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 E indicates estimated value. Letter K indicates non-ideal colony count.

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (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)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
		05270500 SAUK RIVER NEAR ST. CLOUD, MN (LAT 45 33 35N LONG 094 14 00W)									
NOV 1989											
08...	1400	--	--	--	--	--	--	--	--	--	--
		05305400 CHIPPEWA RIVER AT MONTEVIDEO (LAT 44 56 53N LONG 095 43 50W)									
JAN 1990											
17...	1445	5.6	1900	7.6	1.0	736	14.6	36	4.9	27000	6700
AUG											
14...	1300	24	861	8.5	26.0	735	11.1	48	5.4	K28	370
		05313510 YELLOW MEDICINE RIVER ON HWY 67 NEAR GRANITE FALL(LAT 44 43 44N LONG 095 26 37W)									
JAN 1990											
22...	1615	2.4	1280	7.9	0.5	736	12.1	22	1.4	K8	32
JUN											
19...	1530	1040	800	7.9	22.5	730	7.3	57	3.0	--	--
AUG											
15...	1415	48	1120	8.3	26.0	739	9.2	45	6.4	36	470
		05314550 HAWK CREEK AT MOUTH NEAR SACRED HEART (LAT 44 44 11N LONG 095 25 21W)									
JAN 1990											
23...	0930	4.1	2530	7.9	1.0	725	10.6	51	1.4	K3	71
JUN											
19...	1130	5050	338	7.9	22.5	732	7.3	51	2.2	340	7600
AUG											
16...	0850	17	922	6.4	22.0	737	6.1	87	13	K62	80
		05314560 MINNESOTA RIVER NEAR SACRED HEART (LAT 44 43 54N LONG 095 25 14W)									
JAN 1990											
23...	1245	55	1250	6.2	0.5	725	17.2	54	2.5	K4	K18
JUL											
10...	1330	1110	799	6.5	26.0	742	8.1	47	4.1	180	96
AUG											
16...	1545	161	962	6.6	27.0	735	11.4	59	6.9	45	K30
		05314740 MINNESOTA RIVER NEAR DELHI (LAT 44 37 11N LONG 095 10 39W)									
JAN 1990											
24...	1200	61	1200	8.1	0.5	735	15.4	37	3.3	K8	34
AUG											
17...	1030	206	903	6.4	26.5	734	11.5	55	11	K32	K1600
		05316541 REDWOOD RIVER BELOW RAMSEY CREEK AT REDWOOD FALL(LAT 44 33 03N LONG 095 07 26W)									
JAN 1990											
24...	1600	5.3	2620	7.9	0.0	737	11.5	35	3.1	380	K140
JUN											
20...	1330	1030	756	7.6	23.0	731	6.1	49	3.5	--	--
JUL											
26...	1700	605	462	8.2	22.5	737	9.6	46	5.0	--	--
AUG											
21...	0930	97	1140	8.2	19.5	755	8.8	32	4.3	K920	640
		05316580 MINNESOTA RIVER AT MORTON (LAT 44 32 46N LONG 094 59 45W)									
JAN 1990											
25...	0930	73	1330	8.0	0.0	732	15.7	39	3.6	K14	20
JUL											
11...	1030	1460	945	8.5	24.0	742	6.7	57	5.1	88	120
AUG											
21...	1515	599	941	8.5	20.0	750	12.6	46	7.9	310	270

ANALYSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN,NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN,NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)
05270500 SAUK RIVER NEAR ST. CLOUD, MN (LAT 45 33 35N LONG 094 14 00W)												
NOV 1989 08...	--	--	--	0.96	--	--	--	--	--	--	--	--
05305400 CHIPPEWA RIVER AT MONTEVIDEO (LAT 44 56 53N LONG 095 43 50W)												
JAN 1990 17...	16	7	2.2	1.9	--	1.9	1.7	--	2.6	2.6	--	0.45
AUG 14...	35	8	0.60	0.60	8.0	0.18	0.18	93	1.6	1.2	3900	0.34
05313510 YELLOW MEDICINE RIVER ON HWY 67 NEAR GRANITE FALL(LAT 44 43 44N LONG 095 26 37W)												
JAN 1990 22...	15	3	0.30	0.30	--	0.50	0.50	--	0.9	0.9	--	0.04
JUN 19...	248	59	5.3	5.0	--	0.11	0.11	--	1.4	0.9	--	0.21
AUG 15...	22	6	<0.10	<0.10	<2.0	0.02	0.02	40	1.2	0.7	1500	0.11
05314550 HAWK CREEK AT MOUTH NEAR SACRED HEART (LAT 44 44 11N LONG 095 25 21W)												
JAN 1990 23...	8	6	11.0	11.0	--	2.2	2.2	--	4.0	3.5	--	4.6
JUN 19...	295	19	4.3	4.1	--	0.11	0.07	--	1.4	0.60	--	0.37
AUG 16...	56	14	<0.10	<0.10	<2.0	0.03	0.03	94	2.8	0.70	1700	0.21
05314560 MINNESOTA RIVER NEAR SACRED HEART (LAT 44 43 54N LONG 095 25 14W)												
JAN 1990 23...	16	6	1.5	1.5	--	0.59	0.59	--	2.2	1.9	--	0.48
JUL 10...	78	27	1.0	1.0	--	0.03	0.03	--	1.6	1.6	--	0.29
AUG 16...	52	4	<0.10	<0.10	<2.0	0.04	0.04	99	2.0	0.9	2200	0.23
05314740 MINNESOTA RIVER NEAR DELHI (LAT 44 37 11N LONG 095 10 39W)												
JAN 1990 24...	18	13	1.4	1.4	--	0.51	0.51	--	2.0	1.7	--	0.41
AUG 17...	38	2	<0.10	<0.10	<2.0	0.02	0.02	40	1.8	0.7	1300	0.14
05316541 REDWOOD RIVER BELOW RAMSEY CREEK AT REDWOOD FALL(LAT 44 33 03N LONG 095 07 28W)												
JAN 1990 24...	14	8	1.1	1.1	--	3.0	3.0	--	4.1	4.1	--	0.57
JUN 20...	183	46	7.0	1.4	--	0.10	0.04	--	1.2	1.2	--	0.18
JUL 26...	201	29	3.2	3.2	--	0.09	0.05	--	1.2	1.1	--	0.26
AUG 21...	1	1	0.80	0.80	<2.0	0.21	0.21	35	1.7	1.2	2300	0.31
05316580 MINNESOTA RIVER AT MORTON (LAT 44 32 46N LONG 094 59 45W)												
JAN 1990 25...	14	5	1.3	1.3	--	0.56	0.56	--	2.1	1.6	--	0.35
JUL 11...	83	41	1.3	1.3	--	0.04	0.02	--	1.7	0.6	--	0.31
AUG 21...	27	6	0.30	0.30	<2.0	0.02	<0.01	25	2.1	0.8	2300	0.22

ANALYSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	PHOS-PHORUS TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CARBON, INORG + ORGANIC TOT. IN BOT MAT (GM/KG AS C) (00693)	CARBON, INOR-GANIC, TOT IN BOT MAT (G/KG AS C) (00686)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
05270500 SAUK RIVER NEAR ST. CLOUD, MN (LAT 45 33 35N LONG 094 14 00W)											
NOV 1989											
08...	--	--	--	--	--	--	--	--	--	--	--
05305400 CHIPPEWA RIVER AT MONTEVIDEO (LAT 44 56 53N LONG 095 43 50W)											
JAN 1990											
17...	0.43	0.44	0.38	--	8.3	0.5	--	--	--	0.90	<0.10
AUG											
14...	0.22	0.23	0.19	1200	9.6	4.5	48	18	--	10.0	1.0
05313510 YELLOW MEDICINE RIVER ON HWY 67 NEAR GRANITE FALL(LAT 44 43 44N LONG 095 26 37W)											
JAN 1990											
22...	0.03	0.04	0.03	--	3.6	0.3	--	--	--	1.1	<0.10
JUN											
19...	0.12	0.14	0.09	--	6.4	2.7	--	--	521	1.3	<0.30
AUG											
15...	0.02	<0.01	<0.01	620	7.6	>5.0	30	16	--	15.0	1.20
05314550 HAWK CREEK AT MOUTH NEAR SACRED HEART (LAT 44 44 11N LONG 095 25 21W)											
JAN 1990											
23...	4.3	3.4	0.01	--	9.4	0.5	--	--	--	2.8	0.40
JUN											
19...	0.28	0.33	0.25	--	5.2	--	--	--	416	0.50	<0.30
AUG											
16...	0.02	0.09	<0.01	440	9.3	>5.0	46	26	--	19.0	2.0
05314560 MINNESOTA RIVER NEAR SACRED HEART (LAT 44 43 54N LONG 095 25 14W)											
JAN 1990											
23...	0.42	0.34	0.32	--	11	0.8	--	--	--	8.80	<0.20
JUL											
10...	0.12	0.12	0.11	--	8.8	3.3	--	--	129	27.0	<1.1
AUG											
16...	0.06	0.07	0.04	540	9.3	>5.0	46	26	--	20.0	2.2
05314740 MINNESOTA RIVER NEAR DELHI (LAT 44 37 11N LONG 095 10 39W)											
JAN 1990											
24...	0.31	0.32	0.29	--	11	1.0	--	--	--	11.0	<0.30
AUG											
17...	0.02	0.02	<0.01	480	8.8	>5.0	35	21	--	55.0	2.0
05316541 REDWOOD RIVER BELOW RAMSEY CREEK AT REDWOOD FALL(LAT 44 33 03N LONG 095 07 28W)											
JAN 1990											
24...	0.47	0.47	0.46	--	6.8	0.8	--	--	--	15.0	3.3
JUN											
20...	0.14	0.15	0.02	--	7.6	3.1	--	--	319	0.90	<0.30
JUL											
26...	0.16	0.22	0.15	--	6.0	5.1	--	--	263	20.0	1.0
AUG											
21...	0.20	0.20	0.14	480	6.8	2.1	44	16	--	12.0	0.80
05316580 MINNESOTA RIVER AT MORTON (LAT 44 32 46N LONG 094 59 45W)											
JAN 1990											
25...	0.25	0.28	0.25	--	10	0.5	--	--	--	16.0	<0.40
JUL											
11...	0.11	0.15	0.11	--	8.8	3.4	--	--	206	18.0	0.80
AUG											
21...	0.04	0.06	<0.01	530	7.6	7.1	43	18	130	54.0	2.2

ANALYSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (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)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)
		05316685	MINNESOTA RIVER NEAR FAIRFAX (LAT 44 26 01N LONG 094 43 01W)									
JAN 1990												
25...	1530	80	1330	8.1	0.5	734	17.4	--	4.8	K8	K10	17
AUG												
23...	1430	816	944	8.7	21.0	736	11.5	48	6.4	360	150	88
		05316760	MINNESOTA RIVER NEAR NEW ULM (LAT 44 21 43N LONG 094 29 50W)									
JAN 1990												
29...	1545	83	1360	8.2	1.0	728	21.2	44	6.4	K2	K6	16
MAR												
12...	1130	171	984	8.7	2.5	728	26.6	59	14	K4	780	51
15...	1120	E480	870	8.3	1.5	719	12.5	56	9.8	--	--	45
19...	1815	E560	700	9.5	2.0	750	18.0	60	11	--	--	40
24...	1645	E660	710	9.0	2.0	749	18.4	54	16	K23	40	39
APR												
04...	1515	737	772	8.9	9.0	738	19.2	64	15	K1	K30	33
JUL												
11...	1615	1760	957	7.9	24.0	740	6.0	59	4.3	200	790	108
AUG												
24...	1130	859	914	8.5	21.5	738	12.1	59	10	K39	290	102
		05317250	MINNESOTA RIVER AT COURTLAND (LAT 44 15 28N LONG 094 20 29W)									
JAN 1990												
30...	1015	95	1290	8.2	0.5	739	19.9	50	6.5	K95	24	25
MAR												
14...	1850	362	776	8.7	2.5	730	21.5	44	11	--	--	22
JUL												
11...	1600	1960	871	8.3	24.0	741	7.5	55	2.3	88	260	77
AUG												
24...	1630	1430	853	8.5	22.5	738	12.8	46	7.3	K380	480	61
		05317500	MINNESOTA RIVER AT JUDSON, MN (LAT 44 12 00N LONG 094 11 36W)									
JAN 1990												
30...	1345	126	1260	8.2	0.5	742	22.7	52	6.9	47	530	23
AUG												
25...	1115	1960	799	8.4	21.0	739	8.6	37	6.2	580	1200	124
	05325050		MINNESOTA RIVER AT US HWY 14 BRIDGE AT MANKATO (LAT 44 11 29N LONG 094 00 34W)									
FEB 1990												
01...	1030	190	1260	8.2	0.5	745	19.5	47	8.2	K8900	500	32
MAR												
12...	1315	556	780	8.3	6.0	733	14.6	59	10	K40	K970	76
14...	1730	786	722	8.5	3.5	730	13.8	50	12	--	--	140
16...	1600	1110	662	8.3	2.5	733	14.0	50	16	--	--	65
20...	1630	934	714	8.7	5.0	742	19.8	38	10	<1	110	<1
24...	1100	1070	686	9.1	2.0	755	17.2	64	19	<1	K33	22
APR												
05...	1100	1020	751	8.7	7.5	744	14.4	66	12	K10	98	41
JUL												
12...	1000	3770	872	8.3	21.0	750	7.7	--	2.1	480	730	--
AUG												
30...	0900	3940	686	8.5	23.5	742	8.1	45	5.1	310	450	31
		05325200	MINNESOTA RIVER AT ST. PETER (LAT 44 18 26N LONG 093 57 35W)									
FEB 1990												
06...	0930	200	1170	8.4	0.5	743	15.6	51	9.8	450	100	23
AUG												
30...	1430	4040	684	8.5	25.5	739	12.2	52	7.6	K150	84	74

ANALYSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	RESIDUE VOLATILE, SUSPENDED (MG/L) (00535)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN,NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN,NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)	PHOSPHORUS TOTAL (MG/L AS P) (00665)
05316685 MINNESOTA RIVER NEAR FAIRFAX (LAT 44 26 01N LONG 094 43 01W)											
JAN 1990											
25...	7	1.2	1.2	--	0.60	0.59	--	2.1	1.8	--	0.31
AUG											
23...	16	1.4	1.4	<2.0	0.03	0.02	6.7	1.8	0.7	1300	0.35
05316760 MINNESOTA RIVER NEAR NEW ULM (LAT 44 21 43N LONG 094 29 50W)											
JAN 1990											
29...	--	1.0	0.66	--	0.069	0.063	--	2.0	0.8	--	0.26
MAR											
12...	46	0.10	0.10	--	0.02	0.02	--	2.1	1.1	--	0.36
15...	34	<0.10	<0.10	--	0.02	0.01	--	2.3	0.3	--	0.06
19...	30	0.50	0.50	--	0.03	0.03	--	1.5	0.9	--	0.42
24...	24	<0.10	<0.10	--	0.02	0.02	--	2.5	0.9	--	0.31
APR											
04...	19	<0.10	<0.10	--	<0.01	<0.01	--	2.1	0.9	--	0.22
JUL											
11...	32	2.1	2.10	--	0.08	0.06	--	1.6	1.6	--	0.35
AUG											
24...	28	0.40	0.40	<2.0	0.05	<0.01	23	2.6	0.9	2300	0.19
05317250 MINNESOTA RIVER AT COURTLAND (LAT 44 15 28N LONG 094 20 29W)											
JAN 199											
30...	10	1.3	0.87	--	0.040	0.033	--	1.8	0.8	--	0.40
MAR											
14...	22	<0.10	<0.10	--	0.02	0.01	--	1.9	0.5	--	0.29
JUL											
11...	41	2.3	2.3	--	0.04	0.04	--	2.0	1.1	--	0.42
AUG											
24...	13	1.8	1.8	<2.0	0.04	<0.01	21	1.8	0.7	1700	0.24
05317500 MINNESOTA RIVER AT JUDSON, MN (LAT 44 12 00N LONG 094 11 36W)											
JAN 1990											
30...	16	0.99	0.62	--	0.035	0.021	--	1.8	0.6	--	0.35
AUG											
25...	23	5.3	5.3	<2.0	0.05	0.02	39	2.0	0.9	2200	0.18
05325050 MINNESOTA RIVER AT US HWY 14 BRIDGE AT MANKATO (LAT 44 11 29N LONG 094 00 34W)											
FEB 1990											
01...	16	0.85	0.82	--	0.19	0.19	--	2.8	1.4	--	0.39
MAR											
12...	3	0.50	0.50	--	0.43	0.43	--	2.5	1.1	--	0.44
14...	51	1.0	0.9	--	0.23	0.23	--	2.0	1.2	--	0.43
16...	17	1.4	1.4	--	0.18	0.18	--	2.1	1.0	--	0.19
20...	<1	2.8	2.8	--	0.76	0.76	--	2.0	2.0	--	0.43
24...	17	1.2	1.2	--	0.02	0.01	--	2.0	1.5	--	0.37
APR											
05...	34	0.50	0.50	--	<0.01	<0.01	--	2.3	0.9	--	0.27
JUL											
12...	--	6.3	6.3	--	0.04	0.02	--	1.8	1.8	--	0.41
AUG											
30...	7	8.8	8.4	<2.0	0.02	0.02	41	2.4	1.0	1300	0.16
05325200 MINNESOTA RIVER AT ST. PETER (LAT 44 18 26N LONG 093 57 35W)											
FEB 1990											
06...	8	0.80	0.81	--	0.32	0.32	--	2.5	0.8	--	0.34
AUG											
30...	14	7.7	7.5	<2.0	0.01	0.01	33	2.0	1.2	1300	0.13

ANALYSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	PHOS-PHORUS TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CARBON, INORG + ORGANIC TOT. IN BOT MAT (GM/KG AS C) (00693)	CARBON, INOR-GANIC, TOT IN BOT MAT (G/KG AS C) (00686)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
05316685 MINNESOTA RIVER NEAR FAIRFAX (LAT 44 26 01N LONG 094 43 01W)											
JAN 1990											
25...	0.20	0.22	0.20	--	10	1.4	--	--	--	11.0	0.40
AUG											
23...	0.09	0.11	0.05	270	7.4	4.8	22	9.2	81	54.0	2.5
05316760 MINNESOTA RIVER NEAR NEW ULM (LAT 44 21 43N LONG 094 29 50W)											
JAN 1990											
29...	0.07	0.13	0.06	--	11	>5.0	--	--	--	80.0	<1.8
MAR											
12...	0.10	0.12	0.08	--	16	>5.0	--	--	42	2.1	<0.40
15...	0.05	0.06	0.03	--	8.5	4.8	--	--	26	42.0	<1.8
19...	0.18	0.22	0.17	--	8.2	3.4	--	--	30	52.0	<0.90
24...	0.07	0.09	0.05	--	9.4	>5.0	--	--	265	30.0	<1.3
APR											
04...	0.03	0.03	<0.01	--	9.0	>5.0	--	--	81	0.70	<0.50
JUL											
11...	0.16	0.18	0.14	--	8.6	3.8	--	--	359	12.0	<1.1
AUG											
24...	0.03	0.04	<0.01	640	8.0	--	39	15	--	52.0	1.6
05317250 MINNESOTA RIVER AT COURTLAND (LAT 44 15 28N LONG 094 20 29W)											
JAN 1990											
30...	0.20	0.25	0.19	--	8.6	4.5	--	--	--	130	<1.8
MAR											
14...	0.02	0.06	0.01	--	6.4	>5.0	--	--	90	--	--
JUL											
11...	0.13	0.14	0.12	--	8.2	4.4	--	--	295	25.0	1.6
AUG											
24...	0.04	0.05	0.02	480	7.2	4.8	33	15	149	32.0	0.80
05317500 MINNESOTA RIVER AT JUDSON, MN (LAT 44 12 00N LONG 094 11 36W)											
JAN 1990											
30...	0.14	0.21	0.13	--	8.4	--	--	--	--	70.0	<1.3
AUG											
25...	0.08	0.10	0.05	330	6.8	4.6	36	14	--	33.0	<1.1
05325050 MINNESOTA RIVER AT US HWY 14 BRIDGE AT MANKATO (LAT 44 11 29N LONG 094 00 34W)											
FEB 1990											
01...	0.17	0.21	0.16	--	7.2	>5.1	--	--	--	48.0	<0.70
MAR											
12...	0.20	0.24	0.18	--	8.6	3.5	--	--	71	18.0	<0.90
14...	0.11	0.16	0.09	--	7.6	4.0	--	--	143	--	--
16...	0.11	0.14	0.08	--	7.7	5.3	--	--	67	18.0	<0.60
20...	0.32	0.39	0.32	--	8.5	0.8	--	--	39	67.0	<0.90
24...	0.08	0.12	0.06	--	10	6.1	--	--	56	37.0	<1.3
APR											
05...	0.03	0.04	<0.01	--	6.6	9.6	--	--	76	4.4	<1.0
JUL											
12...	0.12	0.19	0.12	--	8.8	2.0	--	--	259	5.0	<1.1
AUG											
30...	0.09	0.14	0.08	280	8.2	3.1	34	20	--	47.0	2.2
05325200 MINNESOTA RIVER AT ST. PETER (LAT 44 18 26N LONG 093 57 35W)											
FEB 1990											
06...	0.08	0.14	0.07	--	6.0	>4.9	--	--	--	92.0	<1.3
AUG											
30...	0.12	0.09	0.09	310	7.8	>5.0	32	16	--	62.0	2.5

ANALYSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (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)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)
		05326400	RUSH RIVER NEAR HENDERSON, MN (LAT 44 29 57N LONG 093 54 18W)									
FEB 1990												
02...	1045	1.3	785	7.8	1.0	747	11.5	16	0.1	K5	K4	8
JUN												
13...	1015	180	576	8.1	21.5	740	7.5	210	3.9	K14000	K42000	1620
14...	1415	234	786	8.0	24.0	734	8.1	54	2.6	3500	3900	72
SEP												
05...	0900	23	1270	8.5	22.5	744	10.1	43	5.3	--	250	6
		05326450	MINNESOTA RIVER AT HENDERSON (LAT 44 31 46N LONG 093 54 02W)									
FEB 1990												
06...	1130	245	1110	8.4	0.5	744	20.8	50	13	K180	29	20
JUL												
12...	1015	4140	880	8.4	22.0	746	7.5	--	2.8	2400	K45000	--
AUG												
31...	1130	3810	785	8.5	26.5	737	9.4	45	5.9	100	76	22
		05330900	NINE MILE CREEK AT BLOOMINGTON, MN (LAT 44 48 46N LONG 093 18 07W)									
SEP 1990												
05...	1500	5.3	546	8.3	22.5	741	10.7	--	--	--	--	--
		05330920	MINNESOTA R AT FT SNELLING ST PK AT ST. PAUL, MN (LAT 44 52 13N LONG 093 11 32W)									
SEP 1990												
05...	1700	E3720	775	8.5	26.0	741	12.2	--	--	--	--	--
		05344995	VERMILLION RIVER TRIBUTARY NEAR FARMINGTON, MN (LAT 44 39 15N LONG 093 08 11W)									
MAR 1990												
14...	1115	34	410	7.3	4.0	--	7.0	--	--	K660	K3200	--
APR												
13...	1110	3.9	593	8.2	7.0	--	14.4	--	--	K4	K16	--
25...	1125	24	435	7.5	15.5	--	6.4	--	--	E1000	K4900	--
MAY												
16...	1025	18	632	7.7	10.0	--	7.2	--	--	K120	930	--
30...	1100	63	623	7.7	13.0	--	7.5	--	--	230	700	--
JUN												
14...	1100	63	402	7.2	20.5	--	3.4	--	--	E2000	3200	--
JUL												
17...	1150	7.4	601	8.0	17.0	--	8.8	--	--	620	K2400	--
SEP												
04...	1515	2.5	592	7.8	19.0	--	8.4	--	--	210	490	--
		05345200	VERMILLION RIVER TRIBUTARY NEAR EMPIRE, MN (LAT 44 40 49N LONG 093 02 04W)									
MAR 1990												
15...	1050	0.97	430	7.3	2.5	--	6.3	--	--	K76	1100	--
MAY												
16...	1240	E0.28	654	7.6	11.5	--	7.2	--	--	200	570	--
		05346000	VERMILLION RIVER AT HASTINGS, MN (LAT 44 43 12N LONG 092 51 57W)									
JAN 1990												
25...	1400	25	883	8.1	0.5	--	11.2	--	--	46	85	--
MAR												
16...	1430	183	547	7.8	3.0	--	10.6	--	--	210	9200	--
APR												
11...	1230	43	731	8.5	4.0	--	18.8	--	--	K3	K38	--
25...	1435	82	626	8.4	22.0	--	9.6	--	--	E500	400	--
MAY												
17...	1510	114	627	8.3	10.5	--	10.8	--	--	580	950	--
31...	1300	70	780	8.3	19.5	--	10.6	--	--	E380	K540	--
JUL												
19...	1220	64	707	8.2	23.0	--	8.2	--	--	K1500	520	--
SEP												
05...	1400	39	739	8.3	24.0	--	9.5	--	--	3400	1000	--

ANALYSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	RESIDUE VOLATILE, SUSPENDED (MG/L) (00535)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN,NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN,NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)	PHOSPHORUS TOTAL (MG/L AS P) (00665)
05326400 RUSH RIVER NEAR HENDERSON, MN (LAT 44 29 57N LONG 093 54 18W)											
FEB 1990											
02...	8	0.12	0.12	--	0.03	0.02	--	0.4	0.3	--	0.02
JUN											
13...	215	12.0	12.0	--	0.10	0.10	--	1.6	1.6	--	0.72
14...	8	28.0	28.0	--	0.94	0.08	--	2.6	1.7	--	0.28
SEP											
05...	6	<0.10	<0.10	<2.0	0.03	0.03	21	1.2	1.2	640	0.26
05326450 MINNESOTA RIVER AT HENDERSON (LAT 44 31 46N LONG 093 54 02W)											
FEB 1990											
06...	9	1.0	1.0	--	0.02	0.01	--	2.1	0.8	--	0.32
JUL											
12...	--	8.1	8.1	--	0.04	0.04	--	1.6	1.2	--	0.40
AUG											
31...	9	7.6	7.0	<2.0	0.02	0.02	30	1.9	1.1	800	0.13
05330900 NINE MILE CREEK AT BLOOMINGTON, MN (LAT 44 48 46N LONG 093 18 07W)											
SEP 1990											
05...	--	--	--	--	--	--	--	--	--	--	--
05330920 MINNESOTA R AT FT SNELLING ST PK AT ST. PAUL, MN (LAT 44 52 13N LONG 093 11 32W)											
SEP 1990											
05...	--	--	--	--	--	--	--	--	--	--	--
05344995 VERMILLION RIVER TRIBUTARY NEAR FARMINGTON, MN (LAT 44 39 15N LONG 093 08 11W)											
MAR 1990											
14...	--	--	4.0	--	--	0.72	--	3.4	2.9	--	0.45
APR											
13...	--	--	0.50	--	--	0.02	--	0.3	0.3	--	0.04
25...	--	--	1.70	--	--	0.11	--	1.3	1.1	--	--
MAY											
16...	--	--	1.7	--	--	0.05	--	0.7	0.5	--	0.07
30...	--	--	0.80	--	--	0.05	--	0.4	0.3	--	0.05
JUN											
14...	--	--	0.90	--	--	0.11	--	1.1	1.0	--	0.31
JUL											
17...	--	--	0.80	--	--	0.05	--	0.4	0.4	--	0.06
SEP											
04...	--	--	2.1	--	--	0.03	--	0.4	0.4	--	0.06
05345200 VERMILLION RIVER TRIBUTARY NEAR EMPIRE, MN (LAT 44 40 49N LONG 093 02 04W)											
MAR 1990											
15...	--	--	2.0	--	--	0.59	--	2.0	1.6	--	0.10
MAY											
16...	--	--	<0.10	--	--	0.18	--	1.0	0.7	--	0.10
05346000 VERMILLION RIVER AT HASTINGS, MN (LAT 44 43 12N LONG 092 51 57W)											
JAN 1990											
25...	--	--	7.4	--	--	0.58	--	1.4	1.4	--	1.6
MAR											
16...	--	--	5.0	--	--	0.40	--	2.2	1.8	--	0.43
APR											
11...	--	--	4.7	--	--	0.04	--	0.8	0.6	--	0.54
25...	--	--	4.9	--	--	0.05	--	1.3	1.3	--	0.73
MAY											
17...	--	--	3.9	--	--	0.04	--	1.0	0.7	--	0.45
31...	--	--	5.9	--	--	0.02	--	1.0	0.9	--	0.46
JUL											
19...	--	--	5.5	--	--	0.01	--	0.8	0.8	--	0.51
SEP											
05...	--	--	7.0	--	--	0.01	--	0.8	0.8	--	0.60

ANALYSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	PHOS-PHORUS TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CARBON, INORG + ORGANIC TOT. IN BOT MAT (GM/KG AS C) (00693)	CARBON, INOR-GANIC, TOT IN BOT MAT (G/KG AS C) (00686)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
05326400 RUSH RIVER NEAR HENDERSON, MN (LAT 44 29 57N LONG 093 54 18W)											
FEB 1990											
02...	<0.01	0.01	<0.01	--	2.4	0.2	--	--	--	0.30	<0.10
JUN											
13...	0.16	0.16	0.16	--	8.8	>10	--	--	2130	8.2	0.70
14...	0.28	--	0.26	--	12	2.6	--	--	153	3.2	<0.40
SEP											
05...	0.17	0.18	0.14	320	12	4.6	26	19	--	21.0	2.8
05326450 MINNESOTA RIVER AT HENDERSON (LAT 44 31 46N LONG 093 54 02W)											
FEB 1990											
06...	0.04	0.10	0.02	--	5.6	>4.9	--	--	87	63.0	1.3
JUL											
12...	0.16	0.18	0.15	--	8.2	3.3	--	--	302	20.0	1.1
AUG											
31...	0.08	0.11	0.06	440	8.1	3.1	29	15	--	40.0	1.5
05330900 NINE MILE CREEK AT BLOOMINGTON, MN (LAT 44 48 46N LONG 093 18 07W)											
SEP 1990											
05...	--	--	--	--	--	--	--	--	--	--	--
05330920 MINNESOTA R AT FT SNELLING ST PK AT ST. PAUL, MN (LAT 44 52 13N LONG 093 11 32W)											
SEP 1990											
05...	--	--	--	--	--	--	--	--	--	--	--
05344995 VERMILLION RIVER TRIBUTARY NEAR FARMINGTON, MN (LAT 44 39 15N LONG 093 08 11W)											
MAR 1990											
14...	0.25	--	--	--	14	2.1	--	--	--	--	--
APR											
13...	0.02	--	--	--	3.0	0.7	--	--	--	--	--
25...	--	--	--	--	10	--	--	--	--	--	--
MAY											
16...	0.04	--	--	--	6.7	0.5	--	--	--	--	--
30...	0.02	--	--	--	4.1	0.4	--	--	--	--	--
JUN											
14...	0.23	--	--	--	11	0.7	--	--	--	--	--
JUL											
17...	0.03	--	--	--	4.2	0.2	--	--	--	--	--
SEP											
04...	0.05	--	--	--	3.1	0.5	--	--	--	--	--
05345200 VERMILLION RIVER TRIBUTARY NEAR EMPIRE, MN (LAT 44 40 49N LONG 093 02 04W)											
MAR 1990											
15...	0.06	--	--	--	9.1	1.0	--	--	--	--	--
MAY											
16...	0.04	--	--	--	8.5	0.9	--	--	--	--	--
05346000 VERMILLION RIVER AT HASTINGS, MN (LAT 44 43 12N LONG 092 51 57W)											
JAN 1990											
25...	1.4	--	--	--	3.1	0.3	--	--	--	--	--
MAR											
16...	0.32	--	--	--	12	1.9	--	--	--	--	--
APR											
11...	0.50	--	--	--	2.6	0.7	--	--	--	--	--
25...	0.67	--	--	--	7.4	--	--	--	--	--	--
MAY											
17...	0.39	--	--	--	6.3	0.5	--	--	--	--	--
31...	0.39	--	--	--	4.6	0.4	--	--	--	--	--
JUL											
19...	0.45	--	--	--	4.2	0.4	--	--	--	--	--
SEP											
05...	0.59	--	--	--	3.4	0.4	--	--	--	--	--

ANALYSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	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)
05384500	RUSH CREEK NEAR RUSHFORD, MN (LAT 43 50 00N LONG 091 46 40W)							
NOV 1989								
08...	--	--	--	--	--	--	--	--
443933093002801	SOUTH BRANCH VERMILLION RIVER AT EMPIRE, MN (LAT 44 39 33N LONG 093 00 28W)							
JAN 1990								
31...	1330	5.9	499	8.0	1.0	12.1	K6	K9
MAR								
15...	1330	51	446	7.4	3.5	9.3	88	K12000
APR								
11...	1430	7.5	507	8.2	6.5	16.2	K2	K26
26...	1210	18	544	7.8	17.5	8.3	K1900	1200
MAY								
16...	1458	32	500	7.7	11.5	9.5	K1200	3400
31...	1050	12	541	7.9	14.0	8.6	490	K540
JUN								
15...	1050	37	462	7.7	19.5	6.5	2300	1300
JUL								
17...	1430	11	528	7.9	19.0	7.9	920	970
SEP								
05...	1050	8.4	498	7.8	18.0	7.8	1400	1400

DATE	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)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)
05384500	RUSH CREEK NEAR RUSHFORD, MN (LAT 43 50 00N LONG 091 46 40W)							
NOV 1989								
08...	1.80	--	--	--	--	--	--	--
443933093002801	SOUTH BRANCH VERMILLION RIVER AT EMPIRE, MN (LAT 44 39 33N LONG 093 00 28W)							
JAN 1990								
31...	5.9	0.03	0.4	0.4	0.04	0.02	1.0	0.2
MAR								
15...	5.7	0.38	2.4	2.0	0.28	0.17	14	1.4
APR								
11...	4.9	0.02	0.4	0.4	0.03	0.02	2.5	0.4
26...	3.8	0.04	1.0	1.0	0.12	0.05	9.0	0.2
MAY								
16...	3.8	0.05	1.3	1.3	0.11	0.06	9.3	1.0
31...	4.4	0.06	0.5	0.5	0.06	0.03	4.2	0.4
JUN								
15...	2.7	0.08	1.4	0.7	0.10	0.10	11	0.6
JUL								
17...	5.3	0.01	0.8	0.8	0.05	0.03	3.3	0.3
SEP								
05...	5.0	0.04	0.7	0.7	0.06	0.05	3.2	0.6

ANALYLSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

ANALYSES FOR ORGANIC CHEMICALS

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)	2,4-D, TOTAL (UG/L) (39730)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39333)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG) (39351)	CHLORDYRIFOS TOTAL RECOVER (UG/L) (38932)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG) (39363)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG) (39368)	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG) (39373)	DEF TOTAL (UG/L) (39040)	DIAZINON, TOTAL IN BOTTOM MATERIAL (UG/KG) (39571)	DIAZINON, TOTAL (UG/L) (39570)
05305400 CHIPPEWA RIVER AT MONTEVIDEO (LAT 44 56 53N LONG 095 43 50W)												
AUG 1990 14...	<0.01	<0.01	0.08	--	--	<0.01	--	--	--	<0.01	--	<0.01
05313510 YELLOW MEDICINE RIVER ON HWY 67 NEAR GRANITE FALL(LAT 44 43 44N LONG 095 26 37W)												
AUG 1990 15...	<0.01	<0.01	0.03	<0.1	<1.0	<0.01	<0.1	<0.1	<0.1	<0.01	<0.1	<0.01
05314550 HAWK CREEK AT MOUTH NEAR SACRED HEART (LAT 44 44 11N LONG 095 25 21W)												
AUG 1990 16...	<0.01	<0.01	<0.01	<1.0	<1.0	<0.01	<0.1	<0.1	<0.1	<0.01	<0.2	<0.01
05314560 MINNESOTA RIVER NEAR SACRED HEART (LAT 44 43 54N LONG 095 25 14W)												
AUG 1990 16...	0.28	<0.01	0.66	--	--	<0.01	--	--	--	<0.01	--	<0.01
05314740 MINNESOTA RIVER NEAR DELHI (LAT 44 37 11N LONG 095 10 39W)												
AUG 1990 17...	--	--	--	--	--	<0.01	--	--	--	<0.01	--	<0.01
05316541 REDWOOD RIVER BELOW RAMSEY CREEK AT REDWOOD FALL(LAT 44 33 03N LONG 095 07 28W)												
AUG 1990 21...	<0.01	<0.01	0.05	<0.1	4.0	<0.01	<0.1	<0.1	<0.1	<0.01	0.1	<0.01
05316580 MINNESOTA RIVER AT MORTON (LAT 44 32 46N LONG 094 59 45W)												
AUG 1990 21...	<0.01	<0.01	0.22	--	--	<0.01	--	--	--	<0.01	--	<0.01
05316685 MINNESOTA RIVER NEAR FAIRFAX (LAT 44 26 01N LONG 094 43 01W)												
AUG 1990 23...	0.08	<0.01	0.32	--	--	<0.01	--	--	--	<0.01	--	<0.01
05316760 MINNESOTA RIVER NEAR NEW ULM (LAT 44 21 43N LONG 094 29 50W)												
AUG 1990 24...	<0.01	<0.01	0.07	--	--	<0.01	--	--	--	<0.01	--	<0.01
05317250 MINNESOTA RIVER AT COURTLAND (LAT 44 15 28N LONG 094 20 29W)												
AUG 1990 24...	<0.01	<0.01	0.08	--	--	<0.01	--	--	--	<0.01	--	<0.01
05317500 MINNESOTA RIVER AT JUDSON, MN (LAT 44 12 00N LONG 094 11 36W)												
AUG 1990 25...	<0.01	<0.01	0.25	--	--	<0.01	--	--	--	<0.01	--	<0.01

ANALYLSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

ANALYSES FOR ORGANIC CHEMICALS

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L) (82052)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39383)	DISYSTON TOTAL (UG/L) (39011)	ENDOSULFAN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39389)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39393)	ETHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39399)	ETHION, TOTAL (UG/L) (39398)	FONOFOS (DYFONATE) WATER WHOLE TOT.REC (UG/L (82614)	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG) (39423)	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG) (39413)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG) (39343)
05305400 CHIPPEWA RIVER AT MONTEVIDEO (LAT 44 56 53N LONG 095 43 50W)											
AUG 1990 14...	0.05	--	<0.01	--	--	--	<0.01	<0.0	--	--	--
05313510 YELLOW MEDICINE RIVER ON HWY 67 NEAR GRANITE FALL(LAT 44 43 44N LONG 095 26 37W)											
AUG 1990 15...	0.01	0.2	<0.01	<0.1	<0.1	<0.1	<0.01	<0.0	<0.1	<0.1	<0.1
05314550 HAWK CREEK AT MOUTH NEAR SACRED HEART (LAT 44 44 11N LONG 095 25 21W)											
AUG 1990 16...	0.04	0.2	<0.01	<0.1	<0.1	<0.1	<0.01	<0.0	<0.1	<1.0	<0.1
05314560 MINNESOTA RIVER NEAR SACRED HEART (LAT 44 43 54N LONG 095 25 14W)											
AUG 1990 16...	0.04	--	<0.01	--	--	--	<0.01	<0.0	--	--	--
05314740 MINNESOTA RIVER NEAR DELHI (LAT 44 37 11N LONG 095 10 39W)											
AUG 1990 17...	--	--	<0.01	--	--	--	<0.01	<0.0	--	--	--
05316541 REDWOOD RIVER BELOW RAMSEY CREEK AT REDWOOD FALL(LAT 44 33 03N LONG 095 07 28W)											
AUG 1990 21...	0.01	0.5	<0.01	<0.1	<0.1	<0.1	<0.01	<0.0	<0.1	<0.1	<0.1
05316580 MINNESOTA RIVER AT MORTON (LAT 44 32 46N LONG 094 59 45W)											
AUG 1990 21...	0.01	--	<0.01	--	--	--	<0.01	<0.0	--	--	--
05316685 MINNESOTA RIVER NEAR FAIRFAX (LAT 44 26 01N LONG 094 43 01W)											
AUG 1990 23...	0.04	--	<0.01	--	--	--	<0.01	<0.0	--	--	--
05316760 MINNESOTA RIVER NEAR NEW ULM (LAT 44 21 43N LONG 094 29 50W)											
AUG 1990 24...	0.02	--	<0.01	--	--	--	<0.01	<0.0	--	--	--
05317250 MINNESOTA RIVER AT COURTLAND (LAT 44 15 28N LONG 094 20 29W)											
AUG 1990 24...	0.01	--	<0.01	--	--	--	<0.01	<0.0	--	--	--
05317500 MINNESOTA RIVER AT JUDSON, MN (LAT 44 12 00N LONG 094 11 36W)											
AUG 1990 25...	0.02	--	<0.01	--	--	--	<0.01	<0.0	--	--	--

ANALYLSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

ANALYSES FOR ORGANIC CHEMICALS

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	MALATHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39531)	MALATHION, TOTAL (UG/L) (39530)	METHOMYL TOTAL (UG/L) (39051)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG) (39481)	METHYL PARATHION, TOT. IN BOTTOM MATL. (UG/KG) (39601)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOT. IN BOTTOM MATL. (UG/KG) (39791)	METHYL TRITHION, TOTAL (UG/L) (39790)	MIREX, TOTAL IN BOTTOM MATERIAL (UG/KG) (39758)	PARATHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39541)	PARATHION, TOTAL (UG/L) (39540)
05305400 CHIPPEWA RIVER AT MONTEVIDEO (LAT 44 56 53N LONG 095 43 50W)											
AUG 1990 14...	--	<0.01	<0.5	--	--	<0.01	--	<0.01	--	--	<0.01
05313510 YELLOW MEDICINE RIVER ON HWY 67 NEAR GRANITE FALL(LAT 44 43 44N LONG 095 26 37W)											
AUG 1990 15...	<0.1	<0.01	<0.5	<1.0	<0.1	<0.01	<0.1	<0.01	<0.1	<0.1	<0.01
05314550 HAWK CREEK AT MOUTH NEAR SACRED HEART (LAT 44 44 11N LONG 095 25 21W)											
AUG 1990 16...	<0.1	<0.01	<0.5	<1.0	<0.1	<0.01	<0.1	<0.01	<0.1	<0.1	<0.01
05314560 MINNESOTA RIVER NEAR SACRED HEART (LAT 44 43 54N LONG 095 25 14W)											
AUG 1990 16...	--	<0.01	<0.5	--	--	<0.01	--	<0.01	--	--	<0.01
05314740 MINNESOTA RIVER NEAR DELHI (LAT 44 37 11N LONG 095 10 39W)											
AUG 1990 17...	--	<0.01	<0.5	--	--	<0.01	--	<0.01	--	--	<0.01
05316541 REDWOOD RIVER BELOW RAMSEY CREEK AT REDWOOD FALL(LAT 44 33 03N LONG 095 07 28W)											
AUG 1990 21...	<0.1	<0.01	<0.5	<1.0	<0.2	<0.01	<0.1	<0.01	<0.1	<0.1	<0.01
05316580 MINNESOTA RIVER AT MORTON (LAT 44 32 46N LONG 094 59 45W)											
AUG 1990 21...	--	<0.01	<0.5	--	--	<0.01	--	<0.01	--	--	<0.01
05316685 MINNESOTA RIVER NEAR FAIRFAX (LAT 44 26 01N LONG 094 43 01W)											
AUG 1990 23...	--	<0.01	<0.5	--	--	<0.01	--	<0.01	--	--	<0.01
05316760 MINNESOTA RIVER NEAR NEW ULM (LAT 44 21 43N LONG 094 29 50W)											
AUG 1990 24...	--	<0.01	<0.5	--	--	<0.01	--	<0.01	--	--	<0.01
05317250 MINNESOTA RIVER AT COURTLAND (LAT 44 15 28N LONG 094 20 29W)											
AUG 1990 24...	--	<0.01	<0.5	--	--	<0.01	--	<0.01	--	--	<0.01
05317500 MINNESOTA RIVER AT JUDSON, MN (LAT 44 12 00N LONG 094 11 36W)											
AUG 1990 25...	--	<0.01	<0.5	--	--	<0.01	--	<0.01	--	--	<0.01

ANALYLSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

ANALYSES FOR ORGANIC CHEMICALS

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	PCB, TOTAL IN BOTTOM MATERIAL (UG/KG) (39519)	PCN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39251)	PERTHANE IN BOTTOM MATERIAL (UG/KG) (81886)	PHORATE TOTAL (UG/L) (39023)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	PROPHAM TOTAL (UG/L) (39052)	SEVIN, TOTAL (UG/L) (39750)	SILVEX, TOTAL (UG/L) (39760)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG) (39403)	TRITHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39787)	TOTAL TRITHION (UG/L) (39786)
05305400 CHIPPEWA RIVER AT MONTEVIDEO (LAT 44 56 53N LONG 095 43 50W)											
AUG 1990 14...	--	--	--	<0.01	<0.01	<0.5	<0.50	<0.01	--	--	<0.01
05313510 YELLOW MEDICINE RIVER ON HWY 67 NEAR GRANITE FALL(LAT 44 43 44N LONG 095 26 37W)											
AUG 1990 15...	<1	<1.0	<1.00	<0.01	<0.01	<0.5	<0.50	<0.01	<10	<0.1	<0.01
05314550 HAWK CREEK AT MOUTH NEAR SACRED HEART (LAT 44 44 11N LONG 095 25 21W)											
AUG 1990 16...	<1	<1.0	<1.00	<0.01	<0.01	<0.5	<0.50	<0.01	<10	<0.1	<0.01
05314560 MINNESOTA RIVER NEAR SACRED HEART (LAT 44 43 54N LONG 095 25 14W)											
AUG 1990 16...	--	--	--	<0.01	<0.01	<0.5	<0.50	<0.01	--	--	<0.01
05314740 MINNESOTA RIVER NEAR DELHI (LAT 44 37 11N LONG 095 10 39W)											
AUG 1990 17...	--	--	--	<0.01	--	<0.5	<0.50	--	--	--	<0.01
05316541 REDWOOD RIVER BELOW RAMSEY CREEK AT REDWOOD FALL(LAT 44 33 03N LONG 095 07 28W)											
AUG 1990 21...	<10	<1.0	<1.00	<0.01	<0.01	<0.5	<0.50	<0.01	<10	<0.1	<0.01
05316580 MINNESOTA RIVER AT MORTON (LAT 44 32 46N LONG 094 59 45W)											
AUG 1990 21...	--	--	--	<0.01	<0.01	<0.5	<0.50	<0.01	--	--	<0.01
05316685 MINNESOTA RIVER NEAR FAIRFAX (LAT 44 26 01N LONG 094 43 01W)											
AUG 1990 23...	--	--	--	<0.01	<0.01	<0.5	<0.50	<0.01	--	--	<0.01
05316760 MINNESOTA RIVER NEAR NEW ULM (LAT 44 21 43N LONG 094 29 50W)											
AUG 1990 24...	--	--	--	<0.01	<0.01	<0.5	<0.50	<0.01	--	--	<0.01
05317250 MINNESOTA RIVER AT COURTLAND (LAT 44 15 28N LONG 094 20 29W)											
AUG 1990 24...	--	--	--	<0.01	<0.01	<0.5	<0.50	<0.01	--	--	<0.01
05317500 MINNESOTA RIVER AT JUDSON, MN (LAT 44 12 00N LONG 094 11 36W)											
AUG 1990 25...	--	--	--	<0.01	<0.01	<0.5	<0.50	<0.01	--	--	<0.01

ANALYLSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

ANALYSES FOR ORGANIC CHEMICALS

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)	2,4-D, TOTAL (UG/L) (39730)	CHLOR-DYRIFOS TOTAL RECOVER (UG/L) (38932)	DEF TOTAL (UG/L) (39040)	DI-AZINON, TOTAL (UG/L) (39570)	DICAMBA (MED-IBEN) (BAN-VEL D) TOTAL (UG/L) (82052)	DI-SYSTON TOTAL (UG/L) (39011)	ETHION, TOTAL (UG/L) (39398)	FONOFOS (DY-FONATE) WATER WHOLE TOT.REC (UG/L (82614)	MALA-THION, TOTAL (UG/L) (39530)
05325050 MINNESOTA RIVER AT US HWY 14 BRIDGE AT MANKATO (LAT 44 11 29N LONG 094 00 34W)											
AUG 1990 30...	0.03	<0.01	0.10	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.0	<0.01
05325200 MINNESOTA RIVER AT ST. PETER (LAT 44 18 28N LONG 093 57 35W)											
AUG 1990 30...	<0.01	<0.01	0.12	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.0	<0.01
05326400 RUSH RIVER NEAR HENDERSON, MN (LAT 44 29 57N LONG 093 54 18W)											
SEP 1990 05...	--	--	--	--	--	--	--	--	--	--	--
05326450 MINNESOTA RIVER AT HENDERSON (LAT 44 31 46N LONG 093 54 02W)											
AUG 1990 31...	<0.01	<0.01	0.10	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.0	<0.01
05330900 NINE MILE CREEK AT BLOOMINGTON, MN (LAT 44 48 46N LONG 093 18 07W)											
SEP 1990 05...	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0	<0.01
05330920 MINNESOTA R AT FT SNELLING ST PK AT ST. PAUL, MN (LAT 44 52 13N LONG 093 11 32W)											
SEP 1990 05...	--	--	--	--	--	--	--	--	--	--	--

DATE	METHO-MYL TOTAL (UG/L) (39051)	METHYL PARA-THION, TOTAL (UG/L) (39600)	METHYL TRI-THION, TOTAL (UG/L) (39790)	PARA-THION, TOTAL (UG/L) (39540)	PHORATE TOTAL (UG/L) (39023)	PICLO-RAM (TOR-DON) (AMDON) TOTAL (UG/L) (39720)	PROPHAM TOTAL (UG/L) (39052)	SEVIN, TOTAL (UG/L) (39750)	SILVEX, TOTAL (UG/L) (39760)	TOTAL TRI-THION (UG/L) (39786)
05325050 MINNESOTA RIVER AT US HWY 14 BRIDGE AT MANKATO (LAT 44 11 29N LONG 094 00 34W)										
AUG 1990 30...	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.5	<0.50	<0.01	<0.01
05325200 MINNESOTA RIVER AT ST. PETER (LAT 44 18 26N LONG 093 57 35W)										
AUG 1990 30...	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.5	<0.50	<0.01	<0.01
05326400 RUSH RIVER NEAR HENDERSON, MN (LAT 44 29 57N LONG 093 54 18W)										
SEP 1990 05...	<0.5	--	--	--	--	--	<0.5	<0.50	--	--
05326450 MINNESOTA RIVER AT HENDERSON (LAT 44 31 46N LONG 093 54 02W)										
AUG 1990 31...	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.5	<0.50	<0.01	<0.01
05330900 NINE MILE CREEK AT BLOOMINGTON, MN (LAT 44 48 46N LONG 093 18 07W)										
SEP 1990 05...	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.5	<0.50	<0.01	<0.01
05330920 MINNESOTA R AT FT SNELLING ST PK AT ST. PAUL, MN (LAT 44 52 13N LONG 093 11 32W)										
SEP 1990 05...	<0.5	--	--	--	--	--	<0.5	<0.50	--	--

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

Field and laboratory determinations of miscellaneous water-quality parameters are made at many streamflow stations in addition to those that are also regular water-quality stations. These data are usually collected at regular intervals during routine visits to the station. Additional data for each station are published elsewhere in this report.

QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (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)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)
		05280000	CROW RIVER AT ROCKFORD, MN (LAT 45 05 12N LONG 093 44 02W)									
OCT 1989												
26...	1215	50	--	--	--	--	--	--	--	--	--	--
		05286000	RUM RIVER NEAR ST. FRANCIS, MN (LAT 45 19 40N LONG 093 22 20W)									
OCT 1989												
31...	1600	140	--	--	--	--	--	--	--	--	--	--
		05294000	POMME DE TERRE RIVER AT APPLETON, MN (LAT 45 12 10N LONG 096 01 20W)									
OCT 1989												
25...	1015	22	680	8.2	12.0	--	--	--	--	--	--	--
		05301000	MINNESOTA RIVER NEAR LAC QUI PARLE, MN (LAT 45 01 17N LONG 095 52 05W)									
JAN 1990												
17...	1030	41	1070	7.9	2.5	736	9.6	75	3.2	K9	K7	10
AUG												
14...	0845	71	781	8.6	22.5	735	6.9	46	6.7	K22	170	17
		05316500	REDWOOD RIVER NEAR REDWOOD FALLS, MN (LAT 44 31 25N LONG 095 10 20W)									
OCT 1989												
24...	1510	8.7	1440	8.3	16.0	--	--	--	--	--	--	--
		05317000	COTTONWOOD RIVER NEAR NEW ULM, MN (LAT 44 17 29N LONG 094 26 24W)									
NOV 1989												
08...	1230	17	--	--	--	--	--	--	--	--	--	--
JAN 1990												
26...	1000	11	1020	7.6	0.5	733	10.4	14	0.7	K1	K900	12
MAR												
12...	1610	48	601	8.1	2.5	729	12.9	23	5.5	27	K1300	14
14...	1645	136	552	8.2	0.5	727	14.5	27	4.7	--	--	10
16...	1110	117	623	8.4	1.0	728	13.2	38	6.3	--	--	34
20...	1015	80	700	8.0	0.5	747	13.7	40	4.1	<1	53	6
27...	1445	81	865	6.2	7.5	745	13.4	28	5.5	K6	36	11
MAY												
01...	1800	71	962	8.6	13.5	743	12.5	--	--	--	--	--
JUN												
05...	1615	316	1220	6.4	21.0	731	9.2	40	2.5	K620	170	27
05...	1830	316	1220	8.4	21.0	731	9.2	--	--	--	--	--
13...	0820	211	1050	8.1	23.0	733	11.1	45	>4.3	>6000	K2900	76
21...	0745	1500	907	8.1	21.5	735	8.1	51	2.6	--	--	225
AUG												
22...	0845	349	686	6.5	20.5	741	11.2	54	7.2	--	K2000	55
		05319500	WATONWAN RIVER NEAR GARDEN CITY, MN (LAT 44 02 47N LONG 094 11 43W)									
FEB 1990												
01...	1530	6.0	1210	7.6	0.5	740	11.8	24	1.5	K800	K4	11
MAR												
12...	1000	25	603	8.0	1.5	727	11.6	40	7.3	K210	K4300	8
15...	1315	148	496	8.0	0.5	723	11.8	40	--	--	--	38
20...	1015	43	819	6.1	1.5	740	15.2	60	4.2	<1	56	22
27...	1100	36	1020	6.2	5.0	745	13.8	32	5.7	K5	45	<1
MAY												
31...	0800	279	1020	8.2	17.5	740	7.9	40	2.3	--	--	1
AUG												
26...	1515	200	760	8.6	27.0	734	11.6	44	5.7	120	68	21

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

DATE	RESIDUE VOLATILE, SUSPENDED (MG/L) (00535)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN,NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN,NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)	PHOSPHORUS TOTAL (MG/L AS P) (00665)
	05280000		CROW RIVER AT ROCKFORD, MN (LAT 45 05 12N LONG 093 44 02W)								
OCT 1989											
26...	--	--	<0.10	--	--	--	--	--	--	--	--
	05286000		RUM RIVER NEAR ST. FRANCIS, MN (LAT 45 19 40N LONG 093 22 20W)								
OCT 1989											
31...	--	--	0.27	--	--	--	--	--	--	--	--
	05294000		POMME DE TERRE RIVER AT APPLETON, MN (LAT 45 12 10N LONG 096 01 20W)								
OCT 1989											
25...	--	--	<0.10	--	--	--	--	--	--	--	--
	05301000		MINNESOTA RIVER NEAR LAC QUI PARLE, MN (LAT 45 01 17N LONG 095 52 05W)								
JAN 1990											
17...	10	0.60	0.60	--	0.62	0.62	--	2.2	2.1	--	0.29
AUG											
14...	1	<0.10	<0.10	<2.0	0.08	0.08	33	1.6	1.1	2100	0.31
	05316500		REDWOOD RIVER NEAR REDWOOD FALLS, MN (LAT 44 31 25N LONG 095 10 20W)								
OCT 1989											
24...	--	--	<0.10	--	--	--	--	--	--	--	--
	05317000		COTTONWOOD RIVER NEAR NEW ULM, MN (LAT 44 17 29N LONG 094 26 24W)								
NOV 1989											
08...	--	--	0.11	--	--	--	--	--	--	--	--
JAN 1990											
26...	8	0.90	0.90	--	0.42	0.42	--	0.7	0.7	--	0.03
MAR											
12...	14	0.60	0.50	--	0.24	0.23	--	0.9	0.5	--	0.10
14...	10	0.40	0.40	--	0.29	0.29	--	1.0	0.8	--	0.12
16...	13	0.60	0.60	--	0.29	0.29	--	1.6	0.9	--	0.11
20...	<1	0.60	0.60	--	0.23	0.23	--	1.4	0.8	--	0.09
27...	8	0.60	0.60	--	0.03	0.03	--	0.8	0.8	--	0.12
MAY											
01...	--	--	<0.10	--	--	--	--	--	--	--	--
JUN											
05...	22	5.9	5.90	--	0.06	0.06	--	1.5	1.5	--	0.1
05...	--	--	8.50	--	--	--	--	--	--	--	--
13...	5	13.0	2.90	--	0.07	0.07	--	2.0	1.7	--	0.1
21...	50	12.0	2.50	--	0.12	0.03	--	0.9	0.9	--	0.1
AUG											
22...	12	6.5	6.50	<2.0	0.02	0.01	29	2.2	1.0	1000	0.3
	05319500		WATONWAN RIVER NEAR GARDEN CITY, MN (LAT 44 02 47N LONG 094 11 43W)								
FEB 1990											
01...	10	0.54	0.54	--	1.20	1.20	--	2.1	1.5	--	0.38
MAR											
12...	8	0.70	0.60	--	0.59	0.59	--	1.8	0.9	--	0.60
15...	26	0.90	0.90	--	0.79	0.79	--	2.4	1.8	--	0.80
20...	<1	3.40	3.40	--	0.12	0.12	--	2.3	1.0	--	0.22
27...	<1	1.50	1.50	--	0.34	0.34	--	1.3	1.2	--	0.47
MAY											
31...	1	19.0	18.0	--	0.03	0.03	--	1.2	1.1	--	0.16
AUG											
28...	6	6.80	6.80	<2.0	0.01	0.01	44	1.9	1.3	1800	0.40

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

DATE	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	PHOS-PHORUS TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CARBON, INORG + ORGANIC TOT. IN BOT MAT (GM/KG AS C) (00693)	CARBON, INOR-GANIC, TOT IN BOT MAT (G/KG AS C) (00686)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
05280000 CROW RIVER AT ROCKFORD, MN (LAT 45 05 12N LONG 093 44 02W)											
OCT 1989											
26...	--	--	--	--	--	--	--	--	--	--	--
05286000 RUM RIVER NEAR ST. FRANCIS, MN (LAT 45 19 40N LONG 093 22 20W)											
OCT 1989											
31...	--	--	--	--	--	--	--	--	--	--	--
05294000 POMME DE TERRE RIVER AT APPLETON, MN (LAT 45 12 10N LONG 096 01 20W)											
OCT 1989											
25...	--	--	--	--	--	--	--	--	--	--	--
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN (LAT 45 01 17N LONG 095 52 05W)											
JAN 1990											
17...	0.26	0.24	0.23	--	13	0.3	--	--	8	1.4	<0.10
AUG											
14...	0.24	0.24	0.22	890	9.0	2.4	39	17	23	13.0	<1.00
05316500 REDWOOD RIVER NEAR REDWOOD FALLS, MN (LAT 44 31 25N LONG 095 10 20W)											
OCT 1989											
24...	--	--	--	--	--	--	--	--	--	--	--
05317000 COTTONWOOD RIVER NEAR NEW ULM, MN (LAT 44 17 29N LONG 094 26 24W)											
NOV 1989											
08...	--	--	--	--	--	--	--	--	--	--	--
JAN 1990											
26...	0.02	0.02	0.02	--	3.3	0.3	--	--	39	1.4	0.10
MAR											
12...	0.04	0.05	0.03	--	5.0	0.6	--	--	26	2.3	<0.40
14...	0.02	0.05	0.02	--	5.5	1.1	--	--	65	--	--
16...	0.09	0.10	0.06	--	6.9	1.8	--	--	38	5.7	0.40
20...	0.05	0.08	0.04	--	8.2	0.9	--	--	24	3.4	<0.40
27...	0.03	0.06	<0.01	--	7.9	0.8	--	--	26	3.8	0.50
MAY											
01...	--	--	--	--	--	--	--	--	--	--	--
JUN											
05...	0.09	0.08	0.07	--	7.7	1.0	--	--	90	3.4	<0.30
05...	--	--	--	--	--	--	--	--	--	--	--
13...	0.04	0.07	0.03	--	6.9	3.8	--	--	136	18.0	0.70
21...	0.11	0.12	0.02	--	7.0	4.3	--	--	454	3.9	<0.30
AUG											
22...	0.15	0.16	0.10	350	7.9	5.0	28	13	--	24.0	0.50
05319500 WATONWAN RIVER NEAR GARDEN CITY, MN (LAT 44 02 47N LONG 094 11 43W)											
FEB 1990											
01...	0.20	0.34	0.19	--	3.5	0.8	--	--	--	2.7	0.20
MAR											
12...	0.47	0.51	0.43	--	8.0	1.1	--	--	--	8.6	0.70
15...	0.58	0.65	0.57	--	8.2	1.3	--	--	--	14.0	1.30
20...	0.08	0.11	0.07	--	9.9	4.0	--	--	--	2.0	<0.40
27...	0.33	0.39	0.31	--	7.9	0.6	--	--	--	3.8	0.30
MAY											
31...	0.08	0.09	0.08	--	7.6	0.9	--	--	53	2.5	<0.70
AUG											
28...	0.31	0.28	0.28	500	10	1.7	31	9.7	50	14.0	1.00

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (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)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)
	05320500		LE SUEUR RIVER NEAR RAPIDAN, MN (LAT 44 06 40N LONG 094 02 28W)									
NOV 1989												
07...	1700	14	--	--	--	--	--	--	--	--	--	--
JAN 1990												
31...	1500	9.9	1000	7.7	0.5	735	11.5	23	1.3	K3	K15	9
MAR												
11...	1800	77	523	8.1	1.5	734	12.3	52	11	140	K3600	7
13...	1530	120	611	8.0	3.5	734	12.4	52	>7.9	--	--	46
14...	1030	244	586	8.0	1.5	729	12.8	75	11	--	--	263
16...	1200	232	510	7.9	1.0	730	13.1	74	15	--	--	62
21...	1030	138	721	8.1	4.0	738	14.6	52	3.4	K10	110	14
28...	1130	50	890	8.1	5.0	745	13.8	35	4.4	K11	65	9
MAY												
31...	1115	647	888	8.3	17.0	743	9.4	35	1.6	--	--	44
AUG												
29...	1600	695	737	8.5	26.0	739	8.5	50	3.2	380	140	83
	05325000		MINNESOTA RIVER AT MANKATO, MN (LAT 44 10 10N LONG 094 00 15W)									
AUG 1990												
02...	2035	10900	--	--	--	--	--	--	--	--	--	--
06...	2020	5520	--	--	--	--	--	--	--	--	--	--
10...	1800	3450	--	--	--	--	--	--	--	--	--	--
13...	2010	2460	--	--	--	--	--	--	--	--	--	--
20...	1700	5620	--	--	--	--	--	--	--	--	--	--
24...	1940	4320	--	--	--	--	--	--	--	--	--	--
31...	1105	3450	--	--	--	--	--	--	--	--	--	--
	05327000		HIGH ISLAND CREEK NEAR HENDERSON, MN (LAT 44 34 19N LONG 093 55 18W)									
FEB 1990												
06...	1500	1.5	997	7.6	2.0	742	10.6	20	0.7	K3	K9	7
JUN												
12...	1530	192	799	8.2	24.5	732	7.6	77	3.0	K470	320	117
13...	1315	229	740	8.1	24.5	740	7.2	92	3.1	4700	K20000	395
SEP												
05...	1100	1.0	937	8.3	22.5	744	9.5	10	4.0	--	460	1
	05337400		KNIFE RIVER NEAR MORA, MN (LAT 45 55 12N LONG 093 18 26W)									
OCT 1989												
31...	1430	1.4	--	--	--	--	--	--	--	--	--	--
MAY 1990												
30...	1030	61	158	8.2	16.0	--	--	--	--	--	--	--
	05345000		VERMILLION RIVER NEAR EMPIRE, MN (LAT 44 40 00N LONG 093 03 17W)									
FEB 1990												
01...	1015	19	1060	7.8	1.5	--	10.1	--	--	120	160	--
MAR												
16...	1020	128	573	7.5	3.0	--	9.4	--	--	250	K5100	--
APR												
12...	1115	27	955	7.9	6.5	--	11.6	--	--	K2	K8	--
26...	1050	51	710	7.7	16.5	--	7.7	--	--	E1200	140	--
MAY												
17...	1200	66	698	7.9	9.5	--	8.8	--	--	K20	K80	--
30...	1330	47	764	7.9	16.0	--	9.1	--	--	46	46	--
JUN												
13...	1400	149	482	7.5	21.0	--	5.6	--	--	>10000	K20000	--
JUL												
18...	1400	42	764	8.0	21.0	--	8.6	--	--	K390	310	--
SEP												
04...	1300	30	753	7.8	20.5	--	8.9	--	--	200	130	--

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

DATE	RESIDUE VOLATILE, SUSPENDED (MG/L) (00535)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN,NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN,NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)	PHOSPHORUS TOTAL (MG/L AS P) (00665)
	05320500		LE SUEUR RIVER NEAR RAPIDAN, MN (LAT 44 06 40N LONG 094 02 28W)								
NOV 1989											
07...	--	--	0.18	--	--	--	--	--	--	--	--
JAN 1990											
31...	8	0.60	0.57	--	0.43	0.43	--	0.6	0.6	--	0.03
MAR											
11...	7	0.80	0.70	--	0.23	0.22	--	1.6	0.7	--	0.25
13...	34	1.3	1.2	--	0.68	0.66	--	2.3	1.2	--	0.37
14...	44	2.4	2.4	--	0.54	0.53	--	1.8	1.6	--	0.59
16...	32	5.3	5.3	--	0.75	0.74	--	3.4	2.3	--	0.40
21...	<1	17.0	17.0	--	0.49	0.49	--	2.6	2.1	--	0.18
28...	9	12.0	12.0	--	0.22	0.21	--	1.8	1.4	--	0.11
MAY											
31...	20	28.0	26.0	--	0.02	0.01	--	1.8	1.8	--	0.17
AUG											
29...	16	16.0	16.0	<2.0	0.02	0.02	23	1.8	1.4	790	0.21
	05325000		MINNESOTA RIVER AT MANKATO, MN (LAT 44 10 10N LONG 094 00 15W)								
AUG 1990											
02...	--	--	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--	--	--	--
13...	--	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--	--
24...	--	--	--	--	--	--	--	--	--	--	--
31...	--	--	--	--	--	--	--	--	--	--	--
	05327000		HIGH ISLAND CREEK NEAR HENDERSON, MN (LAT 44 34 19N LONG 093 55 18W)								
FEB 1990											
06...	6	0.12	0.12	--	0.49	0.49	--	0.8	0.8	--	0.07
JUN											
12...	29	15.0	15.0	--	0.10	0.10	--	2.5	2.1	--	0.17
13...	57	14.0	13.0	--	0.10	0.06	--	2.5	2.0	--	0.40
SEP											
05...	1	0.30	0.30	<2.0	0.07	0.07	12	1.1	1.1	460	0.20
	05337400		KNIFE RIVER NEAR MORA, MN (LAT 45 55 12N LONG 093 18 26W)								
OCT 1989											
31...	--	--	0.37	--	--	--	--	--	--	--	--
MAY 1990											
30...	--	--	0.10	--	--	--	--	--	--	--	--
	05345000		VERMILLION RIVER NEAR EMPIRE, MN (LAT 44 40 00N LONG 093 03 17W)								
FEB 1990											
01...	--	--	6.5	--	--	0.12	--	1.2	1.2	--	1.1
MAR											
16...	--	--	5.0	--	--	0.46	--	2.2	1.7	--	0.48
APR											
12...	--	--	5.1	--	--	0.04	--	1.2	0.8	--	1.3
26...	--	--	4.6	--	--	0.16	--	1.2	1.0	--	0.89
MAY											
17...	--	--	3.4	--	--	0.08	--	0.9	0.9	--	0.42
30...	--	--	5.0	--	--	0.05	--	1.0	0.9	--	0.56
JUN											
13...	--	--	3.1	--	--	0.07	--	1.4	0.9	--	0.40
JUL											
18...	--	--	5.0	--	--	0.06	--	1.0	1.0	--	0.59
SEP											
04...	--	--	5.1	--	--	0.06	--	0.9	0.9	--	0.95

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

DATE	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO TOTAL (MG/L AS P) (70507)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	PHOSPHORUS TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C) (00689)	CARBON, INORG + ORGANIC TOT. IN BOT MAT (GM/KG AS C) (00693)	CARBON, INORGANIC, TOT IN BOT MAT (G/KG AS C) (00686)	SEDIMENT, SUSPENDED (MG/L) (80154)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
	05320500		LE SUEUR RIVER NEAR RAPIDAN, MN (LAT 44 06 40N LONG 094 02 28W)								
NOV 1989											
07...	--	--	--	--	--	--	--	--	--	--	--
JAN 1990											
31...	0.01	0.02	<0.01	--	2.7	0.3	--	--	--	0.60	<0.10
MAR											
11...	0.09	0.12	0.08	--	11	2.2	--	--	103	12.0	0.90
13...	0.21	0.25	0.20	--	10	1.6	--	--	59	10.0	<0.40
14...	0.28	0.32	0.28	--	10	3.0	--	--	403	--	--
16...	0.33	0.34	0.28	--	13	3.1	--	--	93	8.0	<0.40
21...	0.13	0.15	0.13	--	12	1.1	--	--	23	3.2	<0.40
28...	0.07	0.07	0.06	--	9.3	0.4	--	--	19	2.2	<0.20
MAY											
31...	0.09	0.10	0.09	--	8.1	1.2	--	--	118	1.1	<0.70
AUG											
29...	0.20	0.17	0.15	370	11	2.8	29	17	262	18.0	1.00
	05325000		MINNESOTA RIVER AT MANKATO, MN (LAT 44 10 10N LONG 094 00 15W)								
AUG 1990											
02...	--	--	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--	--	--	--
13...	--	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--	--
24...	--	--	--	--	--	--	--	--	--	--	--
31...	--	--	--	--	--	--	--	--	--	--	--
	05327000		HIGH ISLAND CREEK NEAR HENDERSON, MN (LAT 44 34 19N LONG 093 55 18W)								
FEB 1990											
06...	0.01	0.05	0.01	--	3.7	0.4	--	--	23	2.4	<0.10
JUN											
12...	0.09	0.11	0.08	--	15	1.5	--	--	317	3.1	<0.30
13...	0.14	0.14	--	--	15	8.0	--	--	--	2.5	<0.50
SEP											
05...	0.14	0.17	0.14	310	12	1.9	18	13	--	78.0	<1.00
	05337400		KNIFE RIVER NEAR MORA, MN (LAT 45 55 12N LONG 093 18 26W)								
OCT 1989											
31...	--	--	--	--	--	--	--	--	--	--	--
MAY 1990											
30...	--	--	--	--	--	--	--	--	--	--	--
	05345000		VERMILLION RIVER NEAR EMPIRE, MN (LAT 44 40 00N LONG 093 03 17W)								
FEB 1990											
01...	1.10	--	--	--	3.9	0.5	--	--	--	--	--
MAR											
16...	0.36	--	--	--	11	1.7	--	--	--	--	--
APR											
12...	1.20	--	--	--	3.6	0.5	--	--	--	--	--
26...	0.79	--	--	--	6.4	0.3	--	--	--	--	--
MAY											
17...	0.36	--	--	--	11	0.5	--	--	--	--	--
30...	0.45	--	--	--	5.1	0.7	--	--	--	--	--
JUN											
13...	0.32	--	--	--	8.3	4.1	--	--	--	--	--
JUL											
18...	0.52	--	--	--	4.9	0.3	--	--	--	--	--
SEP											
04...	0.94	--	--	--	3.7	0.3	--	--	--	--	--

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)
05353800 STRAIGHT RIVER NEAR FARIBAULT, MN (LAT 44 15 29N LONG 093 13 51W)						
NOV 1989 08...	--	44	--	--	--	1.1
05476000 DES MOINES RIVER AT JACKSON, MN (LAT 43 37 10N LONG 094 59 10W)						
OCT 1989 23...	1845	1.5	835	8.3	9.0	<0.10
MAY 1990 08...	1500	46	1290	8.8	21.5	<0.10
JUN 19...	1200	424	925	8.5	23.0	4.9
06483000 ROCK RIVER AT LUVERNE, MN (LAT 43 39 15N LONG 096 12 03W)						
OCT 1989 23...	1515	12	440	8.7	19.0	1.1
MAY 1990 08...	1115	36	730	8.4	21.0	0.60
JUN 19...	1800	212	390	8.2	25.5	2.1

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

ANALYSES FOR ORGANIC CHEMICALS

DATE	1,2,4-TRICHLOROBENZENE TOTAL (UG/L) (34551)	1,2,5,6-DIBENZANTHRACENE TOTAL (UG/L) (34556)	1,2-DICHLOROBENZENE TOTAL (UG/L) (34536)	1,3-DICHLOROBENZENE TOTAL (UG/L) (34566)	1,4-DICHLOROBENZENE TOTAL (UG/L) (34571)	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)	2,4,6-TRICHLOROPHENOL TOTAL (UG/L) (34621)	2,4-DIMETHYLPHENOL TOTAL (UG/L) (34606)	2,4-D, TOTAL (UG/L) (39730)	2,4-DICHLOROPHENOL TOTAL (UG/L) (34601)
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN (LAT 45 01 17N LONG 095 52 05W)											
AUG 1990 14...	--	--	--	--	--	<0.01	<0.01	--	--	0.02	--
05317000 COTTONWOOD RIVER NEAR NEW ULM, MN (LAT 44 17 29N LONG 094 26 24W)											
AUG 1990 22...	--	--	--	--	--	<0.01	<0.01	--	--	0.17	--
05319500 WATONWAN RIVER NEAR GARDEN CITY, MN (LAT 44 02 47N LONG 094 11 43W)											
AUG 1990 28...	--	--	--	--	--	--	--	--	--	--	--
05320500 LE SUEUR RIVER NEAR RAPIDAN, MN (LAT 44 06 40N LONG 094 02 28W)											
AUG 1990 29...	--	--	--	--	--	<0.01	<0.01	--	--	0.10	--
05325000 MINNESOTA RIVER AT MANKATO, MN (LAT 44 10 10N LONG 094 00 15W)											
AUG 1990 02...	--	--	--	--	--	<0.01	<0.01	--	--	0.10	--
10...	--	--	--	--	--	<0.01	<0.01	--	--	0.13	--
20...	--	--	--	--	--	<0.01	<0.01	--	--	0.08	--
24...	--	--	--	--	--	<0.01	<0.01	--	--	0.07	--
31...	--	--	--	--	--	--	--	--	--	--	--
05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN (LAT 44 34 19N LONG 093 55 18W)											
SEP 1990 05...	--	--	--	--	--	<0.01	<0.01	--	--	0.04	--
05345000 VERMILLION RIVER NEAR EMPIRE, MN (LAT 44 40 00N LONG 093 03 17W)											
APR 1990 26...	<5.0	<10.0	<5.0	<5.0	<5.0	--	--	<20.0	<5.0	--	<5.0
MAY 30...	<5.0	<10.0	<5.0	<5.0	<5.0	--	--	<20.0	<5.0	--	<5.0
SEP 04...	<5.0	<10.0	<5.0	<5.0	<5.0	--	--	<20.0	<5.0	--	<5.0

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

ANALYSES FOR ORGANIC CHEMICALS

DATE	2,4,-DI-NITRO-PHENOL TOTAL (UG/L) (34616)	2,4-DI-NITRO-TOLUENE TOTAL (UG/L) (34611)	2,6-DI-NITRO-TOLUENE TOTAL (UG/L) (34626)	2-CHLORO-NAPH-THALENE TOTAL (UG/L) (34581)	2-CHLORO-PHENOL TOTAL (UG/L) (34586)	2-NITRO-PHENOL TOTAL (UG/L) (34591)	4,6-DINITRO-ORTHO-CRESOL TOTAL (UG/L) (34657)	4-BROMO-PHENYL PHENYL ETHER TOTAL (UG/L) (34636)	4-CHLORO-PHENYL PHENYL ETHER TOTAL (UG/L) (34641)	4-NITRO-PHENOL TOTAL (UG/L) (34646)	ACE-NAPHTH-ENE TOTAL (UG/L) (34205)
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN (LAT 45 01 17N LONG 095 52 05W)											
AUG 1990 14...	--	--	--	--	--	--	--	--	--	--	--
05317000 COTTONWOOD RIVER NEAR NEW ULM, MN (LAT 44 17 29N LONG 094 26 24W)											
AUG 1990 22...	--	--	--	--	--	--	--	--	--	--	--
05319500 WATONWAN RIVER NEAR GARDEN CITY, MN (LAT 44 02 47N LONG 094 11 43W)											
AUG 1990 28...	--	--	--	--	--	--	--	--	--	--	--
05320500 LE SUEUR RIVER NEAR RAPIDAN, MN (LAT 44 06 40N LONG 094 02 28W)											
AUG 1990 29...	--	--	--	--	--	--	--	--	--	--	--
05325000 MINNESOTA RIVER AT MANKATO, MN (LAT 44 10 10N LONG 094 00 15W)											
AUG 1990 02...	--	--	--	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--	--
24...	--	--	--	--	--	--	--	--	--	--	--
31...	--	--	--	--	--	--	--	--	--	--	--
05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN (LAT 44 34 19N LONG 093 55 18W)											
SEP 1990 05...	--	--	--	--	--	--	--	--	--	--	--
05345000 VERMILLION RIVER NEAR EMPIRE, MN (LAT 44 40 00N LONG 093 03 17W)											
APR 1990 26...	<20.0	<5.0	<5.0	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0	<5.0
MAY 30...	<20.0	<5.0	<5.0	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0	<5.0
SEP 04...	<20.0	<5.0	<5.0	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0	<5.0

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

ANALYSES FOR ORGANIC CHEMICALS

DATE	ACE-NAPHTH-YLENE TOTAL (UG/L) (34200)	ALDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39333)	ANTHRA-CENE TOTAL (UG/L) (34220)	BENZO-A-PYRENE TOTAL (UG/L) (34247)	BENZO B FLUOR-AN-THENE TOTAL (UG/L) (34230)	BENZO K FLUOR-AN-THENE TOTAL (UG/L) (34242)	BENZO A ANTHRAC ENE1,2-BENZANT HRACENE TOTAL (UG/L) (34526)	BENZOGH I PERYL ENE1,12 -BENZOP ERYLENE 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)
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN (LAT 45 01 17N LONG 095 52 05W)											
AUG 1990 14...	--	--	--	--	--	--	--	--	--	--	--
05317000 COTTONWOOD RIVER NEAR NEW ULM, MN (LAT 44 17 29N LONG 094 26 24W)											
AUG 1990 22...	--	<0.1	--	--	--	--	--	--	--	--	--
05319500 WATONWAN RIVER NEAR GARDEN CITY, MN (LAT 44 02 47N LONG 094 11 43W)											
AUG 1990 28...	--	--	--	--	--	--	--	--	--	--	--
05320500 LE SUEUR RIVER NEAR RAPIDAN, MN (LAT 44 06 40N LONG 094 02 28W)											
AUG 1990 29...	--	<0.1	--	--	--	--	--	--	--	--	--
05325000 MINNESOTA RIVER AT MANKATO, MN (LAT 44 10 10N LONG 094 00 15W)											
AUG 1990 02...	--	--	--	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--	--
24...	--	--	--	--	--	--	--	--	--	--	--
31...	--	--	--	--	--	--	--	--	--	--	--
05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN (LAT 44 34 19N LONG 093 55 18W)											
SEP 1990 05...	--	<0.1	--	--	--	--	--	--	--	--	--
05345000 VERMILLION RIVER NEAR EMPIRE, MN (LAT 44 40 00N LONG 093 03 17W)											
APR 1990 26...	<5.0	--	<5.0	<10.0	<10.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0
MAY 30...	<5.0	--	<5.0	<10.0	<10.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0
SEP 04...	<5.0	--	<5.0	<10.0	<10.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

ANALYSES FOR ORGANIC CHEMICALS

DATE	BIS 2-CHLORO-ETHYL ETHER TOTAL (UG/L) (34273)	CHLOR-DANE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39351)	CHLOR-DYRIFOS TOTAL RECOVER (UG/L) (38932)	CHRY-SENE TOTAL (UG/L) (34320)	DDD, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39363)	DDE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39368)	DDT, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39373)	DEF TOTAL (UG/L) (39040)	DI-AZINON, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39571)	DI-AZINON, TOTAL (UG/L) (39570)	DICAMBA (MED-IBEN) (BAN-VEL D) TOTAL (UG/L) (82052)
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN (LAT 45 01 17N LONG 095 52 05W)											
AUG 1990											
14...	--	--	<0.01	--	--	--	--	<0.01	--	<0.01	<0.01
05317000 COTTONWOOD RIVER NEAR NEW ULM, MN (LAT 44 17 29N LONG 094 26 24W)											
AUG 1990											
22...	--	2.0	<0.01	--	<0.1	<0.1	<0.1	<0.01	<0.2	<0.01	0.02
05319500 WATONWAN RIVER NEAR GARDEN CITY, MN (LAT 44 02 47N LONG 094 11 43W)											
AUG 1990											
28...	--	--	--	--	--	--	--	--	--	--	--
05320500 LE SUEUR RIVER NEAR RAPIDAN, MN (LAT 44 06 40N LONG 094 02 28W)											
AUG 1990											
29...	--	2.0	<0.01	--	0.3	0.2	<0.1	<0.01	<0.1	<0.01	0.01
05325000 MINNESOTA RIVER AT MANKATO, MN (LAT 44 10 10N LONG 094 00 15W)											
AUG 1990											
02...	--	--	--	--	--	--	--	<0.01	--	<0.01	0.03
10...	--	--	<0.01	--	--	--	--	<0.01	--	<0.01	0.02
20...	--	--	<0.01	--	--	--	--	<0.01	--	<0.01	0.01
24...	--	--	<0.01	--	--	--	--	<0.01	--	<0.01	<0.01
31...	--	--	--	--	--	--	--	--	--	--	--
05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN (LAT 44 34 19N LONG 093 55 18W)											
SEP 1990											
05...	--	1.0	<0.01	--	0.4	0.3	0.2	<0.01	<0.1	<0.01	<0.01
05345000 VERMILLION RIVER NEAR EMPIRE, MN (LAT 44 40 00N LONG 093 03 17W)											
APR 1990											
26...	<5.0	--	--	<10.0	--	--	--	--	--	--	--
MAY											
30...	<5.0	--	--	<10.0	--	--	--	--	--	--	--
SEP											
04...	<5.0	--	--	<10.0	--	--	--	--	--	--	--

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

ANALYSES FOR ORGANIC CHEMICALS

DATE	DI-ELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39383)	DIETHYL PHTHALATE TOTAL (UG/L) (34336)	DIMETHYL PHTHALATE TOTAL (UG/L) (34341)	DI-N-BUTYL PHTHALATE TOTAL (UG/L) (39110)	DI-N-OCTYL PHTHALATE TOTAL (UG/L) (34596)	DISYSTON TOTAL (UG/L) (39011)	ENDOSULFAN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39389)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39393)	ETHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39399)	ETHION, TOTAL (UG/L) (39398)	FLUORANTHENE TOTAL (UG/L) (34376)
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN (LAT 45 01 17N LONG 095 52 05W)											
AUG 1990											
14...	--	--	--	--	--	<0.01	--	--	--	<0.01	--
05317000 COTTONWOOD RIVER NEAR NEW ULM, MN (LAT 44 17 29N LONG 094 26 24W)											
AUG 1990											
22...	0.5	--	--	--	--	<0.01	<0.1	<0.1	<0.1	<0.01	--
05319500 WATONWAN RIVER NEAR GARDEN CITY, MN (LAT 44 02 47N LONG 094 11 43W)											
AUG 1990											
28...	--	--	--	--	--	--	--	--	--	--	--
05320500 LE SUEUR RIVER NEAR RAPIDAN, MN (LAT 44 06 40N LONG 094 02 28W)											
AUG 1990											
29...	1.0	--	--	--	--	<0.01	<0.1	<0.1	<0.1	<0.01	--
05325000 MINNESOTA RIVER AT MANKATO, MN (LAT 44 10 10N LONG 094 00 15W)											
AUG 1990											
02...	--	--	--	--	--	<0.01	--	--	--	<0.01	--
10...	--	--	--	--	--	<0.01	--	--	--	<0.01	--
20...	--	--	--	--	--	<0.01	--	--	--	<0.01	--
24...	--	--	--	--	--	<0.01	--	--	--	<0.01	--
31...	--	--	--	--	--	--	--	--	--	--	--
05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN (LAT 44 34 19N LONG 093 55 18W)											
SEP 1990											
05...	0.2	--	--	--	--	<0.01	<0.1	<0.1	<0.1	<0.01	--
05345000 VERMILLION RIVER NEAR EMPIRE, MN (LAT 44 40 00N LONG 093 03 17W)											
APR 1990											
26...	--	<5.0	<5.0	<5.0	<10.0	--	--	--	--	--	<5.0
MAY											
30...	--	<5.0	<5.0	<5.0	<10.0	--	--	--	--	--	<5.0
SEP											
04...	--	<5.0	<5.0	<5.0	<10.0	--	--	--	--	--	<5.0

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

ANALYSES FOR ORGANIC CHEMICALS

DATE	FLUOR-ENE TOTAL (UG/L) (34381)	FONOFOS (DY-FONATE) WATER WHOLE TOT.REC (UG/L (82614)	HEPTA-CHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG) (39423)	HEPTA-CHLOR, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39413)	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)	LINDANE TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39343)
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN (LAT 45 01 17N LONG 095 52 05W)											
AUG 1990											
14...	--	<0.01	--	--	--	--	--	--	--	--	--
05317000 COTTONWOOD RIVER NEAR NEW ULM, MN (LAT 44 17 29N LONG 094 26 24W)											
AUG 1990											
22...	--	<0.01	<0.1	<0.1	--	--	--	--	--	--	<0.1
05319500 WATONWAN RIVER NEAR GARDEN CITY, MN (LAT 44 02 47N LONG 094 11 43W)											
AUG 1990											
28...	--	--	--	--	--	--	--	--	--	--	--
05320500 LE SUEUR RIVER NEAR RAPIDAN, MN (LAT 44 06 40N LONG 094 02 28W)											
AUG 1990											
29...	--	<0.01	<0.1	<0.1	--	--	--	--	--	--	<0.1
05325000 MINNESOTA RIVER AT MANKATO, MN (LAT 44 10 10N LONG 094 00 15W)											
AUG 1990											
02...	--	--	--	--	--	--	--	--	--	--	--
10...	--	<0.01	--	--	--	--	--	--	--	--	--
20...	--	<0.01	--	--	--	--	--	--	--	--	--
24...	--	<0.01	--	--	--	--	--	--	--	--	--
31...	--	--	--	--	--	--	--	--	--	--	--
05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN (LAT 44 34 19N LONG 093 55 18W)											
SEP 1990											
05...	--	<0.01	<0.1	<0.1	--	--	--	--	--	--	<0.1
05345000 VERMILLION RIVER NEAR EMPIRE, MN (LAT 44 40 00N LONG 093 03 17W)											
APR 1990											
26...	<5.0	--	--	--	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	--
MAY											
30...	<5.0	--	--	--	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	--
SEP											
04...	<5.0	--	--	--	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	--

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

ANALYSES FOR ORGANIC CHEMICALS

DATE	MALATHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39531)	MALATHION, TOTAL (UG/L) (39530)	METHOMYL TOTAL (UG/L) (39051)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG) (39481)	METHYL PARATHION, TOT. IN BOTTOM MATL. (UG/KG) (39601)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOT. IN BOTTOM MATL. (UG/KG) (39791)	METHYL TRITHION, TOTAL (UG/L) (39790)	MIREX, TOTAL IN BOTTOM MATERIAL (UG/KG) (39758)	N-BUTYL BENZYL PHTHALATE TOTAL (UG/L) (34292)	N-NITROSODI-N-PROPYLAMINE TOTAL (UG/L) (34428)
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN (LAT 45 01 17N LONG 095 52 05W)											
AUG 1990											
14...	--	<0.01	<0.5	--	--	<0.01	--	<0.01	--	--	--
05317000 COTTONWOOD RIVER NEAR NEW ULM, MN (LAT 44 17 29N LONG 094 26 24W)											
AUG 1990											
22...	<0.1	<0.01	<0.5	<0.1	<0.1	<0.01	<0.1	<0.01	<0.1	--	--
05319500 WATONWAN RIVER NEAR GARDEN CITY, MN (LAT 44 02 47N LONG 094 11 43W)											
AUG 1990											
28...	--	--	<0.5	--	--	--	--	--	--	--	--
05320500 LE SUEUR RIVER NEAR RAPIDAN, MN (LAT 44 06 40N LONG 094 02 28W)											
AUG 1990											
29...	<0.1	<0.01	<0.5	<1.0	<0.1	<0.01	<0.1	<0.01	<0.1	--	--
05325000 MINNESOTA RIVER AT MANKATO, MN (LAT 44 10 10N LONG 094 00 15W)											
AUG 1990											
02...	--	<0.01	<0.5	--	--	<0.01	--	<0.01	--	--	--
10...	--	<0.01	<0.5	--	--	<0.01	--	<0.01	--	--	--
20...	--	<0.01	<0.5	--	--	<0.01	--	<0.01	--	--	--
24...	--	<0.01	<0.5	--	--	<0.01	--	<0.01	--	--	--
31...	--	--	<0.5	--	--	--	--	--	--	--	--
05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN (LAT 44 34 19N LONG 093 55 18W)											
SEP 1990											
05...	<0.1	<0.01	<0.5	<1.0	<0.1	<0.01	<0.1	<0.01	<0.1	--	--
05345000 VERMILLION RIVER NEAR EMPIRE, MN (LAT 44 40 00N LONG 093 03 17W)											
APR 1990											
26...	--	--	--	--	--	--	--	--	--	<5.0	<5.0
MAY											
30...	--	--	--	--	--	--	--	--	--	<5.0	<5.0
SEP											
04...	--	--	--	--	--	--	--	--	--	<5.0	<5.0

MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

ANALYSES FOR ORGANIC CHEMICALS

DATE	N-NITRO -SODI- METHY- LAMINE TOTAL (UG/L) (34438)	N-NITRO -SODI- PHENY- LAMINE TOTAL (UG/L) (34433)	NAPHTH- ALENE TOTAL (UG/L) (34696)	NITRO- BENZENE TOTAL (UG/L) (34447)	PARA- CHLORO- META CRESOL TOTAL (UG/L) (34452)	PARA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39541)	PARA- THION, TOTAL (UG/L) (39540)	PCB, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39519)	PCN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39251)	PENTA- CHLORO- PHENOL TOTAL (UG/L) (39032)	PER- THANE IN BOT- TOM MA- TERIAL (UG/KG) (81886)
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN (LAT 45 01 17N LONG 095 52 05W)											
AUG 1990 14...	--	--	--	--	--	--	<0.01	--	--	--	--
05317000 COTTONWOOD RIVER NEAR NEW ULM, MN (LAT 44 17 29N LONG 094 26 24W)											
AUG 1990 22...	--	--	--	--	--	<0.1	<0.01	<1	<1.0	--	<1.00
05319500 WATONWAN RIVER NEAR GARDEN CITY, MN (LAT 44 02 47N LONG 094 11 43W)											
AUG 1990 28...	--	--	--	--	--	--	--	--	--	--	--
05320500 LE SUEUR RIVER NEAR RAPIDAN, MN (LAT 44 06 40N LONG 094 02 28W)											
AUG 1990 29...	--	--	--	--	--	<0.1	<0.01	<1	<1.0	--	<1.00
05325000 MINNESOTA RIVER AT MANKATO, MN (LAT 44 10 10N LONG 094 00 15W)											
AUG 1990 02...	--	--	--	--	--	--	<0.01	--	--	--	--
10...	--	--	--	--	--	--	<0.01	--	--	--	--
20...	--	--	--	--	--	--	<0.01	--	--	--	--
24...	--	--	--	--	--	--	<0.01	--	--	--	--
31...	--	--	--	--	--	--	--	--	--	--	--
05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN (LAT 44 34 19N LONG 093 55 18W)											
SEP 1990 05...	--	--	--	--	--	<0.1	<0.01	<1	<10	--	<1.00
05345000 VERMILLION RIVER NEAR EMPIRE, MN (LAT 44 40 00N LONG 093 03 17W)											
APR 1990 26...	<5.0	<5.0	<5.0	<5.0	<30.0	--	--	--	--	<30.0	--
MAY 30...	<5.0	<5.0	<5.0	<5.0	<30.0	--	--	--	--	<30.0	--
SEP 04...	<5.0	<5.0	<5.0	<5.0	<30.0	--	--	--	--	<30.0	--

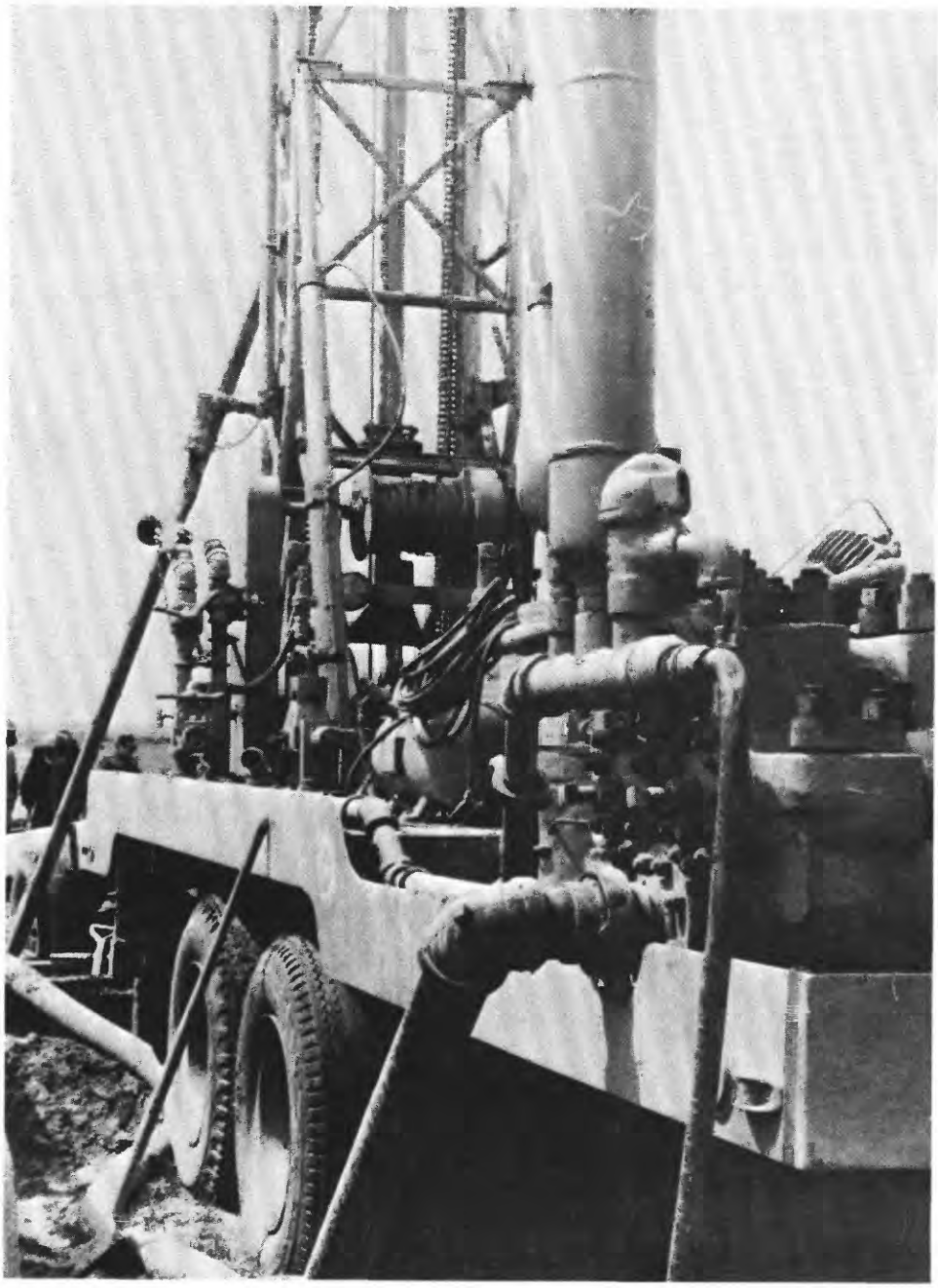
MISCELLANEOUS WATER QUALITY DATA COLLECTED AT CONTINUOUS-RECORD STATIONS

WATER QUALITY DATA AT STREAMFLOW STATIONS

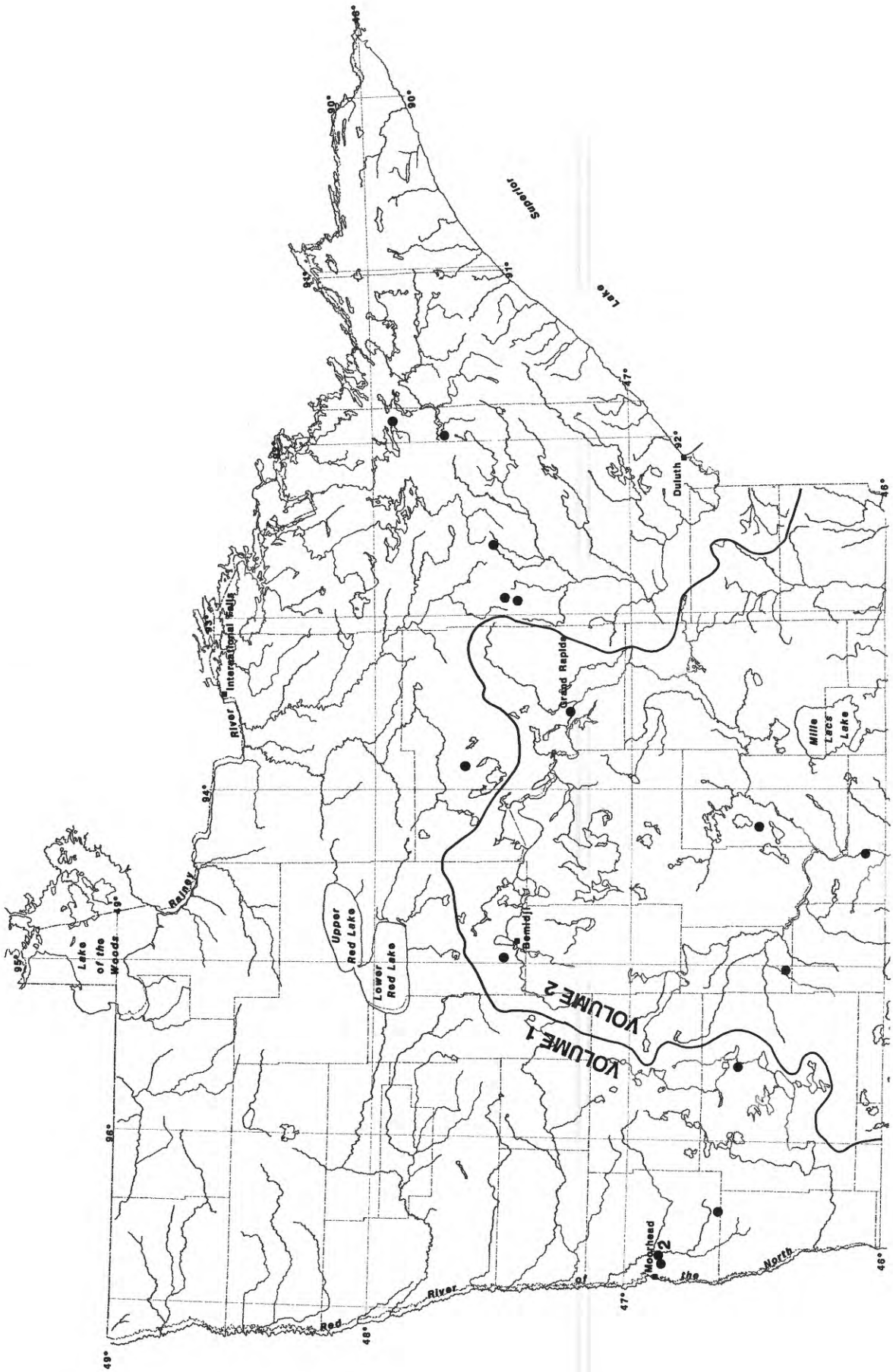
ANALYSES FOR ORGANIC CHEMICALS

DATE	PHENANTHRENE TOTAL (UG/L) (34461)	PHENOL (C6H5OH) TOTAL (UG/L) (34694)	PHORATE TOTAL (UG/L) (39023)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	PROPHAM TOTAL (UG/L) (39052)	PYRENE TOTAL (UG/L) (34469)	SEVIN, TOTAL (UG/L) (39750)	SILVEX, TOTAL (UG/L) (39760)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG) (39403)	TRITHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39787)	TOTAL TRITHION (UG/L) (39786)
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN (LAT 45 01 17N LONG 095 52 05W)											
AUG 1990 14...	--	--	<0.01	<0.01	<0.5	--	<0.50	<0.01	--	--	<0.01
05317000 COTTONWOOD RIVER NEAR NEW ULM, MN (LAT 44 17 29N LONG 094 26 24W)											
AUG 1990 22...	--	--	<0.01	<0.01	<0.5	--	<0.50	<0.01	<10	<0.1	<0.01
05319500 WATONWAN RIVER NEAR GARDEN CITY, MN (LAT 44 02 47N LONG 094 11 43W)											
AUG 1990 28...	--	--	--	--	<0.5	--	<0.50	--	--	--	--
05320500 LE SUEUR RIVER NEAR RAPIDAN, MN (LAT 44 08 40N LONG 094 02 28W)											
AUG 1990 29...	--	--	<0.01	<0.01	<0.5	--	<0.50	<0.01	<10	<0.1	<0.01
05325000 MINNESOTA RIVER AT MANKATO, MN (LAT 44 10 10N LONG 094 00 15W)											
AUG 1990 02...	--	--	<0.01	<0.01	<0.5	--	<0.50	<0.01	--	--	<0.01
10...	--	--	<0.01	<0.01	<0.5	--	<0.50	<0.01	--	--	<0.01
20...	--	--	<0.01	<0.01	<0.5	--	<0.50	<0.01	--	--	<0.01
24...	--	--	<0.01	<0.01	<0.5	--	<0.50	<0.01	--	--	<0.01
31...	--	--	--	--	<0.5	--	<0.50	--	--	--	--
05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN (LAT 44 34 19N LONG 093 55 18W)											
SEP 1990 05...	--	--	<0.01	<0.01	<0.5	--	<0.50	<0.01	<10	<0.1	<0.01
05345000 VERMILLION RIVER NEAR EMPIRE, MN (LAT 44 40 00N LONG 093 03 17W)											
APR 1990 26...	<5.0	<5.0	--	--	--	<5.0	--	--	--	--	--
MAY 30...	<5.0	<5.0	--	--	--	<5.0	--	--	--	--	--
SEP 04...	<5.0	<5.0	--	--	--	<5.0	--	--	--	--	--

GROUND-WATER LEVELS



May 1967


Superior
Lake
Duluth
Grand Rapids
Mille Lacs Lake
International Falls
Rainy River
Lake of the Woods
Upper Red Lake
Lower Red Lake
Bemidji
VOLUME 1
VOLUME 2
Moorhead
Red River of the North
96°
95°
94°
93°
92°
91°
90°
49°
48°
47°
46°

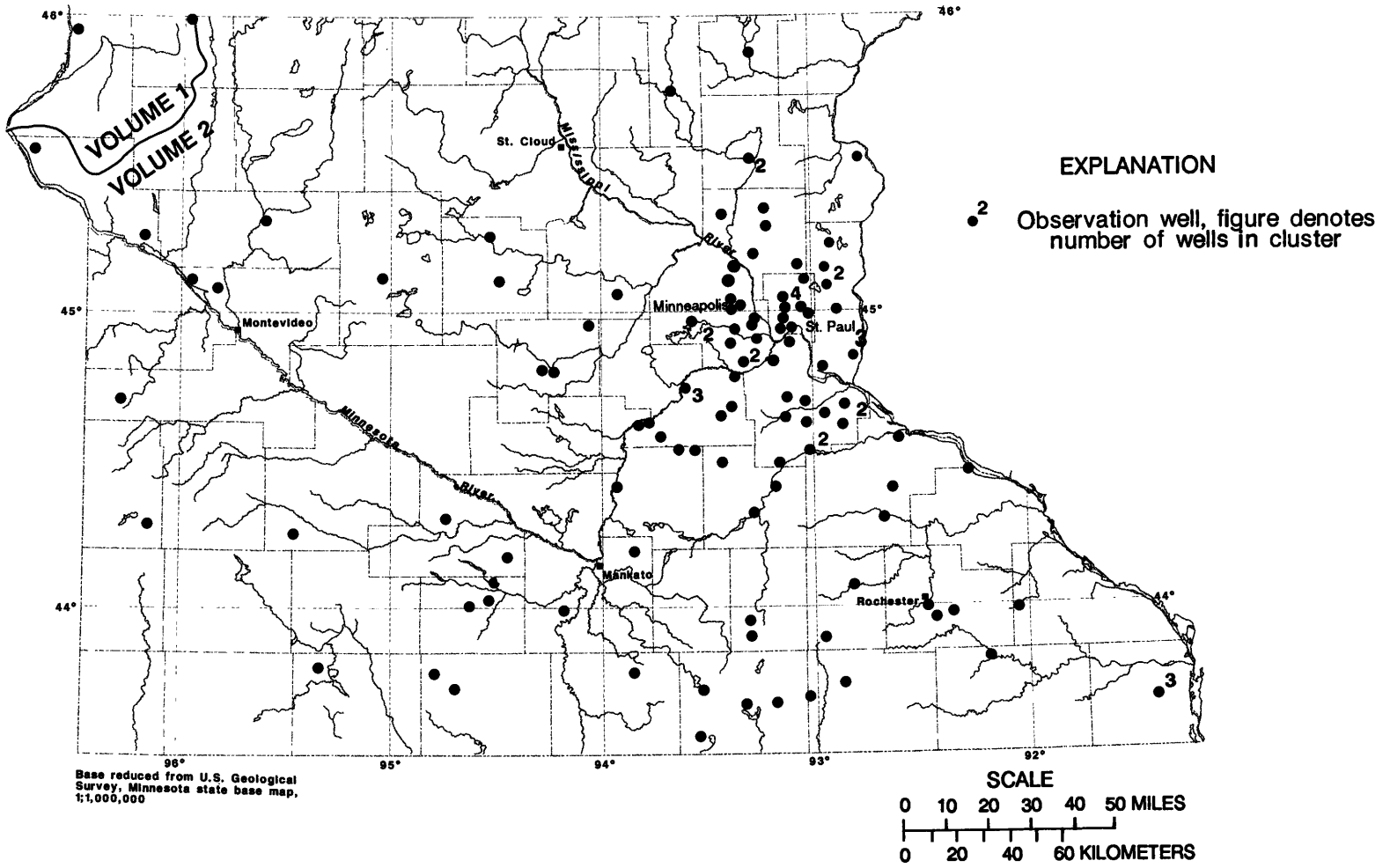


Figure 10.--Location of ground-water wells

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, 8.10 ft below land-surface datum, July 5, 1975; lowest, 18.57 ft below land-surface datum, Oct. 2, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATAUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	18.31	DEC 5	12.87	FEB 5	12.99	APR 5	13.24	JUN 5	12.69	AUG 5	12.47
10	18.30	10	12.99	10	15.82	10	13.31	10	12.81	10	12.71
15	13.73	15	12.91	15	15.97	15	13.38	15	12.60	15	13.02
20	13.19	20	12.90	20	16.01	20	13.35	20	12.44	20	12.53
25	13.39	25	12.96	25	18.07	25	13.29	25	12.55	SEP 25	12.32
31	13.11	31	12.94	28	16.01	30	13.16	30	12.49	30	12.48
NOV 5	13.06	JAN 5	12.95	MAR 5	16.01	MAY 5	13.21	JUL 5	12.83		
10	13.05	10	13.02	10	15.89	10	13.14	10	12.61		
15	12.98	15	12.97	15	15.28	15	13.13	15	12.52		
20	13.02	20	12.89	20	13.86	20	12.97	20	12.58		
25	12.90	25	12.97	25	13.34	25	12.87	25	12.75		
30	12.92	31	13.00	31	13.21	31	12.91	31	12.26		

451210093170201. Local number, 031N24W01CBB01.
LOCATION.--Lat 45°12'10", long 93°17'02", in NW¼NW¼SW¼ sec.1, T.31 N., R.24 W., Hydrologic Unit 07010206, at Golf Course.
Owner: City of Coon Rapids.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in., depth 193 ft, screened 163 to 193 ft.
DATUM.--Altitude of land-surface datum is 897 ft. Measuring point: Top of breather pipe, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--December 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.43 ft below land-surface datum, May 13, 1986; lowest, 41.10 ft below land-surface datum, Sept. 21, 1989.

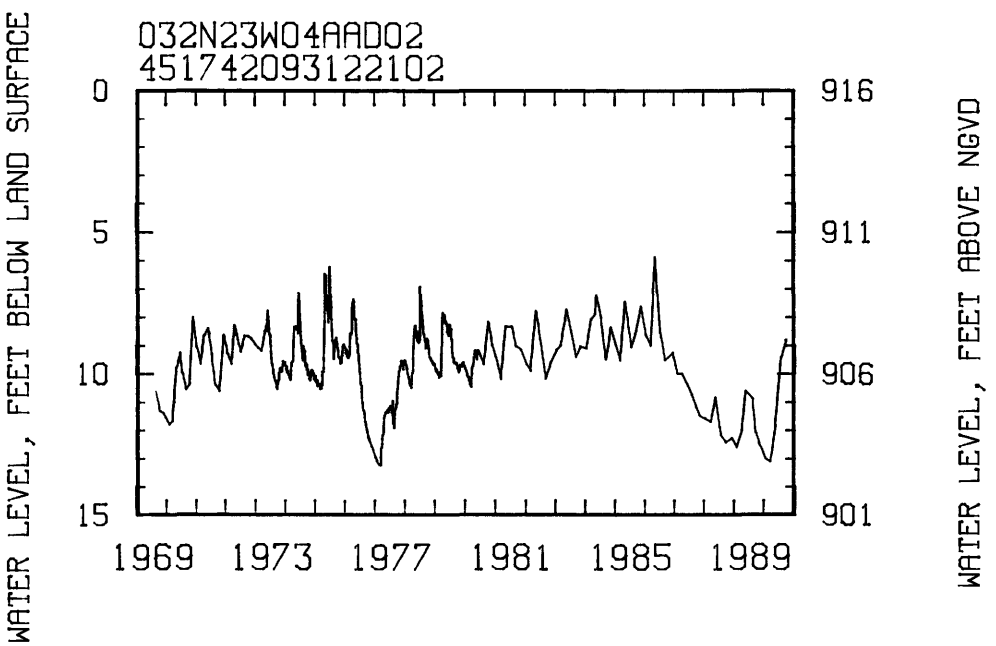
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	26.79	MAR 13	27.32	MAY 15	27.67	JUL 26	30.36

451742093122102. Local number, 032N23W04AAD02.
LOCATION.--Lat 45°17'42", long 93°12'21", in SE¼NE¼NE¼ sec.4, T.32 N., R.23 W., Hydrologic Unit 07030005, 1.5 mi east of Soderville.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial outwash sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 2 in., depth 21 ft, screened 19 to 21 ft.
DATUM.--Altitude of land-surface datum is 916 ft. Measuring point: Top of casing, 3.50 ft above land-surface datum.
PERIOD OF RECORD.--August 1969 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.82 ft below land-surface datum, May 13, 1986; lowest, 13.22 ft below land-surface datum, Mar. 5-9, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	12.45	JAN 16	12.99	MAR 13	13.10	MAY 15	11.83	JUL 26	9.39	SEP 21	8.79



452305093141501. Local number, 033N23W05BAB01.
LOCATION.--Lat 45°23'05", long 93°14'15", in NW¼NE¼NW¼ sec.5, T.33 N., R.23 W., Hydrologic Unit 07010207, at 1300 229th Ave. NE, Bethel.
Owner: Friendship Baptist Church.
AQUIFER.--Franconian Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 141 ft, cased to 126 ft.
DATUM.--Altitude of land-surface datum is 923 ft. Measuring point: Top of well cap, 0.80 ft above land-surface datum.
PERIOD OF RECORD.--April 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 19.45 ft below land-surface datum, July 10, 1986; lowest, 23.64 ft below land-surface datum, Jan. 26, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	23.47	MAR 13	23.74	MAY 15	23.47	JUL 26	22.14	SEP 21	21.50

ANOKA COUNTY--Continued

451938093223101. Local number, 033N24W30ABB01.
LOCATION.--Lat 45°19'38", long 93°22'31", in NW¼NW¼NE¼ sec.30, T.33 N., R.24 W., Hydrologic Unit 07010207, at 4324 Viking Blvd.
Owner: Northwestern Bell Telephone Co.
AQUIFER.--Ironton-Galesville Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 280 ft, cased to 223 ft.
DATUM.--Altitude of land-surface datum is 900 ft. Measuring point: Top of casing, 1.50 ft above land-surface datum.
PERIOD OF RECORD.--April 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 26.64 ft below land-surface datum, May 13, 1986; lowest, 32.89 ft below land-surface datum, Sept. 15, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

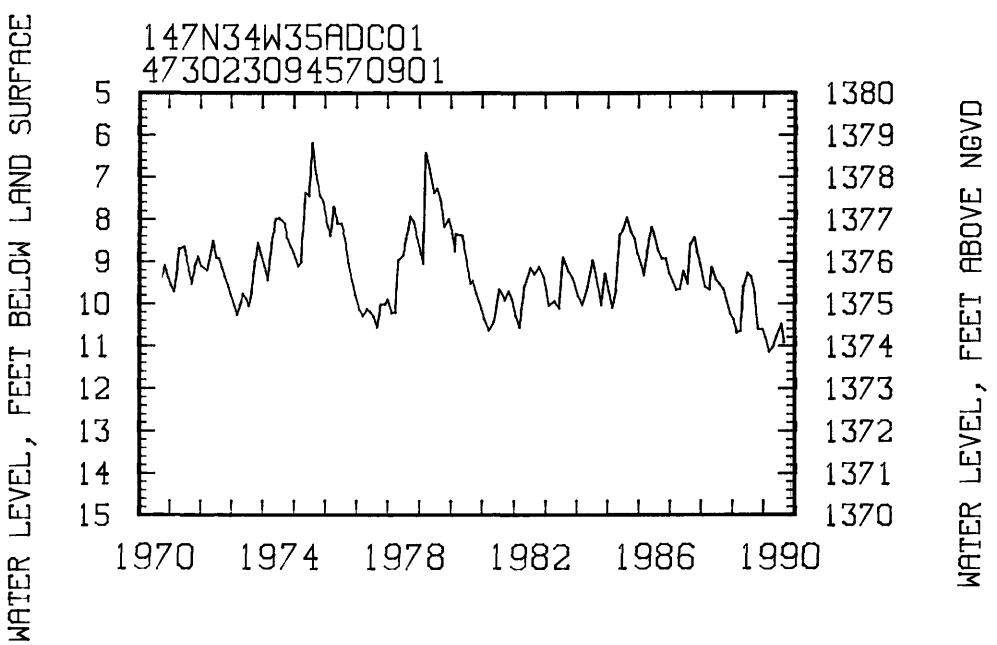
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	32.93	MAR 13	32.91	MAY 15	32.32	JUL 26	30.67	SEP 21	29.92

BELTRAMI COUNTY

473023094570901. Local number, 147N34W35ADC01.
LOCATION.--Lat 47°30'23", long 94°57'09", in SW¼SE¼NE¼ sec.35, T.147 N., R.34 W., Hydrologic Unit 07010101, on Clarence Hart farm.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial outwash sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in., depth 20 ft, screened 18 to 20 ft.
DATUM.--Altitude of land-surface datum is 1,383 ftm. Measuring point: Top of casing, 3.00 ft above land-surface datum.
PERIOD OF RECORD.--October 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 6.17 ft below land-surface datum, Aug. 1, 1975; lowest, 10.69 ft below land-surface datum, Feb. 13, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 26	10.10	JAN 16	10.81	APR 11	11.03	JUL 19	10.47
DEC 11	10.59	MAR 02	11.14	MAY 21	10.78	AUG 20	10.91



GROUND-WATER LEVELS

BIG STONE COUNTY

451517096104501. Local number, 121N44W27CCC01.
LOCATION.--Lat 45°15'17", long 96°10'45", in SW¼SW¼SW¼ sec.27, T.121 N., R.44 W., Hydrologic Unit 07010001, north of Correll.
Owner: U.S. Geological Survey
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in., depth 16 ft, screened 14 to 16 ft.
DATUM.--Altitude of land-surface datum is 1,018 ft. Measuring point: Top of casing, 3.10 ft above land-surface datum.
PERIOD OF RECORD.--September 1972 to February 1974, August 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.16 ft below land-surface datum, June 12, 1986; lowest, 8.99 ft below land-surface datum, Feb. 8, 1977.

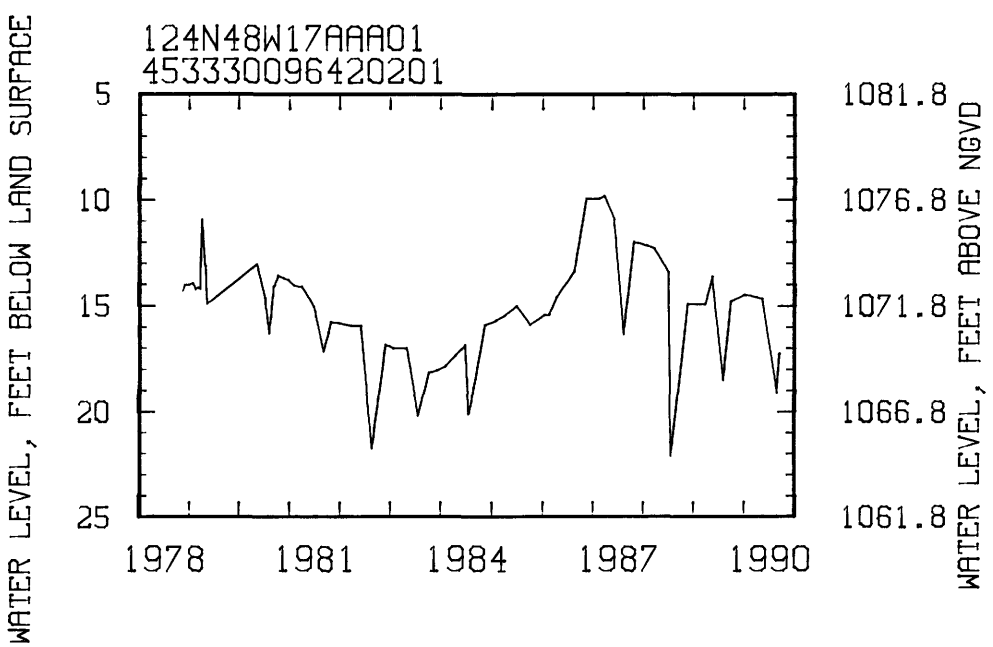
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 08	8.26	MAR 01	8.43	MAY 31	8.28	SEP 21	7.75

453330096420201. Local number, 124N48W17AAA01.
LOCATION.--Lat 45°33'30", long 96°42'02", in NE¼NE¼NE¼ sec.17, T.124 N., R.48 W., Hydrologic Unit 07020001, 0.5 mi east of Beardsley.
Owner: U.S. Geological Survey.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in., depth 282 ft, screened 242 to 282 ft.
DATUM.--Altitude of land-surface datum is 1,086.8 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 3.60 ft above land-surface datum.
PERIOD OF RECORD.--November 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.77 ft below land-surface datum, Mar. 23, 1987; lowest, 22.10 ft below land-surface datum, July 21, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 04	14.42	MAR 28	14.57	MAY 09	14.65	AUG 23	19.10	SEP 12	17.25



GROUND-WATER LEVELS

BLUE EARTH COUNTY

440050094102801. Local number, 106N28W03DBA01.
LOCATION.--Lat 44°00'50", long 94°10'28", in NE¼NW¼SE¼ sec.3, T.106 N., R.28 W., Hydrologic Unit 07020010, at Farmland Industries Ammonia Plant, 3.2 mi north of Vernon Center.
Owner: Farmland Industries.
AQUIFER.--Ironton-Galesville Sandstones of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 16 in., depth 390 ft, cased to 150 ft.
DATUM.--Altitude of land-surface datum is 1,005 ft. Measuring point: Top of recorder floor, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--October 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 71.81 ft below land-surface datum, Apr. 26, 1983; lowest, 76.73 ft below land-surface datum, Oct. 18, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATAUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	76.34	DEC 5	76.58	APR 5	76.40	AUG 5	75.67
10	76.35	10	76.54	10	76.55	10	75.54
15	76.33	15	76.44	15	76.48	15	75.56
20	76.51	20	76.42	20	76.55	20	75.53
25	76.47	25	76.41	25	76.35	25	75.41
31	76.41	JAN 10	76.13	30	76.38	31	75.39
NOV 5	76.21	MAR 10	76.44	MAY 5	76.44	SEP 5	75.54
10	76.22	15	76.02	10	76.35	10	75.51
15	76.36	20	76.47	15	76.31	15	75.45
20	76.42	25	76.59	20	76.24		
25	76.30	31	76.34	25	76.18		
30	76.42			31	76.27		

441134093505301. Local number, 108N25W04BBC01.
LOCATION.--Lat 44°11'34", long 93°50'53", in SW¼NW¼NW¼ sec.4, T.108 N., R.25 W., Hydrologic Unit 07020011, at 1.3 mi west of Madison Lake at waste treatment plant.
Owner: City of Madison Lake.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 6 in., depth 313 ft, cased to 296 ft.
DATUM.--Altitude of land-surface datum is 1,036 ft. Measuring point: Top of casing, 1.60 ft above land-surface datum.
PERIOD OF RECORD.--May 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 92.52 ft below land-surface datum, July 17, 1986; lowest, 95.62 ft below land-surface datum, July 25, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 08	94.75	JAN 10	94.96	MAY 23	95.47	JUL 25	95.62	SEP 26	95.52

BROWN COUNTY

441030094254501. Local number, 108N30W09ADD01.
LOCATION.--Lat 44°10'30", long 94°25'45", in SE¼SE¼NE¼ sec.9, T.108 N., R.30 W., Hydrologic Unit 07020007, 3.7 mi northeast of Hanska.
Owner: Erwin Kjelshus.
AQUIFER.--Deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Bored unused water-table well, diameter 16 in., depth 32 ft, cased to 32 ft, open end.
DATUM.--Altitude of land-surface datum is 1,003 ft. Measuring point: Top of concrete cover, at land-surface datum.
REMARKS.--Measured by Erwin Kjelshus. Water level used in monthly Water Resources Review.
PERIOD OF RECORD.--July 1942 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.50 ft below land-surface datum, Aug. 21, 1990; lowest, 22.00 ft below land-surface datum, Mar. 2, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 10	13.43	DEC 28	16.12	MAR 06	17.70	MAY 04	12.08	JUL 03	4.90	SEP 01	4.05
20	14.35	JAN 11	15.30	19	16.30	17	10.50	17	4.62	11	4.84
NOV 01	15.25	23	16.00	30	14.70	28	6.25	AUG 01	3.20	24	5.24
14	15.69	FEB 08	14.30	APR 10	13.97	JUN 09	5.90	12	4.50		
DEC 05	15.52	23	15.66	21	13.57	20	3.75	21	1.50		

BROWN COUNTY--Continued

441800094434301. Local number, 110N32W30DDB01.
LOCATION.--Lat 44°18'00", long 94°43'43", in NW¼SE¼SE¼ sec.30, T.110 N., R.32 W., Hydrologic Unit 07020008, in Sleepy Eye at hospital.
Owner: City of Sleepy Eye.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in., depth 176 ft.
DATUM.--Altitude of land-surface datum is 1,030 ft. Measuring point: Top of casing, 1.30 ft above land-surface datum.
REMARKS.--Water level affected by pumping from nearby wells.
PERIOD OF RECORD.--August 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 46.80 ft below land-surface datum, Apr. 1, 1987; lowest, 118.1 ft below land-surface datum, Sept. 15, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

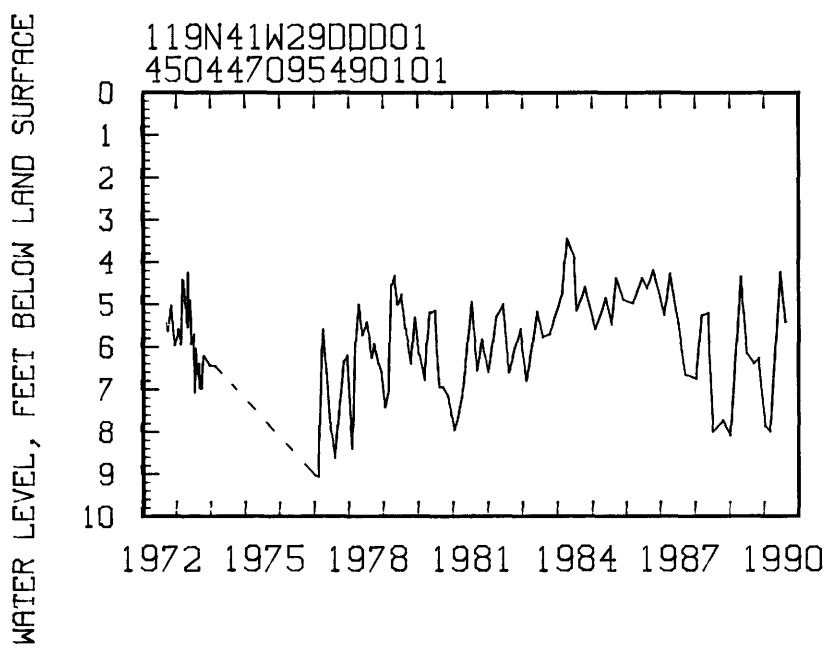
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 02	60.80	DEC 04	58.70	FEB 02	57.10	APR 02	55.90	JUN 01	55.70	AUG 01	52.20
NOV 01	60.70	JAN 02	57.70	MAR 01	56.10	MAY 01	56.70	JUL 02	62.70	SEP 04	66.20

CHIPPEWA COUNTY

450447095490101. Local number, 119N41W29DDD01.
LOCATION.--Lat 45°04'47", long 95°40'01", in SE¼SE¼SE¼ sec.29, T.119 N., R.41 W., Hydrologic Unit 07020005, 5 mi north of Watson.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in., depth 19 ft, screened 17 to 19 ft.
DATUM.--Altitude of land-surface datum is 992 ft. Measuring point: Top of casing, 3.75 ft above land-surface datum.
PERIOD OF RECORD.--September 1972 to February 1974, January 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.43 ft below land-surface datum, Apr. 10, 1984; lowest, 9.06 ft below land-surface datum, Feb. 8, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 30	6.25	JAN 08	7.85	MAR 01	7.98	JUN 20	4.20	AUG 08	5.40



CHIPPEWA COUNTY--Continued

450631095562201. Local number, 119N42W17DDD01.
LOCATION.--Lat 45°06'31", long 95°56'22", in SE¼SE¼SE¼ sec.17, T.119 N., R.42 W., Hydrologic Unit 07020001, west of Milan.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial silt of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in., depth 19 ft, screened 17 to 19 ft.
DATUM.--Altitude of land-surface datum is 1,027 ft. Measuring point: Top of casing, 4.50 ft above land-surface datum.
PERIOD OF RECORD.--September 1972 to October 1973, April 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.50 ft below land-surface datum, May 7, 1973; lowest, 17.46 ft below land-surface datum, Apr. 1, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 30	9.64	JAN 09	11.55	MAR 01	12.87	JUN 20	3.30

CHISAGO COUNTY

453125092445401. Local number, 035N19W17BDB01.
LOCATION.--Lat 45°31'25", long 92°44'54", in NW¼SE¼NW¼ sec.17, T.35 N., R.19 W., Hydrologic Unit 07030005, at Wild River State Park.
Owner: State of Minnesota.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 6 in., depth 270 ft, cased 230 ft.
DATUM.--Altitude of land-surface datum is 820 ft. Measuring point: Top of casing, 0.70 ft above land-surface datum.
PERIOD OF RECORD.--October 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 40.06 ft below land-surface datum, Oct. 20, 1986; lowest, 44.19 ft below land-surface datum, June 8, 1983.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	42.91	MAY 15	42.85	AUG 01	42.54

CROW WING COUNTY

463006094131201. Local number, 135N28W16CCD01.
LOCATION.--Lat 46°30'06", long 94°13'12", in SE¼SW¼SW¼ sec.16, T.135 N., R.28 W., Hydrologic Unit 07010106, northwest of Merrifield.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in., depth 18 ft, screened 16 to 18 ft.
DATUM.--Altitude of land-surface datum is 1,212 ft. Measuring point: Top of casing, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--October 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.20 ft below land-surface datum, May 1, 1982; lowest, 11.38 ft below land-surface datum, Oct. 16, 1970, Feb. 11, 1977, Mar. 11, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 02	9.86	OCT 30	9.88	APR 17	9.99	MAY 18	9.51	JUL 11	9.50
10	9.66	MAR 06	10.30	27	9.84	23	9.50	SEP 05	10.00
17	9.87	APR 04	9.80	MAY 03	9.78	JUN 02	9.50	24	10.12
23	9.88	10	9.40	09	9.60	07	9.48		

DAKOTA COUNTY

445044093102401. Local number, 027N23W09ABD01.
LOCATION.--Lat 44°50'44", long 93°10'24", in SE¼NW¼NE¼ sec.9, T.27 N., R.23 W., Hydrologic Unit 07020012, at Eagan.
Owner: City of Eagan, Timberline Addition.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled public-supply artesian well, diameter 10 in., depth 503 ft, cased to 401 ft.
DATUM.--Altitude of land-surface datum is 900 ft. Measuring point: Hole in well cap, 2.60 ft above land-surface datum.
REMARKS.--Water-level affected by pumping.
PERIOD OF RECORD.--December 1965, April 1966, December 1966, March 1967, December 1970, August 1971, August 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 141.40 ft below land-surface datum, Apr. 5, 1966; lowest, 171.40 ft below land-surface datum, Aug. 2, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	164.19	FEB 28	164.82	JUL 17	169.94	SEP 18	165.10
JAN 05	164.62	MAY 01	160.83				

445330093054301. Local number, 028N22W19DCC02.
LOCATION.--Lat 44°53'30", long 93°05'43", in SW¼SW¼SE¼ sec.19, T.28 N., R.22 W., Hydrologic Unit 07010206, in West St. Paul.
Owner: U.S. Geological Survey, 2-N.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 6 in., depth 539 ft, cased to 407 ft.
DATUM.--Land-surface datum is 1,036 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.60 ft above land-surface datum.
REMARKS.--Water-level affected by regional pumping.
PERIOD OF RECORD.--January 1971 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 309.13 ft below land-surface datum, Apr. 4, 1988; lowest, 328.0 ft below land-surface datum, July 31, 1975.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	314.32	DEC 5	310.93	FEB 5	310.85	APR 5	310.93	JUN 5	313.04	AUG 5	316.89
10	314.70	10	311.30	10	311.34	10	311.16	10	315.82	10	319.83
15	317.14	15	311.72	15	311.62	15	311.54	15	315.36	15	320.17
20	313.68	20	312.48	20	311.33	20	312.43	20	315.04	20	316.49
25	315.15	25	311.13	25	311.54	25	314.24	25	315.48	25	317.71
31	313.46	31	311.03	28	311.30	30	312.68	30	316.40	31	318.70
NOV 5	311.53	JAN 5	311.33	MAR 5	311.14	MAY 5	313.41	JUL 5	318.40	SEP 5	317.42
10	312.00	10	311.26	10	310.96	10	315.22	10	315.65	10	317.10
15	311.89	15	310.89	15	310.73	15	313.34	15	316.22	15	318.22
20	311.32	20	311.24	20	310.74	20	313.00	20	317.26	20	313.74
25	310.83	25	310.82	25	310.92	25	314.10	25	319.04	25	314.28
30	311.82	31	310.88	31	310.72	31	314.70	31	315.25	30	315.04

DAKOTA COUNTY--Continued

443146093002201. Local number, 112N18W08ABA01.
LOCATION.--Lat 44°31'46", long 93°00'22", in NE¼NW¼NE¼ sec.8, T.112 N., R.18 W., Hydrologic Unit 07040002, northeast of Randolph.
Owner: U.S. Geological Survey
AQUIFER.--Surficial outwash sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in., depth 44 ft, screened 42 to 44 ft.
DATUM.--Altitude of land-surface datum is 880 ft. Measuring point: Top of casing, 3.40 ft above land-surface datum.
PERIOD OF RECORD.--April 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.13 ft below land-surface datum, May 3, 1983; lowest, 23.80 ft below land-surface datum, Feb. 21, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 01	21.48	JAN 18	22.11	FEB 27	22.34	MAY 02	21.42	JUL 18	19.15	SEP 13	19.79

443134093010601. Local number, 112N18W08BBC01.
LOCATION.--Lat 44°31'34", long 93°01'06", in SW¼NW¼NW¼ sec.8, T.112 N., R.18 W., Hydrologic Unit 07040002, at Randolph Fire Station.
Owner: City of Randolph.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled fire protection artesian well, diameter 10 in., depth 150 ft, cased to 64 ft.
DATUM.--Altitude of land-surface datum is 883 ft. Measuring point: Top of 3/4-inch breather pipe, 2.20 ft above land-surface datum.
PERIOD OF RECORD.--July 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 10.47 ft below land-surface datum, May 3, 1983; lowest, 19.70 ft below land-surface datum, Aug. 11, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 01	16.10	JAN 24	16.34	FEB 27	16.33	MAY 02	15.42	JUL 18	15.44	SEP 13	14.43

442830093085201. Local number, 112N19W30DBD01.
LOCATION.--Lat 44°28'30", long 93°08'52", in SE¼NW¼SE¼ sec.30, T.112 N., R.19 W., Hydrologic Unit 07040002, at Northfield waste treatment plant.
Owner: City of Northfield.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 6 in., depth 275 ft, cased to 212 ft.
DATUM.--Altitude of land-surface datum is 890 ft. Measuring point: Center of pressure guage, 2.05 ft above land-surface datum.
PERIOD OF RECORD.--May 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.54 ft above land-surface datum, July 12, 1983; lowest, 7.12 ft above land-surface datum, May 2, 1990.

WATER LEVEL, IN FEET ABOVE LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 01	+8.50	JAN 09	+8.39	FEB 27	+8.04	MAY 02	+7.12	JUL 18	+8.96	SEP 25	+7.81

443645093014701. Local number, 113N18W07BAC01.
LOCATION.--Lat 44°36'45", long 93°01'47", in SW¼NE¼NW¼ sec.7, T.113 N., R.18 W., Hydrologic Unit 07040001, west of Hampton.
Owner: Eugene Dohmen.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 16 in., depth 325 ft, cased to 65 ft.
DATUM.--Altitude of land-surface datum is 915 ft. Measuring point: Hole in pump base, 1.60 ft above land-surface datum.
PERIOD OF RECORD.--April 1977 to August 1977, January 1978, June 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.15 ft below land-surface datum, Dec. 4, 1986; lowest, 33.19 ft below land-surface datum, Aug. 12, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 01	32.12	JAN 18	32.30	FEB 27	32.51	JUN 13	31.05	JUL 18	30.18	SEP 13	30.75

444205092500001. Local number, 114N17W10AAA01.
LOCATION.--Lat 44°42'05", long 92°50'00", in NE¼NE¼NE¼ sec.10, T.114 N., R.17 W., Hydrologic Unit 07040001, southeast of Hastings.
Owner: John Conzemius.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 4 in., depth 151 ft, depth of casing unknown.
DATUM.--Altitude of land-surface datum is 827 ft. Measuring point: Top of platform, 2.50 ft above land-surface datum.
PERIOD OF RECORD.--April 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 94.10 ft below land-surface datum, Mar. 31, 1987; lowest, 107.4 ft below land-surface datum, Mar. 12, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATAUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	101.37	DEC 5	101.89	FEB 5	102.40	APR 5	102.14	JUN 5	102.33	AUG 5	102.09
10	101.54	10	102.06	10	102.39	10	102.22	10	102.43	10	101.88
NOV 5	101.73	15	102.07	15	102.39	15	102.18	15	102.37	15	102.15
10	101.84	20	102.16	20	102.57	20	102.23	20	102.23	20	102.24
15	101.86	25	102.10	25	102.72	25	102.24	25	102.51	25	102.06
20	101.97	31	102.15	28	102.63	30	102.38	30	102.24	31	102.11
25	101.87	JAN 5	102.24	MAR 5	102.64	MAY 5	102.34	JUL 5	102.56	SEP 5	102.27
30	101.91	10	102.29	10	102.49	10	102.40	10	102.40	10	102.09
		15	102.31	15	102.34	15	102.41	15	102.11	15	102.03
		20	102.21	20	102.39	20	102.44	20	101.98	20	101.91
		25	102.31	25	102.32	25	102.36	25	102.37	25	101.87
		31	102.45	31	102.07	31	102.37	31	101.84	30	102.00

444047092521901. Local number, 114N17W16CBB01.
LOCATION.--Lat 44°40'47", long 92°52'19", in NW¼NW¼SW¼ sec.16, T.114 N., R.17 W., Hyrologic Unit 07040001, Kirby Avenue, 0.5 mi (0.8 km) north of 190th Street.
Owner: Jim Huneke Construction Company.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled domestic water-table well, diameter 4 in., depth 170 ft, screened 164 to 170 ft.
DATUM.--Altitude of land-surface datum is 823 ft. Measuring point: Top of casing, 1.10 ft above land-surface datum.
PERIOD OF RECORD.--March 1976, March 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 73.32 ft below land-surface datum, Mar. 31, 1987; lowest, 87.75 ft below land-surface datum, June 27, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 01	81.83	JAN 04	81.82	FEB 27	82.06	APR 27	82.06	JUL 18	82.62	SEP 13	83.60

443827092521801. Local number, 114N17W33BBC01.
LOCATION.--Lat 44°38'27", long 92°52'18", in SW¼NW¼NW¼ sec.33, T.114 N., R.17 W., Hydrologic Unit 07040001, 39 ft south of irrigation well.
Owner: Rainer Kimmes.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 16 in., depth 290 ft, cased to 25 ft.
DATUM.--Altitude of land-surface datum is 862 ft. Measuring point: Hole in plate over well, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--August 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 46.14 ft below land-surface datum, Dec. 1, 1986; lowest, 79.20 ft below land-surface datum, July 11, 1985.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	66.63	NOV 30	68.17	FEB 27	68.66	APR 27	68.34
NOV 01	68.55	JAN 04	68.16	MAR 15	68.34	SEP 13	68.73

444117092595701. Local number, 114N18W17AAB01.
LOCATION.--Lat 44°41'17", long 92°59'57", in NW¼NE¼NE¼ sec.17, T.114 N., R.18 W., Hydrologic Unit 07040001, 180th Street, 0.25 mi west of Emery Avenue.
Owner: Joe Ries.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 16 in., depth 280 ft, cased to 39 ft.
DATUM.--Altitude of land-surface datum is 905 ft. Measuring point: Edge of vent pipe, 1.40 ft above land-surface datum.
PERIOD OF RECORD.--June 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 57.30 ft below land-surface datum, Dec. 1, 1986; lowest, 74.15 ft below land-surface datum, Sept. 13, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 01	70.20	FEB 27	70.23	MAY 02	69.55	JUL 18	70.55	SEP 13	71.42

443801092571301. Local number, 114N18W35CCB01.
LOCATION.--Lat 44°38'01", long 92°57'13", in NW¼SW¼SW¼ sec.35, T.114 N., R.18 W., Hydrologic Unit 07040001, Goodwin Avenue, 1.1 mi (1.8 km) south of Northfield Boulevard.
Owner: Al Wagner, Jr.
AQUIFER.--Buried gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in., depth 203 ft, screened 173 to 203 ft.
DATUM.--Altitude of land-surface datum is 898 ft. Measuring point: Hole in pump base, 1.25 ft above land-surface datum.
PERIOD OF RECORD.--June 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 16.83 ft below land-surface datum, Dec. 1, 1986; lowest, 38.28 ft below land-surface datum, Sept. 13, 1982.

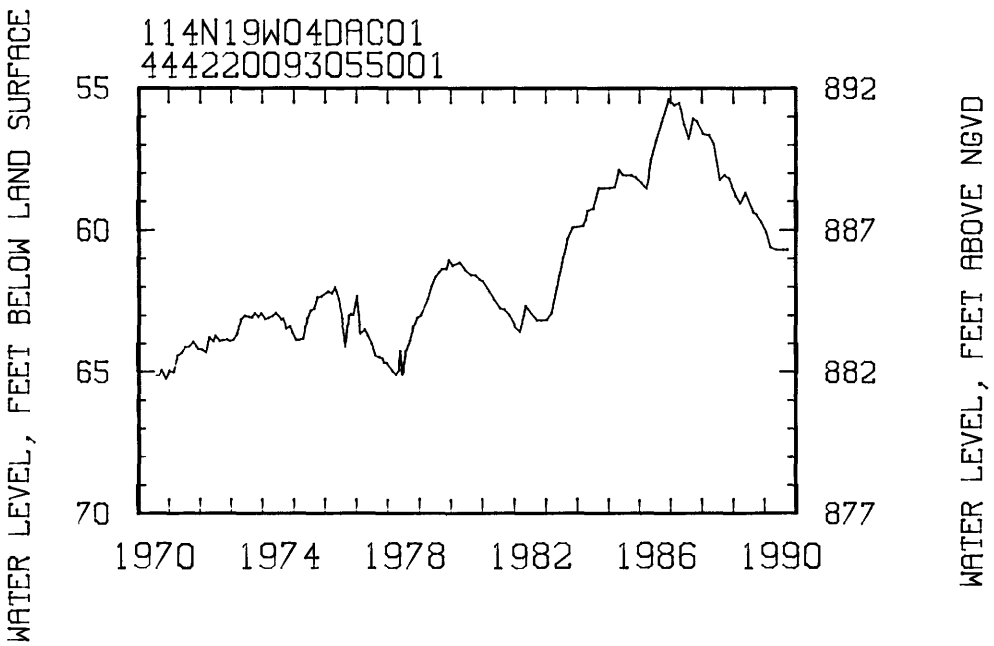
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 01	33.88	JAN 04	33.46	FEB 27	33.90	APR 27	33.48	JUL 18	30.78	SEP 13	33.88

444220093055001. Local number, 114N19W04DAC01.
LOCATION.--Lat 44°42'20", long 93°05'50", in SW¼NE¼SE¼ sec.4, T.114 N., R.19 W., Hydrologic Unit 07040001, 2.1 mi southeast of Rosemount.
Owner: University of Minnesota Agricultural Experiment Station (Plant Pathology).
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 6 in., depth 415 ft, cased to 355 ft.
DATUM.--Altitude of land-surface datum is 947 ft. Measuring point: Top of 1-inch breather pipe, 2.10 ft above land-surface datum.
PERIOD OF RECORD.--August 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 55.36 ft below land-surface datum, Dec. 1, 1986; lowest, 65.23 ft below land-surface datum, Nov. 27, 1970.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 15	59.72	JAN 11	60.07	FEB 27	60.59	MAY 02	60.69	JUL 19	60.69	SEP 13	60.69



443934093043201. Local number, 114N19W22DDD01.
LOCATION.--Lat 44°39'34", long 93°04'32", in SE¼SE¼SE¼ sec.22, T.114 N., R.19 W., Hydrologic Unit 07040001, west of Empire.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial outwash sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in., depth 24 ft, screened 22 to 24 ft.
DATUM.--Altitude of land-surface datum is 875 ft. Measuring point: Top of casing, 3.00 ft above land-surface datum.
PERIOD OF RECORD.--April 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.52 ft below land-surface datum, May 2, 1986; lowest, 9.33 ft below land-surface datum, Sept. 13, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 01	8.94	FEB 27	9.02	MAY 02	7.93	SEP 13	8.08
JAN 18	9.00	MAR 14	8.07	JUL 18	7.00		

DODGE COUNTY

435336092553201. Local number, 105N18W13DDD01.
LOCATION.--Lat 43°53'36", long 92°55'32", in SE¼SE¼SE¼ sec.13, T.105 N., R.18 W., Hydrologic Unit 07080201, 3 mi west of Hayfield.
Owner: James Barry.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 5 in., depth 82 ft, screen information not available.
DATUM.--Altitude of land-surface datum is 1,288 ft. Measuring point: Top of casing, 1.80 ft above land-surface datum.
PERIOD OF RECORD.--June 1975 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 37.61 ft below land-surface datum, June 6, 1984; lowest, 46.25 ft below land-surface datum, Mar. 30, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 04	43.76	NOV 29	42.50	JAN 11	44.01

440448092485501. Local number, 107N17W13BBA01.
LOCATION.--Lat 44°04'48", long 92°48'55", in NE¼NW¼NW¼ sec.13, T.107 N., R.17 W., Hydrologic Unit 07040004, in city of Wasioja.
Owner: Wasioja Township Garage.
AQUIFER.--Galena Formation of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled maintenance artesian well, diameter 6 in., depth 100 ft, cased to 52 ft.
DATUM.--Altitude of land-surface datum is 1,185 ft. Measuring point: Top of casing, 1.60 ft above land-surface datum.
PERIOD OF RECORD.--January 1975 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 12.94 ft below land-surface datum, May 23, 1983; lowest, 26.88 ft below land-surface datum, Jan. 5, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 04	25.27	JAN 11	26.11	JUN 11	24.40	SEP 19	19.23
NOV 29	25.83	MAY 03	24.36	AUG 02	18.78		

FARIBAULT COUNTY

434558093540001. Local number, 104N26W36CAC01.
LOCATION.--Lat 43°45'58", long 93°54'00", in SW¼NE¼SW¼ sec.36, T.104 N., R.26 W., Hydrologic Unit 07020011, at Easton Creamery.
Owner: City of Easton.
AQUIFER.--Platteville Formation of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled public supply artesian well, diameter 6 in., depth 145 ft, cased to 120 ft.
DATUM.--Altitude of land-surface datum is 1,060 ft. Measuring point: Top of well cap, 1.20 ft above land-surface datum.
PERIOD OF RECORD.--August 1979, April 1980, May 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 29.97 ft below land-surface datum, May 10, 1983; lowest, 36.36 ft below land-surface datum, Aug. 2, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 07	34.97	JAN 09	35.50	MAR 06	35.05	MAY 22	35.72	JUL 24	34.34	SEP 25	34.04

GROUND-WATER LEVELS

FILLMORE COUNTY

434936092102201. Local number, 104N11W08ADC01.
LOCATION.--Lat 43°49'36", long 92°10'22", in SW¼SE¼NE¼ sec.8, T.104 N., R.11 W., Hydrologic Unit 07040008, 0.8 mi southeast of Chatfield.
Owner: Fillmore County Highway Department.
AQUIFER.--Prairie du Chien group of early Ordovician age and Jordan sandstone of late Cambrian age.
WELL CHARACTERISTICS.--Drilled domestic water table well, diameter 4 in., depth 284 ft, cased to 128 ft.
DATUM.--Altitude of land-surface datum is 981 ft. Measuring point: Top of casing, 0.50 ft above land-surface datum.
PERIOD OF RECORD.--November 1989 to September 1990.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 31.26 ft below land-surface datum, June 25, 1986; lowest, 38.51 ft below land-surface date, Feb. 6, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV. 29	37.71	FEB. 06	38.51	APR. 10	36.93	JUN. 13	33.20
JAN. 04	38.15	MAR. 14	35.16				

FREEBORN COUNTY

433434093331201. Local number, 101N23W02DAC01.
LOCATION.--Lat 43°34'34", long 93°33'12", in SW¼NE¼SE¼ sec.2, T.101 N., R.23 W., Hydrologic Unit 07080203, 3 mi southwest of Conger.
Owner: Richard Steele.
AQUIFER.--Upper Carbonates of Devonian and Ordovician Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 18 in., depth 373 ft (114 m), cased to 156 ft.
DATUM.--Altitude of land-surface datum is 1,280 ft. Measuring point: Vent pipe, 1.50 ft above land-surface datum.
PERIOD OF RECORD.--July 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 65.58 ft below land-surface datum, Mar. 8, 1983; lowest, 75.45 ft below land-surface datum, Aug. 2, 1989.

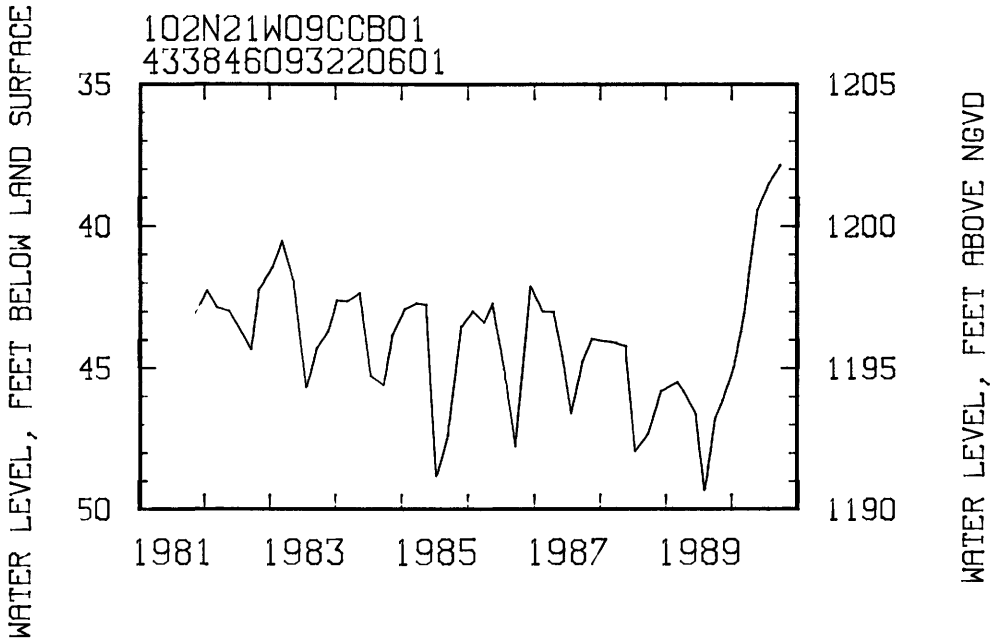
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 07	71.50	JAN 09	68.09	MAR 06	71.26	MAY 22	69.12	JUL 24	69.18	SEP 25	67.74

433846093220601. Local number, 102N21W09CCB01.
LOCATION.--Lat 43°38'46", long 93°22'06", in NW¼SW¼SW¼ sec.9, T.102 N., R.21 W., Hydrologic Unit 07080202, at Freeborn County Courthouse.
Owner: Freeborn County.
AQUIFER.--Cedar Valley Formation of Middle Devonian Age.
WELL CHARACTERISTICS.--Drilled public supply artesian well, diameter 5 in., depth 150 ft, cased to 138 ft.
DATUM.--Altitude of land-surface datum is 1,240 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--November 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 37.83 ft below land-surface datum, Sept. 25, 1990; lowest, 49.32 ft below land-surface datum, Aug. 2, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 07	46.12	JAN 09	44.94	MAR 06	43.07	MAY 22	39.40	JUL 24	38.47	SEP 25	37.83



434032093111801. Local number, 103N20W36CCB01.
LOCATION.--Lat 43°40'32", long 93°11'18", in NE¼SW¼SW¼ sec.36, T.103 N., R.20 W., Hydrologic Unit 07080201, at Pillsbury Grain Station.
Owner: Pillsbury Co.
AQUIFER.--Cedar Valley Formation of Middle Devonian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 5 in., depth 231 ft, cased to 136 ft.
DATUM.--Altitude of land-surface datum is 1,255 ft. Measuring point: Top of casing, 1.80 ft above land-surface datum.
PERIOD OF RECORD.--July 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 48.40 ft below land-surface datum, May 10, 1984; lowest, 55.95 ft below land-surface datum, July 13, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 07	53.17	JAN 09	52.92	MAR 06	53.14	MAY 22	50.36	JUL 24	50.13	SEP 25	49.19

434308093322001. Local number, 103N23W13CDA01.
LOCATION.--Lat 43°43'08", long 93°32'20", in NE¼SE¼SW¼ sec.13, T.103 N., R.23 W., Hydrologic Unit 07020011, 3.3 mi northeast of Alden.
Owner: Oakview Golf Course.
AQUIFER.--Galena Formation of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 6 in., depth 270 ft, cased to 158 ft.
DATUM.--Altitude of land-surface datum is 1,250 ft. Measuring point: Hole in well cap, 1.90 ft above land-surface datum.
PERIOD OF RECORD.--July 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 42.00 ft below land-surface datum, May 10, 1983; lowest, 48.77 ft below land-surface datum, Aug. 2, 1989.

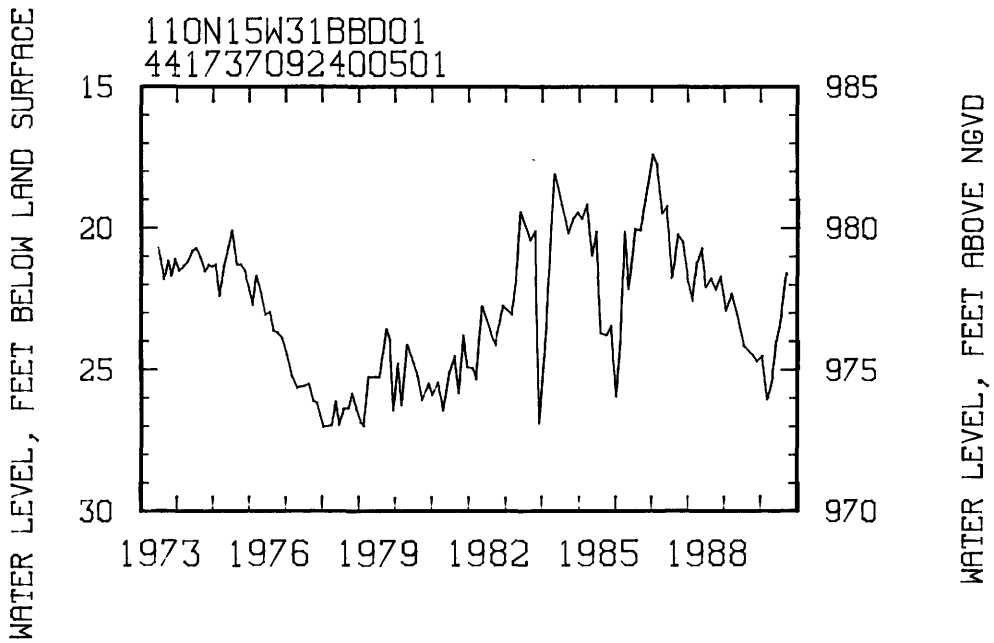
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 07	46.94	JAN 09	46.33	MAR 06	46.35	MAY 22	43.82	JUL 24	43.80	SEP 25	42.65

441737092400501. Local number, 110N15W31BBD01.
LOCATION.--Lat 44°17'37", long 92°40'05", in SE¼NW¼NW¼ sec.31, T.110 N., R.15 W., Hydrologic Unit 07040004, at Zumbrota Fire Station.
Owner: City of Zumbrota, well 3.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 12 in., depth 210 ft, cased to 50 ft.
DATUM.--Altitude of land-surface datum is 1,000 ft. Measuring point: Hole in pump base, 2.20 ft above land-surface datum.
PERIOD OF RECORD.--June 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.38 ft below land-surface datum, Jan 7, 1987; lowest, 27.00 ft below land-surface datum, Jan. 5, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 11	24.49	JAN 11	24.50	APR 23	25.27	JUL 23	23.05
NOV 16	24.69	MAR 05	26.03	JUN 04	23.97	SEP 10	21.58



442401092372501. Local number, 111N15W21CDA01.
LOCATION.--Lat 44°24'01", long 92°37'25", in NE¼SE¼SW¼ sec.21, T.111 N., R.15 W., Hydrologic Unit 07040004, in Goodhue clerk's office.
Owner: City of Goodhue, creamery well.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian age.
WELL CHARACTERISTICS.--Drilled public-supply artesian well, diameter 12 in., depth 310 ft, cased to 175 ft.
DATUM.--Altitude of land-surface datum is 1,125 ft. Measuring point: Top of 1¼ in elbow, 1.50 ft above land-surface datum.
PERIOD OF RECCORD.--June 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 119.00 ft below land-surface datum, Feb. 26, 1987; lowest, 156.5 ft below land-surface datum, May 26, 1983.

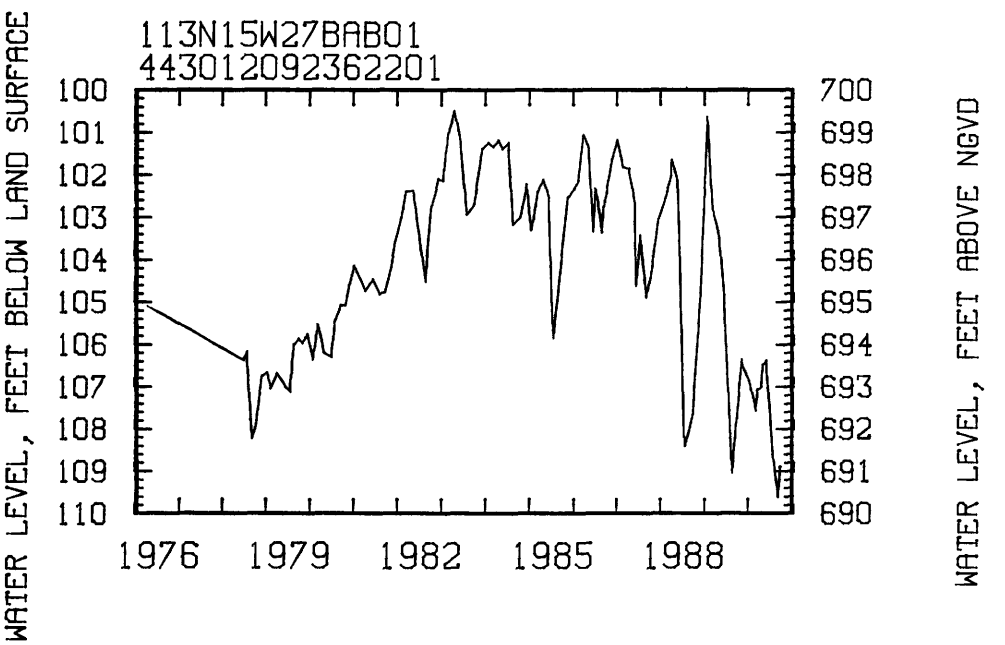
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR Oct.OBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 11	130.89	JAN 11	131.72	JUN 04	133.64	SEP 10	134.48
NOV 28	131.84	MAR 05	137.20	JUL 23	149.04		

443012092362201. Local number, 113N15W27BAB01.
LOCATION.--Lat 44°30'12", long 92°26'22", in NW¼NE¼NW¼ sec.27, T.113 N., R.15 W., Hydrologic Unit 07040002, at Red Wing.
Owner: City of Red Wing, Anderson Park.
AQUIFER.--Eau Claire-Mount Simon Sandstones of Late Cambrian Age.
WELL CHARACTERISTISC.--Drilled unused artesian well, diameter 12 in., depth 560 ft, cased to 243 ft.
DATUM,--Altitude of land-surface datum is 800 ft. Measuring point: Edge of casing, 2.70 ft above land-surface datum.
PERIOD OF RECORD.--April 1976, June 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 100.50 ft below land-surface datum, Apr. 20, 1983; lowest, 109.62 ft below land-surface datum, Sept. 10, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 02	107.73	JAN 11	106.88	APR 23	107.01	JUL 23	108.30	SEP 10	109.62
NOV 14	106.35	MAR 05	107.58	MAY 08	106.49	31	108.62	28	108.90
20	106.54	21	107.08	JUN 04	106.37				



444815093194901. Local number, 027N24W30AAA01.
LOCATION.--Lat 44°48'15", long 93°19'49", in NE¼NE¼NE¼ sec.30, T.27 N., R.24 W., Hydrologic Unit 07020012, at 4001 West 110th Street, Bloomington.
Owner: Transfiguration Church.
AQUIFER.--Buried Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 139 ft, screened 135 to 139 ft.
DATUM.--Altitude of land-surface datum is 832 ft. Measuring point: Top of casing, 0.50 ft above land-surface datum.
PERIOD OF RECORD.--March 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 63.97 ft below land-surface datum, Mar. 2, 1979; lowest, 73.09 ft below land-surface datum, July 17, 1990.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	72.15	JAN 05	72.27	FEB 28	72.45	MAY 03	72.78	JUL 17	73.09	SEP 18	73.00

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 DATAUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	80.77	DEC 5	78.90	FEB 5	78.99	APR 5	78.98	JUN 5	79.31	AUG 5	81.26
10	81.05	10	79.05	10	78.97	10	79.07	10	82.04	10	82.84
15	82.62	15	79.02	15	79.04	15	79.21	15	79.91	15	83.90
20	79.41	20	79.02	20	79.09	20	79.54	20	80.05	20	81.18
25	81.28	25	78.91	25	79.26	25	79.28	25	82.17	25	82.20
31	79.25	31	78.88	28	79.13	30	80.31	JUL 20	80.95	31	83.85
NOV 5	78.98	JAN 5	78.99	MAR 5	79.08	MAY 5	79.68	25	82.89	SEP 5	83.35
10	79.15	10	79.05	10	78.90	10	80.82	31	81.71	10	82.29
15	79.07	15	79.04	15	78.76	15	80.35			15	81.63
20	79.03	20	78.91	20	78.94	20	79.77			20	80.22
25	78.88	25	79.01	25	78.90	25	79.60				
30	78.95	31	79.12	31	78.92	31	82.04				

445356093145301. Local number, 028N24W23ADD01.
LOCATION.--Lat 44°53'56", long 93°14'53", in SE¼SE¼NE¼ sec.23, T.28 N., R.24 W., Hydrologic Unit 07010206, at 5728 Cedar Avenue, Minneapolis.
Owner: Hope Lutheran Church.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 6 in., depth 245 ft, cased to 172 ft.
DATUM.--Altitude of land-surface datum is 835 ft. Measuring point: Top of casing, 0.30 ft above land-surface datum.
PERIOD OF RECORD.--April 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 36.50 ft below land-surface datum, Jan. 22, 1986; lowest, 60.17 ft below land-surface datum, June 21, 1988.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 30	42.70	JAN 08	41.34	MAY 01	42.49	JUL 17	51.68	SEP 18	49.30

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 DATAUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	38.12	DEC 5	33.62	FEB 5	33.88	JUN 5	36.53	AUG 5	39.05
10	41.67	10	32.94	10	34.11	10	39.86	10	44.94
15	38.02	15	33.73	15	34.56	15	40.83	15	46.86
20	36.80	20	33.98	20	33.62	20	38.73	20	39.52
25	39.96	25	32.22	25	34.07	25	41.81	25	42.16
31	36.95	31	32.82	MAR 5	34.04	31	43.97	31	44.26
NOV 5	33.74	JAN 5	33.61	MAY 10	36.81	JUL 5	44.26	SEP 5	41.89
20	33.08	10	33.42	15	35.20	10	40.84	10	40.80
25	32.24	15	33.09	20	33.77	15	38.26	15	40.45
30	34.01	20	33.43	25	36.58	20	42.77		
		25	34.08	31	37.80	25	40.90		
		31	34.70			31	39.04		

445833093154301. Local number, 029N24W26BAB01.
LOCATION.--Lat 44°58'33", long 93°15'43", in NW¼NE¼NW¼ sec.26, T.29 N., R.24 W., Hydrologic Unit 07010206, at 425 Portland Avenue.
Owner: Minneapolis Star and Tribune.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 16 in., depth 445 ft, cased to 252 ft.
DATUM.--Altitude of land-surface datum is 835 ft. Measuring point: Top of steel cover, 7.60 ft below land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--June 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 56.45 ft below land-surface datum, Jan. 10, 1983; lowest, 149.36 ft below land-surface datum, Aug. 16, 1988.

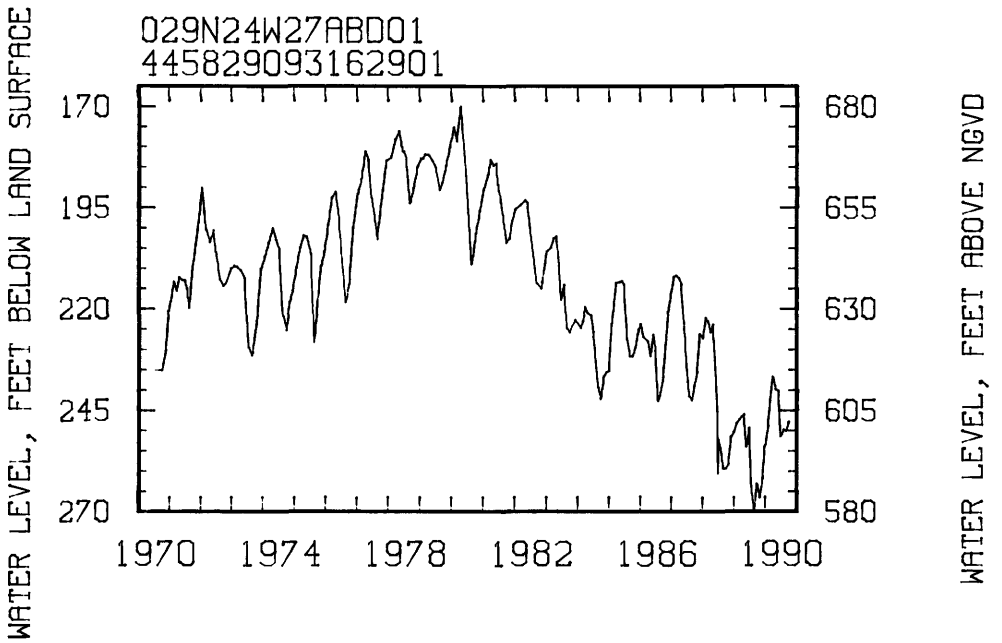
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 26	112.25	DEC 26	71.54	FEB 26	69.23	APR 25	110.07	JUN 27	132.75	AUG 27	126.46
NOV 28	73.95	JAN 29	70.18	MAR 27	69.66	MAY 29	82.23	JUL 30	107.83	SEP 24	79.20

445829093162901. Local number, 029N24W27ABD01.
LOCATION.--Lat 44°58'29", long 93°16'29", in SE¼NW¼NE¼ sec.27, T.29 N., R.24 W., Hydrologic Unit 07010206, at 911 LaSalle Avenue, Minneapolis.
Owner: American Linen Supply Co.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age and Hinckley Sandstone of Late Precambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 16 in., depth 1,094 ft, cased to 812 ft.
DATUM.--Altitude of land-surface datum is 850 ft. Measuring point: Hole in pump base, 22.00 ft below land-surface datum.
REMARKS.--Water level affected by regional pumping.
PERIOD OF RECORD.--July 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 169.8 ft below land-surface datum, Apr. 15, 1980; lowest, 269.92 ft below land-surface datum, Aug. 28, 1989.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 26	266.42	DEC 26	253.70	FEB 26	242.38	APR 25	239.70	JUN 27	251.50	AUG 27	250.10
NOV 28	261.46	JAN 29	248.70	MAR 27	236.60	MAY 29	240.14	JUL 30	249.60	SEP 24	247.79



445618093211801. Local number, 117N21W16CDB01.
LOCATION.--Lat 44°56'18", long 93°21'18", in NW¼SE¼SW¼ sec.16, T.117 N., R.21 W., Hydrologic Unit 07010206, at 2565 Wooddale Avenue South, St. Louis Park.
Owner: D-A Lubricant Co.
AQUIFER.--Ironton-Galesville Sandstones of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 4 in., depth 691 ft, screened 651 to 661 ft.
DATUM.--Altitude of land-surface datum is 917.2 ft, National Geodetic Vertical Datum of 1929. Measuring point: Hole in well seal, 3.60 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--April 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 130.25 ft below land-surface datum, Feb. 6, 1987; lowest, 155.46 ft below land-surface datum, Sept. 20, 1988.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	150.03	MAY 01	137.38	JUL 23	142.90

445646093395301. Local number, 117N24W13BBC04.
LOCATION.--Lat 44°45'46", long 93°39'53", in SW¼NW¼NW¼ sec.13, T.117 N., R.24 W., Hydrologic Unit 07010206, at 3-Point Road.
Owner: City of Mound, well 4.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 10 in., depth 729 ft, cased to 600 ft.
DATUM.--Altitude of land-surface datum is 945 ft: Measuring point: Top of breather pipe, 2.35 ft above land-surface datum.
PERIOD OF RECORD.--November 1985 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 65.30 ft below land-surface datum, Mar. 4, 1980; lowest, 72.80 ft below-land surface datum, Nov. 2, 1989.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	72.80	JAN 05	72.51	MAR 01	72.44	APR 26	72.20	JUL 17	67.02	SEP 18	67.23

445740093333001. Local number, 117N23W11BBD01.
LOCATION.--Lat 44°57'40", long 93°33'30", in SE¼NW¼NW¼ sec.11, T.117 N., R.23 W., Hydrologic Unit 07010206, 2 mi southwest of Wayzata, at Lake Minnetonka.
Owner: Minnetonka Boat Works, Inc., Orono.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 6 in., depth 437 ft, cased to 270 ft.
DATUM.--Altitude of land-surface datum is 930.8 ft National Geodetic Vertical Datum of 1929. Measuring point: Wood floor of instrument shelter, 3.30 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--August 1942 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 14.05 ft below land-surface datum, Apr. 30, 1954; lowest, 44.77 ft below land-surface datum, June 28, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	34.56	JAN 05	33.45	MAR 05	33.53	MAY 05	35.21	AUG 05	37.08
10	33.93	10	33.26	10	33.45	10	36.27	10	39.58
15	33.21	15	33.45	15	32.86	15	35.96	15	39.86
20	33.29	20	33.28	20	33.56	20	34.82	17	40.73
25	32.88	25	33.17	25	33.78	25	34.22	20	38.36
30	32.89	31	33.30	31	33.24	31	34.92	25	37.37
DEC 05	33.04	FEB 05	33.53	APR 05	32.70	JUN 05	35.30	31	38.29
10	33.70	10	33.76	10	32.86	10	35.88	SEP 05	37.59
15	33.45	15	33.99	15	33.27	JUL 20	37.08	10	37.46
20	33.20	20	34.17	30	35.14	25	37.62	15	38.62
						31	34.90	20	37.26
								25	36.10
								30	36.68

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 DATAUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	70.51	DEC 5	68.16	FEB 5	68.61	APR 5	69.15	JUN 5	70.63	AUG 5	71.29
10	70.34	10	68.35	10	68.94	10	69.09	10	72.06	10	77.57
15	71.58	15	68.37	15	69.01	15	69.60	15	71.85	15	74.69
20	69.89	20	68.41	20	68.98	20	70.43	20	70.57	20	72.37
25	71.61	25	67.44	25	69.18	25	71.64	25	71.48	25	72.07
31	70.25	31	67.75	28	69.21	30	70.04	30	71.63	30	73.17
NOV 5	68.46	JAN 5	68.25	MAR 5	68.88	MAY 5	70.51	JUL 5	72.67	SEP 5	72.59
10	68.56	10	68.40	10	68.71	10	71.02	10	72.11	10	71.98
15	68.59	15	68.37	15	68.26	15	70.26	15	70.95	15	72.71
20	68.33	20	68.36	20	68.66	20	69.62	20	71.71	20	72.69
25	67.57	25	68.42	25	69.07	25	70.63	25	72.34	25	71.70
31	67.98	31	68.80	31	68.88	31	71.04	31	71.03	31	72.25

445905093224401. Local number, 118N21W32CBB01.
LOCATION.--Lat 44°59'05", long 93°22'44", in NW¼NW¼SW¼ sec.32, T.118 N., R.21 W., Hydrologic Unit 07010206, at Winnetka Avenue and Highway 55, Golden Valley.
Owner: Red Owl Store.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 6 in., depth 95 ft, screened 87 to 95 ft.
DATUM.--Altitude of land-surface datum is 895 ft. Measuring point: Top of well cap, 0.80 ft above land-surface datum.
PERIOD OF RECORD.--May 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.72 ft below land-surface datum, May 12, 1986; lowest, 22.43 ft below land-surface datum, Jan. 18, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 16	21.51	JAN 18	22.43	MAR 01	22.22	MAY 01	22.28	JUL 23	21.27	SEP 14	21.37

445857093223101. Local number, 118N21W32CBD01.
LOCATION.--Lat 44°58'57", long 93°22'31", in SE¼NW¼SW¼ sec.32, T.118 N., R.21 W., Hydrologic Unit 07010206, at 760 Harold Avenue, Golden Valley.
Owner: Golden Valley Methodist Church.
AQUIFER.--St. Peter Sandstone of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 6 in., depth 265 ft, cased to 200 ft.
DATUM.--Altitude of land-surface datum is 890 ft. Measuring point: Top of well cap, 0.70 ft above land-surface datum.
PERIOD OF RECORD.--February 1971 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 31.33 ft below land-surface datum, May 12, 1986; lowest, 40.62 ft below land-surface datum, Sept. 14, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 16	38.13	JAN 18	38.69	MAR 01	38.69	MAY 01	38.75	JUL 23	39.10	SEP 14	40.62

450854093212801. Local number, 119N21W04BBA01.
LOCATION.--Lat 45°08'54", long 93°21'28", in NE¼NW¼NW¼ sec.4, T.119 N., R.21 W., Hydrologic Unit 07010206, 109th Avenue North, 0.15 mi (0.24 km) east of Zane Avenue North, Brooklyn Park.
Owner: Walter Tessman.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled irrigation water-table well, diameter 12 in., depth 80 ft, screened 62 to 80 ft.
DATUM.--Altitude of land-surface datum is 876 ft. Measuring point: Hole in pump base, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--September 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 15.18 ft below land-surface datum, May 13, 1986; lowest, 22.45 ft below land-surface datum, May 1, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 16	21.92	JAN 18	22.30	MAR 22	22.27	MAY 01	22.45	JUL 23	20.68	SEP 14	20.16

HOUSTON COUNTY

433935091251801. Local number, 102N05W03DCC01.
LOCATION.--Lat 43°39'35", long 91°25'18", in SW¼SW¼SE¼ sec.3, T.102 N., R.5 W., Hydrologic Unit 07060001, 3 mi east of Caledonia.
Owner: U.S Geological Survey.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 4 in., depth 360 ft, cased to 309 ft.
DATUM.--Altitude of land-surface datum is 1,210 ft. Measuring point: Top of casing, 2.50 ft above land-surface datum.
PERIOD OF RECORD.--June 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 213.76 ft below land-surface datum, July 17, 1985; lowest, 245.50 ft below land-surface datum, June 4, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	237.08	JUN 05	240.87	JUL 05	241.57	AUG 05	242.04
JAN 19	238.72	10	241.23	10	241.59	10	241.85
MAR 21	239.54	15	241.12	15	241.42	15	241.87
MAY 10	240.30	20	241.01	20	241.67	SEP 28	242.40
15	240.49	25	241.20	25	241.82		
20	240.67	30	241.36	31	241.96		
25	240.66						
31	240.93						

433935091252001. Local number, 102N05W03DCC02.
LOCATION.--Lat 43°39'35", long 91°25'20", in SW¼SW¼SE¼ sec.3, T.102 N., R.5 W., Hydrologic Unit 07060001, 3 mi east of Caledonia.
Owner: U.S. Geological Survey.
AQUIFER.--Ironton-Galesville Sandstones of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 4 in., depth 650 ft, cased to 614 ft.
DATUM.--Altitude of land-surface datum is 1,210 ft. Measuring point: Top of casing, 2.50 ft above land-surface datum.
PERIOD OF RECORD.--November 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 441.50 ft below land-surface datum, June 4, 1981; lowest, 452.21 ft below land-surface datum, July 31, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	450.77	JAN 19	451.38	MAR 21	451.26	JUL 31	452.21	SEP 28	451.55

443935091252901. Local number, 102N05W03DCC03.
LOCATION.--Lat 44°39'35", long 91°25'19", in SW¼SW¼SE¼ sec.3, T.102 N., R.5 W., Hydrologic Unit 07060001, 3 mi east of Caledonia.
Owner: U.S. Geological Survey
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 4 in., depth 888 ft, cased to 858 ft.
DATUM.--Altitude of land-surface datum is 1,210 ft. Measuring point: Top of casing, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--July 1982 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 522.00 ft below land-surface datum, Nov. 10, 1983; lowest, 526.00 ft below land-surface datum, Sept. 29, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	525.60	MAR 21	525.50	JUL 31	525.76	SEP 28	525.77
JAN 19	525.87						

HUBBARD COUNTY

465142094433201. Local number, 139N32W16AAA01.
LOCATION.--Lat 46°51'42", long 94°43'32", in NE¼NE¼NE¼ sec.16, T.139 N., R.32 W., Hydrologic Unit 07010106, at Badoura Nursery.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial outwash sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in., depth 21 ft, screened 19 to 21 ft.
DATUM.--Altitude of land-surface datum is 1,419 ft. Measuring point: Top of casing, 2.00 ft above land-surface datum.
REMARKS.--Measured weekly by Archie Hakala.
PERIOD OF RECORD.--September 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 10.63 ft below land-surface datum, Sept. 24, 1985; lowest, 15.97 ft below land-surface datum, Mar. 21, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 03	14.82	DEC 05	15.07	FEB 06	15.47	APR 03	15.25	JUN 05	15.20	AUG 07	15.09
10	14.78	19	15.17	13	15.50	10	15.26	12	15.10	14	15.18
17	14.80	JAN 02	15.27	20	15.54	APR 17	15.25	19	15.01	21	15.22
24	14.81	09	15.32	27	15.59	24	15.25	26	14.94	28	15.27
NOV 14	14.94	16	15.37	MAR 06	15.63	MAY 01	15.26	JUL 04	14.87	SEP 04	15.35
21	14.97	23	15.40	13	15.55	08	15.26	10	14.86	11	15.38
28	15.04	30	15.44	20	15.31	15	15.23	17	14.89	18	15.41
				27	15.28	22	15.22	24	14.94	25	15.45
						29	15.22	31	14.99		

ISANTI COUNTY

453125093181101. Local number, 035N24W14BCD01.
LOCATION.--Lat 45°31'25", long 93°18'11", in SE¼SW¼NW¼ sec.14, T.35 N., R.24 W., Hydrologic Unit 07010207, northwest of Isanti.
Owner: Allen Kluck.
AQUIFER.--Eau Claire - Mount Simon Formations of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in., depth 300 ft, cased to 105 ft.
DATUM.--Altitude of land-surface datum is 940 ft. Measuring point: Hole in pump base, 0.10 ft above land-surface datum.
PERIOD OF RECORD.--February 1968 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 11.18 ft below land-surface datum, June 24, 1986; lowest, 16.16 ft below land-surface datum, Oct. 31, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	16.16	MAY 15	15.30	AUG 01	14.56

453058093175901. Local number, 035N24W14CDC01.
LOCATION.--Lat 45°30'58", long 93°17'59", in SW¼SE¼SW¼ sec.14, T.35 N., R.24 W., Hydrologic Unit 07010207, northwest of Isanti.
Owner: Ernest Kluck.
AQUIFER.--Surficial outwash sand of Pleistocene Age.
WELL CHARACTERISTICS.--Driven unused water-table well, diameter 1¼ in., depth 17 ft, screen information not available.
DATUM.--Altitude of land-surface datum is 930 ft. Measuring point: Top of casing, 3.00 ft above land-surface datum.
PERIOD OF RECORD.--March 1968 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.50 ft below land-surface datum, June 24, 1986; lowest, 10.87 ft below land-surface datum, Oct. 31, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	10.87	MAY 15	10.05	AUG 01	8.90

ITASCA COUNTY

471448093322001. Local number, 055N25W17ACD01.
LOCATION.--Lat 47°14'48", long 93°32'20", in SE¼SW¼NE¼ sec.17, T.55 N., R.25 W., Hydrologic Unit 07010103, at west end of 13th Street NW, Grand Rapids.
Owner: U.S. Geological Survey.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 4 in., depth 147 ft, screened 143 to 147 ft.
DATUM.--Altitude of land-surface datum is 1,318 ft. Measuring point: Top of platform, 1.60 ft above land-surface datum.
PERIOD OF RECORD.--April 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 29.04 ft below land-surface datum, June 1, 1966; lowest, 33.92 ft below land-surface datum, May 17, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

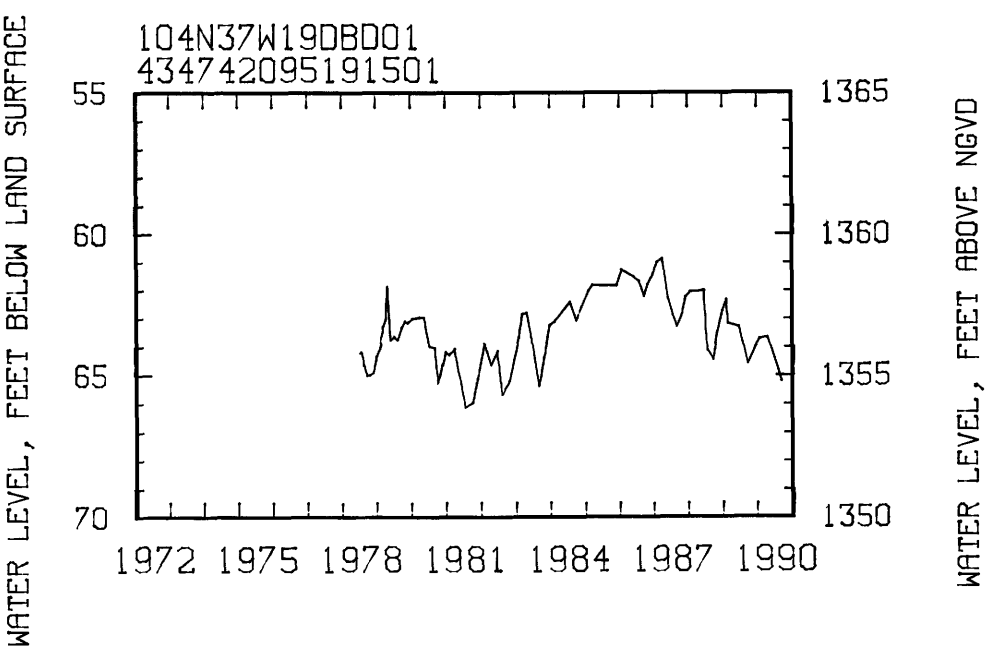
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	31.27	JAN 25	31.49	APR 19	31.49	JUL 12	31.46
DEC 14	31.25	MAR 05	31.64	MAY 29	31.46	AUG 24	31.82

JACKSON COUNTY

434742095191501. Local number, 104N37W19DBD01.
LOCATION.--Lat 43°47'42", long 95°19'15", in SE¼NW¼SE¼ sec.19, T.104 N., R.37 W., Hydrologic Unit 07100001, at Heron Lake.
Owner: City of Heron Lake, old railroad well.
AQUIFER.--Sioux Quartzite of Late Precambrian Age.
WELL CHARACTERISTICS.--Drilled public-supply artesian well, diameter 16 in., depth 323 ft, screened 205 to 225 ft.
DATUM.--Altitude of land-surface datum is 1,420 ft. Measuring point: Edge of breather pipe, 2.60 ft above land-surface datum.
PERIOD OF RECORD.--August 1972, July 1973, September 1976, July 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 59.16 ft below land-surface datum, Aug. 11, 1972; lowest, 66.10 ft below land-surface datum, July 14, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 29	63.97	APR 11	63.64	JUL 25	64.20	SEP 04	65.19
JAN 17	63.70						



KANABEC COUNTY

455236093172301. Local number, 039N24W11DDC01.
LOCATION.--Lat 45°52'36", long 93°17'23", in SW¼SE¼SE¼ sec.11, T.39 N., R.24 W., Hydrologic Unit 07030004, intersection of Forest Avenue and U.S. Highway 65.
Owner: City of Mora, well 3.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled public-supply artesian well, diameter 12 in., depth 170 ft, screened 150 to 170 ft.
DATUM.--Altitude of land-surface datum is 1,011 ft. Measuring point: Edge of vent pipe, 2.40 ft above land-surface datum.
PERIOD OF RECORD.--March 1968 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 29.10 ft below land-surface datum, May 27, 1986; lowest, 46.90 ft below land-surface datum, Mar. 5, 12, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 03	45.50	DEC 04	45.40	FEB 05	46.25	APR 02	45.25	JUN 04	44.80	AUG 06	43.74
09	45.90	11	45.40	12	46.20	09	45.08	11	44.50	13	43.80
16	45.77	18	46.00	20	46.45	16	44.98	18	44.30	28	43.80
23	45.22	27	45.83	26	46.10	23	44.94	25	44.00	SEP 04	44.00
30	45.32	JAN 02	46.51	MAR 05	46.90	30	44.95	JUL 02	43.85	10	44.40
NOV 06	45.28	08	46.00	12	46.90	MAY 08	45.85	09	44.48	18	44.63
13	45.40	16	46.25	19	45.80	14	45.70	16	44.31	24	44.70
21	45.42	23	46.10	26	46.10	22	45.50	23	44.10		
27	45.44	29	46.20			31	45.68	30	44.13		

LE SUEUR COUNTY

442522093543901. Local number, 111N26W14ADA01.
LOCATION.--Lat 44°25'22", long 93°54'39", in NE¼SE¼NE¼ sec.14, T.111 N., R.26 W., Hydrologic Unit 07020012, 0.85 mi south of Le Sueur.
Owner: Merle Moser.
AQUIFER.--Buried gravel of Pleistocene Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 16 in., depth 242 ft, screened 212 to 242 ft.
DATUM.--Altitude of land-surface datum is 855 ft. Measuring point: Edge of vent pipe, 1.20 ft above land-surface datum.
PERIOD OF RECORD.--January 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 71.82 ft below land-surface datum, Feb. 11, 1987; lowest, 84.55 ft below land-surface datum, Mar. 9, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 08	81.07	JAN 10	81.66	MAY 23	82.94	JUL 25	82.95	SEP 26	82.81

443234093333501 Local number, 112N23W02BAB01.
LOCATION.--Lat 44°32'34", long 93°33'35", in NW¼NE¼NW¼ sec.2, T.112 N., R.23 W., Hydrologic Unit 07020012, just east of New Prague.
Owner: Holy Trinity Lutheran Church.
AQUIFER.--St. Lawrence Formation of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 180 ft, cased to 155 ft.
DATUM.--Altitude of land-surface datum is 1,005 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--April 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 93.56 ft below land-surface datum, Feb. 3, 1987; lowest, 99.42 ft below land-surface datum, July 26, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

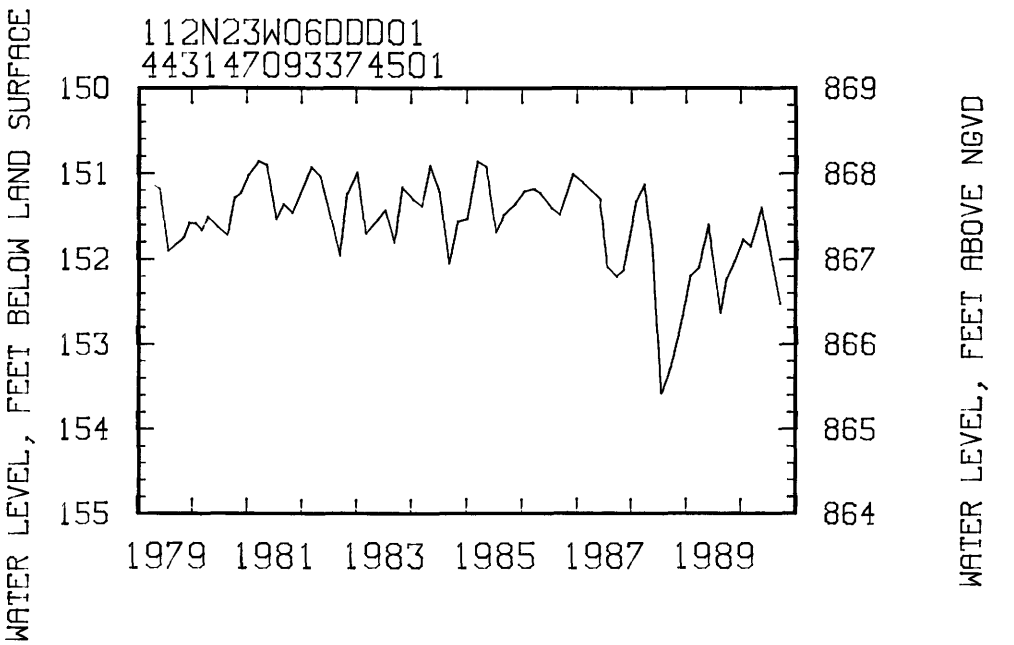
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 15	96.84	MAR 02	96.52	MAY 16	96.37	JUL 19	96.79	SEP 19	97.12

LE SUEUR COUNTY--Continued

443147093374501. Local number, 112N23W06DDD01.
LOCATION.--Lat 44°31'47",long 93°37'45", in SE¼SE¼SE¼ sec.6, T.112 N., R.23 W., Hydrologic Unit 07020012, 3 mi southwest of New Prague.
Owner: Friedens Lutheran Church.
AQUIFER.--St. Lawrence Formation of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 5 in., depth 265 ft, cased to 209 ft.
DATUM.--Altitude of land-surface datum is 1,019 ft. Measuring point: Top of casing, 1.70 ft above land-surface datum.
PERIOD OF RECORD.--April 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 150.85 ft below land-surface datum, Mar. 18, 1981; lowest, 153.58 ft below land-surface datum, July 19, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 15	152.02	JAN 11	151.76	MAR 02	151.85	MAY 16	151.39	SEP 19	152.52



LINCOLN COUNTY

441705096084501. Local number, 110N44W33DCD01.
LOCATION.--Lat 44°17'05", long 96°08'45", in SE¼SW¼SE¼ sec.33, T.110 N., R.44 W., Hydrologic Unit 07020006, at Tyler.
Owner: U.S. Geological Survey.
AQUIFER.--Dakota Sandstone of Early Cretaceous Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 8 in., depth 967 ft, screened 890 to 900 ft.
DATUM.--Altitude of land-surface datum is 1,738 ft. Measuring point: Top of recorder platform, 3.50 ft above land-surface datum.
PERIOD OF RECORD.--November 1969 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 247.41 ft below land-surface datum, Mar. 23, 1987; lowest, 250.82 ft below land-surface datum, Nov. 12, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	249.08	FEB 05	249.00	APR 11	249.20	JUN 18	248.87	AUG 01	248.95

MARTIN COUNTY

434359094422201. Local number, 103N32W08CCD01.
LOCATION.--Lat 43°43'59", long 94°42'22", in SE¼SW¼SW¼ sec.8, T.103 N., R.32 W., Hydrologic Unit 07020009, 1.5 mi south of Trimont.
Owner: Robert Olson.
AQUIFER.--Sandstone of Cretaceous Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 16 in., depth 412 ft, screened 372 to 412 ft.
DATUM.--Altitude of land-surface datum is 1,242 ft. Measuring point: Vent pipe, 0.50 ft above land-surface datum.
PERIOD OF RECORD.--July 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 90.50 ft below land-surface datum, Apr. 14, 1987; lowest, 96.22 ft below land-surface datum, July 21, 1987.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 08	93.18	JAN 09	92.94	MAR 06	92.96	MAY 22	92.46	JUL 24	92.63	SEP 25	92.74

434725094483001. Local number, 104N33W28BAB01.
LOCATION.--Lat 43°47'25", long 94°48'30", in NW¼NE¼NW¼ sec.28, T.104 N., R.33 W., Hydrologic Unit 07020009, 6.6 mi northwest of Trimont.
Owner: Kenneth Schafer.
AQUIFER.--Sioux Quartzite of Late Precambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 5 in., depth 178 ft, cased to 121 ft.
DATUM.--Altitude of land-surface datum is 1,290 ft. Measuring point: Top of casing, 1.30 ft above land-surface datum.
PERIOD OF RECORD.--September 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 82.99 ft below land-surface datum, Apr. 14, 1987; lowest, 86.28 ft below land-surface datum, Mar. 6, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 08	85.58	JAN 09	85.83	MAR 06	86.28	MAY 23	85.79	JUL 24	85.89	SEP 25	85.66

MC LEOD COUNTY

444758094132101. Local number, 115N28W05ACC01.
LOCATION.--Lat 44°47'58", long 94°13'21", in SW¼SW¼NE¼ sec.5, T.115 N., R.28 W., Hydrologic Unit 07010205, northwest of Glencoe.
Owner: Graupmann Farms, Inc.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in., depth 472 ft, screened 432 to 472 ft.
DATUM.--Altitude of land-surface datum is 1,036 ft. Measuring point: Edge of vent pipe, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--September 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 80.50 ft below land-surface datum, Aug. 20, 1979; lowest, 109.65 ft below land-surface datum, Oct. 1, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	94.78	JAN 12	90.35	MAR 20	88.67	MAY 17	88.22	SEP 27	99.88

MC LEOD COUNTY--Continued

444819094164701. Local number, 116N29W35DDC01.
LOCATION.--Lat 44°48'19", long 94°16'47", in SW¼SE¼SE¼ sec.35, T.116 N., R.29 W., Hydrologic Unit 07010205, 1.3 mi south of Biscay.
Owner: Charles Johnson.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in., depth 269 ft, screened 229 to 269 ft.
DATUM.--Altitude of land-surface datum is 1,050 ft. Measuring point: Edge of vent pipe, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--September 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 24.21 ft below land-surface datum, Jan. 23, 1986; lowest, 34.80 ft below land-surface datum, Aug. 26, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	33.84	JAN 12	33.39	MAR 20	32.53	MAY 17	32.26	JUL 27	31.06	SEP 27	31.06

445721094031201. Local number 117N27W10DAA01.
LOCATION.--Lat 44°57'21", long 94°03'12", in NE¼NE¼SE¼ sec.10, T.117 N., R.27 W., Hydrologic Unit 07010205, 0.1 mi south of Winsted.
Owner: Winsted Farmers Coop.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled industrial artesian well, diameter 4 in., depth 129 ft, screened 125 to 129 ft.
DATUM.--Altitude of land-surface datum is 1,015 ft. Measuring point: Top of casing, 1.40 ft above land-surface datum.
PERIOD OF RECORD.--November 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 30.63 ft below land-surface datum, Dec. 10, 1986; lowest, 45.50 ft below land-surface datum, Oct. 7, 1987.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	40.67	JAN 12	40.80	MAR 20	41.30	MAY 17	41.43	JUL 27	39.12	SEP 27	37.95

MEEKER COUNTY

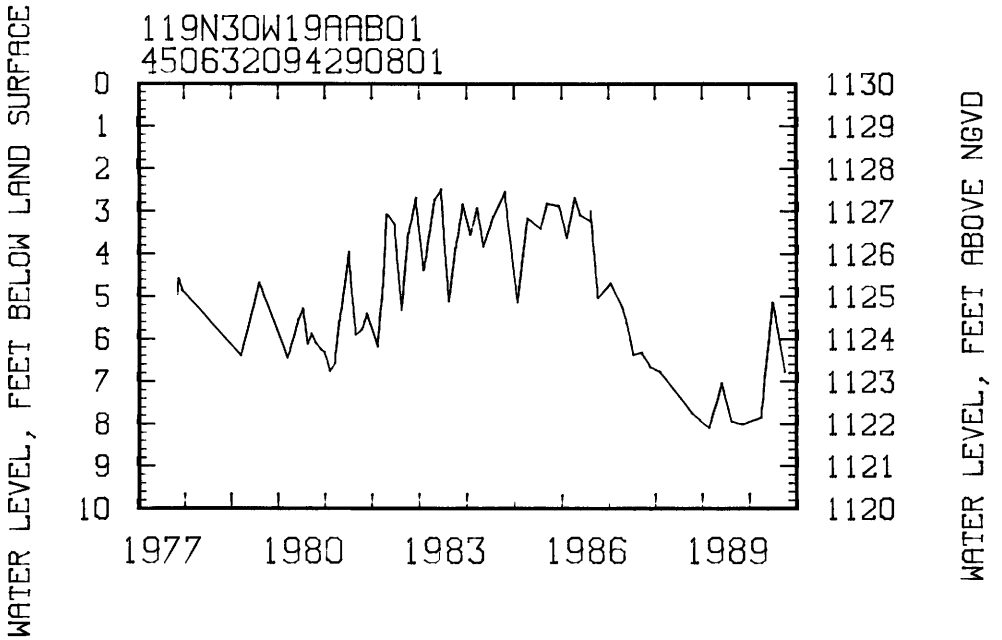
450632094290801. Local number, 119N30W19AAB01.
LOCATION.--Lat 45°06'32", long 94°29'08", in NW¼NE¼NE¼ sec.19, T.119 N., R.30 W., Hydrologic Unit 07010204, on Ted Carlson farm.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1½ in., depth 26 ft, screened 24 to 26 ft.
DATUM.--Altitude of land-surface datum is 1,130 ft. Measuring point: Top of casing, 3.30 ft above land-surface datum.
PERIOD OF RECORD.--November 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.47 ft below land-surface datum, June 14, 1983; lowest 8.09 ft below land-surface datum, Feb. 13, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	8.01	MAR 30	7.82	JUN 29	5.13	SEP 27	6.76

GROUND-WATER LEVELS

MEEKER COUNTY--Continued



451542094322301. Local number, 121N31W26BDC01.
LOCATION.--Lat 45°15'42", long 94°32'23", in SW¼SE¼NW¼ sec.26, T.121 N., R.31 W., Hydrologic Unit 07010204, on Keith Langmo farm.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1½ in., depth 16 ft, screened 14 to 16 ft.
DATUM.--Altitude of land-surface datum is 1,112 ft. Measuring point: Top of casing, 3.00 ft above land-surface datum.
PERIOD OF RECORD.--November 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.70 ft below land-surface datum, Aug. 18, 1986; lowest, 9.19 ft below land-surface datum, Mar. 30, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	9.18	MAR 30	9.19	JUN 29	5.34	SEP 27	6.09

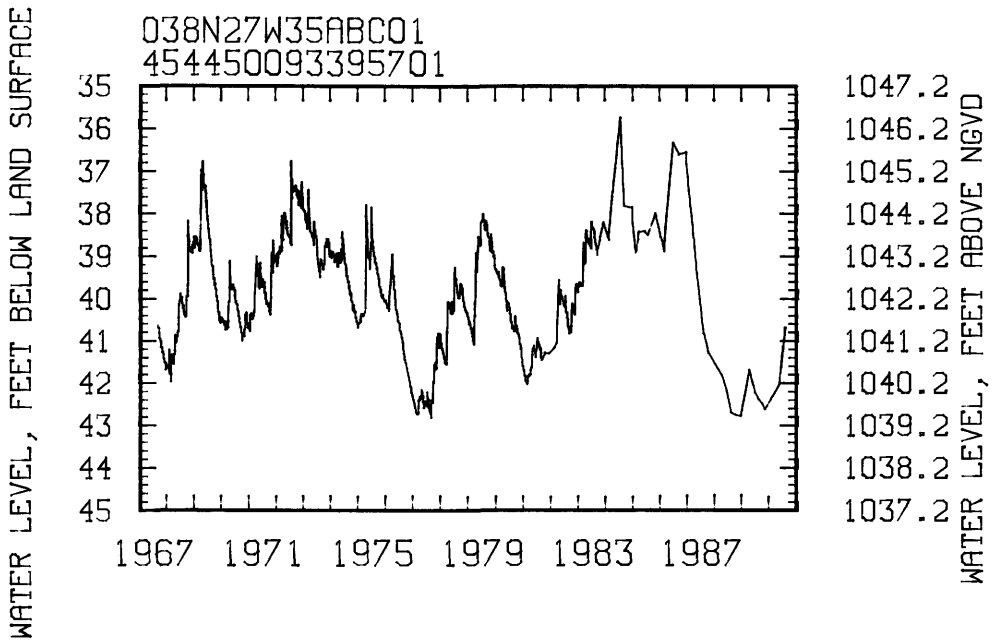
MILLE LACS COUNTY

454450093395701. Local number, 038N27W35ABC01.
LOCATION.--Lat 45°44'50", long 93°39'57", in SW¼NW¼NE¼ sec.35, T.38 N., R.27 W., Hydrologic Unit 07010207, in Milaca.
Owner: City of Milaca, creamery well.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 12 in., depth 82 ft, screened 67 to 82 ft.
DATUM.--Land-surface datum is 1,082.2 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of breather pipe, 4.00 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--September 1967 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 35.72 ft below land-surface datum, July 20, 1984; lowest, 42.81 ft below land-surface datum, Aug. 27, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	42.61	MAY 15	42.00	AUG 01	40.68

MILLE LACS COUNTY--Continued



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 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 06	15.50	DEC 01	15.38	FEB 02	16.05	APR 06	15.65	JUN 01	14.80	AUG 10	14.92
13	15.72	08	15.61	09	15.86	13	15.48	08	14.81	17	14.64
20	15.38	15	15.58	16	16.06	20	15.62	15	15.28	24	14.65
27	15.28	22	15.66	23	16.00	27	15.43	22	14.52	31	14.57
NOV 03	15.20	29	15.60	MAR 01	16.11	MAY 18	15.18	29	14.52	SEP 06	14.86
10	15.47	JAN 05	15.72	09	16.07	25	15.10	JUL 06	14.61	21	14.68
17	15.31	12	15.66	16	15.58			13	14.49	28	14.92
22	15.31	19	15.77	23	15.69			20	14.97		
		26	15.88	30	15.45			27	14.59		

GROUND-WATER LEVELS

MOWER COUNTY

434010093010801. Local number, 102N18W05ACB01.
LOCATION.--Lat 43°40'10", long 93°01'08", in NW¼SW¼NE¼ sec.5, T.102 N., R.18 W., Hydrologic Unit 07080201, in Austin.
Owner: Church of Latter Day Saints.
AQUIFER.--Cedar Valley Formation of Middle Devonian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 5 in., depth 100 ft, cased to 77 ft.
DATUM.--Altitude of land-surface datum is 1,230 ft. Measuring point: Top of casing, 0.80 ft above land-surface datum.
PERIOD OF RECORD.--July 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 33.69 ft below land-surface datum, May 10, 1984; lowest, 38.44 ft below land-surface datum, July 10, 1985.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 07	37.60	JAN 09	38.02	MAR 06	38.33	MAY 22	36.12	JUL 24	36.02	SEP 25	35.32

434417093521001. Local number, 103N17W09DAA01.
LOCATION.--Lat 43°44'17", long 93°52'10", in NE¼NE¼SE¼ sec.9, T.103 N., R.17 W., Hydrologic Unit 07080201, in Brownsdale.
Owner: Land O'Lakes, creamery well.
AQUIFER.--Cedar Valley Formation of Middle Devonian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 4 in., depth 130 ft, casing information not available.
DATUM.--Altitude of land-surface datum is 1,280 ft. Measuring point: Top of well cap, 0.40 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--February 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 35.97 ft below land-surface datum, May 2, 1984; lowest, 45.20 ft below land-surface datum, Mar. 30, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 04	41.18	JAN 11	41.37	JUN 13	41.32	AUG 13	38.75
NOV 29	41.29	MAY 03	40.97	JUL 31	41.13		

OLMSTED COUNTY

445538092232601. Local number, 105N13W04CAA01.
LOCATION.--Lat 44°55'38", long 92°23'26", in NW¼NW¼SW¼ sec.4, T.105 N., R.13 W., Hydrologic Unit 07040004, 1 mile east of Simpson.
Owner: Robert Sheehan.
AQUIFER.--Galena Formation of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 4 in., depth 75 ft, cased to 23 ft.
DATUM.--Altitude of land-surface datum is 1,270 ft: Measuring point: Top of well cap, 1.20 ft above land-surface datum.
PERIOD OF RECORD.--March 1987 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 20.75 ft below land-surface datum, June 13, 1990; lowest, 33.30 ft below land-surface datum, Feb. 6, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	32.09	JAN 04	32.80	MAR 14	30.98	JUN 13	20.75
NOV 29	32.59	FEB 06	33.30	APR 10	30.45		

435757092224201. Local number, 106N13W22CCB01.
LOCATION.--Lat 43°5'57", long 92°22'42", in NW¼SW¼SW¼ sec. 22, T.106 N., R.13 W., Hydrologic Unit 07040004, at Burr Oak School.
Owner: Independent School District 535.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 6 in. depth 510 ft, cased to 430 ft.
DATUM.--Altitude of land-surface datum is 1,090 ft: Measuring point: Top of well cap, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--February 1987 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 28.01 ft below land-surface datum, Feb. 25, 1987; lowest, 32.63 ft below land-surface datum, Feb. 6, 1990.

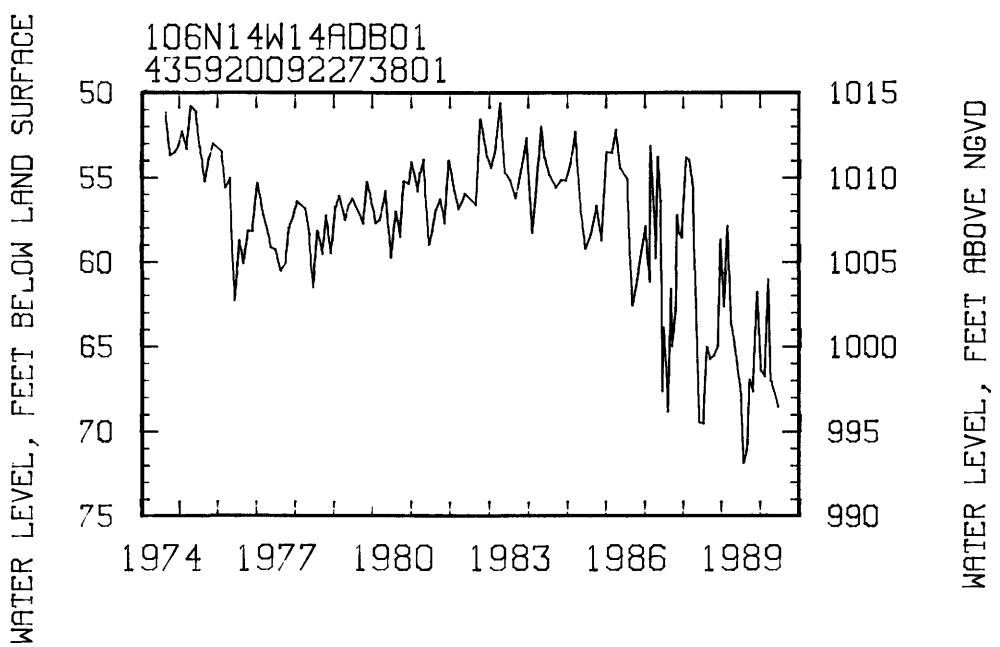
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 04	32.36	FEB 06	32.63	MAR 14	32.22	APR 10	32.54	JUN 13	30.72

435920092273801. Local number, 106N14W14ADB01.
LOCATION.--Lat 43°59'20", long 92°27'38", in NW¼SE¼NE¼ sec.14, T.106 N., R.14 W., Hydrologic Unit 07040004, in Rochester.
Owner: Golden Hill School Dist. #1371.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 6 in., depth 478 ft, cased to 397 ft.
DATUM.--Altitude of land-surface datum is 1,065 ft. Measuring point: Edge of well cap, 1.80 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--August 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 50.58 ft below land-surface datum, Apr. 12, 1983; lowest, 71.86 ft below land-surface datum, July 26, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	67.60	JAN 04	66.43	MAR 14	60.97	JUN 13	68.49
NOV 29	61.69	FEB 06	66.70	APR 10	66.99		



GROUND-WATER LEVELS

RAMSEY COUNTY

445955093011001. Local number, 029N22W14CAB01.
LOCATION.--Lat 44°59'55", long 93°01'10", in NW¼NE¼SW¼ sec.14, T.29 N., R.22 W., Hydrologic Unit 07010206, at Goodrich Golf Course.
Owner: Ramsey County.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in., depth 523 ft, cased to 303 ft.
DATUM.--Altitude of land-surface datum is 970 ft. Measuring point: Edge of vent pipe, 2.50 ft above land-surface datum.
PERIOD OF RECORD.--May 1965, April 1966 to August 1966, August 1971, May 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 124.62 ft below land-surface datum, Feb. 6, 1987; lowest, 140.60 ft below land-surface datum, Apr. 6, 1966.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	131.06	JAN 16	131.83	MAR 13	131.60	APR 30	131.87	JUL 20	135.11	SEP 21	137.24

445955093011002. Local number, 029N22W14CAB02.
LOCATION.--Lat 44°59'55", long 93°01'10", in NW¼NE¼SW¼ sec.14, T.29 N., R.22 W., Hydrologic Unit 07010206, at Goodrich Golf Course.
Owner: U.S. Geological Survey.
AQUIFER.--Buried gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation artesian well, diameter 2 in., depth 81 ft, screened 78 to 81 ft.
DATUM.--Altitude of land-surface datum is 970 ft. Measuring point: Top of casing, 1.30 ft above land-surface datum.
PERIOD OF RECORD.--October 1966 to August 1971, August 1977, June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 30.80 ft below land-surface datum, Oct. 28, 1986; lowest, 45.36 ft below land-surface datum, June 3, 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	38.86	JAN 16	39.78	MAR 13	40.39	APR 30	40.84	JUL 20	38.88	SEP 12	37.34

445955093011003. Local number, 029N22W14CAB03.
LOCATION.--Lat 44°59'55", long 93°01'10", in NW¼NE¼SW¼ sec.14, T.29 N., R.22 W., Hydrologic Unit 07010206, at Goodrich Golf Course.
Owner: U.S. Geological Survey.
AQUIFER.--Buried gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 2 in., depth 52 ft, screened 49 to 52 ft.
DATUM.--Altitude of land-surface datum is 970 ft. Measuring point: Top of casing, 1.80 ft above land-surface datum.
PERIOD OF RECORD.--October 1966 to August 1971, June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.97 ft below land-surface datum, Oct. 28, 1986; lowest, 25.43 ft below land-surface datum, June 3, 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	21.98	JAN 16	22.87	MAR 13	23.72	APR 30	24.19	JUL 20	22.69	SEP 12	20.00

450001093024701. Local number, 029N22W16ADD01.
LOCATION.--Lat 45°00'01", long 93°02'47", in SE¼SE¼NE¼ sec.16, T.29 N., R.22 W., Hydrologic Unit 07010206, at 1955 English St.
Owner: Maplewood Bowl.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 4 in., depth 163 ft, screened 158 to 163 ft.
DATUM.--Altitude of land-surface datum is 900 ft. Measuring point: Top of well cap, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--January 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 65.99 ft below land-surface datum, Feb. 6, 1987; lowest, 73.83 ft below land-surface datum, Apr. 30, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	73.14	JAN 16	73.32	MAR 13	73.65	APR 30	73.83	JUL 20	73.45	SEP 12	73.32

445918092590901. Local number, 029N22W24ADA01.
LOCATION.--Lat 44°59'18", long 92°59'09", in NE¼SE¼NE¼ sec.24, T.29 N., R.22 W., Hydrologic Unit 07010206, at 1555 Century Avenue.
Owner: Northern States Power Co., Maplewood Gas Plant.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled fire protection artesian well, diameter 12 in., depth 523 ft, cased to 420 ft.
DATUM.--Land-surface datum is 996.5 ft National Geodetic Vertical Datum of 1929. Measuring point: Edge of 2 in. breather pipe, 2.40 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--August 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 131.90 ft below land-surface datum, Mar. 9, 1987; lowest, 151.0 ft below land-surface datum, May 14, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 30	145.35	MAR 19	139.55

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.
AQUIPER.--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, 28.76 ft below land-surface datum, Apr. 7, 1986; lowest, 83.28 ft below land-surface datum, Aug. 4, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATAUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	53.30	DEC 5	35.50	FEB 5	34.17	APR 5	34.14	JUN 5	59.15	AUG 5	62.29
10	48.84	10	34.84	10	34.89	10	33.63	10	59.02	10	73.31
15	52.84	15	38.01	15	35.22	15	32.58	15	70.51	15	73.51
20	38.18	20	38.19	20	34.49	20	52.66	20	67.89	20	68.52
25	65.63	25	35.73	25	34.65	25	70.06	25	70.71	25	71.77
31	39.23	31	33.48	28	34.88	30	37.19	30	67.99	31	76.25
NOV 5	36.45	JAN 5	34.94	MAR 5	34.60	MAY 5	52.25	JUL 5	70.79	SEP 5	78.64
10	38.18	10	34.50	10	33.71	10	39.04	10	72.88	10	74.29
15	38.27	15	33.26	15	34.56	15	46.92	15	64.68	15	64.55
20	36.66	20	33.85	20	33.17	20	38.58	20	72.29	20	61.50
25	35.39	25	34.20	25	32.08	25	56.13	25	74.36	25	66.68
30	37.27	31	35.23	31	34.06	31	62.49	31	70.83	30	49.82

450026093084201. Local number, 029N23W11CCC01.
LOCATION.--Lat 45°00'26", long 93°08'42", in SW¼SW¼SW¼ sec.11, T.29 N., R.23 W., Hydrologic Unit 07010206, at 2204 North Lexington Avenue, Roseville.
Owner: Lexington Court Apartments.
AQUIFER.--St. Peter Sandstone of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 6 in., depth 325 ft, cased to 192 ft.
DATUM.--Altitude of land-surface datum is 945 ft. Measuring point: Top of well cap, 1.40 ft above land-surface datum.
PERIOD OF RECORD.--January 1971 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 104.77 ft below land-surface datum, Mar. 30, 1987; lowest, 111.30 ft below land-surface datum, Sept. 12, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	110.01	JAN 16	110.38	FEB 26	110.62	APR 30	110.83	JUL 16	111.09	SEP 12	111.30

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 DATAUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	224.86	DEC 5	224.67	APR 5	215.80	JUN 5	212.91	AUG 5	211.91
10	224.63	10	224.67	10	215.43	10	213.44	10	211.49
15	224.64	15	224.75	15	214.95	15	213.44	15	211.36
20	224.80	20	224.54	20	214.08	20	213.24	20	211.44
25	224.60	25	223.73	25	213.49	25	213.30	25	211.32
31	224.84	31	222.76	30	213.53	30	213.04	31	211.45
NOV 5	225.22	JAN 5	222.64	MAY 5	213.53	JUL 5	213.12	SEP 5	211.69
10	225.45	10	222.08	10	213.24	10	213.03	10	211.90
15	225.42	MAR 15	217.03	15	213.08	15	212.77	15	212.04
20	225.48	20	217.10	20	213.07	20	212.80	20	212.29
25	224.89	25	216.32	25	212.91	25	212.46	25	212.30
30	225.27	31	216.04	31	213.05	31	212.12		

445739093081201. Local number, 029N23W35BAD01.
LOCATION.--Lat 44°57'39", long 93°08'12", in SE¼NE¼NW¼ sec.35, T.29 N., R.23 W., Hydrologic Unit 07010206, Victoria Street, 0.35 mi north of University Avenue.
Owner: City of St. Paul.
AQUIFER.--St. Peter Sandstone of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 16 in., depth 234 ft, screened 174 to 234 ft.
DATUM.--Altitude of land-surface datum is 888 ft. Measuring point: Top of coupling, 0.50 ft above land-surface datum.
PERIOD OF RECORD.--May 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 118.83 ft below land-surface datum, Feb. 2, 1987; lowest, 133.03 ft below land-surface datum, May 5, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	120.49	JAN 03	119.92	FEB 26	120.15	APR 30	119.64	JUL 16	120.46	SEP 12	120.83

RAMSEY COUNTY--Continued

450414093012701. Local number, 030N22W23CBB01.
LOCATION.--Lat 45°04'14", long 93°01'27", in NW¼NW¼SW¼ sec.23, T.30 N., R.22 W., Hydrologic Unit 07010206, Hoffman Road, 0.85 mi southwest of Highway 61.
Owner: White Bear Town Hall.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 96 ft, screened 91 to 96 ft.
DATUM.--Altitude of land-surface datum is 928 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--April 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.54 ft below land-surface datum, Oct. 28, 1986; lowest, 28.08 ft below land-surface datum, May 15, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	27.62	JAN 16	27.71	MAR 13	28.07	MAY 15	28.08	JUL 26	27.98	SEP 21	27.71

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 DATAUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	142.26	DEC 5	141.83	FEB 5	142.18	APR 5	143.29	JUN 5	138.17	AUG 5	140.25
10	141.95	10	142.22	10	142.16	10	143.58	10	138.92	10	140.52
15	141.03	15	142.25	15	142.27	15	141.74	15	139.51	15	140.30
20	141.89	20	142.47	20	142.34	20	140.36	20	139.11	20	140.44
25	140.78	25	142.14	25	142.53	25	139.65	25	138.90	25	140.36
31	142.23	31	141.97	28	142.22	30	139.40	30	140.24	31	140.75
NOV 5	141.97	JAN 5	142.21	MAR 5	142.08	MAY 5	138.41	JUL 5	143.85	SEP 5	140.29
10	142.04	10	142.13	10	142.04	10	138.86	10	142.90	10	140.22
15	141.81	15	142.18	15	141.81	15	138.18	20	143.98	15	140.77
20	142.01	20	142.12	20	142.08	20	137.80	25	143.61	20	139.26
25	141.66	25	142.09	25	141.96	25	138.20	31	140.70	25	139.24
30	141.92	31	142.22	31	141.70	31	138.34			30	141.47

REDWOOD COUNTY

441323095280701. Local number, 109N38W30BBD01.
LOCATION.--Lat 44°13'23", long 95°28'07", in SE¼NW¼NW¼ sec.30, T.109 N., R.38 W., Hydrologic Unit 07020008, at city of Walnut Grove.
Owner: Plum Creek Cheese Co.
AQUIFER.--Sandstone of Cretaceous Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 5 in., depth 240 ft, casing depth not available.
DATUM.--Altitude of land-surface datum is 1,218 ft. Measuring point: Top of well seal, 0.55 ft above land-surface datum.
PERIOD OF RECORD.--August 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 24.20 ft below land-surface datum, April 3, 1984; lowest, 26.80 ft below land-surface datum, Sept. 26, 1984.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

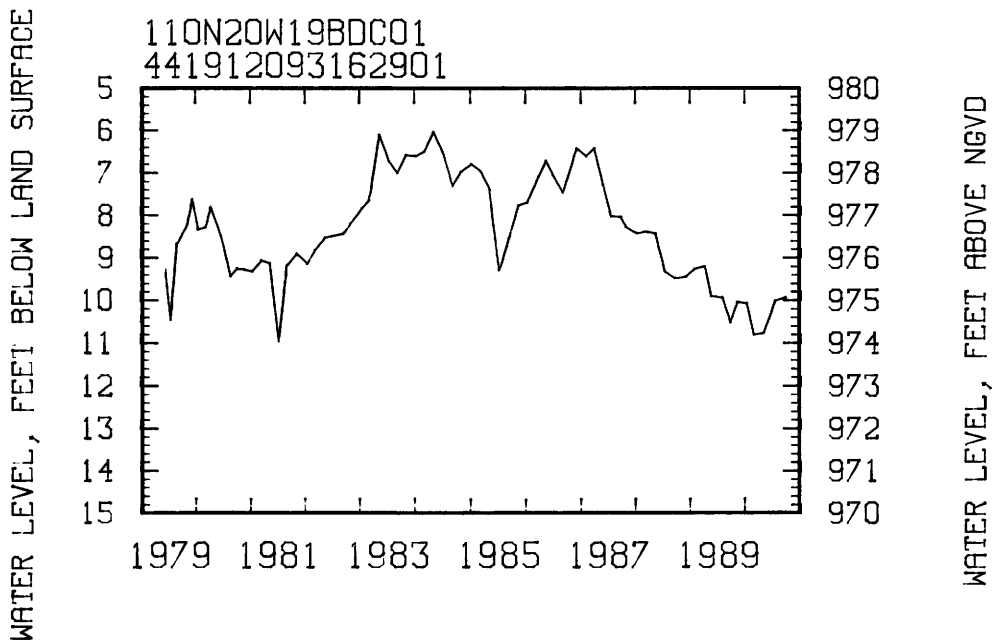
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 29	26.30	JAN 17	26.28	APR 12	26.14	JUN 07	25.89	SEP 04	26.00

RICE COUNTY

441912093162901. Local number, 110N20W19BDC01.
LOCATION.--Lat 44°19'12", long 93°16'29", in SW¼SE¼NW¼ sec.19, T.110 N., R.20 W., Hydrologic Unit 07040002, just north of Faribault.
Owner: St. Lawrence Cemetery Assn.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 400 ft, cased to 357 ft.
DATUM.--Altitude of land-surface datum is 985 ft. Measuring point: Top of casing, 1.60 ft above land-surface datum.
PERIOD OF RECORD.--June 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 6.02 ft below land-surface datum, May 2, 1984; lowest: 10.94 ft below land-surface datum, July 10, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 07	10.02	JAN 09	10.06	FEE 27	10.80	MAY 02	10.74	JUL 18	9.99	SEP 25	9.91



442543093113701. Local number, 111N20W11CDC01.
LOCATION.--Lat 44°25'43", long 93°11'37", in SW¼SE¼SW¼ sec.11, T.111 N., R.20 W., Hydrologic Unit 07040002, Highway 218 at Dundas.
Owner: Rollie Green.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled commercial artesian well, diameter 4 in., depth 158 ft, cased to 101 ft.
DATUM.--Altitude of land-surface datum is 950 ft. Measuring point: Top of casing, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--October 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 21.72 ft below land-surface datum, May 14, 1986; lowest, 27.24 ft below land-surface datum, Jan. 12, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 01	25.80	JAN 09	25.86	FEB 27	25.89	MAY 02	25.02	JUL 18	24.07	SEP 25	26.25

RICE COUNTY--Continued

442751093240701. Local number, 112N21W31CBB01.
LOCATION.--Lat 44°27'51", long 93°24'07", in NW¼NW¼SW¼ sec.31, T.112 N., R.21 W., Hydrologic Unit 07040002, 1.0 mi south of Highway 19.
Owner: Trondhiem Church.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 276 ft, cased to 232 ft.
DATUM.--Altitude of land-surface datum is 1,130 ft. Measuring point: Top of casing, 1.10 ft above land-surface datum.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 136.06 ft below land-surface datum, Sept. 21, 1987; lowest, 141.8 ft below land-surface datum, Oct. 30, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 15	140.22	MAR 02	140.71	JUL 19	140.53	SEP 19	140.52

SCOTT COUNTY

443732093460301. Local number, 113N24W06BCB01.
LOCATION.--Lat 44°37'32", long 93°46'03", in NW¼SW¼NW¼ sec.6, T.113 N., R.24 W., Hydrologic Unit 07020012, in Belle Plaine.
Owner: Creative Tool and Engineering. Formerly Belle Plaine Coop Creamery.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 12 in., depth 272 ft, screen information not available.
DATUM.--Altitude of land-surface datum is 840 ft. Measuring point: Top of well cap, 2.30 ft above land-surface datum.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 116.77 ft below land-surface datum, July 11, 1983; lowest, 143.96 ft below land-surface datum, July 9, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 08	121.37	JAN 10	121.36	FEB 28	121.86	MAY 16	121.00	JUL 19	120.06	SEP 19	120.26

443352093423001. Local number, 113N24W28DAA01.
LOCATION.--Lat 44°33'52", long 93°42'30", in NE¼NE¼SE¼ sec.28, T.113 N., R.24 W., Hydrologic Unit 07020012, at Michelle Wildlife Area.
Owner: U.S. Geological Survey.
AQUIFER.--Ironton-Galesville Sandstones of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 6 in., depth 450 ft, cased to 219 ft.
DATUM.--Altitude of land-surface datum is 990 ft. Measuring point: Top of well seal, 2.30 ft above land-surface datum.
PERIOD OF RECORD.--August 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 131.70 ft below land-surface datum, May 2, 1984; lowest, 137.07 ft below land-surface datum, Aug. 15, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 15	136.47	JAN 11	136.26	MAR 02	136.32	MAY 16	135.51	JUL 19	135.70	SEP 19	135.56

443715093480801. Local number, 113N25W02CAC01.
LOCATION.--Lat 44°37'15", long 93°48'08", in SW¼NE¼SW¼ sec.2, T.113 N., R.25 W., Hydrologic Unit 07020012, 0.75 mi west of Belle Plaine at Shep's Gravel Pit.
Owner: U.S. Geological Survey.
AQUIFER.--Ironton-Galesville Sandstones of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 4 in., depth 323 ft, cased to 193 ft.
DATUM.--Altitude of land-surface datum is 750 ft. Measuring point: Top of casing, 0.25 ft above land-surface datum.
PERIOD OF RECORD.--October 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.59 ft below land-surface datum, May 7, 1986; lowest, 10.86 ft below land-surface datum, Sept. 27, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 08	10.57	MAY 23	10.33	SEP 19	9.74

444025093220801. Local number, 114N21W20BAA01.
LOCATION.--Lat 44°40'25", long 93°22'08", in NE¼NE¼NW¼ sec.20, T.114 N., R.21 W., Hydrologic Unit 07020012, 0.5 mi east of Credit River.
Owner: Credit River Town Hall.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 98 ft, screened 93 to 98 ft.
DATUM.--Altitude of land-surface datum is 946 ft. Measuring point: Top of casing, 1.10 ft above land-surface datum.
PERIOD OF RECORD.--September 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 34.00 ft below land-surface datum, Feb. 3, 1987; lowest, 40.72 ft below land-surface datum, July 16, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 15	39.53	JAN 11	39.09	MAR 02	39.44	MAY 16	39.53	JUL 19	39.79	SEP 19	39.99

443752093254401. Local number, 114N22W35DCC01.
LOCATION.--Lat 44°37'52", long 93°25'44", in SW¼SW¼SE¼ sec.35, T.114 N., R.22 W., Hydrologic Unit 07020012, southwest of Credit River.
Owner: St. Catherine's Church.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 235 ft, cased to 194 ft.
DATUM.--Altitude of land-surface datum is 1,015 ft. Measuring point: Top of casing, 1.20 ft above land-surface datum.
PERIOD OF RECORD.--September 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 83.27 ft below land-surface datum, Dec. 4, 1986; lowest, 90.30 ft below land-surface datum, Sept. 6, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 15	87.52	JAN 11	87.68	MAR 02	87.82	MAY 16	88.03	JUL 19	88.50	SEP 19	87.92

444633093212901. Local number, 115N21W09CCC01.
LOCATION.--Lat 44°46'33", long 93°21'29", in SW¼SW¼SW¼ sec.9, T.115 N., R.21 W., Hydrologic Unit 07020012, at Savage waste treatment plant.
Owner: City of Savage, well 2.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age and Hinckley Sandstone of Late Precambrian Age.
WELL CHARACTERISTICS.--Drilled public-supply artesian well, depth 846 ft, 16 in. casing 0 ft to 280 ft, 10 in. casing 250 ft to 660 ft.
DATUM.--Land-surface datum is 730 ft. Measuring point: Edge of vent pipe 0.75 ft above land-surface datum.
PERIOD OF RECORD.--February 1971 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.98 ft below land-surface datum, Aug. 9, 1979; lowest, 80.65 ft below land-surface datum, July 12, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 28	69.59	MAY 03	62.77	JUL 19	69.09	SEP 19	77.92

444427093353901. Local number, 115N23W28BDD01.
LOCATION.--Lat 44°44'27", long 93°43'53", in SE¼SE¼NW¼ sec.28, T.115 N., R.23 W., Hydrologic Unit 07020012, Merriam Junction.
Owner: Chicago and Northwestern Transportation Company.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 16 in., depth 140 ft, cased to 75 ft.
DATUM.--Altitude of land-surface datum is 758 ft. Measuring point: Top of casing, 0.90 ft above land-surface datum.
PERIOD OF RECORD.--November 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 25.75 ft below land-surface datum, Mar. 8, 1985; lowest, 42.84 ft below land-surface datum, Jan. 20, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 04	42.20	JAN 11	42.95	MAY 03	43.10	SEP 19	41.33
NOV 03	42.28	FEB 28	43.20	JUL 19	42.20		

444427093353902. Local number, 115N23W28BDD02.
LOCATION.--Lat 44°44'27", long 93°35'39", in SE¼SE¼NW¼ sec.28, T.115 N., R.23 W., Hydrologic Unit 07020012, Merriam Junction.
Owner: Chicago and Northwestern Transportation Company.
AQUIFER.--Ironton-Galesville Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 4 in., depth 355 ft, screened 350 to 355 ft.
DATUM.--Altitude of land-surface datum is 758 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--November 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 20.52 ft below land-surface datum, Mar. 21, 1986; lowest, 43.99 ft below land-surface datum, July 14, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATAUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 20	36.65	DEC 5	27.79	FEB 5	24.40	APR 5	32.00	JUN 5	33.41	AUG 5	32.49
25	36.26	10	26.09	10	24.33	10	31.15	10	35.32	10	36.46
31	34.88	15	25.65	MAR 5	24.45	15	28.18	15	35.19	15	41.22
NOV 5	30.69	20	25.42	10	24.18	20	32.48	20	31.83	20	38.78
10	34.81	25	24.97	15	27.63	25	33.04	25	31.35	25	33.95
15	34.82	31	24.82	20	29.80	30	31.52	30	32.84	31	36.59
20	31.69	JAN 5	24.88	25	27.57	MAY 5	29.45	JUL 5	35.88	SEP 5	34.82
25	28.29	10	24.77	31	27.95	10	34.20	10	35.70	10	36.80
31	26.87	15	24.64			15	31.77	15	30.12	15	37.74
		20	24.67			20	31.68	20	35.74	20	36.31
		25	24.53			25	35.09	25	37.60	25	36.30
		31	24.46			31	33.41	31	33.35	30	32.05

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 arteaian 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 DATAUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	52.10	MAR 5	46.47	MAY 5	44.77	SEP 5	50.33
10	51.61	10	46.24	10	44.73	10	50.43
15	51.32	15	46.08	15	44.85	15	40.45
20	51.77	20	46.32	20	45.00	20	50.45
25	51.66	25	46.33	JUL 25	47.56	25	49.47
31	51.59	31	46.20	31	47.69	30	49.28
NOV 5	50.59	APR 5	45.88	AUG 5	47.59		
10	50.36	10	45.57	10	47.61		
15	49.99	15	45.03	15	48.52		
20	48.31	20	44.69	20	49.60		
FEB 28	46.47	25	44.72	25	49.66		
		30	44.96	31	49.94		

STEELE COUNTY

435742093164001. Local number, 106N20W30BAD01.
LOCATION.--Lat 43°57'42", long 93°16'40", in SE¼NE¼NW¼ sec.30, T.106 N., R.20 W., Hydrologic Unit 07040002, at Hope.
Owner: Hope Elevator.
AQUIFER.--Galena Formation of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled commerical artesian well, diameter 5 in., depth 215 ft, cased to 108 ft.
DATUM.--Altitude of land-surface datum is 1,198 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--November 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 29.90 ft below land-surface datum, May 10, 1984; lowest, 34.48 ft below land-surface datum, July 10, 1985.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 07	33.28	JAN 09	33.36	MAR 06	33.63	MAY 22	31.92	JUL 24	30.92	SEP 25	31.57

435611093163001. Local number 106N20W31DCC01.
LOCATION.--Lat 43°56'11", long 93°16'30", in SW¼SW¼SE¼ sec.31, T.106 N., R.20 W., Hydrologic Unit 07040002, 1.75 mi south of city of Hope.
Owner: Owatonna Gun Club.
AQUIFER.--Galena formation of middle Ordovician age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 168 ft, cased to 97 ft.
DATUM.--Altitude of land-surface datum is 1,180 ft. Measuring point: Top of casing, 1.40 ft above land-surface datum.
PERIOD OF RECORD.--November 1989 to September 1990.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.66 ft below land-surface datum, May 10, 1984; lowest, 4.97 ft below land-surface datum, Jan. 9, 1990.

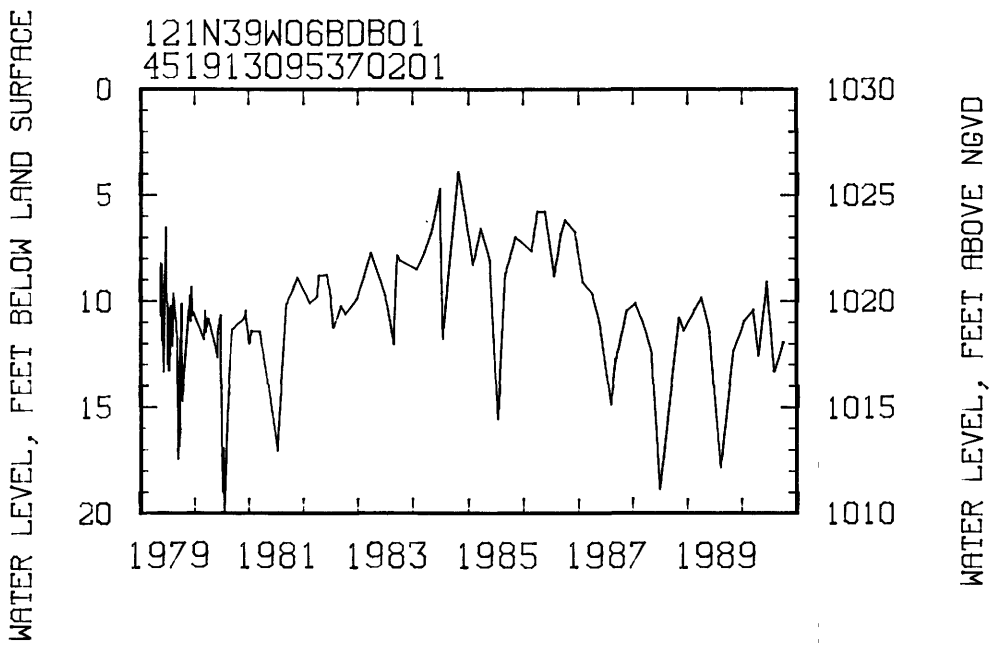
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATAUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 07	4.78	MAR 06	4.92	JUN 13	2.88	SEP 25	3.14
JAN 09	4.97	MAY 22	3.63	JUL 24	2.64		

451913095370201. Local number, 121N39W06BDB01.
LOCATION.--Lat 45°19'13", long 95°37'02", in NW¼SE¼NW¼ sec.6, T.121 N., R.39 W., Hydrologic Unit 07020005, in Ambush Park.
Owner: City of Benson.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 3 in., depth 143 ft, screened 123 to 143 ft.
DATUM.--Altitude of land-surface datum is 1,030 ft. Measuring point: Top of casing 3.00 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--May 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.85 ft below land-surface datum, Oct. 25, 1984; lowest, 19.90 ft below land-surface datum, July 24, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 02	12.28	MAR 14	10.36	JUN 14	9.05	SEP 27	11.92
JAN 09	10.91	APR 19	12.54	AUG 03	13.33		



GROUND-WATER LEVELS

WABASHA COUNTY

442708092155401. Local number, 111N12W04BBD01.
LOCATION.--Lat 44°27'08", long 92°15'54", in SE¼NW¼NW¼ sec.04, T.111 N., R.12 W., Hydrologic Unit 07040001, at Lake City.
Owner: City of Lake City, well 3.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 16 in., depth 430 ft, cased to 258 ft.
DATUM.--Altitude of land-surface datum is 685 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
REMARKS.--Measured weekly by David Finley.
PERIOD OF RECORD.--August 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.63 ft below land-surface datum, May 5, 1975; lowest, 11.50 ft below land-surface datum, Jan. 31, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

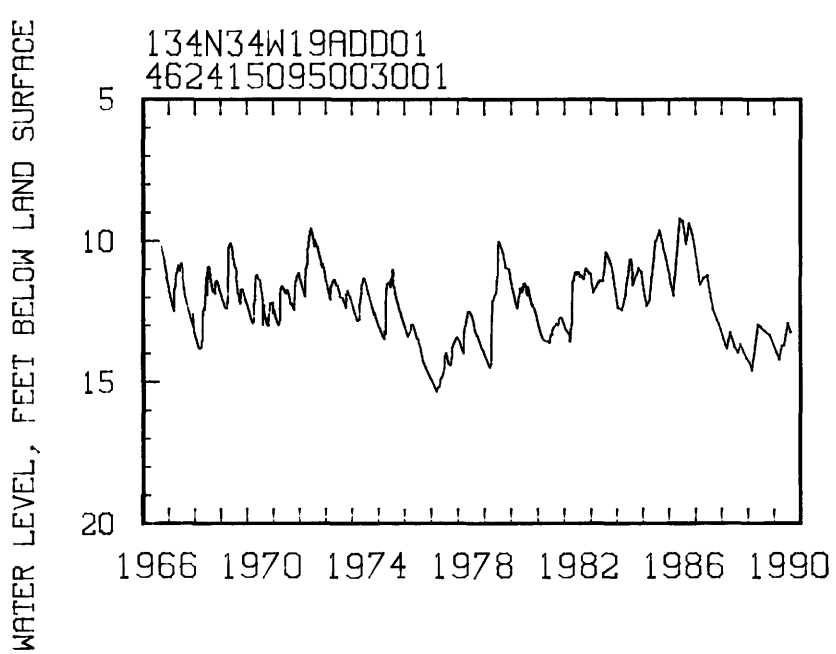
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 02	11.12	DEC 04	10.79	FEB 05	11.11	APR 02	10.24	JUN 04	9.82	AUG 05	9.62
09	11.18	11	11.24	12	10.99	09	10.38	11	9.23	13	10.40
16	11.15	18	11.37	20	11.27	16	10.64	18	7.71	20	10.53
23	10.79	26	11.15	26	11.20	23	10.62	25	7.88	27	10.11
30	11.07	JAN 02	11.12	MAR 05	11.22	30	10.06	JUL 02	8.02	SEP 04	10.52
NOV 06	11.05	08	10.82	12	10.45	MAY 07	9.12	08	9.19	10	10.62
13	11.04	17	11.17	19	8.62	14	9.50	16	9.72	17	10.48
20	11.18	29	11.01	26	9.39	21	9.20	23	10.36	24	10.43
27	10.90					29	9.50	30	9.98		

WADENA COUNTY

462415095003001. Local number, 134N34W19ADD01.
LOCATION.--Lat 46°24'21", long 95°00'36", in SE¼SE¼NE¼ sec.19, T.134 N., R.34 W., Hydrologic Unit 07010107, 0.05 mi north of Verndale.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial outwash sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 2 in., depth 37 ft, screened 34 to 37 ft.
DATUM.--Altitude of land-surface datum is 1,342 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--September 1966 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.18 ft below land-surface datum, May 23, 1986; lowest, 15.33 ft below land-surface datum, Mar. 10-11, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 25	13.33	FEB 02	14.00	APR 03	13.69	MAY 07	13.65	JUL 03	12.88	AUG 08	13.21
JAN 18	13.91	MAR 01	14.19								



GROUND WATER LEVELS

WASHINGTON COUNTY

445125092464001. Local number, 027N20W02BCC01.
LOCATION.--Lat 44°51'25", long 92°46'40", in SW¼SW¼NW¼ sec.2, T.27 N., R.20 W., Hydrologic Unit 07030005, in Afton State Park by Afton Alps.
Owner: U.S. Geological Survey.
AQUIFER.--St. Lawrence Formation and Franconian Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 6 in., depth 285 ft, cased to 105 ft.
DATUM.--Altitude of land-surface datum is 695 ft. Measuring point: Center of pressure guage, 3.80 ft above land-surface datum.
PERIOD OF RECORD.--March 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 33.94 ft above land-surface datum, May 2, 1980; lowest, 19.67 ft above land-surface datum, Jan.8, 1985.

WATER LEVEL, IN FEET ABOVE LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL
NOV 14	+28.87

445125092464002. Local number, 027N20W02BCC02.
LOCATION.--Lat 44°51'25", long 92°46'40", in SW¼SW¼NW¼ sec.2, T.27 N., R.20 W., Hydrologic Unit 07030005, in Afton State Park by Afton Alps.
Owner: U.S. Geological Survey.
AQUIFER.--Ironton-Galesville Sandstones of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 4 in., depth 385 ft, cased to 365 ft.
DATUM.--Altitude of land-surface datum is 695 ft. Measuring point: Center of pressure guage, 3.80 ft above land-surface datum.
PERIOD OF RECORD.--March 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 42.35 ft above land-surface datum, May 2, 1980; lowest, 23.81 ft above land-surface datum, Jan. 8, 1985.

WATER LEVEL, IN FEET ABOVE LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	+32.55	JUL 20	+34.16

445125092464003. Local number, 027N20W02BCC03.
LOCATION.--Lat 44°51'25", long 92°46'40", in SW¼SW¼NW¼ sec.2, T.27 N., R.20 W., Hydrologic Unit 07030005, in Afton State Park by Afton Alps.
Owner: U.S. Geological Survey.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 1¼ in., depth 535 ft, screened 530 to 535 ft.
DATUM.--Altitude of land-surface datum is 695 ft. Measuring point: Center of pressure guage, 3.40 ft above land-surface datum.
PERIOD OF RECORD.--March 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 22.05 ft above land-surface datum, May 2, 1980; lowest, 3.40 ft above land-surface datum, Nov. 14, 1989.

WATER LEVEL, IN FEET ABOVE LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	+3.40	JUL 20	+4.90

445751092563101. Local number, 027N21W28BCC01.
LOCATION.--Lat 44°47'51", 92°56'31", in SW¼SW¼NW¼ sec.28, T.27 N., R.21 W., Hydrologic Unit 07010206, 0.1 mi east of Ideal Avenue South.
Owner: Eugene Smallidge.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation water-table well, diameter 16 in., depth 345 ft, cased to 60 ft.
DATUM.--Altitude of land-surface datum is 807 ft. Measuring point: Hole in pump base, 2.10 ft above land-surface datum.
PERIOD OF RECORD.--August 1977, January 1978, December 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 60.32 ft below land-surface datum, Oct. 28, 1986; lowest, 81.87 ft below land-surface datum, Aug. 3, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 30	72.73	JAN 05	73.20	FEB 27	74.29	MAY 02	74.09	JUL 18	69.72	SEP 13	67.92

445536092462401. Local number, 028N20W11CAA01.
LOCATION.--Lat 44°55'36", long 92°46'24", in NE¼NE¼SW¼ sec.11, T.28 N., R.20 W., Hydrologic Unit 07030005, at Lake St. Croix Beach.
Owner: Lower St. Croix Valley Fire Department.
AQUIFER.--Franconian Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled domestic water-table well, diameter 4 in., depth 94 ft, cased to 78 ft.
DATUM.--Altitude of land-surface datum is 720 ft. Measuring point: Top of electrical housing, 1.70 ft above land-surface datum.
PERIOD OF RECORD.--June 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 31.27 ft, 5 below land-surface datum, May 1, 1986; lowest, 38.79 ft below land-surface datum, Jan. 16, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

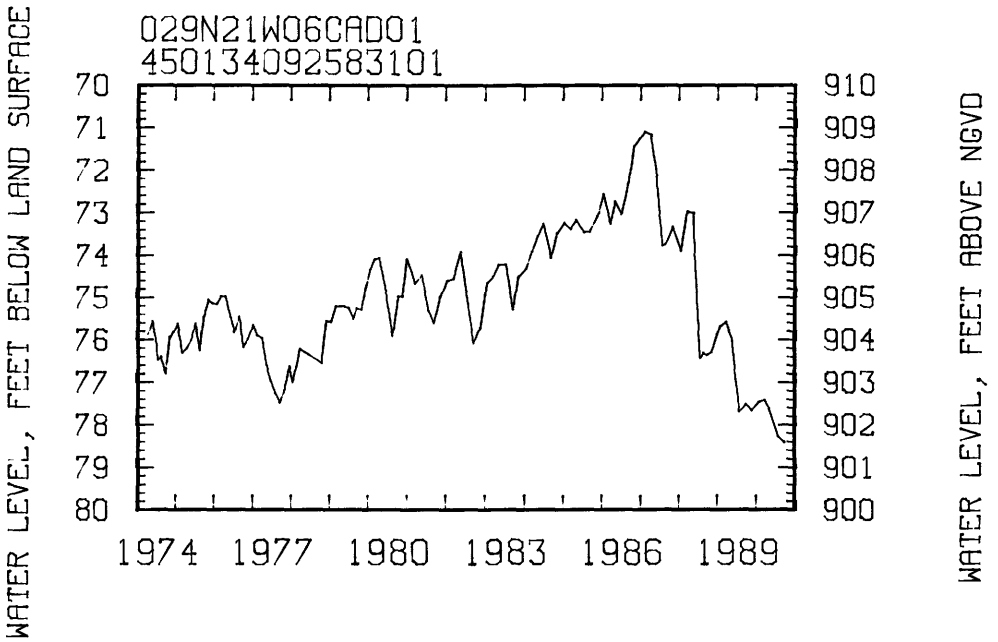
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	38.43	JAN 16	38.79	MAR 19	38.40	APR 30	38.30	JUL 20	35.64	SEP 12	37.50

450134092583101. Local number, 029N21W06CAD01.
LOCATION.--Lat 45°01'34", long 92°58'31", in SE¼NE¼SW¼ sec.6, T.29 N., R.21 W., Hydrologic Unit 07010206, at 6488 North Highway 36 Boulevard.
Owner: Twenty Nine Pines Trailer Park.
AQUIFER.--St. Peter Sandstone of Middle Ordovician Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 6 in., depth 210 ft, cased to 141 ft.
DATUM.--Altitude of land-surface datum is 980 ft. Measuring point: Hole in pump base, 2.20 ft above land-surface datum.
PERIOD OF RECORD.--April 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 71.07 ft below land-surface datum, Feb. 6, 1987; lowest, 78.40 ft below land-surface datum, Sep. 12, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	77.65	JAN 16	77.44	MAR 13	77.39	APR 30	77.64	JUL 20	78.26	SEP 12	78.40

WASHINGTON COUNTY--Continued



450027092552101. Local number, 029N21W10CCC01.
LOCATION.--Lat 45°00'27", long 95°55'21", in SW¼SW¼SW¼ sec.10, T.29 N., R.21 W., Hydrologic Unit 07010206, Lake Jane Road, 0.7 mi (1.1 km) north of Highway 212.
Owner: City of Lake Elmo.
AQUIFER.--Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 6 in., depth 348 ft, cased to 280 ft.
DATUM.--Altitude of land-surface datum is 935 ft. Measuring point: Top of well cap, 1.20 ft above land-surface datum.
PERIOD OF RECORD.--September 1977, February 1978, February 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 31.92 ft below land-surface datum, Oct. 28, 1986; lowest, 45.65 ft below land-surface datum, Sept. 28, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	43.19	JAN 16	43.52	MAR 19	44.41	APR 30	44.34	JUL 20	43.93	SEP 12	43.89

450858092575001. Local number, 031N21W28ABD01.
LOCATION.--Lat 45°08'58", long 92°57'50", in SE¼NW¼NE¼ sec.28, T.31 N., R.21 W., Hydrologic Unit 07010206, County Road 8A, 1.65 mi east of Highway 61.
Owner: White Bear Gun Club.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age.
WELL CHARACTERISTICS.--Drilled domestic artesian well, diameter 4 in., depth 142 ft, cased to 94 ft.
DATUM.--Altitude of land-surface datum is 939 ft. Measuring point: Top of well cap, 1.30 ft above land-surface datum.
PERIOD OF RECORD.--September 1977, February 1978, February 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.57 ft below land-surface datum, Oct. 28, 1986; lowest, 14.17 ft below land-surface datum, Mar. 13, 1990.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	13.84	JAN 16	14.16	MAR 13	14.17	MAY 15	13.76	JUL 26	13.09	SEP 21	12.87

451355092532601. Local number, 032N20W30BCD01.
LOCATION.--Lat 45°13'55", long 92°53'26", in SE¼SW¼NW¼ sec.30, T.32 N., R.20 W., Hydrologic Unit 07030005, 0.25 mi north of 192nd Street.
Owner: Arno Birr.
AQUIFER.--Prairie du Chien Group of Early Ordovician Age and Jordan Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in., depth 260 ft, cased to 141 ft.
DATUM.--Altitude of land-surface datum is 990 ft. Measuring point: Vent pipe, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--March 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 51.56 ft below land-surface datum, Oct. 28, 1986; lowest, 58.53 ft below land-surface datum, Sept. 15, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

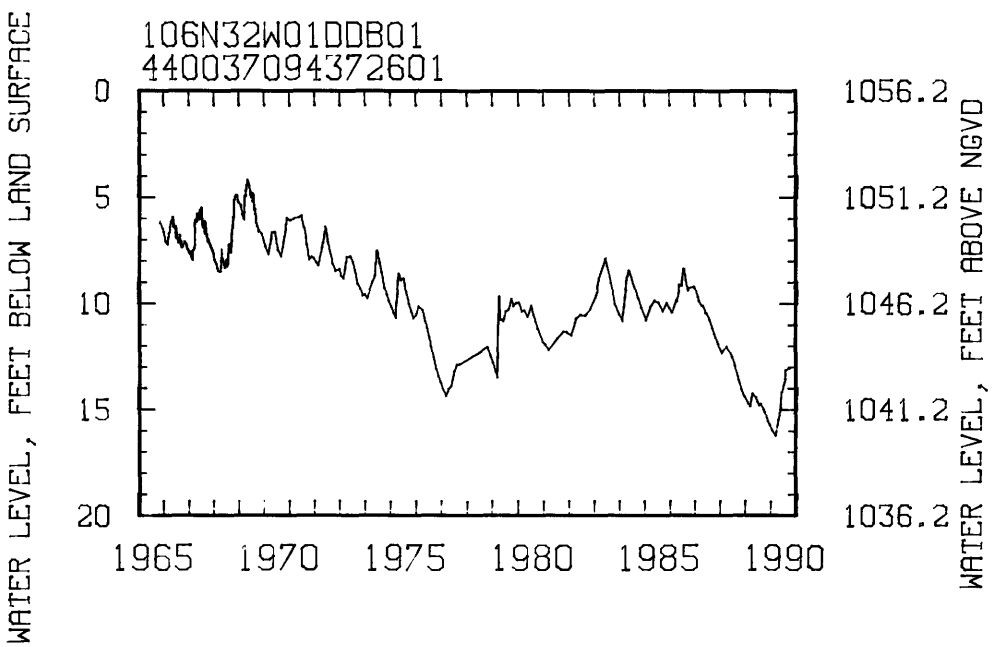
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	56.94	MAR 13	57.37	MAY 15	57.45	SEP 21	56.92

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 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 08	15.50	MAR 07	16.22	JUN 07	14.13
29	15.67	APR 12	15.43	JUL 25	13.52
JAN 10	15.93	MAY 23	14.92	31	13.08
17	15.96			SEP 26	12.98



WATONWAN COUNTY--Continued

440409094304901. Local number, 107N31W14DAC01.
LOCATION.--Lat 44°04'09", long 94°30'49", in SW¼NE¼SE¼ sec.14, T.107 N., R.31 W., Hydrologic Unit 07020010, 2.75 mi east of LaSalle.
Owner: William Lassas.
AQUIFER.--Sandstone of Cretaceous Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in., depth 150 ft, screened 100 to 135 ft.
DATUM.--Altitude of land-surface datum is 1,008 ft. Measuring point: Vent pipe, 1.80 ft above land-surface datum.
PERIOD OF RECORD.--September 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 10.44 ft below land-surface datum, May 9, 1983; lowest, 16.29 ft below land-surface datum, July 12, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 08	15.26	JAN 10	15.07	MAR 07	15.19	MAY 23	14.49	JUL 25	13.54	SEP 26	13.62

440133094312501. Local number, 107N31W35CAC01.
LOCATION.--Lat 44°01'33", long 94°31'25", in SW¼NE¼SW¼ sec.35, T.107 N., R.31 W., Hydrologic Unit 07020010, northeast of St. James.
Owner: Al Guyer.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 10 in., depth 350 ft, screened 310 to 350 ft.
DATUM.--Altitude of land-surface datum is 1,055 ft. Measuring point: Vent pipe, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--September 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 29.83 ft below land-surface datum, May 9, 1983; lowest, 41.64 ft below land-surface datum, July 12, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 08	35.93	JAN 10	35.70	MAY 23	35.35	JUL 25	34.38	SEP 26	34.20

WINONA COUNTY

435746092034202. Local number, 106N10W19DDA02.
LOCATION.--Lat 43°57'46", long 92°03'42", in NE¼SE¼SE¼ sec. 19, T.106N., R.10W., Hydrologic Unit 07040003, at St. Charles.
Owner: City of St. Charles, Well 5.
AQUIFER.--Ironton-Galesville Sandstones of Late Cambrian Age.
WELL CHARACTERISTICS.--Drilled public supply artesian well, diameter 12 in., depth 702 ft, cased to 645 ft.
DATUM.--Altitude of land-surface datum is 1,160 ft; Measuring point: Edge of vent pipe, 1.00 ft above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--May 1984 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 218.80 ft below land-surface datum, Aug. 26, 1987; lowest, 266.75 ft below land-surface datum, July 20, 1985.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 02	235.22	DEC 04	229.26	FEB 06	228.67	APR 04	237.22	JUN 05	237.30	AUG 01	242.12
09	233.82	11	230.17	13	229.12	10	236.13	12	243.56	08	242.90
16	231.68	18	229.47	20	232.30	17	237.40	19	239.20	14	241.90
23	229.40	26	228.72	27	232.38	18	234.50	25	241.20	22	240.70
30	230.75	JAN 02	228.52	MAR 06	237.10	MAY 03	239.80	JUL 09	239.76	29	236.54
NOV 07	231.90	09	228.20	12	236.80	09	238.82	16	240.10	SEP 05	241.12
14	231.50	16	230.42	19	237.65	16	239.90	24	242.82	12	241.70
21	230.30	22	229.78	26	236.22	22	240.28			19	243.06
		29	229.88			29	236.40			25	241.00

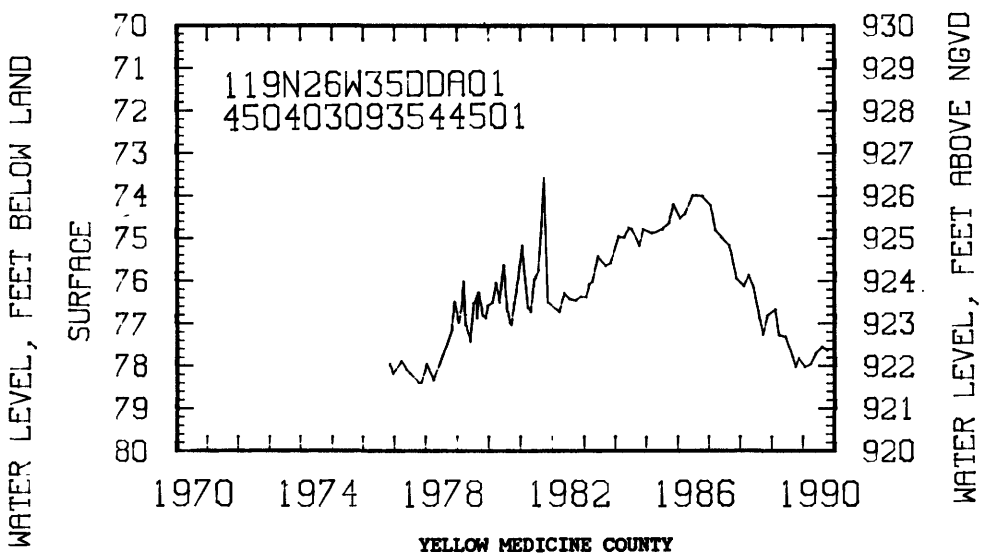
GROUND-WATER LEVELS

WRIGHT COUNTY

450403093544501. Local number, 119N26W35DDA01.
LOCATION.--Lat 45°04'03", long 93°54'45", in NE¼SE¼SE¼ sec.35, T.119 N., R.26 W., Hydrologic Unit 07010204, at Montrose.
Owner: City of Montrose, well 1.
AQUIFER.--Mount Simon Sandstone of Late Cambrian Age and Hinckley Sandstone of Late Precambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 10 in., depth 693 ft, cased to 526 ft.
DATUM.--Altitude of land-surface datum is 1,000 ft. Measuring point: Edge of breather pipe, 1.50 ft above land-surface datum.
PERIOD OF RECORD.--September 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 73.54 ft below land-surface datum, Sept. 28, 1981; lowest, 78.38 ft below land-surface datum, Nov. 3, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 03	77.79	JAN 12	78.02	MAR 20	77.94	MAY 17	77.69	JUL 27	77.53	SEP 27	77.62

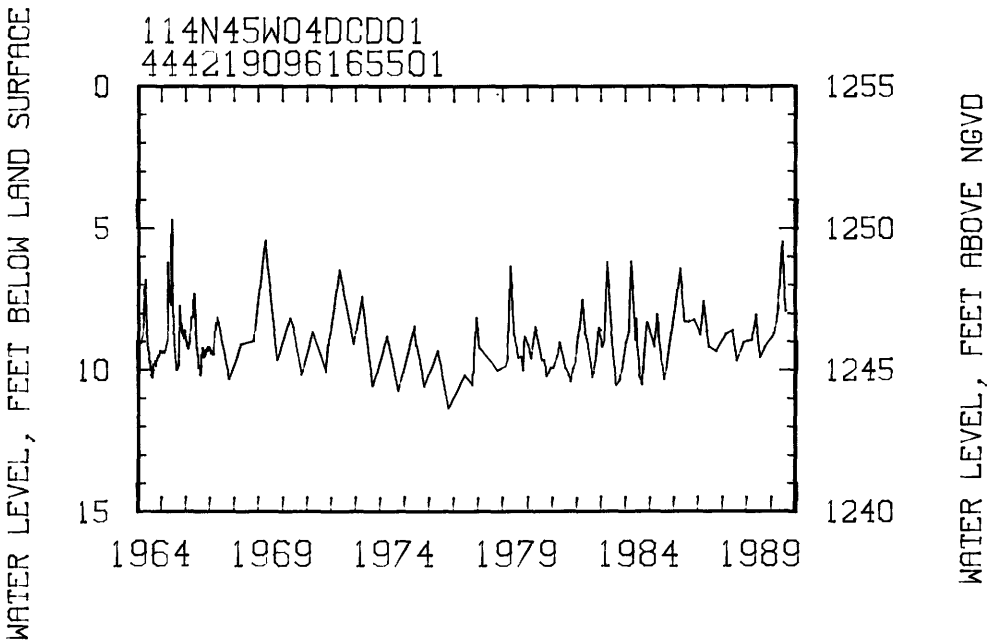


YELLOW MEDICINE COUNTY

444219096165501. Local number, 114N45W04DCD01.
LOCATION.--Lat 44°42'19", long 96°16'55", in SE¼SW¼SE¼ sec.4, T.114 N., R.45 W., Hydrologic Unit 07020003, at Canby City Park.
Owner: City of Canby, well 6.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 12 in., depth 62 ft, screened 44 to 68 ft.
DATUM.--Altitude of land-surface datum is 1,255 ft. Measuring point: Top of casing, 2.90 ft above land-surface datum.
PERIOD OF RECORD.--January 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.67 ft below land-surface datum, June 5, 1965; lowest, 11.32 ft below land-surface datum, Oct. 7, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 05	8.68	APR 11	7.78	JUN 18	5.45	AUG 02	7.90


114N45W04DCD01
444219096165501
WATER LEVEL, FEET BELOW LAND SURFACE
0
5
10
15
1255
1250
1245
1240
1964
1969
1974
1979
1984
1989
WATER LEVEL, FEET ABOVE NGVD

QUALITY OF GROUND-WATER

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

ANOKA COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)
444919093131302	27.23.18CDB02 GWSWI4 SEEPA		06-20-90	1345	--	--	720	--
450433093163228	030.25.22ABC-IP28		07-03-90	1405	28.91	54.00	--	--
450433093163229	030.24.22ABC		07-03-90	1440	29.76	34.00	--	--
450433093163230	30.24.22.DBA 30		07-03-90	1300	27.47	94.00	--	--
450439093164015	30N24W22ABB15	364STPR	07-13-90	1205	--	65.00	808	--
450439093164016	30N24W22ABB16	112SPDF	07-13-90	1334	0.89	50.00	809	--
450439093164017	30N24W22ABB17	112PLSC	07-13-90	1300	3.63	11.00	808	--
450442093163806	30N24W22ABB06	364STPR	07-18-90	1450	0.25	76.00	808	--
450442093163813	30N24W22ABB13	364STPR	07-18-90	1605	1.08	32.00	809	--
450442093163814	30N24W22ABB14	111ALVM	07-18-90	1538	3.01	8.00	808	--
450443093164001	30N24W22ABB01	364STPR	07-06-90	1020	3.62	59.00	811	--
450443093164002	30N24W22ABB02	364STPR	07-06-90	1305	3.59	33.00	811	--
450443093164003	30N24W22ABB03	112SPDF	07-06-90	1150	5.27	11.00	811	--
452132093045301	033N22W10CCB01BROADBENT_FL	112DSMO	08-25-90	1700	8.82	13.00	909	10

STATION NUMBER	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH (STANDARD UNITS) (00400)	PH LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	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)
444919093131302	580	--	7.5	--	18.0	--	--	--	--
450433093163228	555	558	7.8	8.2	14.0	82	22	6.1	1.4
450433093163229	--	1240	7.4	7.9	12.5	190	50	8.6	2.3
450433093163230	480	449	7.9	8.3	12.0	40	25	8.4	5.2
450439093164015	417	438	7.8	7.8	10.5	59	19	3.5	1.1
450439093164016	--	586	7.9	7.8	11.0	80	26	4.1	1.4
450439093164017	964	947	7.2	7.1	12.0	140	33	17	1.4
450442093163806	594	594	7.9	7.9	12.5	78	25	10	3.2
450442093163813	557	543	8.4	8.1	16.0	74	21	7.2	4.4
450442093163814	557	552	7.3	7.3	16.0	72	20	17	2.1
450443093164001	549	554	7.8	8.2	10.5	71	25	5.3	1.6
450443093164002	422	--	9.0	--	12.5	--	--	--	--
450443093164003	627	664	7.6	8.0	12.5	85	29	8.7	2.8
452132093045301	330	349	6.0	6.1	12.0	34	11	6.4	1.3

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

ANOKA COUNTY--Continued

STATION NUMBER	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)
444919093131302	--	--	--	--	--	--	--	--	--
450433093163228	238	--	--	195	206	89	10	0.20	20
450433093163229	351	--	--	288	290	260	100	0.20	25
450433093163230	--	--	--	--	60	90	24	0.10	3.4
450439093164015	184	--	--	151	155	73	5.3	0.60	19
450439093164016	210	--	--	172	172	130	10	0.40	20
450439093164017	406	--	--	333	303	170	44	0.40	25
450442093163806	151	--	--	--	153	110	37	0.30	18
450442093163613	176	--	--	144	147	110	22	<0.10	15
450442093163814	336	--	--	275	279	7.5	13	0.30	23
450443093164001	184	--	--	151	162	120	18	0.40	18
450443093164002	141	11	--	--	--	--	--	--	--
450443093164003	319	--	--	262	266	52	33	0.10	21
452132093045301	31	0	26	25	--	35	20	<0.10	25

STATION NUMBER	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
444919093131302	--	--	--	--	--	--	--	--	--
450433093163228	--	<0.100	--	--	--	1.10	140	6	680
450433093163229	--	0.100	--	--	--	0.040	50	25	1200
450433093163230	--	<0.100	--	--	--	<0.010	50	25	8
450439093164015	--	0.200	--	--	--	0.020	40	20	200
450439093164016	--	2.90	--	--	--	0.030	50	82	290
450439093164017	--	<0.100	--	--	--	<0.010	70	12000	3600
450442093163806	--	<0.100	--	--	--	0.040	20	56	360
450442093163813	--	<0.100	--	--	--	0.060	20	14	220
450442093163814	--	<0.100	--	--	--	0.080	30	6300	1400
450443093164001	--	<0.100	--	--	--	0.020	60	<3	190
450443093164002	--	--	--	--	--	--	--	--	--
450443093164003	--	<0.100	--	--	--	0.010	50	1100	1800
452132093045301	253	20.0	0.120	1.1	<0.010	<0.010	--	1300	330

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

BELTRAMI COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV- OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)
472537094261700	146N30W25CCCC E. SCHRA	112DSMO	02-23-90	1345	11.32	13.00	1317	--	308
472652094362401	146N31W21DAAAA	112DSMO	02-21-90	1000	--	--	1332	--	446
472740094503400	146.33.15 ADD SCHMUNK PARK	112DMDF	08-22-90	1250	25.21	30.50	1365	--	436
472752094291001	146N30W16DCA LC15-FOX	112DSMO	08-29-90	1130	--	41.00	1305	590	565
472810094364301	146N31W09DDCC LC14-SMITH	112DSMO	08-29-90	1000	--	84.00	1325	510	519
472919094540700	146.33.5 CAD CURLING CLUB	112DMDF	08-21-90	1044	22.91	30.00	1357	--	1450
472938094522800	146.33.4 ABB CAMERON PAR	112DMDF	08-21-90	1330	3.25	14.00	1345	--	823
473031094490100	147.33.36 BBB LANINIA RR	112DMDF	08-22-90	1059	27.27	38.00	1368	--	767
473236094505400	147.33.15 BCD DNR NORTH	112DMDF	08-21-90	1500	9.62	21.50	1355	--	463
473306094480000	147.33.13ADA STATE PARK	112DMDF	08-21-90	1650	8.28	45.00	1370	--	382
473318094565300	147.34.13.BBB HWY 9 NORTH	112DMDF	08-22-90	1530	13.88	17.50	1390	--	567

STATION NUMBER	PH (STANDARD UNITS) (00400)	PH LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	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 WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)
472537094261700	--	7.9	6.0	50	7.6	3.7	1.0	--	159	2.0	1.1
472652094362401	--	8.1	7.0	67	16	4.2	0.80	--	201	6.0	11
472740094503400	7.8	7.7	10.0	63	14	12	0.70	--	196	5.4	6.9
472752094291001	7.5	7.4	10.0	91	19	2.7	1.8	335	315	1.1	5.0
472810094364301	7.6	7.5	8.0	76	24	2.7	1.6	278	282	14	2.7
472919094540700	7.7	7.0	15.0	210	71	26	4.5	--	796	7.2	18
472938094522800	7.3	7.3	16.0	120	23	20	2.0	--	336	19	70
473031094490100	7.7	7.6	12.0	76	13	60	1.1	--	109	12	110
473236094505400	7.6	7.5	9.0	74	17	2.0	0.90	--	205	3.4	12
473306094480000	7.7	7.6	9.0	60	15	1.3	0.60	--	206	5.8	2.3
473318094565300	7.8	7.7	12.0	86	21	2.7	0.80	--	265	4.2	14

STATION NUMBER	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, 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 TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)
472537094261700	0.10	11	--	<0.100	0.040	--	0.140	--	0.010	--	--
472652094362401	0.10	22	--	1.40	<0.010	--	0.090	--	0.020	--	--
472740094503400	<0.10	22	254	5.40	<0.010	0.40	--	0.070	0.060	<10	1
472752094291001	0.10	23	--	<0.100	0.210	--	0.020	--	0.020	--	--
472810094364301	0.40	22	--	<0.100	0.210	--	<0.010	--	<0.010	--	--
472919094540700	0.30	28	864	<0.100	0.100	0.60	--	0.009	0.004	20	4
472938094522800	0.40	25	499	0.200	2.90	3.6	--	1.00	1.00	<10	<1
473031094490100	0.30	16	449	3.20	0.010	0.30	--	0.022	0.020	<10	<1
473236094505400	<0.10	19	275	0.800	<0.010	<0.20	--	0.015	<0.001	--	--
473306094480000	0.40	11	209	<0.100	<0.010	<0.20	--	0.003	0.001	--	--
473318094565300	<0.10	18	339	5.10	0.020	0.60	--	0.010	0.005	--	<1

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

BELTRAMI COUNTY--Continued

STATION NUMBER	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)
472537094261700	--	<10	--	--	36	--	5	--	--	2.3
472652094362401	--	<10	--	--	23	--	4	--	--	1.4
472740094503400	44	30	<1.0	<1	13	1	2	<1	0.8	--
472752094291001	--	20	--	--	1800	--	260	--	--	8.6
472810094364301	--	20	--	--	1500	--	310	--	--	1.8
472919094540700	170	40	12	<1	11000	1	930	<1	23	--
472938094522800	--	40	1.0	1	2300	<1	510	<1	6.6	--
473031094490100	44	<10	1.0	<1	9	<1	<1	<1	2.3	--
473236094505400	--	--	--	--	--	--	--	--	2.6	--
473306094480000	--	--	--	--	--	--	--	--	1.6	--
473318094565300	--	--	--	--	12	<100	--	--	2.3	--

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	1,1,1-TRI-CHLORO-ETHANE TOTAL (UG/L) (34506)	1,1,2,2 TETRA-CHLORO-ETHANE TOTAL (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-DIBROMO ETHANE WATER WHOLE TOTAL (UG/L) (77651)	1,2-DI-CHLORO-BENZENE TOTAL (UG/L) (34536)	1,2-DI-CHLORO-ETHANE TOTAL (UG/L) (32103)	1,2-DI-CHLORO-PROPANE TOTAL (UG/L) (34541)
472537094261700	02-23-90	1345	--	--	--	--	--	--	--	--	--
472652094362401	02-21-90	1000	--	--	--	--	--	--	--	--	--
472740094503400	08-22-90	1250	--	--	--	--	--	--	--	--	--
472752094291001	08-29-90	1130	--	--	--	--	--	--	--	--	--
472810094364301	08-29-90	1000	--	--	--	--	--	--	--	--	--
472919094540700	08-21-90	1044	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
472938094522800	08-21-90	1330	--	--	--	--	--	--	--	--	--
473031094490100	08-22-90	1059	--	--	--	--	--	--	--	--	--
473236094505400	08-21-90	1500	--	--	--	--	--	--	--	--	--
473306094480000	08-21-90	1650	--	--	--	--	--	--	--	--	--
473318094565300	08-22-90	1530	--	--	--	--	--	--	--	--	--

STATION NUMBER	1,2-TRANSDI CHLORO-ETHENE TOTAL (UG/L) (34546)	1,3-DI-CHLORO-BENZENE TOTAL (UG/L) (34566)	1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34561)	1,4-DI-CHLORO-BENZENE TOTAL (UG/L) (34571)	2-CHLORO-ETHYL-VINYL-ETHER TOTAL (UG/L) (34576)	ALA-CHLOR TOTAL RECOVER (UG/L) (77825)	AME-TRYNE TOTAL (82184)	ATRA-ZINE, TOTAL (UG/L) (39630)	BENZENE TOTAL (UG/L) (34030)	BROMO-FORM TOTAL (UG/L) (32104)
472537094261700	--	--	--	--	--	--	--	--	--	--
472652094362401	--	--	--	--	--	--	--	--	--	--
472740094503400	--	--	--	--	--	--	--	--	--	--
472752094291001	--	--	--	--	--	--	--	--	--	--
472810094364301	--	--	--	--	--	--	--	--	--	--
472919094540700	20	<3.0	<3.0	<3.0	<3.0	--	--	--	<3.0	<3.0
472938094522800	--	--	--	--	--	--	--	--	--	--
473031094490100	--	--	--	--	--	--	--	--	--	--
473236094505400	--	--	--	--	--	--	--	--	--	--
473306094480000	--	--	--	--	--	--	--	--	--	--
473318094565300	--	--	--	--	--	<0.10	<0.10	<0.10	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

BELTRAMI COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	CARBON-TETRA-CHLO-RIDE TOTAL (UG/L) (32102)	CHLORO-BENZENE TOTAL (UG/L) (34301)	CHLORO-DI-BROMO-METHANE TOTAL (UG/L) (32105)	CHLORO-ETHANE TOTAL (UG/L) (34311)	CHLORO-FORM TOTAL (UG/L) (32106)	CIS 1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34704)	CYAN-AZINE TOTAL (UG/L) (81757)	DI-CHLORO-BROMO-METHANE TOTAL (UG/L) (32101)	DI-CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	ETHYL-BENZENE TOTAL (UG/L) (34371)
472537094261700	--	--	--	--	--	--	--	--	--	--
472652094362401	--	--	--	--	--	--	--	--	--	--
472740094503400	--	--	--	--	--	--	--	--	--	--
472752094291001	--	--	--	--	--	--	--	--	--	--
472810094364301	--	--	--	--	--	--	--	--	--	--
472919094540700	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<3.0	<3.0	<3.0
472938094522800	--	--	--	--	--	--	--	--	--	--
473031094490100	--	--	--	--	--	--	--	--	--	--
473236094505400	--	--	--	--	--	--	--	--	--	--
473306094480000	--	--	--	--	--	--	--	--	--	--
473318094565300	--	--	--	--	--	--	<0.10	--	--	--

STATION NUMBER	METHYL-BROMIDE TOTAL (UG/L) (34413)	METHYL-CHLO-RIDE TOTAL (UG/L) (34418)	METHYL-ENE CHLO-RIDE TOTAL (UG/L) (34423)	METOLA-CHLOR WATER WHOLE TOT.REC (UG/L) (82612)	METRI-BUZIN WATER WHOLE TOT.REC (UG/L) (82611)	PHENOLS TOTAL (UG/L) (32730)	PROME-TONE TOTAL (UG/L) (39056)	PROME-TRYNE TOTAL (UG/L) (39057)	PRO-PAZINE TOTAL (UG/L) (39024)	SIMA-ZINE TOTAL (UG/L) (39055)
472537094261700	--	--	--	--	--	--	--	--	--	--
472652094362401	--	--	--	--	--	--	--	--	--	--
472740094503400	--	--	--	--	--	11	--	--	--	--
472752094291001	--	--	--	--	--	--	--	--	--	--
472810094364301	--	--	--	--	--	--	--	--	--	--
472919094540700	<3.0	<3.0	<3.0	--	--	6	--	--	--	--
472938094522800	--	--	--	--	--	<1	--	--	--	--
473031094490100	--	--	--	--	--	<1	--	--	--	--
473236094505400	--	--	--	--	--	1	--	--	--	--
473306094480000	--	--	--	--	--	4	--	--	--	--
473318094565300	--	--	--	<0.1	<0.1	10	<0.1	<0.1	<0.10	<0.10

STATION NUMBER	SIME-TRYNE TOTAL (UG/L) (39054)	STYRENE TOTAL (UG/L) (77128)	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)	TRI-FLURA-LIN TOTAL RECOVER (UG/L) (39030)	VINYL CHLO-RIDE TOTAL (UG/L) (39175)	XYLENE TOTAL WATER WHOLE TOT REC (UG/L) (81551)
472537094261700	--	--	--	--	--	--	--	--	--	--
472652094362401	--	--	--	--	--	--	--	--	--	--
472740094503400	--	--	--	--	--	--	--	--	--	--
472752094291001	--	--	--	--	--	--	--	--	--	--
472810094364301	--	--	--	--	--	--	--	--	--	--
472919094540700	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	<1.0	<3.0
472938094522800	--	--	--	--	--	--	--	--	--	--
473031094490100	--	--	--	--	--	--	--	--	--	--
473236094505400	--	--	--	--	--	--	--	--	--	--
473306094480000	--	--	--	--	--	--	--	--	--	--
473318094565300	<0.1	--	--	--	--	--	--	<0.10	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

BLUE EARTH COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)
440230094101001	107N28W27DADA BIRR SPRING		08-30-90	0845	779	7.4	10.5

STATION NUMBER	OXYGEN, DISSOLVED (MG/L) (00300)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
440230094101001	2.7	322	<0.010	22.0	0.020	1.1	<0.010	<0.010	2.2

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

BROWN COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)
441636094272701	109N30W5ACDD FLANDRAU SPRI		11-14-89	0715	612	7.4	9.0	0.6
			08-30-90	1130	579	7.3	10.5	0.2

STATION NUMBER	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
441636094272701	245	--	<0.010	0.340	0.070	0.30	<0.010	<0.010	--
	--	268	<0.010	0.200	0.060	<0.20	0.010	0.010	3.8

ANALYSES FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)	2,4-D, TOTAL (UG/L) (39730)	CHLORDYRIFOS TOTAL RECOVER (UG/L) (38932)	DEF TOTAL (UG/L) (39040)	DIAZINON, TOTAL (UG/L) (39570)
441636094272701	11-14-89	0715	--	--	--	--	--	--
	08-30-90	1130	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

STATION NUMBER	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L) (82052)	DISYSTON TOTAL (UG/L) (39011)	ETHION, TOTAL (UG/L) (39398)	FONOFOS (DYFONATE) WATER WHOLE TOT.REC (UG/L (82614)	MALATHION, TOTAL (UG/L) (39530)	METHOMYL TOTAL (UG/L) (39051)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOTAL (UG/L) (39790)
441636094272701	--	--	--	--	--	--	--	--
	<0.01	<0.01	<0.01	<0.0	<0.01	<0.5	<0.01	<0.01

STATION NUMBER	PARATHION, TOTAL (UG/L) (39540)	PHORATE TOTAL (UG/L) (39023)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	PROPHAM TOTAL (UG/L) (39052)	SEVIN, TOTAL (UG/L) (39750)	SILVEX, TOTAL (UG/L) (39760)	TOTAL TRITHION (UG/L) (39786)
441636094272701	--	--	--	--	--	--	--
	<0.01	<0.01	<0.01	<0.5	<0.50	<0.01	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

CASS COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	SPC-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPC-CIFIC CON-DUCT-ANCE LAB (US/CM) (900095)
465910094124101	141N28W28ADCD LC11-ADAMS	112DSMO	08-28-90	1130	--	62.00	1330	450	430
470802094321901	142N31W12ABDC LC2-LOES RE	112DSMO	08-22-90	1200	--	86.00	1306	575	588
471103094175801	143N29W24CDCD LC9-SUGAR P	112DSMO	08-24-90	1345	11.40	95.00	1300	725	673
471546094331700	144N31W25BBDC WELSH LAK	112DSMO	02-23-90	1030	7.83	17.00	1300	--	318
472029094121701	145N28W27DDDA LC6-BENA MA	112DSMO	08-23-90	1330	--	90.00	1310	--	390
472031094123201	145N28W27DCAD LC7-BENA MC	112DSMO	08-23-90	1600	--	185.00	1310	--	351
472200094394001	145N31W19BAAA SPIKE LK	112DSMO	02-23-90	0900	22.78	--	1344	350	398
472201094320400	145N30W19BAAB PIKE BAY EAS	112DSMO	02-23-90	1300	21.64	30.00	1320	410	466
472240094361400	145.31.15 ACB CASS L RR	112DMDF	08-23-90	1500	19.52	23.00	1320	--	756
472250094395300	145.31.18 BAB CASS LAKE N	112DMDF	08-23-90	1310	17.14	21.00	1320	--	445
472257094372001	145N31W09CDBC LC5-SHEPHER	112DSMO	08-23-90	1130	16.16	63.00	1325	325	397
472314094374801	145N31W08DAAC LC4-CASS LA	112DSMO	08-22-90	1700	--	72.00	--	--	408
472318094185001	145N29W11DACCB	112DSMO	02-23-90	1430	6.14	--	1311	--	301
472343094370401	145N31W09ABBB LC8-CASS LA	112DSMO	08-24-90	1115	7.45	--	--	--	358

STATION NUMBER	PH (STAND-ARD UNITS) (00400)	PH LAB (STAND-ARD UNITS) (00403)	TEMPER-ATURE WATER (DEG C) (00010)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)
465910094124101	7.7	7.6	9.0	66	17	3.0	1.7	--	233	12	2.5
470802094321901	8.2	7.5	9.0	88	25	5.2	1.6	313	320	9.1	3.5
471103094175801	7.6	7.6	10.0	82	40	5.6	2.9	389	377	8.3	5.5
471546094331700	--	7.6	5.5	46	8.2	4.1	1.4	--	150	11	1.0
472029094121701	7.8	7.9	9.0	42	12	26	1.8	214	210	1.6	3.0
472031094123201	7.7	7.9	9.0	43	12	14	1.2	202	191	<1.0	1.3
472200094394001	--	7.9	7.0	66	14	1.9	1.3	--	205	8.0	1.1
472201094320400	--	7.7	7.0	72	16	4.1	1.2	--	229	16	2.6
472240094361400	7.2	7.1	17.5	130	20	3.2	1.1	--	256	42	1.7
472250094395300	7.8	7.7	11.0	72	16	1.9	0.70	--	242	1.1	2.7
472257094372001	7.9	7.9	11.0	61	15	3.3	1.7	244	192	10	11
472314094374801	7.8	7.7	11.0	59	13	5.4	3.9	184	183	9.1	2.4
472318094185001	--	7.8	4.0	45	9.8	3.3	0.60	--	148	5.0	0.80
472343094370401	7.9	7.7	9.0	52	13	2.8	1.2	191	185	4.3	2.6

STATION NUMBER	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, 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 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)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)
465910094124101	0.20	16	--	<0.100	0.020	--	0.010	--	<0.010	--	--
470802094321901	0.40	20	--	0.200	0.090	--	0.080	--	0.020	--	--
471103094175801	0.30	21	--	<0.100	0.200	--	0.180	--	0.060	--	--
471546094331700	0.10	18	--	<0.100	0.020	--	0.240	--	0.010	--	--
472029094121701	0.30	14	--	<0.100	0.150	--	0.010	--	0.010	--	--
472031094123201	0.40	16	--	<0.100	0.150	--	0.010	--	<0.010	--	--
472200094394001	0.10	22	--	0.200	0.040	--	0.100	--	0.050	--	--
472201094320400	0.10	20	--	<0.100	0.030	--	0.850	--	<0.010	--	--
472240094361400	<0.10	22	384	0.700	0.190	0.60	--	0.002	0.002	10	4
472250094395300	0.10	20	249	0.800	0.010	0.40	--	0.037	0.030	10	<1
472257094372001	<0.10	19	--	<0.100	0.140	--	0.060	--	0.040	--	--
472314094374801	0.30	21	--	4.20	0.020	--	1.10	--	1.10	--	--
472318094185001	0.10	20	--	<0.100	0.030	--	0.310	--	0.030	--	--
472343094370401	0.20	18	--	<0.100	0.290	--	0.090	--	0.060	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

CASS COUNTY--Continued

STATION NUMBER	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)
465910094124101	--	10	--	--	130	--	46	--	--	6.1
470802094321901	--	<10	--	--	1100	--	180	--	--	2.2
471103094175801	--	120	--	--	3700	--	170	--	--	--
471546094331700	--	<10	--	--	260	--	54	--	--	2.2
472029094121701	--	20	--	--	160	--	86	--	--	1.6
472031094123201	--	20	--	--	860	--	76	--	--	--
472200094394001	--	10	--	--	780	--	110	--	--	1.6
472201094320400	--	10	--	--	1400	--	99	--	--	3.0
472240094361400	260	90	3.0	<1	13000	<1	3000	<1	12	--
472250094395300	34	30	<1.0	<1	<3	<1	5	<1	2.8	--
472257094372001	--	<10	--	--	530	--	110	--	--	1.4
472314094374801	--	30	--	--	12	--	4	--	--	2.1
472318094185001	--	<10	--	--	170	--	120	--	--	3.1
472343094370401	--	10	--	--	1200	--	89	--	--	--

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	1,1,1-TRI-CHLORO-ETHANE TOTAL (UG/L) (34506)	1,1,2,2 TETRA-CHLORO-ETHANE TOTAL (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-DIBROMO ETHANE WATER WHOLE TOTAL (UG/L) (77651)	1,2-DI-CHLORO-BENZENE TOTAL (UG/L) (34536)	1,2-DI-CHLORO-ETHANE TOTAL (UG/L) (32103)
465910094124101	08-28-90	1130	--	--	--	--	--	--	--	--
470802094321901	08-22-90	1200	--	--	--	--	--	--	--	--
471103094175801	08-24-90	1345	--	--	--	--	--	--	--	--
471546094331700	02-23-90	1030	--	--	--	--	--	--	--	--
472029094121701	08-23-90	1330	--	--	--	--	--	--	--	--
472031094123201	08-23-90	1600	--	--	--	--	--	--	--	--
472200094394001	02-23-90	0900	--	--	--	--	--	--	--	--
472201094320400	02-23-90	1300	--	--	--	--	--	--	--	--
472240094361400	08-23-90	1500	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
472250094395300	08-23-90	1310	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
472257094372001	08-23-90	1130	--	--	--	--	--	--	--	--
472314094374801	08-22-90	1700	--	--	--	--	--	--	--	--
472318094185001	02-23-90	1430	--	--	--	--	--	--	--	--
472343094370401	08-24-90	1115	--	--	--	--	--	--	--	--

STATION NUMBER	1,2-DI-CHLORO-PROPANE TOTAL (UG/L) (34541)	1,2-TRANSDI CHLORO-ETHENE TOTAL (UG/L) (34546)	1,3-DI-CHLORO-BENZENE TOTAL (UG/L) (34566)	1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34561)	1,4-DI-CHLORO-BENZENE TOTAL (UG/L) (34571)	2-CHLORO-ETHYL-VINYL-ETHER TOTAL (UG/L) (34576)	BENZENE TOTAL (UG/L) (34030)	BROMO-FORM TOTAL (UG/L) (32104)	CARBON-TETRA-CHLO-RIDE TOTAL (UG/L) (32102)	CHLORO-BENZENE TOTAL (UG/L) (34301)
465910094124101	--	--	--	--	--	--	--	--	--	--
470802094321901	--	--	--	--	--	--	--	--	--	--
471103094175801	--	--	--	--	--	--	--	--	--	--
471546094331700	--	--	--	--	--	--	--	--	--	--
472029094121701	--	--	--	--	--	--	--	--	--	--
472031094123201	--	--	--	--	--	--	--	--	--	--
472200094394001	--	--	--	--	--	--	--	--	--	--
472201094320400	--	--	--	--	--	--	--	--	--	--
472240094361400	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
472250094395300	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
472257094372001	--	--	--	--	--	--	--	--	--	--
472314094374801	--	--	--	--	--	--	--	--	--	--
472318094185001	--	--	--	--	--	--	--	--	--	--
472343094370401	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

CASS COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	CHLORO-DI-BROMO-METHANE TOTAL (UG/L) (32105)	CHLORO-ETHANE TOTAL (UG/L) (34311)	CHLORO-FORM TOTAL (UG/L) (32106)	CIS 1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34704)	DI-CHLORO-BROMO-METHANE TOTAL (UG/L) (32101)	DI-CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	ETHYL-BENZENE TOTAL (UG/L) (34371)	METHYL-BROMIDE TOTAL (UG/L) (34413)	METHYL-CHLO-RIDE TOTAL (UG/L) (34418)	METHYL-ENE CHLO-RIDE TOTAL (UG/L) (34423)
465910094124101	--	--	--	--	--	--	--	--	--	--
470602094321901	--	--	--	--	--	--	--	--	--	--
471103094175801	--	--	--	--	--	--	--	--	--	--
471546094331700	--	--	--	--	--	--	--	--	--	--
472029094121701	--	--	--	--	--	--	--	--	--	--
472031094123201	--	--	--	--	--	--	--	--	--	--
472200094394001	--	--	--	--	--	--	--	--	--	--
472201094320400	--	--	--	--	--	--	--	--	--	--
472240094361400	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
472250094395300	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
472257094372001	--	--	--	--	--	--	--	--	--	--
472314094374801	--	--	--	--	--	--	--	--	--	--
472318094185001	--	--	--	--	--	--	--	--	--	--
472343094370401	--	--	--	--	--	--	--	--	--	--

STATION NUMBER	PHENOLS TOTAL (UG/L) (32730)	STYRENE TOTAL (UG/L) (77126)	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 TOTAL WATER WHOLE TOT REC (UG/L) (81551)
465910094124101	--	--	--	--	--	--	--	--	--
470802094321901	--	--	--	--	--	--	--	--	--
471103094175801	--	--	--	--	--	--	--	--	--
471546094331700	--	--	--	--	--	--	--	--	--
472029094121701	--	--	--	--	--	--	--	--	--
472031094123201	--	--	--	--	--	--	--	--	--
472200094394001	--	--	--	--	--	--	--	--	--
472201094320400	--	--	--	--	--	--	--	--	--
472240094361400	16	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0
472250094395300	8	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0
472257094372001	--	--	--	--	--	--	--	--	--
472314094374801	--	--	--	--	--	--	--	--	--
472318094165001	--	--	--	--	--	--	--	--	--
472343094370401	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

CHIPPEWA COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)
445425095402301	117N40W27CCCA SEEPAGE FACE		09-06-90	0900	886	6.9	10.0

STATION NUMBER	OXYGEN, DISSOLVED (MG/L) (00300)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
445425095402301	6.5	310	<0.010	2.70	0.030	0.40	0.060	0.060	1.8

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)	2,4-D, TOTAL (UG/L) (39730)	CHLORDYRIFOS TOTAL RECOVER (UG/L) (38932)	DEF TOTAL (UG/L) (39040)	DIAZINON, TOTAL (UG/L) (39570)
445425095402301	09-06-90	0900	<0.01	<0.01	0.06	<0.01	<0.01	<0.01

STATION NUMBER	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L) (82052)	DISYSTON TOTAL (UG/L) (39011)	ETHION, TOTAL (UG/L) (39398)	FONOFOS (DYFONATE) WATER WHOLE TOT.REC (UG/L (82614)	MALATHION, TOTAL (UG/L) (39530)	METHOMYL TOTAL (UG/L) (39051)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOTAL (UG/L) (39790)
445425095402301	<0.01	<0.01	<0.01	<0.0	<0.01	<0.5	<0.01	<0.01

STATION NUMBER	PARATHION, TOTAL (UG/L) (39540)	PHORATE TOTAL (UG/L) (39023)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	PROPHAM TOTAL (UG/L) (39052)	SEVIN, TOTAL (UG/L) (39750)	SILVEX, TOTAL (UG/L) (39760)	TOTAL TRITHION (UG/L) (39786)
445425095402301	<0.01	<0.01	<0.01	<0.5	<0.50	<0.01	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

CHISAGO COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
452837092525902	035N20W31DAB02WHEELER_D(C2	112DSMO	08-25-90	1230	7.88	25.00	875

STATION NUMBER	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH (STANDARD UNITS) (00400)	PH LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)
452837092525902	21	237	270	7.9	8.1	12.5	41	10	2.3

STATION NUMBER	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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)
452837092525902	0.40	162	0	133	133	13	3.6	0.10	17

STATION NUMBER	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
452837092525902	157	0.200	0.030	0.30	0.020	<0.010	890	13

CLEARWATER COUNTY--Continued

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH (STANDARD UNITS) (00400)
473131095160600	147.36.28BBC SHEVLIN SOUTH	112DMDF	08-24-90	1110	--	15.00	1445	483	7.8
473232095152900	147.36.21.ABA SHEVLIN NOR	112DMDF	08-25-90	--	5.08	12.00	1465	344	7.7

STATION NUMBER	PH LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)
473131095160600	7.8	15.0	77	17	3.0	1.8	255	3.7	6.5	<0.10	25
473232095152900	7.6	17.5	53	13	2.7	0.70	167	5.8	4.2	0.50	11

STATION NUMBER	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
473131095160600	285	0.900	<0.010	0.40	0.033	0.028	1	<3	<100	2.3
473232095152900	187	2.00	<0.010	0.50	0.026	0.020	<1	30	<100	21

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	ALACHLOR TOTAL RECOVER (UG/L) (77825)	AMETRYNE TOTAL (82184)	ATRAZINE, TOTAL (UG/L) (39630)	CYANAZINE TOTAL (UG/L) (81757)	METOLACHLOR WATER WHOLE TOT.REC (UG/L) (82612)	METRIBUZIN WATER WHOLE TOT.REC (UG/L) (82611)
473131095160600	08-24-90	1110	<0.10	<0.10	2.5	<0.10	<0.1	<0.1
473232095152900	08-25-90	--	<0.10	<0.10	1.3	<0.10	<0.1	<0.1

STATION NUMBER	PHENOLS TOTAL (UG/L) (32730)	PROMETONE TOTAL (UG/L) (39056)	PROMETRYNE TOTAL (UG/L) (39057)	PROPAZINE TOTAL (UG/L) (39024)	SIMAZINE TOTAL (UG/L) (39055)	SIMETRYNE TOTAL (UG/L) (39054)	TRIFLURALIN TOTAL RECOVER (UG/L) (39030)
473131095160600	<1	<0.1	<0.1	<0.10	<0.10	<0.1	<0.10
473232095152900	3	<0.1	<0.1	<0.10	<0.10	<0.1	<0.10

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)
443404093075901	113N19W29BCACBD UN101098 H	367PRDC	08-29-90	1400	--	127.00	960	37
443419093062001	113N19W28ABBBBD UN506626 B	367PRDC	08-24-90	1430	--	320.00	930	11
443422093064701	113N19W21CCDCAC UN207502 S	367PRDC	08-29-90	1600	--	90.00	929	20
443510092574101	113N18W22ABABCA UN426396 P	371JRDN	08-01-90	1330	150.60	480.00	1030	62
443511092570901	113N18W23BBBABA UN416201 F	367PRDC	08-01-90	1500	58.50	185.00	985	40
443536093025901	113N19W13CABBCC UN136520 S	371JRDN	08-22-90	1700	38.94	380.00	927	28
443555093015901	113N18W18BBCACD UN435246 O	367PRDC	09-04-90	1145	--	120.00	945	25
443606092565801	113N18W11CCDDAC UN412476 P	110QRNR	07-25-90	1545	96.40	262.00	981	24
443607092565601	113N18W11CCD1 PEINE WELL		09-05-90	1025	--	--	--	--
443638092560401	113N18W11ADADAB UN104172 B	367PRDC	07-26-90	1300	145.39	230.00	1025	58
443652092535101	113N17W07AABCBB UN207654 M	367PRDC	08-27-90	1300	--	275.00	1025	24
443655093044901	113N19W10AABBCA UN156918 B	371JRDN	07-31-90	1345	50.20	379.00	930	17
443658092540501	113N17W06DCDCBD UN145876 J	371JRDN	07-25-90	1230	154.00	250.00	1011	60
443700093053301	113N19W03CCDCAB UN101031 E	367PRDC	07-31-90	1115	51.10	138.00	940	45
443737092545401	113N18W01AADBDD UN145912 T	367PRDC	07-24-90	1430	122.20	295.00	980	32
443748093035901	113N19W02BAAABB UN418684 B	371JRDN	07-30-90	1530	16.30	300.00	895	30
443748093085001	113N19W6BAA1 DAKOTA CO.		09-06-90	1645	--	--	--	--
443750093041201	114N19W35CDCCBD UN104342 K	367PRDC	08-06-90	1700	41.70	80.00	912	19
443804092544701	114N17W31CBCBCC UN412491 W	371JRDN	07-24-90	1300	74.60	380.00	909	20
443819093170101	114N21W36ACDDCA UN178536 D	110QRNR	08-28-90	1300	--	113.00	1042	11
443856092572101	114N18W27DAD1 STEVEN REC		09-05-90	1100	--	--	--	--
443900093181501	114N21W26DBDAAC UN127124 P	367PRDC	08-28-90	1200	--	277.00	1112	13
443901092515101	114N17W28CAADAB UN104248 G	371JRDN	07-23-90	1800	85.60	292.00	843	46
443905093173801	114N21W25CBAACD UN161439 L	371JRDN	08-28-90	1100	--	479.00	1040	14
443915093081102	114N019W - SHALLOW WELL AT	112PLSC	02-02-90	1210	--	9.70	--	--
		112PLSC	03-14-90	1330	--	9.70	--	--
		112PLSC	04-13-90	1230	--	9.70	--	--
		112PLSC	04-25-90	1225	--	9.70	--	--
		112PLSC	05-16-90	1140	--	9.70	--	--
		112PLSC	05-30-90	1135	--	9.70	--	--
		112PLSC	06-14-90	1130	--	9.70	--	--
		112PLSC	07-17-90	1240	--	9.70	--	--
		112PLSC	09-04-90	1600	--	9.70	--	--
443915093081103	114N019W - DEEP WELL AT F	112PLSC	02-02-90	1255	--	21.00	--	--
		112PLSC	03-14-90	1410	--	21.00	--	--
		112PLSC	04-13-90	1300	--	21.00	--	--
		112PLSC	04-25-90	1255	--	21.00	--	--
		112PLSC	05-16-90	1100	--	21.00	--	--
		112PLSC	05-30-90	1200	--	21.00	--	--
		112PLSC	06-14-90	1146	--	21.00	--	--
		112PLSC	07-17-90	1300	--	21.00	--	--
		112PLSC	09-04-90	1630	--	21.00	--	--
443926093010001	114N18W30AADBAA UN216439 G	367PRDC	08-01-90	1200	--	137.00	857	57
443926093165901	114N21W25ABDABB UN216487 E	364STPR	08-28-90	1400	64.90	180.00	1012	22
443932092510401	114N17W22CCCDDD UN145889 B	367PRDC	07-27-90	1230	128.50	220.00	882	36
443933092533501	114N17W20CCCCBD UN435233 P	371JRDN	08-01-90	1700	77.11	340.00	875	45
443933093002802	114N018W - SITE 3 SHALLOW	112PLSC	01-31-90	1035	--	21.00	--	--
		112PLSC	03-15-90	1330	--	21.00	--	--
		112PLSC	04-11-90	1420	--	21.00	--	--
		112PLSC	04-26-90	1040	--	21.00	--	--
		112PLSC	05-16-90	1535	--	21.00	--	--
		112PLSC	05-31-90	1130	--	21.00	--	--
		112PLSC	06-15-90	1117	--	21.00	--	--
		112PLSC	07-17-90	1515	--	21.00	--	--
		112PLSC	09-05-90	1120	--	21.00	--	--

DAKOTA COUNTY--Continued

STATION NUMBER	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH (STAND-ARD UNITS) (00400)	PH LAB (STAND-ARD UNITS) (00403)	OXID-ATION RED-UCTION POTEN-TIAL (MV) (00090)	TEMPER-ATURE WATER (DEG C) (00010)	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)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
443404093075901	483	460	7.1	7.9	--	10.0	6.9	--	--	52
443419093062001	460	481	7.6	7.8	--	10.5	<0.1	--	--	64
443422093064701	562	555	7.4	7.7	--	10.0	6.2	--	--	72
443510092574101	379	379	7.7	7.8	E0.1	11.0	0.2	--	--	46
443511092570901	277	277	7.7	7.7	E0.1	9.5	0.2	--	--	36
443536093025901	363	392	7.6	7.8	--	10.5	<0.1	--	--	50
443555093015901	495	488	7.1	7.7	--	10.0	5.5	--	--	61
443606092565801	318	321	7.6	7.8	E0.2	10.5	<0.1	--	--	44
443607092565601	294	--	7.3	--	--	10.5	0.2	--	--	--
443638092560401	373	367	7.8	7.9	0.2	10.5	7.7	--	--	43
443652092535101	480	552	7.6	7.6	--	12.5	5.1	--	--	72
443655093044901	538	540	7.5	7.5	E0.1	11.0	0.1	--	--	75
443658092540501	487	497	7.4	7.6	--	9.5	0.4	--	--	64
443700093053301	429	433	7.7	7.7	0.1	10.0	4.3	--	--	58
443737092545401	596	644	7.4	7.5	0.0	10.5	0.0	--	--	85
443748093035901	549	545	7.5	7.5	E0.1	10.5	<0.1	--	--	76
443748093085001	605	--	6.9	--	--	12.0	0.2	--	--	--
443750093041201	497	488	7.5	7.8	E0.1	10.0	6.9	--	--	60
443804092544701	436	435	7.7	7.7	0.1	12.0	1.0	--	--	55
443819093170101	550	595	7.5	7.7	--	10.5	<0.1	--	--	82
443856092572101	451	--	7.3	--	--	11.5	6.3	--	--	--
443900093181501	547	587	7.6	7.5	--	10.0	<0.1	--	--	77
443901092515101	456	444	7.5	7.6	E0.1	10.5	0.8	--	--	57
443905093173801	537	595	7.6	7.4	--	10.0	2.1	--	--	80
443915093081102	909	--	7.5	--	--	4.0	--	<1	<1	--
	870	--	6.9	--	--	6.5	--	<1	2	--
	1180	--	7.6	--	--	7.5	--	<1	<1	--
	1270	--	7.5	--	--	10.0	--	--	--	--
	1570	--	7.4	--	--	8.0	--	--	--	--
	1550	--	7.4	--	--	8.5	--	<1	<1	--
	1540	--	7.3	--	--	10.0	--	--	--	--
	1360	--	7.3	--	--	12.0	--	--	--	--
	1000	--	6.9	--	--	14.5	--	--	--	--
443915093081103	631	--	7.4	--	--	7.0	--	60	<1	--
	626	--	8.4	--	--	8.5	--	<1	1	--
	630	--	7.5	--	--	9.0	--	<1	<1	--
	602	--	7.4	--	--	9.5	--	--	--	--
	613	--	7.4	--	--	8.5	--	--	--	--
	610	--	7.3	--	--	8.5	--	<1	<1	--
	604	--	7.4	--	--	9.0	--	--	--	--
	606	--	7.6	--	--	9.5	--	--	--	--
	600	--	7.4	--	--	12.5	--	--	--	--
443926093010001	621	620	7.4	7.6	E0.1	10.5	4.1	--	--	78
443926093165901	556	604	7.5	7.7	--	10.5	0.3	--	--	82
443932092510401	446	441	7.6	7.6	E0.2	11.0	<0.1	--	--	56
443933092533501	431	434	7.7	7.8	E0.1	12.5	2.4	--	--	53
443933093002802	587	--	7.6	--	--	5.5	--	--	--	--
	534	--	7.3	--	--	5.5	--	1	1	--
	595	--	7.2	--	--	5.0	--	<1	<1	--
	582	--	7.3	--	--	6.0	--	--	--	--
	592	--	7.4	--	--	6.0	--	--	--	--
	594	--	7.3	--	--	6.5	--	--	--	--
	586	--	7.4	--	--	7.5	--	<1	3	--
	553	--	7.4	--	--	9.5	--	--	--	--
	584	--	7.4	--	--	13.0	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

STATION NUMBER	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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)
443404093075901	26	5.4	1.2	243	--	200	199	12	8.8	0.80
443419093062001	22	3.3	0.90	225	--	185	184	63	4.5	0.30
443422093064701	23	4.9	1.0	223	--	183	183	30	21	0.40
443510092574101	20	2.2	0.90	206	--	170	169	30	4.0	<0.10
443511092570901	14	1.8	1.4	171	--	141	140	9.4	1.9	<0.10
443536093025901	20	3.0	1.0	250	--	206	205	16	2.0	0.20
443555093015901	28	2.6	0.90	254	--	208	208	30	5.6	<0.10
443606092565801	12	4.0	0.60	189	--	157	155	20	1.9	<0.10
443607092565601	--	--	--	--	--	--	--	--	--	--
443638092560401	17	4.1	0.40	176	0	144	144	14	10	0.60
443652092535101	27	5.0	0.90	256	--	210	210	56	16	<0.10
443655093044901	27	4.1	0.90	343	--	281	281	18	2.3	<0.10
443658092540501	26	2.9	0.80	292	0	239	239	22	56	<0.10
443700093053301	17	4.9	0.50	207	0	170	170	26	9.1	0.50
443737092545401	33	4.6	1.8	321	--	261	263	88	10	0.20
443748093035901	26	5.0	1.5	328	--	272	269	28	4.1	0.40
443748093085001	--	--	--	--	--	--	--	--	--	--
443750093041201	22	4.2	0.70	183	--	150	150	19	11	0.50
443804092544701	22	2.3	0.80	261	0	215	214	24	2.0	<0.10
443819093170101	23	14	2.0	386	--	317	316	5.7	3.0	0.80
443856092572101	--	--	--	--	--	--	--	--	--	--
443900093181501	21	20	3.0	395	--	328	324	14	2.1	0.30
443901092515101	22	3.2	0.80	251	--	206	206	18	5.3	<0.10
443905093173801	26	10	2.0	379	--	312	311	20	2.5	0.30
443915093081102	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
443915093081103	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
443926093010001	29	4.4	1.1	279	--	228	229	21	14	<0.10
443926093165901	28	3.1	1.7	306	--	252	251	49	14	0.60
443932092510401	22	2.8	0.80	265	--	217	217	24	4.3	0.40
443933092533501	22	2.9	0.80	220	--	181	180	21	7.9	<0.10
443933093002802	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

STATION NUMBER	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	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)	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)
443404093075901	11	255	4.20	--	--	0.40	--	<0.010	<0.010
443419093062001	9.3	283	<0.100	--	--	<0.20	--	<0.010	<0.010
443422093064701	14	328	8.00	--	--	0.30	--	0.020	0.010
443510092574101	11	224	<0.100	--	--	0.40	--	<0.010	<0.010
443511092570901	13	140	<0.100	--	--	0.30	--	0.010	<0.010
443536093025901	11	204	<0.100	--	--	<0.20	--	<0.010	<0.010
443555093015901	12	286	4.00	--	--	0.60	--	<0.010	<0.010
443606092565801	16	185	<0.100	--	--	<0.20	--	0.020	0.020
443607092565601	--	--	<0.100	0.100	<0.20	<0.20	0.010	<0.010	--
443638092560401	20	208	5.60	--	--	0.60	--	0.040	0.020
443652092535101	14	334	3.40	--	--	<0.20	--	<0.010	<0.010
443655093044901	13	291	<0.100	--	--	<0.20	--	0.010	<0.010
443658092540501	15	286	1.00	--	--	<0.20	--	0.010	0.010
443700093053301	18	245	6.80	--	--	0.90	--	0.020	0.020
443737092545401	10	382	1.40	--	--	<0.20	--	<0.010	<0.010
443748093035901	14	295	<0.100	--	--	0.30	--	0.020	<0.010
443748093085001	--	--	<0.100	0.110	<0.20	<0.20	<0.010	<0.010	--
443750093041201	5.0	288	11.0	--	--	0.70	--	0.020	0.020
443804092544701	13	248	<0.100	--	--	<0.20	--	<0.010	<0.010
443819093170101	--	--	<0.100	--	--	0.40	--	<0.010	<0.010
443856092572101	--	--	12.0	0.020	0.70	0.60	0.030	0.020	--
443900093181501	16	330	<0.100	--	--	0.60	--	0.020	<0.010
443901092515101	14	253	2.70	--	--	0.30	--	0.010	<0.010
443905093173801	14	335	<0.100	--	--	0.40	--	<0.010	<0.010
443915093081102	--	--	0.200	0.040	0.50	0.30	0.860	0.100	--
	--	--	0.100	0.070	0.35	0.35	<0.010	<0.010	--
	--	--	0.200	0.130	0.30	0.30	0.020	<0.010	--
	--	--	0.500	0.140	0.40	0.40	<0.010	<0.010	--
	--	--	0.100	0.210	0.40	0.40	0.030	0.010	--
	--	--	0.300	0.180	0.70	0.40	0.020	<0.010	--
	--	--	0.800	0.180	0.50	0.50	0.030	0.030	--
	--	--	1.40	0.070	0.50	0.50	<0.010	<0.010	--
	--	--	1.60	0.030	0.30	0.30	<0.010	<0.010	--
443915093081103	--	--	<0.100	0.120	0.50	<0.20	0.500	0.090	--
	--	--	<0.100	0.100	0.30	0.30	<0.010	<0.010	--
	--	--	<0.100	0.100	0.20	0.20	0.040	<0.010	--
	--	--	<0.100	0.110	<0.20	<0.20	0.010	0.010	--
	--	--	<0.100	0.100	0.20	0.20	0.050	0.010	--
	--	--	<0.100	0.100	0.20	0.20	0.050	0.020	--
	--	--	<0.100	0.100	0.60	0.60	0.010	0.010	--
	--	--	<0.100	0.130	0.20	0.20	0.040	0.030	--
	--	--	<0.100	0.130	0.20	0.20	0.010	0.010	--
443926093010001	15	352	14.0	--	--	0.40	--	0.010	<0.010
443926093165901	19	361	0.300	--	--	<0.20	--	<0.010	<0.010
443932092510401	14	243	0.400	--	--	<0.20	--	<0.010	<0.010
443933092533501	14	255	4.30	--	--	0.50	--	0.010	<0.010
443933093002802	--	--	4.20	0.040	0.40	0.40	0.050	0.020	--
	--	--	2.10	0.010	0.40	0.20	0.150	0.150	--
	--	--	6.70	<0.010	0.50	0.50	0.020	0.020	--
	--	--	8.50	<0.010	0.50	0.50	<0.010	<0.010	--
	--	--	9.00	0.010	0.30	<0.20	0.020	0.020	--
	--	--	9.00	<0.010	1.0	0.50	0.020	0.010	--
	--	--	11.0	<0.010	0.40	0.40	0.010	0.010	--
	--	--	3.40	0.020	0.40	0.40	0.020	0.010	--
	--	--	4.50	<0.010	2.8	0.60	0.030	0.030	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

STATION NUMBER	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	TRITIUM TOTAL (PCI/L) (07000)	TRITIUM IN WATER MOLE-CULES (TU) (07012)	TRITIUM TOTAL (TU) (07017)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00661)
443404093075901	<1	10	<100	2	<0.1	53	--	17	--
443419093062001	1	710	<100	32	<0.1	--	12.8	--	--
443422093064701	<1	8	<100	2	<0.1	110	--	34	--
443510092574101	<1	180	<100	22	0.1	7.0	--	2.1	--
443511092570901	<1	260	<100	29	<0.1	2.0	--	0.7	--
443536093025901	<1	1400	<100	45	<0.1	--	<0.8	--	--
443555093015901	<1	6	<100	2	<0.1	55	--	17	--
443606092565801	<1	750	<100	73	<0.1	<1.0	--	<0.1	--
443607092565601	--	--	--	--	--	--	--	--	5.8
443638092560401	<1	110	<100	2	0.1	54	--	17	--
443652092535101	<1	<15	<100	32	<0.1	--	--	--	--
443655093044901	<1	2100	<100	65	0.2	<1.0	--	0.1	--
443658092540501	<1	15	<100	17	<0.1	<1.0	--	0.1	--
443700093053301	<1	5	<100	<1	<0.1	57	--	18	--
443737092545401	<1	40	<100	130	--	--	42.0	--	--
443746093035901	<1	1500	<100	50	<0.1	--	<0.8	--	--
443748093085001	--	--	--	--	--	--	--	--	1.7
443750093041201	<1	5	<100	<1	<0.1	--	50.0	--	--
443804092544701	<1	2000	<100	28	<0.1	--	1.7	--	--
443819093170101	2	1400	<100	62	<0.1	<1.0	--	<0.8	--
443856092572101	--	--	--	--	--	--	--	--	0.9
443900093181501	1	1900	100	16	0.4	--	--	--	--
443901092515101	1	8	<100	6	<0.1	10	--	3.0	--
443905093173801	<1	890	<100	35	<0.1	--	--	--	--
443915093081102	--	--	--	--	--	--	--	--	2.4
	--	--	--	--	--	--	--	--	2.9
	--	--	--	--	--	--	--	--	2.8
	--	--	--	--	--	--	--	--	3.2
	--	--	--	--	--	--	--	--	3.2
	--	--	--	--	--	--	--	--	3.2
	--	--	--	--	--	--	--	--	3.3
	--	--	--	--	--	--	--	--	2.8
	--	--	--	--	--	--	--	--	2.7
443915093081103	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
443926093010001	<1	4	<100	<1	<0.1	61	21.0	19	--
443926093165901	<1	460	<100	70	<0.1	54	--	17	--
443932092510401	<1	910	<100	25	0.2	--	--	--	--
443933092533501	<1	7	<100	3	<0.1	3.0	--	1.0	--
443933093002802	--	--	--	--	--	--	--	--	1.1
	--	--	--	--	--	--	--	--	1.2
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	1.0
	--	--	--	--	--	--	--	--	1.0
	--	--	--	--	--	--	--	--	1.0
	--	--	--	--	--	--	--	--	1.0
	--	--	--	--	--	--	--	--	1.0
	--	--	--	--	--	--	--	--	1.5

DAKOTA COUNTY--Continued

STATION NUMBER	LOCAL IDENT-I-FIER	GEO-LOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	PUMP OR FLOW PERIOD PRIOR TO SAM-PLING (MIN) (72004)
443933093002803	114N018W - SITE 3 DEEP WEL	112PLSC	01-31-90	1120	--	52.00	--	--
		112PLSC	03-15-90	1410	--	52.00	--	--
		112PLSC	04-11-90	1450	--	52.00	--	--
		112PLSC	04-26-90	1200	--	52.00	--	--
		112PLSC	05-16-90	1552	--	52.00	--	--
		112PLSC	05-31-90	1150	--	52.00	--	--
		112PLSC	07-17-90	1535	--	52.00	--	--
		112PLSC	09-05-90	1140	--	52.00	--	--
443936092514401	114N17W21DCCBDD UN104343 S	371JRDN	07-23-90	1645	--	275.00	885	27
443939092533801	114N17W19DDADDD UN207656 B	367PRDC	07-27-90	1415	57.86	125.00	863	57
443952093005501	114N18W20CBBCAC UN185940 H	371JRDN	08-01-90	1030	11.57	230.00	870	44
444000093031702	114N019W - SITE 2 SHALLOW	112PLSC	02-01-90	1030	--	10.00	--	--
		112PLSC	03-16-90	1050	--	10.00	--	--
		112PLSC	04-12-90	1050	--	10.00	--	--
		112PLSC	04-26-90	0955	--	10.00	--	--
		112PLSC	05-17-90	1240	--	10.00	--	--
		112PLSC	05-30-90	1340	--	10.00	--	--
		112PLSC	06-13-90	1455	--	10.00	--	--
		112PLSC	07-18-90	1430	--	10.00	--	--
		112PLSC	09-04-90	1352	--	10.00	--	--
444000093031703	114N019W - SITE 2 DEEP WEL	112PLSC	02-01-90	1125	--	42.40	--	--
		112PLSC	03-16-90	1125	--	42.40	--	--
		112PLSC	04-12-90	1145	--	42.40	--	--
		112PLSC	04-26-90	1030	--	42.40	--	--
		112PLSC	05-17-90	1300	--	42.40	--	--
		112PLSC	05-30-90	1400	--	42.40	--	--
		112PLSC	06-13-90	1505	--	42.40	--	--
		112PLSC	07-18-90	1443	--	42.40	--	--
		112PLSC	09-04-90	1425	--	42.40	--	--
444017092510901	114N17W22BBBCCD UN145915 J	367PRDC	07-23-90	1300	87.88	234.00	825	40
444025092501201	114N17W15DDCDCB UN170898 M	110QRNR	07-20-90	1600	110.00	174.00	825	12
444046092505101	114N17W15CABCBA UN110545 V	371JRDN	07-17-90	1600	--	202.00	824	30
444049093020402	114N018W - SITE 4 SHALLOW	112PLSC	02-02-90	1500	--	11.00	--	--
		112PLSC	03-15-90	1100	--	11.00	--	--
		112PLSC	04-12-90	1250	--	11.00	--	--
		112PLSC	04-27-90	1025	--	11.00	--	--
		112PLSC	05-16-90	1320	--	11.00	--	--
		112PLSC	05-30-90	1455	--	11.00	--	--
		112PLSC	06-14-90	1255	--	11.00	--	--
		112PLSC	07-19-90	1430	--	11.00	--	--
		112PLSC	09-05-90	1230	--	11.00	--	--
444049093020403	114N018W - SITE 4 DEEP WE	112PLSC	02-02-90	1605	--	23.70	--	--
		112PLSC	03-15-90	1150	--	23.70	--	--
		112PLSC	04-12-90	1325	--	23.70	--	--
		112PLSC	04-27-90	1050	--	23.70	--	--
		112PLSC	05-16-90	1350	--	23.70	--	--
		112PLSC	05-30-90	1520	--	23.70	--	--
		112PLSC	06-14-90	1315	--	23.70	--	--
		112PLSC	07-19-90	1455	--	23.70	--	--
		112PLSC	09-05-90	1300	--	23.70	--	--
444056092522101	114N17W16BCC1 CHARLES BA		09-05-90	1245	--	--	--	--
444058092461901	114N16W17BCB1 PAT SAGER		09-05-90	1405	--	--	--	--
444107092503401	114N17W15ABCBCC UN159526 K	110QRNR	08-08-90	1300	--	254.00	825	24
444127092582501	114N18W10CCBBDC UN124308 K	367PRDC	08-22-90	1530	--	135.00	890	10
444135093172901	114N21W12CACACB UN207768 Q	371JRDN	08-07-90	1330	--	517.00	1050	49

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

STATION NUMBER	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH (STAND-ARD UNITS) (00400)	PH LAB (STAND-ARD UNITS) (00403)	OXID-ATION RED-UCTION POTEN-TIAL (MV) (00090)	TEMPER-ATURE WATER (DEG C) (00010)	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)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
443933093002803	518	--	7.6	--	--	6.5	--	<1	K2	--
	514	--	7.4	--	--	9.5	--	--	--	--
	517	--	7.3	--	--	9.0	--	<1	<1	--
	495	--	7.5	--	--	9.5	--	--	--	--
	502	--	7.6	--	--	9.0	--	--	--	--
	501	--	7.4	--	--	9.5	--	--	--	--
	500	--	7.6	--	--	10.0	--	--	--	--
	486	--	7.9	--	--	12.5	--	--	--	--
443936092514401	490	538	7.5	7.7	--	11.5	--	--	--	65
443939092533801	851	846	7.2	7.4	--	11.5	--	--	--	100
443952093005501	512	513	7.4	7.5	E0.2	10.0	<0.1	--	--	69
444000093031702	521	--	7.7	--	--	6.5	--	<1	<1	--
	625	--	7.1	--	--	6.5	--	<1	2	--
	640	--	7.1	--	--	6.0	--	<1	<1	--
	622	--	7.3	--	--	7.0	--	--	--	--
	692	--	7.2	--	--	6.0	--	--	--	--
	706	--	7.1	--	--	7.0	--	<1	<1	--
	706	--	7.2	--	--	8.5	--	--	--	--
	708	--	7.4	--	--	9.5	--	--	--	--
	659	--	7.2	--	--	13.5	--	--	--	--
444000093031703	662	--	7.4	--	--	4.5	--	--	--	--
	524	--	7.2	--	--	9.0	--	<1	1	--
	526	--	7.3	--	--	8.5	--	<1	<1	--
	504	--	7.5	--	--	9.5	--	--	--	--
	506	--	7.5	--	--	9.0	--	--	--	--
	506	--	7.4	--	--	9.5	--	<1	<1	--
	480	--	7.5	--	--	10.0	--	--	--	--
	490	--	7.7	--	--	9.5	--	--	--	--
	311	--	8.9	--	--	13.5	--	--	--	--
444017092510901	--	471	7.5	7.7	--	11.0	--	--	--	60
444025092501201	654	654	7.3	7.6	E0.1	12.5	7.8	--	--	78
444046092505101	549	564	7.4	7.7	E0.2	11.0	9.8	--	--	68
444049093020402	473	--	7.0	--	--	4.5	--	<1	<1	--
	553	--	7.3	--	--	8.5	--	K8	K1600	--
	573	--	7.1	--	--	5.5	--	K1	80	--
	706	--	7.2	--	--	6.0	--	--	--	--
	657	--	7.0	--	--	7.0	--	--	--	--
	686	--	7.0	--	--	8.5	--	<1	K18	--
	855	--	7.1	--	--	8.5	--	--	--	--
	450	--	7.3	--	--	11.0	--	--	--	--
	372	--	7.0	--	--	13.5	--	--	--	--
444049093020403	393	--	7.8	--	--	7.0	--	<1	K2	--
	393	--	7.8	--	--	13.0	--	<1	K2	--
	406	--	7.7	--	--	9.0	--	<1	<1	--
	380	--	7.9	--	--	8.5	--	--	--	--
	378	--	7.7	--	--	8.5	--	--	--	--
	375	--	7.6	--	--	8.5	--	<1	<1	--
	370	--	7.8	--	--	8.5	--	--	--	--
	373	--	7.9	--	--	9.0	--	--	--	--
	366	--	7.9	--	--	12.0	--	--	--	--
444056092522101	505	--	7.1	--	--	11.5	4.8	--	--	--
444058092461901	336	--	7.4	--	--	11.0	9.3	--	--	--
444107092503401	--	523	7.8	7.7	--	10.5	--	--	--	64
444127092582501	523	570	7.5	7.7	--	9.5	8.8	--	--	79
444135093172901	--	582	7.4	7.3	--	11.0	7.8	--	--	79

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

STATION NUMBER	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	ALKALINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)
443933093002803	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
443936092514401	28	3.8	1.5	239	196	196	66	15	0.20
443939092533601	36	11	2.5	300	248	246	34	47	0.40
443952093005501	26	3.5	1.5	325	269	266	21	2.1	<0.10
444000093031702	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
444000093031703	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
444017092510901	24	2.7	0.60	257	211	211	17	6.0	<0.10
444025092501201	33	3.6	0.80	282	231	231	20	18	0.20
444046092505101	27	4.0	0.90	257	211	211	13	16	0.10
444049093020402	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
444049093020403	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
444056092522101	--	--	--	--	--	--	--	--	--
444058092461901	--	--	--	--	--	--	--	--	--
444107092503401	25	2.9	0.90	199	165	163	17	20	<0.10
444127092582501	25	3.4	1.3	321	264	263	29	10	0.10
444135093172901	28	4.6	2.1	379	314	311	1.7	7.9	0.60

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

STATION NUMBER	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	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)	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)
443933093002803	--	--	<0.100	0.080	0.60	0.40	0.210	0.010	--
	--	--	<0.100	0.080	0.80	0.80	0.050	0.020	--
	--	--	<0.100	0.080	<0.20	<0.20	0.030	0.020	--
	--	--	<0.100	0.070	<0.20	<0.20	0.020	0.010	--
	--	--	<0.100	0.080	0.20	0.20	0.040	<0.010	--
	--	--	<0.100	0.070	<0.20	<0.20	0.020	<0.010	--
	--	--	<0.100	0.040	<0.20	<0.20	0.010	<0.010	--
	--	--	<0.100	0.050	0.20	0.20	0.010	<0.010	--
443936092514401	12	348	4.00	--	--	0.80	--	<0.010	<0.010
443939092533801	16	501	24.0	--	--	0.50	--	<0.010	<0.010
443952093005501	12	282	0.100	--	--	<0.20	--	<0.010	<0.010
444000093031702	--	--	6.50	<0.010	0.60	0.40	0.020	<0.010	--
	--	--	8.40	0.060	1.1	0.60	<0.010	<0.010	--
	--	--	7.90	0.010	0.60	0.60	0.030	0.020	--
	--	--	9.30	0.010	0.30	0.30	0.020	<0.010	--
	--	--	8.40	<0.010	0.20	--	<0.010	<0.010	--
	--	--	6.80	0.010	0.40	0.40	0.020	0.010	--
	--	--	8.90	<0.010	0.80	0.60	<0.010	<0.010	--
	--	--	9.50	0.030	1.0	0.80	0.020	0.010	--
	--	--	16.0	0.020	0.90	0.90	<0.010	<0.010	--
444000093031703	--	--	<0.100	0.220	0.50	0.50	0.350	0.010	--
	--	--	<0.100	0.210	0.60	0.50	0.020	0.020	--
	--	--	<0.100	0.210	0.30	0.30	0.010	<0.010	--
	--	--	<0.100	0.190	0.40	0.40	0.470	0.010	--
	--	--	<0.100	0.190	0.30	0.30	0.010	<0.010	--
	--	--	<0.100	0.190	0.70	0.20	0.020	0.020	--
	--	--	<0.100	0.230	0.30	0.30	0.040	<0.010	--
	--	--	<0.100	0.140	0.20	0.20	0.020	0.010	--
	--	--	<0.100	0.020	0.30	0.30	<0.010	<0.010	--
444017092510901	14	280	10.0	--	--	0.70	--	<0.010	<0.010
444025092501201	17	408	15.0	--	--	0.60	--	0.010	<0.010
444046092505101	16	335	5.70	--	--	0.60	--	<0.010	<0.010
444049093020402	--	--	0.500	0.040	0.30	0.30	0.020	0.010	--
	--	--	2.20	0.030	0.60	0.60	0.050	0.050	--
	--	--	3.80	<0.010	<0.20	<0.20	0.050	0.040	--
	--	--	3.90	<0.010	0.40	0.40	0.050	0.050	--
	--	--	3.10	<0.010	0.50	0.50	0.040	0.040	--
	--	--	2.60	0.010	0.40	0.40	0.060	0.040	--
	--	--	3.20	0.050	0.50	0.50	0.040	0.030	--
	--	--	2.20	<0.010	0.50	0.30	0.050	0.050	--
	--	--	2.10	<0.010	1.2	0.40	0.060	0.060	--
444049093020403	--	--	4.50	0.040	0.90	0.60	0.170	0.030	--
	--	--	4.70	0.030	0.70	0.70	0.040	0.020	--
	--	--	5.00	0.020	0.20	0.20	0.050	0.030	--
	--	--	4.90	<0.010	<0.20	<0.20	0.040	0.040	--
	--	--	4.70	0.010	0.20	0.20	0.060	0.030	--
	--	--	4.70	0.020	0.20	0.20	0.080	0.040	--
	--	--	4.50	0.070	0.60	0.60	0.040	0.020	--
	--	--	4.90	0.020	0.40	0.40	0.050	0.050	--
	--	--	4.30	0.010	0.80	0.50	0.040	0.040	--
444056092522101	--	--	12.0	0.020	0.50	0.50	0.020	0.020	--
444058092461901	--	--	12.0	0.020	0.60	0.60	0.040	0.030	--
444107092503401	15	340	15.0	--	--	1.6	--	0.020	0.020
444127092582501	19	328	4.90	--	--	0.60	--	0.050	0.030
444135093172901	16	310	<0.100	--	--	0.50	--	0.020	0.010

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

STATION NUMBER	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	TRITIUM TOTAL (PCI/L) (07000)	TRITIUM IN WATER MOLE-CULES (TU) (07012)	TRITIUM TOTAL (TU) (07017)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)
443933093002803	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
443936092514401	3	4	<100	45	<0.1	--	28.0	--	--
443939092533801	<1	11	<100	<1	0.1	96	--	30	--
443952093005501	1	1300	<100	87	<0.1	<1.0	--	0.2	--
444000093031702	--	--	--	--	--	--	--	--	0.9
	--	--	--	--	--	--	--	--	0.9
	--	--	--	--	--	--	--	--	0.9
	--	--	--	--	--	--	--	--	0.8
	--	--	--	--	--	--	--	--	0.9
	--	--	--	--	--	--	--	--	1.2
	--	--	--	--	--	--	--	--	1.4
	--	--	--	--	--	--	--	--	1.3
	--	--	--	--	--	--	--	--	0.9
444000093031703	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
444017092510901	2	25	<100	1	<0.1	--	19.0	--	--
444025092501201	<1	12	<100	<1	<0.1	--	44.0	--	--
444046092505101	<1	3	<100	<1	<0.1	75	36.0	23	--
444049093020402	--	--	--	--	--	--	--	--	2.2
	--	--	--	--	--	--	--	--	3.3
	--	--	--	--	--	--	--	--	3.0
	--	--	--	--	--	--	--	--	2.9
	--	--	--	--	--	--	--	--	3.0
	--	--	--	--	--	--	--	--	3.1
	--	--	--	--	--	--	--	--	3.3
	--	--	--	--	--	--	--	--	2.1
	--	--	--	--	--	--	--	--	1.6
444049093020403	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
444056092522101	--	--	--	--	--	--	--	--	0.9
444058092461901	--	--	--	--	--	--	--	--	0.8
444107092503401	<1	<3	<100	<1	<0.1	110	--	35	--
444127092582501	<1	9	<100	<1	<0.1	--	37.8	--	--
444135093172901	<1	6	<100	15	0.2	--	<0.8	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)
444145093165601	114N21W12ADCCBD UN427499 C	364STPR	08-06-90	1430	121.33	280.00	1045	29
444147093182001	114N21W11ACC1 KROOK WELL		03-28-90	0945	--	--	--	--
			09-06-90	1600	--	--	--	--
444151092523801	114N17W8ADB1 TOM JESSE W		09-05-90	1135	--	--	--	--
444158093175001	114N21W12BBCCCA UN212390 S	110QRNR	08-08-90	1550	--	158.00	990	5
444159092490901	114N17W11ABDBCA UN426905 B	371JRDN	08-22-90	1400	119.79	280.00	841	20
444209092462101	114N16W6DDD1 MCNAMARA WE		09-05-90	1435	--	--	--	--
444234093173101	114N21W01CABBCC UN207752 G	367PRDC	09-04-90	1300	--	167.00	980	28
444236092485701	114N17W02ADCDCB UN145852 B	371JRDN	07-17-90	1400	116.00	195.00	829	52
444250093154901	114N20W06ABD1 UNITED CHU		03-28-90	1145	--	--	--	--
			09-06-90	1510	--	--	--	--
444251092484701	114N17W02AADAAC UN207641 R	367PRDC	07-23-90	1535	110.00	200.00	825	56
444304093055401	115N19W33DDD1 U. OF M AG		09-05-90	1550	--	--	--	--
444312092515702	115N017W - SITE 5 SHALLOW	112PLSC	01-25-90	1241	--	59.00	--	--
		112PLSC	03-16-90	1550	--	59.00	--	--
		112PLSC	04-11-90	1250	--	59.00	--	--
		112PLSC	04-25-90	1525	--	59.00	--	--
		112PLSC	05-17-90	1555	--	59.00	--	--
		112PLSC	05-31-90	1330	--	59.00	--	--
		112PLSC	07-19-90	1310	--	59.00	--	--
		112PLSC	09-05-90	1505	--	59.00	--	--
444322093173901	115N21W36CBACCD UN207887 O	371JRDN	08-03-90	1245	--	1070	1070	17
444333092593401	115N18W33BCC1 SWOBODA WE		03-29-90	1045	--	--	--	--
			09-05-90	1640	--	--	--	--
444354093174301	115N21W36BBBAA UN207861 L	367PRDC	08-02-90	1600	--	273.00	1013	26
444551092542601	115N17W18CACDBD UN207631 T	371JRDN	08-24-90	1200	--	400.00	840	14
444552093080001	115N19W18DCA1 DON GRUNTH		09-04-90	1300	--	--	--	--
444601093082901	115N19W18DAA1 MARVIN KA		09-04-90	1230	--	--	--	--
444606093193101	115N21W15ACDCDC UN205839 S	371JRDN	08-02-90	1230	--	274.00	805	45
444634093041401	27N22W32DCC1 PHILLIP BRA		09-04-90	1435	--	--	--	--
444638093034401	27N22W33CCA1 BOB PLAN WE		09-04-90	1620	--	--	--	--
444843093045801	27N22W20CBB1 KOWSKI WELL		03-29-90	0930	--	--	--	--
			09-04-90	1520	--	--	--	--
444919093131301	027.23.18CDBO1 GSWSI3 LIFT		06-20-90	1155	--	--	--	--
445000093055701	27N22W7CDC1 RABUSE WELL		09-04-90	1355	--	--	--	--
445053093055001	27N22W6CDC1 MIKE TAURIN		09-04-90	1145	--	--	--	--
445134093082001	27N23W2BAC1 JIM HANSON W		09-04-90	1100	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

STATION NUMBER	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (US/CM) (90095)	PH (STAND-ARD UNITS) (00400)	PH LAB (STAND-ARD UNITS) (00403)	OXID-ATION RED-UCTION POTEN-TIAL (MV) (00090)	TEMPER-ATURE WATER (DEG C) (00010)	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)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
444145093165601	--	659	7.2	7.6	E0.2	10.5	<0.1	--	--	99
444147093182001	636	--	7.5	--	--	10.0	--	<1	<1	--
	648	--	7.0	--	--	11.0	5.6	--	--	--
444151092523801	422	--	7.2	--	--	8.5	8.7	--	--	--
444158093175001	--	575	7.6	7.5	--	11.0	7.1	--	--	76
444159092490901	367	398	7.8	7.8	--	11.5	5.6	--	--	52
444209092462101	463	--	7.2	--	--	10.5	9.9	--	--	--
444234093173101	848	857	7.1	7.4	--	11.5	0.3	--	--	110
444236092485701	508	510	7.3	7.7	E0.1	11.5	9.5	--	--	62
444250093154901	581	--	7.2	--	--	12.0	--	1	4	--
	528	--	6.9	--	--	10.5	0.1	--	--	--
444251092484701	499	491	7.5	7.7	E0.1	11.5	9.4	--	--	59
444304093055401	463	--	6.9	--	--	9.5	0.4	--	--	--
444312092515702	952	--	7.7	--	--	11.0	--	<1	K2	--
	917	--	7.7	--	--	5.5	--	<1	K220	--
	576	--	7.6	--	--	6.5	--	<1	K4	--
	670	--	7.5	--	--	8.0	--	--	--	--
	760	--	7.5	--	--	5.0	--	--	--	--
	815	--	7.5	--	--	6.0	--	--	--	--
	572	--	7.5	--	--	14.0	--	--	--	--
	660	--	7.4	--	--	20.0	--	--	--	--
444322093173901	--	580	7.5	7.5	E0.0	13.5	4.1	--	--	77
444333092593401	804	--	7.0	--	--	7.0	--	<1	<1	--
	665	--	6.9	--	--	12.0	9.4	--	--	--
444354093174301	556	607	7.5	7.5	E0.1	10.5	0.1	--	--	79
444551092542601	433	461	7.4	7.6	--	10.5	0.7	--	--	57
444552093080001	474	--	7.2	--	--	10.5	0.4	--	--	--
444601093082901	526	--	7.1	--	--	9.5	3.6	--	--	--
444606093193101	503	550	7.4	7.5	E0.0	11.5	0.3	--	--	73
444634093041401	524	--	7.0	--	--	10.5	0.6	--	--	--
444638093034401	554	--	7.0	--	--	10.0	5.3	--	--	--
444843093045801	629	--	7.5	--	--	10.0	--	<1	<1	--
	599	--	7.2	--	--	10.5	0.2	--	--	--
444919093131301	675	--	7.1	--	--	15.0	--	--	--	--
445000093055701	491	--	7.1	--	--	11.0	3.5	--	--	--
445053093055001	760	--	6.9	--	--	12.0	9.3	--	--	--
445134093082001	666	--	7.0	--	--	10.5	0.2	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

STATION NUMBER	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	ALKA-LINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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)
444145093165601	27	9.8	3.8	458	375	375	1.0	2.6	0.10
444147093182001	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
444151092523801	--	--	--	--	--	--	--	--	--
444158093175001	30	5.0	1.9	368	302	302	19	3.1	0.60
444159092490901	18	2.5	0.90	237	194	194	15	3.0	0.20
444209092462101	--	--	--	--	--	--	--	--	--
444234093173101	42	4.5	3.1	448	378	376	32	51	<0.10
444236092485701	24	8.2	0.90	266	216	218	16	14	0.20
444250093154901	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
444251092484701	25	3.6	0.90	231	188	189	17	15	0.10
444304093055401	--	--	--	--	--	--	--	--	--
444312092515702	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
444322093173901	29	4.9	1.9	394	322	323	1.0	2.6	0.60
444333092593401	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
444354093174301	30	3.4	2.2	355	292	291	34	13	0.20
444551092542601	26	3.1	1.9	286	234	234	17	2.1	0.10
444552093080001	--	--	--	--	--	--	--	--	--
444601093082901	--	--	--	--	--	--	--	--	--
444606093193101	28	3.7	2.3	372	305	305	2.2	3.4	<0.10
444634093041401	--	--	--	--	--	--	--	--	--
444638093034401	--	--	--	--	--	--	--	--	--
444843093045801	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
444919093131301	--	--	--	540	--	--	--	--	--
445000093055701	--	--	--	--	--	--	--	--	--
445053093055001	--	--	--	--	--	--	--	--	--
445134093082001	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

STATION NUMBER	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
444145093165601	20	379	<0.100	--	--	1.0	--	0.080	0.080
444147093182001	--	--	<0.100	0.080	0.20	0.20	0.050	<0.010	--
	--	--	0.200	0.070	<0.20	<0.20	0.020	0.020	--
444151092523801	--	--	8.50	0.020	0.70	0.70	0.010	<0.010	--
444158093175001	22	323	<0.100	--	--	0.60	--	0.020	<0.010
444159092490901	17	224	4.40	--	--	0.40	--	0.020	<0.010
444209092462101	--	--	12.0	0.020	0.60	0.60	0.020	<0.010	--
444234093173101	26	530	<0.100	--	--	1.3	--	<0.010	<0.010
444236092485701	17	288	5.50	--	--	0.40	--	0.020	0.020
444250093154901	--	--	<0.100	0.080	0.30	0.30	0.010	<0.010	--
	--	--	<0.100	0.080	<0.20	<0.20	<0.010	<0.010	--
444251092484701	14	317	6.60	--	--	0.50	--	0.020	<0.010
444304093055401	--	--	0.700	0.020	<0.20	<0.20	0.030	0.020	--
444312092515702	--	--	9.50	0.020	0.80	0.80	0.510	0.480	--
	--	--	7.60	0.050	0.60	0.50	0.620	0.550	--
	--	--	5.20	<0.010	0.70	0.60	0.570	0.570	--
	--	--	5.50	<0.010	0.60	0.60	--	0.450	--
	--	--	3.70	<0.010	0.30	0.30	0.530	0.480	--
	--	--	4.20	<0.010	0.80	0.40	0.700	0.680	--
	--	--	2.30	0.030	0.30	0.30	0.760	0.740	--
	--	--	3.60	0.020	0.90	0.70	0.840	0.840	--
444322093173901	0.50	317	<0.100	--	--	0.50	--	0.020	0.020
444333092593401	--	--	26.0	<0.010	1.3	0.70	0.010	<0.010	--
	--	--	22.0	0.020	0.60	0.60	<0.010	--	--
444354093174301	28	350	<0.100	--	--	<0.20	--	0.020	<0.010
444551092542601	14	250	<0.100	--	--	<0.20	--	<0.010	<0.010
444552093080001	--	--	<0.100	0.040	0.30	0.30	0.020	0.010	--
444601093082901	--	--	3.20	0.020	0.30	0.30	0.020	<0.010	--
444606093193101	17	299	0.300	--	--	0.20	--	0.020	0.020
444634093041401	--	--	3.10	0.020	<0.20	<0.20	0.010	<0.010	--
444638093034401	--	--	4.30	0.020	0.50	0.50	0.010	<0.010	--
444843093045801	--	--	<0.100	0.120	<0.20	--	0.040	<0.010	--
	--	--	<0.100	0.120	<0.20	<0.20	0.030	0.020	--
444919093131301	--	--	--	--	--	--	--	--	--
445000093055701	--	--	0.800	0.020	<0.20	<0.20	0.020	<0.010	--
445053093055001	--	--	3.60	0.020	0.50	0.50	0.040	0.020	--
445134093082001	--	--	0.100	0.050	<0.20	<0.20	0.040	0.020	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

STATION NUMBER	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	TRITIUM TOTAL (PCI/L) (07000)	TRITIUM IN WATER MOLE-CULES (TU) (07012)	TRITIUM TOTAL (TU) (07017)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00661)
444145093165601	2	1400	<100	77	<0.1	--	8.0	--	--
444147093182001	--	--	--	--	--	--	--	--	1.4
	--	--	--	--	--	--	--	--	9.4
444151092523801	--	--	--	--	--	--	--	--	0.6
444158093175001	<1	1000	<100	180	<0.1	--	2.7	--	--
444159092490901	<1	<3	<100	2	<0.1	--	2.0	--	--
444209092462101	--	--	--	--	--	--	--	--	0.8
444234093173101	2	8700	400	510	<0.1	94	--	29	--
444236092485701	<1	4	<100	<1	<0.1	--	49.0	--	--
444250093154901	--	--	--	--	--	--	--	--	0.7
	--	--	--	--	--	--	--	--	1.1
444251092484701	<1	20	<100	<1	<0.1	150	52.0	48	--
444304093055401	--	--	--	--	--	--	--	--	0.7
444312092515702	--	--	--	--	--	--	--	--	1.3
	--	--	--	--	--	--	--	--	1.7
	--	--	--	--	--	--	--	--	3.2
	--	--	--	--	--	--	--	--	2.5
	--	--	--	--	--	--	--	--	2.4
	--	--	--	--	--	--	--	--	2.2
	--	--	--	--	--	--	--	--	2.4
	--	--	--	--	--	--	--	--	2.2
444322093173901	<1	50	<100	31	<0.1	--	<0.8	--	--
444333092593401	--	--	--	--	--	--	--	--	0.8
	--	--	--	--	--	--	--	--	2.8
444354093174301	2	1200	<100	230	<0.1	55	22.0	17	--
444551092542601	<1	200	<100	41	<0.1	--	<0.8	--	--
444552093080001	--	--	--	--	--	--	--	--	0.7
444601093082901	--	--	--	--	--	--	--	--	--
444606093193101	<1	50	<100	46	<0.1	--	<0.8	--	--
444634093041401	--	--	--	--	--	--	--	--	0.6
444638093034401	--	--	--	--	--	--	--	--	0.7
444843093045801	--	--	--	--	--	--	--	--	0.8
	--	--	--	--	--	--	--	--	0.9
444919093131301	--	--	--	--	--	--	--	--	--
445000093055701	--	--	--	--	--	--	--	--	1.3
445053093055001	--	--	--	--	--	--	--	--	0.7
445134093082001	--	--	--	--	--	--	--	--	0.9

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	1,1,1-TRICHLOROETHANE TOTAL (UG/L) (34506)	1,1,2,2 TETRACHLOROETHANE TOTAL (UG/L) (34516)	1,1,2-TRICHLOROETHANE TOTAL (UG/L) (34511)	1,1-DICHLOROETHANE TOTAL (UG/L) (34496)	1,1-DICHLOROETHYLENE TOTAL (UG/L) (34501)	1,2,4-TRICHLOROBENZENE TOTAL (UG/L) (34551)	1,2,5,6-DIBENZANTHRACENE TOTAL (UG/L) (34556)	1,2-DIBROMOETHANE WATER WHOLE TOTAL (UG/L) (77651)	1,2-DICHLOROBENZENE TOTAL (UG/L) (34536)
443933093002803	01-31-90	1120	--	--	--	--	--	--	--	--	--
	03-15-90	1410	--	--	--	--	--	--	--	--	--
	04-11-90	1450	--	--	--	--	--	--	--	--	--
	04-26-90	1200	--	--	--	--	--	--	--	--	--
	05-16-90	1552	--	--	--	--	--	--	--	--	--
	05-31-90	1150	--	--	--	--	--	--	--	--	--
	07-17-90	1535	--	--	--	--	--	--	--	--	--
	09-05-90	1140	--	--	--	--	--	--	--	--	--
443936092514401	07-23-90	1645	--	--	--	--	--	--	--	--	--
443939092533801	07-27-90	1415	--	--	--	--	--	--	--	--	--
443952093005501	08-01-90	1030	--	--	--	--	--	--	--	--	--
444000093031702	02-01-90	1030	--	--	--	--	--	--	--	--	--
	03-16-90	1050	--	--	--	--	--	--	--	--	--
	04-12-90	1050	--	--	--	--	--	--	--	--	--
	04-26-90	0955	--	--	--	--	--	<5.0	<10.0	--	<5.0
	05-17-90	1240	--	--	--	--	--	--	--	--	--
	05-30-90	1340	--	--	--	--	--	<5.0	<10.0	--	<5.0
	06-13-90	1455	--	--	--	--	--	--	--	--	--
	07-18-90	1430	--	--	--	--	--	--	--	--	--
	09-04-90	1352	--	--	--	--	--	<5.0	<10.0	--	<5.0
444000093031703	02-01-90	1125	--	--	--	--	--	--	--	--	--
	03-16-90	1125	--	--	--	--	--	--	--	--	--
	04-12-90	1145	--	--	--	--	--	--	--	--	--
	04-26-90	1030	--	--	--	--	--	<5.0	<10.0	--	<5.0
	05-17-90	1300	--	--	--	--	--	--	--	--	--
	05-30-90	1400	--	--	--	--	--	<5.0	<10.0	--	<5.0
	06-13-90	1505	--	--	--	--	--	--	--	--	--
	07-18-90	1443	--	--	--	--	--	--	--	--	--
	09-04-90	1425	--	--	--	--	--	<5.0	<10.0	--	<5.0
444017092510901	07-23-90	1300	--	--	--	--	--	--	--	--	--
444025092501201	07-20-90	1600	--	--	--	--	--	--	--	--	--
444046092505101	07-17-90	1600	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	<3.0	<3.0
444049093020402	02-02-90	1500	--	--	--	--	--	--	--	--	--
	03-15-90	1100	--	--	--	--	--	--	--	--	--
	04-12-90	1250	--	--	--	--	--	--	--	--	--
	04-27-90	1025	--	--	--	--	--	<5.0	<10.0	--	<5.0
	05-16-90	1320	--	--	--	--	--	--	--	--	--
	05-30-90	1455	--	--	--	--	--	<5.0	<10.0	--	<5.0
	06-14-90	1255	--	--	--	--	--	--	--	--	--
	07-19-90	1430	--	--	--	--	--	--	--	--	--
	09-05-90	1230	--	--	--	--	--	<5.0	<10.0	--	<5.0
444049093020403	02-02-90	1605	--	--	--	--	--	--	--	--	--
	03-15-90	1150	--	--	--	--	--	--	--	--	--
	04-12-90	1325	--	--	--	--	--	--	--	--	--
	04-27-90	1050	--	--	--	--	--	<5.0	<10.0	--	<5.0
	05-16-90	1350	--	--	--	--	--	--	--	--	--
	05-30-90	1520	--	--	--	--	--	<5.0	<10.0	--	<5.0
	06-14-90	1315	--	--	--	--	--	--	--	--	--
	07-19-90	1455	--	--	--	--	--	--	--	--	--
	09-05-90	1300	--	--	--	--	--	<5.0	<10.0	--	<5.0
444056092522101	09-05-90	1245	--	--	--	--	--	--	--	--	--
444058092461901	09-05-90	1405	--	--	--	--	--	--	--	--	--
444107092503401	08-08-90	1300	--	--	--	--	--	--	--	--	--
444127092582501	08-22-90	1530	--	--	--	--	--	--	--	--	--
444135093172901	08-07-90	1330	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	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)	1,3-DI-CHLORO-BENZENE TOTAL (UG/L) (34566)	1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34561)	1,4-DI-CHLORO-BENZENE TOTAL (UG/L) (34571)	2,4,6-TRI-CHLORO-PHENOL TOTAL (UG/L) (34621)	2,4-DI-METHYL-PHENOL TOTAL (UG/L) (34606)	2,4-DI-CHLORO-PHENOL TOTAL (UG/L) (34601)	2,4,-DI-NITRO-PHENOL TOTAL (UG/L) (34616)
443933093002803	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
443936092514401	--	--	--	--	--	--	--	--	--	--
443939092533801	--	--	--	--	--	--	--	--	--	--
443952093005501	--	--	--	--	--	--	--	--	--	--
444000093031702	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	<5.0	--	<5.0	<20.0	<5.0	<5.0	<20.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	<5.0	--	<5.0	<20.0	<5.0	<5.0	<20.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	<5.0	--	<5.0	<20.0	<5.0	<5.0	<20.0
444000093031703	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	<5.0	--	<5.0	<20.0	<5.0	<5.0	<20.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	<5.0	--	<5.0	<20.0	<5.0	<5.0	<20.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	<5.0	--	<5.0	<20.0	<5.0	<5.0	<20.0
444017092510901	--	--	--	--	--	--	--	--	--	--
444025092501201	--	--	--	--	--	--	--	--	--	--
444046092505101	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	--	--	--	--
444049093020402	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	<5.0	--	<5.0	<20.0	<5.0	<5.0	<20.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	<5.0	--	<5.0	<20.0	<5.0	<5.0	<20.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	<5.0	--	<5.0	<20.0	<5.0	<5.0	<20.0
444049093020403	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	<5.0	--	<5.0	<20.0	<5.0	<5.0	<20.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	<5.0	--	<5.0	<20.0	<5.0	<5.0	<20.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	<5.0	--	<5.0	<20.0	<5.0	<5.0	<20.0
444056092522101	--	--	--	--	--	--	--	--	--	--
444058092461901	--	--	--	--	--	--	--	--	--	--
444107092503401	--	--	--	--	--	--	--	--	--	--
444127092582501	--	--	--	--	--	--	--	--	--	--
444135093172901	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	2,4-DINITROTOLUENE TOTAL (UG/L) (34611)	2,6-DINITROTOLUENE TOTAL (UG/L) (34626)	2-CHLOROETHYLVINYLETHER TOTAL (UG/L) (34576)	2-CHLORONAPHTHALENE TOTAL (UG/L) (34581)	2-CHLOROPHENOL TOTAL (UG/L) (34586)	2-NITROPHENOL TOTAL (UG/L) (34591)	4,6-DINITRO-ORTHO-CRESOL TOTAL (UG/L) (34657)	4-BROMOPHENYL PHENYL ETHER TOTAL (UG/L) (34636)	4-CHLOROPHENYL PHENYL ETHER TOTAL (UG/L) (34641)	4-NITROPHENOL TOTAL (UG/L) (34646)
443933093002803	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
443936092514401	--	--	--	--	--	--	--	--	--	--
443939092533801	--	--	--	--	--	--	--	--	--	--
443952093005501	--	--	--	--	--	--	--	--	--	--
444000093031702	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0
444000093031703	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0
444017092510901	--	--	--	--	--	--	--	--	--	--
444025092501201	--	--	--	--	--	--	--	--	--	--
444046092505101	--	--	<3.0	--	--	--	--	--	--	--
444049093020402	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0
444049093020403	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	<5.0	<5.0	<5.0	<30.0	<5.0	<5.0	<30.0
444056092522101	--	--	--	--	--	--	--	--	--	--
444058092461901	--	--	--	--	--	--	--	--	--	--
444107092503401	--	--	--	--	--	--	--	--	--	--
444127092582501	--	--	--	--	--	--	--	--	--	--
444135093172901	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	ACE-NAPHTH-ENE TOTAL (UG/L) (34205)	ACE-NAPHTH-YLENE TOTAL (UG/L) (34200)	ALA-CHLOR TOTAL RECOVER (UG/L) (77825)	AME-TRYNE TOTAL (82184)	ANTHRA-CENE TOTAL (UG/L) (34220)	ATRA-ZINE, TOTAL (UG/L) (39630)	BENZENE TOTAL (UG/L) (34030)	BENZO-A-PYRENE TOTAL (UG/L) (34247)	BENZO B FLUOR-AN-THENE TOTAL (UG/L) (34230)	BENZO K FLUOR-AN-THENE TOTAL (UG/L) (34242)
443933093002803	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
443936092514401	--	--	--	--	--	--	--	--	--	--
443939092533801	--	--	--	--	--	--	--	--	--	--
443952093005501	--	--	--	--	--	--	--	--	--	--
444000093031702	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	--	<5.0	--	--	<10.0	<10.0	<10.0
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	--	<5.0	--	--	<10.0	<10.0	<10.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	--	<5.0	--	--	<10.0	<10.0	<10.0
444000093031703	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	--	<5.0	--	--	<10.0	<10.0	<10.0
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	--	<5.0	--	--	<10.0	<10.0	<10.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	--	<5.0	--	--	<10.0	<10.0	<10.0
444017092510901	--	--	--	--	--	--	--	--	--	--
444025092501201	--	--	--	--	--	--	--	--	--	--
444046092505101	--	--	<0.10	<0.10	--	<0.10	<3.0	--	--	--
444049093020402	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	--	<5.0	--	--	<10.0	<10.0	<10.0
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	--	<5.0	--	--	<10.0	<10.0	<10.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	--	<5.0	--	--	<10.0	<10.0	<10.0
444049093020403	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	--	<5.0	--	--	<10.0	<10.0	<10.0
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	--	<5.0	--	--	<10.0	<10.0	<10.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<5.0	--	--	<5.0	--	--	<10.0	<10.0	<10.0
444056092522101	--	--	--	--	--	--	--	--	--	--
444058092461901	--	--	--	--	--	--	--	--	--	--
444107092503401	--	--	--	--	--	--	--	--	--	--
444127092582501	--	--	--	--	--	--	--	--	--	--
444135093172901	--	--	--	--	--	--	--	--	--	--

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	BENZO A ANTHRAC ENE1,2- BENZANT HRACENE TOTAL (UG/L) (34526)	BENZOGH I PERYL ENE1,12 -BENZOP ERYLENE 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- 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)
443933093002803	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
443936092514401	--	--	--	--	--	--	--	--	--	--
443939092533801	--	--	--	--	--	--	--	--	--	--
443952093005501	--	--	--	--	--	--	--	--	--	--
444000093031702	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	--	--	--	--
444000093031703	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	--	--	--	--
444017092510901	--	--	--	--	--	--	--	--	--	--
444025092501201	--	--	--	--	--	--	--	--	--	--
444046092505101	--	--	--	--	--	--	<3.0	<3.0	<3.0	<3.0
444049093020402	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	--	--	--	--
444049093020403	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	--	--	--	--
444056092522101	--	--	--	--	--	--	--	--	--	--
444058092461901	--	--	--	--	--	--	--	--	--	--
444107092503401	--	--	--	--	--	--	--	--	--	--
444127092582501	--	--	--	--	--	--	--	--	--	--
444135093172901	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	CHLORO-ETHANE TOTAL (UG/L) (34311)	CHLORO-FORM TOTAL (UG/L) (32106)	CHRY-SENE TOTAL (UG/L) (34320)	CIS 1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34704)	CYAN-AZINE TOTAL (UG/L) (81757)	DI-CHLORO-BROMO-METHANE TOTAL (UG/L) (32101)	DI-CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	DIETHYL PHTHAL-ATE TOTAL (UG/L) (34336)	DI-METHYL PHTHAL-ATE TOTAL (UG/L) (34341)	DI-N-BUTYL PHTHAL-ATE TOTAL (UG/L) (39110)
443933093002803	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
443936092514401	--	--	--	--	--	--	--	--	--	--
443939092533801	--	--	--	--	--	--	--	--	--	--
443952093005501	--	--	--	--	--	--	--	--	--	--
444000093031702	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	<10.0	--	--	--	--	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	<10.0	--	--	--	--	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	<10.0	--	--	--	--	<5.0	<5.0	<5.0
444000093031703	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	<10.0	--	--	--	--	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	<10.0	--	--	--	--	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	<10.0	--	--	--	--	<5.0	<5.0	<5.0
444017092510901	--	--	--	--	--	--	--	--	--	--
444025092501201	--	--	--	--	--	--	--	--	--	--
444046092505101	<3.0	<3.0	--	<3.0	<0.10	<3.0	<3.0	--	--	--
444049093020402	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	<10.0	--	--	--	--	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	<10.0	--	--	--	--	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	<10.0	--	--	--	--	<5.0	<5.0	<5.0
444049093020403	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	<10.0	--	--	--	--	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	<10.0	--	--	--	--	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	<10.0	--	--	--	--	<5.0	<5.0	<5.0
444056092522101	--	--	--	--	--	--	--	--	--	--
444056092461901	--	--	--	--	--	--	--	--	--	--
444107092503401	--	--	--	--	--	--	--	--	--	--
444127092582501	--	--	--	--	--	--	--	--	--	--
444135093172901	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DI-N-OCTYL PHTHALATE TOTAL (UG/L) (34596)	ETHYL-BENZENE TOTAL (UG/L) (34371)	FLUORANTHENE TOTAL (UG/L) (34376)	FLUORENE TOTAL (UG/L) (34381)	HEXACHLOROBENZENE TOTAL (UG/L) (39700)	HEXACHLOROBUTADIENE TOTAL (UG/L) (39702)	HEXACHLOROCYCLOPENTADIENE TOTAL (UG/L) (34386)	HEXACHLOROETHANE TOTAL (UG/L) (34396)	INDENO (1,2,3-CD) PYRENE TOTAL (UG/L) (34403)	ISOPHORONE TOTAL (UG/L) (34408)
443933093002803	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
443936092514401	--	--	--	--	--	--	--	--	--	--
443939092533801	--	--	--	--	--	--	--	--	--	--
443952093005501	--	--	--	--	--	--	--	--	--	--
444000093031702	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	<10.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0
444000093031703	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	<10.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0
444017092510901	--	--	--	--	--	--	--	--	--	--
444025092501201	--	--	--	--	--	--	--	--	--	--
444046092505101	--	<3.0	--	--	--	--	--	--	--	--
444049093020402	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	<10.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0
444049093020403	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	<10.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<10.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0
444056092522101	--	--	--	--	--	--	--	--	--	--
444058092461901	--	--	--	--	--	--	--	--	--	--
444107092503401	--	--	--	--	--	--	--	--	--	--
444127092582501	--	--	--	--	--	--	--	--	--	--
444135093172901	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	METHYL-BROMIDE TOTAL (UG/L) (34413)	METHYL-CHLO-RIDE TOTAL (UG/L) (34418)	METHYL-ENE CHLO-RIDE TOTAL (UG/L) (34423)	METOLA-CHLOR WATER WHOLE TOT.REC (UG/L) (82612)	METRI-BUZIN WATER WHOLE TOT.REC (UG/L) (82611)	N-BUTYL BENZYL PHTHAL-ATE TOTAL (UG/L) (34292)	N-NITRO-SODI-N-PROPYL-AMINE TOTAL (UG/L) (34428)	N-NITRO-SODI-METHY-LAMINE TOTAL (UG/L) (34438)	N-NITRO-SODI-PHENY-LAMINE TOTAL (UG/L) (34433)	NAPHTH-ALENE TOTAL (UG/L) (34696)
443933093002803	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
443936092514401	--	--	--	--	--	--	--	--	--	--
443939092533801	--	--	--	--	--	--	--	--	--	--
443952093005501	--	--	--	--	--	--	--	--	--	--
444000093031702	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
444000093031703	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
444017092510901	--	--	--	--	--	--	--	--	--	--
444025092501201	--	--	--	--	--	--	--	--	--	--
444046092505101	<3.0	<3.0	<3.0	<0.1	<0.1	--	--	--	--	--
444049093020402	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
444049093020403	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	<5.0	<5.0	<5.0	<5.0	<5.0
444056092522101	--	--	--	--	--	--	--	--	--	--
444058092461901	--	--	--	--	--	--	--	--	--	--
444107092503401	--	--	--	--	--	--	--	--	--	--
444127092582501	--	--	--	--	--	--	--	--	--	--
444135093172901	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

DAKOTA COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	NITRO-BENZENE TOTAL (UG/L) (34447)	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)	PROME-TONE TOTAL (UG/L) (39056)	PROME-TRYNE TOTAL (UG/L) (39057)	PRO-PAZINE TOTAL (UG/L) (39024)	PYRENE TOTAL (UG/L) (34469)	SIMA-ZINE TOTAL (UG/L) (39055)
443933093002803	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
443936092514401	--	--	--	--	--	--	--	--	--	--
443939092533801	--	--	--	--	--	--	--	--	--	--
443952093005501	--	--	--	--	--	--	--	--	--	--
444000093031702	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<30.0	<30.0	<5.0	<5.0	--	--	--	<5.0	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<30.0	<30.0	<5.0	<5.0	--	--	--	<5.0	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<30.0	<30.0	<5.0	<5.0	--	--	--	<5.0	--
444000093031703	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<30.0	<30.0	<5.0	<5.0	--	--	--	<5.0	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<30.0	<30.0	<5.0	<5.0	--	--	--	<5.0	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<30.0	<30.0	<5.0	<5.0	--	--	--	<5.0	--
444017092510901	--	--	--	--	--	--	--	--	--	--
444025092501201	--	--	--	--	--	--	--	--	--	--
444046092505101	--	--	--	--	--	<0.1	<0.1	<0.10	--	<0.10
444049093020402	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<30.0	<30.0	<5.0	<5.0	--	--	--	<5.0	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<30.0	<30.0	<5.0	<5.0	--	--	--	<5.0	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<30.0	<30.0	<5.0	<5.0	--	--	--	<5.0	--
444049093020403	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<30.0	<30.0	<5.0	<5.0	--	--	--	<5.0	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<30.0	<30.0	<5.0	<5.0	--	--	--	<5.0	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	<5.0	<30.0	<30.0	<5.0	<5.0	--	--	--	<5.0	--
444056092522101	--	--	--	--	--	--	--	--	--	--
444058092461901	--	--	--	--	--	--	--	--	--	--
444107092503401	--	--	--	--	--	--	--	--	--	--
444127092582501	--	--	--	--	--	--	--	--	--	--
444135093172901	--	--	--	--	--	--	--	--	--	--

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	SIME-TRYNE TOTAL (UG/L) (39054)	STYRENE TOTAL (UG/L) (77128)	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)	TRI-FLURA-LIN TOTAL RECOVER (UG/L) (39030)	VINYL CHLO-RIDE TOTAL (UG/L) (39175)	XYLENE TOTAL WATER WHOLE TOT REC (UG/L) (81551)
443933093002803	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
443936092514401	--	--	--	--	--	--	--	--	--	--
443939092533801	--	--	--	--	--	--	--	--	--	--
443952093005501	--	--	--	--	--	--	--	--	--	--
444000093031702	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
444000093031703	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
444017092510901	--	--	--	--	--	--	--	--	--	--
444025092501201	--	--	--	--	--	--	--	--	--	--
444046092505101	<0.1	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<0.10	<1.0	<3.0
444049093020402	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
444049093020403	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
444056092522101	--	--	--	--	--	--	--	--	--	--
444058092461901	--	--	--	--	--	--	--	--	--	--
444107092503401	--	--	--	--	--	--	--	--	--	--
444127092582501	--	--	--	--	--	--	--	--	--	--
444135093172901	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

HENNEPIN COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)	SPECIFIC CONDUCTANCE (US/CM) (00095)
444937093140201	27.24.13ACD01 GWSW1 FLOWIN	378PDCJ	06-18-90	1220	--	--	700	--	390
450145093330501	118N23W14ACCCDD UN104727 M	371JRDN	08-08-90	1300	--	363.00	1020	21	718
450147093244301	118N22W13DABDBB UN204271 H	367PRDC	08-21-90	1130	--	256.00	905	30	700
450147093300801	118N22W18ADDDAC UN164534 M	367PRDC	08-08-90	1700	110.20	263.00	1012	27	742
450148093344801	118N23W15BCDCBA UN118855 T	371JRDN	08-08-90	1100	118.80	360.00	1032	35	840
450150093275201	118N22W16ADCABB UN136095 J	367PRDC	08-10-90	1430	165.02	292.00	1042	13	788
450201093332201	118N23W14BACABA UN405084 M	110QRNR	08-07-90	1500	67.80	152.00	982	82	855
450202093301001	118N22W18AADABC UN405052 W	110QRNR	08-10-90	1405	113.33	179.00	1007	24	625
450205093321601	118N23W13BBADAC UN163895 G	364STPR	08-09-90	1130	95.13	204.00	1010	19	751
450208093173401	29N24W04AABDBD UN203577 W	367PRDC	08-30-90	1400	--	225.00	840	25	905
450210093353801	118N23W16BAAADA UN157819 J	110QRNR	08-07-90	1300	--	114.00	1011	18	828
450214093294701	118N22W08CCDADD UN204208 G	371JRDN	09-10-90	2300	--	392.00	1001	35	571
450216093320401	118N23W12CDDBBC UN145406 D	371JRDN	08-08-90	1500	--	319.00	1002	35	727
450218093223201	118N21W08CCDABB UN114311 R	367PRDC	08-09-90	1530	--	260.00	910	37	652
450224093263501	118N22W10DBCDDD UN146122 S	367PRDC	08-30-90	1200	--	215.00	992	14	833
450257093282901	118N22W09BABDCD UN135325 C	371JRDN	08-09-90	1400	95.05	275.00	985	27	621
450301093255301	118N22W11BAAACB UN204222 D	371JRDN	08-10-90	1100	48.56	215.00	910	40	534
450359093242901	119N22W36DCCADC UN204844 H	371JRDN	09-06-90	1200	--	192.00	882	16	629
450406093293001	119N22W32CDAADA UN104701 O	371JRDN	08-31-90	1300	--	247.00	950	11	724
450407093193301	119N21W34DCABBC UN203317 B	371JRDN	08-31-90	1100	--	340.00	861	15	584
450408093192901	118N22W13DADACC UN204272 F	371JRDN	09-06-90	1100	38.20	390.00	925	21	697
450411093283101	119N22W33CACDBC UN128030 C	371JRDN	08-30-90	1600	--	280.00	990	12	790
450418093303801	119N22W31DBBDBB UN166097 K	371JRDN	08-29-90	1500	82.06	204.00	988	37	745
450419093254401	119N22W35DBBACD UN204836 L	371JRDN	09-06-90	1300	--	169.00	920	21	562
450444093170501	119.21.36ABA01-IP25		06-22-90	1205	--	88.17	--	--	528
450444093170502	119.21.36ABA02-IP26		06-22-90	1410	25.86	48.17	--	--	--
450444093170504	119.21.36ABA04-IP33		06-22-90	1720	25.53	39.00	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

HENNEPIN COUNTY--Continued

STATION NUMBER	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH (STANDARD UNITS) (00400)	PH LAB (STANDARD UNITS) (00403)	OXIDATION REDUCTION POTENTIAL (MV) (00090)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	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)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)
444937093140201	--	7.3	--	--	13.0	--	--	--	--	--	258
450145093330501	704	7.1	7.4	E0.2	9.5	<0.1	91	37	5.9	3.4	475
450147093244301	733	7.7	7.6	--	10.0	<0.1	92	41	4.9	2.9	497
450147093300801	745	7.2	7.5	E0.1	9.5	0.1	100	40	5.7	3.6	527
450148093344801	837	7.0	7.6	E0.2	9.0	<0.1	110	45	8.2	3.6	582
450150093275201	826	6.8	7.5	E0.1	9.5	<0.1	100	49	6.5	2.4	560
450201093332201	845	6.9	7.2	E0.2	9.5	0.2	130	36	3.3	4.5	588
450202093301001	654	6.9	7.4	E0.1	9.5	<0.1	87	32	5.3	3.2	448
450205093321601	748	7.3	7.7	E0.2	9.5	<0.1	97	34	19	1.5	531
450208093173401	873	7.3	7.5	--	10.0	4.5	110	45	11	2.4	339
450210093353801	822	7.0	7.1	E0.2	10.5	0.1	120	35	4.1	5.4	584
450214093294701	590	7.4	7.6	E0.0	9.5	0.2	79	29	4.2	2.8	383
450216093320401	721	7.1	7.4	E0.2	10.0	<0.1	91	37	10	2.6	499
450218093223201	652	7.1	7.5	E0.1	11.0	0.1	80	38	4.9	2.7	439
450224093263501	798	7.4	7.6	--	9.5	0.3	99	46	7.5	3.6	556
450257093282901	624	7.2	7.4	E0.1	9.5	<0.1	81	32	5.0	2.5	428
450301093255301	546	7.2	7.5	E2	13.0	2.5	65	31	5.1	2.9	370
450359093242901	648	7.5	7.7	--	10.5	0.3	80	36	5.9	3.2	417
450406093293001	734	8.0	7.5	--	9.0	--	89	38	13	2.5	504
450407093193301	582	7.1	7.7	--	9.5	3.2	71	31	5.1	2.1	317
450408093192901	704	7.1	7.5	--	10.0	0.4	89	39	5.6	3.1	462
450411093283101	763	8.6	7.6	--	9.0	<0.1	94	42	8.3	3.4	499
450418093303801	787	7.5	7.6	--	10.0	<0.1	87	44	17	2.8	545
450419093254401	603	7.2	7.6	--	11.0	0.4	74	33	4.2	3.1	398
450444093170501	522	7.6	7.7	--	12.5	--	58	29	6.8	2.0	--
450444093170502	716	7.9	7.8	--	--	--	94	31	5.4	1.7	--
450444093170504	695	7.3	7.6	--	--	--	89	31	4.9	1.6	--

STATION NUMBER	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)
444937093140201	--	--	--	--	--	--	--	--	--	--	--
450145093330501	--	390	389	--	2.7	2.7	0.60	21	401	0.100	1.3
450147093244301	--	407	407	--	8.2	6.1	0.30	29	419	<0.100	0.40
450147093300801	--	434	432	--	7.7	3.5	0.10	28	418	<0.100	0.60
450148093344801	--	478	477	--	13	2.8	0.60	24	486	<0.100	1.6
450150093275201	--	459	459	--	32	3.5	0.10	25	480	<0.100	0.80
450201093332201	--	485	482	--	15	4.4	0.30	35	511	<0.100	1.7
450202093301001	--	368	367	--	5.4	3.0	0.10	26	368	<0.100	0.60
450205093321601	--	435	435	--	1.9	<0.10	<0.10	19	428	<0.100	0.60
450208093173401	--	278	278	--	150	35	<0.10	20	593	<0.100	0.50
450210093353801	--	479	479	--	6.8	23	0.50	39	494	<0.100	3.6
450214093294701	--	315	314	--	12	3.1	0.30	22	332	<0.100	0.80
450216093320401	--	409	409	--	3.1	2.7	0.60	20	458	<0.100	0.90
450218093223201	--	361	360	--	2.5	<0.10	0.10	22	358	<0.100	0.40
450224093263501	--	456	459	--	13	3.6	<0.10	31	451	<0.100	0.60
450257093282901	0	353	351	--	2.4	2.5	<0.10	18	334	<0.100	0.50
450301093255301	--	303	303	--	2.9	2.8	0.10	15	301	<0.100	0.80
450359093242901	--	343	343	--	12	3.4	<0.10	26	362	<0.100	0.90
450406093293001	--	416	413	--	7.1	2.9	<0.10	20	409	<0.100	1.0
450407093193301	--	260	260	--	36	12	0.20	18	331	<0.100	0.50
450408093192901	--	382	379	--	2.9	4.3	<0.10	25	368	<0.100	0.50
450411093283101	--	410	409	--	26	2.7	0.30	22	436	<0.100	0.80
450418093303801	--	447	448	--	15	2.9	0.30	20	444	<0.100	1.5
450419093254401	--	327	326	--	<1.0	3.5	<0.10	18	293	<0.100	0.80
450444093170501	--	--	258	256	31	5.1	0.40	17	--	<0.100	--
450444093170502	--	--	220	222	110	36	0.20	20	--	<0.100	--
450444093170504	--	--	221	219	110	32	0.10	17	--	<0.100	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

HENNEPIN COUNTY--Continued

STATION NUMBER	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	TRITIUM TOTAL (PCI/L) (07000)	TRITIUM IN WATER MOLECULES (TU) (07012)	TRITIUM TOTAL (TU) (07017)
444937093140201	--	--	--	--	--	--	--	--	--	--	--
450145093330501	0.090	0.070	13	--	4900	<100	1000	<0.1	<1.0	<0.8	<0.1
450147093244301	0.080	0.060	7	--	860	<100	250	<0.1	--	<0.8	--
450147093300801	0.050	0.040	<1	--	2800	<100	820	<0.1	<1.0	--	<0.1
450148093344801	0.350	0.250	12	--	3100	<100	160	<0.1	<1.0	--	<0.1
450150093275201	0.100	0.090	5	--	1200	--	67	<0.1	3.0	--	0.9
450201093332201	--	0.240	<1	--	8500	<100	220	<0.1	--	5.0	--
450202093301001	0.020	0.020	<1	--	430	--	1200	<0.1	1.0	--	0.3
450205093321601	0.110	0.080	13	--	1400	<100	400	<0.1	<1.0	--	0.1
450208093173401	0.020	<0.010	4	--	580	<100	200	<0.1	--	--	--
450210093353801	0.020	0.020	6	--	8400	<100	120	<0.1	--	31.0	--
450214093294701	0.010	<0.010	<1	--	210	200	1200	<0.1	--	--	--
450216093320401	0.040	0.030	4	--	3600	<100	600	<0.1	<1.0	--	<0.1
450218093223201	<0.010	<0.010	<1	--	120	<100	150	<0.1	<1.0	--	0.2
450224093263501	0.050	0.050	6	--	710	<100	180	<0.1	<1.0	--	<0.1
450257093282901	<0.010	<0.010	<1	--	380	<100	560	<0.1	<1.0	--	0.1
450301093255301	<0.010	<0.010	5	--	3400	--	380	<0.1	<1.0	--	<0.1
450359093242901	0.020	0.020	2	--	200	100	1000	<0.1	<1.0	--	<0.1
450406093293001	0.060	0.040	14	--	3900	<100	170	<0.1	1.0	--	<0.8
450407093193301	0.010	<0.010	<1	--	28	<100	440	<0.1	--	--	--
450408093192901	0.030	0.030	8	--	810	<100	240	<0.1	--	--	<0.1
450411093283101	0.020	0.020	3	--	230	100	660	<0.1	--	--	--
450418093303801	0.010	0.010	14	--	2400	<100	120	<0.1	1.0	--	<0.8
450419093254401	<0.010	<0.010	1	--	500	<100	1000	<0.1	--	--	--
450444093170501	--	<0.010	--	30	96	--	210	--	--	--	--
450444093170502	--	<0.010	--	20	340	--	310	--	--	--	--
450444093170504	--	<0.010	--	20	320	--	110	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

HUBBARD COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH (STANDARD UNITS) (00400)
471013094395401	143N32W25DAAC	LC3-LIONS D 112DSMO	08-22-90	1500	86.00	1360	575	584	7.3

STATION NUMBER	PH LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	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 WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)
471013094395401	7.5	10.0	82	26	5.4	1.8	340	321	6.8	3.6

STATION NUMBER	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	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)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
471013094395401	0.30	19	0.300	0.010	<0.010	<0.010	10	15	17	1.3

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

ISANTI COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
453631093263701	036N25W15CAB01MORAN_S(I4)	112DSMO	08-31-90	1230	19.22	21.00	975

STATION NUMBER	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH (STANDARD UNITS) (00400)	PH LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)
453631093263701	36	225	8.1	7.8	13.0	6.7	26	8.0	2.8

STATION NUMBER	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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)
453631093263701	1.4	71	0	58	58	12	2.9	<0.10	14

STATION NUMBER	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
453631093263701	158	10.0	0.020	0.60	0.040	0.040	40	13

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

ITASCA COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)
471917093555601	144N26W02ABCD	LC10-BALL C 112DSMO	08-24-90	1600	3.60	71.00	1290	620	590
472023093534801	145N25W31BABB	LC1-BALLCLU 112DSMO	08-21-90	1600	--	188.00	1290	590	641
472602094014601	146N26W30BCDD	LC120SHERMA 112DSMO	08-28-90	1430	--	156.00	1320	520	513
472852094045301	146N27W10AACB	LC-13 BOWEN 112DSMO	08-28-90	1600	--	61.00	1320	440	431
473110094023101	147N27W25BADD	LC16-FOREST 112DSMO	08-29-90	1500	--	157.00	1310	375	357

STATION NUMBER	PH (STANDARD UNITS) (00400)	PH LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	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 WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)
471917093555601	7.7	7.8	9.0	57	14	54	3.5	317	297	6.3	14
472023093534801	8.5	7.5	8.0	95	27	6.4	3.1	334	357	4.1	3.6
472602094014601	8.0	8.0	12.0	43	17	51	3.2	296	287	<1.0	5.0
472852094045301	7.9	7.9	9.0	46	14	30	2.5	--	238	<1.0	3.7
473110094023101	8.1	7.8	9.0	37	11	23	1.5	190	196	<1.0	2.7

STATION NUMBER	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	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)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
471917093555601	0.30	22	<0.100	0.590	0.090	0.050	140	400	120	--
472023093534801	0.30	24	<0.100	0.150	0.020	0.020	20	360	410	2.3
472602094014601	0.60	17	<0.100	0.360	0.090	0.090	90	530	63	3.5
472852094045301	0.50	20	<0.100	0.770	0.310	0.310	90	770	89	3.5
473110094023101	0.30	12	<0.100	0.270	0.100	0.080	90	1100	64	2.6

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

LAC QUI PARLE COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)
450026095514001	118N42W25AABA SEEPAGE AT B		09-05-90	1615	2010	6.9	8.5

STATION NUMBER	OXYGEN, DISSOLVED (MG/L) (00300)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
450026095514001	0.6	443	<0.010	<0.100	3.30	3.8	0.110	0.070	3.2

ANALYSES FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)	2,4-D, TOTAL (UG/L) (39730)	CHLORDYRIFOS TOTAL RECOVER (UG/L) (38932)	DEF TOTAL (UG/L) (39040)	DIAZINON, TOTAL (UG/L) (39570)
450026095514001	09-05-90	1615	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

STATION NUMBER	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L) (82052)	DISYSTON TOTAL (UG/L) (39011)	ETHION, TOTAL (UG/L) (39398)	FONOFOS (DYFONATE) WATER WHOLE TOT.REC (UG/L (82614)	MALATHION, TOTAL (UG/L) (39530)	METHOMYL TOTAL (UG/L) (39051)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOTAL (UG/L) (39790)
450026095514001	<0.01	<0.01	<0.01	<0.0	<0.01	<0.5	<0.01	<0.01

STATION NUMBER	PARATHION, TOTAL (UG/L) (39540)	PHORATE TOTAL (UG/L) (39023)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	PROPHAM TOTAL (UG/L) (39052)	SEVIN, TOTAL (UG/L) (39750)	SILVEX, TOTAL (UG/L) (39760)	TOTAL TRITHION (UG/L) (39786)
450026095514001	<0.01	<0.01	<0.01	<0.5	<0.50	<0.01	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

LE SUEUR COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)
441827093573301	110N26W28BDAA SEEPAGE FACE		09-06-90	1630	885	7.2	10.0	8.5
442006093545601	110N26W14ACDB PAULSON SPRI		11-13-89	1715	648	7.6	9.5	0.1
			08-29-90	1730	636	7.4	9.5	0.1
442204093532301	110N26W5AACA ROGERS CK SPR		11-13-89	1610	648	7.6	9.0	2.0
			08-29-90	1600	669	7.4	13.0	2.0
443129093530501	112N25W7BCAB HENDERSON STA		11-13-89	1340	--	--	--	--

STATION NUMBER	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
441827093573301	--	327	<0.010	8.20	0.040	0.80	0.020	<0.010	1.8
442006093545601	348	--	<0.010	<0.100	0.810	0.90	<0.010	<0.010	--
	--	342	<0.010	<0.100	0.780	0.90	0.010	0.010	1.4
442204093532301	303	--	<0.010	7.10	0.030	1.0	<0.010	<0.010	--
	--	268	<0.010	4.80	0.020	0.50	<0.010	<0.010	3.3
443129093530501	--	--	0.080	1.10	0.010	0.40	<0.010	<0.010	--

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)	2,4-D, TOTAL (UG/L) (39730)	CHLORDYRIFOS TOTAL RECOVER (UG/L) (38932)	DEF TOTAL (UG/L) (39040)	DIAZINON, TOTAL (UG/L) (39570)
441827093573301	09-06-90	1630	--	--	--	--	--	--
442006093545601	11-13-89	1715	--	--	--	--	--	--
	08-29-90	1730	--	--	--	--	--	--
442204093532301	11-13-89	1610	--	--	--	--	--	--
	08-29-90	1600	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
443129093530501	11-13-89	1340	--	--	--	--	--	--

STATION NUMBER	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L) (82052)	DISYSTON TOTAL (UG/L) (39011)	ETHION, TOTAL (UG/L) (39398)	FONOFOS (DYFONATE) WATER WHOLE TOT.REC (UG/L (82614)	MALATHION, TOTAL (UG/L) (39530)	METHOMYL TOTAL (UG/L) (39051)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOTAL (UG/L) (39790)
441827093573301	--	--	--	--	--	--	--	--
442006093545601	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--
442204093532301	--	--	--	--	--	--	--	--
	<0.01	<0.01	<0.01	<0.0	<0.01	<0.5	<0.01	<0.01
443129093530501	--	--	--	--	--	--	--	--

STATION NUMBER	PARATHION, TOTAL (UG/L) (39540)	PHORATE TOTAL (UG/L) (39023)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	PROPHAM TOTAL (UG/L) (39052)	SEVIN, TOTAL (UG/L) (39750)	SILVEX, TOTAL (UG/L) (39760)	TOTAL TRITHION (UG/L) (39786)
441827093573301	--	--	--	--	--	--	--
442006093545601	--	--	--	--	--	--	--
	--	--	--	--	--	--	--
442204093532301	--	--	--	--	--	--	--
	<0.01	<0.01	<0.01	<0.5	<0.50	<0.01	<0.01
443129093530501	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

NICOLLET COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)
441531094203001	109N29W8CADA COURTLAND BRI		08-30-90	1030	737	7.3	10.5

STATION NUMBER	OXYGEN, DISSOLVED (MG/L) (00300)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
441531094203001	1.8	285	<0.010	8.20	0.010	0.20	0.010	0.010	1.3

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)	2,4-D, TOTAL (UG/L) (39730)	CHLORDYRIFOS TOTAL RECOVER (UG/L) (38932)	DEF TOTAL (UG/L) (39040)	DIAZINON, TOTAL (UG/L) (39570)
441531094203001	08-30-90	1030	<0.01	<0.01	0.02	<0.01	<0.01	<0.01

STATION NUMBER	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L) (82052)	DISYSTON TOTAL (UG/L) (39011)	ETHION, TOTAL (UG/L) (39398)	FONOFOS (DYFONATE) WATER WHOLE TOT.REC (UG/L (82614)	MALATHION, TOTAL (UG/L) (39530)	METHOMYL TOTAL (UG/L) (39051)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOTAL (UG/L) (39790)
441531094203001	0.01	<0.01	<0.01	<0.0	<0.01	<0.5	<0.01	<0.01

STATION NUMBER	PARATHION, TOTAL (UG/L) (39540)	PHORATE TOTAL (UG/L) (39023)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	PROPHAM TOTAL (UG/L) (39052)	SEVIN, TOTAL (UG/L) (39750)	SILVEX, TOTAL (UG/L) (39760)	TOTAL TRITHION (UG/L) (39786)
441531094203001	<0.01	<0.01	<0.01	<0.5	<0.50	<0.01	<0.01

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

OLMSTED COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)	SPECIFIC CONDUCTANCE (US/CM) (00095)
440326092271801	107N14W24CBABAB UN228586 W	367PRDC	08-14-90	1500	--	151.00	1012	19	537
440333092240701	107N13W20ADCBAC UN150296 H	371JRDN	08-23-90	1230	--	560.00	1190	27	--
440334092262001	107N14W24ADADDC UN228649 J	387PRDC	08-15-90	1000	211.20	332.00	1195	74	545
440335092271501	107N14W24BCADDB UN150277 B	371JRDN	08-14-90	1030	--	400.00	1005	14	467
440345092160201	107N12W21ABBDCD UN227472 B	387PRDC	08-23-90	1500	--	256.00	1140	33	--
440352092155701	107N12W16DCDCCD UN220754 Y	367PRDC	09-05-90	1730	56.00	295.00	1175	25	--
440352092160301	107N12W16DCCDCB UN148332 M	371JRDN	08-15-90	1700	62.80	435.00	1150	13	801
440352092182001	107N12W18DCDCDB UN150319 B	367PRDC	08-17-90	1330	161.90	398.00	1224	23	--
440353092152001	107N12W15CCDCAD UN119824 V	371JRDN	08-15-90	1600	171.20	600.00	1257	28	452
440353092220101	107N13W15DCCDAC UN401807 S	367PRDC	08-13-90	1900	231.24	402.00	1265	23	522
440355092213201	107N13W15DDDADC UN105498 S	364STPR	08-15-90	1500	--	280.00	1265	13	512
440402092280101	107N14W14DCBDCB UN220812 S	371JRDN	08-23-90	1100	--	364.00	965	30	--
440410092225801	107N13W16DACBAC UN220771 B	371JRDN	08-13-90	1800	--	623.00	1220	10	473
440412092235701	107N13W17DAADCD UN220773 F	367PRDC	08-22-90	1100	110.80	285.00	1125	6	--
440414092255801	107N13W18CABCAC UN180557 C	371JRDN	08-14-90	1400	21.41	420.00	1010	14	527
440415092223801	107N13W15CBBBAD UN105470 O	367PRDC	08-22-90	1300	212.00	395.00	1240	22	--
440416092224501	107N13W16DAAABD UN220769 R	384STPR	08-21-90	1430	214.10	265.00	1240	12	--
440416092240901	107N13W17DABDDA UN220774 B	371JRDN	08-21-90	1330	68.70	460.00	1085	47	--
440417092255701	107N13W18CABBAA UN228816 L	367PRDC	08-14-90	1300	13.25	140.00	1010	12	575
440417092263701	107N14W13DBAAAC UN228548 D	371JRDN	08-14-90	1130	--	404.00	1003	14	475
440418092190201	107N12W18BCCDCC UN227475 M	364STPR	08-21-90	1530	--	240.00	1245	21	--
440448092272601	107N14W12CCCCAA UN220810 P	371JRDN	08-13-90	1600	--	413.00	1025	20	549
440451092271501	107N14W12CCADCC UN228559 W	367PRDC	08-21-90	1200	--	186.00	1010	28	--
440454092250101	107N13W08CCBACC UN228853 G	387PRDC	08-13-90	2000	--	335.00	1225	13	544
440459092251901	107N13W07DACDBD UN101263 C	371JRDN	08-14-90	1230	--	570.00	1222	16	497
440507092262001	107N14W12DAAADC UN150233 L	371JRDN	08-22-90	1430	--	598.00	1165	28	--
440512092243401	107N13W08BDDDDB UN150209 B	371JRDN	08-22-90	1830	--	598.00	1200	30	--
440523092163201	107N12W09BBDCDA UN235540 E	371JRDN	08-21-90	1700	25.40	440.00	1095	20	--
440524092261701	107N13W07BCBBBA UN228652 P	367PRDC	08-22-90	1530	--	321.00	1145	25	--
440531092240101	107N13W08AAACAC UN220766 W	367PRDC	08-15-90	1330	--	230.00	1120	10	524
440532092261901	107N14W12AAADAC UN158970 J	371JRDN	09-05-90	1330	--	455.00	1065	20	--
440536092212901	107N13W02CCCCCD UN105493 B	367PRDC	08-15-90	1400	195.52	295.00	1240	19	500
440554092264901	107N14W01DBCACC UN101297 S	371JRDN	08-16-90	1100	60.00	395.00	1005	46	490
470000108020001	107N-12W-16AACC UNW00248 G	364GLEN	08-23-90	1600	--	70.00	--	25	--
470000134000001	107N-12W-19ABAD UNW00254 R	110QRNR	08-23-90	1400	--	70.00	--	25	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

OLMSTED COUNTY--Continued

STATION NUMBER	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH (STANDARD UNITS) (00400)	PH LAB (STANDARD UNITS) (00403)	OXIDATION REDUCTION POTENTIAL (MV) (00090)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	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)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)
440326092271801	575	7.2	7.7	E0.1	11.0	8.3	93	19	2.8	1.2	311
440333092240701	574	7.0	7.3	--	15.0	0.8	85	24	2.6	1.6	400
440334092262001	584	7.0	7.5	E0.2	11.5	7.7	94	22	2.5	1.0	342
440335092271501	493	7.3	7.5	E0.2	14.5	<0.1	72	21	1.9	1.0	306
440345092160201	624	7.2	7.5	--	12.5	6.9	97	20	6.5	0.60	345
440352092155701	665	6.8	7.4	--	10.0	7.3	100	22	5.8	1.8	339
440352092160301	649	7.1	7.5	E0.1	10.5	3.3	100	24	6.3	1.0	342
440352092182001	484	7.2	7.5	--	11.5	--	69	24	2.4	0.90	317
440353092152001	485	7.3	7.5	E0.1	10.0	4.5	76	19	2.2	0.60	309
440353092220101	548	7.2	7.5	E0.1	10.5	<0.1	82	22	2.7	1.4	386
440355092213201	550	6.8	7.2	E0.1	10.5	0.5	85	22	2.8	1.8	286
440402092280101	480	7.0	7.5	--	13.0	5.2	68	20	2.3	1.5	293
440410092225801	500	7.1	7.5	E0.1	12.5	1.3	74	21	4.0	1.1	317
440412092235701	568	7.0	7.6	--	10.5	--	90	20	2.8	1.2	306
440414092255801	559	7.1	7.4	E0.1	10.5	1.9	83	24	2.4	1.7	336
440415092223801	580	6.8	7.4	--	11.0	<0.1	89	25	3.0	1.4	333
440416092224501	577	6.9	7.2	--	11.5	1.6	85	23	2.9	1.9	355
440416092240901	529	6.9	7.6	--	12.0	0.8	75	22	2.7	1.0	311
440417092255701	615	7.1	7.6	E0.1	10.5	10.5	96	20	3.5	1.4	326
440417092263701	508	7.2	7.5	E0.1	10.5	0.7	74	22	2.3	1.4	304
440418092190201	592	7.1	7.4	--	11.0	6.2	86	24	6.1	1.5	364
440448092272601	583	7.1	7.6	E0.1	12.0	6.3	87	24	3.1	0.90	350
440451092271501	535	7.1	7.6	--	10.5	1.9	77	28	2.6	1.4	336
440454092250101	577	7.1	7.6	E0.1	10.5	9.1	84	25	2.3	1.1	359
440459092251901	534	7.3	7.6	E0.1	11.0	4.9	78	24	2.2	1.2	323
440507092262001	556	7.0	7.6	--	12.0	6.4	74	31	2.2	1.1	326
440512092243401	530	7.3	7.4	--	10.5	0.3	76	23	2.5	1.1	326
440523092163201	496	7.5	7.6	--	12.0	0.3	73	22	2.4	0.80	310
440524092261701	537	7.2	7.5	--	10.5	2.4	74	27	2.2	1.2	337
440531092240101	566	7.0	7.6	E0.1	9.5	2.1	76	28	2.8	0.90	345
440532092261901	510	6.9	7.5	--	11.0	0.1	75	22	2.4	1.5	349
440536092212901	535	7.1	7.5	E0.1	10.5	0.1	76	24	2.3	1.0	342
440554092264901	527	7.0	7.4	E0.0	12.0	7.6	76	23	2.5	1.6	337
470000108020001	976	6.9	7.1	--	11.0	1.0	140	39	7.6	3.6	440
470000134000001	588	6.7	7.4	--	9.5	7.3	89	20	5.3	0.90	315

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

OLMSTED COUNTY--Continued

STATION NUMBER	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)
440326092271801	--	255	254	19	8.4	0.20	12	332	5.90	0.50
440333092240701	--	328	328	51	2.2	0.30	11	313	<0.100	<0.20
440334092262001	--	280	280	26	7.2	0.40	14	353	1.80	0.40
440335092271501	--	253	251	17	2.1	0.20	12	280	<0.100	0.30
440345092160201	--	283	283	35	12	0.20	16	380	2.20	0.30
440352092155701	--	278	278	22	19	0.10	16	399	6.60	0.70
440352092160301	--	281	280	43	15	0.60	16	408	3.00	0.50
440352092182001	--	260	260	10	<0.10	0.10	10	265	<0.100	0.20
440353092152001	--	257	253	18	<0.10	0.60	15	272	<0.100	<0.20
440353092220101	--	318	316	25	1.0	0.20	9.8	307	<0.100	<0.20
440355092213201	--	234	235	50	3.1	0.60	12	320	<0.100	0.30
440402092280101	--	241	240	22	2.3	0.30	12	264	<0.100	<0.20
440410092225801	--	260	260	17	1.0	0.30	12	278	<0.100	0.30
440412092235701	--	252	251	17	13	1.4	12	333	3.60	0.70
440414092255801	--	276	275	34	2.2	0.20	11	312	<0.100	0.30
440415092223801	--	273	273	39	1.9	0.40	10	332	<0.100	0.30
440416092224501	--	290	291	76	2.2	0.60	10	345	0.200	<0.20
440416092240901	--	255	255	32	2.6	0.10	13	287	<0.100	<0.20
440417092255701	--	268	267	17	16	0.20	12	355	7.50	0.60
440417092263701	--	250	249	22	2.1	0.20	11	284	<0.100	0.30
440418092190201	--	298	298	27	2.9	0.50	15	335	0.800	<0.20
440448092272601	--	287	287	21	9.1	0.20	16	346	1.90	0.60
440451092271501	--	277	275	22	10	0.40	11	291	<0.100	0.20
440454092250101	--	296	294	24	5.3	0.30	14	319	1.30	<0.20
440459092251901	0	267	265	24	2.4	0.30	11	293	0.300	0.20
440507092262001	--	269	267	29	2.6	0.20	11	293	<0.100	<0.20
440512092243401	--	268	267	30	2.1	0.30	11	276	<0.100	<0.20
440523092163201	--	254	254	15	2.1	<0.10	12	276	<0.100	0.50
440524092261701	--	273	270	23	2.4	0.20	11	297	<0.100	<0.20
440531092240101	--	284	283	22	3.8	0.10	14	323	1.10	<0.20
440532092261901	--	286	286	17	1.8	0.20	11	269	<0.100	<0.20
440536092212901	--	281	280	16	<0.10	0.20	12	296	0.100	0.20
440554092264901	--	276	276	27	3.3	0.60	11	256	<0.100	<0.20
470000108020001	--	361	361	110	25	0.40	12	675	9.30	0.50
470000134000001	--	259	258	22	10	0.40	20	346	5.50	0.70

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

OLMSTED COUNTY--Continued

STATION NUMBER	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	TRITIUM TOTAL (PCI/L) (07000)	TRITIUM IN WATER MOLECULES (TU) (07012)	TRITIUM TOTAL (TU) (07017)
440326092271801	<0.010	<0.010	<1	<3	<100	<1	0.1	99	--	31
440333092240701	<0.010	<0.010	<1	340	<100	28	<0.1	--	<0.8	--
440334092262001	0.010	0.010	<1	<3	<100	<1	<0.1	69	--	21
440335092271501	<0.010	<0.010	<1	1400	<100	28	0.1	1.0	--	<0.8
440345092160201	0.020	<0.010	<1	9	<100	2	<0.1	--	19.2	--
440352092155701	0.020	0.020	<1	28	<100	6	<0.1	--	--	22
440352092160301	<0.010	<0.010	<1	6	<100	<1	<0.1	78	--	24
440352092182001	<0.010	<0.010	1	1700	<100	19	<0.1	--	<0.8	--
440353092152001	0.010	0.010	<1	600	<100	22	<0.1	<1.0	--	<0.2
440353092220101	<0.010	<0.010	<1	2900	<100	67	<0.1	<1.0	--	0.1
440355092213201	0.010	0.010	<1	1200	<100	39	<0.1	<1.0	--	<0.1
440402092280101	<0.010	<0.010	<1	280	<100	19	<0.1	--	<0.8	--
440410092225801	0.870	0.630	<1	380	<100	22	<0.1	<1.0	--	<0.1
440412092235701	0.020	<0.010	<1	8	<100	1	<0.1	--	30.3	--
440414092255801	<0.010	<0.010	<1	1500	<100	57	0.1	<1.0	0.8	<0.8
440415092223801	<0.010	<0.010	<1	900	<100	30	<0.1	--	1.0	--
440416092224501	0.010	0.010	<1	210	<100	23	<0.1	--	<0.8	--
440416092240901	<0.010	<0.010	<1	590	200	19	0.1	--	<0.8	--
440417092255701	0.020	<0.010	<1	<3	<100	<1	<0.1	94	--	29
440417092263701	<0.010	<0.010	<1	520	<100	22	<0.1	<1.0	--	<0.8
440418092190201	0.030	0.010	<1	6	<100	1	<0.1	--	<0.8	--
440448092272601	0.020	<0.010	<1	<3	<100	<1	<0.1	68	--	21
440451092271501	<0.010	<0.010	<1	190	<100	57	<0.1	--	<0.8	--
440454092250101	0.020	<0.010	<1	<3	<100	<1	<0.1	51	--	16
440459092251901	<0.010	<0.010	<1	23	<100	3	0.1	6.0	--	2.0
440507092262001	<0.010	<0.010	<1	75	<100	8	<0.1	--	3.3	--
440512092243401	<0.010	<0.010	<1	2700	100	32	<0.1	--	<0.8	--
440523092163201	<0.010	<0.010	<1	2100	<100	37	<0.1	--	<0.8	--
440524092261701	<0.010	<0.010	<1	80	<100	20	<0.1	--	<0.8	--
440531092240101	0.010	<0.010	<1	12	<100	<1	<0.1	--	8.7	--
440532092261901	<0.010	<0.010	<1	35	<100	110	<0.1	<1.0	--	<0.1
440536092212901	<0.010	<0.010	2	2700	<100	26	<0.1	--	<0.8	--
440554092264901	0.010	0.010	<1	390	<100	26	<0.1	<1.0	--	<0.8
470000108020001	<0.010	<0.010	<1	<3	<100	5	<0.1	--	27.2	--
470000134000001	0.020	<0.010	<1	<3	<100	<1	<0.1	--	18.9	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

OLMSTED COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	1,1,1-TRICHLOROETHANE TOTAL (UG/L) (34506)	1,1,2,2 TETRACHLOROETHANE TOTAL (UG/L) (34516)	1,1,2-TRICHLOROETHANE TOTAL (UG/L) (34511)	1,1-DICHLOROETHANE TOTAL (UG/L) (34496)	1,1-DICHLOROETHYLENE TOTAL (UG/L) (34501)	1,2-DIBROMOETHANE WATER WHOLE TOTAL (UG/L) (77651)	1,2-DICHLOROBENZENE TOTAL (UG/L) (34536)	1,2-DICHLOROETHANE TOTAL (UG/L) (32103)
440326092271801	08-14-90	1500	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440333092240701	08-23-90	1230	--	--	--	--	--	--	--	--
440334092262001	08-15-90	1000	--	--	--	--	--	--	--	--
440335092271501	08-14-90	1030	--	--	--	--	--	--	--	--
440345092160201	08-23-90	1500	--	--	--	--	--	--	--	--
440352092155701	09-05-90	1730	--	--	--	--	--	--	--	--
440352092160301	08-15-90	1700	--	--	--	--	--	--	--	--
440352092182001	08-17-90	1330	--	--	--	--	--	--	--	--
440353092152001	08-15-90	1600	--	--	--	--	--	--	--	--
440353092220101	08-13-90	1900	--	--	--	--	--	--	--	--
440355092213201	08-15-90	1500	--	--	--	--	--	--	--	--
440402092280101	08-23-90	1100	--	--	--	--	--	--	--	--
440410092225801	08-13-90	1800	--	--	--	--	--	--	--	--
440412092235701	08-22-90	1100	--	--	--	--	--	--	--	--
440414092255801	08-14-90	1400	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440415092223801	08-22-90	1300	--	--	--	--	--	--	--	--
440416092224501	08-21-90	1430	--	--	--	--	--	--	--	--
440416092240901	08-21-90	1330	--	--	--	--	--	--	--	--
440417092255701	08-14-90	1300	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440417092263701	08-14-90	1130	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440418092190201	08-21-90	1530	--	--	--	--	--	--	--	--
440448092272601	08-13-90	1600	--	--	--	--	--	--	--	--
440451092271501	08-21-90	1200	--	--	--	--	--	--	--	--
440454092250101	08-13-90	2000	--	--	--	--	--	--	--	--
440459092251901	08-14-90	1230	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440507092262001	08-22-90	1430	--	--	--	--	--	--	--	--
440512092243401	08-22-90	1630	--	--	--	--	--	--	--	--
440523092163201	08-21-90	1700	--	--	--	--	--	--	--	--
440524092261701	08-22-90	1530	--	--	--	--	--	--	--	--
440531092240101	08-15-90	1330	--	--	--	--	--	--	--	--
440532092261901	09-05-90	1330	--	--	--	--	--	--	--	--
440536092212901	08-15-90	1400	--	--	--	--	--	--	--	--
440554092264901	08-16-90	1100	--	--	--	--	--	--	--	--
470000108020001	08-23-90	1600	--	--	--	--	--	--	--	--
470000134000001	08-23-90	1400	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

OLMSTED COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	1,2-DI-CHLORO-PROPANE TOTAL (UG/L) (34541)	1,2-TRANSDI CHLORO-ETHENE TOTAL (UG/L) (34546)	1,3-DI-CHLORO-BENZENE TOTAL (UG/L) (34566)	1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34561)	1,4-DI-CHLORO-BENZENE TOTAL (UG/L) (34571)	2-CHLORO-ETHYL-VINYL-ETHER TOTAL (UG/L) (34576)	BENZENE TOTAL (UG/L) (34030)	BROMO-FORM TOTAL (UG/L) (32104)	CARBON-TETRA-CHLO-RIDE TOTAL (UG/L) (32102)	CHLORO-BENZENE TOTAL (UG/L) (34301)
440326092271801	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440333092240701	--	--	--	--	--	--	--	--	--	--
440334092262001	--	--	--	--	--	--	--	--	--	--
440335092271501	--	--	--	--	--	--	--	--	--	--
440345092160201	--	--	--	--	--	--	--	--	--	--
440352092155701	--	--	--	--	--	--	--	--	--	--
440352092160301	--	--	--	--	--	--	--	--	--	--
440352092182001	--	--	--	--	--	--	--	--	--	--
440353092152001	--	--	--	--	--	--	--	--	--	--
440353092220101	--	--	--	--	--	--	--	--	--	--
440355092213201	--	--	--	--	--	--	--	--	--	--
440402092280101	--	--	--	--	--	--	--	--	--	--
440410092225801	--	--	--	--	--	--	--	--	--	--
440412092235701	--	--	--	--	--	--	--	--	--	--
440414092255801	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440415092223801	--	--	--	--	--	--	--	--	--	--
440416092224501	--	--	--	--	--	--	--	--	--	--
440416092240901	--	--	--	--	--	--	--	--	--	--
440417092255701	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440417092263701	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440418092190201	--	--	--	--	--	--	--	--	--	--
440448092272601	--	--	--	--	--	--	--	--	--	--
440451092271501	--	--	--	--	--	--	--	--	--	--
440454092250101	--	--	--	--	--	--	--	--	--	--
440459092251901	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440507092262001	--	--	--	--	--	--	--	--	--	--
440512092243401	--	--	--	--	--	--	--	--	--	--
440523092163201	--	--	--	--	--	--	--	--	--	--
440524092261701	--	--	--	--	--	--	--	--	--	--
440531092240101	--	--	--	--	--	--	--	--	--	--
440532092261901	--	--	--	--	--	--	--	--	--	--
440536092212901	--	--	--	--	--	--	--	--	--	--
440554092264901	--	--	--	--	--	--	--	--	--	--
470000108020001	--	--	--	--	--	--	--	--	--	--
470000134000001	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

OLMSTED COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	CHLORO-DI-BROMO-METHANE TOTAL (UG/L) (32105)	CHLORO-ETHANE TOTAL (UG/L) (34311)	CHLORO-FORM TOTAL (UG/L) (32106)	CIS 1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34704)	DI-CHLORO-BROMO-METHANE TOTAL (UG/L) (32101)	DI-CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	ETHYL-BENZENE TOTAL (UG/L) (34371)	METHYL-BROMIDE TOTAL (UG/L) (34413)	METHYL-CHLO-RIDE TOTAL (UG/L) (34418)
440326092271801	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440333092240701	--	--	--	--	--	--	--	--	--
440334092262001	--	--	--	--	--	--	--	--	--
440335092271501	--	--	--	--	--	--	--	--	--
440345092160201	--	--	--	--	--	--	--	--	--
440352092155701	--	--	--	--	--	--	--	--	--
440352092160301	--	--	--	--	--	--	--	--	--
440352092182001	--	--	--	--	--	--	--	--	--
440353092152001	--	--	--	--	--	--	--	--	--
440353092220101	--	--	--	--	--	--	--	--	--
440355092213201	--	--	--	--	--	--	--	--	--
440402092260101	--	--	--	--	--	--	--	--	--
440410092225601	--	--	--	--	--	--	--	--	--
440412092235701	--	--	--	--	--	--	--	--	--
440414092255801	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440415092223801	--	--	--	--	--	--	--	--	--
440416092224501	--	--	--	--	--	--	--	--	--
440416092240901	--	--	--	--	--	--	--	--	--
440417092255701	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440417092263701	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440418092190201	--	--	--	--	--	--	--	--	--
440448092272601	--	--	--	--	--	--	--	--	--
440451092271501	--	--	--	--	--	--	--	--	--
440454092250101	--	--	--	--	--	--	--	--	--
440459092251901	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
440507092262001	--	--	--	--	--	--	--	--	--
440512092243401	--	--	--	--	--	--	--	--	--
440523092163201	--	--	--	--	--	--	--	--	--
440524092261701	--	--	--	--	--	--	--	--	--
440531092240101	--	--	--	--	--	--	--	--	--
440532092261901	--	--	--	--	--	--	--	--	--
440536092212901	--	--	--	--	--	--	--	--	--
440554092264901	--	--	--	--	--	--	--	--	--
470000106020001	--	--	--	--	--	--	--	--	--
470000134000001	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

OLMSTED COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	METHYL-ENE CHLO-RIDE TOTAL (UG/L) (34423)	STYRENE TOTAL (UG/L) (77128)	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)	VIHYL CHLO-RIDE TOTAL (UG/L) (39175)	XYLENE TOTAL WATER WHOLE TOT REC (UG/L) (81551)
440326092271801	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0
440333092240701	--	--	--	--	--	--	--	--	--
440334092262001	--	--	--	--	--	--	--	--	--
440335092271501	--	--	--	--	--	--	--	--	--
440345092160201	--	--	--	--	--	--	--	--	--
440352092155701	--	--	--	--	--	--	--	--	--
440352092160301	--	--	--	--	--	--	--	--	--
440352092182001	--	--	--	--	--	--	--	--	--
440353092152001	--	--	--	--	--	--	--	--	--
440353092220101	--	--	--	--	--	--	--	--	--
440355092213201	--	--	--	--	--	--	--	--	--
440402092280101	--	--	--	--	--	--	--	--	--
440410092225801	--	--	--	--	--	--	--	--	--
440412092235701	--	--	--	--	--	--	--	--	--
440414092255801	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0
440415092223801	--	--	--	--	--	--	--	--	--
440416092224501	--	--	--	--	--	--	--	--	--
440416092240901	--	--	--	--	--	--	--	--	--
440417092255701	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0
440417092263701	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0
440418092190201	--	--	--	--	--	--	--	--	--
440448092272601	--	--	--	--	--	--	--	--	--
440451092271501	--	--	--	--	--	--	--	--	--
440454092250101	--	--	--	--	--	--	--	--	--
440459092251901	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0
440507092262001	--	--	--	--	--	--	--	--	--
440512092243401	--	--	--	--	--	--	--	--	--
440523092163201	--	--	--	--	--	--	--	--	--
440524092261701	--	--	--	--	--	--	--	--	--
440531092240101	--	--	--	--	--	--	--	--	--
440532092261901	--	--	--	--	--	--	--	--	--
440536092212901	--	--	--	--	--	--	--	--	--
440554092264901	--	--	--	--	--	--	--	--	--
470000108020001	--	--	--	--	--	--	--	--	--
470000134000001	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

RAMSEY COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)
450221093054601	30N22W31DCBB. ST PAUL WATE	112OTSH	05-30-90	1030	17.15	17.30	888	26
		112OTSH	08-22-90	1115	14.10	17.30	888	--
450240093053501	30N22W31ACDB. ST PAUL WATE	112OTSH	06-06-90	1500	--	--	885	25
		112OTSH	08-23-90	1430	7.27	--	885	--
450252093045201	30N22W32BAC. ST PAUL WATER	112OTSH	06-06-90	1300	8.75	19.80	894	30
		112OTSH	08-24-90	1100	9.43	19.80	894	--
450254093043701	30N22W32BADA. ST PAUL WATE	112OTSH	06-08-90	1100	33.42	38.50	927	30
		112OTSH	08-27-90	1100	--	38.50	927	--
450311093040701	30N22W29DDAC. ST PAUL WATE	112OTSH	05-31-90	1020	9.08	14.30	908	18
		112OTSH	08-22-90	1430	8.30	14.30	908	--
450316093051301	30N22W30DADD. ST PAUL WATE	112OTSH	08-27-90	1400	--	32.00	905	--
450317093042001	30N22W29DBDD. ST PAUL WATE	112OTSH	05-31-90	1130	6.94	10.90	901	30
		112OTSH	08-23-90	1330	6.13	10.90	901	--
450342093055601	30N22W30BADC. ST. PAUL WA	112OTSH	06-01-90	1100	5.94	11.30	892	35
		112OTSH	08-23-90	1515	--	11.30	892	--
		112OTSH	08-23-90	1530	6.00	11.30	892	--
450348093053601	30N22W30ABAC. ST PAUL WAT	112OTSH	06-01-90	1300	5.01	8.90	910	35
		112OTSH	08-24-90	1000	3.18	8.90	910	--
450352093032201	30N22W28BAAA. ST PAUL WATE	112OTSH	05-30-90	1240	9.83	14.50	915	45
		112OTSH	08-22-90	1400	9.48	14.50	915	--
450352093055801	30N22W30BABA. ST. PAUL WA	112OTSH	05-31-90	1410	8.10	15.00	897	60
		112OTSH	08-23-90	1600	7.20	15.00	897	--
450416093012401	30N22W23BBC	112OTSH	09-13-90	1320	5.87	7.00	929	--
450417093012301	30N22W23BBC NORTH LOT OF W	112OTSH	09-10-90	1400	8.58	46.00	929	--
450418093014701	30N22W22ABD ABANDONED HOUS	112OTSH	09-11-90	1400	7.65	8.00	922	--
450418093014801		112OTSH	09-11-90	1315	24.51	28.00	922	--
450435093013201	30N22W22DBB COLUMBIA PARK	112OTSH	09-11-90	1115	0.56	32.00	919	--
450437093023101	30N22W22DBB - TOP LANE NEX	112OTSH	09-10-90	1650	20.62	25.00	933	--
		112OTSH	09-13-90	1700	--	25.00	933	--

STATION NUMBER	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH (STANDARD UNITS) (00400)	PH LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	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)
450221093054601	1660	--	6.4	--	10.0	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
450240093053501	773	762	7.1	7.4	9.0	<0.1	92	42	12	1.2
	--	--	--	--	--	--	--	--	--	--
450252093045201	454	451	7.5	7.6	9.5	0.7	60	19	7.4	0.90
	--	--	--	--	--	--	--	--	--	--
450254093043701	925	1190	7.8	7.9	11.0	--	120	48	51	2.1
	--	--	--	--	--	--	--	--	--	--
450311093040701	416	406	8.8	8.4	9.0	3.3	46	10	5.5	23
	--	--	--	--	--	--	--	--	--	--
450316093051301	--	--	--	--	--	--	--	--	--	--
450317093042001	1030	1000	7.0	7.1	10.5	<0.1	160	41	2.4	2.8
	--	--	--	--	--	--	--	--	--	--
450342093055601	183	175	--	7.4	10.0	7.2	17	4.4	5.0	1.4
	--	--	--	--	--	--	--	--	--	--
450348093053601	235	222	6.6	6.8	12.0	2.9	17	6.1	10	2.5
	--	--	--	--	--	--	--	--	--	--
450352093032201	2260	2260	7.1	7.3	10.0	3.4	74	14	390	1.8
	--	--	--	--	--	--	--	--	--	--
450352093055801	371	372	7.4	7.4	8.0	1.6	36	9.3	24	1.2
	--	--	--	--	--	--	--	--	--	--
450416093012401	915	880	8.3	8.7	--	--	41	16	130	15
450417093012301	777	790	7.3	7.2	--	--	66	21	59	3.8
450418093014701	1240	1220	7.4	7.0	--	--	160	37	42	2.5
450418093014801	889	881	8.0	7.8	--	--	30	8.8	150	3.9
450435093013201	316	317	8.3	8.1	--	--	44	11	6.4	1.7
450437093023101	735	751	8.2	7.8	--	--	100	29	15	1.2
	762	758	8.0	8.0	--	--	100	28	15	1.2

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

RAMSEY COUNTY--Continued

STATION NUMBER	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)
450221093054601	--	--	--	--	--	150	--	--	--
	--	--	--	--	--	--	--	--	<0.100
450240093053501	442	0	362	372	48	18	<0.10	26	0.500
	--	--	--	--	--	--	--	--	0.700
450252093045201	287	0	235	233	1.3	13	0.40	26	<0.100
	--	--	--	--	--	--	--	--	<0.100
450254093043701	481	0	394	391	95	110	<0.10	27	5.00
	--	--	--	--	--	--	--	--	4.60
450311093040701	158	11	138	133	10	33	<0.10	23	2.80
	--	--	--	--	--	--	--	--	7.50
450316093051301	--	--	--	--	--	--	--	--	0.800
450317093042001	609	0	499	491	90	7.3	0.10	29	1.10
	--	--	--	--	--	--	--	--	1.20
450342093055601	33	0	27	29	38	6.5	<0.10	20	0.600
	--	--	--	--	--	--	--	--	0.600
	--	--	--	--	--	--	--	--	0.600
450348093053601	94	0	77	71	18	13	<0.10	8.9	0.500
	--	--	--	--	--	--	--	--	<0.100
450352093032201	307	0	252	258	24	580	<0.10	14	2.90
	--	--	--	--	--	--	--	--	2.00
450352093055801	133	0	138	111	5.7	48	<0.10	16	0.700
	--	--	--	--	--	--	--	--	0.600
450418093012401	--	--	--	386	15	71	0.10	8.3	<0.100
450417093012301	--	--	--	325	2.3	65	0.50	35	<0.100
450418093014701	--	--	--	445	71	110	0.60	27	<0.100
450418093014801	--	--	--	375	<1.0	67	0.20	25	<0.100
450435093013201	--	--	--	161	1.7	6.4	0.40	27	<0.100
450437093023101	--	--	--	170	210	8.2	0.40	30	5.10
	--	--	--	173	200	10	0.20	28	5.20

STATION NUMBER	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN,AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
450221093054601	<0.100	--	0.030	--	1.6	--	0.520	--	--
	<0.100	0.250	0.220	1.8	1.7	0.460	0.350	--	--
450240093053501	0.500	0.010	<0.010	0.40	0.40	0.050	0.030	280	670
	0.700	0.030	0.010	0.40	0.20	0.050	0.020	--	--
450252093045201	<0.100	0.010	<0.010	0.20	0.20	0.050	0.040	39	91
	<0.100	<0.010	<0.010	0.30	<0.20	0.080	0.050	--	--
450254093043701	5.00	0.030	0.030	0.50	0.50	0.050	0.030	11	880
	4.50	0.080	0.060	0.80	0.50	0.040	0.040	--	--
450311093040701	2.70	<0.010	<0.010	0.50	0.30	0.780	0.780	<3	3
	7.50	<0.010	<0.010	0.70	0.40	0.740	0.730	--	--
450316093051301	0.800	0.060	0.020	0.50	0.30	0.060	<0.010	--	--
450317093042001	1.10	0.080	0.050	0.60	0.60	0.020	<0.010	1100	2700
	1.20	0.030	0.030	0.50	0.40	0.020	<0.010	--	--
450342093055601	0.600	0.020	0.020	0.50	0.30	0.080	0.070	13	150
	0.600	<0.010	<0.010	0.40	0.20	0.150	0.140	--	--
	0.500	0.010	<0.010	1.2	<0.20	0.140	0.140	--	--
450348093053601	0.500	0.100	0.040	0.80	0.80	0.080	0.010	54	290
	<0.100	0.070	0.030	0.70	0.60	0.050	0.030	--	--
450352093032201	2.90	<0.010	<0.010	1.0	1.0	0.070	0.050	20	30
	2.00	0.010	<0.010	0.60	0.50	0.080	0.070	--	--
450352093055801	0.700	<0.010	<0.010	0.20	0.20	0.040	0.020	22	170
	0.600	<0.010	<0.010	0.20	<0.20	0.030	0.020	--	--
450416093012401	<0.100	1.20	1.20	2.0	2.0	0.690	0.390	28	360
450417093012301	<0.100	1.80	1.70	4.0	4.0	0.070	0.070	5300	320
450418093014701	<0.100	0.130	0.110	0.70	0.70	0.020	0.010	3100	1100
450418093014801	<0.100	0.930	0.900	1.6	1.8	0.130	0.120	1800	110
450435093013201	<0.100	0.400	0.200	0.60	0.60	0.130	0.130	53	760
450437093023101	5.10	0.050	0.050	0.50	0.50	0.130	0.120	8	34
	5.20	0.040	0.030	1.2	1.2	0.140	0.110	5	33

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

RAMSEY COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	1,1,1-TRICHLOROETHANE TOTAL (UG/L) (34506)	1,1,2,2 TETRACHLOROETHANE TOTAL (UG/L) (34516)	1,1,2-TRICHLOROETHANE TOTAL (UG/L) (34511)	1,1-DICHLOROETHANE TOTAL (UG/L) (34496)	1,1-DICHLOROETHYLENE TOTAL (UG/L) (34501)	1,2-DIBROMOETHANE WATER WHOLE TOTAL (UG/L) (77651)	1,2-DICHLOROBENZENE TOTAL (UG/L) (34536)	1,2-DICHLOROETHANE TOTAL (UG/L) (32103)
450221093054601	05-30-90	1030	--	--	--	--	--	--	--	--
	08-22-90	1115	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
450240093053501	06-06-90	1500	--	--	--	--	--	--	--	--
	08-23-90	1430	--	--	--	--	--	--	--	--
450252093045201	06-06-90	1300	--	--	--	--	--	--	--	--
	08-24-90	1100	--	--	--	--	--	--	--	--
450254093043701	06-08-90	1100	--	--	--	--	--	--	--	--
	08-27-90	1100	--	--	--	--	--	--	--	--
450311093040701	05-31-90	1020	--	--	--	--	--	--	--	--
	08-22-90	1430	--	--	--	--	--	--	--	--
450316093051301	08-27-90	1400	--	--	--	--	--	--	--	--
450317093042001	05-31-90	1130	--	--	--	--	--	--	--	--
	08-23-90	1330	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
450342093055601	06-01-90	1100	--	--	--	--	--	--	--	--
	08-23-90	1515	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
	08-23-90	1530	--	--	--	--	--	--	--	--
450348093053601	06-01-90	1300	--	--	--	--	--	--	--	--
	08-24-90	1000	--	--	--	--	--	--	--	--
450352093032201	05-30-90	1240	--	--	--	--	--	--	--	--
	08-22-90	1400	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
450352093055801	05-31-90	1410	--	--	--	--	--	--	--	--
	08-23-90	1600	--	--	--	--	--	--	--	--
450416093012401	09-13-90	1320	--	--	--	--	--	--	--	--
450417093012301	09-10-90	1400	--	--	--	--	--	--	--	--
450418093014701	09-11-90	1400	--	--	--	--	--	--	--	--
450418093014801	09-11-90	1315	--	--	--	--	--	--	--	--
450435093013201	09-11-90	1115	--	--	--	--	--	--	--	--
450437093023101	09-10-90	1650	--	--	--	--	--	--	--	--
	09-13-90	1700	--	--	--	--	--	--	--	--

STATION NUMBER	1,2-DICHLOROPROPANE TOTAL (UG/L) (34541)	1,2-TRANSDICHLOROETHENE TOTAL (UG/L) (34546)	1,3-DICHLOROBENZENE TOTAL (UG/L) (34566)	1,3-DICHLOROPROPENE TOTAL (UG/L) (34561)	1,4-DICHLOROBENZENE TOTAL (UG/L) (34571)	2-CHLOROETHYLVINYLETHER TOTAL (UG/L) (34576)	BENZENE TOTAL (UG/L) (34030)	BROMOFORM TOTAL (UG/L) (32104)	CARBONTETRACHLORIDE TOTAL (UG/L) (32102)	CHLOROBENZENE TOTAL (UG/L) (34301)
450221093054601	--	--	--	--	--	--	--	--	--	--
	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
450240093053501	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
450252093045201	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
450254093043701	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
450311093040701	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
450316093051301	--	--	--	--	--	--	--	--	--	--
450317093042001	--	--	--	--	--	--	--	--	--	--
	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
450342093055601	--	--	--	--	--	--	--	--	--	--
	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
450348093053601	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
450352093032201	--	--	--	--	--	--	--	--	--	--
	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
450352093055801	--	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--	--
450416093012401	--	--	--	--	--	--	--	--	--	--
450417093012301	--	--	--	--	--	--	--	--	--	--
450418093014701	--	--	--	--	--	--	--	--	--	--
450418093014801	--	--	--	--	--	--	--	--	--	--
450435093013201	--	--	--	--	--	--	--	--	--	--
450437093023101	--	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

RAMSEY COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	CHLORO-DI-BROMO-METHANE TOTAL (UG/L) (32105)	CHLORO-ETHANE TOTAL (UG/L) (34311)	CHLORO-FORM TOTAL (UG/L) (32106)	CIS 1,3-DI-CHLORO-PROPENE TOTAL (UG/L) (34704)	DI-CHLORO-BROMO-METHANE TOTAL (UG/L) (32101)	DI-CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	ETHYL-BENZENE TOTAL (UG/L) (34371)	METHYL-BROMIDE TOTAL (UG/L) (34413)	METHYL-CHLO-RIDE TOTAL (UG/L) (34418)
450221093054601	--	--	--	--	--	--	--	--	--
	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
450240093053501	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
450252093045201	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
450254093043701	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
450311093040701	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
450316093051301	--	--	--	--	--	--	--	--	--
450317093042001	--	--	--	--	--	--	--	--	--
	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
450342093055601	--	--	--	--	--	--	--	--	--
	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
	--	--	--	--	--	--	--	--	--
450348093053601	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
450352093032201	--	--	--	--	--	--	--	--	--
	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
450352093055801	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
450416093012401	--	--	--	--	--	--	--	--	--
450417093012301	--	--	--	--	--	--	--	--	--
450418093014701	--	--	--	--	--	--	--	--	--
450418093014801	--	--	--	--	--	--	--	--	--
450435093013201	--	--	--	--	--	--	--	--	--
450437093023101	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--

STATION NUMBER	METHYL-ENE CHLO-RIDE TOTAL (UG/L) (34423)	STYRENE TOTAL (UG/L) (77128)	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 TOTAL WATER WHOLE TOT REC (UG/L) (81551)
450221093054601	--	--	--	--	--	--	--	--	--
	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0
450240093053501	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
450252093045201	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
450254093043701	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
450311093040701	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
450316093051301	--	--	--	--	--	--	--	--	--
450317093042001	--	--	--	--	--	--	--	--	--
	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0
450342093055601	--	--	--	--	--	--	--	--	--
	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0
	--	--	--	--	--	--	--	--	--
450348093053601	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
450352093032201	--	--	--	--	--	--	--	--	--
	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<1.0	<3.0
450352093055801	--	--	--	--	--	--	--	--	--
	--	--	--	--	--	--	--	--	--
450416093012401	--	--	--	--	--	--	--	--	--
450417093012301	--	--	--	--	--	--	--	--	--
450418093014701	--	--	--	--	--	--	--	--	--
450418093014801	--	--	--	--	--	--	--	--	--
450435093013201	--	--	--	--	--	--	--	--	--
450437093023101	--	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

REDWOOD COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)
443317095073401	113N36W36ABBC REDWOOD SPRI		08-30-90	1430	535	7.4	10.0	0.1
443921095203301	114N37W30AADB BOILING SPRI		11-14-89	1030	1760	7.4	9.0	0.1
			09-06-90	1230	1700	7.0	9.0	0.4

STATION NUMBER	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
443317095073401	--	242	<0.010	<0.100	0.280	0.30	0.060	0.060	1.4
443921095203301	413	--	<0.010	<0.100	1.60	1.6	<0.010	<0.010	--
	--	405	<0.010	<0.100	1.60	1.7	<0.010	<0.010	3.1

RENVILLE COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)
442859094490301	112N33W20DAAD PETERSON SPR		08-30-90	1630	1000	7.0	11.5
443631095094801	113N36W10ABDA SEEPAGE AT C		09-05-90	1115	1510	7.0	14.5

STATION NUMBER	OXYGEN, DISSOLVED (MG/L) (00300)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
442859094490301	4.2	391	<0.010	0.700	<0.010	0.30	<0.010	<0.010	2.4
443631095094801	2.1	272	<0.010	4.90	0.030	0.90	<0.010	<0.010	2.1

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

SCOTT COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)	SPECIFIC CONDUCTANCE (US/CM) (00095)
444132093383201	114N23W7CCBB SEEPAGE FACE		08-29-90	1045	--	--	700	--	962
444609093201801	115N21W15BCCBCC UN208817 W	367PRDC	08-03-90	1500	87.68	112.00	815	69	533

STATION NUMBER	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH (STANDARD UNITS) (00400)	PH LAB (STANDARD UNITS) (00403)	OXIDATION REDUCTION POTENTIAL (MV) (00090)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	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)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)
444132093383201	--	7.4	--	--	13.0	2.4	--	--	--	--	--
444609093201801	589	7.5	7.5	E0.1	11.0	0.1	76	30	4.3	2.7	371

STATION NUMBER	ALKALINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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)	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)
444132093383201	--	405	--	--	--	--	--	<0.010	0.900	0.030
444609093201801	304	304	22	4.5	0.60	1.0	335	--	<0.100	--

STATION NUMBER	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	TRITIUM IN WATER MOLECULES (TU) (07012)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
444132093383201	<0.20	0.040	0.030	--	--	--	--	--	--	2.2
444609093201801	0.80	0.030	0.030	4	170	<100	370	<0.1	<0.8	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

SCOTT COUNTY--Continued

ANALYSIS FOR ORGANIC CHEMICALS

STATION NUMBER	DATE	TIME	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)	2,4-D, TOTAL (UG/L) (39730)	CHLORDYRIFOS TOTAL RECOVER (UG/L) (38932)	DEF TOTAL (UG/L) (39040)	DIAZINON, TOTAL (UG/L) (39570)
444132093383201	08-29-90	1045	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
444609093201801	08-03-90	1500	--	--	--	--	--	--

STATION NUMBER	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L) (82052)	DISYSTON TOTAL (UG/L) (39011)	ETHION, TOTAL (UG/L) (39398)	FONOFOS (DYFONATE) WATER WHOLE TOT.REC (UG/L (82614)	MALATHION, TOTAL (UG/L) (39530)	METHOMYL TOTAL (UG/L) (39051)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOTAL (UG/L) (39790)
444132093383201	<0.01	<0.01	<0.01	<0.0	<0.01	<0.5	<0.01	<0.01
444609093201801	--	--	--	--	--	--	--	--

STATION NUMBER	PARATHION, TOTAL (UG/L) (39540)	PHORATE TOTAL (UG/L) (39023)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	PROPHAM TOTAL (UG/L) (39052)	SEVIN, TOTAL (UG/L) (39750)	SILVEX, TOTAL (UG/L) (39760)	TOLUENE TOTAL (UG/L) (34010)	TOTAL TRITHION (UG/L) (39786)
444132093383201	<0.01	<0.01	<0.01	<0.5	<0.50	<0.01	--	<0.01
444609093201801	--	--	--	--	--	--	--	--

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

SHERBURNE COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
451825093422101	033N27W33ACC01ZIMMERMAN_S(	112DSMO	08-21-90	1230	7.73	11.00	921
452030093511401	033N28W20BAC01NSP_S(SH5)	112DSMO	08-15-90	1630	19.42	23.00	929
452030093511402	033N28W20BAC02NSP_D(SH6)	112DSMO	08-21-90	1730	20.05	35.00	929
452309093573701	033N29W04BBA01GOENNERE_S(S	112DSMO	09-01-90	1000	16.77	20.00	947
452309093573702	033N29W04BBA02GOENNERE_D(S	112DSMO	08-22-90	1230	16.62	35.00	947
452312093463802	034N28W36CCC02	112DSMO	09-02-90	1815	9.98	20.50	940
452807093491401	034N28W04ADA02	112DSMO	08-31-90	1730	2.66	13.00	996
452914094045602	035N30W28CDC02AYERS_D(SH19	112DSMO	08-22-90	1800	8.13	23.00	1000
452952093570801	035N29W28ABC01	112DSMO	09-01-90	1430	16.66	31.20	998
453215093315101	035N26W12BCC01UBL_S(SH21)	112DSMO	08-31-90	1500	5.76	11.00	959

STATION NUMBER	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH (STANDARD UNITS) (00400)	PH LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)
451825093422101	18	296	310	6.6	6.8	18.0	--	37	8.5
452030093511401	35	580	579	7.6	7.7	11.5	--	80	23
452030093511402	59	572	613	7.7	7.6	11.0	--	83	24
452309093573701	30	835	806	6.9	7.3	12.5	6.1	110	32
452309093573702	59	611	635	7.2	7.6	11.0	--	96	26
452312093463802	35	507	475	8.0	8.0	15.0	6.8	63	16
452807093491401	28	103	116	8.8	8.4	13.5	4.4	15	3.9
452914094045602	40	679	710	7.3	7.5	12.0	--	90	29
452952093570801	31	653	625	7.4	7.5	13.0	5.3	86	23
453215093315101	30	142	153	6.6	7.1	15.5	4.9	20	3.9

STATION NUMBER	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)
451825093422101	2.5	5.2	98	0	82	80	7.4	7.5	<0.10
452030093511401	2.8	1.2	226	0	187	185	26	22	<0.10
452030093511402	3.1	1.5	216	0	177	177	37	30	0.20
452309093573701	3.4	1.2	314	--	258	255	64	29	<0.10
452309093573702	2.8	1.2	267	0	220	218	110	17	0.20
452312093463802	2.9	19	238	0	196	195	14	3.1	<0.10
452807093491401	2.0	0.40	63	0	52	52	7.6	2.6	<0.10
452914094045602	3.4	1.3	265	0	218	217	15	44	<0.10
452952093570801	3.2	1.1	239	0	196	194	12	23	<0.10
453215093315101	2.8	1.8	71	0	59	59	<1.0	2.1	<0.10

STATION NUMBER	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
451825093422101	17	211	14.0	0.030	1.4	<0.010	<0.010	810	180
452030093511401	15	375	15.0	0.080	0.70	<0.010	<0.010	470	25
452030093511402	16	392	16.0	0.030	0.70	<0.010	<0.010	21	6
452309093573701	23	559	17.0	0.130	0.80	<0.010	<0.010	33	14
452309093573702	22	443	0.900	0.020	0.20	<0.010	<0.010	840	28
452312093463802	18	289	8.80	0.040	0.70	<0.010	<0.010	120	12
452807093491401	21	81	0.400	0.020	<0.20	0.040	0.040	38	8
452914094045602	17	473	18.0	0.010	0.60	<0.010	<0.010	15	5
452952093570801	19	421	20.0	0.020	1.0	<0.010	<0.010	150	12
453215093315101	11	92	1.50	0.070	0.50	<0.010	<0.010	820	90

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

SIBLEY COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)
443418093552201	113N26W26BABA SEEPAGE FACE		08-29-90	1345	998	7.6	9.5

STATION NUMBER	OXYGEN, DISSOLVED (MG/L) (00300)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
443418093552201	0.1	444	<0.010	<0.100	1.70	1.8	0.020	0.020	3.9

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

STEARNS COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)
451930094161702	121N29W1ABB02ECKMAN-D	112DSMO	09-05-90	1300	13.35	29.00	1145
451930094161703	121N29W1ABB03ECKMAN-S	112DSMO	09-05-90	1145	13.59	19.00	1145
452008094155702	122N29W36ADC02STEIN-S	112DSMO	09-05-90	1600	9.85	16.50	1145
453631094153501	125N28W30BDC01HEIM-S	112DSMO	09-05-90	1900	--	14.00	1052

STATION NUMBER	PUMP OR FLOW PERIOD PRIOR TO SAMPLING (MIN) (72004)	SPECIFIC CONDUCTANCE (US/CM) (00095)	SPECIFIC CONDUCTANCE LAB (US/CM) (90095)	PH (STANDARD UNITS) (00400)	PH LAB (STANDARD UNITS) (00403)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)
451930094161702	51	711	672	7.4	7.5	14.0	5.4	91	27
451930094161703	26	599	572	7.4	7.4	13.5	3.8	89	19
452008094155702	44	736	689	7.3	7.4	16.0	1.2	96	30
453631094153501	42	461	454	7.6	7.9	14.5	6.8	30	7.6

STATION NUMBER	SODIUM, DISSOLVED (MG/L AS NA) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)
451930094161702	3.3	1.0	287	0	239	235	13	14	<0.10
451930094161703	2.9	0.40	333	0	274	273	4.8	6.7	<0.10
452008094155702	2.8	2.5	395	0	323	324	11	12	<0.10
453631094153501	62	0.60	227	0	189	186	10	16	<0.10

STATION NUMBER	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
451930094161702	21	--	21.0	0.020	0.70	<0.010	<0.010	7	2
451930094161703	25	357	7.60	0.010	0.30	<0.010	<0.010	13	1
452008094155702	16	436	6.90	0.120	0.80	<0.010	<0.010	950	650
453631094153501	10	258	4.20	0.020	0.30	<0.010	<0.010	9	<1

QUALITY OF GROUND WATER

WATER QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

YELLOW MEDICINE COUNTY

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)
444750095332001	115N39W4BDDC BAKER SPRING		11-14-89	1430	1540	7.0	8.5	0.4
			09-05-90	1400	1580	7.3	8.5	1.0

STATION NUMBER	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	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 DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
444750095332001	350	--	<0.010	<0.100	0.060	0.20	<0.010	<0.010	--
	--	365	<0.010	<0.100	0.060	<0.20	0.010	<0.010	1.8

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 1989 TO SEPTEMBER 1990

WEEKLY COMPOSITE

DATE	GREEN-WICH MEAN TIME	TOTAL PRECIP-ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUC-TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	SPEC. CONDUC-TANCE LAB ATM DEP WET TOT (US/CM) (83156)	PH FIELD ATM DEP WET T (UNITS) (83106)	PH LAB ATM DEP WET T (UNITS) (83107)	CALCIUM ATM DEP WET DIS (MG/L) (82932)	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)
OCT 03-10	1000	0.24	12.2	14.3	4.90	6.28	0.560	0.095
OCT 10-17	1000	0.03	--	15.8	--	6.48	0.590	0.141
OCT 17-24	1500	0.0	--	--	--	--	--	--
OCT 24-31	1000	1.12	7.5	5.5	4.70	5.32	0.070	0.013
OCT 31-NOV 07	1100	0.35	7.3	7.1	5.10	6.06	0.100	0.025
NOV 07-14	1100	0.20	7.9	7.4	4.90	6.14	0.090	0.016
NOV 14-21	1100	0.03	--	13.9	--	6.61	0.190	0.056
NOV 21-28	1400	0.55	5.6	4.6	4.90	5.68	0.090	0.015
NOV 28-DEC 05	1100	--	--	24.1	--	6.96	0.430	0.113
DEC 05-12	1100	--	--	--	--	--	--	--
DEC 12-19	1100	--	--	--	--	--	--	--
DEC 19-26	1100	--	--	--	--	--	--	--
DEC 26 1989-JAN 02 1990	1500	0.10	4.6	4.2	4.90	6.09	0.100	0.022
JAN 02-09	1100	0.0	--	--	--	--	--	--
JAN 09-16	1100	0.0	--	--	--	--	--	--
JAN 16-23	1100	0.06	18.2	16.3	4.70	5.66	0.360	0.048
JAN 23-30	1100	0.07	10.1	10.6	5.10	6.34	0.420	0.054
JAN 30-FEB 06	1230	0.05	10.6	8.0	4.80	5.84	0.420	0.063
FEB 06-13	1100	0.0	--	--	--	--	--	--
FEB 13-20	1100	0.37	3.2	3.2	5.10	5.93	0.220	0.038
FEB 20-27	1100	0.30	5.4	4.8	--	5.75	0.070	0.015
FEB 27-MAR 06	1100	0.0	--	--	--	--	--	--
MAR 06-13	1530	2.00	5.2	4.6	5.20	5.19	0.020	0.003
MAR 13-20	1100	1.30	6.1	4.9	5.10	5.22	0.040	0.005
MAR 20-27	1100	--	--	38.2	--	5.54	0.690	0.145
MAR 27-APR 03	1100	0.42	9.0	6.5	5.20	5.58	0.050	0.008
APR 03-10	1000	0.06	31.0	34.0	5.20	6.72	0.620	0.111
APR 10-17	1400	0.10	5.6	6.2	5.20	6.39	0.220	0.053
APR 17-24	1000	0.77	16.5	17.8	5.70	6.78	0.430	0.094
APR 24-MAY 01	1000	2.35	9.0	9.2	5.80	6.37	0.230	0.045

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN.--Continued

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

WEEKLY COMPOSITE

DATE	GREEN-WICH MEAN TIME	TOTAL PRECIP-ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUC-TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	SPEC. CONDUC-TANCE LAB ATM DEP WET TOT (US/CM) (83156)	PH FIELD ATM DEP WET T (UNITS) (83106)	PH LAB ATM DEP WET T (UNITS) (83107)	CALCIUM ATM DEP WET DIS (MG/L) (82932)	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)
MAY 01-08	1500	0.0	--	--	--	--	--	--
MAY 08-15	1000	0.31	9.8	9.2	5.10	5.87	0.220	0.050
MAY 15-22	1100	--	7.4	6.8	4.90	4.93	0.080	0.010
MAY 22-29	1400	0.85	13.8	15.9	4.55	4.70	0.130	0.027
MAY 29-JUN 05	0900	2.40	6.9	5.3	5.20	5.77	0.200	0.026
JUN 05-12	1530	2.30	6.9	5.7	5.60	5.82	0.170	0.027
JUN 12-19	1300	1.04	9.1	8.7	5.10	5.03	0.120	0.020
JUN 19-26	1600	0.26	7.7	7.0	5.40	5.41	0.140	0.033
JUN 26-JUL 03	1500	0.21	10.2	9.8	5.60	6.14	0.460	0.084
JUL 03-10	1500	0.45	16.5	17.9	5.60	6.32	0.340	0.077
JUL 10-17	1000	0.95	5.2	5.1	5.20	5.22	0.050	0.013
JUL 17-24	1000	0.11	10.6	11.4	5.50	6.13	0.370	0.058
JUL 24-31	1000	0.40	27.0	26.4	4.50	4.44	0.200	0.054
JUL 31-AUG 07	1400	0.27	9.1	9.4	6.10	6.61	0.530	0.153
AUG 07-14	1400	0.08	9.9	29.6	5.40	7.09	0.480	0.150
AUG 14-21	1000	0.40	9.3	8.2	5.20	5.05	0.090	0.017
AUG 21-28	1000	1.18	--	7.1	--	5.59	0.160	0.020
AUG 28-SEP 04	1415	0.62	14.2	11.9	4.90	5.21	0.300	0.032
SEP 04-11	1000	0.45	8.1	8.0	4.80	5.20	0.250	0.046
SEP 11-18	1200	0.02	--	34.6	--	7.02	3.56	0.760
SEP 18-25	1230	--	10.5	8.9	5.10	5.67	0.070	0.016
SEP 25-OCT 02	1000	0.15	16.6	16.2	5.20	6.87	0.590	0.149

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN.--Continued

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

WEEKLY COMPOSITE

DATE	SODIUM ATM DEP WET DIS (MG/L) (83138)	POTASSIUM ATM DEP WET DIS (MG/L) (83120)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	CHLORIDE ATM DEP WET DIS (MG/L) (82944)	NITROGEN NITRATE ATM DEP WET DIS AS NO3 (MG/L) (83071)	NITROGEN AMMON. ATM DEP WET DIS AS NH4 (MG/L) (83047)	PHOSPHORUS ORTHO ATM DEP WET DIS AS PO4 (MG/L) (83111)
OCT 03-10	0.067	0.046	1.85	0.10	1.61	1.19	<0.020
OCT 10-17	0.241	0.046	0.95	0.28	3.49	0.790	<0.020
OCT 17-24	--	--	--	--	--	--	--
OCT 24-31	0.019	0.016	0.52	0.05	0.58	0.180	<0.020
OCT 31-NOV 07	0.043	0.043	0.86	0.08	0.90	0.680	<0.020
NOV 07-14	0.074	0.012	0.85	0.06	0.88	0.600	<0.020
NOV 14-21	0.875	0.075	0.56	0.62	1.43	0.680	0.190
NOV 21-28	0.030	0.006	0.33	0.04	0.89	0.260	<0.020
NOV 28-DEC 05	1.02	0.057	0.94	0.94	0.94	0.570	<0.380
DEC 05-12	--	--	--	--	--	--	--
DEC 12-19	--	--	--	--	--	--	--
DEC 19-26	--	--	--	--	--	--	--
DEC 26 1989-JAN 02 1990	0.046	0.029	0.43	0.06	0.22	0.150	<0.020
JAN 02-09	--	--	--	--	--	--	--
JAN 09-16	--	--	--	--	--	--	--
JAN 16-23	0.164	0.068	2.35	0.29	2.61	1.22	<0.020
JAN 23-30	0.113	0.043	0.71	0.14	2.02	0.740	<0.020
JAN 30-FEB 06	0.086	0.023	0.46	0.14	2.06	0.320	<0.020
FEB 06-13	--	--	--	--	--	--	--
FEB 13-20	0.029	0.015	0.22	0.04	0.28	<0.020	<0.020
FEB 20-27	0.041	0.038	0.45	0.08	0.62	0.310	<0.020
FEB 27-MAR 06	--	--	--	--	--	--	--
MAR 06-13	0.020	0.004	0.33	0.04	0.40	0.140	<0.020
MAR 13-20	0.024	0.010	0.40	0.04	0.48	0.100	<0.020
MAR 20-27	0.517	0.048	3.23	0.81	3.07	1.29	<0.320
MAR 27-APR 03	0.015	<0.003	0.99	0.05	0.74	0.540	<0.020
APR 03-10	0.104	0.095	4.24	0.18	4.70	3.24	<0.020
APR 10-17	0.090	0.044	0.41	0.15	0.57	0.620	<0.020
APR 17-24	0.125	0.076	1.39	0.16	1.97	1.80	<0.020
APR 24-MAY 01	0.051	0.022	0.79	0.10	1.24	0.910	<0.020

CHEMICAL QUALITY OF PRECIPITATION

461458094295000 PRECIPITATION STATION AT CAMP RIPLEY, MN.--Continued

CHEMICAL ANALYSIS, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

WEEKLY COMPOSITE

DATE	SODIUM ATM DEP WET DIS (MG/L) (83138)	POTASSIUM ATM DEP WET DIS (MG/L) (83120)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	CHLORIDE ATM DEP WET DIS (MG/L) (82944)	NITROGEN NITRATE ATM DEP WET DIS AS NO3 (MG/L) (83071)	NITROGEN AMMON. ATM DEP WET DIS AS NH4 (MG/L) (83047)	PHOSPHORUS ORTHO ATM DEP WET DIS AS PO4 (MG/L) (83111)
MAY 01-08	--	--	--	--	--	--	--
MAY 08-15	0.026	0.014	1.13	0.08	1.43	0.710	<0.020
MAY 15-22	0.017	0.012	0.45	0.06	0.76	0.080	<0.020
MAY 22-29	0.010	0.020	1.75	0.07	1.56	0.560	<0.020
MAY 29-JUN 05	0.029	0.028	0.51	<0.03	0.70	0.280	<0.020
JUN 05-12	0.063	0.040	0.60	0.11	0.81	0.460	<0.020
JUN 12-19	0.029	0.029	0.73	0.08	1.18	0.320	<0.020
JUN 19-26	0.027	0.041	0.80	0.10	0.66	0.410	0.020
JUN 26-JUL 03	0.049	0.066	1.02	0.16	1.83	0.530	<0.020
JUL 03-10	0.112	0.084	2.48	0.19	2.76	1.37	<0.020
JUL 10-17	0.009	0.007	0.43	0.06	0.54	0.170	<0.020
JUL 17-24	0.044	0.065	1.05	0.13	2.04	0.910	0.140
JUL 24-31	0.033	0.033	3.53	0.10	1.66	0.920	<0.020
JUL 31-AUG 07	0.031	0.047	0.53	0.09	0.93	0.620	<0.020
AUG 07-14	0.158	0.566	2.09	0.23	0.98	3.40	0.520
AUG 14-21	0.018	0.009	0.69	0.05	1.32	0.420	<0.020
AUG 21-28	0.027	0.017	0.79	0.08	1.12	0.580	<0.020
AUG 28-SEP 04	0.029	0.020	1.81	0.08	1.54	0.720	<0.020
SEP 04-11	0.020	0.023	0.93	0.11	1.12	0.270	<0.020
SEP 11-18	0.076	0.409	1.85	0.29	2.82	<0.070	<0.070
SEP 18-25	0.014	0.013	1.09	0.09	1.40	0.860	<0.020
SEP 25-OCT 02	0.060	0.051	1.20	0.08	1.90	1.42	<0.020

INDEX

INDEX

INDEX

INDEX

INDEX

☆U.S. GOVERNMENT PRINTING OFFICE: 1991- 557-098/40232

October 1, 1978

FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

The following factors may be used to convert the inch-pound units published herein to the International System of Units (SI).

Multiply inch-pound units	By	To obtain SI units
	Length	
inches (in)	2.54×10^{1}	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet (ft)	3.048×10^{-1}	meters (m)
miles (mi)	1.609×10^{0}	kilometers (km)
	Area	
acres	4.047×10^{3}	square meters (m^2)
	4.047×10^{-1}	square hectometers (hm^2)
	4.047×10^{-3}	square kilometers (km^2)
square miles (mi^2)	2.590×10^{0}	square kilometers (km^2)
	Volume	
gallons (gal)	3.785×10^{0}	liters (L)
	3.785×10^{0}	cubic decimeters (dm^3)
	3.785×10^{-3}	cubic meters (m^3)
million gallons	3.785×10^{3}	cubic meters (m^3)
	3.785×10^{-3}	cubic hectometers (hm^3)
cubic feet (ft^3)	2.832×10^{1}	cubic decimeters (dm^3)
	2.832×10^{-2}	cubic meters (m^3)
cfs-days	2.447×10^{3}	cubic meters (m^3)
	2.447×10^{-3}	cubic hectometers (hm^3)
acre-feet (acre-ft)	1.233×10^{3}	cubic meters (m^3)
	1.233×10^{-3}	cubic hectometers (hm^3)
	1.233×10^{-6}	cubic kilometers (km^3)
	Flow	
cubic feet per second (ft^3/s)	2.832×10^{1}	liters per second (L/s)
	2.832×10^{1}	cubic decimeters per second (dm^3/s)
	2.832×10^{-2}	cubic meters per second (m^3/s)
gallons per minute (gal/min)	6.309×10^{-2}	liters per second (L/s)
	6.309×10^{-2}	cubic decimeters per second (dm^3/s)
	6.309×10^{-5}	cubic meters per second (m^3/s)
million gallons per day	4.381×10^{1}	cubic decimeters per second (dm^3/s)
	4.381×10^{-2}	cubic meters per second (m^3/s)
	Mass	
tons (short)	9.072×10^{-1}	megagrams (Mg) or metric tons

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF THE INTERIOR
INT 413

U.S. DEPARTMENT OF THE INTERIOR
Geological Survey
702 Post Office Building
St. Paul, MN 55101

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

SPECIAL 4TH CLASS BOOK RATE