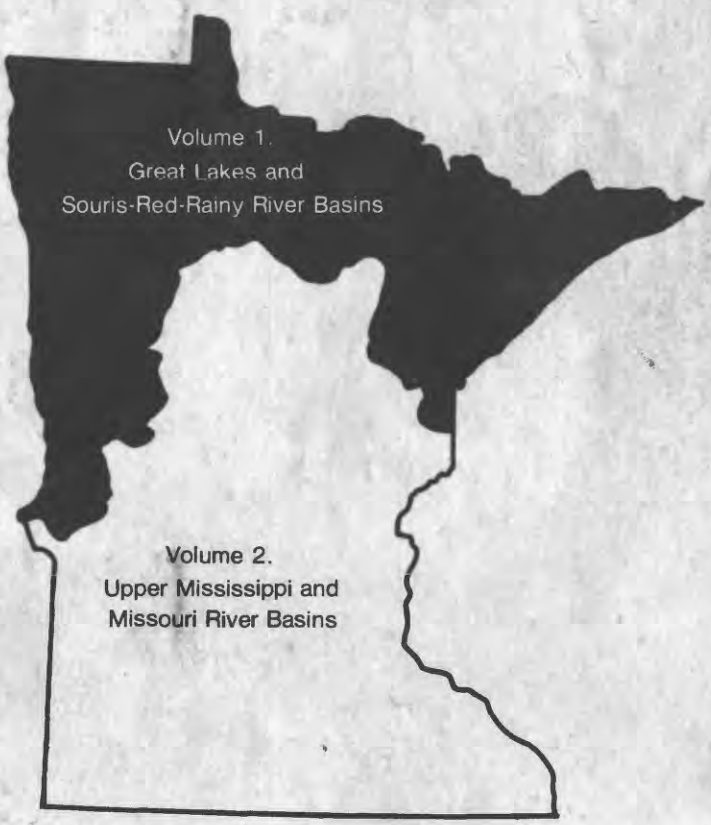
Water Resources Data Minnesota Water Year 1981

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



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MN-81-1
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 1981

1980

OCTOBER

S	M	T	W	T	F	S
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1981

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SEPTEMBER

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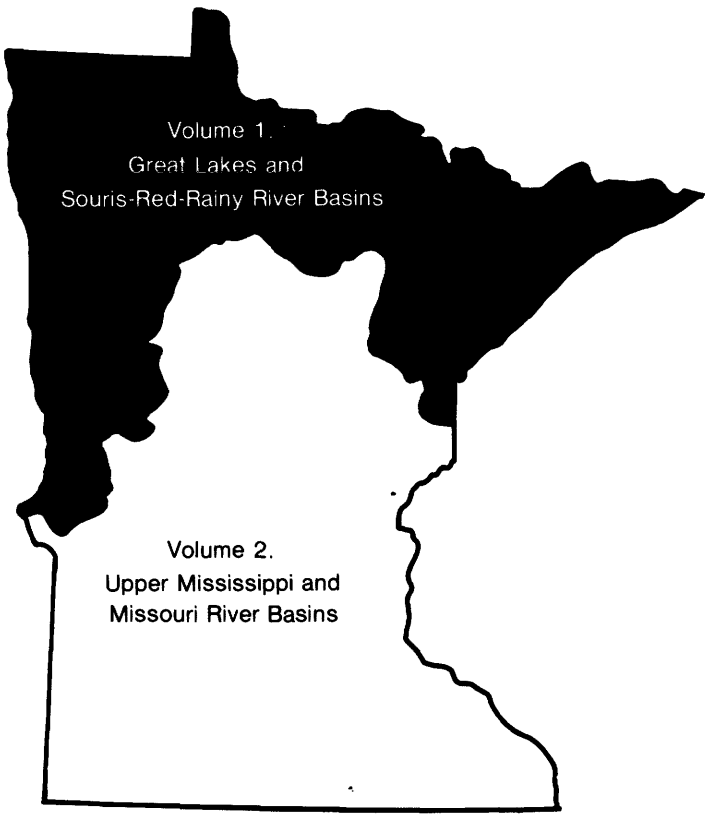
Water Resources Data Minnesota

Water Year 1981

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



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MN-81-1
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

UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

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1982

PREFACE

This report was prepared by personnel of the Minnesota district of the Water Resources Division of the U.S. Geological Survey under the supervision of D. R. Albin, District Chief, and F. T. Schaefer, Acting Regional Hydrologist, Northeastern Region. It was done in cooperation with the State of Minnesota and with other agencies.

This report is one of a series issued by state. General direction for the series is by Philip Cohen, Chief Hydrologist, U.S. Geological Survey, and James E. Biesecker, Assistant Chief Hydrologist for Scientific Publications and Data Management.

Data for Minnesota are in two volumes as follows:

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

Volume 2. Upper Mississippi and Missouri River Basins

50272-101

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

16. Abstract (Limit: 200 words)

Water-resources data for the 1981 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 47 gaging stations; stage-only records for 1 gaging station; stage and contents for 5 lakes and reservoirs; water quality for 9 gaging stations, 1 stage station, 14 partial-record lake stations, and 21 wells; and water levels for 56 observation wells. Also included are 53 high-flow partial-record stations and 1 low-flow partial-record station. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. These data, together with the data in Volume 2, 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, 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	229
	20. Security Class (This Page) UNCLASSIFIED	22. Price

CONTENT

ILLUSTRATIONS

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

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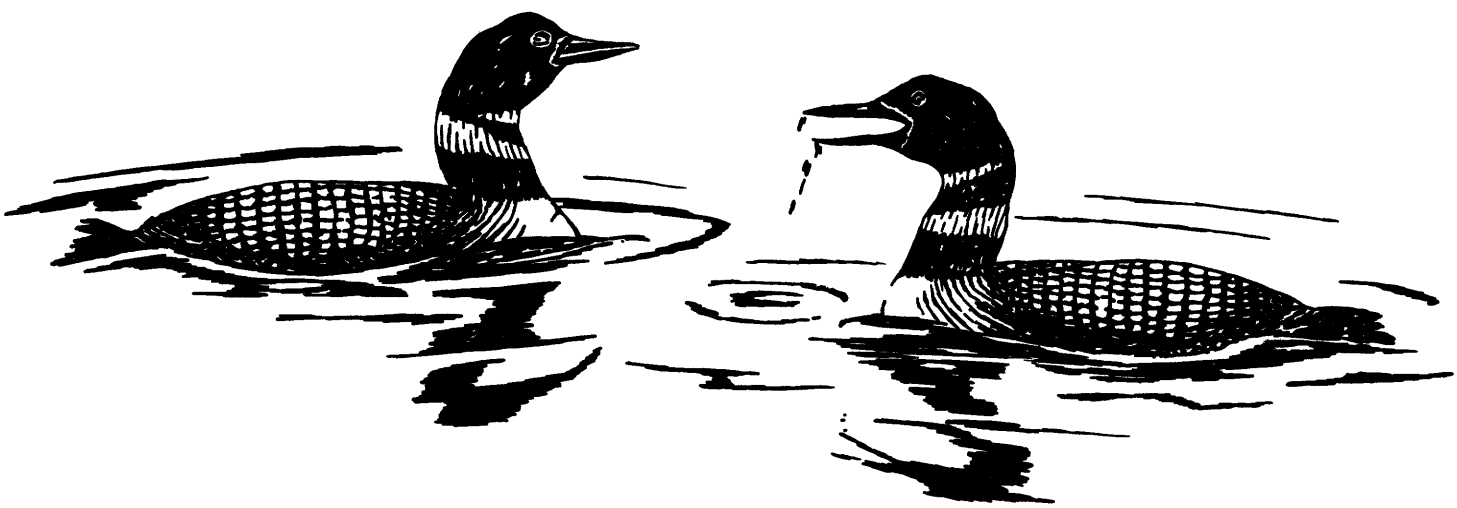

WATER RESOURCES DATA FOR MINNESOTA, 1981

INTRODUCTION

Water resources data for the 1981 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 47 gaging stations; stage only records for 1 gaging station; stage and contents for 5 lakes and reservoirs; water quality for 9 gaging stations, 1 stage station, 14 partial-record lake stations, and 21 wells; and water levels for 56 observation wells. Also included are 53 high-flow partial-record stations and 1 low-flow partial-record station. Additional water data were collected at various sites, not involved in the systematic data collection program, and are published as miscellaneous measurements. These data, together with the data in Volume 2, represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Minnesota.

Records of discharge or stage of streams, and contents or stage of lakes and reservoirs were first published in a series of U.S. Geological Survey water-supply papers titled "Surface Water Supply of the United States." Through September 30, 1960, these water-supply papers were in an annual series and then in a 5-year series for 1961-65 and 1966-70. Records of chemical quality, water temperatures, and suspended sediment were published from 1941 to 1970 in an annual series of water supply papers titled "Quality of Surface Waters of the United States." Records of ground-water levels were published from 1935 to 1974 in a series of water-supply papers titled "Ground-Water Levels in the United States." Water-supply papers may be consulted in the libraries of the principal cities in the United States or may be purchased from Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, VA 22202.

For water years 1961 through 1974, streamflow data were released by the Geological Survey in annual reports on a State-boundary basis. Water-quality records for water years 1964 through 1974 were similarly released either in separate reports or in conjunction with streamflow records.

Beginning with the 1975 water year, water data for streamflow, water quality, and ground water are published as an official Survey report on a State-boundary basis. These official Survey reports carry an identification number consisting of the two letter State abbreviation, the last two digits of the water year, and the volume number. For example, this report is identified as "U.S. Geological Survey Water-Data Report MN-81-1." Water-Data reports are for sale 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) 725-7841.

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, Larry Seymour, director.

Minnesota Department of Transportation, Richard P. Braun, commissioner.

Minnesota Department of Health, George R. Pettersen, commissioner.

Minnesota Pollution Control Agency, Louis J. Breimhurst, executive director.

Metropolitan Waste Control Commission of the Twin Cities Area, B. L. Lukermann, chairwoman.

Metropolitan Council of the Twin Cities Area, Charles R. Weaver, chairman.

Elm Creek Conservation Commission, Gerald E. Butcher, chairman.

Assistance in the form of funds or services was given by the Corps of Engineers, U.S. Army, in collecting records for 45 gaging stations and 11 water-quality stations published in this report.

Twelve gaging stations in the Hudson Bay and St. Lawrence River basins were maintained by funds appropriated to the United States Department of State. Nine of these, on waters 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."

Some records for the Red River of the North, which borders the State on the west, were obtained at the request of other Federal agencies as a part of the program of the U.S. Department of the Interior for development of the Missouri River basin.

ACKNOWLEDGMENT

Minnesota district personnel who contributed significantly to the collection and preparation of water-resources data for publication in this report were:

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HYDROLOGIC CONDITIONS

PRECIPITATION AND STREAMFLOW

Normal annual precipitation in Minnesota ranges from 19 inches in the northwest to 32 inches in the southeast. The average annual runoff ranges from less than 2 inches in the west to more than 16 inches in the northeast. During the 1981 water year, rainfall was deficient throughout the State from October through May. Above normal rainfall during June, July, and August in most of the State reduced the rainfall deficit in some areas and caused a surplus in other areas. Total precipitation for the 1981 water year was above normal in the northwest, north-central, south-central, and southeast areas and below normal in all remaining areas. The southwest was the most deficient in precipitation; almost 5 inches below normal. Annual runoff in 1981 ranged from less than 0.2 inch in parts of the west to almost 17 inches in the northeast.

An unusually warm period during February caused most of the snow cover in northern Minnesota to melt, producing above average streamflow in February and March, which was 2 months ahead of the normal melt period. During April and May, the usual time of spring runoff, rainfall was deficient, and flows reached record lows.

Records from stations in northern Minnesota indicate that runoff was near or below average during 1981. Baptism River near Beaver Bay in northeast Minnesota and Little Fork River at Littlefork in north-central Minnesota had near average runoff for the year, 16.9 and 7.3 inches, respectively. Roseau River at Ross, in northwest Minnesota, was much below average, with 1.0 inch of runoff. Figure 1 on page 4 shows a comparison of monthly and annual mean discharges for these stations to median discharges for a 30-year base period.

Annual mean streamflow was considerably below average in the northwest, somewhat below in north-central Minnesota, and near average or slightly above in the northeast, reflecting the residual effects of the precipitation pattern of the previous year.

No previous peaks of record were exceeded during 1981 at any gaging stations on streams for which records are published in this volume.

WATER QUALITY

Dissolved-solids data from selected NASQAN stations were used to indicate how overall water quality varied in the Great Lakes and Souris-Red-Rainy River basins. In northeast Minnesota, dissolved-solids concentrations in the St. Louis River at Scanlon, about 15 miles southwest of Duluth, were lower throughout the year than the mean for the period of record (fig. 2). The Rainy River at Manitou Rapids, on the Canadian border in north-central Minnesota, also had lower than

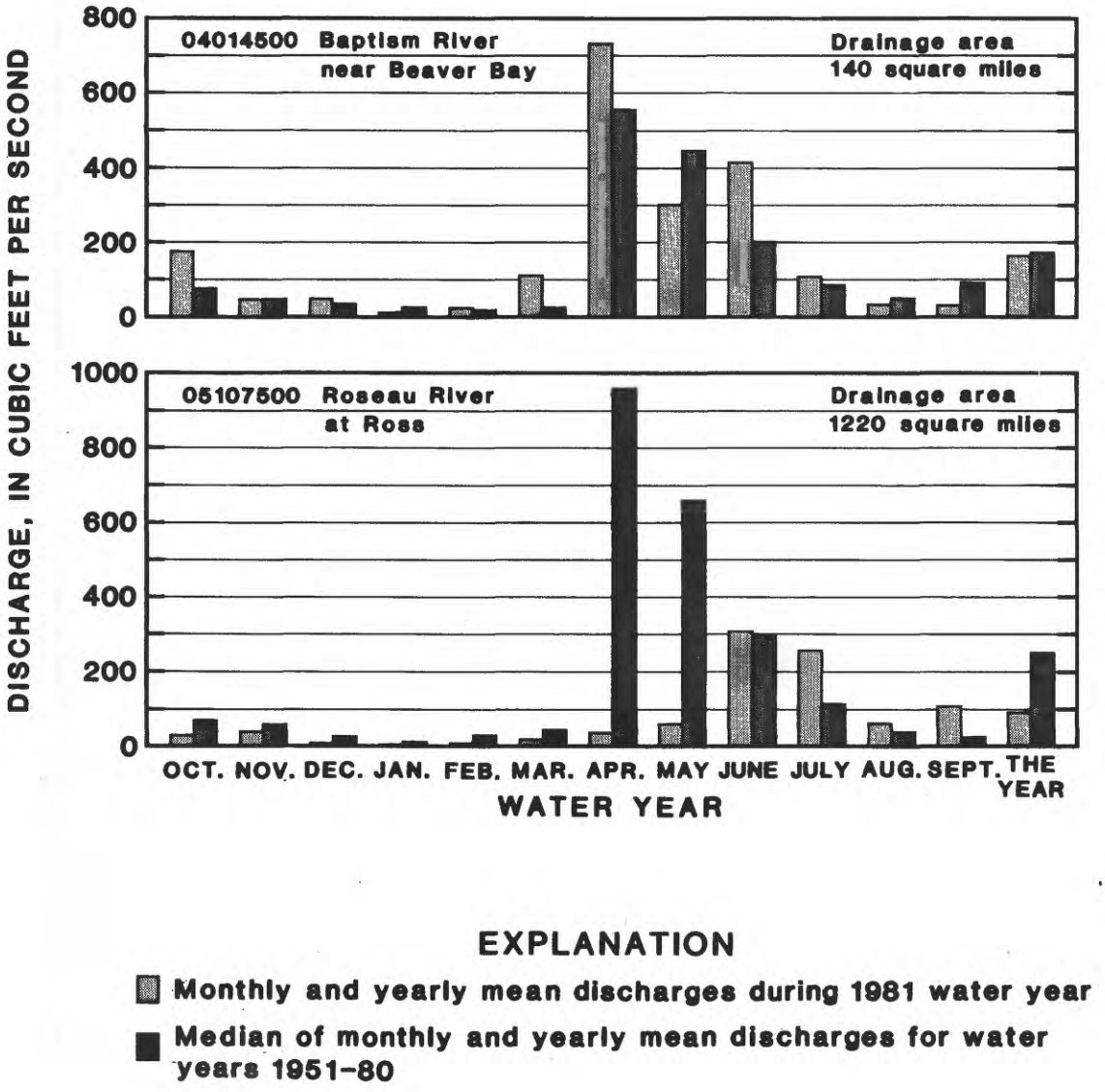


Figure 1.--Comparison of discharges at three long-term representative 30-year base period

normal dissolved solids. In northwest Minnesota, where runoff was lower than normal, dissolved-solids concentrations were higher than normal during most of the year, as shown in figure 2 by data for the Red Lake River at Crookston and, to a lesser degree, by data for the Roseau River below State Ditch 51 near Caribou.

Constituent concentrations in all samples of ground water analyzed and published in this volume were below maximum limits for drinking water prescribed by the U.S. Environmental Protection Agency, with one exception. A shallow well in St. Louis County in northeast Minnesota was sampled July 15, 1981, and a concentration of 56 mg/L of nitrite plus nitrate as nitrogen was found. The maximum prescribed concentration for nitrate as nitrogen in drinking water is 10 mg/L.

GROUND-WATER LEVELS

The water table was at or below normal level in most of the State during the 1981 water year. The seasonal position of the water table (fig. 3) reflects a shortage of recharge during fall, winter, and early spring. The recovery to near normal levels in summer reflects the influence of precipitation on recharge to the aquifer. Figure 3 shows how the water table relates seasonally to normal levels based on water-level fluctuations in 17 key wells. The 1980-81 levels are compared to the long-term means for each month and grouped by seasons. During fall and winter, the water table was at or below normal except in northwest, northeast, and southeast Minnesota. During spring, continuing deficiencies in precipitation resulted in a below-normal water table in most of the State except the northeast and the Twin Cities area. During summer, the water table recovered to near normal in response to late spring and early summer rain.

Water levels in confined aquifers, both buried drift and bedrock, were at or below normal levels in most of the State during all the 1981 water year. The seasonal position of these confined levels (fig. 4) reflects a shortage of natural recharge related to deficient precipitation similar to the water-table response, but slightly subdued and delayed in time. Figure 4 shows how the confined levels relate seasonally to normal levels based on water-level fluctuations in 17 key wells. During fall and winter, water levels were at or below normal except in northeast Minnesota and two small areas in central Minnesota including the western part of the Twin Cities basin. During spring, the area of below normal levels increased to include more than half the State. During summer, water levels in much of the State were back to near normal.

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 the 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.

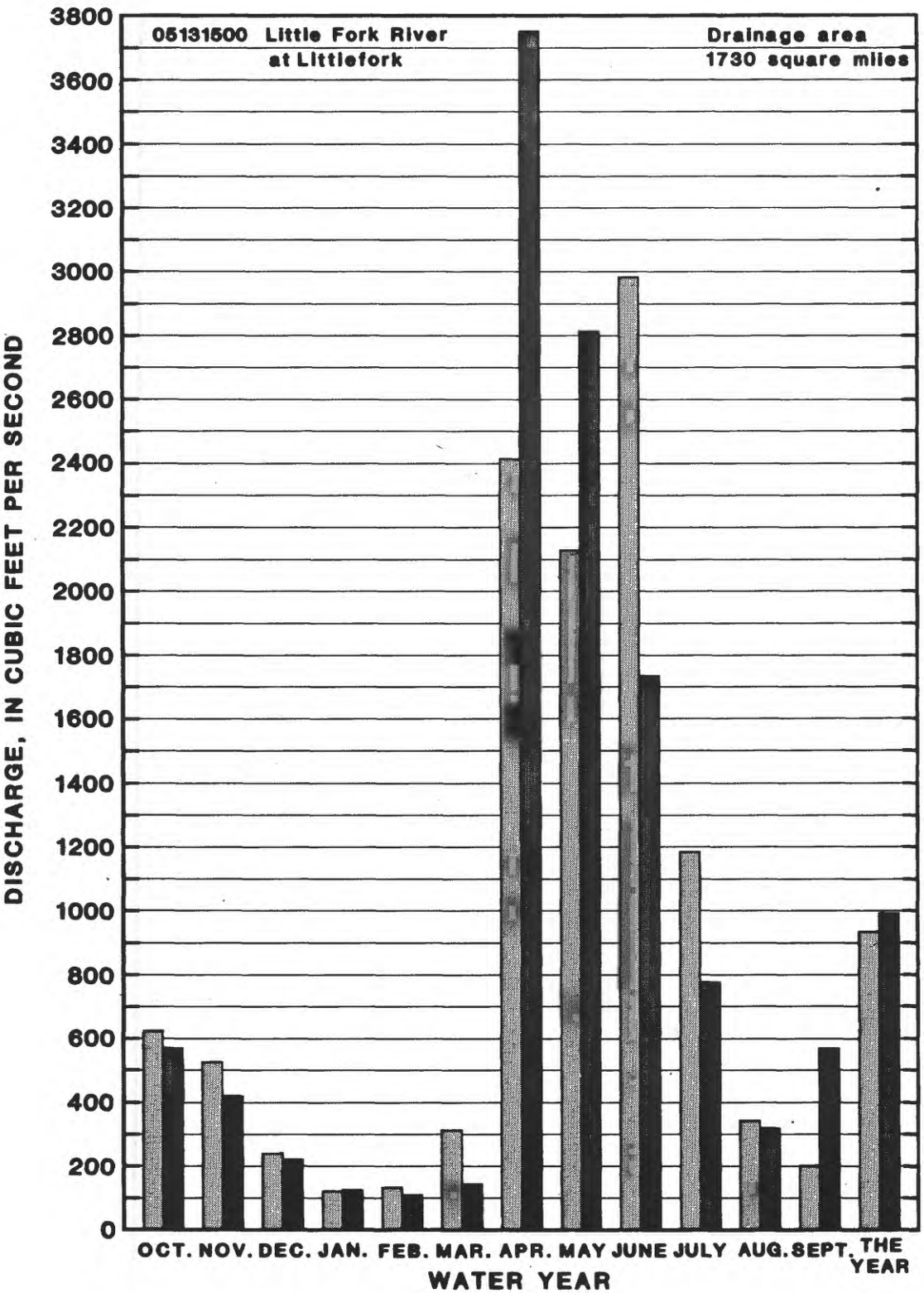
Aquifer is a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

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 whien 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.



gaging stations for the current year with median discharges for a

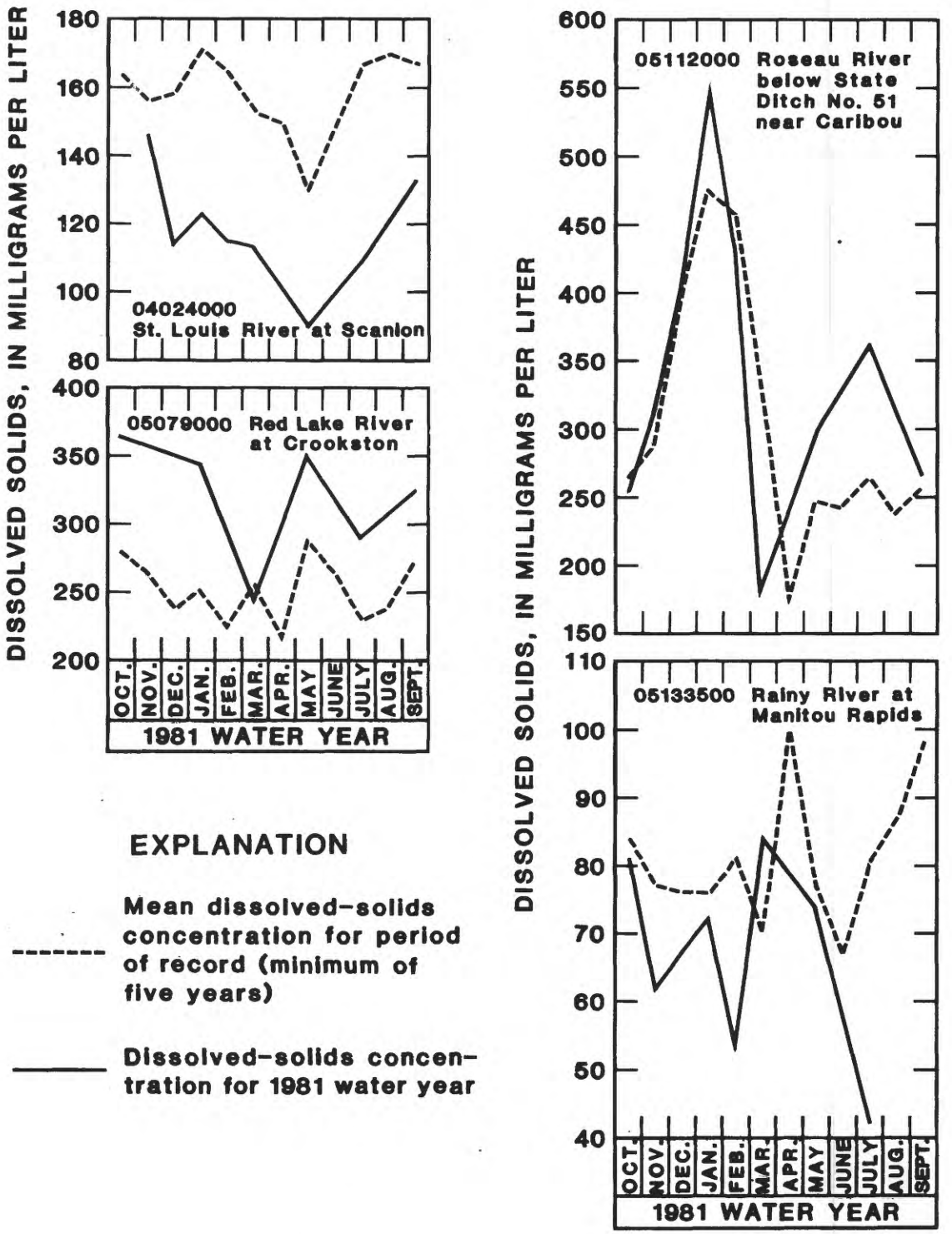


Figure 2.--Comparison of dissolved-solids concentrations for the current year with mean monthly values for the periods of record

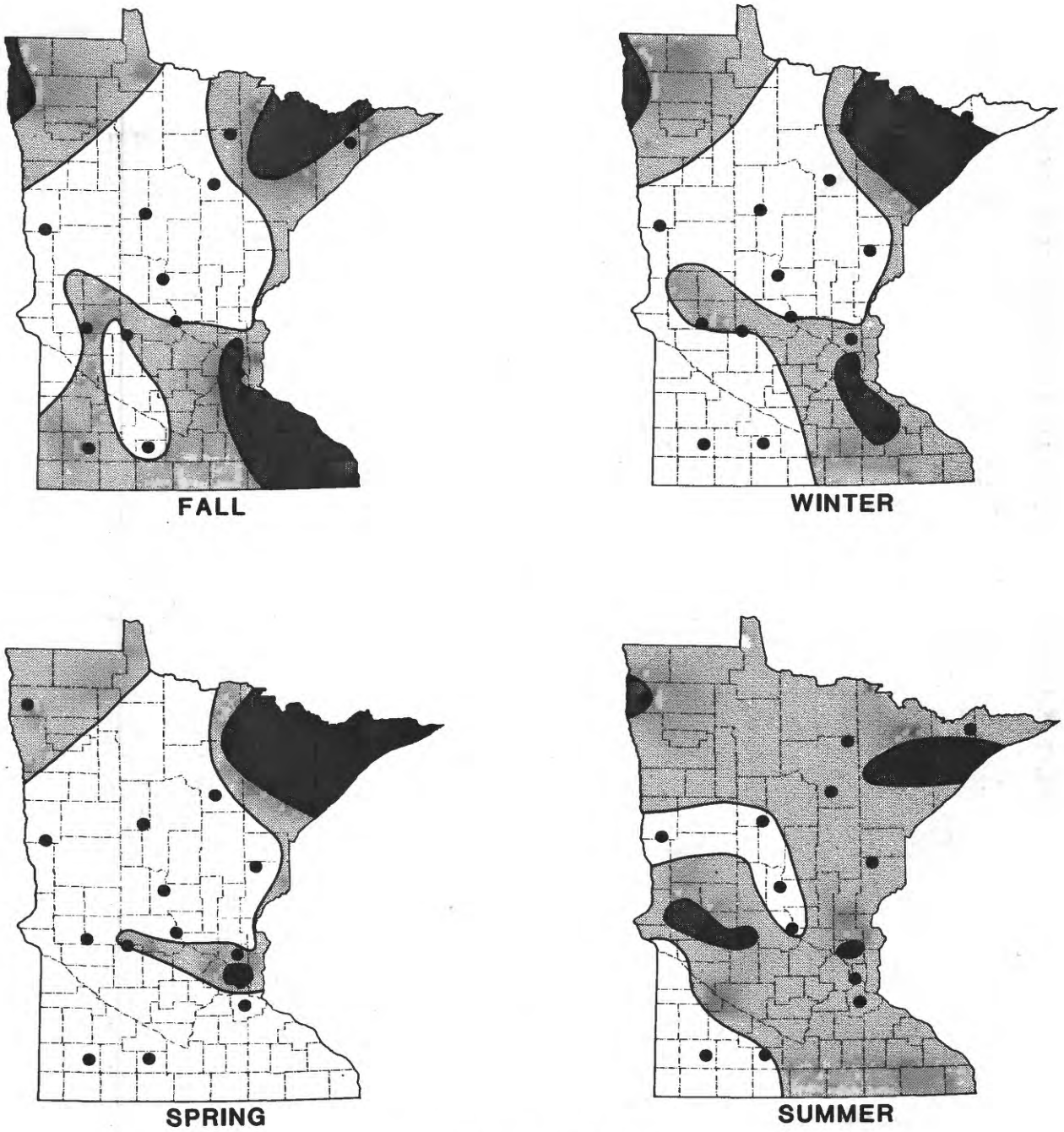


Figure 3.--Relationship of seasonal water-table levels to long-term mean levels

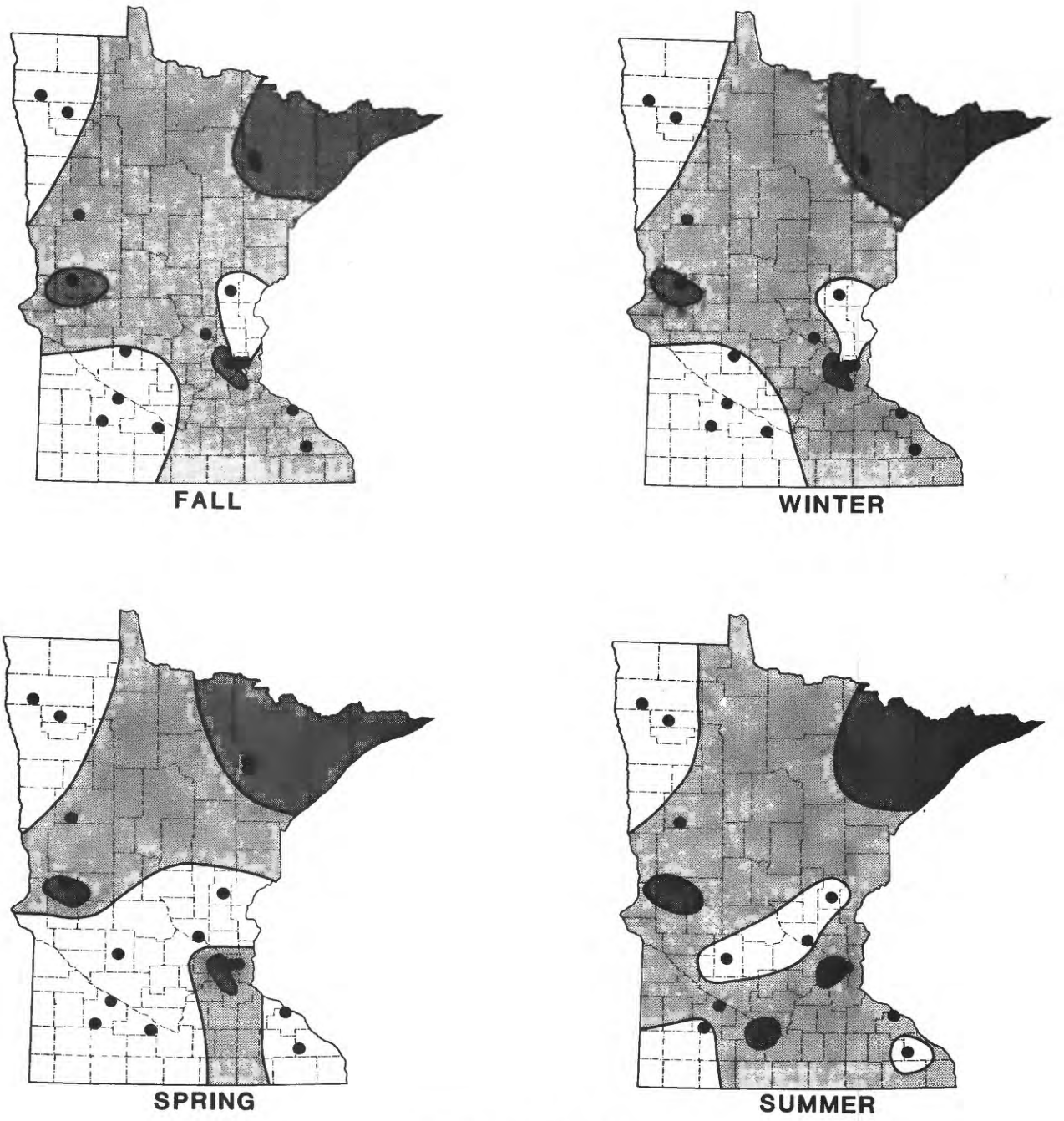


Figure 4.--Relationship of seasonal water levels in confined aquifers to long-term mean levels.

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 quantitiy of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by microorganisms, such as bacteria.

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

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

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

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

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

Bottom material: See Bed Material.

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

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

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

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

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

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

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

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

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

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

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

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

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 memmbrane filter, and thus may include some very small (colloidal) suspended particles. Analyses are performed on filtered samples.

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

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

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) 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 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.

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 (Ci). 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.

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.

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.

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).

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.

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

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 appoximating 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 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.

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

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.

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 discharge. 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.

DOWNSTREAM ORDER 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 stations is listed between them. A similar order is followed in 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 indention in a list of stations in the 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 used in this report. In assigning station numbers, no distinction is made between partial-record stations and other stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete 8-digit number for each station such as 05041000, which appears just to the left of the station name, includes the 2-digit part number "05" plus the 6-digit downstream order number "041000".

NUMBERING SYSTEM FOR WELLS AND MISCELLANEOUS SITES

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

The well and miscellaneous site numbering system of the U.S. Geological Survey is based on the grid system of latitude and longitude. The system provides the geographic location of the well or miscellaneous site and a unique number for each site. The number consists of 15 digits. The first 6 digits denote the degrees, minutes, and seconds of latitude, the next 7 digits denote degrees, minutes, and seconds of longitude, and the last 2 digits (assigned sequentially) identify the wells or other sites within a 1-second grid. See figure 5 below. 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.

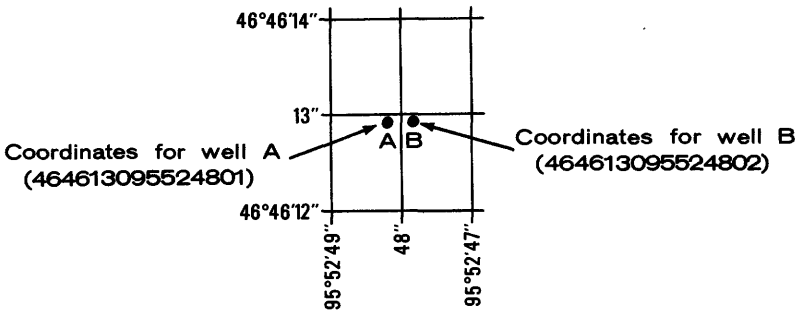


Figure 5.--Example of system for numbering wells and miscellaneous sites

SPECIAL NETWORKS AND PROGRAMS

Hydrologic bench-mark station is one that provides hydrologic data for a basin in which the hydrologic regimen will likely be governed solely by natural conditions. Data collected at a bench-mark station may be used to separate effects of natural from manmade changes in other basins which have been developed and in which the physiography, climate, and geology are similar to those in the undeveloped bench-mark basin.

National stream-quality accounting network (NASQAN) is a data collection network designed by the U.S. Geological Survey to meet many of the information demands of agencies or groups involved in national or regional water-quality planning and management. Both accounting and broad-scale monitoring objectives have been incorporated into the network design. Areal configuration of the network is based on river-basin accounting units (identified by 8-digit hydrologic-unit numbers) designated by the Office of Water Data Coordination in consultation with the Water Resources Council. Primary objectives of the network are (1) to depict areal variability of streamflow and water-quality conditions nationwide on a year-by-year basis and (2) to detect and assess long-term changes in streamflow and stream quality.

Pesticide program is a network of regularly sampled water-quality stations where samples are collected to determine the concentration and distribution of pesticides in streams where potential contamination could result from the application of the commonly used insecticides and herbicides. Operation of the network is a Federal interagency activity.

Radiochemical program is a network of regularly sampled water-quality stations where samples are collected to be analyzed for radiosotopes. 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 base line 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 STAGE AND WATER-DISCHARGE RECORDS

COLLECTION AND COMPUTATION OF DATA

The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. Records of stage are obtained from either direct readings on a nonrecording gage or from a water-stage recorder that gives either a continuous graph of the fluctuations or a tape punched at selected time intervals. Measurements of discharge are made with a current meter, using the general methods adopted by the Geological Survey. These methods are described in standard text-books, in Water-Supply Paper 888, and in U.S. Geological Survey Techniques of Water-Resources Investigations, book 3, chapter A6.

For stream-gaging stations, rating tables giving the discharge for any stage are prepared from stage-discharge relation curves. If extensions to the rating curves are necessary to express discharge greater than measured, they are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, computation of flow over dams or weirs), step-backwater techniques, velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean discharges are computed from the daily figures. 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 computed by the shifting-control method, in which correction factors based on individual discharge measurements and notes by hydrologists and observers are used in applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the control, the daily mean discharge is computed by what is basically the shifting-control method.

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.

At some northern stream-gaging stations the stage-discharge relation is affected by ice in the winter, and it becomes impossible to compute the discharge in the usual manner. Discharge for periods of ice effect is computed on the basis of gage-height record and occasional winter discharge measurements. Consideration is given to the available information on temperature and precipitation, notes by gage observers and hydrologists, and comparable records of discharge for other stations in the same or nearby basins.

For a lake or reservoir station, capacity tables giving the contents for any stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly change in contents is computed.

If the stage-capacity curve is subject to changes because of deposition of sediment in the reservoir, periodic resurveys of the reservoir are necessary to define new stage-capacity curves. During the period between reservoir surveys the computed contents may be increasingly in error due to the gradual accumulation of sediment.

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 on the basis of recorded range-in-stage, prior and subsequent records, discharge measurements, weather records, and comparison with records for other stations in the same or nearby basins. Likewise daily contents may be estimated on the basis of operator's log, prior and subsequent records, inflow-outflow studies, and other information.

The data in this report generally comprise a description of the station and tabulations of daily and monthly figures. For gaging stations on streams or canals a table showing the daily discharge and monthly and yearly discharge is given. For gaging stations on lakes and reservoirs a monthly summary table of stage and contents or a table showing the daily contents is given. Tables of daily mean gage heights are included for some streamflow stations and for some reservoir stations. Records are published for the water year, which begins on October 1 and ends on September 30.

The description of the gaging station gives the location, drainage area, period of record, notations of revisions of previously published records, type and history of gages, general remarks, average discharge, and extremes of discharge or contents. The location of the gaging station and the drainage area are obtained from most accurate maps available. River mileage, given under "LOCATION" for some stations, is that determined and used by the Corps of Engineers or other agencies. Periods for which there are published records for the present station or for stations generally equivalent to the present one are given under "PERIOD OF RECORD."

Previously published streamflow records of some stations have been found to be in error on the basis of data or information later obtained. Revisions of such records are usually published along with the current records in one of the annual or compilation reports. In order to make it easier to find such revised records, a paragraph headed "REVISED RECORDS" has been added to the description of all stations for which revised records have been published. Listed herein are all the reports in which revisions have been published, each followed by the water years for which figures are revised in that report. In listing the water years only one number is given; for instance, 1965 stands for the water year October 1, 1964, to September 30, 1965. If no daily, monthly, or annual figures of discharge are affected by the revision, the fact is brought out by notations 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 revised figure was first published is given. It should be noted that for all stations for which cubic feet per second per square mile and runoff in inches are published, a revision of the drainage area necessitates corresponding revision of all figures based on the drainage area. Revised figures of cubic feet per second per square mile and runoff in inches resulting from a revision of the drainage area only are usually not published in the annual series of reports.

The type of gage currently in use; the datum of the present gage referred to National Geodetic Vertical Datum; and a condensed history of the types, locations, and datums of previous gages used during the period of record are given under "GAGE." National Geodetic Vertical Datum is explained in "DEFINITION OF TERMS."

Information pertaining to the accuracy of the discharge records and to conditions which affect the natural flow of the gaging station is given under "REMARKS." For reservoir stations, information on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir is given under "REMARKS."

The average discharge for the number of years indicated is given under "AVERAGE DISCHARGE"; it is not given for stations having fewer than 5 complete years of record or for stations where changes in water development during the period of record cause the figure to have little significance. In addition, the median of yearly mean discharges is given for stream-gaging stations having 10 or more complete years of record if the median differs from the average by more than 10 percent. Under "EXTREMES" are given first, the extremes for the period of record, second, information available outside the period of record, and last, those for the current year. Unless otherwise qualified, the maximum discharge (or contents) is the instantaneous maximum corresponding to the crest stage obtained by use of a water-stage recorder (graphic or digital), a crest-stage gage, or a nonrecording gage read at the time of crest. If the maximum gage height did not occur on the same day as the maximum discharge (or contents), it is given separately. Similarly, the minimum is the instantaneous minimum unless otherwise qualified. For some stations, peak discharges are listed with "EXTREMES FOR CURRENT YEAR". If they are, all independent peaks above the selected base are published in tabular format with the time of occurrence and corresponding gage heights, including the maximum for the year. The base discharge, which is given in the table heading, is selected so that an average of about three peaks a year will be presented. Peak discharges are not published for any canals, ditches, drains, or for any stream for which the peaks are subject to substantial control by man. Time of day is expressed in 24-hour local standard time; for example, 12:30 a.m. is 0030, 1:30 p.m. is 1330. The minimums for these stations are published in a separate paragraph following the table of peaks.

The daily table for stream-gaging stations gives the 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 may be 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, if the drainage area includes large noncontributing areas, or if the average annual rainfall over the drainage basin is usually less than 20 inches. In the yearly summary below the monthly summary, the figures shown are the appropriate daily discharges for the calendar and water years.

Footnotes to the table of daily discharge are introduced by the word "NOTE". Footnotes are used to indicate periods for which the discharge is computed or estimated by special methods because of no gage-height record, backwater from various sources, or other unusual conditions. Periods of no gage-height record are indicated if the period is continuous for a month or more or includes the maximum discharge for the year. Periods of backwater from an unusual source, of indefinte stage-discharge relation, or of any other unusual condition at the gage site are indicated only if they are a month or more in length and the accuracy of the records is affected. Days on which the stage-discharge relation is affected by ice are not indicated. The methods used in computing discharge for various unusual conditions have been explained in preceding paragraphs.

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.

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. Occasionally, a series of discharge measurements are made within a short time period to investigate the seepage gains or losses along a reach of a stream or to determine the low-flow characteristics of an area. Such measurements are also given in special tables following the tables of partial-record stations.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS

The accuracy of streamflow data 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 observations of stage, measurements of discharge, and interpretations of records.

The station description under "REMARKS" states the degree of accuracy of the records. "Excellent" means that about 95 percent of the daily discharges are within 5 percent; "good," within 10 percent; and "fair," within 15 percent. "Poor" means that daily discharges have less than "fair" accuracy.

Figures of daily mean discharge in this report are shown to the nearest hundredth of a cubic foot per second for discharges of less than 1 ft^3/s; to tenths between 1.0 and 10 ft^3/s; to whole numbers between 10 and 1,000 ft^3/s; and to 3 significant figures above 1,000 ft^3/s. The number of significant figures used is based solely on the magnitude of the figure. The same rounding rules apply to discharge figures listed for partial-record stations.

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 DATA 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.

RECORDS OF DISCHARGE COLLECTED BY AGENCIES OTHER THAN THE GEOLOGICAL SURVEY

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

EXPLANATION OF WATER-QUALITY RECORDS

COLLECTION AND EXAMINATION OF DATA

Surface-water samples for analyses usually are collected at or near gaging stations. The quality-of-water records are given immediately following the discharge records at these stations.

The descriptive heading for water-quality records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, pH, dissolved oxygen, water temperature, sediment discharge, etc.), extremes for the period of daily record; extremes for the current year; and general remarks.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, date of sampling and (or) other pertinent data are given in the table containing the chemical analyses of the ground water.

WATER ANALYSIS

Most methods for collecting and analyzing water samples are described in the U.S. Geological Survey Techniques of Water-Resources Investigations listed on a following page.

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.

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 district office.

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 daily 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.

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 in predicting long-term sediment-discharge characteristics of the stream.

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

EXPLANATION OF GROUND-WATER LEVEL RECORDS

COLLECTION OF THE DATA

Only ground-water-level data from a basic network of observation wells are published herein. This basic network contains observation wells so located that the most significant data are obtained from the fewest wells in the most important aquifers.

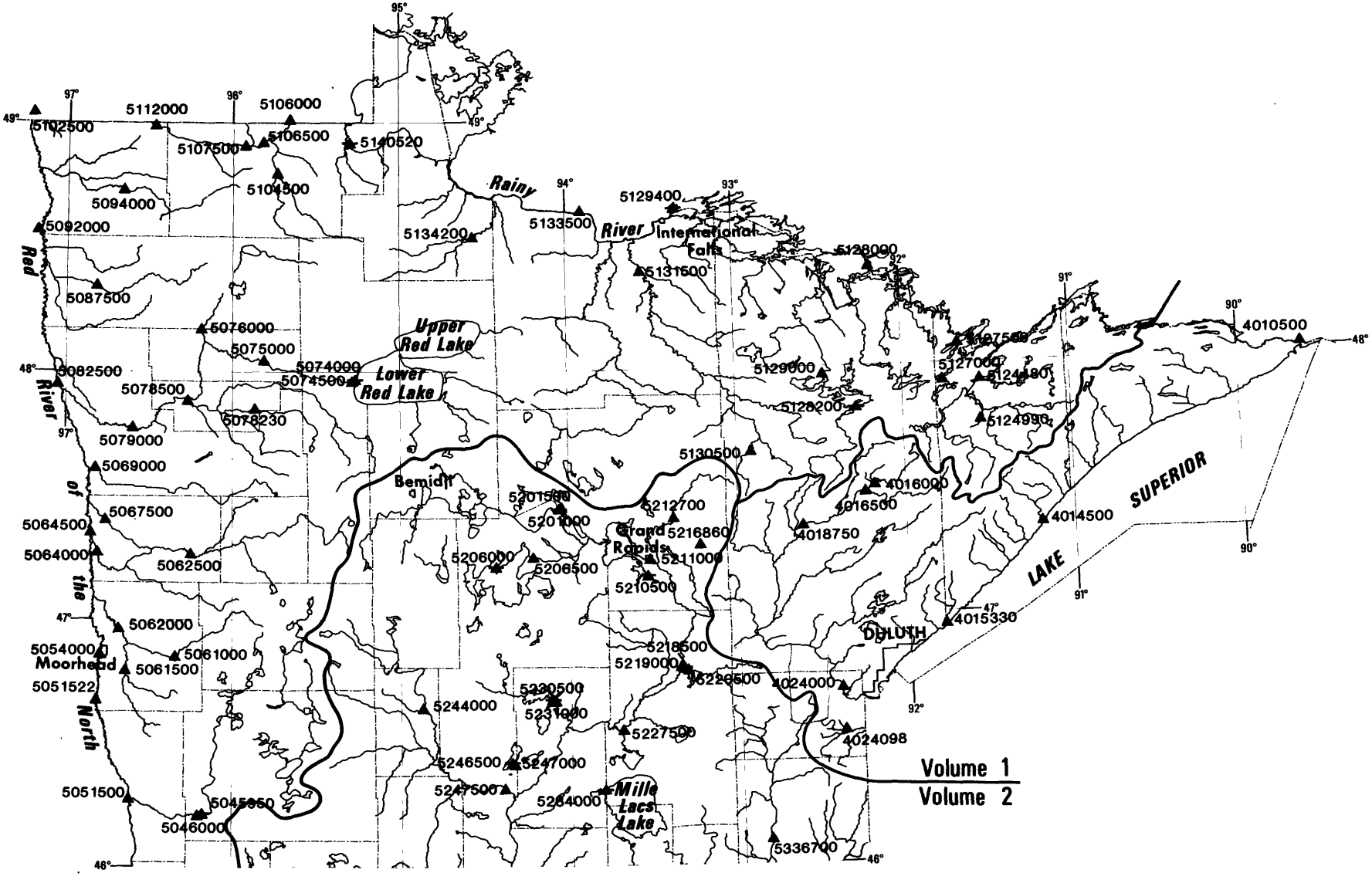
Each well is identified by means of (1) a 15-digit number that is based on latitude and longitude and (2) a local number that is provided for local needs. See figure 5.

Measurements are made in many types of wells, under varying conditions of access and at different temperatures, hence, neither the method of measurement nor the equipment can be standardized. At each observation well, however, the equipment and techniques used are those that will ensure that measurements at each well are consistent.

Water-level measurements in this report are given in feet with reference to either NGVD of 1929 or land-surface datum (lsd). NGVD of 1929 is the datum plane on which the national network of precise levels is based; land-surface datum is a datum plane that is approximately at land surface at each well. If known, the altitude of the land-surface datum in NGVD of 1929 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).

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth to water of several hundred feet, the error in determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to water the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given only to a tenth of a foot or a larger unit.

Hydrographs showing water-level fluctuations are included for eight representative wells; one bedrock, two buried-sand, and five surficial sand wells.


Red River of the North
Rainy River
Lower Red Lake
Upper Red Lake
Mille Lacs Lake
LAKE SUPERIOR
International Falls
Bemidji
Grand Rapids
Moorhead
DULUTH
5112000
5106000
5102500
5107500
5106500
5140520
5104500
5094000
5092000
5087500
5076000
5075000
5074000
5074500
5082500
5078500
5078230
5079000
5069000
5067500
5064500
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5061000
5061500
5051522
5244000
5230500
5231000
5227500
5246500
5247000
5247500
5264000
5051500
5045650
5046000
5336700
5129400
5133500
5134200
5131500
5128000
5129000
5127000
5124180
5126200
5124990
5130500
5201500
5201000
5212700
5216860
5211000
5206000
5206500
5210500
5218500
5219000
5226500
4024000
4024098
4016000
4016500
4018750
4014500
4010500
4015330
Volume 1
Volume 2

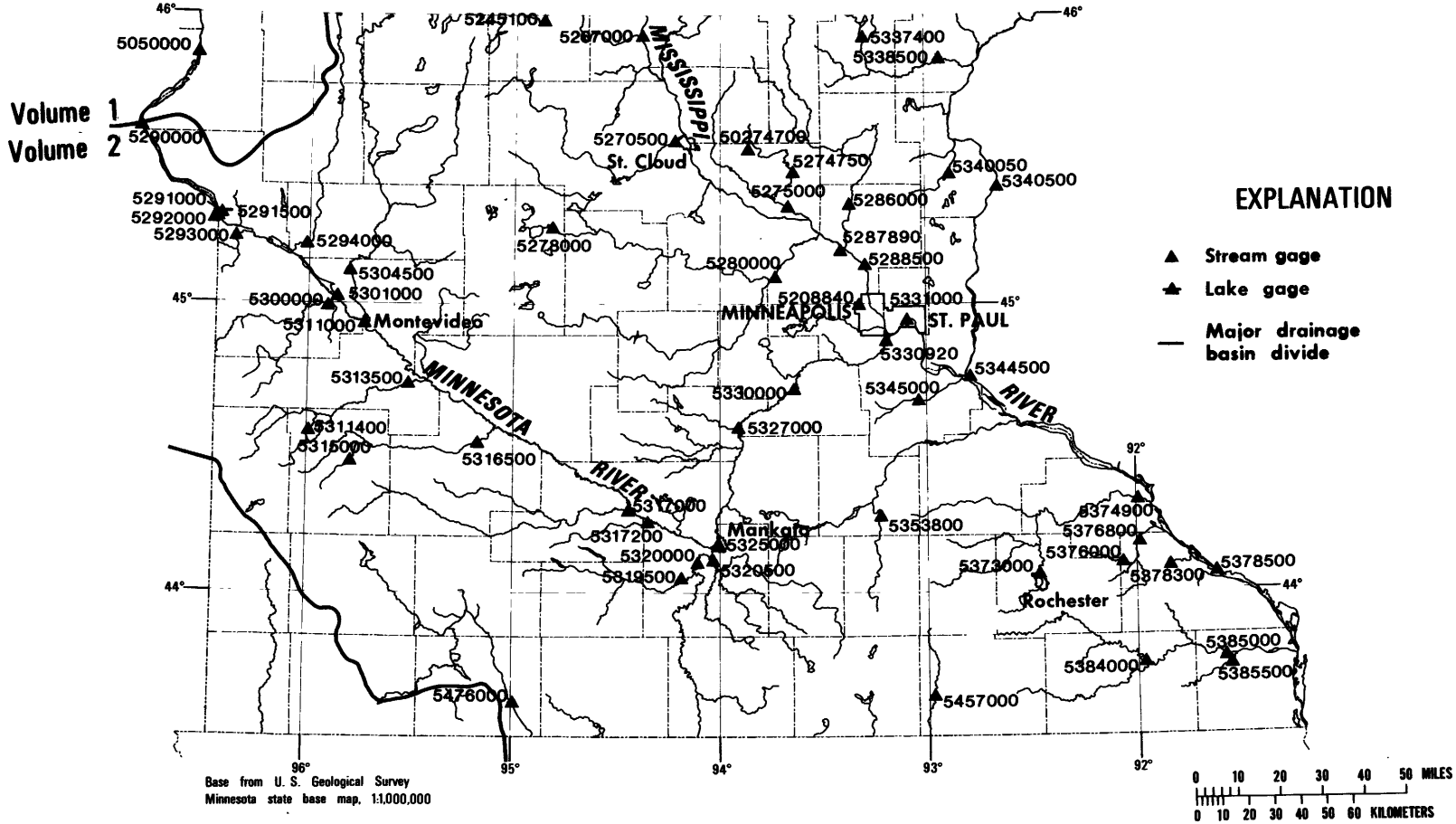
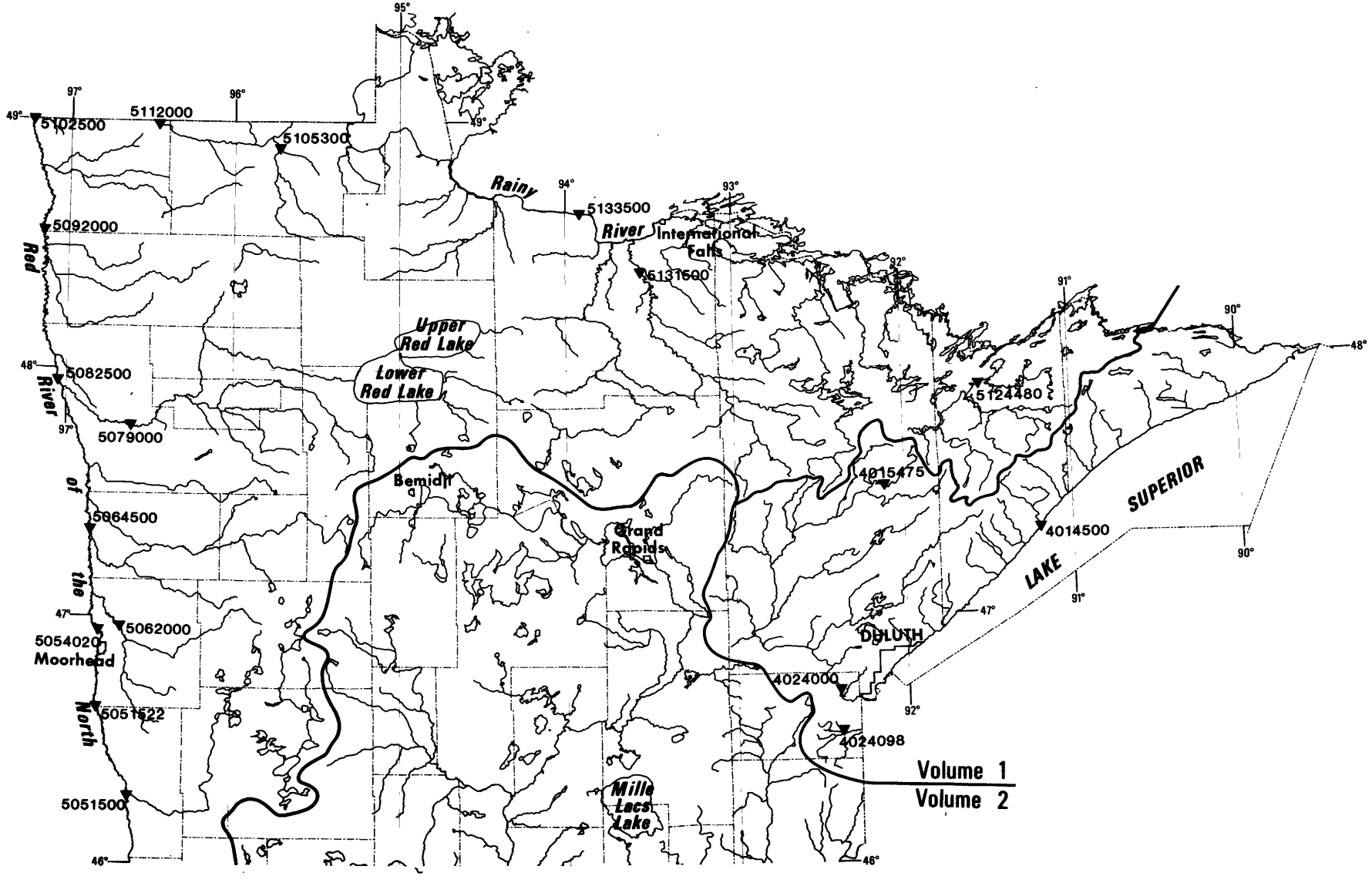


Figure 6.--Location of water-discharge stations


5102500
5112000
5105300
5092000
5133500
Rainy River
International Falls
5131600
Red River
Upper Red Lake
Lower Red Lake
5082500
5079000
5124480
Bemidji
4015475
5064500
Grand Rapids
SUPERIOR
4014500
LAKE
Red River of the North
5062000
5054020
Moorhead
DULUTH
4024000
5051522
4024098
Volume 1
Volume 2
Mille Lacs Lake
5051500
95°
97°
96°
94°
93°
92°
91°
90°
49°
48°
47°
46°

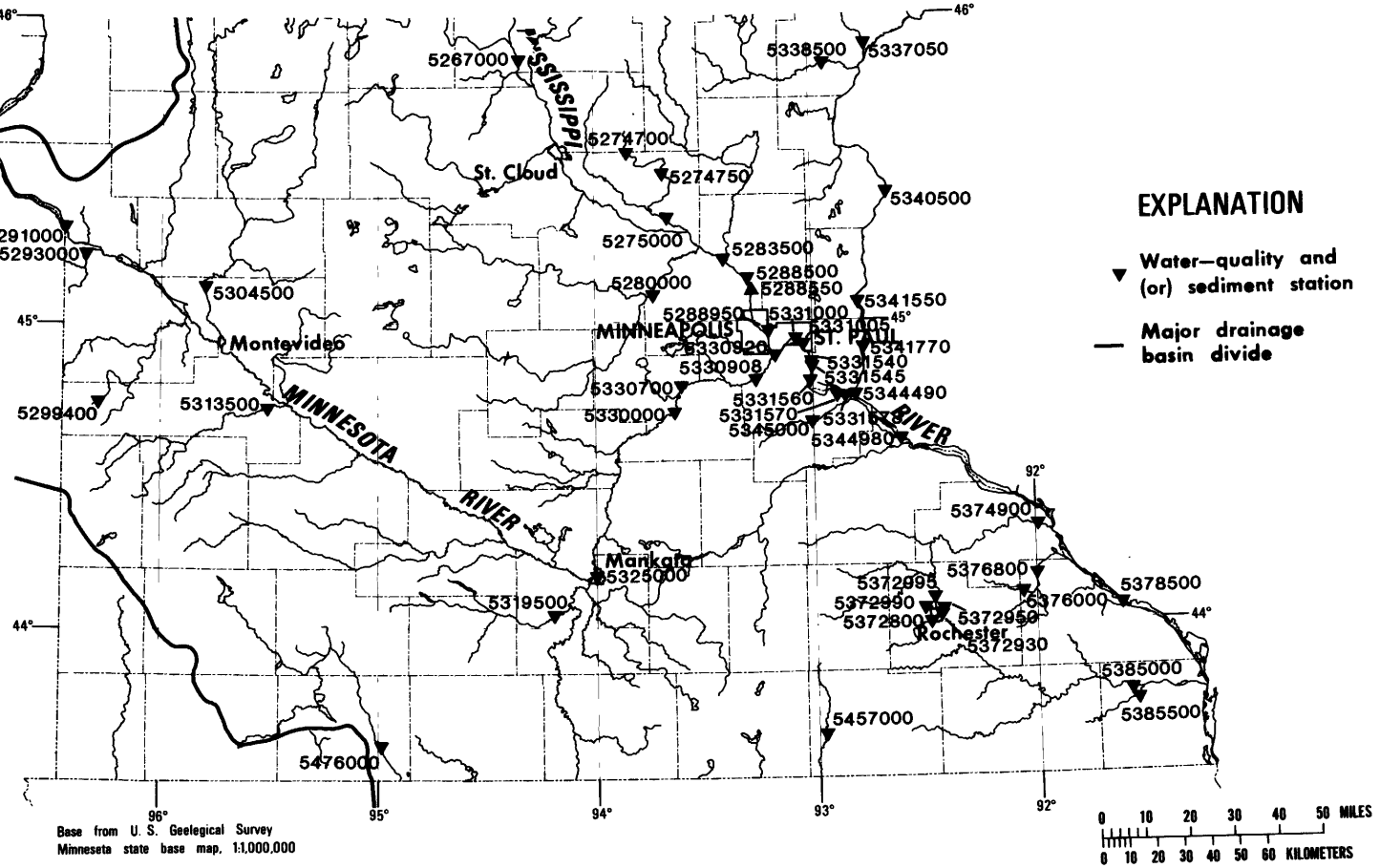


Figure 7.--Location of water-quality stations

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS

Thirty-four manuals by the U.S. Geological Survey have been published to date in the series on techniques describing procedures for planning and executing 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) is on 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, Branch of Distribution, 1200 South Eads Street, Arlington, VA 22202 (authorized agent of the Superintendent of Documents, Government Printing Office).

NOTE: When ordering 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-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.
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-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-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 programed text for self-instruction,* by G. D. Bennett: USGS--TWRI Book 3, Chapter B2. 1976. 172 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. W. Skougstad and others, editors: USGS--TWRI Book 5, Chapter A1. 1979. 626 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 analysis of organic substances in water,* by D. F. Goerlitz and Eugene Brown: USGS--TWRI Book 5, Chapter A3. 1972. 40 pages.
5-A4. *Methods for collection and analysis of aquatic biological and microbiological samples,* edited by P. E. Greeson, T. A. Ehlke, G. A. Irwin, B. W. Lium, and K. V. Slack: USGS--TWRI Book 5, Chapter A4. 1977. 332 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-C1. *Laboratory theory and methods for sediment analysis,* by H. P. Guy: USGS--TWRI Book 5, Chapter C1. 1969. 58 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.
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-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.

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
	Streams tributary to Lake Superior		
04010000	Pigeon River above mouth of Arrow River, MN	256	1924-27
†04011000	Brule River at mouth near Hoveland, MN	248	1911
†04011500	Devil Track River at mouth near Grand Marais, MN	a77	1911
†04012000	Cascade River at mouth near Grand Marais, MN	111	1911
*04012500	Poplar River at Lutsen, MN	114	1911†, 1912-17, 1928-47, 1952-61
04013000	Cross River at Schroeder, MN	a91	1931-32
04015000	Beaver Creek (Beaver Bay Run) at Beaver Bay, MN	126	1911-14, 1928-31
04015455	South Branch Partridge River near Babbitt, MN	18.5	1977-80
04015500	Second Creek near Aurora, MN	29	1955-80
04017000	Embarrass River at Embarrass, MN	93.8	1942-64
04018000	Embarrass River near McKinley, MN	171	1953-62
04018900	East Two Rivers near Iron Junction, MN	40.0	1966-79
04019000	West Two Rivers near Iron Junction, MN	65.3	1953-62, 1965-79
04019300	West Swan River near Silica, MN	16.3	1963-79
04019500	East Swan River near Toivola, MN	112	1953-62, 1964-71
04020000	Swan River near Toivola, MN	254	1952-61
04021000	Whiteface River below (at) Meadowlands, MN	453	1909-17
04023000	Cloquet River at Independence, MN	a750	1909-17
†04023500	St. Louis River near Cloquet, MN	a3,400	1903
04024090	Elim Creek near Holyoke, MN	1.06	1976-78
04024093	Skunk Creek below Elim Creek near Holyoke, MN	8.83	1976-78
	Red River of the North basin		
05030000	Otter Tail River near Detroit Lakes, MN	270	1937-71
05030500	Otter Tail River at German Church, near Fergus Falls, MN	a1,230	1904-17
05033900	Pelican River at Detroit Lakes, MN	-	1968-71, 1974-75
05034100	Pelican River at Detroit Lake outlet near Detroit Lakes, MN	-	1968-71, 1972-75
05035100	Long Lake outlet near Detroit Lakes, MN	-	1968-71
05035200	West Branch County Ditch No. 14 near Detroit Lakes, MN	-	1968-71
05035300	East Branch County Ditch No. 14 near Detroit Lakes, MN	-	1968-71
05035500	St. Clair Lake outlet near Detroit Lakes, MN	-	1968-75
05035600	Pelican River at Muskrat Lake outlet near Detroit Lakes, MN	-	1968-75
05037100	Pelican River at Sallie Lake outlet near Detroit Lakes, MN	-	1968-75
05039100	Pelican River at Lake Melissa outlet near Detroit Lakes, MN	-	1968-75
05040000	Pelican River near Detroit Lakes, MN	123	1942-53
05040500	Pelican River near Fergus Falls, MN	482	1909-12, 1942-80
†05045500	Otter Tail River (Red River) near Fergus Falls, MN	a1,690	1909-10

"See footnotes at end of table."

DISCONTINUED GAGING STATIONS

Station number	Station name	Drainage area (mi^2)	Period of record
	Red River of the North basin--Continued		
05046500	Otter Tail River near Breckenridge, MN	a2,040	1931-32, 1939-46†
†05047000	Mustinka River (head of Bois de Sioux River) near Norcross, MN	-	1940-47
05047500	Mustinka ditch above West Branch Mustinka River (Twelve Mile Creek) near Charlesville, MN	-	1943-55
05048000	Mustinka ditch below West Branch Mustinka River (Twelve Mile Creek) near Charlesville, MN	-	1943-55
05048500	West Branch Mustinka River (Twelve Mile Creek) below Mustinka ditch near Charlesville, MN	-	1943-55
05049000	Mustinka River above (near) Wheaton, MN	834	1915-24, 1930-58
05050500	Bois de Sioux River below Fairmont, ND	a1,540	1919-44
05051000	Rabbit River at Cambell, MN	266	1942-52
05054020	Red River of the North below Fargo, ND	-	1969-78
*05061200	Whiskey Creek at Barnesville, MN	25.3	1964-66
05063000	Wild Rice River near Ada, MN	a1,100	1948-54
*05063500	South Branch Wild River River near Borup, MN	254	1944-49
05067000	Marsh River below Ada, MN	-	1948-52
05068000	Sand Hill River at Beltrami, MN	a324	1943-58
05068500	Sand Hill ditch at Beltrami, MN	-	1943-58
05075500	Thief River near Gatske, MN	-	1953-56
05076500	Red Lake River at Thief River Falls, MN	a3,450	1909-18, 1920-30
05077000	Clearwater River near Pinewood, MN	132	1940-45
05077500	Clearwater River near Leonard, MN	153	1934-47
*05077700	Ruffy Brook near Gonvick, MN	45.2	1960-78
*05078000	Clearwater River at Plummer, MN	512	1939-79
05083500	Red River of the North at Oslo, MN	331,200	1936-37, 1941-43, 1945-60, 1973-78
05085500	Snake River at Warren, MN	a175	1945, 1953-56
05086000	Snake River at Alvarado, MN	309	1945, 1953-56
05086500	Snake River near Argyle, MN	481	1945
05087000	Middle River near Strandquist, MN	-	1953-56
05090500	Tamarac River near Strandquist, MN	-	1953-56
05091000	Tamarac River at Stephen, MN	-	1945
05091500	Tamarac River near Stephen, MN	a320	1945, 1953-55
05092500	Two Rivers (Middle Fork Two rivers) near Hallock, MN	131	1931-38
05093000	South Branch (South Fork) Two Rivers near Pelan, MN	281	1928-38, 1953-56
05094500	South Branch Two Rivers (Two Rivers) at Hallock, MN	-	1940-47
05095000	Two Rivers (South Branch Two Rivers) at Hallock, MN	625	1911-14, 1929-30, 1938-39, 1941-43
05095500	Two Rivers below Hallock, MN	644	1945-55
05096000	North Branch (North Fork) Two Rivers near Lancaster, MN	a32	1929-38, 1941-55

"See footnotes at end of table."

DISCONTINUED GAGING STATIONS

Station number	Station name	Drainage area (mi^2)	Period of record
	Red River of the North basin--Continued		
05096500	State Ditch 85 near Lancaster, MN	a95	1929-38, 1942-55
05097000	North Branch Two Rivers at Lancaster, MN	209	1941-42, 1953-56
05097500	North Branch Two Rivers near Northcote, MN	386	1941-42, 1945-51
05098000	Two Rivers below North Branch near Hallock, MN	a1,060	1941-43
05103000	Roseau River (at) near Malung, MN	252	1928-46
05104000	South Fork (West Branch) Roseau River near Malung, MN	312	1911-14, 1928-46
05105000	Roseau River at Roseau, MN	-	1940-47
05105500	Roseau River near Roseau, MN	-	1930-60
05107000	Pine Creek near Pine Creek, MN	74.6	1928-53
05108000	Roseau River near Badger, MN	-	1928-69
05108500	Roseau River near Duxby, MN	-	1929-51, 1952-56
05109000	Badger Creek near Badger, MN	a2.2	1929-30, 1931-38
05109500	Roseau River near Haug, MN	-	1932-66
05110000	Roseau River at outlet of State Ditch 69 near Oak Point, MN	-	1939-42
05110500	Roseau River at head of State Ditch 51 near Oak Point, MN	-	1933-42
05111000	Roseau River at Oak Point, MN	-	1933-39, 1941-60
05112500	Roseau River at International boundary, near Caribou, MN	a1,590	1933-69
	Lake of the Woods basin		
05124500	Isabella River near Isabella, MN	341	1953-61, 1976-77
05125000	South Kawishiwi River near Ely, MN	-	1953-61, 1976-78
05125500	Stony River near Isabella, MN	180	1953-64
05125550	Stony River near Babbitt, MN	219	1975-80
05126000	Dunka River near Babbitt, MN	53.4	1951-62, 1975-80
05126210	South Kawishiwi River above White Iron Lake near Ely, MN	-	1975-78
05126500	Bear Island River near Ely, MN	68.5	1953-62, 1975-77
05127205	Burntside River near Ely, MN	-	1967-78
05127207	Bjorkman's Creek near Ely, MN	1.36	1972-78
05127210	Armstrong Creek near Ely, MN	5.29	1967-78
05127215	Longstorff Creek near Ely, MN	8.84	1967-78
05127219	Shagawa Lake tributary at Ely, MN	1.84	1971-78
05127220	Burgo Creek near Ely, MN	3.04	1967-78
05127230	Shagawa River near Ely, MN	99	1967-78
05128340	Pike River near Biwabik, MN	-	1977-79
05128500	Pike River near Embarrass, MN	115	1953-64, 1976-79
05129500	Rainy River at International Falls, MN	14,900	1905-60
05130000	Sturgeon River (Lake) at Side Lake, MN	-	1938-47
05131000	Dark River near Chisholm, MN	50.6	1942-61, 1965-79

"See footnotes at end of table."

DISCONTINUED GAGING STATIONS

Station number	Station name	Drainage area (mi^2)	Period of record
	Lake of the Woods basin--Continued		
05131800	Deer Lake outlet (Deer Lake) near Effie, MN	-	1937-39, 1940-46
*05132000	Big Fork River at Big Falls, MN	a1,460	1909-10†, 1911-12†, 1928-79
05132500	Big Fork River at Laurel, MN	-	1909
05133000	Black River near Loman, MN	-	1909
05139500	Warroad River near Warroad, MN	162	1946-80
*05140000	Bulldog Run near Warroad, MN	14.2	1946-51, 1966-77
*05140500	East Branch Warroad River near Warroad, MN	102	1946-54, 1966-77

* Presently operated as high-flow partial-record station.
† Stage records only
a Approximately

STREAMS TRIBUTARY TO LAKE SUPERIOR

04010500 PIGEON RIVER AT MIDDLE FALLS, NEAR GRAND PORTAGE, MN
(International gaging station)

LOCATION.--Lat 48°00'44", long 89°36'58", in SW¼NE¼ sec.24, T.64 N., R.6 E., Cook County, Hydrologic Unit 04010101, on the Grand Portage Indian Reservation, on right bank 400 ft (122 m) upstream from Middle Falls, 2.5 mi (4.0 km) upstream from Grand Portage Port of Entry, 3.5 mi (5.6 km) upstream from mouth, and 4.7 mi (7.6 km) northeast of village of Grand Portage.
DRAINAGE AREA.--600 mi^2 (1,554 km^2).
PERIOD OF RECORD.--June to October 1921, April to November 1922, March 1923 to current year. Published as "at International Bridge" April 1924 to September 1940; as "below International Bridge" October 1940 to September 1965. Monthly discharge only for some periods, published in WSP 1307.
REVISED RECORDS.--WSP 744: 1927-28. WSP 804: 1934(M). WSP 974: Drainage area. WSP 1337: 1924(M), 1925, 1926-28(M), 1931(M), 1938(M), 1941(M), 1945-46(M), 1947, 1948(M), 1950(M).
GAGE.--Water-stage recorder. Datum of gage is 787.58 ft (240.054 m), National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1940, nonrecording gage at International Bridge, 5.8 mi (9.3 km) upstream at datum 102.24 ft (31.163 m) higher. Oct. 1, 1940, to Dec. 31, 1975, at present site at datum 2.00 ft (0.610 m) higher.
REMARKS.--Records good except those for winter period, which are fair.
COOPERATION.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.
AVERAGE DISCHARGE.--58 years (water years 1924-81), 504 ft^3/s (14.27 m^3/s), 11.41 in/yr (290 mm/yr).
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,000 ft^3/s (312 m^3/s) May 5, 1934, gage height, 7.6 ft (2.32 m), site and datum then in use, from rating curve extended above 7,000 ft^3/s (198 m^3/s); minimum daily, 1.0 ft^3/s (0.028 m^3/s) Jan. 15-21, 1977; minimum recorded gage height, 1.24 ft (0.378 m) Jan. 7, 8, 15, 1977, but may have been less during period of no gage-height record, Jan. 16 to Apr. 17, 1977.
EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,000 ft^3/s (85.0 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Apr. 8	1730	Ice jam		*8.77	2.673
Apr. 11	1630	*3320	94.0	8.45	2.576

Minimum discharge, 48 ft^3/s (1.36 m^3/s) Sept. 25, gage-height, 2.38 ft (0.725 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	611	653	260	185	145	175	600	1590	670	882	207	163
2	584	606	265	185	145	180	760	1530	1100	746	200	176
3	560	556	270	180	145	185	900	1790	2250	670	195	174
4	525	530	265	180	140	190	1060	1910	2730	666	193	151
5	492	509	255	180	140	190	1140	1840	2150	598	189	130
6	468	486	245	175	140	200	1160	1800	1580	538	195	116
7	451	460	240	175	140	200	1200	1670	1280	496	200	118
8	434	429	235	175	135	205	1500	1550	1140	454	202	120
9	415	411	230	170	135	210	2000	1450	1070	426	220	119
10	402	387	230	170	135	210	2620	1390	998	406	235	120
11	392	385	230	170	135	210	3240	1330	930	380	240	110
12	389	410	225	165	135	210	2810	1250	874	374	232	97
13	378	404	225	165	135	205	2590	1180	850	476	223	88
14	361	393	220	165	135	205	2500	1120	886	423	216	86
15	347	395	220	165	135	200	2380	1060	926	374	204	84
16	352	376	215	165	140	200	2270	966	894	338	198	78
17	387	342	215	160	140	200	2430	754	830	329	193	72
18	463	315	210	160	140	195	2560	678	790	383	187	69
19	470	337	210	160	140	190	2420	650	746	409	180	67
20	447	342	210	160	140	190	2130	622	714	371	176	64
21	429	355	205	160	140	185	1870	598	690	338	172	61
22	413	331	205	155	145	180	1700	570	674	317	167	57
23	546	333	200	155	145	180	1930	552	646	293	165	61
24	1870	313	200	155	150	185	2180	570	678	275	161	56
25	2010	306	195	155	155	190	2060	646	750	265	159	50
26	1450	311	195	150	160	195	1880	710	718	255	157	57
27	1120	297	195	150	165	200	1780	702	646	245	151	69
28	940	291	190	150	170	230	1750	662	754	235	146	79
29	824	256	190	150	---	280	1710	634	1390	225	142	84
30	757	259	190	150	---	390	1660	626	1110	216	126	92
31	691	---	185	150	---	500	---	610	---	211	92	---
TOTAL	19978	11778	6825	5090	4005	6665	56790	33010	31464	12614	5723	2868
MEAN	644	393	220	164	143	215	1893	1065	1049	407	185	95.6
MAX	2010	653	270	185	170	500	3240	1910	2730	882	240	176
MIN	347	256	185	150	135	175	600	552	646	211	92	50
CFSM	1.07	.66	.37	.27	.24	.36	3.16	1.78	1.75	.68	.31	.16
IN.	1.24	.73	.42	.32	.25	.41	3.52	2.05	1.95	.78	.35	.18

CAL YR 1980 TOTAL 125662 MEAN 343 MAX 2880 MIN 44 CFSM .57 IN 7.79
WTR YR 1981 TOTAL 196810 MEAN 539 MAX 3240 MIN 50 CFSM .90 IN 12.20

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN

LOCATION.--Lat 47°20'07", long 91°12'06", in SE¼NE¼ sec.15, T.56 N., R.7 W., Lake County, Hydrologic Unit 04010101, on right bank 400 ft (122 m) upstream from bridge on U.S. Highway 61, 0.3 mi (0.5 km) upstream from mouth, 4 mi (6 km) northeast of Silver Bay, and 7 mi (11 km) northeast of village of Beaver Bay.

DRAINAGE AREA.--140 mi^2 (363 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1927 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECRODS.--WSP 894: 1939. WSP 1337: 1933-34(M), 1935.

GAGE.--Water-stage recorder. Datum of gage is 613.65 ft (187.041 m) National Geodetic Vertical Datum of 1919 (Corps of Engineers bench mark). Prior to Oct. 5, 1934, nonrecording gage, and Oct. 5, 1934 to Nov. 22, 1978, water-stage recorder at site 370 ft (113 m) downstream and at datum 3.68 ft (1.122 m) lower.

REMARKS.--Records good except those for winter period, which are fair.

AVERAGE DISCHARGE.--54 years, 167 ft^3/s (4.729 m^3/s), 16.20 in/yr (411 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,000 ft^3/s (283 m^3/s) Sept. 24, 1977, gage height, 8.33 ft (2.539 m) site and datum then in use, from highwater mark in well, from rating curve extended above 4,200 ft^3/s (119 m^3/s) on basis of slope-area measurement of peak flow; maximum gage height, 11.06 ft (3.371 m) Apr. 12, 1965, site and datum then in use, from floodmark (backwater from ice); no flow Jan. 14 to Mar. 2, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,300 ft^3/s (36.8 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Apr. 23	2200	*1560	44.2	*9.36	2.853
June 3	2200	1330	37.7	9.08	2,768

Minimum discharge, 9.7 ft^3/s (0.27 m^3/s) Sept. 23, gage height, 5.37 ft (1.637 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	160	138	60	28	12	31	452	554	245	520	42	18
2	151	128	58	26	12	29	494	511	605	354	38	22
3	140	123	57	24	12	28	735	469	1060	259	34	23
4	129	120	56	22	12	28	719	450	1200	203	43	20
5	120	113	55	21	12	27	561	608	847	158	39	19
6	115	111	55	20	12	26	542	508	583	125	44	18
7	111	110	54	18	12	25	603	416	409	101	76	24
8	105	108	54	16	12	25	690	353	324	84	85	25
9	97	105	54	15	12	25	716	308	259	80	90	22
10	93	95	53	14	12	25	1100	265	209	65	85	20
11	94	90	52	13	12	25	1120	230	180	57	85	19
12	96	90	51	12	11	26	852	202	151	50	69	18
13	96	90	50	12	11	28	769	180	153	49	55	16
14	91	90	49	12	11	31	755	162	212	44	48	15
15	88	90	48	12	11	34	629	153	245	46	41	13
16	100	89	47	12	11	37	579	140	194	42	35	12
17	222	89	46	13	11	38	819	132	153	49	29	11
18	224	89	46	13	12	31	755	121	142	59	26	11
19	187	87	45	13	14	27	607	112	125	51	22	11
20	162	83	44	13	54	26	483	106	132	46	20	10
21	145	79	43	14	47	26	392	100	165	54	19	10
22	131	77	43	14	58	27	414	94	335	49	19	10
23	227	75	42	14	120	33	1210	101	335	62	18	9.7
24	531	73	41	15	84	48	1370	387	495	170	17	10
25	485	72	40	15	58	70	998	535	480	138	18	17
26	367	71	39	15	46	115	783	605	418	106	18	86
27	288	70	37	15	37	100	704	500	328	80	17	171
28	216	68	35	14	33	250	738	375	638	63	15	147
29	180	67	34	13	---	820	688	297	1060	55	14	115
30	162	64	32	13	---	790	616	249	774	50	14	101
31	152	---	31	12	---	490	---	203	---	45	14	---
TOTAL	5465	2754	1451	483	761	3341	21893	9426	12456	3314	1189	1023.7
MEAN	176	91.8	46.8	15.6	27.2	108	730	304	415	107	38.4	34.1
MAX	531	138	60	28	120	820	1370	608	1200	520	90	171
MIN	88	64	31	12	11	25	392	94	125	42	14	9.7
CFSM	1.26	.66	.33	.11	.19	.77	5.21	2.17	2.96	.76	.27	.24
IN.	1.45	.73	.39	.13	.20	.89	5.82	2.50	3.31	.88	.32	.27

CAL YR 1980 TOTAL 44930.0 MEAN 123 MAX 1150 MIN 10 CFSM .88 IN 11.94
WTR YR 1981 TOTAL 63556.7 MEAN 174 MAX 1370 MIN 9.7 CFSM 1.24 IN 16.89

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1968 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1980 to September 1981.
WATER TEMPERATURES: October 1980 to September 1981.

INSTRUMENTATION.--Water-quality minimonitor since October 1980.

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

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 167 micromhos Feb. 18, 1981; minimum, 40 micromhos Apr. 11, 12, 1981.
WATER TEMPERATURES: Maximum, 26.5°C July 7, 1981; minimum, 0.0°C several days during winter period.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 167 micromhos Feb. 18; minimum, 40 micromhos Apr. 11, 12.
WATER TEMPERATURES: Maximum, 26.5°C July 7; minimum, 0.0°C several days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
NOV										
04...	1100	119	65	63	7.6	5.5	3.0	.70	13.3	101
DEC										
09...	1115	54	65	91	--	-15.0	.5	.90	13.3	95
JAN										
06...	1325	20	106	107	7.6	-8.0	.0	.80	14.3	101
FEB										
10...	1330	12	122	125	7.6	-18.0	.0	.50	12.5	89
MAR										
10...	1230	25	112	119	7.7	.0	.0	1.1	14.1	98
MAY										
05...	1215	622	53	60	7.8	10.0	7.0	1.3	11.8	100
JUL										
07...	1100	104	59	69	7.6	19.0	21.0	.70	8.4	96
SEP										
09...	1130	22	104	104	8.0	21.0	15.0	.40	8.7	89

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3) (95902)	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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
NOV										
04...	K11	K8	28	.00	7.0	2.6	2.2	.2	.2	28
DEC										
09...	K3	K7	39	13	9.9	3.5	3.1	.2	.2	30
JAN										
06...	K7	K2	39	6.0	9.8	3.5	3.2	.2	.3	33
FEB										
10...	K1	33	57	13	14	5.3	4.4	.3	.3	44
MAR										
10...	K7	K4	44	9.0	11	4.1	4.6	.3	.4	35
MAY										
05...	K18	84	23	11	6.0	2.0	2.1	.2	.3	12
JUL										
07...	28	110	34	15	9.4	2.5	1.9	.1	.1	19
SEP										
09...	88	73	49	5.0	12	4.6	3.6	.2	.1	44

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
NOV 04...	6.5	2.1	.1	12	74	51	23.8	.20	.20	.050
DEC 09...	7.2	2.5	.2	16	82	59	12.0	.29	.27	.110
JAN 06...	7.5	3.1	.2	16	93	65	5.0	.33	.33	.020
FEB 10...	8.1	3.9	.2	16	91	81	3.0	.40	.40	.020
MAR 10...	6.5	4.2	.2	14	77	68	5.2	.41	.41	.050
MAY 05...	7.3	1.8	.2	8.0	60	36	101	.27	.27	.060
JUL 07...	4.9	2.3	.2	8.3	77	42	21.6	.09	.09	<.010
SEP 09...	4.1	2.9	.3	8.4	--	63	3.7	.05	.05	.040

DATE	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 TOTAL (MG/L AS C) (00680)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
NOV 04...	.050	.49	.49	.010	.010	--	1	.32	100
DEC 09...	.100	.32	.31	.030	.030	9.8	<1	<.15	100
JAN 06...	.020	.27	.18	.030	.020	9.0	<1	<.05	100
FEB 10...	.020	.22	.12	.050	<.010	--	<1	<.03	100
MAR 10...	.050	.26	.23	.010	.010	8.1	<1	<.07	100
MAY 05...	.050	.62	.53	.020	<.010	--	2	3.4	100
JUL 07...	<.010	.57	.57	.010	<.010	--	2	.56	100
SEP 09...	.040	.59	.33	<.010	<.010	10	4	.24	94

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA) (01007)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO) (01037)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)
NOV 04...	1100	2	1	100	10	1	1	--	<10	1	0
FEB 10...	1330	1	1	100	100	0	0	20	10	1	0
MAY 05...	1215	0	0	<50	30	1	<1	10	10	0	0
JUL 07...	1100	1	1	<50	10	1	1	<10	<1	1	1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)
NOV 04...	3	3	290	190	0	0	10	0	<.1	<.1
FEB 10...	4	1	240	170	26	0	10	10	.2	.2
MAY 05...	4	2	250	160	22	0	10	3	--	<.1
JUL 07...	5	5	440	330	9	4	10	6	.1	.1

04014500 - BAPTISM RIVER NEAR BEAVER BAY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)
NOV										
04...	2	1	0	0	0	0	8	0	13	.4
FEB										
10...	3	3	0	0	0	0	60	<10	4.3	.5
MAY										
05...	3	0	0	0	0	0	10	2	16	.4
JUL										
07...	5	3	1	0	0	0	20	10	18	.2

PHYTOPLANKTON ANALYSES, OCTOBER 1980 TO SEPTEMBER 1981

DATE	NOV 4,80	MAR 10,81	MAY 5,81	JUL 7,81
TIME	1100	1230	1215	1100
TOTAL CELLS/ML	840	26	100	620
DIVERSITY: DIVISION	0.4	0.0	0.5	0.0
.CLASS	0.4	0.0	0.5	0.0
..ORDER	0.4	0.0	2.2	0.0
...FAMILY	0.4	0.0	2.2	0.0
....GENUS	0.5	0.0	2.5	0.0

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)								
.BACILLARIOPHYCEAE								
..ACHNANTHALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	26#	25	--	-
..EUPODISCALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	--	-	13	13	--	-
....STEPHANODISCUS	13	2	--	-	--	-	--	-
..FRAGILARIALES								
...FRAGILARIACEAE								
....FRAGILARIA	26	3	26#	100	26#	25	--	-
....SYNEDRA	--	-	--	-	13	13	--	-
....TABELLARIA	26	3	--	-	--	-	--	-
..NAVICULALES								
...GOMPHONEMACEAE								
....GOMPHONEMA	--	-	--	-	13	13	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	--	-	13	13	620#	100
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	770#	92	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04014500 BAPTISM RIVER NEAR BEAVER BAY MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	62	60	61	78	68	72	102	101	102
2	---	---	---	62	61	62	81	74	77	102	101	101
3	---	---	---	64	62	63	83	81	82	101	100	101
4	---	---	---	64	63	63	87	81	82	102	101	101
5	---	---	---	64	63	63	90	86	88	104	102	103
6	---	---	---	65	64	64	87	86	86	104	103	104
7	---	---	---	65	63	64	87	85	86	104	103	103
8	---	---	---	67	63	64	86	85	86	106	103	105
9	---	---	---	67	64	66	87	86	86	106	105	105
10	---	---	---	67	61	64	90	87	88	108	105	107
11	---	---	---	71	64	68	92	90	91	109	107	108
12	---	---	---	71	67	69	92	91	92	109	108	109
13	---	---	---	71	68	70	94	91	92	110	109	109
14	---	---	---	69	63	68	95	93	94	111	110	110
15	---	---	---	70	59	64	96	95	96	111	110	110
16	---	---	---	70	67	69	96	95	96	112	110	111
17	---	---	---	71	59	68	96	95	95	113	111	112
18	---	---	---	66	60	63	97	95	96	113	111	112
19	---	---	---	75	63	69	97	96	97	112	111	112
20	---	---	---	75	72	73	99	97	98	113	111	112
21	65	64	64	75	66	73	101	99	100	113	111	112
22	65	64	64	75	73	74	102	101	102	113	112	112
23	71	64	68	75	62	73	102	101	102	113	112	113
24	70	60	64	60	55	58	103	101	102	114	113	114
25	59	57	58	63	59	61	102	101	101	117	114	115
26	57	55	56	62	61	62	102	101	102	119	115	117
27	56	55	56	79	61	72	103	101	103	116	115	116
28	58	55	57	79	78	78	103	102	102	116	113	115
29	59	57	58	79	78	78	103	101	102	114	113	113
30	61	59	60	79	77	78	103	102	102	115	113	114
31	61	60	61	---	---	---	102	101	102	117	114	116
MONTH				79	55	67	103	68	94	119	100	109

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	117	115	116	109	107	108	61	56	59	46	45	45
2	116	114	115	109	107	108	58	51	56	46	45	45
3	116	114	115	109	107	108	52	47	51	47	46	47
4	116	115	116	109	108	109	48	45	47	51	47	48
5	118	116	117	109	108	108	50	45	49	52	48	50
6	118	117	118	109	108	108	51	47	49	49	48	48
7	118	117	118	109	108	108	51	47	49	50	48	49
8	118	116	117	120	109	112	48	45	47	51	49	50
9	117	115	116	116	112	113	47	44	45	51	50	51
10	117	116	116	112	110	110	46	42	44	52	51	51
11	117	116	116	119	110	112	42	40	41	53	52	52
12	117	116	116	121	114	117	42	40	41	54	52	54
13	118	116	117	122	113	118	46	42	44	56	54	55
14	118	116	118	115	108	112	46	43	44	57	55	56
15	119	118	119	115	110	112	45	42	44	59	57	58
16	140	119	122	113	107	111	50	45	46	59	58	59
17	150	140	145	109	107	108	51	46	48	60	59	60
18	167	143	153	110	108	109	47	44	45	61	60	60
19	152	135	144	110	109	109	46	44	45	63	61	62
20	134	124	129	111	109	110	47	45	46	65	63	64
21	125	113	121	112	110	111	48	46	47	67	65	66
22	114	95	104	112	103	108	54	48	51	68	66	67
23	103	97	100	107	103	105	55	45	50	70	68	69
24	106	104	105	105	97	102	44	41	42	72	63	68
25	105	104	105	99	95	97	43	41	42	62	56	59
26	108	105	107	96	93	94	44	42	43	56	52	54
27	108	107	108	95	93	94	46	43	44	53	51	52
28	108	107	108	95	75	88	46	44	45	53	51	52
29	---	---	---	77	65	70	45	44	44	54	53	53
30	---	---	---	65	59	63	45	44	45	55	54	55
31	---	---	---	60	58	59	---	---	---	57	55	56
MONTH	167	95	118	122	58	103	61	40	46	72	45	55

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	62	56	58	48	45	47	88	85	87	112	108	110
2	60	53	56	51	48	50	89	86	88	108	105	107
3	55	46	51	54	51	52	90	88	89	106	103	104
4	46	44	45	57	54	56	91	89	90	104	102	103
5	47	45	46	60	56	58	92	90	91	105	103	104
6	48	46	47	63	60	61	92	90	91	106	103	105
7	51	48	49	67	63	65	91	86	89	110	103	106
8	52	50	52	69	66	68	86	82	84	109	107	108
9	54	52	53	73	69	71	94	84	90	107	102	104
10	56	54	55	74	72	73	88	83	85	104	102	103
11	58	55	57	76	74	75	84	83	84	104	101	103
12	60	57	58	78	76	77	85	83	83	105	102	104
13	64	59	61	80	78	80	86	84	85	106	103	105
14	64	60	62	82	80	81	90	85	88	107	103	105
15	63	59	61	83	82	82	90	89	90	107	105	106
16	60	58	59	84	82	83	91	88	90	108	106	107
17	60	58	59	87	83	85	93	90	91	109	107	108
18	62	60	61	86	84	85	95	92	94	111	108	110
19	62	61	62	86	85	85	98	93	95	112	110	111
20	66	62	64	89	83	85	99	95	97	113	111	112
21	66	62	64	85	84	85	101	97	99	114	112	113
22	65	58	62	85	84	85	102	98	100	114	113	113
23	58	55	56	88	80	85	105	100	102	114	113	114
24	60	55	57	87	78	82	104	102	103	116	114	114
25	54	52	53	82	74	76	105	102	103	115	112	114
26	53	52	52	75	73	74	107	103	105	113	100	110
27	54	52	53	77	74	75	108	104	106	99	86	90
28	55	51	54	79	76	77	108	104	106	86	80	83
29	50	45	47	82	79	80	109	105	107	80	78	79
30	46	45	45	83	82	82	110	107	108	80	76	78
31	---	---	---	86	82	84	111	108	109	---	---	---
MONTH	66	44	55	89	45	74	111	82	94	116	76	104

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	2.0	.5	1.5	.0	.0	.0	.0	.0	.0
2	---	---	---	2.5	1.0	2.0	.0	.0	.0	.0	.0	.0
3	---	---	---	4.0	1.5	2.5	.0	.0	.0	.0	.0	.0
4	---	---	---	3.0	1.5	3.0	.0	.0	.0	.0	.0	.0
5	---	---	---	1.5	.0	1.0	.0	.0	.0	.0	.0	.0
6	---	---	---	3.5	1.5	2.5	.0	.0	.0	.0	.0	.0
7	---	---	---	3.5	2.0	2.5	.0	.0	.0	.0	.0	.0
8	---	---	---	2.0	.0	1.0	.0	.0	.0	.0	.0	.0
9	---	---	---	1.0	.0	.5	.0	.0	.0	.0	.0	.0
10	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
11	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
12	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
13	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
14	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
15	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
16	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
17	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
18	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
19	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
20	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
21	4.5	3.0	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
22	3.0	1.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
23	4.0	2.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
24	4.0	3.0	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	3.0	1.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	2.0	.5	1.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	1.5	.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	3.0	.0	1.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	2.0	1.0	1.5	---	---	---	.0	.0	.0	.0	.0	.0
MONTH				4.0	.0	.5	.0	.0	.0	.0	.0	.0

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	.0	.0	.0	7.5	2.5	5.0
2	.0	.0	.0	.0	.0	.0	.0	.0	.0	7.0	4.5	6.0
3	.0	.0	.0	.0	.0	.0	.0	.0	.0	8.5	6.0	7.0
4	.0	.0	.0	.0	.0	.0	.0	.0	.0	8.0	7.5	8.0
5	.0	.0	.0	.0	.0	.0	1.0	.0	.0	10.5	6.5	8.0
6	.0	.0	.0	.0	.0	.0	1.0	.0	.0	11.0	6.0	8.5
7	.0	.0	.0	.0	.0	.0	2.0	.0	.5	12.0	6.5	9.5
8	.0	.0	.0	.0	.0	.0	2.0	.0	.5	10.5	8.0	9.5
9	.0	.0	.0	.0	.0	.0	2.0	.0	1.0	9.0	7.0	8.0
10	.0	.0	.0	.0	.0	.0	3.5	.5	1.5	10.0	5.0	7.5
11	.0	.0	.0	.0	.0	.0	2.5	.0	1.0	11.0	5.0	8.0
12	.0	.0	.0	.0	.0	.0	3.5	.5	2.0	12.5	6.0	9.5
13	.0	.0	.0	.0	.0	.0	2.0	1.5	2.0	13.5	7.5	10.5
14	.0	.0	.0	.0	.0	.0	3.0	.0	1.5	14.0	8.0	11.5
15	.0	.0	.0	.0	.0	.0	5.5	.0	2.5	13.5	9.0	11.5
16	.0	.0	.0	.0	.0	.0	7.0	3.0	5.0	12.0	9.5	10.5
17	.0	.0	.0	.0	.0	.0	7.5	4.5	5.5	12.5	8.0	10.0
18	.0	.0	.0	.0	.0	.0	6.5	3.0	5.0	13.0	6.5	10.0
19	.0	.0	.0	.0	.0	.0	7.0	4.0	5.5	15.0	8.0	12.0
20	.0	.0	.0	.0	.0	.0	6.5	3.0	4.5	17.5	10.5	14.0
21	.0	.0	.0	.0	.0	.0	4.5	3.0	3.5	18.5	12.0	15.5
22	.0	.0	.0	.0	.0	.0	3.5	3.0	3.5	17.5	13.0	15.5
23	.0	.0	.0	.0	.0	.0	3.0	1.5	2.0	16.5	13.5	14.5
24	.0	.0	.0	.0	.0	.0	3.0	1.0	2.0	13.0	11.5	12.0
25	.0	.0	.0	.0	.0	.0	4.5	1.5	3.0	11.5	11.0	11.0
26	.0	.0	.0	.0	.0	.0	7.5	3.5	5.5	11.0	10.0	10.5
27	.0	.0	.0	.0	.0	.0	6.0	4.5	5.0	14.5	8.0	11.0
28	.0	.0	.0	.0	.0	.0	5.5	4.0	4.5	15.0	11.0	12.5
29	---	---	---	.0	.0	.0	6.5	3.5	5.0	16.5	12.5	14.5
30	---	---	---	.0	.0	.0	6.0	3.5	4.5	14.0	11.5	13.0
31	---	---	---	.0	.0	.0	---	---	---	16.0	10.0	13.0
MONTH	.0	.0	.0	.0	.0	.0	7.5	.0	2.5	18.5	2.5	10.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	14.5	11.5	13.0	19.0	14.0	16.5	21.0	19.5	20.5	19.0	15.5	17.5
2	13.0	10.5	12.0	20.0	15.0	17.5	22.0	18.5	20.5	17.0	14.0	15.5
3	13.0	11.5	12.0	19.5	16.5	18.0	20.5	19.0	19.5	17.0	13.0	15.0
4	16.5	11.5	14.0	23.0	16.5	19.5	22.0	17.5	20.0	17.0	13.5	15.0
5	18.0	14.5	16.5	23.5	17.5	20.5	21.5	18.5	20.5	16.5	15.0	15.5
6	18.5	14.5	16.5	26.0	19.5	22.5	21.5	20.0	21.0	16.0	14.5	15.0
7	16.5	14.0	14.5	26.5	21.0	24.0	20.0	18.5	19.5	17.5	15.0	16.0
8	16.0	13.5	14.5	26.0	21.5	24.0	21.0	17.0	19.5	17.0	14.0	15.5
9	17.0	13.0	15.0	23.5	19.0	21.5	20.5	17.5	19.0	18.5	13.0	15.5
10	17.5	14.0	16.0	23.5	18.0	21.5	20.0	17.5	19.0	19.5	16.0	17.5
11	18.5	13.0	16.0	24.0	20.5	22.5	21.5	16.5	19.0	19.5	16.0	17.5
12	20.0	15.5	18.0	23.0	20.5	22.0	22.5	18.5	20.5	19.0	15.0	17.0
13	18.5	14.5	15.5	23.5	20.0	22.0	22.0	18.5	19.5	18.5	15.5	17.0
14	14.5	13.5	14.0	23.0	18.0	20.0	22.5	17.0	20.0	17.0	13.5	15.0
15	17.5	13.5	15.5	18.5	17.0	17.5	22.0	18.0	19.5	15.0	12.5	14.0
16	18.0	14.0	16.0	19.5	17.0	18.5	19.5	16.0	17.5	13.5	11.0	12.5
17	18.5	14.0	16.5	20.0	18.0	19.0	19.0	14.5	16.5	12.5	10.0	11.5
18	17.0	14.5	15.5	19.5	17.5	18.5	21.0	16.5	18.5	13.5	10.0	12.0
19	17.5	12.5	15.0	21.5	17.0	19.5	21.0	16.5	18.5	14.0	11.0	12.5
20	16.0	13.5	14.5	21.5	19.5	20.5	22.0	17.5	19.5	12.5	9.5	11.0
21	14.5	12.5	13.5	20.5	17.0	18.5	19.5	17.5	18.5	11.5	10.0	11.0
22	16.0	12.5	14.0	19.0	14.5	17.5	19.5	16.5	18.0	11.5	8.5	10.0
23	15.0	13.0	14.0	18.0	15.0	16.0	22.0	17.5	19.5	10.5	8.5	9.5
24	16.0	12.5	14.0	17.0	14.5	15.5	20.0	17.5	19.0	12.0	10.0	11.0
25	15.5	13.5	14.5	18.0	15.5	16.5	17.5	16.5	17.0	12.0	11.5	11.5
26	17.0	13.5	15.0	19.0	14.0	16.5	19.5	16.0	17.5	12.5	11.0	12.0
27	17.5	13.5	15.5	19.0	14.0	16.5	20.5	16.0	18.0	10.5	8.5	9.5
28	17.0	14.5	15.5	19.0	15.5	17.5	19.5	14.5	17.0	8.5	6.5	7.5
29	17.5	14.0	15.5	20.5	16.0	18.5	18.5	16.0	17.0	8.0	7.5	7.5
30	18.0	14.0	16.0	20.5	18.5	19.0	20.5	16.5	18.5	7.5	6.5	7.0
31	---	---	---	20.5	18.5	19.5	19.0	18.5	18.5	---	---	---
MONTH	20.0	10.5	15.0	26.5	14.0	19.5	22.5	14.5	19.0	19.5	6.5	13.0

04015330 KNIFE RIVER NEAR TWO HARBORS, MN

LOCATION.--Lat 46°56'49", long 91°47'32", in SW¼NW¼ sec.31, T.52 N., R.11 W., Lake County, Hydrologic Unit 04010102, on right bank 600 ft (183 m) downstream from bridge on U.S. Highway 61, 0.5 mi (0.8 km) upstream from bridge on County Highway 102, in town of Knife River, 0.8 mi (1.3 km) upstream from Lake Superior, and 7.8 mi (12.6 km) southwest of Two Harbors.

DRAINAGE AREA.--85.6 mi^2 (221.7 km^2).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1970-71, July 1974 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Altitude of gage is 640 ft (195 m), from topographic map.

REMARKS.--Records fair except those for winter period and those for periods of no gage-height record Oct. 10 to Jan 7 and Feb. 16 to Apr. 12, which are poor.

AVERAGE DISCHARGE.--7 years, 81.6 ft^3/s (2.311 m^3/s), 12.95 in/yr (329 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,440 ft^3/s (211 m^3/s) May 10, 1979, gage height, 11.16 ft (3.402 m); minimum, no flow Dec. 2, 1976 to Mar. 4, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 800 ft^3/s (22.7 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Apr. 23	0715	*2430	68.8	*7.24	2.207	June 3	1130	1690	47.9	6.38	1.945
May 5	0315	1050	29.7	5.53	1.686	June 29	0415	1120	31.7	5.58	1.701

Minimum discharge, 2.3 ft^3/s (0.065 m^3/s) Sept. 18, gage height, 2.53 ft (0.771 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	35	7.9	4.2	3.0	23	240	322	24	157	43	5.0
2	29	33	7.5	4.2	2.9	22	290	226	26	95	73	5.2
3	27	31	7.2	4.2	2.9	21	390	186	881	67	37	5.2
4	26	30	6.9	4.1	2.9	20	340	196	600	57	40	4.7
5	23	29	6.6	4.1	2.8	20	300	790	232	42	30	4.4
6	21	28	6.3	4.0	2.8	20	280	338	123	34	98	4.0
7	21	28	6.0	3.9	2.8	19	320	199	75	28	222	5.6
8	19	27	5.9	3.9	2.8	19	350	141	58	29	102	7.7
9	20	25	5.7	3.9	2.8	19	400	116	44	30	65	7.2
10	19	24	5.6	3.8	2.8	18	500	93	38	24	57	5.5
11	18	22	5.4	3.7	2.7	17	580	79	38	19	71	4.8
12	17	21	5.3	3.7	2.7	17	450	68	33	17	37	4.1
13	17	20	5.2	3.7	2.7	18	380	58	38	17	26	3.6
14	16	19	5.2	3.6	2.7	20	338	52	163	17	21	6.5
15	17	18	5.1	3.6	2.7	21	196	46	205	23	17	6.5
16	23	17	5.1	3.5	2.7	22	160	42	126	23	13	3.9
17	35	17	5.0	3.5	2.9	22	160	37	75	67	11	3.1
18	40	16	5.0	3.5	4.5	21	146	29	61	37	9.2	2.4
19	36	15	5.0	3.4	6.0	19	121	28	41	25	8.4	2.6
20	32	14	4.9	3.4	9.0	17	107	25	49	24	9.4	2.7
21	29	13	4.9	3.4	15	16	85	22	75	58	8.1	2.9
22	28	13	4.8	3.3	20	17	202	21	278	38	7.9	2.7
23	50	12	4.8	3.3	25	20	1850	20	215	26	8.6	2.8
24	120	11	4.7	3.3	30	25	1270	31	395	33	8.1	3.2
25	110	11	4.6	3.2	28	35	546	43	202	43	7.4	3.6
26	90	10	4.6	3.2	27	50	310	67	193	32	7.4	9.9
27	70	9.8	4.5	3.2	26	80	298	65	121	23	7.4	41
28	60	9.4	4.4	3.1	24	200	362	49	290	19	6.7	20
29	50	8.9	4.4	3.1	---	300	254	41	895	22	5.6	15
30	40	8.4	4.3	3.0	---	250	250	35	362	18	5.2	16
31	37	---	4.3	3.0	---	190	---	29	---	21	5.0	---
TOTAL	1170	575.5	167.1	111.0	262.1	1578	11475	3494	5956	1165	1067.4	211.8
MEAN	37.7	19.2	5.39	3.58	9.36	50.9	383	113	199	37.6	34.4	7.06
MAX	120	35	7.9	4.2	30	300	1850	790	895	157	222	41
MIN	16	8.4	4.3	3.0	2.7	16	85	20	24	17	5.0	2.4
CFSM	.44	.22	.06	.04	.11	.60	4.47	1.32	2.33	.44	.40	.08
IN.	.51	.25	.07	.05	.11	.69	4.99	1.52	2.59	.51	.46	.09

CAL YR 1980 TOTAL 18033.3 MEAN 49.3 MAX 2080 MIN 1.3 CFSM .58 IN 7.84
WTR YR 1981 TOTAL 27232.9 MEAN 74.6 MAX 1850 MIN 2.4 CFSM .87 IN 11.83

STREAMS TRIBUTARY TO LAKE SUPERIOR

04015475 PARTRIDGE RIVER ABOVE COLBY LAKE, AT HOYT LAKES, MN

LOCATION.--Lat 47°31'38", long 92°07'21", in SW¼NE¼ sec.9, T.58 N., R.14 W., St. Louis County, Hydrologic Unit 04010201, in Superior National Forest, 10 ft (3.0 m) upstream from bridge on County Highway 110, 1 mi (1.6 km) east of Hoyt Lakes.

DRAINAGE AREA.--106 mi^2 (275 km^2) of which 6.0 mi^2 (15.5 km^2) is noncontributing.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Altitude of gage is 1,455 ft (443 m), from topographic map.

REMARKS.--Records fair except those for winter period and those for period of no gage-height record, April 27 to June 25, which are poor.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,020 ft^3/s (57.2 m^3/s) Apr. 22, 1979, gage height, 10.89 ft (3.319 m); minimum, 0.88 ft^3/s (0.025 m^3/s) Feb. 15, 1981, gage height, 4.81 ft (1.466 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 0.50 ft^3/s (0.014 m^3/s) was measured Aug. 23, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 613 ft^3/s (17.4 m^3/s) Apr. 26, gage height, 8.25 ft (2.515 m); minimum, 0.88 ft^3/s (0.025 m^3/s) Feb. 15, gage height, 4.81 ft (1.466 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	132	76	23	4.0	1.8	5.4	185	540	75	325	24	4.7
2	122	71	22	3.9	1.8	5.4	196	520	85	304	23	4.5
3	116	67	20	3.8	1.6	5.9	225	490	100	246	21	4.5
4	108	66	19	3.7	1.4	6.1	309	450	120	178	22	4.0
5	99	60	17	3.5	1.3	5.2	283	420	130	129	22	3.7
6	89	56	16	3.4	1.3	5.2	312	380	140	101	25	3.7
7	81	54	15	3.2	1.3	5.2	305	340	135	77	29	4.2
8	74	51	14	3.0	1.3	4.5	288	310	125	60	30	4.0
9	68	51	14	2.9	1.3	4.2	280	280	115	50	32	4.5
10	60	49	13	2.7	1.2	3.7	287	260	100	42	31	5.2
11	58	46	13	2.6	1.1	3.5	311	230	90	38	30	5.8
12	57	43	12	2.5	1.0	3.7	341	210	80	33	29	5.5
13	57	43	12	2.5	.98	4.2	349	190	75	30	28	5.0
14	56	42	11	2.4	.98	4.7	360	170	70	28	26	4.7
15	52	42	11	2.4	.96	5.5	370	150	64	26	26	4.5
16	51	42	10	2.4	1.4	6.1	360	130	58	25	24	4.0
17	52	40	9.6	2.2	1.9	6.5	360	110	54	29	21	3.5
18	54	38	9.0	2.0	3.3	6.5	369	95	50	42	18	3.0
19	57	37	8.5	2.2	5.4	6.5	392	85	49	48	16	2.7
20	61	35	7.9	2.0	5.8	6.1	390	75	53	48	13	2.5
21	63	33	7.4	1.9	6.2	6.1	380	65	64	46	12	2.5
22	67	33	6.9	1.9	7.0	7.1	380	62	80	43	11	2.4
23	69	32	6.4	1.9	7.8	8.8	390	60	100	40	9.6	2.2
24	82	31	5.8	1.9	7.9	11	441	62	120	41	8.4	2.0
25	102	29	5.3	1.7	7.8	16	539	63	152	42	7.4	2.4
26	117	29	5.0	1.7	7.7	20	600	64	158	43	6.8	3.2
27	120	26	4.8	1.7	6.9	23	595	66	149	42	5.8	4.2
28	115	26	4.5	1.7	6.1	33	590	67	158	38	5.2	5.2
29	103	25	4.3	1.7	---	61	580	68	231	33	5.2	7.1
30	90	24	4.2	1.8	---	122	560	69	293	28	5.0	9.6
31	82	---	4.1	1.8	---	169	---	70	---	25	4.7	---
TOTAL	2514	1297	335.7	77.0	94.52	581.1	11327	6151	3273	2280	571.1	125.0
MEAN	81.1	43.2	10.8	2.48	3.38	18.7	378	198	109	73.5	18.4	4.17
MAX	132	76	23	4.0	7.9	169	600	540	293	325	32	9.6
MIN	51	24	4.1	1.7	.96	3.5	185	60	49	25	4.7	2.0
CFSM	.77	.41	.10	.02	.03	.18	3.57	1.87	1.03	.69	.17	.04
IN.	.88	.46	.12	.03	.03	.20	3.98	2.16	1.15	.80	.20	.04

CAL YR 1980 TOTAL 17867.50 MEAN 48.8 MAX 312 MIN 1.6 CFSM .46 IN 6.27
WTR YR 1981 TOTAL 28626.42 MEAN 78.4 MAX 600 MIN .96 CFSM .74 IN 10.05

04015475 PARTRIDGE RIVER ABOVE COLBY LAKE AT HOYT LAKES, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--February 1976 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1976 to current year.
WATER TEMPERATURES: February 1976 to current year.

INSTRUMENTATION.--Specific conductance and water temperature recorder since February 1976.

REMARKS.--Extremes are published for years with 80 percent or more daily record.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water year 1980): Maximum, 268 micromhos Aug. 28 and 29, 1980; minimum, 63 micromhos April 11, 1980.
WATER TEMPERATURES (water years 1979, 1980): Maximum, 27.5°C June 25, 1980; minimum, 0.0°C on many days during winter periods.

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	96	89	92	90	87	89	136	135	135	---	---	---
2	100	96	98	92	90	91	139	134	136	---	---	---
3	105	100	102	94	91	93	140	136	139	---	---	---
4	109	105	107	94	91	93	157	140	151	---	---	---
5	113	109	111	92	89	91	158	157	157	---	---	---
6	115	113	114	97	92	94	161	158	159	---	---	---
7	115	114	115	101	97	99	168	161	164	---	---	---
8	115	112	114	104	102	103	178	168	174	---	---	---
9	112	109	111	104	101	103	187	179	183	---	---	---
10	109	108	109	101	99	100	194	187	190	---	---	---
11	108	107	107	99	96	97	200	194	197	---	---	---
12	110	107	108	96	92	93	204	200	202	---	---	---
13	111	107	108	92	89	90	206	203	205	---	---	---
14	110	108	109	88	86	87	208	206	207	---	---	---
15	112	109	110	87	86	86	---	---	---	---	---	---
16	110	109	109	88	86	87	---	---	---	---	---	---
17	112	110	111	92	88	90	---	---	---	---	---	---
18	114	112	113	98	92	95	---	---	---	---	---	---
19	116	114	115	105	98	101	---	---	---	---	---	---
20	117	115	116	115	105	110	---	---	---	---	---	---
21	119	117	118	125	115	120	---	---	---	---	---	---
22	122	120	121	132	126	129	---	---	---	---	---	---
23	122	119	121	134	132	133	---	---	---	---	---	---
24	119	114	117	136	134	135	---	---	---	---	---	---
25	114	103	109	135	134	135	---	---	---	---	---	---
26	102	96	99	135	135	135	---	---	---	---	---	---
27	95	90	92	136	134	135	---	---	---	---	---	---
28	89	86	87	137	135	136	---	---	---	211	209	210
29	87	84	86	138	137	137	---	---	---	214	211	212
30	89	85	87	138	137	137	---	---	---	217	214	215
31	89	86	87	---	---	---	---	---	---	219	217	218
MONTH	122	84	107	138	86	107						

04015475 PARTRIDGE RIVER ABOVE COLBY LAKE AT HOYT LAKES, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	219	218	219	228	225	226	92	73	80	48	46	46
2	219	218	218	233	228	230	72	64	67	50	48	49
3	221	218	219	237	233	235	64	54	59	56	51	53
4	221	219	220	237	234	236	58	53	55	59	56	57
5	221	220	221	236	234	234	55	51	52	63	59	61
6	221	219	220	234	229	231	52	47	49	67	63	65
7	220	219	219	229	224	226	53	48	51	67	66	67
8	220	219	219	225	221	223	58	53	56	66	65	65
9	219	218	219	223	221	222	58	56	57	68	66	66
10	219	218	218	228	224	224	56	54	56	72	68	69
11	219	217	219	237	228	230	54	52	53	75	72	73
12	220	216	219	247	237	238	53	51	52	81	75	77
13	221	220	221	262	248	253	51	48	49	84	80	81
14	222	221	221	272	263	268	48	47	47	86	84	85
15	221	220	221	280	272	274	49	48	49	86	85	85
16	221	220	221	285	282	284	52	49	50	88	85	86
17	221	219	220	284	281	282	53	51	52	91	88	89
18	220	214	217	289	285	287	55	53	55	92	91	91
19	213	209	210	291	289	290	56	53	54	92	87	89
20	211	209	210	295	290	292	58	56	56	87	85	86
21	209	208	209	295	291	294	63	58	60	86	84	85
22	207	206	207	294	288	291	66	63	65	87	86	86
23	213	207	210	288	285	287	66	55	61	91	88	90
24	214	212	213	286	274	280	54	49	50	95	92	93
25	212	209	210	272	258	268	49	45	46	96	95	96
26	214	210	212	258	253	256	45	43	44	96	96	96
27	221	214	218	255	244	249	45	44	45	96	94	95
28	225	221	223	246	227	236	45	44	45	96	91	93
29	---	---	---	254	227	235	46	45	45	91	90	91
30	---	---	---	244	158	195	46	46	46	91	89	90
31	---	---	---	155	94	121	---	---	---	89	86	88
MONTH	225	206	217	295	94	248	92	43	54	96	46	79

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	89	86	88				---	---	---			
2	90	88	89				---	---	---			
3	92	88	90				---	---	---			
4	93	92	93				---	---	---			
5	92	91	92				---	---	---			
6	94	91	92				---	---	---			
7	94	89	92				---	---	---			
8	89	87	88				---	---	---			
9	89	86	87				---	---	---			
10	91	89	89				---	---	---			
11	94	91	92				---	---	---			
12	96	93	94				---	---	---			
13	96	94	95				---	---	---			
14	98	96	96				---	---	---			
15	99	98	99				---	---	---			
16	102	99	99				---	---	---			
17	104	102	103				---	---	---			
18	104	104	104				---	---	---			
19	106	104	104				---	---	---			
20	105	103	104				---	---	---			
21	104	101	102				---	---	---			
22	101	101	101				---	---	---			
23	105	101	102				---	---	---			
24	108	99	105				264	253	254			
25	98	81	89				264	253	254			
26	---	---	---				---	---	---			
27	---	---	---				---	---	---			
28	---	---	---				---	---	---			
29	---	---	---				---	---	---			
30	---	---	---				---	---	---			
31	---	---	---				---	---	---			

04015475 PARTRIDGE RIVER ABOVE COLBY LAKE AT HOYT LAKES, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	11.0	11.0	11.0	2.0	.5	1.5	.5	.0	.0	---	---	---
2	10.5	9.0	10.0	2.5	.5	2.0	.5	.0	.0	---	---	---
3	9.0	8.0	8.5	3.0	1.5	2.5	.5	.0	.0	---	---	---
4	8.5	8.0	8.5	3.0	2.0	2.5	.5	.0	.0	---	---	---
5	9.0	6.5	8.0	2.5	1.5	2.0	.0	.0	.0	---	---	---
6	9.5	7.5	8.5	3.5	2.0	2.5	.0	.0	.0	---	---	---
7	10.5	8.0	9.5	3.0	2.5	2.5	.0	.0	.0	---	---	---
8	11.5	9.5	10.5	2.5	1.5	2.0	.0	.0	.0	---	---	---
9	11.0	9.5	10.0	1.5	.5	1.5	.0	.0	.0	---	---	---
10	10.0	8.5	9.5	1.0	.0	.5	.0	.0	.0	---	---	---
11	8.5	6.0	7.0	1.0	.0	.5	.0	.0	.0	---	---	---
12	6.0	5.5	6.0	1.0	.5	1.0	.0	.0	.0	---	---	---
13	6.0	4.5	5.0	.5	.0	.5	.0	.0	.0	---	---	---
14	5.0	4.5	5.0	.5	.0	.5	.0	.0	.0	---	---	---
15	6.0	4.5	5.5	.5	.0	.5	---	---	---	---	---	---
16	5.5	5.0	5.5	.5	.0	.5	---	---	---	---	---	---
17	6.0	5.5	6.0	.5	.0	.0	---	---	---	---	---	---
18	6.0	5.0	5.5	.5	.0	.0	---	---	---	---	---	---
19	5.0	4.5	5.0	1.0	.0	.5	---	---	---	---	---	---
20	5.0	4.0	4.5	.5	.5	.5	---	---	---	---	---	---
21	5.5	4.0	4.5	.5	.0	.5	---	---	---	---	---	---
22	4.5	3.5	4.0	1.0	.5	.5	---	---	---	---	---	---
23	3.5	3.0	3.5	.5	.0	.5	---	---	---	---	---	---
24	3.5	3.0	3.5	.5	.0	.0	---	---	---	---	---	---
25	3.0	2.0	2.5	.0	.0	.0	---	---	---	---	---	---
26	2.0	1.5	1.5	.5	.0	.5	---	---	---	---	---	---
27	1.5	.5	1.0	.5	.5	.5	---	---	---	---	---	---
28	1.5	.0	1.0	.5	.5	.5	---	---	---	.0	.0	.0
29	1.5	.0	1.0	.5	.5	.5	---	---	---	.0	.0	.0
30	2.0	1.0	1.5	1.0	.5	.5	---	---	---	.0	.0	.0
31	2.0	1.0	1.5	---	---	---	---	---	---	.0	.0	.0
MONTH	11.5	.0	5.5	3.5	.0	1.0						

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.5	.5	.5	.5	.0	.0	7.5	5.0	6.0
2	.0	.0	.0	.5	.5	.5	1.5	.0	.5	8.0	6.5	7.0
3	.0	.0	.0	.5	.5	.5	.5	.0	.5	9.5	7.5	8.5
4	.0	.0	.0	.5	.5	.5	.5	.0	.0	9.5	9.0	9.5
5	.0	.0	.0	.5	.5	.5	1.0	.0	.5	11.0	8.5	9.5
6	.0	.0	.0	.5	.5	.5	1.0	.0	.5	11.5	9.0	10.0
7	.0	.0	.0	.5	.5	.5	3.0	.5	1.5	12.0	9.5	11.0
8	.0	.0	.0	.5	.5	.5	4.0	3.0	3.5	12.0	10.5	11.0
9	.0	.0	.0	.5	.5	.5	5.0	3.0	4.0	11.0	9.5	10.0
10	.0	.0	.0	.5	.5	.5	7.0	4.5	5.5	11.0	8.0	9.5
11	.0	.0	.0	.5	.5	.5	6.0	5.0	5.5	11.5	8.0	10.0
12	.0	.0	.0	1.0	.5	.5	5.5	4.0	5.0	12.5	9.0	10.5
13	.0	.0	.0	1.0	.5	.5	5.0	4.0	4.5	13.0	10.0	11.5
14	.0	.0	.0	1.5	.5	1.0	4.0	2.5	3.5	13.0	10.5	12.0
15	.0	.0	.0	1.5	.5	1.0	5.5	2.5	4.0	13.0	11.0	12.0
16	.0	.0	.0	1.5	1.0	1.0	6.0	4.5	5.5	14.0	12.0	13.0
17	.0	.0	.0	2.0	1.0	1.0	7.5	6.0	6.5	14.0	11.5	12.5
18	.0	.0	.0	1.0	1.0	1.0	7.5	5.5	6.5	15.0	12.5	13.0
19	.0	.0	.0	1.0	.5	.5	8.0	6.0	7.0	16.0	12.5	14.0
20	.5	.0	.0	1.0	.5	1.0	7.5	6.0	6.5	17.5	14.5	15.5
21	.0	.0	.0	1.5	1.0	1.0	6.5	4.5	5.0	19.0	15.5	17.0
22	.0	.0	.0	1.5	.5	1.0	4.5	4.0	4.0	19.0	16.5	17.5
23	.0	.0	.0	1.5	1.0	1.5	4.0	3.0	3.5	18.5	17.0	17.5
24	.5	.5	.5	2.0	1.0	1.5	3.0	2.0	2.5	17.0	16.5	17.0
25	.5	.5	.5	2.0	1.5	1.5	4.0	2.0	3.0	17.0	16.0	16.5
26	.5	.5	.5	1.5	1.0	1.5	7.0	3.5	5.0	16.0	15.5	15.5
27	.5	.5	.5	1.5	.5	1.0	7.0	6.0	6.5	17.5	13.5	15.5
28	.5	.5	.5	2.0	.5	1.5	6.0	5.5	5.5	17.5	15.5	16.5
29	---	---	---	1.5	.0	.5	6.5	5.5	6.0	17.5	16.0	17.0
30	---	---	---	.0	.0	.0	6.5	5.5	6.0	17.0	15.5	16.5
31	---	---	---	.5	.0	.0	---	---	---	18.0	14.5	16.0
MONTH	.5	.0	.0	2.0	.0	1.0	8.0	.0	4.0	19.0	5.0	13.0

04015475 PARTRIDGE RIVER ABOVE COLBY LAKE AT HOYT LAKES, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	17.5	15.5	16.5				---	---	---			
2	16.0	14.5	15.0				---	---	---			
3	17.0	15.0	16.0				---	---	---			
4	18.5	15.5	17.0				---	---	---			
5	20.0	17.5	18.5				---	---	---			
6	20.5	17.5	18.5				---	---	---			
7	20.0	18.0	19.5				---	---	---			
8	19.5	17.5	18.0				---	---	---			
9	19.5	16.5	18.0				---	---	---			
10	19.5	17.5	18.5				---	---	---			
11	20.0	17.5	18.5				---	---	---			
12	20.5	18.0	19.5				---	---	---			
13	20.0	18.5	19.5				---	---	---			
14	20.0	18.0	19.5				---	---	---			
15	21.0	19.0	20.0				---	---	---			
16	20.5	18.0	19.5				---	---	---			
17	20.5	18.0	19.5				---	---	---			
18	18.5	16.0	17.5				---	---	---			
19	18.0	15.0	16.5				---	---	---			
20	17.0	15.5	16.5				---	---	---			
21	17.0	15.5	16.5				---	---	---			
22	18.0	15.0	16.5				---	---	---			
23	17.0	16.5	17.0				---	---	---			
24	17.5	15.5	16.5				22.5	21.5	22.0			
25	17.5	16.0	16.5				21.5	20.5	21.0			
26	---	---	---				21.5	19.5	20.5			
27	---	---	---				---	---	---			
28	---	---	---				---	---	---			
29	---	---	---				---	---	---			
30	---	---	---				---	---	---			
31	---	---	---				---	---	---			

04016000 PARTRIDGE RIVER NEAR AURORA, MN

LOCATION.--Lat 47°31'02", long 92°11'24", in SE¼SW¼ sec.12, T.58 N., R.15 W., St. Louis County, Hydrologic Unit 04010201, on right bank at upstream side of highway bridge, 1,000 ft (305 m) downstream from Second Creek, 2.5 mi (4.0 km) east of Aurora, and 2.8 mi (4.5 km) upstream from mouth.

DRAINAGE AREA.--161 mi^2 (417 km^2) of which 13.3 mi^2 (34.4 km^2) is noncontributing.

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

REVISED RECORDS.--WSP 974: 1942. WSP 1307: 1943(M). WDR MN-77-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,402.30 ft (427.421 m) National Geodetic Vertical Datum of 1929. Aug. 5, 1942, to Aug. 25, 1944, nonrecording gage, and Aug. 26, 1944, to July 1, 1956, water-stage recorder at site 45 ft (14 m) downstream at same datum.

REMARKS.--Records good. Flow regulated at times by storage in off-channel Partridge Reservoir, formerly known as Whitewater Lake. Reservoir formed from lake by levees around marsh areas and natural outlet. Usable capacity, 20,000 acre-ft (24.7 hm^3) between elevations 1,410 ft (430 m), natural lake level, and 1,440 ft (439 m). Storage began Apr. 9, 1955. Storage in reservoir obtained from Colby Lake during periods of high flow; release from storage returned to Colby Lake to maintain lake elevation during diversion for iron-ore processing. Diversion began Feb. 7, 1956. Some seepage losses from reservoir bypass station. Flow also affected by mining activities in Second Creek basin.

AVERAGE DISCHARGE (adjusted for storage and diversion).--39 years, 126 ft^3/s (3.568 m^3/s), 10.63 in/yr (270 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,230 ft^3/s (91.5 m^3/s) May 10, 1950, gage height, 7.86 ft (2.396 m); minimum daily, 2.2 ft^3/s (0.062 m^3/s) Jan. 30, 31, 1961; minimum gage height, 0.88 ft (0.268 m) Mar. 2, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 740 ft^3/s (21.0 m^3/s) Apr. 27, gage height, 4.80 ft (1.463 m); minimum daily, 5.6 ft^3/s (0.16 m^3/s) Jan. 14-16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	50	32	17	14	23	67	662	85	362	51	21
2	100	48	29	17	13	23	70	609	99	360	47	20
3	107	56	27	16	15	23	64	544	116	324	46	19
4	109	54	26	16	16	22	66	481	138	271	45	18
5	106	52	25	15	19	22	61	431	152	215	42	18
6	100	53	25	14	21	22	60	390	158	168	44	17
7	91	60	25	14	20	24	58	350	148	136	43	18
8	82	70	25	12	18	27	59	309	113	111	42	16
9	62	67	24	11	17	28	61	276	96	97	45	17
10	59	55	22	8.7	18	28	89	253	99	79	48	17
11	60	50	22	7.4	19	25	136	234	93	64	48	17
12	62	52	22	6.7	19	22	258	220	86	56	44	17
13	64	54	21	6.1	21	19	350	200	81	48	42	16
14	63	56	20	5.6	22	19	382	177	78	45	41	16
15	61	54	20	5.6	23	21	389	160	72	43	37	16
16	61	54	21	5.6	21	23	387	147	66	40	35	15
17	65	53	21	6.0	21	24	396	136	64	44	32	13
18	64	51	21	6.3	24	24	411	124	55	49	29	13
19	66	50	20	6.7	26	21	425	112	51	59	26	13
20	71	48	20	6.9	27	18	427	99	58	69	25	13
21	78	47	20	7.4	31	20	402	62	61	77	27	14
22	82	45	22	8.0	33	24	382	64	82	73	28	13
23	90	43	20	8.5	34	27	449	68	98	70	26	12
24	97	41	18	17	33	31	553	71	104	75	26	12
25	105	38	18	24	31	38	631	73	126	72	24	15
26	117	37	18	27	26	42	686	70	164	71	24	19
27	128	36	17	27	24	43	719	73	180	69	23	24
28	131	35	17	23	23	53	722	83	227	62	22	22
29	127	33	17	19	---	75	692	79	285	56	23	22
30	114	34	18	16	---	84	679	72	333	50	22	28
31	68	---	19	14	---	77	---	70	---	53	21	---
TOTAL	2690	1476	672	394.5	629	972	10131	6699	3568	3368	1078	511
MEAN	86.8	49.2	21.7	12.7	22.5	31.4	338	216	119	109	34.8	17.0
MAX	131	70	32	27	34	84	722	662	333	362	51	28
MIN	59	33	17	5.6	13	18	58	62	51	40	21	12
†	+17.7	+12.6	+2.77	+1.43	+2.28	+19.4	+101.8	+22.4	+24.2	+16.1	+6.94	+0.53
MEAN ‡	104	61.8	24.5	14.1	24.8	50.8	440	238	143	125	41.7	17.5
CFSM ‡	.65	.38	.15	.09	.15	.32	2.73	1.48	.89	.78	.26	.11
IN. ‡	.75	.43	.18	.10	.16	.36	3.05	1.71	.99	.89	.30	.12

CAL YR 1980 TOTAL 18290.7 MEAN 50.0 MAX 309 MIN 9.1 MEAN ‡ 69.5 CFSM ‡ 0.43 IN. ‡ 5.88
WTR YR 1981 TOTAL 32188.5 MEAN 88.2 MAX 722 MIN 5.6 MEAN ‡ 107 CFSM ‡ 0.66 IN. ‡ 9.04

† Change in contents in Partridge Reservoir and diversion to iron-ore processing plant, equivalent in cubic feet per second; furnished by Erie Mining Co.
‡ Adjusted for change in contents and diversion.

04016500 ST. LOUIS RIVER NEAR AURORA, MN

LOCATION.--Lat 47°29'30", long 92°14'20", in NW¼SW¼ sec.22, T.58 N., R.15 W., St. Louis County, Hydrologic Unit 04010201, on left bank at upstream side of highway bridge, 0.8 mi (1.3 km) downstream from Partridge River and 1.5 mi (2.4 km) south of Aurora.

DRAINAGE AREA.--290 mi^2 (751 km^2) of which 13.3 mi^2 (34.4 km^2) is noncontributing.

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

REVISED RECORDS.--WSP 1337: 1950. WDR MN-77-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,371.24 ft (417.954 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 26, 1944, nonrecording gage at same site and datum.

REMARKS.--Records good except those for winter period and those for period of no gage-height record, June 27 to Aug. 19, which are fair. Flow regulated at times by storage in off-channel Partridge Reservoir, formerly known as Whitewater Lake. Reservoir formed from lake by levees around marsh areas and natural outlet. Available capacity 20,000 acre-ft (24.7 hm^3) between elevations 1,410 ft (430 m), natural lake level, and 1,440 ft (439 m). Storage in reservoir obtained from Colby Lake during periods of high flow; release from storage returned to Colby Lake to maintain lake elevation during diversion for iron-ore processing. Diversion began Feb. 7, 1956. Some seepage losses from reservoir enter above station. Flow also affected by mining activities in Second Creek (station 04015500) basin.

AVERAGE DISCHARGE (adjusted for storage and diversion).--39 years, 245 ft^3/s (6.938 m^3/s), 11.47 in/yr (291 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,380 ft^3/s (152 m^3/s) May 14, 1950, gage height, 8.37 ft (2.551 m); minimum daily, 4.0 ft^3/s (0.11 m^3/s) Jan. 29 to Feb. 10, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,400 ft^3/s (39.6 m^3/s) Apr. 27, gage height, 4.15 ft (1.265 m); minimum daily, 23 ft^3/s (0.65 m^3/s) Sept. 23, 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	326	166	79	54	37	56	209	1330	201	760	115	41
2	316	158	70	52	37	55	209	1260	223	760	105	38
3	315	164	71	51	37	54	217	1170	253	700	98	37
4	305	164	73	49	37	53	270	1080	284	600	93	35
5	295	157	72	48	40	53	261	1000	308	500	89	33
6	278	151	74	46	47	53	255	928	320	400	88	32
7	261	155	79	44	47	56	254	844	308	300	89	38
8	239	167	78	42	46	62	257	762	270	250	90	33
9	209	176	72	41	45	66	262	702	243	210	95	31
10	198	160	66	39	45	64	318	645	241	180	100	32
11	197	148	64	38	45	60	390	593	232	150	100	31
12	187	146	65	37	45	55	543	551	217	130	95	30
13	183	149	63	36	45	50	681	504	212	110	90	29
14	179	148	63	35	46	50	758	458	206	100	85	28
15	175	144	62	34	48	53	776	418	197	95	80	28
16	170	139	62	33	51	56	790	383	183	90	75	27
17	177	136	62	32	55	58	868	352	170	93	68	25
18	179	140	61	32	58	56	904	327	152	100	62	25
19	180	139	61	31	62	52	910	300	141	120	56	24
20	179	124	60	30	65	50	904	271	155	140	57	24
21	187	123	60	30	69	50	868	218	162	160	58	24
22	191	119	59	30	70	58	868	201	197	165	57	24
23	208	113	58	31	70	65	1090	203	223	155	54	23
24	230	114	58	35	68	78	1280	204	256	160	53	23
25	248	108	58	45	64	92	1350	206	300	165	50	33
26	265	99	58	60	61	112	1350	201	332	160	49	39
27	277	97	57	55	59	115	1360	200	450	150	46	43
28	273	97	57	48	57	144	1370	206	520	140	44	37
29	264	94	56	44	---	196	1340	201	600	130	44	35
30	249	92	56	40	---	223	1330	189	700	110	41	41
31	199	---	55	38	---	222	---	180	---	115	40	---
TOTAL	7139	4087	1989	1260	1456	2467	22242	16087	8256	7398	2266	943
MEAN	230	136	64.2	40.6	52.0	79.6	741	519	275	239	73.1	31.4
MAX	326	176	79	60	70	223	1370	1330	700	760	115	43
MIN	170	92	55	30	37	50	209	180	141	90	40	23
†	+17.7	+12.6	+2.77	+1.43	+2.28	+19.4	+101.8	+22.4	+24.2	+16.1	+6.94	+0.53
MEAN ‡	248	149	67.0	42.0	54.3	99.0	843	541	299	255	80.0	31.9
CFSM ‡	.86	.51	.23	.14	.19	.34	2.91	1.87	1.03	.88	.28	.11
IN. ‡	.99	.57	.27	.17	.19	.39	3.24	2.15	1.15	1.01	.32	.12

CAL YR 1980 TOTAL 45918 MEAN 125 MAX 600 MIN 25 MEAN ‡ 145 CFSM ‡ 0.50 IN. ‡ 6.81
WTR YR 1981 TOTAL 75590 MEAN 207 MAX 1370 MIN 23 MEAN ‡ 226 CFSM ‡ 0.78 IN. ‡ 10.58

† Change in contents in Partridge Reservoir and diversion to iron-ore processing plant, equivalent in cubic feet per second; furnished by Erie Mining Co.
‡ Adjusted for change in contents and diversion.

04018750 ST. LOUIS RIVER AT FORBES, MN

LOCATION.--Lat 47° 21'48", long 92°35'56", in NE¼SE¼ sec.3, T.56 N., R.18 W., St. Louis County, Hydrologic Unit 04010201, on right bank at downstream side of highway bridge, 0.5 mi (0.8 km) downstream from Eveleth Taconite Company dam, 0.6 mi (1.0 km) south of Forbes, 1.8 mi (2.9 km) upstream from Elbow Creek.

DRAINAGE AREA.--713 mi^2 (1,847 km^2).

PERIOD OF RECORD.--August 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,293.11 ft (394.140 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 28, 1964, nonrecording gage at same site and datum.

REMARKS.--Records good except those for winter periods, which are poor. Natural flow of stream affected by continually changing iron-mining activities that include diversions for iron-ore processing, regulation of storage reservoirs and tailing ponds, and mine pit dewatering. There is some regulation at medium and low flows by Eveleth Taconite Company dam 1.5 mi (2.4 km) upstream.

AVERAGE DISCHARGE.--17 years, 544 ft^3/s (15.41 m^3/s), 10.36 in/yr (263 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,200 ft^3/s (176 m^3/s) Apr. 25, 1979, gage height, 17.71 ft (5.398 m); minimum daily, 15 ft^3/s (0.42 m^3/s) Jan. 9, 1981; minimum gage height, 5.14 ft (1.567 m) Nov. 26, 1972.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,970 ft^3/s (84.1 m^3/s) Apr. 28, gage height, 12.58 ft (3.834 m); minimum daily, 15 ft^3/s (0.42 m^3/s) Jan. 9; minimum gage height, 5.25 ft (1.600 m) Nov. 23, 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	738	438	150	180	50	280	1400	2800	443	1860	201	120
2	656	396	130	20	100	40	1400	2770	484	1850	229	115
3	632	377	20	210	90	160	1500	2680	524	1790	225	111
4	606	374	270	25	45	140	1500	2540	549	1680	238	107
5	551	359	190	100	180	150	1400	2380	563	1510	242	105
6	543	344	50	170	35	250	1100	2220	593	1330	237	100
7	532	356	120	30	100	25	950	2040	618	1150	242	103
8	492	344	190	210	100	140	900	1870	609	986	246	102
9	445	384	50	15	80	180	915	1720	567	869	247	101
10	414	380	400	170	30	200	949	1580	529	751	238	96
11	405	280	390	30	140	250	993	1440	502	656	230	94
12	385	350	290	120	60	45	1040	1320	472	593	225	89
13	364	320	210	100	40	120	1210	1200	453	522	212	86
14	353	300	160	45	120	130	1390	1090	452	463	205	84
15	344	270	130	140	100	180	1460	990	427	431	212	80
16	334	280	130	25	75	260	1460	900	396	392	203	81
17	348	270	140	140	65	30	1670	816	367	363	190	78
18	361	70	140	60	150	220	1710	626	338	352	182	77
19	361	300	140	35	250	35	1720	677	313	329	174	74
20	377	240	160	200	35	160	1610	616	311	318	166	73
21	393	270	170	40	140	120	1700	557	342	329	165	70
22	409	100	160	60	150	30	1710	494	410	326	157	69
23	425	170	30	130	250	200	2220	465	451	309	158	67
24	441	190	240	110	280	180	2560	497	500	320	154	70
25	477	130	200	45	35	170	2700	511	565	331	149	80
26	494	50	200	100	180	250	2780	510	661	316	144	95
27	507	150	190	160	180	400	2820	492	729	215	140	108
28	507	170	190	35	190	600	2840	470	1260	253	133	114
29	501	50	200	120	---	900	2760	470	1860	265	126	107
30	504	40	170	190	---	1200	2740	462	1880	377	124	103
31	487	---	40	160	---	1300	---	446	---	154	121	---
TOTAL	14386	7752	5250	3175	3250	8345	51107	37649	18168	21390	5915	2759
MEAN	464	258	169	102	116	269	1704	1214	606	690	191	92.0
MAX	738	438	400	210	280	1300	2840	2800	1880	1860	247	120
MIN	334	40	20	15	30	25	900	446	311	154	121	67
CFSM	.65	.36	.24	.14	.16	.38	2.39	1.70	.85	.97	.27	.13
IN.	.75	.40	.27	.17	.17	.44	2.67	1.96	.95	1.12	.31	.14

CAL YR 1980 TOTAL 114518 MEAN 313 MAX 1140 MIN 20 CFSM .44 IN 5.97
WTR YR 1981 TOTAL 179146 MEAN 491 MAX 2840 MIN 15 CFSM .69 IN 9.35

04024000 ST. LOUIS RIVER AT SCANLON, MN

LOCATION.--Lat 46°42'12", long 92°25'07", in NW¼ sec.30, T.49 N., R.16 W., Carlton County, Hydrologic Unit 04010201, on right bank 25 ft (8 m) downstream from lower bridge on U.S. Highway 61 at Scanlon, 0.6 mi (1.0 km) downstream from Minnesota Power and Light Co. powerplant, 3 mi (5 km) upstream from Thomson Reservoir, and 3.2 mi (5.1 km) upstream from Midway River.

DRAINAGE AREA.--3,430 mi^2 (8,880 km^2), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--January 1908 to current year. Monthly discharge only for some periods published in WSP 1307. Published as "near Thomson" 1908-50.

REVISED RECORDS.--WSP 1337: 1911-12.

GAGE.--Water-stage recorder. Datum of gage is 1,101.23 ft (335.655 m) National Geodetic Vertical Datum of 1929. Oct. 5, 1909, to Sept. 5, 1914, nonrecording gage 3 mi (5 km) downstream and 50 ft (15 m) below powerplant at datum about 420 ft (128 m) lower. Sept. 6, 1914, to Aug. 4, 1953, powerplant record at Thomson hydroelectric plant.

REMARKS.--Records good. Diurnal fluctuation caused by powerplant upstream. Flow regulated by Whiteface Reservoir and Boulder, Island, Rice and Fish Lakes, combined capacity, 332,160 acre-ft (410 hm^3); the water-discharge table shows the monthly change in contents (†).

AVERAGE DISCHARGE (UNADJUSTED).--73 years, 2,287 ft^3/s (64.77 m^3/s), 9.05 in/yr (230 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 37,900 ft^3/s (1,070 m^3/s) May 9, 1950; maximum gage height, 15.8 ft (4.816 m) May 9, 1950, from Minnesota Department of Transportation (discharge uncertain); minimum discharge, 54 ft^3/s (1.53 m^3/s) July 30, 1980; minimum daily, 88 ft^3/s (2.49 m^3/s) Aug. 24, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 14,300 ft^3/s (405 m^3/s) Apr. 24, gage height, 8.77 ft (2.673 m); minimum daily, 430 ft^3/s (12.2 m^3/s) Sept. 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1660	1200	1350	1050	860	1130	2650	10200	1590	9520	1300	776
2	1460	1100	800	1100	840	1100	2550	9600	1550	7750	1360	821
3	1380	991	600	920	750	1120	2640	9100	2060	5560	1040	686
4	1300	1020	1180	980	740	1050	3440	8590	3260	6320	1150	758
5	1270	921	1370	930	820	1090	3500	8810	3550	6360	1230	731
6	1160	869	1440	1000	830	976	3510	8220	3250	5280	2810	642
7	1170	859	1470	1100	820	941	3440	7100	2940	4220	6190	722
8	997	878	1390	890	770	1020	3210	6100	3190	3500	4490	695
9	1000	1020	1100	940	800	1110	3070	5490	2990	2990	3550	664
10	987	981	900	920	820	920	2870	4870	2980	2560	3050	730
11	951	1050	700	880	820	968	2910	4510	2590	2270	2490	662
12	785	1180	700	890	830	1020	3000	3980	2420	2110	2320	650
13	773	1460	1440	900	780	1240	3200	3610	2390	1950	1920	600
14	712	1580	866	940	840	1220	3760	3240	2710	1880	1820	600
15	593	1590	931	940	820	1280	4170	3010	3460	1970	1540	1100
16	588	1520	1670	940	780	1280	3970	2650	3140	2020	1400	520
17	785	1630	1340	940	980	1340	3970	2470	2490	2000	1270	520
18	906	1510	1180	930	900	1340	4350	2300	2160	1700	1070	540
19	682	1500	760	920	1150	1210	4330	2020	1760	1630	1170	520
20	903	1570	900	930	1210	1100	4230	1690	1660	1550	1000	520
21	870	1510	1150	940	1260	1080	3770	1670	2000	1860	1040	560
22	869	1790	1100	930	1270	1140	4230	1590	2020	1620	1100	560
23	887	1590	1040	920	1290	1130	9490	1420	2610	1560	1000	500
24	1110	1550	1070	910	1250	1140	14100	1380	3440	1550	1060	430
25	1120	1310	1050	910	1290	1190	13700	1260	3800	1820	920	480
26	1480	1390	990	900	1410	1850	12100	1490	3880	2060	960	500
27	1330	1330	970	900	1290	1790	10800	1620	3770	1950	950	530
28	1430	1460	1050	900	1220	1940	10600	1730	3880	1670	940	620
29	1270	1450	1100	890	---	2350	9860	1860	7690	1470	860	780
30	1210	1400	1150	890	---	2760	10200	1710	11000	1220	920	870
31	1080	---	1150	880	---	2640	---	1550	---	1330	767	---
TOTAL	32718	39209	33907	29010	27440	41465	167620	124840	96230	91250	52687	19287
MEAN	1055	1307	1094	936	980	1338	5587	4027	3208	2944	1700	643
MAX	1660	1790	1670	1100	1410	2760	14100	10200	11000	9520	6190	1100
MIN	588	859	600	880	740	920	2550	1260	1550	1220	767	430
†	+407	-225	-778	-674	-564	-156	+2080	+1004	+378	+46	-9	-348
MEAN ‡	1462	1082	316	262	416	1182	7667	5031	3586	2990	1691	295
CFSM ‡	.43	.32	.09	.08	.12	.34	2.24	1.47	1.05	.87	.49	.09
IN. ‡	.49	.35	.11	.09	.13	.40	2.49	1.69	1.17	1.01	.57	.10

CAL YR 1980 TOTAL 494857 MEAN 1352 MAX 6530 MIN 124 MEAN ‡ 1297 CFSM ‡ 0.38 IN. ‡ 5.15
WTR YR 1981 TOTAL 755663 MEAN 2070 MAX 14100 MIN 430 MEAN ‡ 2168 CFSM ‡ 0.63 IN. ‡ 8.58

† Change in contents, equivalent in cubic feet per second, in Whiteface Reservoir and Boulder, Island, Rice, and Fish Lakes; records furnished by Minnesota Power and Light Co.
‡ Adjusted for change in contents.

04024000 ST. LOUIS RIVER AT SCANLON, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

LOCATION.--Samples collected at cableway 0.75 mi (1.21 km) downstream.

PERIOD OF RECORD.--Water years 1958-66, 1968 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1980 to September 1981.
WATER TEMPERATURES: October 1980 to September 1981.

INSTRUMENTATION.--Water-quality minimonitor since October 1980.

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

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 336 micromhos Aug. 14, 1981; minimum, 68 micromhos June 10, 1981.
WATER TEMPERATURES: Maximum, 25.0°C July 12-14, 1981; minimum, 0.0°C several days during winter period.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 336 micromhos Aug. 14; minimum, 68 micromhos June 10.
WATER TEMPERATURES: Maximum, 25.0°C July 12-14; minimum, 0.0°C several days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
NOV										
03...	1310	990	178	179	7.0	13.0	4.0	.70	13.5	107
DEC										
08...	1415	1400	160	152	--	-15.0	.5	1.4	13.1	94
JAN										
05...	1530	1050	145	162	7.6	-10.0	.0	1.5	10.2	72
FEB										
09...	1545	830	150	157	7.5	-17.0	.0	1.2	10.5	74
MAR										
09...	1540	1120	152	160	7.7	.0	.0	1.4	11.7	83
MAY										
04...	1315	8500	108	103	7.3	10.5	9.5	3.5	11.0	100
JUL										
06...	1430	5180	110	108	7.4	30.0	23.0	3.7	7.8	93
SEP										
08...	1515	514	155	154	7.9	20.0	19.0	3.6	8.3	92

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3) (95902)	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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
NOV										
03...	K12	K3	82	24	18	8.9	5.6	.3	1.3	58
DEC										
08...	K1200	K12	67	17	15	7.2	4.6	.2	1.0	50
JAN										
05...	K12	K3	70	15	16	7.2	4.2	.2	1.1	55
FEB										
09...	K7	K14	68	10	16	6.9	4.9	.3	1.0	58
MAR										
09...	340	K5	61	4.0	14	6.2	5.2	.3	1.8	57
MAY										
04...	K43	K21	42	2.0	9.6	4.3	3.7	.3	1.2	40
JUL										
06...	30	180	51	12	12	5.0	3.5	.2	1.2	39
SEP										
08...	21	K120	73	9.0	16	8.0	4.2	.2	.8	64

04024000 ST. LOUIS RIVER AT SCANLON, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
NOV										
03...	18	6.9	.1	9.6	146	105	390	.19	.19	.040
DEC										
08...	11	4.1	.1	7.1	114	81	431	.19	.19	.090
JAN										
05...	13	4.1	.2	7.8	123	88	349	.23	.23	.020
FEB										
09...	8.1	3.5	.1	8.7	115	86	258	.27	.27	.040
MAR										
09...	8.6	5.1	.1	9.1	113	86	342	.36	.36	.100
MAY										
04...	9.6	3.6	.1	4.4	90	62	2070	.18	.18	.030
JUL										
06...	7.5	3.2	<.1	6.2	109	63	1520	.16	.14	.030
SEP										
08...	8.3	4.2	.1	7.2	133	88	185	.14	.11	.060

DATE	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 TOTAL (MG/L AS C) (00680)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
NOV									
03...	.040	.99	.92	.060	.020	--	5	13	100
DEC									
08...	.070	1.40	.77	.030	.030	12	7	26	58
JAN									
05...	.020	.41	.41	.040	.040	16	2	5.7	100
FEB									
09...	.040	.47	.36	.020	.020	--	2	4.5	100
MAR									
09...	.100	.54	.46	.010	.010	17	2	6.0	100
MAY									
04...	.030	.88	.78	.050	.020	--	29	666	88
JUL									
06...	.010	.91	.89	.060	.020	--	11	154	100
SEP									
08...	.030	1.20	.70	.020	.010	20	5	7.0	100

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA) (01007)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO) (01037)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)
NOV											
03...	1310	2	2	100	30	0	0	20	10	0	0
FEB											
09...	1545	1	1	100	100	0	0	20	10	1	0
MAY											
04...	1315	1	1	100	40	1	<1	20	10	1	0
JUL											
06...	1430	1	1	100	20	1	1	<10	<1	1	1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)
NOV										
03...	2	0	1000	650	2	0	70	60	<.1	<.1
FEB										
09...	3	2	790	420	9	0	50	40	.3	.3
MAY										
04...	7	2	1100	320	3	0	70	30	--	--
JUL										
06...	26	6	940	570	7	3	70	30	<.1	<.1

04024000 ST. LOUIS RIVER AT SCANLON, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)
NOV 03...	5	0	0	0	0	0	280	0	23	.6
FEB 09...	4	4	0	0	1	0	20	10	14	.3
MAY 04...	5	1	0	0	0	0	40	10	21	--
JUL 06...	6	6	0	0	0	0	30	30	10	.3

DATE	TIME	ALDRIN, TOTAL (UG/L) (39330)	CHLOR-DANE, TOTAL (UG/L) (39350)	DDD, TOTAL (UG/L) (39360)	DDE, TOTAL (UG/L) (39365)	DDT, TOTAL (UG/L) (39370)	DI-AZINON, TOTAL (UG/L) (39570)	DI-ELDRIN TOTAL (UG/L) (39380)	ENDRIN, TOTAL (UG/L) (39390)	ETHION, TOTAL (UG/L) (39398)
NOV 06...	1300	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	HEPTA-CHLOR, TOTAL (UG/L) (39410)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L) (39420)	LINDANE TOTAL (UG/L) (39340)	MALA-THION, TOTAL (UG/L) (39530)	METH-OXY-CHLOR, TOTAL (UG/L) (39480)	METHYL PARA-THION, TOTAL (UG/L) (39600)	METHYL TRI-THION, TOTAL (UG/L) (39790)	PARA-THION, TOTAL (UG/L) (39540)	TOX-APHENE, TOTAL (UG/L) (39400)	TOTAL TRI-THION (UG/L) (39786)
NOV 06...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

PHYTOPLANKTON ANALYSES, OCTOBER 1980 TO SEPTEMBER 1981

DATE	NOV 3,80	MAR 9,81	MAY 4,81	JUL 6,81
TIME	1310	1540	1315	1430
TOTAL CELLS/ML	670	52	440	480
DIVERSITY: DIVISION	0.8	1.5	1.0	1.5
.CLASS	0.8	1.5	1.0	1.5
..ORDER	1.2	1.5	1.4	2.0
...FAMILY	1.2	1.5	1.4	2.0
....GENUS	1.2	1.5	1.4	2.4

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)								
.BACILLARIOPHYCEAE								
..BACILLARIALES								
...NITZSCHIACEAE								
....NITZSCHIA	--	-	--	-	13	3	78#	16
..EUPODISCALES								
...COSCINODISCACEAE								
....CYCLOTELLA	500#	75	--	-	--	-	26	5
....MELOSIRA	--	-	--	-	--	-	26	5
....STEPHANODISCUS	--	-	--	-	190#	44	--	-
..FRAGILARIALES								
...FRAGILARIACEAE								
....ASTERIONELLA	52	8	13#	25	--	-	--	-
....FRAGILARIA	--	-	--	-	26	6	--	-
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	13	3
....CLOSTERIOPSIS	--	-	--	-	--	-	13	3
....OOCYSTIS	--	-	--	-	--	-	52	11
....SELENASTRUM	--	-	--	-	--	-	13	3
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	39	6	26#	50	--	-	26	5
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	77	12	13#	25	--	-	230#	49
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	210#	47	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04024000 ST. LOUIS RIVER AT SCANLON, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---				---	---	---	152	147	149
2	---	---	---				---	---	---	151	146	148
3	---	---	---				---	---	---	147	144	145
4	---	---	---				---	---	---	149	144	147
5	---	---	---				---	---	---	155	149	153
6	---	---	---				---	---	---	159	154	156
7	---	---	---				---	---	---	159	156	157
8	---	---	---				---	---	---	156	149	153
9	---	---	---				151	146	149	150	143	146
10	---	---	---				158	152	156	156	146	151
11	---	---	---				158	155	157	158	155	156
12	---	---	---				157	153	155	157	149	153
13	---	---	---				157	145	151	153	151	152
14	---	---	---				147	125	138	155	152	153
15	---	---	---				135	121	125	156	150	153
16	---	---	---				152	138	147	151	146	148
17	---	---	---				151	128	137	146	142	144
18	---	---	---				164	142	157	148	143	144
19	---	---	---				166	163	164	149	147	148
20	197	194	195				164	160	161	149	147	148
21	199	195	196				170	157	161	149	143	146
22	199	195	196				160	142	151	149	145	147
23	237	195	218				164	158	161	149	143	145
24	207	197	201				158	146	154	149	144	146
25	221	198	206				148	143	146	149	147	148
26	206	198	202				144	142	143	150	147	148
27	202	197	199				149	143	145	150	145	147
28	201	194	198				152	149	150	150	145	148
29	---	---	---				156	148	151	149	145	146
30	---	---	---				150	146	148	151	147	149
31	---	---	---				150	147	148	154	149	151
MONTH										159	142	149

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	155	153	154	170	165	168	142	128	134	93	85	89
2	161	151	154	164	156	160	147	123	131	102	90	96
3	162	147	152	160	154	156	132	118	124	103	91	95
4	151	147	148	194	166	185	123	111	115	113	96	105
5	152	148	150	196	152	175	121	111	114	135	103	122
6	154	152	153	152	148	150	130	113	119	163	96	122
7	154	148	151	152	147	149	118	108	111	199	168	184
8	151	146	149	150	147	148	114	108	112	212	200	209
9	148	144	146	153	145	148	119	106	109	218	208	211
10	145	143	144	156	152	153	114	106	114	239	221	231
11	147	143	145	159	156	157	123	107	112	272	241	257
12	148	143	145	175	156	162	115	109	112	283	226	261
13	148	146	147	168	156	161	128	109	116	224	210	215
14	151	147	149	172	153	162	116	110	112	210	201	205
15	160	149	152	177	161	168	112	107	109	202	193	197
16	170	149	158	181	163	172	111	107	108	193	181	187
17	168	151	161	179	159	169	109	105	107	181	174	177
18	194	161	171	177	165	171	105	99	101	175	143	161
19	172	155	162	171	158	164	103	100	101	138	106	116
20	162	153	156	160	151	156	102	98	100	151	114	129
21	164	155	159	167	151	157	103	99	101	195	153	176
22	195	165	179	156	148	152	102	96	98	225	197	212
23	189	181	185	150	144	147	99	85	91	226	206	219
24	185	180	182	151	143	146	90	85	88	247	204	224
25	181	175	177	145	136	142	119	83	92	276	247	267
26	178	173	176	146	126	134	111	82	96	278	247	260
27	210	177	189	138	129	133	127	93	113	254	141	166
28	177	170	173	139	129	133	114	96	107	151	130	135
29	---	---	---	132	117	125	138	108	121	149	130	139
30	---	---	---	128	113	124	130	86	94	165	124	139
31	---	---	---	137	127	132	---	---	---	156	121	132
MONTH	210	143	160	196	113	154	147	82	109	283	85	175

04024000 ST. LOUIS RIVER AT SCANLON, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	149	117	123	152	105	119	297	278	288	153	150	151
2	148	115	121	105	94	99	313	298	305	154	152	153
3	132	111	119	104	96	100	321	313	317	158	154	155
4	161	111	122	102	95	100	327	320	323	164	158	160
5	149	114	129	109	96	101	332	327	330	166	162	164
6	157	116	128	116	102	109	335	330	333	164	161	163
7	148	118	127	119	111	115	335	320	325	161	156	158
8	147	102	115	124	116	120	321	319	320	156	146	151
9	135	94	106	126	122	124	325	320	322	162	151	155
10	114	68	85	132	122	126	325	323	324	163	154	159
11	103	69	74	138	127	132	325	323	324	164	156	161
12	94	70	78	140	131	135	331	323	328	163	156	159
13	104	70	78	138	132	134	335	331	333	161	157	159
14	94	71	74	136	130	134	336	333	334	162	157	159
15	99	75	80	133	128	130	334	313	325	172	155	160
16	77	72	74	132	127	129	323	314	319	170	150	159
17	74	70	72	136	129	132	315	310	312	173	155	163
18	102	73	81	138	131	134	315	310	313	172	157	163
19	131	104	118	140	134	137	315	201	245	171	153	161
20	137	85	106	136	131	134	199	170	182	178	155	161
21	98	91	94	137	133	134	169	154	162	184	158	163
22	119	85	103	136	131	134	154	147	151	176	156	164
23	124	81	97	140	131	136	147	143	145	182	153	165
24	132	89	103	140	139	140	145	143	144	163	154	160
25	139	96	102	140	136	138	149	144	147	177	155	165
26	140	100	104	161	139	150	147	145	146	177	159	167
27	106	101	103	181	161	171	146	144	145	188	160	167
28	125	105	113	206	181	194	146	144	145	172	154	162
29	148	124	137	230	207	219	147	144	145	169	150	156
30	157	149	153	255	232	243	148	146	147	174	145	153
31	---	---	---	278	256	266	153	147	150	---	---	---
MONTH	161	68	104	278	94	141	336	143	253	188	145	160

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---				---	---	---	.0	.0	.0
2	---	---	---				---	---	---	.0	.0	.0
3	---	---	---				---	---	---	.0	.0	.0
4	---	---	---				---	---	---	.0	.0	.0
5	---	---	---				---	---	---	.0	.0	.0
6	---	---	---				---	---	---	.0	.0	.0
7	---	---	---				---	---	---	.0	.0	.0
8	---	---	---				.0	.0	.0	.0	.0	.0
9	---	---	---				.0	.0	.0	.0	.0	.0
10	---	---	---				.0	.0	.0	.0	.0	.0
11	---	---	---				.0	.0	.0	.0	.0	.0
12	---	---	---				.0	.0	.0	.0	.0	.0
13	---	---	---				.0	.0	.0	.0	.0	.0
14	---	---	---				.0	.0	.0	.0	.0	.0
15	---	---	---				.0	.0	.0	.0	.0	.0
16	---	---	---				.0	.0	.0	.0	.0	.0
17	---	---	---				.0	.0	.0	.0	.0	.0
18	---	---	---				.0	.0	.0	.0	.0	.0
19	---	---	---				.0	.0	.0	.0	.0	.0
20	6.0	5.5	5.5				.0	.0	.0	.0	.0	.0
21	5.5	5.0	5.5				.0	.0	.0	.0	.0	.0
22	5.0	4.5	5.0				.0	.0	.0	.0	.0	.0
23	4.5	4.5	4.5				.0	.0	.0	.0	.0	.0
24	4.5	4.0	4.0				.0	.0	.0	.0	.0	.0
25	4.0	3.0	3.5				.0	.0	.0	.0	.0	.0
26	3.0	2.5	3.0				.0	.0	.0	.0	.0	.0
27	2.5	2.0	2.5				.0	.0	.0	.0	.0	.0
28	2.0	2.0	2.0				.0	.0	.0	.0	.0	.0
29	2.0	1.5	1.5				.0	.0	.0	.0	.0	.0
30	---	---	---				.0	.0	.0	.0	.0	.0
31	---	---	---				.0	.0	.0	.0	.0	.0
MONTH										.0	.0	.0

04024000 ST. LOUIS RIVER AT SCANLON, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	2.5	1.0	1.5	8.0	6.5	7.0
2	.0	.0	.0	.0	.0	.0	3.0	1.5	2.0	8.5	7.5	8.0
3	.0	.0	.0	.0	.0	.0	2.5	2.0	2.5	9.0	8.5	8.5
4	.0	.0	.0	.5	.0	.0	2.5	1.5	2.0	9.5	9.0	9.5
5	.0	.0	.0	.5	.0	.0	1.5	.5	1.0	11.0	9.0	10.5
6	.0	.0	.0	.0	.0	.0	2.5	1.0	1.5	11.5	10.5	11.0
7	.0	.0	.0	.0	.0	.0	4.0	2.0	3.0	12.0	11.0	11.5
8	.0	.0	.0	.0	.0	.0	5.0	3.5	4.0	12.0	11.5	11.5
9	.0	.0	.0	.0	.0	.0	5.0	3.5	4.5	11.5	11.0	11.0
10	.0	.0	.0	.0	.0	.0	6.0	4.0	5.5	11.0	10.0	10.5
11	.0	.0	.0	.0	.0	.0	6.0	5.0	5.5	11.0	10.5	10.5
12	.0	.0	.0	.0	.0	.0	6.0	5.0	5.5	11.5	10.5	11.0
13	.0	.0	.0	.0	.0	.0	6.0	4.5	5.0	12.0	11.0	11.5
14	.0	.0	.0	.0	.0	.0	5.5	5.0	5.5	13.0	11.5	12.5
15	.0	.0	.0	.5	.0	.0	6.0	5.0	5.5	13.5	12.0	13.0
16	.0	.0	.0	.5	.0	.0	6.5	6.0	6.5	13.5	12.5	13.0
17	.0	.0	.0	.5	.0	.0	7.5	6.5	7.0	13.0	12.5	12.5
18	.0	.0	.0	.0	.0	.0	8.0	7.0	7.5	13.0	12.0	12.5
19	.0	.0	.0	.0	.0	.0	8.5	7.5	8.0	13.5	12.5	13.0
20	.0	.0	.0	.5	.0	.0	8.5	8.0	8.5	15.0	13.5	14.5
21	.0	.0	.0	.5	.0	.0	8.0	6.5	7.0	16.5	15.0	16.0
22	.0	.0	.0	.5	.0	.0	6.5	5.5	6.0	17.5	16.0	17.0
23	.0	.0	.0	.5	.0	.0	6.0	4.5	5.5	17.5	17.0	17.5
24	.0	.0	.0	1.0	.0	.5	4.0	3.5	4.0	17.5	17.0	17.0
25	.0	.0	.0	1.0	.0	.5	3.5	3.0	3.0	17.0	16.5	17.0
26	.0	.0	.0	.5	.0	.0	5.0	3.5	4.0	17.0	16.0	16.5
27	.0	.0	.0	1.0	.0	.5	5.5	5.0	5.5	17.0	15.5	16.5
28	.0	.0	.0	1.0	.5	.5	7.0	6.0	6.5	17.0	16.0	16.5
29	---	---	---	1.0	.5	.5	7.5	7.0	7.0	17.5	16.0	17.0
30	---	---	---	1.5	.5	1.5	7.0	6.5	7.0	17.5	17.0	17.0
31	---	---	---	1.5	1.0	1.5	---	---	---	17.5	17.0	17.5
MONTH	.0	.0	.0	1.5	.0	.0	8.5	.5	5.0	17.5	6.5	13.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	17.0	16.0	16.5	19.0	18.0	18.5	20.5	20.5	20.5	20.0	19.0	19.5
2	16.0	15.0	15.5	20.0	18.5	19.0	21.0	20.5	20.5	20.0	19.0	19.5
3	15.5	15.0	15.0	20.0	19.5	20.0	21.0	20.5	20.5	20.0	19.0	19.5
4	17.0	15.0	16.0	21.5	19.5	20.5	21.5	20.5	21.0	20.0	19.0	19.5
5	18.5	17.0	17.5	22.0	21.0	21.5	22.5	21.0	21.5	19.5	18.5	19.0
6	19.0	18.0	18.5	23.0	22.0	22.5	23.0	21.5	22.0	19.0	18.5	19.0
7	19.0	18.0	18.5	24.0	23.0	23.5	23.0	21.0	22.0	19.0	18.5	19.0
8	18.5	18.0	18.0	24.5	23.5	24.0	20.5	19.5	20.0	19.0	18.0	18.5
9	18.0	17.5	17.5	24.5	24.0	24.0	20.5	20.0	20.5	19.0	18.0	18.5
10	18.5	18.0	18.0	24.5	23.5	24.0	20.5	20.0	20.5	19.5	19.0	19.0
11	19.0	18.5	18.5	24.0	24.0	24.0	20.5	20.0	20.5	20.0	19.0	19.5
12	19.5	18.5	19.0	25.0	24.0	24.5	20.5	20.5	20.5	20.0	19.0	19.5
13	19.0	18.5	19.0	25.0	24.5	25.0	21.0	20.5	21.0	20.0	19.0	19.5
14	18.5	17.5	18.0	25.0	23.5	24.5	21.5	20.5	21.0	20.0	19.0	19.5
15	18.0	17.0	17.5	23.5	22.0	23.0	21.5	21.0	21.5	19.5	18.5	19.0
16	18.5	17.5	18.0	22.0	21.0	21.5	22.0	21.0	21.5	18.5	17.0	17.5
17	19.0	18.5	18.5	21.0	20.5	21.0	21.5	20.5	21.0	17.5	16.5	17.0
18	18.5	18.5	18.5	22.5	21.0	22.0	21.5	20.5	21.0	16.5	15.5	16.0
19	18.5	18.0	18.0	23.5	22.0	22.5	21.0	20.5	21.0	15.5	15.0	15.5
20	17.5	17.5	17.5	23.5	23.0	23.0	21.0	20.5	21.0	15.5	14.5	15.0
21	17.5	17.0	17.0	23.0	22.5	22.5	21.0	20.5	21.0	15.0	14.5	14.5
22	16.5	16.5	16.5	22.5	21.5	22.0	20.5	20.0	20.5	15.0	14.0	14.5
23	16.5	16.0	16.5	21.5	20.5	21.0	20.5	20.0	20.5	14.5	14.0	14.0
24	16.5	16.0	16.0	20.5	20.0	20.5	20.5	19.5	20.0	15.0	14.0	14.0
25	17.5	16.5	17.0	20.0	19.5	20.0	20.0	19.5	19.5	14.0	14.0	14.0
26	18.5	17.0	17.5	20.0	19.5	19.5	20.0	19.5	19.5	14.0	13.5	14.0
27	19.0	18.0	18.5	20.0	19.5	19.5	20.0	19.0	19.5	13.5	12.5	13.0
28	19.0	18.5	18.5	20.0	19.5	20.0	19.5	19.0	19.0	12.5	11.5	12.0
29	19.5	18.0	18.5	20.5	20.0	20.0	19.5	19.0	19.0	12.0	11.0	11.5
30	19.5	18.5	19.0	21.0	20.0	20.5	20.0	19.0	19.5	11.0	10.5	10.5
31	---	---	---	20.5	20.5	20.5	20.0	19.5	19.5	---	---	---
MONTH	19.5	15.0	17.5	25.0	18.0	22.0	23.0	19.0	20.5	20.0	10.5	16.5

04024098 DEER CREEK NEAR HOLYOKE, MN

LOCATION.--Lat 46°31'30", long 92°23'20", in NE¼SE¼ sec.29, T.47 N., R.16 W., Carlton County, Hydrologic Unit 04010301, on left bank 179 ft (54.6 m) west of State Highway No. 23, 0.9 mi (1.4 km) upstream from mouth and 4.0 mi (6.4 km) north of Holyoke.

DRAINAGE AREA.--7.77 mi^2 (20.1 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1976 to current year.

GAGE.--Water-stage recorder. Datum of gage is 786.14 ft (239.615 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for winter periods, which are fair.

AVERAGE DISCHARGE.--5 years, 5.62 ft^3/s (0.159 m^3/s), 9.82 in/yr (249 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 383 ft^3/s (10.8 m^3/s) May 10, 1979, gage height, 17.11 ft (5.215 m), from rating curve extended above 104 ft^3/s (2.95 m^3/s); minimum daily discharge 0.35 ft^3/s (0.010 m^3/s) July 25, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 235 ft^3/s (6.66 m^3/s) June 13, gage height, 15.68 ft (4.779 m) from rating curve extended above 142 ft^3/s (4.02 m^3/s); minimum, 0.76 ft^3/s (0.022 m^3/s) Dec. 1; minimum gage height, 11.28 ft (3.438 m) July 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.2	2.4	1.6	1.6	3.0	2.7	18	16	1.7	5.7	2.3	2.3
2	2.3	2.5	1.8	1.6	3.0	2.4	11	10	1.9	3.6	2.9	1.6
3	2.4	2.5	2.5	1.6	3.0	2.4	9.0	8.5	3.9	2.7	3.4	1.2
4	1.9	2.5	2.7	1.6	3.0	2.4	8.0	10	3.1	2.7	5.0	1.2
5	1.7	2.4	2.7	1.6	3.0	2.4	8.1	39	2.1	2.0	2.5	1.2
6	1.7	2.3	2.6	1.6	3.0	2.4	24	15	1.7	1.2	2.3	1.1
7	1.7	2.6	2.3	1.6	3.0	2.4	22	9.3	1.4	1.4	2.5	1.3
8	1.6	3.5	2.1	1.6	3.0	2.4	12	7.4	1.8	1.3	2.3	1.5
9	1.7	4.0	2.2	1.6	3.0	2.4	8.6	6.5	1.7	1.5	2.0	1.3
10	1.8	3.3	2.1	1.6	2.9	2.4	15	5.5	2.1	1.5	1.8	1.3
11	1.8	2.5	2.3	1.6	2.8	10	11	4.8	2.0	1.8	2.0	1.4
12	1.8	2.9	2.4	1.7	2.8	20	8.0	4.3	2.1	2.0	1.8	1.2
13	1.8	5.5	1.8	1.8	2.8	14	9.9	4.0	36	1.4	2.2	1.2
14	1.9	4.7	1.8	1.9	2.8	11	11	3.5	128	3.1	2.2	1.3
15	2.0	3.4	1.8	1.9	2.8	7.5	5.0	3.2	64	5.5	2.2	1.2
16	2.2	2.9	1.8	1.9	3.5	5.6	4.7	2.9	23	2.9	2.2	1.2
17	4.7	2.7	1.8	1.9	9.0	4.1	5.0	2.7	12	7.1	2.2	1.2
18	3.6	2.2	1.8	2.0	20	3.0	5.2	2.4	7.4	3.4	2.3	1.3
19	2.9	2.1	1.7	2.1	18	2.9	4.7	2.2	5.0	2.3	1.5	1.4
20	2.6	2.1	1.7	2.2	14	2.7	4.7	2.1	10	2.2	1.2	1.3
21	3.4	2.2	1.7	2.3	12	2.7	4.2	1.9	9.0	3.4	1.3	1.3
22	2.9	2.2	1.7	2.5	11	10	19	1.8	17	1.8	4.0	1.3
23	3.1	2.2	1.7	2.7	9.7	9.3	151	1.8	17	1.8	3.1	1.3
24	4.4	1.9	1.6	2.9	7.4	7.4	48	2.5	28	3.1	2.0	1.3
25	3.9	1.9	1.6	3.3	5.4	23	17	3.3	12	4.7	4.9	1.4
26	3.3	1.8	1.6	3.4	4.1	46	11	3.6	9.5	3.1	59	4.8
27	2.9	1.9	1.6	3.3	3.5	13	21	2.9	7.1	2.3	23	4.6
28	2.6	1.9	1.6	3.2	2.9	14	24	2.4	21	2.2	8.5	2.3
29	2.4	1.9	1.6	3.1	---	61	16	2.5	32	2.0	5.4	2.7
30	2.5	1.9	1.6	3.0	---	37	19	2.0	12	2.2	3.5	3.1
31	2.5	---	1.6	3.0	---	13	---	1.7	---	2.2	2.5	---
TOTAL	78.2	78.8	59.4	67.7	164.4	341.5	535.1	185.7	475.5	84.1	164.0	50.8
MEAN	2.52	2.63	1.92	2.18	5.87	11.0	17.8	5.99	15.9	2.71	5.29	1.69
MAX	4.7	5.5	2.7	3.4	20	61	151	39	128	7.1	59	4.8
MIN	1.6	1.8	1.6	1.6	2.8	2.4	4.2	1.7	1.4	1.2	1.2	1.1
CFSM	.32	.34	.25	.28	.76	1.42	2.29	.77	2.05	.35	.68	.22
IN.	.37	.38	.28	.32	.79	1.63	2.56	.89	2.28	.40	.79	.24

CAL YR 1980 TOTAL 1261.90 MEAN 3.45 MAX 87 MIN .90 CFSM .44 IN 6.04
WTR YR 1981 TOTAL 2285.20 MEAN 6.26 MAX 151 MIN 1.1 CFSM .81 IN 10.94

04024098 DEER CREEK NEAR HOLYOKE, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1976 to current year.

PERIOD OF DAILY RECORD.--
SUSPENDED-SEDIMENT DISCHARGE: October 1976 to October 1981.

INSTRUMENTATION.--Sediment pumping sampler October 1976 to October 1981.

REMARKS.--Pumping sampler removed October 26, 1981. One or more samples taken daily and at stage intervals of about 0.35 ft for storm events through October 25, 1981. For storm events, suspended-sediment load was obtained by averaging for intervals of a day.

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	30	.18	---	---	---	---	---	---			---	---
2	21	.13	---	---	---	---	---	---			---	---
3	18	.12	---	---	---	---	---	---			---	---
4	20	.10	---	---	---	---	---	---			---	---
5	20	.09	---	---	---	---	---	---			---	---
6	20	.09	12	.07	---	---	---	---			---	---
7	20	.09	---	---	---	---	---	---			---	---
8	20	.09	---	---	---	---	---	---			---	---
9	21	.10	---	---	---	---	---	---			---	---
10	24	.12	---	---	---	---	---	---			---	---
11	25	.12	---	---	22	.14	---	---			---	---
12	21	.10	---	---	---	---	---	---			108	5.8
13	14	.07	---	---	---	---	---	---			---	---
14	27	.14	---	---	---	---	15	.08			---	---
15	12	.06	---	---	---	---	---	---			---	---
16	12	.07	---	---	---	---	---	---			---	---
17	20	.25	---	---	---	---	---	---			---	---
18	10	.10	---	---	---	---	---	---			---	---
19	10	.08	---	---	---	---	---	---			---	---
20	11	.08	---	---	---	---	---	---			---	---
21	13	.12	---	---	---	---	---	---			---	---
22	26	.20	---	---	---	---	---	---			---	---
23	31	.26	---	---	---	---	---	---			---	---
24	21	.25	---	---	---	---	---	---			---	---
25	13	.14	---	---	---	---	---	---			---	---
26	---	---	---	---	---	---	---	---			---	---
27	---	---	---	---	---	---	---	---			---	---
28	---	---	---	---	---	---	---	---			---	---
29	---	---	---	---	---	---	---	---			---	---
30	---	---	---	---	---	---	---	---			---	---
31	---	---	---	---	---	---	---	---			---	---

04024098 DEER CREEK NEAR HOLYOKE, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	APRIL MEAN CONCEN-TRATION (MG/L)	APRIL LOADS (T/DAY)	MAY MEAN CONCEN-TRATION (MG/L)	MAY LOADS (T/DAY)	JUNE MEAN CONCEN-TRATION (MG/L)	JUNE LOADS (T/DAY)	JULY MEAN CONCEN-TRATION (MG/L)	JULY LOADS (T/DAY)	AUGUST MEAN CONCEN-TRATION (MG/L)	AUGUST LOADS (T/DAY)	SEPTEMBER MEAN CONCEN-TRATION (MG/L)	SEPTEMBER LOADS (T/DAY)
1	---	---	---	---	---	---	32	.49	---	---	---	---
2	---	---	---	---	---	---	---	---	---	---	48	.21
3	---	---	---	---	---	---	---	---	---	---	---	---
4	---	---	---	---	---	---	---	---	---	---	---	---
5	---	---	---	---	---	---	---	---	---	---	---	---
6	---	---	---	---	45	.21	---	---	---	---	---	---
7	---	---	30	.75	47	.18	---	---	---	---	---	---
8	---	---	---	---	58	.28	---	---	---	---	---	---
9	---	---	---	---	45	.21	---	---	---	---	---	---
10	---	---	---	---	---	---	---	---	---	---	---	---
11	---	---	---	---	---	---	---	---	---	---	---	---
12	---	---	---	---	---	---	---	---	---	---	---	---
13	---	---	---	---	1150	358	---	---	---	---	---	---
14	38	1.1	---	---	---	---	---	---	---	---	---	---
15	---	---	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	---	---	---
17	---	---	---	---	---	---	---	---	---	---	---	---
18	---	---	---	---	---	---	---	---	---	---	---	---
19	---	---	---	---	---	---	---	---	---	---	---	---
20	---	---	42	.24	---	---	---	---	---	---	---	---
21	16	.18	56	.29	---	---	---	---	---	---	---	---
22	---	---	---	---	---	---	---	---	---	---	---	---
23	---	---	---	---	---	---	---	---	---	---	---	---
24	---	---	---	---	---	---	---	---	---	---	---	---
25	---	---	---	---	---	---	---	---	---	---	---	---
26	---	---	---	---	---	---	---	---	628	165	---	---
27	---	---	---	---	---	---	---	---	---	---	---	---
28	---	---	---	---	---	---	---	---	---	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	40	.22	---	---	---	---	---	---	---	---
31	---	---	68	.31	---	---	---	---	---	---	---	---

05045950 ORWELL LAKE NEAR FERGUS FALLS, MN

LOCATION.--Lat 46°12'55", long 96°10'40", in SW¼ sec.26, T.132 N., R.44 W., Otter Tail County, Hydrologic Unit 09020103, at dam on Otter Tail River at outlet of Orwell Lake, 7 mi (11 km) southwest of Fergus Falls.

DRAINAGE AREA.--1,830 mi^2 (4,740 km^2), approximately.

PERIOD OF RECORD.--March 1953 to current year. Prior to October 1971, published as Orwell Reservoir.

GAGE.--Water-stage recorder. Datum of gage is adjustment of 1912.

REMARKS.--Reservoir is formed by earth dam with concrete spillway with one taintor gate; storage began in March 1953. Capacity to elevation 1,070 ft (326 m) (maximum operating stage) is 14,100 acre-ft (17.4 hm^3) of which 13,100 acre-ft (16.2 hm^3) is controlled storage above elevation 1,048 ft (319 m) (minimum operating stage). Dead storage, 210 acre-ft (0.259 hm^3). Figures given herein represent total contents. Reservoir is used for flood control and to increase low flow for water supply and pollution abatement.

COOPERATION.--Records furnished by Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 16,920 acre-ft (20.9 hm^3) June 17, 1962, May 23, 1966, elevation, 1,072.38 ft (326.861 m); minimum (after initial filling), 844 acre-ft (1.04 hm^3) Aug. 26, 27, 1953, elevation, 1,046.96 ft (319.113 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 12,640 acre-ft (15.6 hm^3) Sept. 30, elevation, 1,068.64 ft (325.721 m); minimum, 4,780 acre-ft (5.89 hm^3) May 18, elevation, 1,058.33 ft (322.579 m).

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1066.38	10540	
Oct. 31	1067.68	11710	+1170
Nov. 30	1065.37	9700	-2020
Dec. 31	1061.88	7020	-2680
CAL YR 1980			+476
Jan. 31	1061.34	6640	-378
Feb. 28	1061.81	6970	+329
Mar. 31	1059.31	5340	-1630
Apr. 30	1059.65	5540	-204
May 31	1059.20	5270	-270
June 30	1061.13	6490	+1220
July 31	1059.42	5400	-1090
Aug. 31	1063.91	8530	+3130
Sept. 30	1068.64	12640	+4110
WTR YR 1981			+1960

05046000 OTTER TAIL RIVER BELOW ORWELL DAM, NEAR FERGUS FALLS, MN

LOCATION.--Lat 46°12'35", long 96°11'05", in NE¼ sec.34, T.132 N., R.44 W., Otter Tail County, Hydrologic Unit 09020103, on left bank 0.7 mi (1.1 km) downstream from Orwell Dam, 6.1 mi (9.8 km) downstream from Dayton Hollow Dam, 8 mi (13 km) southwest of Fergus Falls, and 11.1 mi (17.9 km) downstream from Pelican River.

DRAINAGE AREA.--1,830 mi^2 (4,740 km^2), approximately.

PERIOD OF RECORD.--October 1930 to current year. Prior to October 1952, published as Otter Tail River below Pelican River, near Fergus Falls. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 785: 1934(M). WSP 1208: 1947(M). WSP 1308: 1931(M).

GAGE.--Water-stage recorder. Datum of gage is 1,029.65 ft (313.837 m), adjustment of 1912 (levels by Corps of Engineers). Oct. 11, 1930, to Nov. 17, 1933, at same site at datum 2.00 ft (0.61 m) higher; Nov. 18, 1933, to Mar. 21, 1953, at site 6.1 mi (9.8 km) upstream at datum 40.30 ft (12.283 m) higher.

REMARKS.--Records good. Flow regulated by Orwell Lake (station 05045950) beginning Mar. 21, 1953 and powerplants upstream.

AVERAGE DISCHARGE.--51 years, 302 ft^3/s (8.553 m^3/s), 218,800 acre-ft/yr (270 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,710 ft^3/s (48.4 m^3/s) June 17, 1953, gage height, 5.60 ft (1.707 m) backwater from aquatic vegetation; minimum, 0.70 ft^3/s (0.020 m^3/s) Aug. 5, 1970, gage height, 1.28 ft (0.390 m), result of regulation.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 267 ft^3/s (7.56 m^3/s) part or all of each day Aug. 4-8, gage height, 2.75 ft (0.838 m) result of regulation; minimum, 34 ft^3/s (0.96 m^3/s) Aug. 31, gage height, 2.07 ft (0.631 m) result of regulation.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	97	116	113	95	182	224	235	123	130	133	44
2	40	95	120	110	113	178	224	235	123	153	133	42
3	42	95	116	103	133	187	224	235	123	149	182	43
4	42	92	113	103	130	182	224	214	123	149	240	51
5	40	113	113	100	133	182	224	196	133	145	267	55
6	42	123	113	100	133	182	224	191	137	145	267	55
7	40	123	113	100	133	182	224	191	137	141	261	58
8	53	123	110	100	133	178	210	191	141	141	261	58
9	64	123	107	97	133	178	205	191	145	137	256	58
10	71	123	116	89	133	178	205	191	141	137	182	58
11	71	123	123	89	133	187	205	191	141	145	145	58
12	69	123	120	89	130	201	205	191	141	145	157	60
13	69	123	116	92	130	196	205	191	141	130	157	60
14	71	123	116	92	123	196	205	191	137	123	157	62
15	71	123	116	89	123	196	205	191	137	123	157	64
16	71	123	116	86	126	214	205	191	141	123	157	64
17	71	126	116	86	126	230	205	191	141	123	145	64
18	73	126	113	86	126	230	205	161	141	123	137	62
19	73	126	113	100	130	230	205	141	130	123	137	64
20	73	126	113	116	130	235	205	145	120	126	137	64
21	73	126	107	116	133	235	205	141	120	126	137	64
22	76	120	110	113	133	230	205	137	116	153	137	64
23	76	123	113	110	141	230	205	137	107	178	137	66
24	89	123	116	113	141	230	205	137	100	178	116	66
25	97	123	116	113	133	230	205	133	100	178	89	64
26	97	123	113	110	133	230	205	126	100	173	92	62
27	97	123	107	110	161	224	224	123	100	161	92	62
28	97	123	107	113	182	224	235	123	100	149	76	60
29	97	120	107	107	---	224	235	123	103	137	66	58
30	97	116	116	95	---	224	235	123	103	130	66	55
31	95	---	116	95	---	224	---	123	---	133	51	---
TOTAL	2176	3569	3527	3135	3703	6429	6397	5280	3745	4407	4727	1765
MEAN	70.2	119	114	101	132	207	213	170	125	142	152	58.8
MAX	97	126	123	116	182	235	235	235	145	178	267	66
MIN	39	92	107	86	95	178	205	123	100	123	51	42
AC-FT	4320	7080	7000	6220	7340	12750	12690	10470	7430	8740	9380	3500

CAL YR 1980 TOTAL 98999 MEAN 270 MAX 873 MIN 39 AC-FT 196400
WTR YR 1981 TOTAL 48860 MEAN 134 MAX 267 MIN 39 AC-FT 96910

05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, SD

LOCATION.--Lat 45°51'45", long 96°34'25", in SW¼SW¼ sec.27, T.128 N., R.47 W., Roberts County, Hydrologic Unit 09020101, on Sisseton Indian Reservation, on left bank just downstream from Big Slough Outlet, 300 ft (91 m) downstream from White Rock Dam, 4 mi (6 km) south of White Rock, and 5 mi (8 km) northwest of Wheaton, MN.

DRAINAGE AREA.--1,160 mi^2 (3,004 km^2), approximately.

PERIOD OF RECORD.--October 1941 to current year.

GAGE.--Water-stage recorder. Datum of gage is 960.00 ft (292.608 m), adjustment of 1912 (levels by Corps of Engineers). Prior to Jan. 14, 1943, nonrecording gage at same site at datum 0.11 ft (0.03 m) lower. Jan. 15, 1943, to Sept. 30, 1963, water-stage recorder at same site at datum 0.11 ft (0.03 m) lower.

REMARKS.--Records fair. Flow regulated by Lake Traverse-Boise de Sioux Flood Control and Water Conservation project (available capacity for flood control, 137,000 acre-ft or 169 hm^3).

AVERAGE DISCHARGE.--40 years, 78.1 ft^3/s (2.212 m^3/s), 56,580 acre-ft/yr (69.8 hm^3/yr); median of yearly mean discharges, 52 ft^3/s (1.47 m^3/s), 37,700 acre-ft/yr (46 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,770 ft^3/s (107 m^3/s), occurred during period Apr. 19-21, 1969, gage height, 15.07 ft (4.593 m), from floodmark; no flow at times in most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 27 ft^3/s (0.76 m^3/s) July 19, gage height, 4.16 ft (1.268 m); maximum gage height, 4.28 ft (1.305 m) May 9; no flow on many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	.42	.21	.00	.00	.29	2.8	1.8	2.4	10	.55	.00
2	7.9	.33	.19	.00	.00	.25	3.4	.85	2.4	9.1	.50	.00
3	2.6	.50	.17	.00	.00	.23	4.0	1.6	2.1	9.1	.42	.00
4	1.1	.45	.21	.00	.00	.21	3.4	2.4	2.4	8.7	.33	.00
5	.65	.38	.19	.00	.00	.19	1.8	2.0	2.8	8.7	.27	.02
6	.60	.42	.19	.00	.00	.19	.96	1.3	1.9	8.7	.23	.00
7	.70	.45	.19	.00	.00	.19	1.9	1.1	1.6	5.2	.15	.00
8	.75	.35	.19	.00	.00	.19	2.0	1.2	1.5	3.6	.09	.02
9	.82	.45	.19	.00	.00	.19	1.8	2.6	1.9	2.8	.03	.00
10	1.0	.33	.17	.00	.00	.21	2.6	1.5	1.9	2.2	.00	.00
11	.85	.21	.17	.00	.00	.21	2.5	1.1	1.5	2.2	.00	.00
12	.75	.33	.17	.00	.00	.23	1.9	1.0	1.3	4.9	.00	.00
13	.68	.45	.15	.00	.00	.25	4.0	1.1	3.0	9.6	.00	.00
14	.70	.31	.17	.00	.00	.27	2.6	1.1	12	18	.00	.00
15	.65	.25	.15	.00	.00	.31	1.3	1.1	15	21	.00	.00
16	.62	.25	.15	.00	.02	.33	1.3	1.2	18	20	.00	.00
17	.35	.25	.17	.00	.03	.35	1.3	1.3	20	21	.00	.00
18	.62	.27	.15	.00	.14	.35	1.0	1.2	21	22	.00	.00
19	.52	.27	.15	.00	.42	.35	1.6	1.2	18	24	.00	.00
20	.55	.37	.08	.00	.62	.35	.85	1.1	16	21	.00	.00
21	.50	.31	.00	.00	.60	.35	.58	.75	16	5.2	.02	.00
22	.52	.29	.00	.00	.52	.35	1.3	.62	18	1.8	.03	.00
23	.62	.31	.00	.00	.48	.33	2.5	.82	19	1.2	.12	.00
24	.65	.33	.00	.00	.42	.33	1.3	1.0	19	1.4	.09	.00
25	.72	.31	.00	.00	.38	.42	1.0	1.2	19	2.4	.08	.00
26	.58	.27	.00	.00	.35	.50	1.3	1.3	17	2.2	.04	.00
27	.52	.25	.00	.00	.35	.31	2.1	1.4	14	1.4	.02	.00
28	.50	.25	.00	.00	.31	.48	2.1	2.2	14	1.0	.00	.00
29	.42	.23	.00	.00	---	.85	2.0	2.6	14	.78	.00	.00
30	.55	.23	.00	.00	---	1.1	2.5	3.0	12	.65	.00	.00
31	.52	---	.00	.00	---	1.9	---	2.5	---	.60	.00	---
TOTAL	38.51	9.82	3.41	.00	4.64	12.06	59.69	45.14	308.7	250.43	2.97	.04
MEAN	1.24	.33	.11	.000	.17	.39	1.99	1.46	10.3	8.08	.096	.001
MAX	10	.50	.21	.00	.62	1.9	4.0	3.0	21	24	.55	.02
MIN	.35	.21	.00	.00	.00	.19	.58	.62	1.3	.60	.00	.00
AC-FT	76	19	6.8	.00	9.2	24	118	90	612	497	5.9	.08

CAL YR 1980	TOTAL	5799.45	MEAN 15.8	MAX 165	MIN .00	AC-FT	11500
WTR YR 1981	TOTAL	735.41	MEAN 2.01	MAX 24	MIN .00	AC-FT	1460

05051500 RED RIVER OF THE NORTH AT WAHPETON, ND

LOCATION.--Lat 46°15'55", long 96°35'40", in N½ sec.8, T.132 N., R.47 W., Richland County, Hydrologic Unit 09020104, on left bank in Wahpeton, 800 ft (240 m) downstream from confluence of Bois de Sioux and Otter Tail Rivers and at mile 548.6 (882.7 km).

DRAINAGE AREA.--4,010 mi^2 (10,390 km^2), approximately.

PERIOD OF RECORD.--April 1942 to current year. Gage-height records collected in this vicinity since 1917 are contained in reports of the U.S. Weather Bureau.

GAGE.--Water-stage recorder and concrete and wooden dam. Datum of gage is 942.97 ft (287.417 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 6, 1943, U.S. Weather Bureau nonrecording gage 800 ft (240 m) upstream, converted to present datum. Aug. 6, 1943, to Oct. 27, 1950, nonrecording gage at present site and datum.

REMARKS.--Records fair. Flow regulated by Orwell Reservoir, capacity, 14,100 acre-ft (17.4 hm^3) at elevation 1,070 ft (326.136 m) National Geodetic Vertical Datum of 1929, adjustment of 1912; Lake Traverse, capacity, 137,000 acre-ft (169 hm^3), available for flood control; numerous other controlled lakes and ponds, and several powerplants.

AVERAGE DISCHARGE.--38 years (1943-81), 525 ft^3/s (14.87 m^3/s), 380,400 acre-ft/yr (469 hm^3/yr); median of yearly mean discharges, 483 ft^3/s (13.7 m^3/s), 350,000 acre-ft/yr (432 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,200 ft^3/s (261 m^3/s) Apr. 10, 1969, gage height, 16.34 ft (4.980 m); minimum daily, 1.7 ft^3/s (0.048 m^3/s) Aug. 28 to Sept. 5, 9, 10, 1976; minimum observed gage height, 0.63 ft (0.192 m) Aug. 29, 1976.

EXTREMES OUTSIDE PERIOD OF RECORD.--A stage of 17.0 ft (5.182 m), discharge, 10,500 ft^3/s (297 m^3/s) occurred in the spring of 1897 and has not been exceeded since.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 512 ft^3/s (14.5 m^3/s) Aug. 2, gage height, 4.54 ft (1.384 m); minimum daily, 35 ft^3/s (0.99 m^3/s) Oct. 2, Sept. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	36	86	75	125	95	205	251	241	149	265	445	59
2	35	86	53	115	90	210	237	233	153	238	493	47
3	37	84	101	105	110	205	232	229	159	228	462	42
4	40	84	131	105	130	205	232	232	156	202	405	35
5	42	83	118	100	125	205	232	222	150	187	401	36
6	44	101	113	100	120	205	227	198	152	172	405	44
7	45	119	103	100	115	205	224	190	160	160	385	54
8	45	125	83	100	115	205	226	186	166	151	360	54
9	45	125	94	95	120	205	218	181	170	152	344	54
10	55	127	92	90	135	205	197	185	167	148	329	54
11	57	125	99	85	140	205	194	192	164	159	276	56
12	60	123	130	85	140	210	197	190	164	164	194	54
13	60	125	135	95	145	250	202	190	180	153	182	50
14	59	125	125	95	150	290	208	187	227	193	176	50
15	59	117	125	95	150	290	202	187	417	179	174	52
16	72	125	125	90	150	275	192	187	408	178	172	53
17	73	125	125	95	150	260	192	186	313	167	167	53
18	68	117	110	95	150	240	202	186	246	156	160	53
19	68	133	69	95	150	210	205	165	223	156	142	53
20	66	140	105	105	154	224	205	140	204	149	133	52
21	104	119	115	115	220	240	194	150	208	162	131	53
22	96	138	115	116	215	232	192	270	195	184	129	53
23	76	136	115	120	210	232	197	175	190	200	133	54
24	70	99	105	120	205	229	205	150	207	250	146	55
25	74	81	100	120	200	218	199	150	238	251	144	56
26	88	90	115	120	200	208	194	153	259	233	108	57
27	89	100	115	115	200	221	202	153	232	216	94	54
28	89	105	120	110	200	218	208	153	192	195	89	57
29	89	110	120	105	---	245	234	148	174	169	84	58
30	86	120	120	100	---	248	238	146	222	153	68	59
31	88	---	125	100	---	237	---	147	---	221	62	---
TOTAL	2015	3373	3376	3211	4284	7037	6338	5702	6245	5791	6993	1561
MEAN	65.0	112	109	104	153	227	211	184	208	187	226	52.0
MAX	104	140	135	125	220	290	251	270	417	265	493	59
MIN	35	81	53	85	90	205	192	140	149	148	62	35
AC-FT	4000	6690	6700	6370	8500	13960	12570	11310	12390	11490	13870	3100

CAL YR 1980 TOTAL 128357 MEAN 351 MAX 2960 MIN 27 AC-FT 254600
WTR YR 1981 TOTAL 55926 MEAN 153 MAX 493 MIN 35 AC-FT 110900

05051500 RED RIVER OF THE NORTH AT WAHPETON, ND--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1972-81.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3) (95902)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
MAR								
19...	0755	206	489	8.5	.0	240	21	43
SEP								
04...	0910	35	473	8.5	17.5	240	18	42

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
MAR								
19...	32	12	.3	1.7	218	42	10	.1
SEP								
04...	33	17	.5	4.7	222	43	17	.1

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS NO3) (71851)	PHOS-PHATE, ORTHO, DIS-SOLVED (MG/L AS PO4) (00660)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
MAR									
19...	11	307	284	171	1.0	.02	190	20	10
SEP									
04...	1.1	259	--	24.3	1.0	.04	0	50	10

05051522 RED RIVER OF THE NORTH AT HICKSON, ND

LOCATION.--Lat 46°39'35", long 96°47'44", in SW¼ sec.19, T.137 N., R.48 W., Clay County, Minnesota, Hydrologic Unit 09020104, on right bank 60 ft (18 m) downstream from bridge on township road 1 mi (2 km) southeast of Hickson, ND.

DRAINAGE AREA.--4,300 mi^2 (11,100 km^2), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1975 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 877.06 ft (267.3 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by Orwell Reservoir, capacity, 14,100 acre-ft (17.4 hm^3) at elevation 1,070 ft (326.136 m) National Geodetic Vertical Datum of 1929, adjustment of 1912; Lake Traverse, capacity, 137,000 acre-ft (169 hm^3), available for flood control; numerous other controlled lakes and ponds, and several powerplants.

AVERAGE DISCHARGE.--6 years, 485 ft^3/s (13.74 m^3/s), 351,400 acre-ft/yr (433 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,600 ft^3/s (272 m^3/s) Apr. 18, 1979, gage height, 33.03 ft (10.068 m); no flow Oct. 26, 1976 to Jan. 9, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 544 ft^3/s (15.4 m^3/s) Aug. 4, gage height, 10.41 ft (3.173 m), from graph based on gage readings; minimum daily, 30 ft^3/s (0.85 m^3/s) Oct. 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	80	110	125	105	205	292	223	168	195	192	92
2	30	83	75	125	95	205	284	240	172	236	356	81
3	32	83	60	115	110	205	279	258	171	278	512	67
4	34	83	74	105	110	205	270	258	173	265	540	56
5	37	80	80	100	110	210	256	250	178	246	520	48
6	38	77	115	100	125	210	256	253	179	220	468	44
7	40	83	132	100	130	205	257	244	172	204	456	47
8	46	92	124	100	120	205	253	222	170	179	448	51
9	52	108	110	100	120	205	252	201	172	163	428	57
10	50	122	80	95	120	205	252	198	180	152	400	58
11	50	122	75	95	135	205	236	192	186	153	380	56
12	52	129	90	95	135	210	220	198	181	159	364	55
13	69	127	100	95	140	205	216	202	182	162	300	51
14	89	126	110	95	145	205	216	200	189	213	236	50
15	98	126	125	95	150	240	220	196	201	208	208	50
16	95	126	125	95	150	280	228	194	286	216	192	52
17	92	126	136	95	155	290	216	193	425	204	188	52
18	83	111	125	90	160	290	212	192	402	194	184	52
19	80	105	110	95	160	270	204	187	335	179	180	52
20	66	115	105	100	160	260	208	184	283	167	168	54
21	61	140	85	105	170	250	208	172	263	162	156	54
22	56	130	80	115	190	260	212	155	242	153	144	54
23	89	135	115	115	205	300	204	173	240	163	140	54
24	115	105	110	120	215	340	196	291	229	178	156	54
25	74	80	115	120	210	330	196	191	223	213	160	56
26	61	85	115	120	205	300	204	167	233	288	164	59
27	59	97	115	120	205	260	208	160	268	284	160	56
28	71	108	115	120	205	244	200	160	282	255	126	59
29	86	115	120	110	---	272	201	162	261	240	111	59
30	86	120	120	110	---	276	208	164	218	216	108	59
31	86	---	120	110	---	276	---	164	---	196	104	---
TOTAL	2011	3219	3271	3280	4240	7623	6864	6244	6864	6341	8249	1689
MEAN	64.9	107	106	106	151	246	229	201	229	205	266	56.3
MAX	115	140	136	125	215	340	292	291	425	288	540	92
MIN	30	77	60	90	95	205	196	155	168	152	104	44
AC-FT	3990	6380	6490	6510	8410	15120	13610	12380	13610	12580	16360	3350

CAL YR 1980	TOTAL	136734	MEAN 374	MAX 3180	MIN 26	AC-FT	271200	
WTR YR 1981	TOTAL	59895	MEAN 164	MAX 540	MIN 30	AC-FT	118800	

05051522 RED RIVER OF THE NORTH AT HICKSON, ND--Continued

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1975 to current year.
WATER TEMPERATURES: October 1975 to current year.

REMARKS.--Letter E indicates estimated value.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,900 micromhos Jan. 27, 1977; minimum daily, 190 micromhos Mar. 28, 1978.
WATER TEMPERATURES: Maximum daily, 30.5°C July 14, 1980; minimum daily, 0.0°C on many days during winter months.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 715 micromhos June 19; minimum daily, 400 micromhos Mar. 18.
WATER TEMPERATURES: Maximum daily, 29.5°C July 6; minimum daily, 0.5°C on many days during winter months.

..ATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	COLOR (PLAT-INUM-COBALT UNITS) (00080)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)
DEC												
17...	1310	135	755	717	8.1	.0	25	5.2	12.8	91	300	25
MAR												
19...	1315	E270	410	428	8.4	.0	10	4.0	15.3	111	200	--
JUN												
10...	1705	194	615	610	8.4	22.0	10	39	9.2	109	260	--
SEP												
03...	1020	62	428	442	8.1	20.0	15	44	8.1	91	200	--

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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY, LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SOLIDS, SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)
DEC													
17...	56	40	22	.5	5.4	280	84	11	.3	6.3	427	394	156
MAR													
19...	40	25	9.6	.3	3.1	180	38	6.4	.2	8.1	242	239	176
JUN													
10...	50	34	21	.6	10	250	70	11	.2	7.2	349	355	183
SEP													
03...	37	27	11	.4	4.2	190	31	6.3	.1	1.0	255	232	42.7

DATE	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOS-PHORUS, HYDRO-LYZABLE TOTAL (MG/L AS P) (00669)	BORON, DIS-SOLVED (UG/L AS B) (01020)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	PHENOLS (UG/L) (32730)
DEC												
17...	.17	.16	.430	2.00	.120	.100	.100	.00	120	16	--	0
MAR												
19...	.20	.00	.010	1.40	.100	.030	.020	.07	40	7.6	--	0
JUN												
10...	.23	.25	.100	3.80	.390	.050	.150	.04	120	19	1.2	5
SEP												
03...	.01	.00	.060	.23	.070	.020	.070	.00	60	8.7	1.1	0

05051522 RED RIVER OF THE NORTH AT HICKSON, ND--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	TEMPER-ATURE (DEG C) (00010)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)
OCT						
09...	1110	54	12.0	594	28	4.1
NOV						
12...	1555	127	4.0	542	34	12
DEC						
17...	1310	135	.0	755	11	4.0
JAN						
21...	1220	102	.0	662	10	2.8
FEB						
26...	1625	206	.0	450	16	8.9
MAR						
19...	1315	E270	.0	410	9	6.6
APR						
29...	1230	198	14.0	508	132	71
JUN						
10...	1705	194	22.0	615	98	51
JUL						
23...	1545	174	25.5	555	180	85
SEP						
03...	1020	62	20.0	428	72	12

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	580	600	540	595	---	---	460	500	570	635	490	440
2	600	---	560	600	550	460	460	500	575	625	---	460
3	540	600	565	600	530	460	450	---	580	550	490	450
4	540	600	560	---	550	470	460	500	580	555	400	450
5	---	590	560	560	600	480	---	510	580	---	400	470
6	570	560	560	500	610	490	480	515	590	560	530	---
7	600	540	---	520	615	480	485	520	---	560	540	490
8	600	530	560	550	---	---	490	500	580	500	480	520
9	650	---	625	550	570	480	485	500	570	500	---	530
10	650	600	625	560	600	460	480	---	580	520	500	545
11	---	600	640	---	620	500	---	540	585	510	520	560
12	---	500	630	530	620	470	---	540	540	---	500	570
13	540	500	625	535	600	450	460	520	560	520	480	---
14	540	500	---	600	635	470	480	510	---	480	475	580
15	560	480	625	550	---	---	495	515	550	450	470	580
16	550	---	650	560	635	420	500	500	560	440	---	600
17	555	500	690	570	635	420	480	---	500	435	480	600
18	530	500	660	---	630	400	495	505	630	420	495	625
19	---	500	650	560	600	420	---	505	715	---	460	625
20	620	510	655	550	560	420	490	505	540	450	410	---
21	700	510	---	590	520	405	505	500	---	500	440	670
22	620	505	650	580	---	---	500	505	500	550	450	630
23	540	---	655	550	460	405	480	510	500	540	---	620
24	530	520	625	580	460	405	500	---	510	530	440	600
25	520	520	580	---	425	405	495	460	500	510	440	590
26	---	500	600	600	425	420	---	460	490	---	450	540
27	580	525	605	585	420	410	495	500	500	490	450	---
28	420	550	---	580	420	430	500	545	---	445	420	520
29	500	510	640	550	---	---	495	570	580	465	450	500
30	450	---	620	520	---	460	500	580	600	500	---	500
31	460	---	605	500	---	460	---	---	---	490	440	---

05051522 RED RIVER OF THE NORTH AT HICKSON, ND--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14.0	4.5	4.0	1.0	---	---	8.5	15.5	19.0	25.5	26.5	23.0
2	12.5	---	.5	1.0	.5	1.0	10.5	16.5	18.5	25.0	---	21.5
3	10.5	5.5	1.0	1.0	1.0	2.0	8.5	---	21.0	26.0	26.5	19.5
4	12.5	5.5	1.5	---	1.0	1.5	8.0	15.0	20.0	27.0	26.0	18.5
5	---	6.5	4.5	1.0	1.0	1.0	---	16.0	22.0	---	26.0	20.5
6	16.0	6.0	1.0	.5	.5	1.0	10.5	16.0	23.5	29.5	24.5	---
7	14.0	6.5	---	.5	.5	1.5	9.5	16.0	---	29.0	24.5	21.0
8	16.0	7.0	4.0	.5	---	---	10.0	16.5	21.5	27.0	24.0	23.5
9	13.5	---	1.0	.5	1.0	1.5	11.5	14.5	21.0	27.5	---	24.5
10	12.0	5.0	.5	.5	1.0	1.5	10.5	---	21.0	27.5	23.0	26.0
11	---	5.0	2.5	---	1.0	2.5	---	15.5	23.5	27.5	23.5	23.5
12	---	5.0	3.5	.5	2.5	2.0	---	15.0	22.5	---	24.5	23.5
13	8.0	4.5	1.5	.5	1.0	2.0	10.5	15.0	21.5	25.5	25.0	---
14	7.5	2.0	---	.5	2.0	4.0	10.5	16.0	---	23.5	26.0	18.5
15	7.5	2.5	2.0	1.0	---	---	11.5	17.5	21.5	24.0	24.5	17.5
16	8.0	---	4.0	1.0	3.0	3.0	13.5	17.0	21.5	26.5	---	16.0
17	7.0	3.5	1.0	1.0	2.0	1.5	13.0	---	20.0	26.5	23.5	18.0
18	7.5	2.5	1.0	---	2.5	1.0	11.5	17.5	20.0	26.0	24.0	17.5
19	---	2.0	1.0	.5	2.0	1.5	---	18.5	18.5	---	23.5	20.0
20	8.0	2.0	.5	.5	2.0	2.0	12.5	18.5	20.0	27.5	23.5	---
21	8.0	2.5	---	1.0	2.0	2.0	11.5	20.0	---	26.5	24.0	18.5
22	6.5	2.5	1.0	1.0	---	---	10.0	20.0	20.5	25.0	22.5	15.5
23	5.5	---	.5	1.0	3.0	2.5	10.5	19.0	19.5	26.0	---	14.5
24	5.0	1.5	.5	2.5	1.5	4.0	12.0	---	21.0	25.5	22.5	16.0
25	4.0	1.0	.5	---	1.5	2.5	14.5	16.5	22.0	23.5	23.0	15.5
26	---	2.0	.5	1.0	2.0	3.0	---	17.0	24.0	---	22.5	14.0
27	4.0	1.0	1.0	1.0	1.0	4.0	13.5	19.0	22.0	23.0	22.0	---
28	2.5	3.5	---	1.0	2.0	5.5	14.5	18.5	---	22.5	23.5	12.0
29	4.0	3.0	1.0	.5	---	---	14.5	19.0	24.5	23.0	24.0	12.0
30	4.5	---	6.0	.5	---	8.0	15.0	19.0	25.0	23.5	---	11.0
31	3.5	---	1.5	1.0	---	8.0	---	---	---	25.5	22.0	---

05054000 RED RIVER OF THE NORTH AT FARGO, ND

LOCATION.--Lat 46°51'40", long 96°47'00", in NW¼NE¼ sec.18, T.139 N., R.48 W., Cass County, Hydrologic Unit 09020104, at city waterplant on 4th St. S. in Fargo, 25 mi (40 km) upstream from mouth of Sheyenne River and at mile 453.0 (728.9 km).

DRAINAGE AREA.--6,800 mi^2 (17,600 km^2), approximately.

PERIOD OF RECORD.--May 1901 to current year. Published as "at Moorhead, Minn." 1901. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1308: 1902-4, 1906-7, 1910-14, 1916, 1918, 1924. WSP 1388: 1905-6, 1917-20(M), 1935(M), 1938-39(M), 1943.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 861.8 ft (262.68 m) National Geodetic Vertical Datum of 1929. Oct. 1, 1960, to Sept. 30, 1962, water-stage recorder at present site at datum 5.6 ft (1.71 m) higher. See WSP 1728 or 1913 for history of changes prior to Oct. 1, 1960.

REMARKS.--Records good. Flow regulated by Orwell Reservoir, capacity, 14,100 acre-ft (17.4 hm^3) at elevation 1,070 ft (326.136 m) National Geodetic Vertical Datum of 1929, adjustment of 1912; Lake Traverse, capacity, 137,000 acre-ft (169 hm^3), available for flood control; other controlled lakes and ponds and several powerplants. Some small diversions for municipal supply. Figures of daily discharge do not include diversions to cities of Fargo and Moorhead and from Sheyenne River.

AVERAGE DISCHARGE (UNADJUSTED).--80 years, 554 ft^3/s (15.69 m^3/s), 401,400 acre-ft/yr (495 hm^3/yr); median of yearly mean discharges, 442 ft^3/s (12.5 m^3/s), 320,200 acre-ft/yr (395 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 25,300 ft^3/s (716 m^3/s) Apr. 15, 1969, gage height, 37.34 ft (11.381 m); no flow for many days in each year for period 1932-41, Sept. 30, Oct. 1, 2, 1970, Oct. 10-19, 1976.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1897 reached a stage of 39.1 ft (11.92 m) present datum, discharge, 25,000 ft^3/s (708 m^3/s) at site 1.5 mi (2.4 km) downstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,710 ft^3/s (48.4 m^3/s) May 24, gage height, 15.84 ft (4.828 m); minimum daily, 19 ft^3/s (0.54 m^3/s) Oct. 2, 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	85	118	110	90	190	330	246	182	208	189	101
2	19	84	97	110	100	190	313	265	168	218	207	87
3	19	83	78	100	100	190	313	271	164	285	415	77
4	21	82	63	85	100	190	313	274	182	308	561	64
5	21	80	60	80	100	195	308	268	182	296	625	58
6	21	77	65	80	105	195	302	257	186	253	583	72
7	21	80	94	80	115	195	302	252	186	208	530	82
8	25	82	114	80	120	200	302	237	182	177	476	42
9	30	85	118	80	120	200	290	211	177	160	463	43
10	30	105	111	80	110	195	290	208	199	144	432	44
11	28	114	94	80	120	200	274	190	182	148	394	45
12	33	113	85	80	130	205	263	190	182	160	370	39
13	35	114	82	75	140	205	238	195	228	153	341	30
14	43	115	83	75	140	210	238	195	200	270	258	29
15	58	111	93	75	140	215	233	195	190	258	206	29
16	77	110	100	75	145	245	233	204	204	327	187	27
17	91	108	110	75	145	280	223	213	318	314	174	27
18	80	107	113	75	145	287	223	204	406	272	165	28
19	80	97	115	75	145	285	204	195	376	234	158	29
20	77	99	115	75	145	290	218	200	313	194	162	29
21	68	110	110	80	155	275	218	208	280	174	152	29
22	65	124	110	85	160	260	213	204	253	164	130	31
23	65	124	80	90	170	280	218	450	253	159	126	31
24	94	120	90	100	195	310	218	1710	238	164	170	33
25	104	111	105	100	205	350	213	1490	213	172	179	33
26	94	80	105	95	191	325	218	814	218	225	155	40
27	77	82	105	95	190	302	233	462	249	270	149	41
28	71	94	105	95	190	253	223	324	290	263	142	39
29	80	104	105	95	---	290	223	218	290	245	124	37
30	85	114	110	90	---	290	231	200	253	218	109	40
31	85	---	110	90	---	302	---	186	---	242	110	---
TOTAL	1718	2994	3043	2660	3911	7599	7618	10736	6944	6883	8442	1336
MEAN	55.4	99.8	98.2	85.8	140	245	254	346	231	222	272	44.5
MAX	104	124	118	110	205	350	330	1710	406	327	625	101
MIN	19	77	60	75	90	190	204	186	164	144	109	27
AC-FT	3410	5940	6040	5280	7760	15070	15110	21290	13770	13650	16740	2650
(+)	1091	1031	1016	1161	1122	1034	1118	1268	1482	1324	1593	1462
MEAN*	73	117	115	105	160	262	273	367	256	244	298	69
AC-FT*	4500	6970	7060	6440	8880	16100	16230	22560	15250	14970	18330	4110

		OBSERVED					ADJUSTED	
CAL YR 1980	TOTAL 150892	MEAN 412	MAX 5180	MIN 13	AC-FT 299300		MEAN 432	AC-FT 313660
WTR YR 1981	TOTAL 63884	MEAN 175	MAX 1710	MIN 19	AC-FT 126700		MEAN 195	AC-FT 141400

+ Diversions in acre-feet to cities of Fargo and Moorhead.
* Adjusted for diversions to cities of Fargo and Moorhead.

05054020 RED RIVER OF THE NORTH BELOW FARGO, ND

LOCATION.--LAT 46°55'50", long 96°47'05", in SW¼NE¼ sec.19, T.140 N., R.48 W., Cass County, Hydrologic Unit 09020104, at bridge on county highway 2 mi (3.2 km) north of North Dakota State University campus in Fargo, and 12 mi (19 km) above mouth of Sheyenne River.

DRAINAGE AREA.--6,820 mi^2 (17,660 km^2), approximately.

PERIOD OF RECORD.--Water years 1969 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1973 to September 1974, October 1975 to March 1978, July 1978 to current year.
WATER TEMPERATURES: October 1973 to September 1974, October 1975 to March 1978, July 1978 to current year.

REMARKS.--Fragmentary records of specific conductance and temperature for October 1974 to September 1975 are available in the Bismarck District office. Records of discharge are given for station 05054000, Red River of the North at Fargo, N. Dak., and are unadjusted for treated sewage inflow between sites. Water-quality monitor discontinued March 1978. Daily measurements of specific conductance and temperature resumed by observer July 1978.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 1,220 micromhos Nov. 7, 1976; minimum, 206 micromhos July 4, 1977.
WATER TEMPERATURES: Maximum, 31.5°C July 19, 1977; minimum, 0.0°C on many days during winter months.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 945 micromhos June 26; minimum daily, 230 micromhos May 26.
WATER TEMPERATURES: Maximum daily, 25.5°C July 8, 12, 13 and Aug. 14; minimum daily, 0.0°C on many days during winter months.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	COLOR (PLAT-INUM-COBALT UNITS) (00080)	HARD-NESS (MG/L AS CACO3) (00900)
OCT 08...	1000	22	636	8.0	--	13.0	--	280
NOV 12...	1300	117	609	8.4	3.5	4.0	27	250
DEC 18...	1200	114	702	8.5	-11.0	.0	25	300
JAN 20...	1000	76	636	7.7	-1.5	.0	15	300
FEB 26...	0745	197	619	7.4	-1.0	.0	20	260
MAR 18...	0930	292	500	7.7	.0	.0	10	220
APR 29...	0900	214	588	8.4	11.5	13.0	20	260
JUN 10...	1030	200	640	8.2	20.5	19.0	10	280
JUL 23...	0900	167	491	7.5	19.0	23.0	40	210
SEP 01...	1030	96	501	8.0	20.0	19.0	15	210

DATE	HARD-NESS NONCAR-BONATE (MG/L AS CACO3) (95902)	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)	PERCENT SODIUM (00932)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)
OCT 08...	53	49	39	49	26	1.3	15	230	120
NOV 12...	33	42	36	24	17	.7	6.9	220	88
DEC 18...	31	53	41	25	15	.6	7.8	270	86
JAN 20...	26	56	38	22	14	.6	6.7	270	62
FEB 26...	17	50	32	22	15	.6	5.8	240	60
MAR 18...	21	44	27	15	13	.5	5.0	200	52
APR 29...	40	48	34	24	16	.7	8.7	220	76
JUN 10...	28	52	36	24	15	.6	11	250	84
JUL 23...	52	42	26	20	16	.6	7.4	160	87
SEP 01...	35	43	26	21	17	.6	6.8	180	70

05054020 RED RIVER OF THE NORTH BELOW FARGO, ND--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

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)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	BORON, DISSOLVED (UG/L AS B) (01020)
OCT 08...	29	.5	11	435	452	.31	.840	190
NOV 12...	12	.3	3.3	371	346	.14	.320	110
DEC 18...	16	.3	3.0	411	395	.12	.250	110
JAN 20...	13	.3	8.8	386	370	.16	.110	60
FEB 26...	9.6	.3	12	374	339	.70	.280	90
MAR 18...	10	.2	9.5	298	283	.01	.120	60
APR 29...	26	.3	1.8	364	352	.13	.150	80
JUN 10...	15	.2	5.3	383	379	.28	.170	110
JUL 23...	14	.2	15	308	310	.39	.230	60
SEP 01...	11	.2	3.5	307	291	.21	.170	80

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	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)
SEP 01...	1030	10	3	140	<1	0	0	4	10	0

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)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)
SEP 01...	20	5	.0	<10	3	0	160	3.0	25	>.01

05054020 RED RIVER OF THE NORTH BELOW FARGO, ND--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	690	595	550	705	650	570	485	575	690	600	550	510
2	685	595	555	700	650	545	485	570	690	600	545	520
3	700	590	575	700	660	540	475	570	660	715	545	500
4	690	630	575	655	655	515	485	565	650	710	520	510
5	690	670	575	650	645	510	475	580	630	705	525	510
6	700	750	585	640	645	510	500	545	630	705	520	500
7	735	745	580	625	630	510	490	565	625	685	515	565
8	730	625	580	640	640	575	490	605	625	700	550	560
9	745	610	575	625	640	580	515	590	615	735	555	560
10	740	560	580	640	635	570	520	565	660	725	545	560
11	730	550	595	630	630	565	525	560	660	705	570	565
12	710	555	600	640	620	565	520	560	655	675	575	550
13	705	545	610	640	600	560	520	550	650	665	525	565
14	700	610	610	630	620	540	525	565	645	545	515	565
15	680	605	625	640	620	545	550	560	650	540	515	550
16	675	610	630	630	610	530	530	560	660	580	505	550
17	650	625	640	630	610	510	530	565	665	595	500	570
18	645	620	640	605	605	495	520	570	665	620	520	570
19	640	615	630	600	610	485	525	570	600	615	525	570
20	655	595	625	600	610	485	515	590	590	620	495	575
21	650	595	625	605	620	470	520	590	590	530	525	575
22	650	590	640	605	610	465	540	600	595	500	520	580
23	635	580	625	600	610	465	540	310	560	485	520	595
24	610	575	630	605	600	465	510	240	565	480	500	570
25	600	565	640	670	600	455	505	240	720	480	505	575
26	600	560	660	670	600	425	510	230	945	485	500	570
27	595	555	675	680	605	435	520	310	830	540	480	555
28	590	550	700	640	585	435	580	485	590	555	510	550
29	590	550	700	625	---	430	575	670	565	555	500	580
30	580	550	705	620	---	470	565	670	605	560	510	585
31	595	---	700	620	---	480	---	690	---	560	510	---
MEAN	664	599	620	638	622	506	518	530	649	605	522	555

WTR YR 1981 MEAN 586 MAX 945 MIN 230

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16.0	5.5	.5	.0	.0	1.0	3.5	14.0	17.5	22.0	24.5	21.5
2	14.0	6.0	.5	.0	.0	1.5	4.0	14.0	17.5	22.0	25.0	21.0
3	13.0	7.0	.5	.0	.0	1.5	4.0	14.0	18.5	23.0	25.0	20.0
4	13.5	7.0	.5	.0	.0	1.0	5.0	13.5	18.5	23.5	24.5	19.5
5	13.0	6.0	.5	.0	.0	1.0	5.5	13.5	19.0	24.0	24.5	19.5
6	13.0	6.0	1.0	.0	.0	1.0	7.0	14.0	19.0	24.0	24.0	19.0
7	13.5	5.5	.5	.0	.0	1.0	8.0	14.5	19.5	24.5	24.0	19.0
8	14.0	5.5	.5	.0	.0	1.0	9.5	14.5	20.0	25.5	23.5	19.5
9	14.0	5.5	.5	.0	.0	1.0	9.5	14.5	20.0	25.0	24.5	20.0
10	13.0	4.0	.5	.0	.0	1.0	10.5	14.0	20.0	24.5	24.5	21.0
11	11.0	4.0	.5	.0	.0	1.0	10.5	14.0	19.5	25.0	24.5	21.5
12	9.5	4.0	1.0	.0	.5	1.0	11.0	14.5	19.5	25.5	25.0	21.5
13	8.0	4.0	1.0	.0	.5	1.0	10.0	15.0	19.5	25.5	25.0	21.0
14	8.5	3.5	.5	.0	.5	1.0	10.0	15.0	20.0	24.5	25.5	19.0
15	8.0	3.0	.5	.0	1.0	1.5	9.5	15.0	20.0	23.5	24.5	17.0
16	8.0	3.0	.5	.0	1.0	1.5	10.5	15.5	20.0	23.0	24.5	15.5
17	8.0	2.5	.5	.0	1.5	1.5	10.5	15.5	20.0	23.5	24.0	15.0
18	8.5	2.5	.5	.0	1.5	1.0	10.0	16.0	20.0	24.5	24.0	15.5
19	8.5	3.0	.5	.0	2.0	1.0	10.0	16.0	20.0	25.0	24.0	16.5
20	9.0	2.5	.0	.5	2.0	1.5	10.0	17.0	19.5	25.0	22.5	17.0
21	8.0	3.0	.0	.5	2.0	1.5	10.0	17.5	19.5	25.0	23.5	17.0
22	7.5	2.5	.0	.5	2.0	2.5	10.5	17.5	19.0	23.5	23.0	16.0
23	7.0	2.0	.0	.5	1.5	3.0	10.5	16.5	19.0	23.0	23.0	14.5
24	6.5	2.0	.0	.5	1.5	3.0	10.5	16.5	19.0	23.0	22.5	14.0
25	6.5	1.0	.0	.5	1.5	3.0	11.0	16.5	19.0	23.0	23.0	14.0
26	6.0	1.5	.0	.0	1.0	2.5	11.5	16.5	20.5	22.5	22.5	14.0
27	5.5	1.5	.0	.0	1.0	2.0	11.5	16.5	20.5	22.5	22.5	13.5
28	5.5	1.5	.0	.0	1.0	2.0	12.5	17.0	21.0	23.0	22.5	13.5
29	5.0	1.5	.0	.0	---	2.0	13.0	17.0	21.0	23.0	23.0	13.0
30	5.0	1.5	.0	.0	---	2.5	13.0	17.0	21.5	23.0	23.0	13.0
31	5.5	---	.0	.0	---	2.5	---	17.0	---	23.5	22.0	---
MEAN	9.5	3.5	.5	.0	1.0	1.5	9.5	15.5	19.5	24.0	24.0	17.5

WTR YR 1981 MEAN 10.5 MAX 25.5 MIN .0

05062000 BUFFALO RIVER NEAR DILWORTH, MN

LOCATION.--Lat 46°57'40", long 96°39'40", in SW¼SE¼ sec.6, T.140 N., R.47 W., Clay County, Hydrologic Unit 09020106, on left bank 4.5 mi (7.2 km) southeast of Kragnes, 6.5 mi (10.5 km) northeast of Dilworth, and 9 mi (14 km) downstream from South Branch.

DRAINAGE AREA.--1,040 mi^2 (2,690 km^2), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1931 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1308: 1931(M).

GAGE.--Water-stage recorder. Datum of gage is 878.31 ft (267.709 m) National Geodetic Vertical Datum of 1929 (levels by Corps of Engineers). Prior to Apr. 5, 1937, nonrecording gage at same site and datum.

REMARKS.--Records good except those for winter period, which are fair.

AVERAGE DISCHARGE.--50 years, 128 ft^3/s (3.625 m^3/s), 92,740 acre-ft/yr (114 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,600 ft^3/s (385 m^3/s) July 2, 1975, gage height, 27.10 ft (8.260 m); no flow at times in 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,090 ft^3/s (30.9 m^3/s) May. 23, gage height, 13.02 ft (3.968 m); minimum, 10 ft^3/s (0.28 m^3/s) Sept. 26, gage height, 2.40 ft (0.732 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	39	33	19	17	64	122	56	59	57	39	79
2	25	38	33	19	17	60	149	57	51	67	50	75
3	26	41	32	19	17	55	142	60	48	65	48	73
4	26	40	32	18	17	48	148	60	49	61	44	70
5	29	38	31	18	17	46	143	59	49	56	41	68
6	31	37	30	18	17	48	131	57	48	50	38	70
7	32	38	30	18	17	46	120	55	46	44	45	73
8	36	41	29	18	17	44	108	54	44	38	62	69
9	36	42	28	18	17	40	98	52	40	34	82	64
10	31	42	27	18	17	44	90	49	41	30	95	55
11	29	41	26	18	17	48	82	47	41	27	100	46
12	30	37	25	18	17	50	75	45	41	26	107	41
13	32	35	25	17	17	50	73	43	38	25	110	37
14	29	35	24	17	17	52	76	41	38	31	110	34
15	32	35	23	17	17	54	78	39	43	33	98	29
16	35	35	22	17	17	56	76	36	46	38	84	25
17	39	33	22	17	17	58	71	34	51	36	72	21
18	40	35	22	17	17	60	65	32	57	36	60	20
19	36	36	22	17	20	58	60	28	51	38	51	19
20	36	38	21	17	54	58	57	26	47	39	44	18
21	38	39	21	17	58	62	57	26	44	40	40	16
22	39	37	21	17	56	68	56	64	42	39	35	15
23	38	39	20	17	48	69	56	977	39	39	31	13
24	38	35	20	17	39	68	53	926	38	39	35	12
25	38	35	20	17	42	66	51	733	43	41	38	12
26	39	34	20	17	50	66	51	438	47	43	44	11
27	41	34	19	17	70	70	52	237	47	40	43	12
28	41	34	19	17	70	110	52	136	60	36	51	15
29	41	34	19	17	---	99	54	97	62	34	55	17
30	40	34	19	17	---	91	55	82	55	34	70	15
31	40	---	19	17	---	102	---	70	---	36	83	---
TOTAL	1067	1111	754	542	813	1910	2501	4716	1405	1252	1905	1124
MEAN	34.4	37.0	24.3	17.5	29.0	61.6	83.4	152	46.8	40.4	61.5	37.5
MAX	41	42	33	19	70	110	149	977	62	67	110	79
MIN	24	33	19	17	17	40	51	26	38	25	31	11
AC-FT	2120	2200	1500	1080	1610	3790	4960	9350	2790	2480	3780	2230

CAL YR 1980 TOTAL 25729.5 MEAN 70.3 MAX 1800 MIN 4.1 AC-FT 51030
WTR YR 1981 TOTAL 19100.0 MEAN 52.3 MAX 977 MIN 11 AC-FT 37880

05062000 BUFFALO RIVER NEAR DILWORTH, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1962, 1965, 1968-71, 1973 to current year.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	.0	2.0	---	---	---	---	---
2	---	---	---	---	---	---	7.0	---	---	---	---	---
3	---	---	---	---	---	---	6.0	---	---	---	---	---
4	---	---	---	---	---	---	4.0	---	---	---	---	---
5	---	---	---	---	---	---	6.5	---	---	---	---	---
6	---	---	---	---	---	---	6.0	---	---	---	---	---
7	---	---	---	---	---	---	6.0	---	---	---	---	---
8	---	---	---	---	---	---	8.0	---	---	---	---	---
9	---	---	---	---	---	---	10.0	---	---	---	---	---
10	---	---	---	---	---	---	10.5	---	---	---	---	---
11	---	---	---	---	---	---	6.0	---	---	---	---	---
12	---	---	---	---	---	---	---	---	---	---	---	---
13	---	---	---	---	---	---	---	---	---	---	---	---
14	---	---	---	---	---	---	---	---	---	---	---	---
15	---	---	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	---	---	---
17	---	---	.5	---	---	---	---	---	---	---	---	---
18	---	---	---	---	---	---	---	---	---	---	---	---
19	---	---	---	---	---	---	---	---	---	---	---	---
20	---	---	---	---	.0	---	---	---	---	---	---	---
21	---	---	---	---	.0	---	---	17.5	---	---	---	---
22	---	---	---	.5	.0	---	---	---	---	22.0	---	---
23	5.0	---	---	---	.0	.5	8.0	13.0	17.0	---	---	---
24	---	.0	---	---	.5	---	---	12.0	---	---	---	14.5
25	---	---	---	---	.0	---	---	13.0	---	---	---	---
26	---	---	---	---	.0	---	---	13.0	---	---	23.0	---
27	---	---	---	---	---	---	---	13.5	25.0	---	---	---
28	---	---	---	---	---	2.5	---	15.0	---	---	---	---
29	---	---	---	---	---	4.0	---	17.0	---	---	---	---
30	---	---	---	---	---	4.0	---	---	---	---	---	---
31	---	---	---	---	---	4.0	---	---	---	---	---	---

05062000 BUFFALO RIVER NEAR DILWORTH, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	---	---	---	---	---	---	---	---	---	---	102	18
2	---	---	---	---	---	---	---	---	---	---	---	---
3	---	---	---	---	---	---	---	---	---	---	---	---
4	---	---	---	---	---	---	---	---	---	---	---	---
5	---	---	---	---	---	---	---	---	---	---	---	---
6	---	---	---	---	---	---	---	---	---	---	---	---
7	---	---	---	---	---	---	---	---	---	---	---	---
8	---	---	---	---	---	---	---	---	---	---	---	---
9	---	---	---	---	---	---	---	---	---	---	---	---
10	---	---	---	---	---	---	---	---	---	---	---	---
11	---	---	---	---	---	---	---	---	---	---	---	---
12	---	---	---	---	---	---	---	---	---	---	---	---
13	---	---	---	---	---	---	---	---	---	---	---	---
14	---	---	---	---	---	---	---	---	---	---	---	---
15	---	---	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	---	---	---
17	---	---	---	---	155	9.2	---	---	---	---	---	---
18	---	---	---	---	---	---	---	---	---	---	---	---
19	---	---	---	---	---	---	---	---	---	---	---	---
20	---	---	---	---	---	---	---	---	36	5.2	---	---
21	---	---	---	---	---	---	---	---	33	5.2	---	---
22	---	---	---	---	---	---	138	6.3	22	3.3	---	---
23	81	8.3	---	---	---	---	---	---	69	8.9	24	4.5
24	---	---	137	13	---	---	---	---	73	7.7	---	---
25	---	---	---	---	---	---	---	---	67	7.6	---	---
26	---	---	---	---	---	---	---	---	50	6.8	---	---
27	---	---	---	---	---	---	---	---	---	---	---	---
28	---	---	---	---	---	---	---	---	---	---	23	6.8
29	---	---	---	---	---	---	---	---	---	---	21	5.6
30	---	---	---	---	---	---	---	---	---	---	26	6.4
31	---	---	---	---	---	---	---	---	---	---	24	6.6
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	22	7.2	---	---	---	---	---	---	---	---	---	---
2	22	8.9	---	---	---	---	---	---	---	---	---	---
3	22	8.4	---	---	---	---	---	---	---	---	---	---
4	28	11	---	---	---	---	---	---	---	---	---	---
5	20	7.7	---	---	---	---	---	---	---	---	---	---
6	23	8.1	---	---	---	---	---	---	---	---	---	---
7	23	7.5	---	---	---	---	---	---	---	---	---	---
8	25	7.3	---	---	---	---	---	---	---	---	---	---
9	32	8.5	---	---	---	---	---	---	---	---	---	---
10	60	15	---	---	---	---	---	---	220	56	---	---
11	85	19	---	---	---	---	---	---	208	56	---	---
12	---	---	---	---	---	---	---	---	197	57	---	---
13	---	---	---	---	---	---	---	---	185	55	---	---
14	---	---	---	---	---	---	---	---	175	52	---	---
15	---	---	---	---	---	---	---	---	163	43	---	---
16	---	---	---	---	---	---	---	---	---	---	---	---
17	---	---	---	---	---	---	---	---	---	---	---	---
18	---	---	---	---	---	---	---	---	---	---	---	---
19	---	---	---	---	---	---	---	---	---	---	---	---
20	---	---	---	---	---	---	---	---	---	---	---	---
21	---	---	84	5.9	---	---	---	---	---	---	---	---
22	---	---	137	54	---	---	80	8.4	---	---	---	---
23	115	17	771	2050	124	13	---	---	---	---	---	---
24	---	---	431	1080	---	---	---	---	98	9.3	56	2.3
25	---	---	301	610	---	---	---	---	---	---	---	---
26	---	---	176	209	---	---	---	---	---	---	---	---
27	---	---	140	92	142	18	---	---	---	---	---	---
28	---	---	68	25	---	---	---	---	---	---	---	---
29	---	---	56	14	---	---	---	---	---	---	---	---
30	---	---	---	---	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---

05062500 WILD RICE RIVER AT TWIN VALLEY, MN

LOCATION.--Lat 47°16'00", long 96°14'40", in NW¼NE¼ sec.27, T.144 N., R.44 W., Norman County, Hydrologic Unit 09020108, on left bank 100 ft (30 m) upstream from highway bridge, 0.8 mi (1.3 km) northeast of village of Twin Valley, and 2 mi (3 km) upstream from small tributary.

DRAINAGE AREA.--888 mi^2 (2,300 km^2).

PERIOD OF RECORD.--June 1909 to September 1917, July 1930 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 955: 1941. WSP 1308: 1915(M), 1917(M).

GAGE.--Water-stage recorder. Datum of gage is 1,008.16 ft (307.287 m) National Geodetic Vertical Datum of 1929. (Corps of Engineers bench mark). June 1909 to September 1917, nonrecording gage at site 0.2 mi (0.3 km) downstream at different datum. July 23, 1930, to Nov. 24, 1934, nonrecording gage at highway bridge 100 ft (30 m) downstream from present site at present datum. Nov. 25, 1934, to Aug. 2, 1950, water-stage recorder 80 ft (24 m) upstream from present site at present datum.

REMARKS.--Records good except those for winter period, which are fair. Flow slightly regulated by Rice Lake and many other small lakes above station.

AVERAGE DISCHARGE.--59 years, 172 ft^3/s (4.871 m^3/s), 124,600 acre-ft/yr (154 hm^3/yr); median of yearly mean discharges, 152 ft^3/s (4.30 m^3/s), 110,000 acre-ft/yr (136 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,200 ft^3/s (261 m^3/s) July 22, 1909, gage height, 20.0 ft (6.10 m), site and datum then in use, from rating curve extended above 3,300 ft^3/s (93.5 m^3/s); minimum, 0.5 ft^3/s (0.014 m^3/s) Nov. 4, 1939.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 295 ft^3/s (8.35 m^3/s) Sept. 6, gage height, 3.45 ft (1.052 m); minimum, 11 ft^3/s (0.31 m^3/s) Oct. 2, gage height, 1.20 ft (0.366 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	23	23	17	15	40	132	85	88	164	135	137
2	12	23	22	16	15	38	132	86	81	162	127	248
3	12	23	22	16	15	36	147	91	79	154	121	250
4	12	24	21	16	15	36	136	85	97	150	115	252
5	13	24	21	16	15	36	120	104	104	153	109	248
6	14	24	20	16	15	36	125	98	114	153	109	251
7	14	24	20	16	15	36	117	83	120	138	122	242
8	14	24	20	16	15	36	97	78	128	127	138	227
9	14	25	19	16	15	36	98	79	110	120	145	222
10	13	25	19	16	15	37	101	78	104	115	137	208
11	15	25	19	16	15	38	90	85	103	158	137	191
12	15	27	19	16	15	39	87	85	96	170	115	175
13	15	28	19	16	15	39	85	73	106	169	100	163
14	16	27	18	16	15	40	79	76	112	178	91	150
15	16	26	18	16	15	41	72	75	134	183	84	140
16	18	25	18	16	15	42	75	68	166	196	77	129
17	22	26	18	16	16	43	68	64	166	198	70	118
18	28	26	18	15	18	44	59	62	145	196	60	109
19	25	28	18	15	19	46	76	60	126	188	46	98
20	24	30	18	15	21	49	67	61	118	180	38	86
21	24	29	17	15	24	51	59	61	154	167	37	77
22	26	29	17	15	28	55	52	54	153	167	38	70
23	26	28	17	15	33	60	55	49	158	169	42	66
24	25	28	17	15	35	65	57	60	183	178	73	63
25	25	27	17	15	37	70	71	64	178	174	81	63
26	25	26	17	15	38	75	59	67	182	162	83	72
27	24	25	17	15	39	80	54	64	174	151	83	65
28	24	24	17	15	40	90	58	72	166	142	86	61
29	24	24	17	15	---	112	71	74	158	129	87	57
30	25	23	17	15	---	121	78	79	156	120	84	61
31	23	---	17	15	---	121	---	83	---	150	96	---
TOTAL	595	770	577	483	588	1688	2577	2303	3959	4961	2866	4299
MEAN	19.2	25.7	18.6	15.6	21.0	54.5	85.9	74.3	132	160	92.5	143
MAX	28	30	23	17	40	121	147	104	183	198	145	252
MIN	12	23	17	15	15	36	52	49	79	115	37	57
AC-FT	1180	1530	1140	958	1170	3350	5110	4570	7850	9840	5680	8530

CAL YR 1980 TOTAL 27835.5 MEAN 76.1 MAX 950 MIN 5.5 AC-FT 55210
WTR YR 1981 TOTAL 25666.0 MEAN 70.3 MAX 252 MIN 12 AC-FT 50910

05064000 WILD RICE RIVER AT HENDRUM, MN

LOCATION.--Lat 47°16'05", long 96°47'50", in SE¼SE¼ sec.19, T.144 N., R.48 W., Norman County, Hydrologic Unit 09020108, near center of span on downstream side of highway bridge, 0.5 mi (0.8 km) east of Hendrum and 4 mi (6.4 km) upstream from mouth.

DRAINAGE AREA.--1,600 mi^2 (4,140 km^2), approximately.

PERIOD OF RECORD.--March 1944 to current year.

REVISED RECORDS.--WSP 1728: 1958.

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 836.75 ft (255.041 m) National Geodetic Vertical Datum of 1929 (levels by Corps of Engineers).

REMARKS.--Records fair. Large part of high flow diverted into Marsh River basin at overflow section 3.5 mi (5.6 km) east of Ada. Another diversion into the Marsh River basin formed in 1947, 1.5 mi (2.4 km) southeast of Ada and diverted water at all stages 1947-51, after which it was closed except for a small regulated flow diverted for abatement of pollution from Ada sewage plant effluent. Amount of diversion not known.

AVERAGE DISCHARGE.--37 years, 256 ft^3/s (7.250 m^3/s), 185,500 acre-ft/yr (229 hm^3/yr); median of yearly mean discharges, 206 ft^3/s (5.83 m^3/s), 149,000 acre-ft/yr (184 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,350 ft^3/s (265 m^3/s) Apr. 10, 1978, gage height, 31.42 ft (9.577 m); maximum gage height, 32.30 ft (9.845 m) Apr. 21, 1979, backwater from Red River of the North; no flow some days in 1948-49.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,840 ft^3/s (52.1 m^3/s) May 24, gage height, 14.50 ft (4.420 m) from graph based on gage readings; minimum daily, 8.0 ft^3/s (0.23 m^3/s) Jan. 19-25; minimum gage height observed, 1.93 ft (0.588 m) Dec. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	34	20	11	8.0	26	166	89	86	179	200	111
2	14	32	19	11	8.0	26	184	93	90	185	190	131
3	14	32	19	11	8.0	25	179	97	88	199	187	217
4	14	40	19	10	8.0	25	171	96	90	199	174	240
5	15	34	18	10	8.0	25	164	101	93	182	170	225
6	16	29	18	10	8.0	25	159	90	103	165	245	220
7	16	32	18	9.8	8.0	25	147	92	108	165	255	258
8	17	33	18	9.6	8.0	25	138	94	108	156	247	340
9	17	33	17	9.4	8.0	25	128	77	120	147	248	311
10	16	33	17	9.2	8.0	26	119	82	117	138	229	283
11	17	33	17	9.0	8.0	27	110	84	105	141	208	258
12	18	34	17	9.0	8.0	29	102	85	104	156	194	229
13	18	36	16	8.8	8.0	31	100	91	117	169	186	209
14	19	37	16	8.8	8.2	33	90	82	129	185	158	187
15	22	32	16	8.6	8.6	35	88	76	171	193	144	169
16	26	31	16	8.6	8.8	38	85	72	159	197	130	155
17	30	29	15	8.4	9.6	42	83	71	152	197	124	154
18	35	27	15	8.4	11	45	81	70	174	197	112	142
19	40	30	15	8.2	12	48	72	64	162	201	102	130
20	44	29	14	8.2	13	50	67	62	154	198	93	123
21	42	27	14	8.2	15	54	78	54	169	183	80	115
22	40	25	14	8.2	16	58	76	96	202	182	71	105
23	39	24	13	8.2	18	63	74	1040	197	180	68	99
24	39	23	13	8.2	20	68	72	1480	189	193	78	97
25	38	22	13	8.2	23	74	67	509	192	185	81	97
26	37	22	12	8.2	25	82	70	198	197	190	103	89
27	31	21	12	8.2	26	92	76	128	196	179	106	86
28	32	21	12	8.2	26	105	70	109	195	167	97	97
29	36	20	12	8.2	---	116	73	94	193	159	100	92
30	37	20	11	8.2	---	130	77	81	186	150	101	91
31	34	---	11	8.2	---	150	---	78	---	166	107	---
TOTAL	827	875	477	277.2	344.2	1623	3166	5535	4346	5483	4588	5060
MEAN	26.7	29.2	15.4	8.94	12.3	52.4	106	179	145	177	148	169
MAX	44	40	20	11	26	150	184	1480	202	201	255	340
MIN	14	20	11	8.2	8.0	25	67	54	86	138	68	86
AC-FT	1640	1740	946	550	683	3220	6280	10980	8620	10880	9100	10040

CAL YR 1980 TOTAL 34515.48 MEAN 94.3 MAX 1770 MIN .82 AC-FT 68460
WTR YR 1981 TOTAL 32601.40 MEAN 89.3 MAX 1480 MIN 8.0 AC-FT 64660

05064500 RED RIVER OF THE NORTH AT HALSTAD, MN

LOCATION.--Lat 47°21'10", long 96°50'50", on line between secs.24 and 25, T.145 N., R.49 W., Traill County, Hydrologic Unit 09020107, on left bank on upstream side of highway bridge, 0.5 mi (0.8 km) west of Halstad, 2.5 mi (4.0 km) downstream from Wild Rice River, and at mile 375.2 (603.7 km).

DRAINAGE AREA.--21,800 mi^2 (56,500 km^2), approximately, including 3,800 mi^2 (9,840 km^2) in closed basins.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1936 to June 1937 (no winter records), April 1942 to September 1960 (spring and summer months only), May 1961 to current year.

REVISED RECORDS.--WSP 1388: 1936, 1950. WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 826.65 ft (251.963 m) National Geodetic Vertical Datum of 1929. Prior to July 17, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good. Some regulation by many controlled lakes and reservoirs on tributaries.

AVERAGE DISCHARGE.--20 years (1961-81), 1,761 ft^3/s (49.87 m^3/s), 1,276,000 acre-ft/yr (1.57 km^3/yr); median of yearly mean discharges, 1,640 ft^3/s (46.4 m^3/s), 1,188,000 acre-ft/yr (1.5 km^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 42,000 ft^3/s (1,190 m^3/s) Apr. 22, 1979, gage height, 39.00 ft (11.887 m); minimum observed, 5.4 ft^3/s (0.15 m^3/s) Oct. 8, 9, 12-14, 1936.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in 1897 reached a stage of about 38.5 ft (11.73 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,920 ft^3/s (111 m^3/s) May 25, gage height, 10.57 ft (3.222 m); minimum daily, 123 ft^3/s (3.48 m^3/s) Jan. 18, 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	316	318	354	155	152	390	850	500	522	649	652	321
2	310	323	362	155	145	392	858	522	487	620	630	336
3	305	323	345	155	140	410	922	539	464	620	566	352
4	273	345	362	155	140	417	966	563	427	655	536	385
5	236	407	362	155	144	414	974	566	417	700	636	407
6	202	437	307	150	148	425	946	572	460	780	818	397
7	181	437	257	150	142	432	922	582	517	822	914	414
8	179	420	238	150	139	432	910	569	545	776	870	457
9	181	402	235	150	140	432	906	550	547	723	826	508
10	179	394	230	146	155	440	906	542	542	675	787	464
11	179	392	225	145	155	447	930	517	525	643	759	430
12	189	400	220	144	155	457	950	508	492	604	732	395
13	189	414	215	142	155	470	934	503	484	575	700	347
14	194	404	209	134	160	495	882	484	503	588	662	318
15	196	380	203	133	160	540	773	472	611	627	598	289
16	207	364	198	130	167	600	675	452	617	773	547	265
17	231	350	194	124	175	650	598	437	563	756	482	246
18	259	321	194	123	179	700	542	420	547	776	432	233
19	314	347	198	123	184	750	497	404	617	787	390	216
20	327	354	196	124	205	800	472	367	713	742	360	205
21	321	357	189	126	244	850	447	332	719	710	340	202
22	332	370	187	127	270	890	452	314	700	671	334	191
23	329	345	184	127	277	900	470	1150	687	620	332	178
24	325	347	175	128	300	870	464	2930	662	579	323	173
25	327	347	160	130	330	850	464	3800	639	582	327	175
26	336	334	151	133	357	825	467	3320	617	598	360	178
27	338	347	152	139	382	780	472	2420	585	630	412	170
28	338	354	156	144	390	756	482	1880	575	691	400	160
29	325	338	160	148	---	756	505	1050	604	703	360	163
30	318	338	159	151	---	770	505	752	643	675	343	165
31	321	---	157	152	---	822	---	604	---	675	340	---
TOTAL	8257	11009	6934	4348	5690	19162	21141	28621	17031	21025	16768	8740
MEAN	266	367	224	140	203	618	705	923	568	678	541	291
MAX	338	437	362	155	390	900	974	3800	719	822	914	508
MIN	179	318	151	123	139	390	447	314	417	575	323	160
AC-FT	16380	21840	13750	8620	11290	38010	41930	56770	33780	41700	33260	17340

CAL YR 1980 TOTAL 272767 MEAN 745 MAX 11100 MIN 151 AC-FT 541000
WTR YR 1981 TOTAL 168726 MEAN 462 MAX 3800 MIN 123 AC-FT 334700

05064500 RED RIVER OF THE NORTH AT HALSTAD, MN--Continued
(National stream-quality accounting network station)
(Radiochemical station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1961, 1964-67, 1972 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1977 to current year.
WATER TEMPERATURES: February 1977 to current year.

REMARKS.--Letter E indicates estimated value and letter K indicates non-ideal colony count.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,050 micromhos Oct. 4, 1978; minimum daily, 225 micromhos Apr. 5, 1978.
WATER TEMPERATURES: Maximum daily, 31.0°C July 13, 14, 1980, July 11, 12, 1981; minimum daily, 0.0°C on many days during winter months.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 980 micromhos Feb. 4, 16; minimum daily, 300 micromhos May 25.
WATER TEMPERATURES: Maximum daily, 31.0°C July 11, 12; minimum observed, 0.0°C on many days during winter months.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
OCT 07...	1335	172	796	--	8.5	30.0	13.0	28	10.6	104
NOV 11...	1220	380	892	863	8.9	4.5	3.0	16	13.1	100
DEC 16...	1345	198	962	940	7.8	-1.0	.0	7.6	11.6	82
JAN 19...	1225	124	968	929	7.8	-.5	.0	1.0	5.1	36
FEB 18...	1415	179	860	845	7.8	8.5	.0	4.6	6.6	47
MAR 16...	1305	575	628	597	8.0	10.0	1.0	5.4	13.3	97
APR 27...	1130	E480	848	866	8.7	9.0	13.5	45	6.9	61
MAY 26...	1300	3370	310	299	8.1	16.0	15.0	360	6.8	71
JUN 23...	1225	659	629	616	8.2	17.0	19.0	78	7.6	81
JUL 21...	1435	700	684	686	8.1	25.5	26.0	74	5.9	74
AUG 25...	1130	337	608	595	8.3	25.0	22.5	40	7.7	90
SEP 29...	1335	165	600	579	8.7	16.5	10.0	11	11.4	104

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3) (95902)	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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
OCT 07...	K12	150	260	21	55	30	69	1.9	10	240
NOV 11...	K13	86	310	62	64	37	67	1.7	10	250
DEC 16...	K10	32	370	49	77	43	61	1.4	9.7	320
JAN 19...	K19	K14	370	11	77	42	48	1.1	7.2	340
FEB 18...	K6	54	370	47	81	40	41	.9	7.2	320
MAR 16...	--	120	240	35	53	25	24	.7	5.0	200
APR 27...	K10	120	300	34	64	35	65	1.6	8.3	270
MAY 26...	780	K20000	130	22	28	15	7.6	.3	3.9	110
JUN 23...	K120	850	270	37	54	32	31	.8	6.8	230
JUL 21...	K60	100	250	44	54	29	47	1.3	6.8	210
AUG 25...	220	135	260	39	56	29	25	.7	7.1	220
SEP 29...	K37	K55	260	21	55	30	30	.9	4.9	240

05064500 RED RIVER OF THE NORTH AT HALSTAD, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
OCT										
07...	120	29	.3	18	501	475	233	.22	.24	.000
NOV										
11...	150	35	.4	13	534	529	548	.37	.34	.820
DEC										
16...	140	33	.3	12	587	570	314	.32	.31	.300
JAN										
19...	120	23	.3	15	578	539	194	.62	.51	.740
FEB										
18...	110	20	.3	18	514	513	248	.65	.63	.480
MAR										
16...	83	11	.2	11	353	334	548	.25	.24	.010
APR										
27...	110	52	.4	8.2	525	507	--	.48	.49	.760
MAY										
26...	37	4.7	.1	5.7	176	170	1600	.48	.46	.160
JUN										
23...	81	23	.2	11	383	378	681	.18	.17	.120
JUL										
21...	100	21	.2	18	430	407	813	1.1	1.1	.140
AUG										
25...	81	12	.2	14	365	357	332	.15	.14	.110
SEP										
29...	86	14	.2	13	378	378	168	.08	.08	.110

DATE	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 TOTAL (MG/L AS C) (00680)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT									
07...	.000	1.30	1.0	.300	.230	14	43	20	100
NOV									
11...	.560	3.20	2.2	.610	.010	--	16	16	96
DEC									
16...	.310	3.00	1.3	.250	.180	16	13	6.9	92
JAN									
19...	.700	--	--	.200	.140	18	17	5.7	88
FEB									
18...	.470	1.70	1.5	.230	.190	--	10	4.8	83
MAR									
16...	.030	1.20	1.1	.170	.100	--	--	--	--
APR									
27...	1.10	5.90	2.4	.850	.640	24	--	--	--
MAY									
26...	.160	2.10	1.4	.450	.150	--	730	6640	100
JUN									
23...	.110	2.20	1.6	.260	.100	28	172	306	99
JUL									
21...	.110	1.50	1.0	.600	.460	14	205	387	100
AUG									
25...	.080	1.40	.92	.160	.110	--	70	64	98
SEP									
29...	.130	1.10	1.1	.120	.050	11	19	8.5	95

05064500 RED RIVER OF THE NORTH AT HALSTAD, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA) (01007)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO) (01037)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)
NOV											
11...	1220	4	4	100	200	1	<1	10	0	2	<3
FEB											
18...	1415	2	2	100	100	0	2	0	0	0	<3
MAY											
26...	1300	10	4	200	200	0	0	30	0	0	0
AUG											
25...	1130	7	7	100	100	0	<1	0	0	1	<3

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)
NOV										
11...	20	9	630	20	7	4	100	10	.2	.3
FEB										
18...	6	3	280	30	4	0	80	60	.1	.1
MAY										
26...	35	4	18000	20	25	3	860	10	.3	.1
AUG										
25...	9	5	1300	<10	8	5	120	5	.2	.0

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)
NOV										
11...	20	16	0	0	1	0	30	20	12	.7
FEB										
18...	5	2	0	0	0	2	30	40	39	.4
MAY										
26...	25	2	1	0	1	0	140	20	9.0	2.4
AUG										
25...	8	4	0	1	0	0	40	22	9.5	.7

DATE	TIME	GROSS ALPHA, DIS-SOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS ALPHA, DIS-SOLVED (PCI/L AS U-NAT) (01515)	GROSS ALPHA, SUSP. TOTAL (PCI/L AS U-NAT) (01516)	GROSS BETA, DIS-SOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DIS-SOLVED (PCI/L AS SR/YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90) (80060)	RADIUM 226, DIS-SOLVED, RADON METHOD (PCI/L) (09511)
MAY										
26...	1300	<4.9	31	3.3	21	7.8	37	7.5	35	.61
AUG										
25...	1130	<8.1	3.5	--	2.4	16	3.2	14	3.0	.11

05064500 RED RIVER OF THE NORTH AT HALSTAD, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1980 TO SEPTEMBER 1981

DATE	MAR 16,81		MAY 26,81		JUN 23,81		JUL 21,81		AUG 25,81		SEP 29,81	
TIME	1305		1300		1225		1435		1130		1335	
TOTAL CELLS/ML	10000		3100		26000		13000		5800		5000	
DIVERSITY: DIVISION	0.5		1.3		1.6		1.6		1.3		1.9	
.CLASS	0.5		1.3		1.6		1.6		1.3		1.9	
..ORDER	0.8		2.5		1.9		2.4		1.8		2.1	
...FAMILY	0.8		3.0		2.5		2.9		2.9		2.8	
....GENUS	1.3		3.6		3.7		3.7		3.6		3.2	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)												
.BACILLARIOPHYCEAE												
..ACHNANTHALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	--	-	--	-	--	-	*	0	--	-
..BACILLARIALES												
...NITZSCHIACEAE												
....NITZSCHIA	100	1	400	13	560	2	510	4	310	5	180	4
..EUPODISCALES												
...COSCINODISCACEAE												
....CYCLOTELLA	7400#	72	490#	16	2900	11	700	6	56	1	200	4
....MELOSIRA	--	-	710#	23	1500	6	370	3	*	0	--	-
....STEPHANODISCUS	1400	14	*	0	--	-	--	-	--	-	--	-
..FRAGILARIALES												
...FRAGILARIACEAE												
....ASTERIONELLA	100	1	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	69	2	--	-	--	-	--	-	--	-
..NAVICULALES												
...CYMBELLACEAE												
....CYMBELLA	--	-	*	0	--	-	--	-	--	-	--	-
...GOMPHONEMACEAE												
....GOMPHONEMA	--	-	*	0	--	-	--	-	--	-	--	-
...NAVICULACEAE												
....CALONEIS	--	-	*	0	--	-	--	-	--	-	--	-
....NAVICULA	--	-	120	4	*	0	94	1	70	1	39	1
..SURIRELLALES												
...SURIRELLACEAE												
....SURIRELLA	--	-	120	4	--	-	94	1	*	0	--	-
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...CHLOROCOCCACEAE												
....SCHROEDERIA	100	1	--	-	--	-	--	-	--	-	--	-
...COCCOMYXACEAE												
....ELAKATOTHRIX	--	-	--	-	280	1	--	-	--	-	--	-
...DICTYOSPHAERIACEAE												
....DICTYOSPHAERIUM	--	-	110	4	630	2	280	2	880#	15	790#	16
...HYDRODICTYACEAE												
....PEDIASTRUM	--	-	290	9	--	-	--	-	--	-	--	-
...MICRACTINIACEAE												
....MICRACTINIUM	--	-	--	-	420	2	--	-	98	2	98	2
...OOCYSTACEAE												
....ANKISTRODESMUS	100	1	--	-	490	2	140	1	130	2	200	4
....CHODATELLA	--	-	--	-	--	-	--	-	--	-	*	0
....CLOSTERIOPSIS	--	-	--	-	*	0	--	-	--	-	--	-
....FRANCEIA	--	-	--	-	--	-	*	0	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	840	3	140	1	--	-	79	2
....NEPHROCYTIUM	--	-	--	-	--	-	--	-	56	1	--	-
....OOCYSTIS	--	-	110	4	350	1	230	2	400	7	*	0
....QUADRIGULA	--	-	--	-	--	-	--	-	56	1	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	*	0	--	-
...PALMELLACEAE												
....SPHAEROCYSTIS	--	-	--	-	--	-	370	3	260	5	160	3
...SCENEDESMACEAE												
....ACTINASTRUM	--	-	220	7	560	2	190	1	--	-	--	-
....COELASTRUM	--	-	41	1	2700	11	650	5	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	330	3	170	3	--	-
....GLOEOACTINIUM	--	-	--	-	280	1	330	3	200	3	--	-
....SCENEDESMUS	--	-	27	1	2200	9	1500	12	910#	16	160	3
....TETRASTRUM	--	-	--	-	1400	5	370	3	170	3	79	2
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	1100	11	82	3	910	4	280	2	56	1	160	3
...VOLVOCACEAE												
....PANDORINA	--	-	--	-	--	-	370	3	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

05064500 RED RIVER OF THE NORTH AT HALSTAD, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1980 TO SEPTEMBER 1981--Continued

DATE TIME	MAR 16,81 1305		MAY 26,81 1300		JUN 23,81 1225		JUL 21,81 1435		AUG 25,81 1130		SEP 29,81 1335	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA												
.CHRYSOPHYCEAE												
..OCHROMONADALES												
...OCHROMONADACEAE												
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-	1300#	25
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	--	-	140	1	*	0	--	-	--	-
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	--	-	--	-	*	0	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....AGMENELLUM	--	-	--	-	280	1	--	-	--	-	490	10
....ANACYSTIS	--	-	--	-	5200#	20	3500#	28	390	7	--	-
....GOMPHOSPHAERIA	--	-	--	-	3600	14	--	-	--	-	1100#	22
..NOSTOCALES												
...HAMMATOIDEACEAE												
....RAPHIDIOPSIS	--	-	55	2	--	-	--	-	--	-	--	-
..OSCILLATORIALES												
...OSCILLATORIACEAE												
....LYNGBYA	--	-	--	-	--	-	--	-	200	3	--	-
....OSCILLATORIA	--	-	140	4	--	-	1900	15	1300#	22	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	55	2	--	-	--	-	*	0	--	-
....PHACUS	--	-	--	-	*	0	--	-	*	0	--	-
....TRACHELOMONAS	--	-	27	1	210	1	140	1	*	0	--	-
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..DINOKONTAE												
...PERIDINIACEAE												
....PERIDINIUM	--	-	--	-	*	0	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

05064500 RED RIVER OF THE NORTH AT HALSTAD, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	750	800	850	920	880	700	520	760	540	750	600	570
2	755	800	830	900	890	650	500	750	560	740	580	590
3	750	810	900	890	920	640	550	730	560	680	600	600
4	760	800	800	930	980	650	525	710	580	670	580	600
5	770	820	830	750	960	640	550	710	---	650	580	580
6	790	800	820	730	920	650	580	700	450	650	540	690
7	790	800	870	700	900	700	600	700	550	640	530	695
8	810	805	900	690	910	710	600	720	600	660	550	680
9	780	830	880	680	900	700	650	740	750	670	560	640
10	800	820	890	700	920	760	650	730	740	700	540	570
11	810	800	950	720	900	750	680	720	720	740	540	570
12	800	800	940	720	860	670	720	710	710	780	540	600
13	820	780	960	730	900	650	700	730	700	725	560	610
14	850	750	950	750	910	620	720	745	650	720	580	600
15	860	750	960	730	950	600	720	750	680	700	580	620
16	820	730	930	720	980	550	740	750	650	620	580	650
17	830	700	940	730	910	570	700	750	640	600	570	630
18	800	700	930	750	890	560	710	750	620	630	560	640
19	810	720	910	880	850	560	680	740	650	640	580	630
20	800	710	900	870	860	570	670	725	660	660	600	640
21	820	700	900	890	840	550	650	700	650	660	580	650
22	790	750	900	900	820	540	660	720	655	670	600	650
23	720	730	920	880	800	500	650	---	630	670	610	630
24	670	740	920	900	760	500	690	---	660	660	600	610
25	740	800	930	890	750	480	700	300	640	660	610	600
26	750	780	920	900	780	480	720	320	630	660	600	620
27	770	800	930	870	800	460	800	330	650	660	580	600
28	750	800	920	820	770	490	800	330	680	650	600	600
29	730	800	930	830	---	500	800	320	710	640	580	610
30	810	780	910	830	---	520	800	440	740	620	600	600
31	900	---	920	800	---	500	---	520	---	610	600	---
MEAN	787	774	905	806	875	594	668		643	670	578	619

WTR YR 1981 MEAN 713 MAX 980 MIN 300

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.0	3.5	.5	.0	1.0	1.0	4.5	16.0	17.0	26.5	25.0	22.5
2	12.5	5.0	.5	.0	1.0	1.0	6.0	16.0	17.5	27.0	24.0	24.0
3	13.0	5.5	.5	.0	1.0	1.0	7.0	16.0	17.5	28.0	26.0	20.0
4	11.5	5.5	.5	.0	1.0	1.0	8.0	15.0	17.5	28.5	26.5	22.0
5	13.0	5.5	.5	.0	1.0	1.0	8.5	15.5	18.0	28.5	26.0	18.5
6	13.5	5.5	.0	.0	1.0	1.0	9.0	16.5	20.0	29.5	25.5	19.0
7	16.0	5.5	.0	.0	1.0	1.0	9.0	16.5	21.0	30.0	28.5	18.0
8	16.0	7.0	.0	.0	1.0	1.0	9.5	17.0	21.0	30.0	25.0	22.0
9	14.5	7.0	.0	.0	1.0	1.0	10.5	13.0	21.5	30.0	24.0	25.0
10	13.0	6.0	.0	.0	1.0	1.0	11.0	12.0	22.5	30.0	24.0	25.5
11	9.0	4.5	.0	.0	1.0	1.0	9.0	16.0	23.0	31.0	24.5	25.5
12	8.0	3.5	.0	.5	1.0	3.0	9.0	16.0	23.0	31.0	25.0	25.0
13	8.0	3.0	.0	.5	1.0	2.0	9.0	17.0	23.0	28.5	26.5	24.0
14	7.5	3.0	.0	.5	1.0	1.0	10.0	17.5	22.0	28.0	26.5	18.5
15	7.5	3.0	.0	.5	1.0	1.0	11.5	17.5	22.0	25.0	26.0	17.0
16	7.0	2.0	.0	.5	1.0	1.0	13.0	18.0	21.0	25.0	25.0	16.0
17	7.0	1.0	.0	.5	1.0	1.0	12.0	19.0	22.0	26.0	25.0	16.5
18	6.0	1.0	.0	.5	1.0	1.0	13.5	21.0	22.0	26.0	24.0	16.5
19	6.0	1.0	.0	.5	1.0	1.0	13.0	22.0	19.5	27.0	25.0	17.0
20	7.0	1.0	.0	.5	1.0	1.0	13.0	22.0	19.0	28.0	24.0	17.0
21	7.0	1.0	.0	.5	1.0	1.0	10.0	22.0	19.0	26.5	25.0	16.0
22	6.0	1.0	.0	.5	1.0	1.5	9.0	22.0	21.0	25.0	23.0	16.0
23	6.0	1.0	.0	.5	1.0	1.5	10.0	---	19.5	24.5	23.0	15.0
24	5.5	1.0	.0	.5	1.0	1.5	12.0	---	22.5	25.0	24.0	15.0
25	3.0	1.0	.0	.5	1.0	2.0	13.0	15.5	23.0	25.0	24.0	14.0
26	5.0	1.0	.0	.0	1.0	2.0	15.0	16.0	23.5	24.5	24.5	13.0
27	3.5	1.0	.0	.0	1.0	2.0	14.0	16.5	24.0	24.0	25.0	10.0
28	3.5	1.0	.0	.0	1.0	2.0	13.0	18.0	24.0	25.5	25.0	11.0
29	4.0	.5	.0	.0	---	2.0	14.0	18.5	25.0	27.0	25.0	12.0
30	4.0	.5	.0	.0	---	2.0	15.0	19.0	26.0	25.5	25.0	12.0
31	3.0	---	.0	.0	---	2.5	---	17.0	---	25.5	24.0	---
MEAN	8.5	3.0	.0	.0	1.0	1.5	10.5		21.5	27.0	25.0	18.0

WTR YR 1981 MEAN 11.0 MAX 31.0 MIN .0

05067500 MARSH RIVER NEAR SHELLY, MN

LOCATION.--Lat 47°24'45", long 96°45'50", in NE¼NW¼ sec.3, T.145 N., R.48 W., Norman County, Hydrologic Unit 09020107, near center of span on downstream truss of bridge, 3.8 mi (6.1 km) southeast of Shelly and 10 mi (16 km) upstream from mouth.

DRAINAGE AREA.--151 mi^2 (391 km^2).

PERIOD OF RECORD.--March 1944 to current year. Monthly discharge only for March 1944, published in WSP 1308.

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 841.14 ft (356.379 m) National Geodetic Vertical Datum of 1929 (levels by Corps of Engineers). Prior to Oct. 1, 1965, nonrecording gage at datum 3.0 ft (0.914 m) higher.

REMARKS.--Records poor. Large part of high flow of Wild Rice River diverted into Marsh River basin at overflow section 4.6 mi (5.6 km) east of Ada. Another diversion from Wild Rice River basin formed in 1947, 1.5 mi (2.4 km) southeast of Ada and diverted water at all stages 1947-51, after which it was closed except for a small regulated flow diverted for abatement of pollution from Ada sewage plant effluent.

AVERAGE DISCHARGE.--37 years, 66.3 ft^3/s (1.878 m^3/s), 48,030 acre-ft/yr (59.2 hm^3/yr); median of yearly mean discharges, 31 ft^3/s (0.88 m^3/s), 22,500 acre-ft/yr (28 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,880 ft^3/s (138 m^3/s) Apr. 19, 1979, gage height, 23.36 ft (7.120 m), from floodmark; no flow for many days most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 896 ft^3/s (25.4 m^3/s) May 23, gage height, 11.03 ft (3.362 m); no flow on many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	1.7	.08	.20	2.7	7.0	.56	.10
2	.00	.00	.00	.00	.00	.96	.06	.10	2.1	3.9	.69	.10
3	.00	.00	.00	.00	.00	.62	.12	.04	5.0	3.6	.82	.08
4	.00	.00	.00	.00	.00	.62	.17	.02	1.4	3.0	.40	.06
5	.00	.00	.00	.00	.00	.75	.19	.00	3.4	2.1	.45	.04
6	.00	.00	.00	.00	.00	.62	.22	.00	13	1.6	.40	.01
7	.00	.00	.00	.00	.00	.62	.12	.00	6.2	1.1	.25	.10
8	.00	.00	.00	.00	.00	.65	.14	.00	4.3	.82	.28	34
9	.00	.00	.00	.00	.00	.68	.14	.00	3.4	.75	.17	27
10	.00	.00	.00	.00	.00	.62	.10	.00	1.6	1.1	.10	15
11	.00	.00	.00	.00	.00	.96	.06	.00	1.2	1.4	.12	15
12	.00	.00	.00	.00	.00	7.4	.08	.00	.96	1.4	.06	15
13	.00	.00	.00	.00	.00	3.2	.04	.00	1.0	1.3	.04	12
14	.00	.00	.00	.00	.00	6.2	.04	.00	.92	1.0	.04	8.7
15	.00	.00	.00	.00	.07	1.3	.02	.00	.96	1.1	.04	6.4
16	.00	.00	.00	.00	.45	5.0	.02	.00	7.0	.96	.04	3.0
17	.00	.00	.00	.00	1.4	1.1	.02	.00	8.7	.82	.04	1.0
18	.00	.00	.00	.00	1.4	.82	.02	.00	7.4	.68	.22	.40
19	.00	.00	.00	.00	1.8	.68	.01	.00	3.4	.50	.20	.20
20	.00	.00	.00	.00	3.2	.96	.01	.00	2.7	.32	.12	.20
21	.00	.00	.00	.00	2.2	.50	.01	.00	1.9	.25	.02	.20
22	.00	.00	.00	.00	6.0	.40	.01	.12	5.2	.20	.02	.10
23	.00	.00	.00	.00	3.1	.45	.01	510	5.6	.20	.02	.10
24	.00	.00	.00	.00	4.8	.36	.01	628	5.6	.14	.02	.10
25	.00	.00	.00	.00	3.7	.40	.01	175	2.8	.25	.02	.10
26	.00	.00	.00	.00	4.1	.50	.01	68	1.6	.18	.10	.10
27	.00	.00	.00	.00	3.2	.50	.02	41	1.9	.12	.20	.01
28	.00	.00	.00	.00	2.7	.45	.02	28	4.1	.08	.28	.01
29	.00	.00	.00	.00	---	.40	.08	18	4.8	.10	.20	.01
30	.00	.00	.00	.00	---	.50	.50	8.2	6.8	.10	.14	.01
31	.00	---	.00	.00	---	.32	---	2.2	---	.56	.10	---
TOTAL	.00	.00	.00	.00	38.12	40.24	2.34	1478.88	117.64	36.63	6.16	139.13
MEAN	.000	.000	.000	.000	1.36	1.30	.078	47.7	3.92	1.18	.20	4.64
MAX	.00	.00	.00	.00	6.0	7.4	.50	628	13	7.0	.82	34
MIN	.00	.00	.00	.00	.00	.32	.01	.00	.92	.08	.02	.01
AC-FT	.00	.00	.00	.00	76	80	4.6	2930	233	73	12	276

CAL YR 1980 TOTAL 3414.73 MEAN 9.33 MAX 566 MIN .00 AC-FT 6770
WTR YR 1981 TOTAL 1859.14 MEAN 5.09 MAX 628 MIN .00 AC-FT 3690

05069000 SAND HILL RIVER AT CLIMAX, MN

LOCATION.--Lat 47°36'43", long 96°48'52", in NE¼NE¼ sec.30, T.148 N., R.48 W., Polk County, Hydrologic Unit 09020301, near center of span on downstream side of bridge on U.S. Highway 75 in Climax and 3.7 mi (6.0 km) upstream from mouth.

DRAINAGE AREA.--426 mi^2 (1,103 km^2).

PERIOD OF RECORD.--March 1943 to current year (winter records incomplete in some years). Monthly discharge only for some periods, published in WSP 1308 and 1728.

REVISED RECORDS.--WSP 1388: 1943(M), 1944, 1947(M). WSP 1728: 1951(M), 1960 (Average discharge).

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 820.10 ft (249.966 m) National Geodetic Vertical Datum of 1929 (levels by Corps of Engineers). Prior to Oct. 1, 1966, nonrecording gage at site 3.2 mi (5.1 km) upstream at datum 12.78 ft (3.90 m) higher. Nonrecording gage and crest-stage gage at site 3.2 mi (5.1 km) upstream at datum 12.78 ft (3.90 m) higher (used as supplementary gage during periods of backwater from the Red River).

REMARKS.--Records fair except those for the winter period, which are poor.

AVERAGE DISCHARGE.--35 years (water years 1947-81), 69.7 ft^3/s (1.974 m^3/s), 50,500 acre-ft/yr (62.3 hm^3/yr); median of yearly mean discharges, 51 ft^3/s (1.44 m^3/s), 36,900 acre-ft/yr (45 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,560 ft^3/s (129 m^3/s) Apr. 14, 1965, gage height, 17.81 ft (5.428 m), site and datum then in use; maximum gage height, 32.79 ft (9.994 m) Apr. 23, 1979, from floodmark (backwater from Red River of the North); minimum daily discharge, 1.0 ft^3/s (0.03 m^3/s) Jan. 17, 18, 1962.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 362 ft^3/s (10.3 m^3/s) May 24, gage height, 7.20 ft (2.195 m), from graph based on gage readings; minimum daily, 7.7 ft^3/s (0.22 m^3/s) Feb. 6-14; minimum gage height, 4.10 ft (1.250 m); Aug. 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.2	16	12	8.6	7.8	26	44	20	49	52	25	23
2	11	16	12	8.5	7.8	30	47	35	47	44	20	21
3	11	17	11	8.5	7.8	30	48	31	43	41	15	19
4	12	16	11	8.4	7.8	30	40	31	39	36	20	16
5	15	17	11	8.4	7.8	29	36	26	39	32	20	19
6	20	16	10	8.4	7.7	29	33	25	43	28	20	25
7	14	16	10	8.3	7.7	29	31	22	35	25	26	31
8	13	17	10	8.3	7.7	29	39	19	31	22	32	39
9	12	17	9.9	8.2	7.7	29	30	19	24	20	24	49
10	12	16	9.8	8.2	7.7	29	28	20	22	21	22	49
11	12	16	9.7	8.2	7.7	28	25	18	20	23	21	56
12	13	17	9.6	8.1	7.7	28	23	16	19	24	19	78
13	13	16	9.5	8.1	7.7	28	20	16	24	27	18	101
14	14	16	9.4	8.0	7.7	28	19	15	27	26	16	88
15	15	16	9.4	8.0	7.8	27	19	14	34	26	14	74
16	16	16	9.3	8.0	8.1	27	22	14	43	29	12	59
17	18	14	9.2	7.9	8.8	29	17	13	32	23	11	52
18	20	11	9.2	7.9	9.8	29	19	13	30	19	10	39
19	20	16	9.1	7.8	11	29	18	13	28	17	10	32
20	20	18	9.0	7.8	13	28	19	12	25	17	9.9	25
21	19	16	9.0	7.8	15	27	17	14	29	15	9.8	12
22	17	16	8.9	7.8	17	26	18	17	33	15	9.3	12
23	17	15	8.9	7.8	20	25	17	218	45	16	9.1	22
24	17	15	8.8	7.8	23	35	17	288	42	23	11	13
25	17	14	8.8	7.8	25	50	16	203	55	25	16	15
26	17	14	8.8	7.8	25	45	16	135	58	17	17	14
27	17	13	8.7	7.8	25	40	18	81	56	17	17	12
28	17	13	8.7	7.8	24	42	19	63	61	17	16	13
29	17	12	8.6	7.8	---	55	23	53	63	17	17	14
30	17	12	8.6	7.8	---	50	22	57	68	16	20	14
31	17	---	8.6	7.8	---	50	---	52	---	24	22	---
TOTAL	478.2	460	296.5	249.4	340.8	1016	760	1573	1164	754	529.1	1036
MEAN	15.4	15.3	9.56	8.05	12.2	32.8	25.3	50.7	38.8	24.3	17.1	34.5
MAX	20	18	12	8.6	25	55	48	288	68	52	32	101
MIN	8.2	11	8.6	7.8	7.7	25	16	12	19	15	9.1	12
AC-FT	949	912	588	495	676	2020	1510	3120	2310	1500	1050	2050

CAL YR 1980 TOTAL 14489.3 MEAN 39.6 MAX 850 MIN 3.3 AC-FT 28740
WTR YR 1981 TOTAL 8657.0 MEAN 23.7 MAX 288 MIN 7.7 AC-FT 17170

05074000 LOWER RED LAKE NEAR RED LAKE, MN

LOCATION.--Lat 47°57'27", long 95°16'34", in SW¼NW¼ sec.28, T.152 N., R.36 W., Clearwater County, Hydrologic Unit 09020302, on Red Lake Indian Reservation, on left bank just upstream from dam at outlet, 13 mi (21 km) northwest of village of Red Lake.

DRAINAGE AREA.--1,950 mi^2 (5,050 km^2), approximately.

PERIOD OF RECORD.--June 1930 to November 1932 (published as Red Lake at Redby), May 1933 to current year (published as Red Lake near Red Lake 1933-40); records on Upper Red Lake published as Red Lake at Waskish, April 1930 to September 1933, all in reports of Geological Survey. October 1921 to September 1929 gage heights at Redby and on Upper Red Lake at Waskish in files of Minnesota Department of Conservation (fragmentary).

GAGE.--Water-stage recorder. Datum of gage is 1,169.00 ft (356.311 m), adjustment of 1912 (levels by Corps of Engineers). May 1933 to Sept. 6, 1934, nonrecording gage at same site and datum. Nonrecording gages at Waskish and Redby at datum 69.00 ft (21.031 m) lower.

REMARKS.--Water level subject to fluctuation caused by change in direction and velocity of wind and by seiches.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 9.53 ft (2.905 m) June 25, 1950; minimum recorded, 0.80 ft (0.244 m) Nov. 20, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 5.94 ft (1.811 m) Aug. 2; maximum daily, 5.37 ft (1.637 m) July 14; minimum, 3.56 ft (1.085 m), probably occurred Sept. 27; minimum daily recorded, 4.04 ft (1.231 m) Oct. 10, but may have been less during period of no gage-height record Sept. 27-30.

MONTHEND GAGE HEIGHT, IN FEET, OCTOBER 1980 TO SEPTEMBER 1981

Oct. 31 ..... 4.31	Feb. 27 ..... 4.65	June 30 ..... 5.14
Nov. 30 ..... 4.56	Mar. 31 ..... 4.73	July 31 ..... 5.00
Dec. 31 ..... 4.56	Apr. 30 ..... 4.77	Aug. 31 ..... 5.03
Jan. 31 ..... 4.66	May 31 ..... 4.76	Sept.26 ..... 4.61

NOTE.--Mean daily gage heights are available.

05074500 RED LAKE RIVER NEAR RED LAKE, MN

LOCATION.--Lat 47°57'27", long 95°16'35", in SW¼NW¼ sec.28, T.152 N., R.36 W., Clearwater County, Hydrologic Unit 09020302, on Red Lake Indian Reservation, on left bank 50 ft (15 m) downstream from dam at outlet of Lower Red Lake and 13 mi (21 km) northwest of village of Red Lake.

DRAINAGE AREA.--1,950 mi^2 (5,050 km^2), approximately.

PERIOD OF RECORD.--May 1933 to current year. Monthly discharge only for May 1933, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 1,167.00 ft (355.702 m), adjustment of 1912 (levels by Corps of Engineers). Prior to Sept. 7, 1934, nonrecording gage at site 50 ft (15 m) upstream at datum 2.00 ft (0.610 m) higher. Sept. 7, 1934, to Nov. 26, 1951, water-stage recorder at present site at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records fair. Flow completely regulated by outlet dam on Lower Red Lake.

AVERAGE DISCHARGE.--48 years, 485 ft^3/s (13.74 m^3/s), 351,400 acre-ft/yr (433 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,600 ft^3/s (102 m^3/s) June 25, 1950, gage height, 11.19 ft (3.411 m), affected by seiches and backwater from aquatic vegetation, present datum, from rating curve extended above 1,400 ft^3/s (39.6 m^3/s); no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 461 ft^3/s (13.1 m^3/s) Aug. 31, gage height, 4.46 ft (1.359 m); maximum gage height, 4.64 ft (1.414 m) July 23; minimum daily disoharge, 34 ft^3/s (0.96 m^3/s) Apr. 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	102	53	66	54	54	66	87	51	77	314	406	435
2	99	48	65	54	54	66	72	43	82	331	409	425
3	87	60	64	54	54	67	72	53	82	345	419	428
4	82	63	63	54	54	67	73	51	89	351	412	419
5	84	58	62	54	54	68	67	46	102	354	425	409
6	84	55	61	54	54	68	60	48	96	357	438	416
7	85	51	60	54	54	69	65	50	92	354	432	432
8	90	53	59	54	54	69	65	51	97	363	435	422
9	87	65	58	54	54	70	58	58	94	360	435	419
10	90	58	58	54	54	70	60	48	97	366	428	416
11	90	53	57	54	54	71	56	46	96	372	428	419
12	78	60	56	54	55	72	50	50	92	372	428	416
13	63	62	56	54	55	73	65	55	92	372	425	416
14	60	63	56	54	55	75	62	56	97	375	435	416
15	65	87	56	54	55	77	53	60	106	378	435	416
16	53	89	56	54	55	77	48	51	107	378	425	409
17	62	65	56	54	56	68	50	50	101	381	425	406
18	72	84	56	54	58	84	50	62	100	384	425	400
19	67	75	56	54	59	75	50	75	99	381	422	400
20	70	75	56	54	60	68	43	75	96	384	419	400
21	65	87	56	54	60	63	39	73	97	378	435	400
22	53	68	56	54	61	70	51	75	99	366	428	390
23	55	85	56	54	62	63	60	78	97	381	432	390
24	63	82	55	54	63	68	43	78	107	403	435	390
25	68	78	55	54	63	78	34	84	106	419	435	381
26	58	75	55	54	64	78	41	80	101	416	435	390
27	56	73	55	54	64	70	43	80	99	409	435	394
28	58	72	54	54	65	78	50	80	111	409	435	366
29	53	69	54	54	---	70	43	80	114	400	432	360
30	55	67	54	54	---	67	53	80	177	403	428	369
31	55	---	54	54	---	65	---	84	---	412	441	---
TOTAL	2209	2033	1781	1674	1604	2190	1663	1951	3002	11668	13277	12149
MEAN	71.3	67.8	57.5	54.0	57.3	70.6	55.4	62.9	100	376	428	405
MAX	102	89	66	54	65	84	87	84	177	419	441	435
MIN	53	48	54	54	54	63	34	43	77	314	406	360
AC-FT	4380	4030	3530	3320	3180	4340	3300	3870	5950	23140	26330	24100

CAL YR 1980 TOTAL 144655 MEAN 395 MAX 834 MIN 48 AC-FT 286900
WTR YR 1981 TOTAL 55201 MEAN 151 MAX 441 MIN 34 AC-FT 109500

05075000 RED LAKE RIVER AT HIGH LANDING, NEAR GOODRIDGE, MN

LOCATION.--Lat 48°02'34", long 95°48'28", in NW¼NW¼ sec.28, T.153 N., R.40 W., Pennington County, Hydrologic Unit 09020303, on left bank 50 ft (15 m) upstream from highway bridge at High Landing, 7 mi (11 km) south of Goodridge and 33 mi (53 km) upstream from Thief River.

DRAINAGE AREA.--2,300 mi^2 (6,000 km^2), approximately.

PERIOD OF RECORD.--September 1929 to current year. Prior to October 1930, published as "at Kratka".

GAGE.--Water-stage recorder. Datum of gage is 1,141.57 ft (347.951 m), adjustment of 1912 (levels by Corps of Engineers). See WSP 1308 or 1738 for history of changes prior to Oct. 1, 1949.

REMARKS.--Records good except those for winter period, which are poor. Flow regulated by outlet dam on Lower Red Lake.

AVERAGE DISCHARGE.--52 years, 537 ft^3/s (15.21 m^3/s), 389,100 acre-ft/yr (480 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,060 ft^3/s (115 m^3/s) July 7, 1975, gage height, 13.39 ft (4.081 m); maximum gage height, 13.44 ft (4.097 m) July 3, 1975; no flow during infrequent periods in 1931-34, 1936-37.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 577 ft^3/s (16.3 m^3/s) June 29, gage height, 5.71 ft (1.740 m); minimum daily, 59 ft^3/s (1.67 m^3/s) Dec. 13-26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	81	74	66	60	61	83	99	77	83	258	404	471
2	79	74	64	60	61	82	125	77	92	352	406	471
3	83	71	63	60	61	82	120	77	87	378	409	458
4	87	70	62	60	61	82	106	75	85	368	415	450
5	84	72	61	60	61	82	95	77	92	357	426	456
6	80	72	60	60	61	83	92	77	88	349	468	464
7	79	74	60	60	61	85	84	76	90	348	466	526
8	78	77	60	60	62	87	83	74	85	340	456	506
9	82	75	60	60	62	92	84	76	82	335	449	481
10	79	76	60	60	62	96	79	76	90	338	450	470
11	77	108	60	60	62	100	77	76	85	387	450	470
12	84	91	60	60	62	104	81	74	85	382	452	460
13	83	90	59	60	62	109	76	73	91	362	454	452
14	84	87	59	60	63	113	74	74	95	364	454	450
15	80	70	59	60	64	115	77	74	98	375	454	449
16	80	70	59	60	66	115	75	75	94	370	456	449
17	91	87	59	60	68	114	70	76	97	359	460	449
18	80	84	59	60	72	112	74	73	93	352	458	447
19	81	80	59	60	78	109	76	73	90	352	454	437
20	82	92	59	60	82	105	73	73	98	359	458	441
21	79	79	59	60	86	104	74	73	95	357	481	445
22	82	92	59	61	88	103	73	73	97	359	508	447
23	86	89	59	61	90	105	70	75	99	352	492	452
24	81	63	59	61	90	110	74	79	102	352	488	450
25	80	78	59	61	90	115	75	82	94	365	490	448
26	79	75	59	61	89	120	72	78	95	377	481	455
27	82	73	60	61	87	122	73	78	101	382	473	427
28	75	71	60	61	85	120	77	77	332	385	470	433
29	79	69	60	61	---	120	76	76	528	392	466	445
30	73	67	60	61	---	120	77	78	349	394	464	465
31	69	---	60	61	---	105	---	80	---	406	471	---
TOTAL	2499	2350	1862	1870	1997	3194	2461	2352	3692	11206	14183	13724
MEAN	80.6	78.3	60.1	60.3	71.3	103	82.0	75.9	123	361	458	457
MAX	91	108	66	61	90	122	125	82	528	406	508	526
MIN	69	63	59	60	61	82	70	73	82	258	404	427
AC-FT	4960	4660	3690	3710	3960	6340	4880	4670	7320	22230	28130	27220

CAL YR 1980 TOTAL 162001 MEAN 443 MAX 1420 MIN 59 AC-FT 321300
WTR YR 1981 TOTAL 61390 MEAN 168 MAX 528 MIN 59 AC-FT 121800

05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN

LOCATION.--Lat 48°11'08", long 96°10'11", in NW¼SW¼ sec.3, T.154 N., R.43 W., Marshall County, Hydrologic Unit 09020304, on right bank, 0.2 mi (0.3 km) upstream from highway bridge, 5 mi (8 km) north of city of Thief River Falls, 7 mi (11 km) upstream from mouth, and 9 mi (14 km) downstream from Mud Lake National Wildlife Refuge.

DRAINAGE AREA.--959 mi^2 (2,484 km^2).

PERIOD OF RECORD.--July 1909 to September 1917, April 1920 to September 1921, October 1922 to September 1924, October 1928 to current year. Monthly discharge only for some periods, annual maximums for water years 1919, 1922, 1925, 1926, published in WSP 1308.

REVISED RECORDS.--WSP 925: Drainage area. WSP 1308: 1917(M), 1924(M), 1929(M), 1931-33(M), 1935(M), 1937(M).

GAGE.--Water-stage recorder and control of grouted boulders. Datum of gage is 1,112.33 ft (339.038 m) National Geodetic Vertical Datum of 1929 (levels by Minnesota Department of Transportation). Prior to May 4, 1939, nonrecording gages at same site and datum.

REMARKS.--Records good except those for winter period, which are poor. Some regulation by Thief and Mud Lakes.

AVERAGE DISCHARGE.--64 years, 158 ft^3/s (4.475 m^3/s), 114,500 acre-ft/yr (141 hm^3/yr); median of yearly mean discharges, 106 ft^3/s (3.00 m^3/s), 76,800 acre-ft/yr (95 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,610 ft^3/s (159 m^3/s) May 13, 1950, gage height, 17.38 ft (5.297 m); no flow at times in some years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 620 ft^3/s (17.6 m^3/s) June 28, gage height, 7.08 ft (2.158 m); no flow on many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.9	4.5	2.9	.02	.00	3.0	38	3.8	19	398	6.6	15
2	4.3	4.5	2.4	.02	.00	2.5	32	4.7	37	336	5.5	8.0
3	3.9	4.5	1.9	.01	.00	2.0	30	5.2	27	278	4.8	4.5
4	3.8	4.3	1.6	.01	.00	1.8	22	5.3	24	229	4.1	2.8
5	3.3	4.1	1.5	.00	.00	1.5	16	5.4	33	202	3.5	2.0
6	3.1	3.9	1.4	.01	.00	1.3	11	5.3	35	177	3.5	19
7	2.9	4.7	1.2	.00	.00	1.2	8.6	4.8	41	163	3.8	132
8	3.1	5.5	1.1	.00	.00	1.1	6.8	5.0	40	143	4.9	78
9	3.3	5.0	1.0	.00	.00	1.0	5.8	9.1	35	134	5.3	45
10	3.3	4.7	.90	.00	.00	1.0	4.8	8.5	30	118	4.1	28
11	3.1	5.3	.80	.00	.00	1.0	4.5	6.5	25	106	3.9	18
12	2.6	7.0	.70	.00	.00	1.2	4.2	6.1	21	95	3.9	12
13	2.6	7.0	.60	.00	.00	2.0	3.7	6.0	20	85	3.9	10
14	2.8	6.8	.52	.01	.00	4.0	3.6	5.7	39	80	3.6	7.2
15	2.8	6.2	.36	.02	.01	7.0	3.3	5.5	99	76	3.2	5.4
16	3.2	7.0	.32	.01	.02	12	3.2	4.9	65	71	2.9	4.5
17	4.5	7.0	.29	.00	.05	20	2.9	4.4	52	66	2.6	4.1
18	4.5	6.2	.26	.01	.15	30	2.4	4.6	47	58	2.3	3.7
19	4.7	5.7	.23	.01	.40	25	2.7	4.8	37	51	1.9	2.6
20	4.5	5.8	.21	.00	.90	20	2.4	4.4	30	55	1.7	2.1
21	5.1	5.2	.18	.01	2.0	17	2.4	4.2	23	49	4.9	1.6
22	5.1	5.0	.15	.01	5.0	15	2.3	4.2	20	45	4.7	1.5
23	5.1	5.0	.12	.00	10	15	2.2	7.0	26	49	3.5	2.6
24	5.3	4.7	.10	.02	8.0	15	2.1	6.7	36	47	4.0	3.0
25	5.5	4.2	.08	.04	6.5	20	2.2	6.1	48	33	2.9	2.9
26	5.3	3.9	.07	.05	5.0	30	2.1	5.7	49	30	2.0	3.3
27	5.7	3.7	.06	.06	4.0	54	2.3	6.0	44	29	1.2	3.8
28	5.5	3.5	.05	.07	3.5	57	2.4	7.1	525	26	.85	4.8
29	5.7	3.3	.04	.02	---	58	3.1	9.0	501	18	.61	4.4
30	5.5	3.3	.03	.01	---	56	3.5	11	468	12	.44	5.9
31	5.0	---	.03	.00	---	48	---	13	---	8.4	3.7	---
TOTAL	129.0	151.5	21.10	.42	45.53	523.6	232.5	190.0	2496	3267.4	104.80	437.7
MEAN	4.16	5.05	.68	.014	1.63	16.9	7.75	6.13	83.2	105	3.38	14.6
MAX	5.7	7.0	2.9	.07	10	58	38	13	525	398	6.6	132
MIN	2.6	3.3	.03	.00	.00	1.0	2.1	3.8	19	8.4	.44	1.5
AC-FT	256	301	42	.8	90	1040	461	377	4950	6480	208	868

CAL YR 1980 TOTAL 21218.66 MEAN 58.0 MAX 1640 MIN .00 AC-FT 42090
WTR YR 1981 TOTAL 7599.55 MEAN 20.8 MAX 525 MIN .00 AC-FT 15070

NOTE.--No gage-height record Feb. 13 to Mar. 14.

05078230 LOST RIVER AT OKLEE, MN

LOCATION.--Lat 47°50'35", long 95°51'30", in SE¼NE¼ sec.2, T.150 N., R.41 W., Red Lake County, Hydrologic Unit 09020305, on downstream side of bridge on State Highway 222 at northwest edge of Oklee, 12 mi (19 km) upstream from mouth.

DRAINAGE AREA.--266 mi^2 (689 km^2).

PERIOD OF RECORD.--April 1960 to current year. Monthly and daily figures for Apr. 1, 1960, to June 30, 1960, published in WSP 2113.

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 1,126.94 ft (343.391 m), adjustment of 1912 (levels by Corps of Engineers). Prior to Sept. 9, 1960, reference points at same site at datum 8.00 ft (2.438 m) higher. Sept. 9, 1960, to Sept. 30, 1964, nonrecording gage at same site at datum 8.00 ft (2.438 m) higher.

REMARKS.--Records poor.

AVERAGE DISCHARGE.--21 years, 75.9 ft^3/s (2.149 m^3/s), 54,990 acre-ft/yr (67.8 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,210 ft^3/s (90.9 m^3/s) Apr. 11, 1969, gage height, 14.91 ft (4.545 m), from floodmark; maximum gage height, 16.72 ft (5.096 m), present datum, May 24, 1962; no flow Feb. 16 to Mar. 21, 1963, Feb. 15 to Mar. 2, 1964, Jan. 6 to Mar. 11, 1977.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since at least 1897, 18.39 ft (5.605 m) present datum, Apr. 21, 1950 from floodmarks, discharge, 2,790 ft^3/s (79.0 m^3/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,560 ft^3/s (44.2 m^3/s) Sept. 8, gage height, 12.98 ft (3.956 m); minimum discharge, 0.93 ft^3/s (0.026 m^3/s) June 12; minimum gage height, 2.49 ft (0.759 m) Dec. 3, 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.1	13	5.0	2.8	2.7	16	50	49	9.0	85	14	400
2	8.0	19	4.5	2.8	2.7	15	45	39	7.1	48	6.9	250
3	8.6	25	4.2	2.8	2.7	15	40	34	5.6	30	11	200
4	11	25	4.0	2.8	2.8	14	36	32	14	36	24	150
5	12	26	3.8	2.8	2.8	14	32	38	17	45	20	100
6	12	27	3.7	2.8	2.8	13	32	36	21	35	70	200
7	13	28	3.6	2.8	2.8	13	31	31	9.3	32	189	500
8	11	29	3.5	2.8	2.8	13	27	29	6.9	61	208	1200
9	11	30	3.4	2.8	2.8	13	27	30	5.8	190	155	800
10	8.6	32	3.3	2.8	2.8	13	25	30	3.6	163	137	400
11	8.0	33	3.2	2.8	2.8	13	31	23	1.9	136	99	200
12	7.8	34	3.1	2.8	2.8	13	29	17	.93	127	58	110
13	7.6	35	3.1	2.8	2.8	13	23	7.8	1.2	121	48	75
14	7.3	30	3.0	2.8	2.8	13	9.0	9.3	2.3	116	41	56
15	7.1	26	3.0	2.8	2.9	14	10	8.0	13	106	28	46
16	11	23	3.0	2.8	3.3	14	19	10	17	151	26	39
17	22	20	3.0	2.7	5.0	14	18	6.2	18	128	24	35
18	18	12	3.0	2.7	7.0	14	18	5.2	12	89	21	32
19	15	15	2.9	2.7	9.5	15	17	2.4	9.6	42	20	30
20	12	18	2.9	2.7	12	16	19	1.9	8.0	26	19	29
21	14	11	2.9	2.7	17	17	27	1.0	5.0	19	45	28
22	16	12	2.9	2.7	21	20	28	3.0	3.6	12	95	27
23	17	12	2.9	2.7	24	23	30	4.2	13	8.0	140	27
24	18	11	2.9	2.7	24	30	31	6.9	18	5.4	90	26
25	17	10	2.9	2.7	22	40	32	8.6	20	11	180	26
26	19	9.0	2.9	2.7	21	50	31	11	11	15	110	26
27	20	8.0	2.9	2.7	19	65	31	16	9.3	6.5	90	27
28	20	7.0	2.9	2.7	17	80	47	13	74	4.8	60	29
29	16	6.0	2.9	2.7	---	80	42	8.6	201	2.3	45	31
30	14	5.5	2.9	2.7	---	75	50	6.9	160	1.0	35	34
31	9.9	---	2.9	2.7	---	60	---	5.4	---	8.6	150	---
TOTAL	399.0	591.5	101.1	85.3	243.6	818	887.0	523.4	698.13	1860.6	2258.9	5133
MEAN	12.9	19.7	3.26	2.75	8.70	26.4	29.6	16.9	23.3	60.0	72.9	171
MAX	22	35	5.0	2.8	24	80	50	49	201	190	208	1200
MIN	7.1	5.5	2.9	2.7	2.7	13	9.0	1.0	.93	1.0	6.9	26
AC-FT	791	1170	201	169	483	1620	1760	1040	1380	3690	4480	10180

CAL YR 1980 TOTAL 9679.91 MEAN 26.4 MAX 660 MIN .58 AC-FT 19200
WTR YR 1981 TOTAL 13599.53 MEAN 37.3 MAX 1200 MIN .93 AC-FT 26970

NOTE.--No gage-height record Aug. 19 to Sept. 30.

05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN

LOCATION.--Lat 47°53'15", long 96°16'25", in NW¼NE¼ sec.22, T.151 N., R.44 W., Red Lake County, Hydrologic Unit 09020305, on left bank 40 ft (12 m) downstream from Great Northern Railroad bridge in Red Lake Falls, 1.4 mi (2.3 km) upstream from mouth, and 3 mi (5 km) downstream from Badger Creek.

DRAINAGE AREA.--1,370 mi^2 (3,550 km^2), approximately.

PERIOD OF RECORD.--June 1909 to September 1917, October 1934 to current year. Monthly discharge only for October, November, 1934, published in WSP 1308.

REVISED RECORDS.--WSP 355: 1911-12. WSP 1438: 1910-11, 1917(M).

GAGE.--Water-stage recorder. Datum of gage is 949.49 ft (289.405 m), adjustment of 1912 (levels by Corps of Engineers). Prior to Sept. 12, 1911, nonrecording gage at site 0.5 mi (0.8 km) upstream and Sept. 12, 1911, to Sept. 30, 1917, nonrecording gage at site 40 ft (12 m) upstream at different datum.

REMARKS.--Records good except those for winter period, which are fair.

AVERAGE DISCHARGE.--55 years, 315 ft^3/s (8.921 m^3/s), 228,200 acre-ft/yr (281 hm^3/yr); median of yearly mean discharges, 283 ft^3/s (8.01 m^3/s), 205,000 acre-ft/yr (253 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,300 ft^3/s (292 m^3/s) Apr. 25, 1979, gage height, 12.38 ft (3.773 m); maximum gage height observed, 17.5 ft (5.344 m) Apr. 5, 1913, site and datum then in use (backwater from ice); no flow Sept. 15, 1936, Sept. 14, 1939, Aug. 19-22, 1940.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,160 ft^3/s (89.5 m^3/s) Sept. 8, gage height, 6.97 ft (2.124 m); minimum discharge, 21 ft^3/s (0.59 m^3/s) May 22, gage height, 1.68 ft (0.512 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	88	74	51	50	55	160	100	88	1050	250	1670
2	72	90	73	51	50	53	140	119	120	747	239	1180
3	69	86	71	51	50	50	120	116	126	565	235	788
4	69	81	70	51	50	49	105	134	166	457	243	567
5	69	79	68	51	50	48	95	113	182	483	264	454
6	67	84	67	51	50	48	85	92	164	456	312	438
7	67	89	66	51	50	47	75	76	197	387	436	1520
8	68	91	65	51	50	47	68	69	212	332	421	2970
9	63	86	64	51	50	47	60	62	193	275	331	2350
10	63	91	63	50	50	47	56	55	162	317	290	1320
11	62	98	62	50	50	47	49	53	144	793	271	851
12	58	94	61	50	50	48	54	52	150	736	245	627
13	61	111	60	50	50	48	47	49	141	837	235	489
14	59	99	59	50	50	49	44	44	160	895	220	385
15	55	81	58	50	50	50	44	39	266	889	218	311
16	62	89	58	50	50	50	41	37	255	854	194	262
17	75	78	58	50	50	54	38	37	238	814	170	229
18	83	83	58	50	52	56	34	33	209	701	148	200
19	92	88	57	50	55	54	34	30	199	620	129	178
20	109	91	57	50	58	50	37	28	194	556	121	166
21	110	92	56	50	63	47	33	25	207	498	189	156
22	106	92	56	50	68	45	31	27	237	490	979	152
23	109	91	55	50	72	47	30	38	238	483	961	163
24	105	88	54	50	72	51	31	62	232	435	834	171
25	98	86	54	50	71	60	38	196	227	390	1080	164
26	99	84	53	50	69	72	38	100	231	359	669	160
27	98	81	53	50	65	84	43	87	345	335	459	162
28	92	79	52	50	60	105	52	91	2210	311	331	168
29	103	78	52	50	---	125	65	83	2340	292	255	192
30	102	76	51	50	---	145	84	84	1550	281	211	199
31	96	---	51	50	---	165	---	76	---	281	498	---
TOTAL	2509	2624	1856	1559	1555	1943	1831	2207	11383	16919	11438	18642
MEAN	80.9	87.5	59.9	50.3	55.5	62.7	61.0	71.2	379	546	369	621
MAX	110	111	74	51	72	165	160	196	2340	1050	1080	2970
MIN	55	76	51	50	50	45	30	25	88	275	121	152
AC-FT	4980	5200	3680	3090	3080	3850	3630	4380	22580	33560	22690	36980

CAL YR 1980 TOTAL 51286 MEAN 140 MAX 1830 MIN 11 AC-FT 101700
WTR YR 1981 TOTAL 74466 MEAN 204 MAX 2970 MIN 25 AC-FT 147700

NOTE.--No gage-height record Jan. 11 to Apr. 10.

05079000 RED LAKE RIVER AT CROOKSTON, MN

LOCATION.--Lat 47°46'32", long 96°36'33", in SW¼SW¼ sec.30, T.150 N., R.46 W., Polk County, Hydrologic Unit 09020303, on right bank at downstream side of Sargent Street bridge in Crookston, 0.3 mi (0.5 km) downstream from Interstate Power Co.'s dam, 0.6 mi (1.0 km) downstream from bridge on U.S. Highway 75, and 53 mi (85 km) upstream from mouth.

DRAINAGE AREA.--5,280 mi^2 (13,680 km^2), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1901 to current year. Monthly discharge only for some periods, published in WSP 1308. Figures of daily discharge for Apr. 3-30, 1904, published in WSP 130, have been found unreliable and should not be used.

REVISED RECORDS.--WSP 1115: 1906, 1915-16, 1919-20, 1922, 1925, 1927, 1929. WSP 1308: 1916(M), 1919(M), 1928(M), 1930(M). See also PERIOD OF RECORD.

GAGE.--Water-stage recorder. Datum of gage is 832.72 ft (253.813 m) National Geodetic Vertical Datum of 1929. May 18, 1901, to June 30, 1909, nonrecording gage at bridge 300 ft (91 m) upstream at same datum. July 1, 1909, to Sept. 25, 1911, nonrecording gage, Sept. 26, 1911, to Sept. 30, 1919, water-stage recorder, Oct. 1, 1919, to Sept. 30, 1930, nonrecording gage, at present site and datum.

REMARKS.--Records good except those for winter period, which are fair. Diurnal fluctuation prior to 1975 caused by powerplant 1,000 ft (300 m) upstream. Runoff from 1,950 mi^2 (5,050 km^2) in the headwaters of Red Lake River is completely controlled by dam at outlet of Lower Red Lake. Flow partially affected by occasional regulation at Thief and Mud Lakes in Thief River basin (see station 05076000).

AVERAGE DISCHARGE.--80 years, 1,115 ft^3/s (31.58 m^3/s), 807,800 acre-ft/yr (996 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 28,400 ft^3/s (804 m^3/s) Apr. 12, 1969, gage height, 27.33 ft (8.330 m); no flow for part of July 13, 1960 (caused by regulation of powerplant upstream).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,120 ft^3/s (202 m^3/s) June 29, gage height, 13.56 ft (4.133 m); minimum discharge, 90 ft^3/s (2.55 m^3/s) Nov. 24, gage height, 2.62 ft (0.799 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	194	212	160	130	125	180	440	208	212	4190	731	2110
2	180	198	150	130	125	175	420	226	226	2800	650	2510
3	184	190	140	130	125	170	409	230	320	2130	642	1850
4	170	177	130	130	125	170	445	226	331	1740	653	1350
5	170	161	120	130	125	170	458	248	404	1500	660	1110
6	180	187	110	125	125	170	427	230	441	1370	916	1020
7	164	174	105	125	125	170	361	190	394	1200	989	2820
8	174	157	130	125	125	170	283	184	377	1060	1060	4450
9	180	201	155	125	125	175	268	190	381	951	934	4300
10	158	195	155	125	125	180	230	174	359	857	789	3000
11	126	183	155	125	125	185	215	198	312	1570	733	1960
12	140	212	150	125	125	190	215	164	245	1820	684	1460
13	140	197	150	125	125	200	184	164	310	1530	661	1210
14	140	212	150	125	125	220	174	174	295	1620	641	996
15	140	177	150	125	125	240	184	153	354	1800	617	846
16	150	142	150	125	130	260	170	151	615	1520	605	764
17	160	133	150	125	130	285	174	154	642	1450	572	692
18	180	147	150	125	135	285	142	139	533	1330	534	664
19	200	174	145	125	150	280	151	118	451	1190	524	616
20	210	244	140	125	160	260	128	121	396	1050	500	593
21	220	211	135	125	180	250	140	114	401	982	556	593
22	226	221	135	125	200	240	131	131	1040	970	993	546
23	234	222	130	125	220	230	140	168	975	920	1920	602
24	222	136	130	125	230	230	140	326	691	911	1590	708
25	245	150	130	125	220	230	137	808	564	873	1810	703
26	219	150	130	125	200	240	134	809	484	787	1710	664
27	215	165	130	125	190	250	151	384	482	764	1230	644
28	208	160	130	125	185	300	161	293	1970	754	956	626
29	201	150	130	125	---	350	161	234	6560	720	746	607
30	219	160	130	125	---	450	180	224	5860	723	711	664
31	222	---	130	125	---	450	---	209	---	748	749	---
TOTAL	5771	5398	4285	3900	4205	7355	6953	7342	26625	41830	27066	40678
MEAN	186	180	138	126	150	237	232	237	888	1349	873	1356
MAX	245	244	160	130	230	450	458	809	6560	4190	1920	4450
MIN	126	133	105	125	125	170	128	114	212	720	500	546
AC-FT	11450	10710	8500	7740	8340	14590	13790	14560	52810	82970	53690	80680

CAL YR 1980 TOTAL 272685 MEAN 745 MAX 6290 MIN 105 AC-FT 540900
WTR YR 1981 TOTAL 181408 MEAN 497 MAX 6560 MIN 105 AC-FT 359800

NOTE.--No gage-height record Dec. 20 to Mar. 14.

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1962, 1974-76, 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1980 to September 1981.
WATER TEMPERATURES: October 1980 to September 1981.

INSTRUMENTATION.--Water-quality minimonitor since October 1980.

REMARKS.--Letter K indicates non-ideal colony count and letter E indicates estimated value. Extremes are published for years with 80 percent or more daily record. Malfunctions of the monitor resulted in less than 80 percent recorded daily record for the current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
OCT 07...	1230	151	535	544	8.3	18.0	11.0	.60	10.9	103
JAN 20...	1450	124	514	549	7.7	-4.0	.0	1.1	9.5	67
MAR 17...	0945	285	370	371	8.1	-4.0	.0	1.0	13.0	92
MAY 12...	1545	145	540	523	8.3	24.0	15.0	6.0	10.2	104
JUL 14...	1200	1570	415	412	8.4	23.0	25.0	40	7.5	93
SEP 15...	0900	785	455	454	8.4	11.0	17.0	12	8.5	89

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3) (95902)	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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
OCT 07...	E3600	850	260	64	63	26	12	.3	3.8	200
JAN 20...	5200	2900	290	.00	70	28	8.3	.2	3.3	280
MAR 17...	470	362	180	16	44	16	6.6	.2	4.2	160
MAY 12...	K770	K170	270	63	63	28	14	.4	4.5	210
JUL 14...	K1700	1100	230	46	56	21	6.9	.2	3.6	180
SEP 15...	570	540	250	62	63	23	5.9	.2	4.3	190

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
OCT 07...	80	8.9	.2	3.3	364	318	148	.03	.03	.110
JAN 20...	27	4.6	.2	15	346	326	116	.18	.18	.240
MAR 17...	28	7.2	.1	7.9	245	212	189	.30	.30	.070
MAY 12...	63	8.8	.2	3.5	351	311	137	.01	.01	.040
JUL 14...	40	4.5	.2	16	291	258	1230	.29	.29	.060
SEP 15...	53	6.0	.2	11	326	282	691	.22	.22	.080

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	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)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
OCT 07...	.090	.88	.77	.090	.060	13	12	4.9	100
JAN 20...	.240	.68	.67	.060	.040	13	33	11	73
MAR 17...	.060	.49	.48	.090	.050	--	27	21	100
MAY 12...	.040	1.20	1.2	.050	.040	--	18	7.0	89
JUL 14...	.050	1.40	.97	.200	.110	--	--	--	--
SEP 15...	.080	.85	.85	.100	.090	15	34	72	100

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA) (01007)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOVERABLE (UG/L AS CO) (01037)	COBALT, DISSOLVED (UG/L AS CO) (01035)
OCT 07...	1230	--	--	--	--	--	--	--	--	--	--
MAR 17...	0945	1	1	100	100	0	0	20	20	0	0
MAY 12...	1545	2	2	100	70	1	1	20	20	1	0
JUN 14...	1200	4	2	100	60	1	1	40	10	6	2

DATE	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	MERCURY DISSOLVED (UG/L AS HG) (71890)
OCT 07...	--	--	--	--	--	--	--	--	--	--
MAR 17...	4	2	490	40	9	1	100	40	.2	.1
MAY 12...	3	2	320	10	1	0	80	30	<.1	<.1
JUL 14...	6	6	1500	10	7	1	150	8	.2	.1

DATE	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOVERABLE (UG/L AS AG) (01077)	SILVER, DISSOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C) (00689)
OCT 07...	--	--	--	--	0	--	--	--	--	--
MAR 17...	4	3	0	0	0	0	40	10	--	.3
MAY 12...	5	3	0	0	0	0	80	<4	22	--
JUL 14...	8	7	0	0	0	0	50	10	14	.8

DATE	TIME	LENGTH OF EXPOSURE (DAYS) (00022)	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M (00573)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M (00572)	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2) (70957)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2) (70958)
OCT 07...	1230	21	.157	.236	.110	.030

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1980 TO SEPTEMBER 1981

DATE	OCT 7,80	MAR 17,81	MAY 12,81	JUL 14,81
TIME	1230	0945	1545	1200
TOTAL CELLS/ML	890	590	5100	63000
DIVERSITY: DIVISION	1.9	1.2	1.4	0.6
.CLASS	1.9	1.2	1.4	0.6
..ORDER	2.7	2.0	2.1	0.8
...FAMILY	2.7	2.5	2.2	0.9
....GENUS	2.7	2.5	2.8	1.0

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)								
.BACILLARIOPHYCEAE								
..BACILLARIALES								
...NITZSCHIACEAE								
....NITZSCHIA	120	13	190#	33	200	4	410	1
..EUPODISCALES								
...COSCINODISCACEAE								
....CYCLOTELLA	170#	19	120#	20	670	13	700	1
....MELOSIRA	--	-	--	-	100	2	--	-
....STEPHANODISCUS	--	-	--	-	1900#	36	--	-
..FRAGILARIALES								
...FRAGILARIACEAE								
....SYNEDRA	--	-	--	-	34	1	--	-
..NAVICULALES								
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	*	0
...GOMPHONEMACEAE								
....GOMPHONEMA	13	1	--	-	--	-	*	0
...NAVICULACEAE								
....NAVICULA	13	1	--	-	100	2	*	0
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....SCHROEDERIA	--	-	52	9	--	-	--	-
...DICTYOSPHAERIACEAE								
....DICTYOSPHAERIUM	--	-	52	9	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	100#	17	34	1	*	0
....OOCYSTIS	--	-	--	-	34	1	600	1
....QUADRIGULA	--	-	--	-	--	-	*	0
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	*	0
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	2400	4
....SCENEDESMUS	190#	22	--	-	200	4	990	2
....TETRASTRUM	--	-	--	-	--	-	640	1
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	78	9	52	9	--	-	*	0
CHRYSOPHYTA								
.CHRYSOPHYCEAE								
..OCHROMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	*	0
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	78	9	--	-	170	3	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	100	2	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	26	3	--	-	810#	16	55000#	87
..NOSTOCALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	670	1
..OSCILLATORIALES								
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	480	1
....OSCILLATORIA	210#	23	--	-	810#	16	*	0
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	*	0
....TRACHELOMONAS	--	-	26	4	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	572	530	556	587	579	582	596	560	567
2	---	---	---	574	557	565	596	584	588	586	538	551
3	---	---	---	589	576	585	603	585	591	552	523	531
4	---	---	---	589	580	584	638	599	620	548	521	525
5	---	---	---	589	580	584	654	634	645	544	523	530
6	---	---	---	589	567	574	651	636	638	536	522	527
7	---	---	---	575	566	569	656	635	639	541	530	533
8	---	---	---	579	572	575	654	628	634	544	522	529
9	---	---	---	592	574	584	660	639	652	549	522	529
10	---	---	---	586	577	580	674	656	661	546	525	528
11	---	---	---	575	555	562	670	653	656	537	525	530
12	---	---	---	560	540	549	679	654	661	541	529	535
13	---	---	---	539	514	526	682	651	659	545	532	537
14	---	---	---	531	512	524	666	643	652	550	530	539
15	---	---	---	544	531	539	672	619	635	560	543	548
16	---	---	---	544	531	538	630	602	610	553	544	548
17	---	---	---	528	518	521	614	589	596	559	542	548
18	---	---	---	533	520	525	618	589	597	542	531	536
19	---	---	---	543	526	532	623	594	600	548	535	541
20	---	---	---	544	530	538	606	594	598	---	---	---
21	---	---	---	549	529	536	610	597	600	---	---	---
22	---	---	---	581	551	567	618	596	604	---	---	---
23	---	---	---	571	557	562	632	603	608	---	---	---
24	---	---	---	556	544	549	619	599	604	---	---	---
25	---	---	---	567	552	561	616	594	598	---	---	---
26	---	---	---	568	559	564	610	595	598	---	---	---
27	---	---	---	578	561	570	624	595	605	---	---	---
28	---	---	---	573	565	569	629	598	608	---	---	---
29	---	---	---	577	558	566	618	586	592	---	---	---
30	526	516	520	583	576	579	610	568	579	---	---	---
31	536	521	526	---	---	---	574	560	563	---	---	---
MONTH				592	512	558	682	560	615			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	310	297	301	296	288	293	456	448	451
2	---	---	---	307	297	300	301	290	297	452	449	450
3	---	---	---	324	308	319	311	301	307	463	452	458
4	447	432	438	338	326	331	316	310	312	472	463	466
5	442	435	439	351	336	343	323	313	320	481	469	475
6	446	437	441	371	347	360	342	320	335	510	479	492
7	450	442	445	391	371	381	352	343	349	519	508	512
8	452	437	445	409	387	395	362	352	355	538	520	527
9	460	443	448	432	402	408	376	363	370	560	540	552
10	457	443	449	430	401	407	387	378	383	558	542	552
11	457	446	450	426	403	409	394	386	390	546	539	543
12	464	450	456	427	403	412	407	394	400	545	539	542
13	468	459	464	414	386	400	422	409	416	543	535	539
14	473	460	466	400	376	387	430	422	426	534	525	527
15	483	462	468	383	367	376	432	426	429	527	518	522
16	794	467	532	379	356	365	439	429	432	520	505	510
17	604	470	513	376	365	369	443	432	435	526	503	517
18	620	479	533	374	353	364	450	440	445	541	527	534
19	584	462	492	350	345	347	454	445	447	551	541	545
20	469	428	453	351	335	343	449	442	445	552	545	548
21	428	392	409	341	323	330	451	442	445	---	---	---
22	393	362	380	332	322	326	462	445	453	---	---	---
23	364	331	330	336	326	329	462	450	456	---	---	---
24	353	331	338	336	316	326	457	447	451	---	---	---
25	362	345	356	319	300	309	457	445	450	---	---	---
26	345	324	334	307	282	292	462	451	456	---	---	---
27	327	309	318	334	280	286	462	452	455	---	---	---
28	311	302	307	295	278	283	471	457	464	---	---	---
29	---	---	---	286	278	281	458	450	454	---	---	---
30	---	---	---	289	279	284	456	449	453	---	---	---
31	---	---	---	296	284	290	---	---	---	---	---	---
MONTH				432	278	344	471	288	404			

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	2.5	2.5	2.5	.0	.0	.0	.0	.0	.0
2	---	---	---	3.0	2.5	2.5	.0	.0	.0	.0	.0	.0
3	---	---	---	3.5	2.5	3.0	.0	.0	.0	.0	.0	.0
4	---	---	---	4.0	3.5	3.5	.0	.0	.0	.0	.0	.0
5	---	---	---	4.5	4.0	4.0	.0	.0	.0	.0	.0	.0
6	---	---	---	4.5	4.0	4.5	.0	.0	.0	.0	.0	.0
7	---	---	---	4.5	4.5	4.5	.0	.0	.0	.0	.0	.0
8	---	---	---	5.0	4.5	5.0	.0	.0	.0	.0	.0	.0
9	---	---	---	5.0	4.0	4.5	.0	.0	.0	.0	.0	.0
10	---	---	---	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0
11	---	---	---	2.5	2.0	2.5	.0	.0	.0	.0	.0	.0
12	---	---	---	2.0	1.5	1.5	.0	.0	.0	.0	.0	.0
13	---	---	---	1.5	1.0	1.5	.0	.0	.0	.0	.0	.0
14	---	---	---	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
15	---	---	---	1.0	.5	1.0	.0	.0	.0	.0	.0	.0
16	---	---	---	1.0	.5	.5	.0	.0	.0	.0	.0	.0
17	---	---	---	.5	.0	.5	.0	.0	.0	.0	.0	.0
18	---	---	---	1.0	.0	.5	.0	.0	.0	.0	.0	.0
19	---	---	---	.5	.5	.5	.0	.0	.0	.0	.0	.0
20	---	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
21	---	---	---	.5	.0	.0	.0	.0	.0	---	---	---
22	---	---	---	.5	.0	.0	.0	.0	.0	---	---	---
23	---	---	---	.0	.0	.0	.0	.0	.0	---	---	---
24	---	---	---	.5	.0	.0	.0	.0	.0	---	---	---
25	---	---	---	.5	.0	.0	.0	.0	.0	---	---	---
26	---	---	---	.5	.0	.0	.0	.0	.0	---	---	---
27	---	---	---	.5	.0	.0	.0	.0	.0	---	---	---
28	---	---	---	.0	.0	.0	.0	.0	.0	---	---	---
29	---	---	---	.0	.0	.0	.0	.0	.0	---	---	---
30	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0	---	---	---
31	2.5	2.0	2.5	---	---	---	.0	.0	.0	---	---	---
MONTH				5.0	.0	1.5	.0	.0	.0			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	.0	.0	.0	.5	.0	.5	15.0	13.0	14.0
2	---	---	---	.0	.0	.0	3.0	.5	2.0	14.0	13.0	13.5
3	.0	.0	.0	.0	.0	.0	5.0	3.0	4.0	14.5	13.5	14.0
4	.0	.0	.0	.0	.0	.0	4.5	3.5	4.0	14.5	13.5	14.0
5	.0	.0	.0	.0	.0	.0	4.5	3.5	4.0	14.0	13.5	14.0
6	.0	.0	.0	.0	.0	.0	5.5	3.5	5.0	15.5	13.0	14.0
7	.0	.0	.0	.0	.0	.0	6.5	5.0	6.0	15.5	13.5	14.5
8	.0	.0	.0	.0	.0	.0	8.0	6.0	7.0	15.0	14.5	15.0
9	.0	.0	.0	.0	.0	.0	9.0	7.0	8.0	14.5	13.5	14.0
10	.0	.0	.0	.0	.0	.0	9.0	8.5	8.5	13.5	12.5	13.0
11	.0	.0	.0	.0	.0	.0	9.0	8.5	9.0	13.5	12.0	12.5
12	.0	.0	.0	.0	.0	.0	9.0	8.0	8.5	15.0	12.5	14.0
13	.0	.0	.0	.0	.0	.0	8.5	7.0	8.0	15.5	14.0	15.0
14	.0	.0	.0	.0	.0	.0	8.5	7.0	7.5	16.5	15.5	16.0
15	.0	.0	.0	.0	.0	.0	8.5	7.5	8.0	17.5	16.5	17.0
16	.0	.0	.0	.0	.0	.0	9.5	7.5	8.5	18.0	17.0	17.0
17	.0	.0	.0	.0	.0	.0	9.5	9.0	9.0	18.5	16.0	17.5
18	.0	.0	.0	.0	.0	.0	11.0	8.5	10.0	19.5	17.0	18.0
19	.0	.0	.0	.0	.0	.0	10.5	9.5	10.0	20.5	17.0	18.5
20	.0	.0	.0	.5	.0	.0	11.0	9.0	10.0	20.0	17.0	18.5
21	.0	.0	.0	.0	.0	.0	9.5	9.0	9.5	---	---	---
22	.0	.0	.0	.5	.0	.0	9.0	8.0	9.0	---	---	---
23	.0	.0	.0	.5	.0	.0	8.5	7.5	8.0	---	---	---
24	.0	.0	.0	.5	.0	.0	8.5	7.0	8.0	---	---	---
25	.0	.0	.0	.5	.0	.0	9.5	8.0	8.5	---	---	---
26	.0	.0	.0	.0	.0	.0	12.5	8.5	10.0	---	---	---
27	.0	.0	.0	.5	.0	.0	13.0	12.0	12.5	---	---	---
28	.0	.0	.0	.5	.0	.0	13.5	12.0	13.0	---	---	---
29	---	---	---	.5	.0	.0	14.0	13.0	13.5	---	---	---
30	---	---	---	.0	.0	.0	14.0	13.0	13.5	---	---	---
31	---	---	---	.0	.0	.0	---	---	---	---	---	---
MONTH				2.0	.0	.0	14.0	.0	8.0			

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND

LOCATION.--Lat 47°56'34", long 97°03'10", in SW¼NE¼ sec.33, T.152 N., R.50 W., Grand Forks County, Hydrologic Unit 09020301, on left bank on second floor of old sewage plant in Grand Forks, 2.3 mi (3.7 km) downstream from Red Lake River, and at mile 295.7 (475.8 km).

DRAINAGE AREA.--30,100 mi^2 (78,000 km^2), approximately, including 3,800 mi^2 (9,840 km^2) in closed basins.

PERIOD OF RECORD.--April 1882 to current year. Monthly discharge only prior to May 1901, published in WSP 1308.

REVISED RECORDS.--WSP 855: 1936(M). WSP 1115: 1942. WSP 1175: 1897(M). WSP 1388: 1904, 1914-15, 1917-19, 1921-22, 1927, 1950. WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 778.35 ft (237.241 m) National Geodetic Vertical Datum of 1929. Nov. 3, 1933, to Apr. 13, 1965, water-stage recorder 0.3 mi (0.5 km) upstream at present datum. See WSP 1728 or 1913 for history of changes prior to Nov. 3, 1933.

REMARKS. Records good.

AVERAGE DISCHARGE.--99 years, 2,535 ft^3/s (71.79 m^3/s) 1,837,000 acre-ft/yr (2.27 km^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 85,000 ft^3/s (2,410 m^3/s) Apr. 10, 1897, gage height, 50.2 ft (15.30 m), site and datum then in use, from rating curve extended above 54,000 ft^3/s (1,530 m^3/s); minimum, 1.8 ft^3/s (0.051 m^3/s) Sept. 2, 1977, caused by unusual regulation during repair of dam at Grand Forks.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,710 ft^3/s (190 m^3/s) July 1, gage height, 14.68 ft (4.474 m); minimum daily, 250 ft^3/s (7.08 m^3/s) Feb. 4-11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	538	430	493	305	262	950	1360	655	1210	6590	1520	1140
2	556	428	418	300	258	920	1380	655	1030	6020	1460	1600
3	488	418	352	300	253	850	1380	684	908	4600	1470	2590
4	396	418	359	300	250	810	1380	722	870	3490	1380	2490
5	420	415	385	300	250	800	1420	750	908	2850	1280	1960
6	425	415	410	300	250	780	1470	761	908	2500	1300	1780
7	406	460	438	300	250	740	1430	764	956	2280	1540	1760
8	381	510	410	300	250	700	1380	750	1010	2160	1820	2500
9	356	518	354	300	250	690	1290	730	1010	2050	1990	4140
10	337	500	339	290	250	680	1200	726	1000	1870	1940	5040
11	330	493	334	290	250	670	1180	694	988	1760	1780	4400
12	328	490	343	290	260	670	1140	664	952	1940	1640	3330
13	317	495	350	290	270	680	1150	649	952	2400	1550	2500
14	317	510	345	290	310	680	1150	628	888	2310	1470	1950
15	326	507	326	290	316	700	1100	601	870	2300	1400	1620
16	337	490	334	290	325	730	1020	595	912	2440	1320	1390
17	354	438	442	290	330	760	912	571	1100	2460	1230	1660
18	365	345	420	290	340	820	824	541	1230	2430	1160	1520
19	374	300	387	290	350	870	722	518	1220	2330	1030	1410
20	392	367	370	290	380	880	667	490	1140	2200	940	928
21	420	415	340	300	420	950	604	460	1180	2020	888	862
22	435	435	319	310	450	1030	550	418	1270	1860	866	820
23	448	505	312	300	500	1070	547	440	1410	1770	976	817
24	463	475	306	300	560	1080	565	1510	1760	1680	1710	834
25	465	372	306	295	640	1200	568	3890	1660	1620	1980	842
26	468	341	304	290	770	1330	568	5380	1470	1550	1950	876
27	475	376	298	285	880	1420	583	5500	1340	1490	2080	866
28	726	385	288	280	940	1470	598	4320	1300	1440	1830	842
29	610	406	282	275	---	1460	601	3100	1780	1450	1560	817
30	463	435	288	270	---	1380	628	2210	4860	1470	1300	828
31	432	---	302	265	---	1260	---	1530	---	1530	1150	---
TOTAL	13148	13092	10954	9065	10814	29030	29367	41906	38092	74860	45510	54112
MEAN	424	436	353	292	386	936	979	1352	1270	2415	1468	1804
MAX	726	518	493	310	940	1470	1470	5500	4860	6590	2080	5040
MIN	317	300	282	265	250	670	547	418	870	1440	866	817
AC-FT	26080	25970	21730	17980	21450	57580	58250	83120	75560	148500	90270	107300

CAL YR 1980	TOTAL	596885	MEAN	1631	MAX	21800	MIN 282	AC-FT	1184000
WTR YR 1981	TOTAL	369950	MEAN	1014	MAX	6590	MIN 250	AC-FT	733800

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1956-81.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	HARD-NESS, (MG/L AS CACO3) (00900)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3) (95902)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
APR 01...	1525	1370	420	7.9	2.0	190	31	42

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
APR 01...	21	16	.5	1.6	160	39	11	.1

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS NO3) (71851)	PHOS-PHATE, ORTHO, DIS-SOLVED (MG/L AS PO4) (00660)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
APR 01...	6.9	231	235	854	1.0	.01	0	0	20

05087500 MIDDLE RIVER AT ARGYLE, MN

LOCATION.--Lat 48°20'27", long 96°49'02", in SE¼SW¼ sec.10, T.156 N., R.48 W., Marshall County, Hydrologic Unit 09020309, on left bank 20 ft (6.1 m) upstream from bridge on U.S. Highway 75 in Argyle and 14 mi (22 km) upstream from mouth.

DRAINAGE AREA.--265 mi^2 (686 km^2).

PERIOD OF RECORD.--March to September 1945, October 1950 to current year. Monthly discharge only for some periods, published in WSP 1728.

GAGE.--Water-stage recorder. Datum of gage is 828.53 ft (252.536 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 8, 1951, nonrecording gage and Nov. 8, 1951, to Sept. 18, 1952, water-stage recorder at present site at datum 1.0 ft (0.30 m) higher.

REMARKS.--Records poor.

AVERAGE DISCHARGE.--31 years (water years 1951-81), 41.2 ft^3/s (1.167 m^3/s), 29,850 acre-ft/yr (36.8 hm^3/yr); median of yearly mean discharges, 37 ft^3/s (1.05 m^3/s), 26,800 acre-ft/yr (33 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,260 ft^3/s (121 m^3/s) July 3, 1975, gage height, 16.59 ft (5.057 m); no flow at times in most years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1950 reached a stage of 15.25 ft (4.648 m) present datum, from floodmarks, discharge, 2,790 ft^3/s (79.0 m^3/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 107 ft^3/s (3.03 m^3/s) July 3, gage height, 3.97 ft (1.210 m); no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.44	.01	.18	.00	.00	.90	15	2.1	2.9	80	.11	.00
2	.15	.09	.13	.00	.00	.80	14	2.1	3.4	96	.13	.00
3	.15	.21	.03	.00	.00	.65	13	2.1	3.1	104	.18	.00
4	.15	.14	.11	.00	.00	.55	12	2.2	4.5	87	.13	.00
5	.13	.04	.11	.00	.00	.50	11	1.9	10	66	.04	.00
6	.09	.02	.13	.00	.00	.42	11	1.6	9.8	48	.18	.15
7	.04	.01	.11	.00	.00	.38	11	1.3	10	34	.15	.01
8	.01	.11	.11	.00	.00	.36	9.5	1.4	8.0	27	.22	.00
9	.01	.18	.09	.00	.00	.33	7.9	1.8	7.0	19	.18	.00
10	.97	.10	.09	.00	.00	.33	6.6	1.3	6.6	15	.04	.00
11	.66	.02	.04	.00	.00	.34	5.8	.47	5.7	13	.01	.00
12	.28	.02	.11	.00	.00	.40	4.9	.30	4.8	11	.00	.00
13	.22	.09	.11	.00	.00	.70	4.1	.26	5.3	9.4	.00	4.2
14	.11	.04	.13	.00	.00	1.3	3.3	.33	5.6	8.0	.00	4.1
15	.03	.02	.04	.00	.01	2.3	2.9	.51	5.6	7.3	.00	2.6
16	.53	.01	.03	.00	.02	4.0	2.7	.56	4.6	6.7	.00	1.6
17	1.5	.01	.03	.00	.04	7.0	2.3	1.1	4.0	5.3	.00	1.8
18	.75	.01	.01	.00	.08	10	2.1	.97	3.9	4.4	.00	1.2
19	.28	.02	.00	.00	.18	8.0	1.8	.29	2.8	3.9	.00	.66
20	.18	.03	.00	.00	.35	7.0	1.6	.12	2.9	3.4	.00	.33
21	.13	.11	.00	.00	.70	5.5	1.5	.01	1.8	2.9	.00	1.8
22	.11	.11	.00	.00	1.5	5.0	1.5	.00	1.3	2.4	.00	.33
23	.15	.09	.00	.01	3.0	5.0	1.7	.28	1.5	1.8	.00	.75
24	.13	.04	.00	.11	2.4	5.2	1.7	2.5	2.1	1.5	.00	1.2
25	.87	.09	.00	.10	2.0	6.0	2.0	11	3.4	1.4	.00	1.2
26	.52	.09	.00	.09	1.5	11	2.1	7.6	7.7	1.2	.00	.21
27	.37	.11	.00	.06	1.3	16	2.2	6.0	7.8	.87	.00	.02
28	.19	.11	.00	.03	1.1	18	2.1	4.9	10	.33	.00	.02
29	.13	.13	.00	.02	---	18	2.1	4.1	29	.18	.00	.03
30	.07	.18	.00	.01	---	18	2.0	3.6	77	.09	.00	1.0
31	.01	---	.00	.00	---	17	---	3.0	---	.18	.00	---
TOTAL	9.36	2.24	1.59	.43	14.18	170.96	161.4	65.70	252.1	661.25	1.37	23.21
MEAN	.30	.075	.051	.014	.51	5.51	5.38	2.12	8.40	21.3	.044	.77
MAX	1.5	.21	.18	.11	3.0	18	15	11	77	104	.22	4.2
MIN	.01	.01	.00	.00	.00	.33	1.5	.00	1.3	.09	.00	.00
AC-FT	19	4.4	3.2	.9	28	339	320	130	500	1310	2.7	46

CAL YR 1980 TOTAL 3776.48 MEAN 10.3 MAX 346 MIN .00 AC-FT 7490
WTR YR 1981 TOTAL 1363.79 MEAN 3.74 MAX 104 MIN .00 AC-FT 2710

NOTE.--No gage-height record Feb. 9 to Mar. 30.

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND

LOCATION.--Lat 48°34'20", long 97°08'50", in SE¼SE¼SE¼ sec.24, T.159 N., R.51 W., Pembina County, Hydrologic Unit 09020311, on downstream end of east pier of interstate highway bridge, 1.5 mi (2.4 km) northeast of Drayton, and at mile 206.7 (332.6 km).

DRAINAGE AREA.--34,800 mi^2 (90,130 km^2), approximately, includes 3,800 mi^2 (9,840 km^2) in closed basins.

PERIOD OF RECORD.--April 1936 to June 1937, April 1941 to current year (fragmentary prior to April 1949).

REVISED RECORDS.--WSP 1388: 1949-50. WSP 1728: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 755.00 ft (230.124 m) National Geodetic Vertical Datum of 1929 (Minnesota Department of Transportation benchmark). Prior to Nov. 30, 1954, nonrecording gage at site 1.5 mi (2.4 km) upstream at datum 1.59 ft (0.485 m) higher.

REMARKS.--Records good. Some regulation by reservoirs on tributaries.

AVERAGE DISCHARGE.--32 years (1949-81), 3,759 ft^3/s (106.5 m^3/s), 2,723,000 acre-ft/yr (3.36 km^3/yr); median of yearly mean discharges, 2,650 ft^3/s (75.0 m^3/s), 1,920,000 acre-ft/yr (2.4 km^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 92,900 ft^3/s (2,630 m^3/s) Apr. 28, 1979, gage height, 43.66 ft (13.308 m); minimum observed, 7.7 ft^3/s (0.22 m^3/s) Oct. 16, 1936, gage height, 1.75 ft (0.533 m), former site and datum.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1897 reached a stage of about 41 ft (12.5 m), at site and datum in use prior to Nov. 30, 1954.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,520 ft^3/s (213 m^3/s) July 3, gage height, 13.96 ft (4.255 m); minimum daily, 250 ft^3/s (7.08 m^3/s) Feb. 4-16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	689	761	525	313	262	1000	2080	748	2070	4200	1480	1370
2	672	680	510	313	258	1110	2100	756	1690	6820	1510	1240
3	672	632	500	313	253	1170	2100	748	1370	7380	1520	1230
4	648	648	495	313	250	1190	2000	792	1190	6380	1520	1800
5	616	648	490	313	250	1150	1900	828	1080	4940	1520	1940
6	537	632	480	313	250	1070	1850	846	1020	3840	1450	2310
7	509	640	470	313	250	1020	1800	884	1010	3140	1400	2100
8	509	656	470	313	250	980	1700	874	1010	2630	1400	1980
9	474	672	460	313	250	940	1670	893	1050	2460	1610	2070
10	418	734	450	313	250	912	1540	893	1080	2290	1830	3420
11	448	743	440	313	250	893	1470	855	1090	2150	1940	4940
12	442	725	435	313	250	902	1360	837	1080	1970	1880	5100
13	412	716	430	313	250	912	1280	819	1100	1900	1780	4240
14	400	725	420	313	250	912	1270	792	1100	2120	1640	3240
15	394	707	410	313	250	960	1260	756	1080	2310	1550	2530
16	394	707	400	313	250	980	1230	740	1050	2320	1470	2040
17	436	680	390	313	260	1040	1180	731	990	2340	1400	1710
18	481	648	380	313	290	1090	1130	714	1000	2390	1340	1490
19	481	672	380	310	320	1150	1030	688	1150	2410	1260	1310
20	467	656	375	310	330	1160	980	664	1260	2360	1180	1180
21	481	586	370	310	348	1240	874	640	1300	2270	1110	1100
22	502	586	365	305	378	1340	783	616	1270	2130	1030	1030
23	544	616	360	302	403	1390	740	578	1300	2180	990	970
24	624	600	360	300	436	1420	722	608	1350	1840	990	940
25	640	600	350	295	483	1520	688	706	1530	1760	1150	931
26	672	600	350	290	600	1600	680	2070	1700	1670	1660	922
27	664	590	345	285	783	1660	688	4560	1660	1600	1870	922
28	672	570	340	280	855	1760	706	5400	1690	1530	1980	980
29	680	550	335	275	---	1810	714	4820	1910	1470	1970	940
30	800	540	330	270	---	1930	714	3720	2150	1440	1800	922
31	860	---	325	265	---	2000	---	2750	---	1460	1550	---
TOTAL	17238	19520	12740	9431	9509	38211	38239	42326	39330	85700	46780	56897
MEAN	556	651	411	304	340	1233	1275	1365	1311	2765	1509	1897
MAX	860	761	525	313	855	2000	2100	5400	2150	7380	1980	5100
MIN	394	540	325	265	250	893	680	578	990	1440	990	922
AC-FT	34190	38720	25270	18710	18860	75790	75850	83950	78010	170000	92790	112900

CAL YR 1980 TOTAL 661646 MEAN 1808 MAX 22300 MIN 325 AC-FT 1312000
WTR YR 1981 TOTAL 415921 MEAN 1140 MAX 7380 MIN 250 AC-FT 825000

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1972-81.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	HARD-NESS, (MG/L AS CACO3) (00900)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3) (95902)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
APR 09...	1340	1570	810	8.0	8.5	230	62	52

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
APR 09...	24	75	2.2	3.9	167	82	100	.1

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS NO3) (71851)	PHOS-PHATE, ORTHO, DIS-SOLVED (MG/L AS PO4) (00660)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
APR 09...	7.2	493	445	2090	1.0	.00	30	20	10

05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN

LOCATION.--Lat 48°43'50", long 96°39'50", in SW¼SW¼ sec.30, T.161 N., R.46 W., Kittson County, Hydrologic Unit 09020312, on left bank 70 ft (21 m) upstream from culvert on U.S. Highway 59 at town of Lake Bronson and 3.4 mi (5.5 km) downstream from dam at outlet of Bronson Lake.

DRAINAGE AREA.--444 mi^2 (1,150 km^2).

PERIOD OF RECORD.--September 1928 to November 1936, April to September 1937, April 1941 to October 1943, April to December 1944, April 1945 to September 1947, October 1953 to September 1981 (discontinued). Monthly discharge only for some periods, published in WSP 1308. Published as South Fork Two Rivers at Bronson prior to 1941.

REVISED RECORDS.--WSP 1308: 1929(M), 1931(M), 1936(M), 1944(M), 1947(M).

GAGE.--Water-stage recorder. Datum of gage is 928.53 ft (283.016 m) National Geodetic Vertical Datum of 1929 (Minnesota Department of Transportation bench mark). Prior to Nov. 23, 1953, nonrecording gage at bridge 100 ft (30 m) downstream at datum 2.00 ft (0.610 m) higher. Nov. 23, 1953, to Oct. 5, 1963, water-stage recorder at same site at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records good except those for winter period, which are poor. Flow partly regulated since 1937 by Bronson Lake, usable capacity, 3,700 acre-ft (4.56 hm^3).

AVERAGE DISCHARGE.--40 years (water years 1929-36, 1942, 1943, 1946, 1947, 1954-81), 87.3 ft^3/s (2.472 m^3/s), 63,250 acre-ft/yr (78.0 hm^3/yr); median of yearly mean discharges, 56 ft^3/s (1.59 m^3/s), 40,600 acre-ft/yr (50 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,410 ft^3/s (153 m^3/s) Apr. 5, 1966, gage height, 18.23 ft (5.557 m); no flow at times in 1937, 1941, 1960, 1973.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 340 ft^3/s (9.63 m^3/s) June 30, gage height, 5.39 ft (1.643 m); maximum gage height, 6.40 ft (1.951 m) Feb. 17, 19 (backwater from ice); minimum daily discharge, 0.33 ft^3/s (0.009 m^3/s) Dec. 17 to Jan. 7; minimum gage height, 3.24 ft (0.988 m) May 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.0	1.0	3.2	.33	2.2	64	47	4.8	1.0	281	1.8	.90
2	.80	1.9	3.8	.33	2.2	64	27	5.8	1.5	187	1.5	.68
3	.90	.42	4.4	.33	2.2	62	5.6	4.5	1.9	96	1.3	.52
4	.90	.47	4.8	.33	2.2	58	14	4.0	2.7	99	1.1	.52
5	1.0	.58	5.2	.33	2.2	44	17	4.1	6.1	96	1.1	.53
6	1.1	.54	5.4	.33	2.2	31	30	3.5	6.3	70	1.4	2.3
7	1.0	.61	5.6	.33	2.2	35	35	3.2	7.8	5.7	1.5	1.6
8	1.0	1.1	6.0	.34	2.2	40	24	3.2	10	16	1.2	.90
9	1.0	1.4	6.5	.35	2.3	46	17	3.8	10	21	1.1	.92
10	1.1	1.1	7.2	.36	2.4	50	2.8	5.2	10	22	.99	.88
11	1.1	1.4	8.0	.37	2.5	52	1.4	4.3	9.3	21	.94	.74
12	1.2	1.5	12	.39	3.0	50	1.4	2.8	8.7	19	.87	.64
13	1.0	1.4	48	.41	5.0	48	1.7	3.6	18	16	.79	.88
14	.90	1.5	30	.44	8.6	43	1.7	2.5	18	15	.76	.75
15	.84	1.7	1.0	.48	15	39	2.2	2.2	32	13	.68	.65
16	1.2	1.7	.34	.52	25	36	3.6	4.2	42	12	.63	.74
17	2.2	1.7	.33	.58	45	33	3.2	5.0	46	10	.68	.76
18	1.4	1.8	.33	.64	49	31	3.6	3.1	58	9.3	.77	.68
19	1.1	1.9	.33	.78	50	28	4.0	1.9	50	8.5	.79	.62
20	1.0	2.2	.33	.98	48	26	4.0	1.3	40	7.6	.70	.63
21	.84	2.4	.33	1.3	42	24	4.8	1.2	39	6.1	.76	.62
22	.80	2.4	.33	1.7	37	22	5.2	1.1	40	6.0	.91	.50
23	.90	2.4	.33	1.9	33	20	4.8	1.4	40	5.0	.85	.94
24	1.0	2.2	.33	2.0	40	19	4.4	6.5	41	4.1	1.1	.94
25	.90	2.2	.33	2.0	50	17	5.2	32	41	3.7	.97	.92
26	.90	2.4	.33	2.1	60	16	3.8	39	41	3.0	.68	1.2
27	.90	2.4	.33	2.1	62	15	3.1	30	41	2.6	.64	.96
28	1.0	2.2	.33	2.1	64	22	3.9	20	41	2.2	.57	.87
29	1.0	2.4	.33	2.1	---	30	5.3	1.5	109	2.0	.53	.93
30	1.0	2.4	.33	2.2	---	64	4.5	1.3	294	2.1	.56	1.5
31	1.0	---	.33	2.2	---	97	---	1.1	---	2.4	1.0	---
TOTAL	31.98	49.32	156.39	30.65	661.4	1226	291.2	208.1	1106.3	1064.3	29.17	26.22
MEAN	1.03	1.64	5.04	.99	23.6	39.5	9.71	6.71	36.9	34.3	.94	.87
MAX	2.2	2.4	48	2.2	64	97	47	39	294	281	1.8	2.3
MIN	.80	.42	.33	.33	2.2	15	1.4	1.1	1.0	2.0	.53	.50
AC-FT	63	98	310	61	1310	2430	578	413	2190	2110	58	52

CAL YR 1980 TOTAL 7303.92 MEAN 20.0 MAX 765 MIN .33 AC-FT 14490
WTR YR 1981 TOTAL 4881.03 MEAN 13.4 MAX 294 MIN .33 AC-FT 9680

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA
(International gaging station)

LOCATION.--Lat 49°00'30", long 97°12'40", in sec.2, T.1, R.2 E., on right bank 1,500 ft (460 m) downstream from Canadian National Railway bridge in Emerson, 0.8 mi (1.3 km) downstream from international boundary, 3.6 mi (5.8 km) downstream from Pembina River, and at mile 154.3 (248.3 km).

DRAINAGE AREA.--40,200 mi^2 (104,100 km^2), approximately, includes 3,800 mi^2 (9,840 km^2) in closed basins.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March to November 1902 (gage heights only), May 1912 to September 1929 (monthly discharge only, published in WSP 1308). October 1929 to current year.

GAGE.--Water-stage recorder. Datum of gage is 700.00 ft (213.360 m) National Geodetic Vertical Datum of 1929, by Geodetic Survey of Canada. See WSP 1728 or 1913 for history of changes prior to Apr. 10, 1953.

REMARKS.--Records good. Discharge partialy regulated by reservoirs on tributaries.

COOPERATION.--This station is one of the internatioal gaging stations maintained by Canada under agreement with the United States.

AVERAGE DISCHARGE.--69 years (water years 1913-81), 3,280 ft^3/s (92.89 m^3/s), 2,376,000 acre-ft/yr (2.93 km^3/yr); median of yearly mean disoharges, 2,630 ft^3/s (74.5 m^3/s), 1,910,000 acre-ft/yr (2.4 km^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 95,500 ft^3/s (2,700 m^3/s) May 13, 1950, gage height, 90.89 ft (27.703 m); maximum gage height, 91.19 ft (27.795 m) May 1, 1979; minimum observed discharge, 0.9 ft^3/s (0.025 m^3/s) Feb. 6-8, 1937.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,150 ft^3/s (174 m^3/s) July 4, gage height, 55.19 ft (16.822 m); minimum daily, 246 ft^3/s (6.97 m^3/s) Feb. 8-19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	681	804	456	305	261	783	3790	964	3100	2430	1510	1590
2	685	847	444	303	257	903	3110	991	2550	4260	1540	1400
3	679	797	439	303	254	1020	2740	1000	2130	6070	1550	1230
4	675	716	433	301	252	1150	2620	997	1760	6110	1550	1230
5	659	684	427	301	250	1270	2580	1010	1430	5530	1580	1690
6	635	669	422	301	248	1340	2550	1030	1320	4550	1590	2210
7	578	664	414	301	248	1370	2490	1050	1240	3800	1530	2250
8	514	656	407	299	246	1370	2450	1070	1200	3230	1460	2070
9	474	658	400	299	246	1330	2360	1090	1190	2860	1450	1950
10	460	663	391	299	246	1250	2160	1090	1200	2600	1620	2080
11	435	679	384	299	246	1170	2000	1110	1230	2440	1830	3070
12	413	715	375	299	246	1110	1880	1090	1240	2280	1930	4040
13	416	739	366	299	246	1070	1780	1060	1270	2110	1910	4100
14	396	736	355	299	246	1070	1680	1040	1300	2030	1810	3590
15	372	740	345	299	246	1100	1650	1020	1370	2170	1680	2970
16	366	740	337	299	246	1150	1630	981	1410	2310	1590	2470
17	394	740	331	297	246	1220	1590	929	1380	2340	1510	2070
18	417	714	326	297	246	1300	1560	890	1290	2370	1440	1740
19	440	636	324	295	246	1360	1530	857	1280	2420	1350	1520
20	483	612	322	293	248	1410	1440	831	1330	2410	1260	1330
21	507	605	318	291	254	1450	1330	786	1440	2370	1170	1190
22	533	593	316	291	272	1490	1210	742	1560	2270	1090	1090
23	552	589	314	288	291	1520	1120	745	1530	2150	1030	1010
24	564	581	312	286	343	1560	1080	748	1530	2010	977	941
25	594	574	312	282	419	1610	1040	781	1560	1900	955	897
26	637	559	310	278	496	1680	1000	865	1680	1820	1090	886
27	674	537	310	276	581	1810	956	1680	1910	1730	1550	866
28	696	509	308	272	674	2050	955	3510	1940	1650	1840	885
29	705	483	308	270	---	2400	964	4580	1970	1580	1930	926
30	707	468	307	267	---	2900	957	4560	2120	1540	1930	936
31	728	---	305	265	---	3370	---	3880	---	1510	1780	---
TOTAL	17069	19707	11118	9054	8300	45586	54202	42977	47460	84850	47032	54227
MEAN	551	657	359	292	296	1471	1807	1386	1582	2737	1517	1808
MAX	728	847	456	305	674	3370	3790	4580	3100	6110	1930	4100
MIN	366	468	305	265	246	783	955	742	1190	1510	955	866
AC-FT	33860	39090	22050	17960	16460	90420	107500	85240	94140	168300	93290	107600

CAL YR 1980 TOTAL 668415 MEAN 1826 MAX 21700 MIN 305 AC-FT 1326000
WTR YR 1981 TOTAL 441582 MEAN 1210 MAX 6110 MIN 246 AC-FT 875900

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued
(National stream-quality accounting network station)
(Pesticide station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1977 to current year.
WATER TEMPERATURES: October 1977 to current year.

REMARKS.--Specific conductance and temperature monitor operated by Canada. Letter K indicates non-ideal colony count, letter E indicates estimated value, and letters ND indicate material analyzed for but not detected.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily mean, 1,200 micromhos Sept. 24, 1978, and Aug. 30, 1980, and on many days during October 1980 through March 1981; minimum daily mean, 330 micromhos Apr. 10, 16, 17, 1978.
WATER TEMPERATURES: Maximum daily mean, 26.0°C July 13, 14, 1981; minimum daily mean, 0.0°C on many days during winter months.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily mean, 1,200 micromhos on many days during October through March; minimum daily mean, 400 micromhos May 30, 31.
WATER TEMPERATURES: Maximum daily mean, 26.0°C July 13, 14; minimum daily mean, 1.0°C on many days during winter months.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
OCT										
09...	0900	509	1190	--	8.7	11.0	12.5	46	10.0	95
NOV										
06...	0930	705	1093	--	8.4	--	4.5	1.0	12.7	102
DEC										
05...	1220	E670	1460	1460	8.9	-3.0	.5	14	18.2	130
JAN										
13...	1200	296	1810	1780	7.9	-2.0	.5	6.1	9.8	70
FEB										
20...	1515	E320	1150	1160	8.0	.0	.5	5.1	10.5	82
MAR										
18...	0900	E1000	829	841	8.1	15.0	.5	21	13.5	96
APR										
15...	1015	1640	778	804	8.6	15.0	9.0	110	11.9	105
MAY										
20...	0900	E200	910	938	8.7	24.0	18.0	72	8.5	92
JUN										
10...	0830	E1220	811	827	8.2	20.0	19.5	120	7.0	79
JUL										
07...	1030	E4000	600	601	8.1	30.0	26.0	270	5.3	69
AUG										
13...	1240	E1890	665	674	8.4	29.0	24.5	99	6.4	86
SEP										
10...	1300	2210	488	459	8.0	29.0	20.5	95	7.2	82

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS NONCARBONATE (MG/L AS CACO3) (95902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)
OCT										
09...	K10	K12	340	130	78	35	120	2.8	11	210
NOV										
06...	K12	66	320	87	71	34	110	2.7	11	230
DEC										
05...	<2	46	380	120	81	43	170	3.8	13	260
JAN										
13...	K13	440	500	140	110	54	190	3.7	13	360
FEB										
20...	K10	600	390	80	87	42	97	2.1	7.4	310
MAR										
18...	1000	1700	230	64	54	24	78	2.2	7.3	170
APR										
15...	53	K44	240	73	56	25	65	1.8	6.0	170
MAY										
20...	K27	160	300	70	64	34	83	2.1	7.6	230
JUN										
10...	K20	170	240	75	53	25	70	2.0	7.0	160
JUL										
07...	96	1100	220	73	53	22	37	1.1	5.7	150
AUG										
13...	K43	--	230	30	51	25	45	1.4	5.2	200
SEP										
10...	--	--	200	50	47	20	22	.7	5.9	150

DATE	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	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)
OCT										
09...	160	170	.4	11	748	712	1030	.00	.00	.000
NOV										
06...	150	130	.3	9.9	654	655	1240	.19	.18	.070
DEC										
05...	180	200	.4	4.7	877	848	1590	.00	.00	.040
JAN										
13...	220	240	.6	15	1100	1060	879	.63	.61	2.30
FEB										
20...	140	130	.3	15	690	709	596	.93	.93	.330
MAR										
18...	88	110	.2	12	494	479	1330	.75	.75	.060
APR										
15...	100	76	.2	6.0	469	437	2080	.00	.02	.070
MAY										
20...	140	96	.3	6.8	573	570	309	.00	.02	.180
JUN										
10...	96	99	.2	11	486	462	1600	.91	.98	.160
JUL										
07...	94	52	.2	14	368	372	3970	.85	.82	.090
AUG										
13...	47	51	.2	13	409	359	2090	.24	.25	.070
SEP										
10...	72	15	.2	11	289	285	1720	.32	.33	.160

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	NITROGEN, AMMONIA DIS-SOLVED (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, DIS-SOLVED (MG/L AS P) (00666)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	SEDIMENT, SUS-PENDED (MG/L) (80154)	SEDIMENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT									
09...	.000	1.40	1.0	.250	.130	--	--	--	--
NOV									
06...	.100	1.50	1.3	.380	.290	31	--	--	--
DEC									
05...	.060	1.60	1.2	.300	.250	19	20	36	96
JAN									
13...	2.30	3.10	2.8	.880	.750	--	12	9.6	97
FEB									
20...	.330	.47	.31	.230	.210	35	11	--	94
MAR									
18...	.030	2.20	1.7	.260	.200	13	20	54	84
APR									
15...	.090	1.60	1.6	.240	.040	--	140	620	100
MAY									
20...	.090	1.80	.93	.240	.130	16	130	--	100
JUN									
10...	.250	1.50	.90	.280	.110	14	230	758	100
JUL									
07...	.070	1.70	1.2	.450	.130	--	510	--	100
AUG									
13...	<.060	1.10	1.1	.350	.170	7.4	196	1000	100
SEP									
10...	.100	1.50	1.0	.250	.050	--	166	991	99

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA) (01007)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)	CHROMIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO) (01037)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)
OCT											
09...	0900	7	5	100	100	0	<1	20	0	1	<3
JAN											
13...	1200	3	4	100	200	0	<1	10	0	2	<3
APR											
15...	1015	4	2	100	100	0	<1	20	10	2	<3
JUL											
07...	1030	9	4	100	100	1	0	30	0	5	0
SEP											
10...	1300	5	4	100	230	1	<1	10	10	1	0

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGANESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)
OCT										
09...	14	4	1400	<10	4	0	120	3	.1	.0
JAN										
13...	5	3	240	30	2	1	70	30	.1	.1
APR										
15...	5	4	3300	10	6	1	280	5	.1	.1
JUL										
07...	27	6	12000	50	10	1	530	10	.2	.1
SEP										
10...	14	5	4300	20	22	2	170	4	.2	.0

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)
OCT										
09...	14	0	1	1	0	0	40	<3	17	.7
JAN										
13...	5	4	0	0	0	0	10	30	16	--
APR										
15...	8	2	0	0	2	0	30	<3	9.0	1.0
JUL										
07...	19	5	0	0	0	0	70	60	11	.9
SEP										
10...	11	2	1	0	0	0	30	40	13	--

DATE	TIME	PCB, TOTAL (39516)	ALDRIN, TOTAL (UG/L) (39330)	CHLOR-DANE, TOTAL (UG/L) (39350)	DDD, TOTAL (UG/L) (39360)	DDE, TOTAL (UG/L) (39365)	DDT, TOTAL (UG/L) (39370)	DI-AZINON, TOTAL (UG/L) (39570)	DI-ELDRIN TOTAL (UG/L) (39380)	ENDRIN, TOTAL (UG/L) (39390)	ETHION, TOTAL (UG/L) (39398)
NOV											
06...	0930	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	HEPTA-CHLOR, TOTAL (UG/L) (39410)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L) (39420)	LINDANE TOTAL (UG/L) (39340)	MALA-THION, TOTAL (UG/L) (39530)	METH-OXY-CHLOR, TOTAL (UG/L) (39480)	METHYL PARA-THION, TOTAL (UG/L) (39600)	METHYL TRI-THION, TOTAL (UG/L) (39790)	PARA-THION, TOTAL (UG/L) (39540)	TOX-APHENE, TOTAL (UG/L) (39400)	TOTAL TRI-THION (UG/L) (39786)
NOV										
06...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	TIME	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M (00573)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M (00572)	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2) (70957)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2) (70958)
OCT					
09...	0900	12.0	10.6	6.99	.540

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1980 TO SEPTEMBER 1981

DATE	MAR 18,81	MAY 20,81	JUN 10,81	JUL 7,81	AUG 13,81	SEP 10,81
TIME	0900	0900	0830	1030	1240	1300
TOTAL CELLS/ML	18000	14000	7100	2900	16000	7800
DIVERSITY: DIVISION	0.2	1.8	1.4	1.7	1.3	1.3
.CLASS	0.2	1.8	1.4	1.7	1.3	1.3
..ORDER	0.3	2.3	1.6	2.6	1.8	1.5
...FAMILY	0.3	3.0	1.9	2.8	2.6	2.1
....GENUS	0.3	3.5	2.4	3.2	3.2	3.1

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)												
.BACILLARIOPHYCEAE												
..BACILLARIALES												
...NITZSCHIACEAE												
....NITZSCHIA	--	-	930	7	110	2	330	11	220	1	170	2
..EUPODISCALES												
...COSCINODISCACEAE												
....CYCLOTELLA	--	-	2000	14	400	6	190	7	250	2	61	1
....MELOSIRA	--	-	880	6	110	2	55	2	110	1	--	-
....STEPHANODISCUS	17000#	96	--	-	--	-	*	0	--	-	--	-
..FRAGILARIALES												
...FRAGILARIACEAE												
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-	*	0
....SYNEDRA	--	-	310	2	--	-	28	1	--	-	--	-
..NAVICULALES												
...CYMBELLACEAE												
....AMPHORA	--	-	--	-	--	-	*	0	--	-	--	-
...GOMPHONEMACEAE												
....GOMPHONEMA	--	-	--	-	--	-	*	0	--	-	--	-
...NAVICULACEAE												
....NAVICULA	--	-	--	-	--	-	110	4	*	0	46	1
..SURIRELLALES												
...SURIRELLACEAE												
....SURIRELLA	--	-	--	-	96	1	55	2	--	-	46	1
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...CHLOROCOCCACEAE												
....SCHROEDERIA	330	2	--	-	*	0	--	-	*	0	*	0
....TETRAEDRON	--	-	--	-	83	1	--	-	--	-	--	-
...DICTYOSPHAERIACEAE												
....DICTYOSPHAERIUM	--	-	--	-	170	2	--	-	--	-	92	1
...HYDRODICTYACEAE												
....PEDIASTRUM	--	-	--	-	--	-	--	-	1300	8	--	-
...MICRACTINIACEAE												
....MICRACTINIUM	--	-	3000#	21	55	1	--	-	1200	8	230	3
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	620	4	83	1	69	2	330	2	280	4
....CHODATELLA	--	-	--	-	--	-	--	-	*	0	--	-
....CLOSTERIOPSIS	--	-	*	0	--	-	--	-	--	-	--	-
....FRANCEIA	--	-	*	0	--	-	--	-	*	0	--	-
....KIRCHNERIELLA	--	-	--	-	96	1	41	1	510	3	670	9
....OOCYSTIS	--	-	100	1	--	-	110	4	250	2	290	4
....QUADRIGULA	--	-	--	-	--	-	--	-	--	-	110	1
....TREUBARIA	--	-	150	1	--	-	--	-	--	-	--	-
...SCENEDESMACEAE												
....ACTINASTRUM	--	-	2100	15	96	1	--	-	--	-	120	2
....COELASTRUM	--	-	--	-	260	4	--	-	290	2	76	1
....CRUCIGENIA	--	-	--	-	--	-	--	-	720	4	61	1
....GLOEOACTINIUM	--	-	--	-	140	2	--	-	--	-	660	8
....SCENEDESMUS	--	-	310	2	480	7	330	11	1600	10	570	7
....TETRASTRUM	--	-	210	1	220	3	150	5	1000	6	430	5
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	330	2	210	1	110	2	--	-	*	0	46	1
...PHACOTACEAE												
....PHACOTUS	--	-	--	-	--	-	--	-	--	-	*	0
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	410	3	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	--	-	*	0	28	1	140	1	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1980 TO SEPTEMBER 1981--Continued

DATE TIME	MAR 18,81 0900		MAY 20,81 0900		JUN 10,81 0830		JUL 7,81 1030		AUG 13,81 1240		SEP 10,81 1300	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-	180	2
....ANACYSTIS	--	-	980	7	4500#	63	280	10	6700#	41	3500#	45
..NOSTOCALES												
...NOSTOCACEAE												
....ANABAENOPSIS	--	-	--	-	--	-	--	-	800	5	--	-
..OSCILLATORIALES												
...OSCILLATORIACEAE												
....LYNGBYA	--	-	--	-	--	-	--	-	470	3	--	-
....OSCILLATORIA	--	-	1300	9	--	-	1000#	35	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	310	2	*	0	--	-	140	1	*	0
....PHACUS	--	-	--	-	*	0	--	-	--	-	--	-
....TRACHELOMONAS	--	-	150	1	55	1	--	-	*	0	61	1
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..DINOKONTAE												
...GLENODINIACEAE												
....GLENODINIUM	--	-	--	-	--	-	41	1	--	-	--	-
...PERIDINIACEAE												
....PERIDINIUM	--	-	--	-	--	-	--	-	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1120	1150	1200	1200	1200	1030	630	860	420	1010	580	550
2	1160	1200	1200	1200	1200	1080	620	850	440	1030	610	520
3	1090	1200	1200	1200	1200	1200	610	840	460	980	620	530
4	1090	1180	1200	1200	1200	1150	620	860	490	650	620	580
5	1130	1150	1200	1200	1200	1020	640	880	530	550	590	590
6	1200	1100	1200	1200	1200	490	680	880	580	600	580	610
7	1200	1080	1200	1200	1200	500	650	850	630	620	570	600
8	1200	1080	1200	1200	1200	540	670	880	690	640	570	570
9	1200	1170	1200	1200	1200	550	730	890	740	670	600	520
10	1200	1180	1200	1200	1200	580	780	860	850	690	630	520
11	1200	1130	1200	1200	1200	640	840	840	890	670	680	680
12	1200	1200	1200	1200	1200	620	840	900	920	700	680	660
13	1200	1200	1200	1200	1200	580	820	870	---	720	650	550
14	1200	1200	1200	1200	1200	540	810	880	---	700	630	480
15	1140	1200	1200	1200	1200	520	760	910	---	690	610	530
16	1120	1200	1200	1200	1200	510	820	940	1000	690	---	610
17	1110	1200	1200	1200	1200	680	840	970	1010	670	---	640
18	1090	1200	1200	1200	1200	800	730	950	1030	660	---	600
19	1200	1200	1200	1200	1200	700	---	930	1070	640	---	580
20	1200	1200	1200	1200	1200	680	760	910	1070	570	---	600
21	1110	1200	1200	1200	1200	660	770	900	1100	540	590	590
22	1120	1200	1200	1200	1180	700	760	880	1140	530	590	590
23	1200	1200	1200	1200	1110	710	760	870	1140	560	580	600
24	1100	1200	1200	1200	1020	690	790	870	---	570	580	600
25	1050	---	1200	1200	980	680	780	880	---	600	580	640
26	1040	1200	1200	1200	970	690	780	890	---	570	580	670
27	1060	1200	1200	1200	980	720	870	900	---	570	580	650
28	1200	1200	1200	1200	1020	750	840	900	---	580	580	670
29	1150	1200	1200	1200	---	720	830	750	---	570	580	650
30	1170	1200	1200	1200	---	660	830	400	980	570	580	690
31	1110	---	1200	1200	---	660	---	400	---	570	570	---
MEAN	1150		1200	1200	1160	711		851		657		596

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.0	3.0	2.5	2.0	1.0	1.0	5.5	8.5	17.0	22.5	23.5	21.0
2	12.0	3.0	2.5	2.0	1.0	1.0	6.0	9.0	17.0	23.0	23.5	20.5
3	11.0	3.5	2.5	1.5	1.0	1.0	7.0	9.0	17.0	23.0	24.0	20.0
4	10.5	3.5	2.5	2.0	1.0	1.0	7.0	9.5	17.5	23.0	24.0	19.0
5	10.0	3.5	2.5	2.5	1.0	1.0	8.0	9.5	18.0	23.0	24.0	19.0
6	11.0	4.0	2.5	1.5	1.5	1.0	9.0	10.0	18.5	24.0	23.5	19.0
7	12.0	4.0	2.5	1.0	1.5	1.0	9.5	11.0	19.0	24.5	23.0	19.0
8	12.5	3.5	2.5	1.0	1.5	1.0	10.0	12.0	19.0	25.5	23.0	19.5
9	13.0	3.0	2.5	1.0	1.5	1.0	10.5	12.5	19.0	25.0	23.0	19.5
10	11.5	2.0	2.5	1.0	1.0	1.0	11.5	12.0	19.0	25.0	22.5	20.0
11	11.0	1.5	2.5	1.0	1.0	1.0	11.0	12.0	19.5	25.0	23.0	21.0
12	8.0	2.0	2.5	1.0	1.0	1.0	11.0	13.0	19.5	25.5	23.5	20.5
13	7.0	3.0	2.5	1.0	1.0	1.0	11.0	14.5	---	26.0	23.5	20.5
14	7.0	3.0	2.5	1.0	1.0	1.0	9.5	15.0	---	26.0	24.0	20.0
15	7.0	2.0	2.0	1.0	1.0	1.0	7.0	16.0	---	25.0	24.0	19.0
16	7.5	2.0	2.0	1.0	1.0	1.0	8.5	16.0	19.5	24.5	---	18.5
17	7.5	1.5	2.0	1.0	1.0	3.0	8.5	16.0	19.0	24.5	---	18.0
18	7.0	1.5	2.0	1.0	1.0	4.5	6.0	16.5	18.5	25.0	---	18.0
19	6.0	1.5	2.0	1.0	1.0	4.5	---	17.0	18.0	24.5	---	18.0
20	6.5	2.0	2.0	1.0	1.0	4.5	6.0	17.5	19.0	25.0	---	17.5
21	7.0	2.0	2.0	1.0	1.0	5.0	6.0	18.0	19.0	24.5	23.0	17.5
22	6.5	2.0	2.0	1.0	1.0	5.0	5.0	19.0	19.0	24.0	23.0	17.5
23	6.5	2.0	2.0	1.0	1.0	5.0	4.5	17.5	19.0	24.0	23.0	16.5
24	5.5	1.5	2.0	1.0	1.0	4.5	5.0	16.0	---	23.5	23.0	16.0
25	5.0	---	2.0	1.0	1.0	4.5	6.0	15.0	---	23.0	23.0	15.5
26	4.0	2.0	2.0	1.0	1.0	4.5	6.5	14.5	---	24.0	23.0	14.5
27	3.5	1.5	2.0	1.0	1.0	4.5	7.5	15.0	---	24.0	22.5	14.0
28	3.0	1.5	2.0	1.0	1.0	4.5	8.5	15.5	---	25.0	23.0	14.0
29	3.0	1.5	2.0	1.0	---	4.5	9.0	16.5	---	25.0	23.0	14.0
30	3.5	1.5	2.0	1.0	---	4.5	9.0	16.5	22.0	24.5	22.0	14.5
31	3.5	---	2.5	1.0	---	5.0	---	16.5	---	23.5	20.5	---
MEAN	8.0		2.0	1.0	1.0	2.5		14.0		24.5		18.0

05104500 ROSEAU RIVER BELOW SOUTH FORK NEAR MALUNG, MN

LOCATION.--Lat 48°47'30", long 95°44'40", in NW¼SW¼ sec.6, T.161 N., R.39 W., Roseau County, Hydrologic Unit 09020314, on left bank 0.3 mi (0.5 km) downstream from South Fork and 1.5 mi (2.4 km) northwest of Malung.

DRAINAGE AREA.--573 mi^2 (1,484 km^2).

PERIOD OF RECORD.--October 1946 to current year.

REVISED RECORDS.--WSP 2113: 1948, 1950, 1951, 1956(M), 1957(M), 1962(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,029.67 ft (313.843 m), adjustment of 1912.

REMARKS.--Records fair. Some flow bypasses the gaging station through a natural overflow channel 0.8 mi (1.3 km) upstream and returns to river 0.5 mi (0.8 km) downstream. Overflow begins at stage of about 13.0 ft (4.0 m), discharge, 1,800 ft^3/s (51.0 m^3/s). These records include any flow in the overflow channel.

AVERAGE DISCHARGE.--35 years, 145 ft^3/s (4.106 m^3/s), 105,100 acre-ft/yr (130 hm^3/yr); median of yearly mean discharges, 114 ft^3/s (3.23 m^3/s), 82,600 acre-ft/yr (102 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,750 ft^3/s (163 m^3/s) July 18, 1968, gage height, 22.32 ft (6.803 m); maximum gage height, 23.37 ft (7.123 m) Apr. 3, 1966 (backwater from ice); no flow for part of Jan. 15, 1952 (caused by construction of concrete control), July 23 to Sept. 8, 1961, Dec. 22 to Mar. 10, 1977, and Sept. 9-11, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 506 ft^3/s (14.3 m^3/s) July 2, gage height, 7.22 ft (2.201 m); minimum, 0.10 ft^3/s (0.003 m^3/s) Oct. 11-13, gage height, 4.91 ft (1.497 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.15	9.8	6.6	2.7	1.9	13	28	10	40	489	3.2	1.9
2	.16	9.8	6.1	2.6	1.8	11	26	12	38	502	4.4	1.7
3	.18	9.2	5.7	2.6	1.9	9.5	26	12	37	450	6.6	1.8
4	.19	9.8	5.8	2.5	1.9	8.4	23	12	37	369	8.2	1.5
5	.20	9.8	6.2	2.4	1.9	7.8	19	12	40	289	8.2	1.2
6	.16	9.2	6.4	2.3	1.9	6.9	19	11	68	227	26	3.0
7	.15	11	6.3	2.2	1.9	6.4	18	10	67	179	40	9.2
8	.14	7.7	6.1	2.1	1.9	6.2	16	10	68	145	63	20
9	.13	12	5.8	2.0	1.9	6.2	15	11	70	116	74	33
10	.12	11	5.5	1.9	1.9	6.1	13	12	64	94	58	46
11	.10	15	5.3	1.9	1.8	6.7	12	14	59	80	41	46
12	.10	16	5.3	1.8	1.7	8.9	11	15	53	68	30	36
13	.11	16	5.1	1.8	1.5	12	9.6	15	59	58	21	26
14	.11	16	5.1	1.8	1.5	14	9.1	15	70	47	17	21
15	.12	14	4.9	1.8	1.5	16	9.2	14	152	39	13	17
16	.18	16	5.1	1.7	1.5	18	9.3	11	207	34	11	13
17	.70	18	5.3	1.8	1.6	20	8.4	6.5	210	29	8.7	10
18	1.4	15	5.2	1.8	1.9	19	8.0	6.1	200	23	7.2	7.9
19	1.1	13	4.9	1.7	2.0	16	7.9	5.4	175	22	6.1	6.5
20	2.1	12	4.6	1.7	2.5	14	8.6	4.8	155	22	4.9	5.5
21	9.2	9.8	3.8	1.8	5.0	14	8.6	4.8	135	18	4.0	4.9
22	12	9.6	3.4	1.8	13	13	9.4	4.9	121	11	3.6	4.8
23	15	9.4	3.0	1.8	34	13	10	8.6	114	9.0	3.2	4.9
24	16	9.0	2.9	1.8	31	13	10	25	116	7.8	3.7	5.1
25	17	8.7	2.9	1.9	26	14	9.6	80	134	6.8	4.8	5.1
26	14	8.6	2.8	1.9	21	16	8.8	87	155	5.5	4.0	5.1
27	12	8.4	2.8	1.9	17	17	9.2	84	158	4.9	2.8	5.5
28	9.8	8.2	2.8	1.9	15	23	9.5	76	168	3.8	2.2	6.9
29	11	7.7	2.8	1.9	---	29	9.4	66	279	3.2	1.8	5.7
30	13	7.2	2.8	1.8	---	32	8.9	57	447	2.8	1.7	9.0
31	12	---	2.8	2.0	---	32	---	48	---	3.2	1.8	---
TOTAL	148.60	336.9	144.1	61.6	198.4	442.1	389.5	760.1	3696	3358.0	485.1	365.2
MEAN	4.79	11.2	4.65	1.99	7.09	14.3	13.0	24.5	123	108	15.6	12.2
MAX	17	18	6.6	2.7	34	32	28	87	447	502	74	46
MIN	.10	7.2	2.8	1.7	1.5	6.1	7.9	4.8	37	2.8	1.7	1.2
AC-FT	295	668	286	122	394	877	773	1510	7330	6660	962	724

CAL YR 1980 TOTAL 15285.29 MEAN 41.8 MAX 2760 MIN .00 AC-FT 30320
WTR YR 1981 TOTAL 10385.60 MEAN 28.5 MAX 502 MIN .10 AC-FT 20600

05105300 ROSEAU RIVER BELOW ROSEAU, MN

LOCATION.--Lat 48°53'28", long 95°43'50", in SW¼SE¼ sec.31, T.163 N., R.39 W., Roseau County, Hydrologic Unit 09020314, at bridge on County Highway 28, 900 ft (274 m) downstream from Hay Creek and 3.2 mi (5.1 km) northeast of Roseau.

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

REMARKS.--Letter K indicates non-ideal colony count, and letter E indicates estimated value.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	COLOR (PLAT-INUM-COBALT UNITS) (00080)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML) (31501)
OCT											
16...	1630	E1.0	--	--	--	--	--	--	--	--	46
17...	0930	11	445	464	6.9	6.0	6.0	13	10.0	83	--
DEC											
18...	1000	5.7	365	523	7.7	-21.0	.0	10	5.0	35	--
JAN											
21...	1400	2.5	645	657	7.4	-2.0	.0	20	1.0	7	--
MAR											
26...	0900	27	295	310	8.0	3.5	.0	40	11.8	84	--
MAY											
18...	1600	9.1	440	449	8.3	26.0	20.0	17	9.8	110	--
JUL											
20...	1530	34	370	350	8.0	21.0	22.5	60	6.3	80	--
SEP											
21...	1405	7.9	365	380	8.1	12.0	13.0	40	9.1	89	--

DATE	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)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
OCT										
16...	K15	31	--	--	--	--	--	--	--	--
17...	--	--	43	23	16	7.0	190	30	19	.2
DEC										
18...	160	K19	56	24	13	2.2	270	19	3.6	.2
JAN										
21...	490	57	70	30	16	2.9	340	27	5.4	.2
MAR										
26...	K20	64	37	14	7.2	3.8	140	13	5.7	.1
MAY										
18...	K22	K7	52	22	9.0	2.4	240	18	3.6	.2
JUL										
20...	1200	1100	50	17	5.9	2.2	190	7.2	2.1	.1
SEP										
21...	120	110	49	19	6.5	2.4	200	13	3.0	.1

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P) (00671)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)
OCT										
16...	--	--	--	--	--	--	--	--	--	--
17...	2.4	14	.01	.78	.040	80	20	10	11	.9
DEC										
18...	13	0	.77	.66	.030	80	30	70	15	.5
JAN										
21...	19	15	.04	.78	.010	80	70	380	--	--
MAR										
26...	6.5	2	.08	.97	.010	60	70	20	7.8	.7
MAY										
18...	2.5	18	.01	.52	.010	--	<10	20	12	.3
JUL										
20...	19	14	.09	.90	.070	80	70	20	20	1.2
SEP										
21...	6.3	16	.03	.80	.030	50	50	20	--	--

05106000 SPRAGUE CREEK NEAR SPRAGUE, MANITOBA

(International gaging station)

LOCATION.--Lat 48°59'33", long 95°39'43", in NE¼ sec.34, T.164 N., R.39 W., Roseau County, Hydrologic Unit 09020314, on left bank 0.5 mi (0.8 km) south of international boundary, 3.5 mi (5.6 km) south of Sprague, Manitoba, 8 mi (13 km) upstream from mouth, and 10.5 mi (16.9 km) northeast of Roseau, MN.

DRAINAGE AREA.--176 mi^2 (455 km^2), revised. Prior to October 1958, 151 mi^2 (391 km^2); change due to construction of drainage ditch within basin.

PERIOD OF RECORD.--September 1928 to December 1981 (discontinued). Winter records incomplete prior to 1941. Prior to September 1951, published as Mud Creek near Sprague.

REVISED RECORDS.--WSP 1055: 1944. WSP 1308: 1931(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,038.4 ft (316.504 m), National Geodetic Vertical Datum of 1929. Prior to Mar. 15, 1929, nonrecording gage at same site and datum.

REMARKS.--Records good except those for winter period, which are poor.

COOPERATION.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

AVERAGE DISCHARGE.--42 years (water years 1929, 1941-81), 57.0 ft^3/s (1.614 m^3/s), 41,300 acre-ft/yr (50.9 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,560 ft^3/s (72.5 m^3/s) Apr. 22, 1974, gage height, 15.00 ft (4.572 m); maximum gage height, 15.31 ft (4.666 m) Sept. 1, 1942; no flow at times in some years.

EXTREMES FOR CURRENT PERIOD.--Water year 1981: Maximum discharge, 312 ft^3/s (8.84 m^3/s) June 15, gage height, 7.49 ft (2.283 m); minimum daily discharge, 0.77 ft^3/s (0.022 m^3/s) Feb. 3-15; minimum gage height, 1.92 ft (0.585 m) Dec. 19.

October to December 1981: Maximum discharge during period, 195 ft^3/s (5.52 m^3/s), Oct. 4, gage height, 5.84 ft (1.780 m); minimum daily, 3.5 ft^3/s (0.099 m^3/s) Dec. 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.2	11	3.5	1.1	.78	6.5	20	4.4	37	127	48	4.0
2	2.9	11	3.2	1.0	.78	6.3	19	4.6	44	101	42	4.7
3	3.0	10	2.9	1.0	.77	6.0	17	5.2	44	84	33	3.9
4	3.1	10	2.8	1.0	.77	5.6	15	5.2	39	70	27	3.2
5	3.1	10	2.7	1.0	.77	5.3	14	5.2	45	52	23	3.1
6	3.2	10	2.6	.98	.77	5.0	12	5.4	44	39	62	9.5
7	3.4	10	2.5	.96	.77	4.6	11	5.0	36	30	80	100
8	3.1	12	2.4	.95	.77	4.4	10	4.6	39	22	83	154
9	2.9	20	2.3	.94	.77	4.2	9.0	4.7	44	16	70	223
10	2.8	21	2.2	.93	.77	4.2	6.8	4.7	40	13	52	242
11	3.0	18	2.1	.92	.77	4.5	5.4	4.7	27	11	40	193
12	3.8	16	2.0	.90	.77	5.0	4.7	4.6	25	9.8	30	155
13	3.0	16	2.0	.89	.77	6.0	4.7	4.4	28	9.5	23	124
14	2.9	16	1.9	.88	.77	7.5	4.4	4.4	50	15	20	96
15	2.7	14	1.8	.88	.77	9.0	4.1	4.4	267	12	19	78
16	3.0	13	1.7	.87	.82	11	4.0	4.3	273	10	14	64
17	11	12	1.6	.86	1.0	14	3.9	4.4	227	10	12	53
18	31	11	1.6	.85	1.5	14	3.6	3.9	205	10	9.8	44
19	30	9.5	1.5	.84	2.0	13	3.4	3.8	174	10	9.0	37
20	25	9.3	1.5	.83	2.5	12	3.4	3.6	146	29	7.6	32
21	20	8.8	1.4	.82	3.5	11	3.6	7.4	155	32	7.0	30
22	18	8.8	1.4	.82	5.0	10	3.9	4.0	170	30	6.8	28
23	19	8.5	1.3	.81	7.0	9.5	3.9	10	137	21	8.0	35
24	18	7.6	1.3	.80	8.5	9.0	3.9	32	182	17	10	31
25	22	7.0	1.2	.80	8.4	9.5	4.1	73	210	16	7.8	39
26	26	6.2	1.2	.80	8.0	11	4.0	64	162	14	6.6	31
27	18	5.0	1.2	.80	7.5	13	4.0	54	135	13	5.7	31
28	15	4.7	1.1	.79	7.0	15	3.9	48	208	11	4.9	36
29	13	4.3	1.1	.79	---	18	3.8	46	250	9.0	4.4	37
30	13	4.0	1.1	.78	---	22	4.3	45	165	7.4	3.8	43
31	12	---	1.1	.78	---	22	---	41	---	32	3.6	---
TOTAL	340.1	324.7	58.2	27.37	74.29	298.1	214.8	515.9	3608	882.7	773.0	1964.4
MEAN	11.0	10.8	1.88	.88	2.65	9.62	7.16	16.6	120	28.5	24.9	65.5
MAX	31	21	3.5	1.1	8.5	22	20	73	273	127	83	242
MIN	2.7	4.0	1.1	.78	.77	4.2	3.4	3.6	25	7.4	3.6	3.1
AC-FT	675	644	115	54	147	591	426	1020	7160	1750	1530	3900

CAL YR 1980 TOTAL 2057.45 MEAN 5.62 MAX 170 MIN .00 AC-FT 4080
WTR YR 1981 TOTAL 9081.56 MEAN 24.9 MAX 273 MIN .77 AC-FT 18010

05106000 SPRAGUE CREEK NEAR SPRAGUE, MANITOBA--Continued
(International gaging station)

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	121	66	31									
2	181	64	31									
3	178	60	31									
4	191	57	30									
5	188	57	23									
6	180	53	26									
7	169	51	28									
8	152	49	26									
9	135	47	23									
10	133	40	19									
11	135	40	17									
12	127	40	16									
13	165	43	15									
14	184	44	15									
15	172	48	13									
16	157	57	12									
17	136	59	11									
18	122	58	9.0									
19	108	58	7.0									
20	97	44	5.2									
21	88	45	6.0									
22	78	38	6.0									
23	72	32	5.7									
24	72	32	7.0									
25	65	31	5.2									
26	75	32	4.9									
27	58	32	5.2									
28	56	32	4.3									
29	63	32	4.6									
30	67	32	3.8									
31	69	---	3.5									
TOTAL	3794	1373	444.4									
MEAN	122	45.8	14.3									
MAX	191	66	31									
MIN	56	31	3.5									
AC-FT	7530	2720	881									

05106500 ROSEAU RIVER AT ROSEAU LAKE, MN

LOCATION.--Lat 48°54'22", long 95°49'55", in SW¼SW¼ sec.28, T.163 N., R.40 W., Roseau County, Hydrologic Unit 09020314, at downstream side of bridge on County Road 123 at Roseau Lake, 3.5 mi (5.6 km) upstream from Pine Creek, 3.8 mi (6.1 km) downstream from Sprague Creek, and 7 mi (11 km) northwest of Roseau.

PERIOD OF RECORD.--November 1939 to current year (incomplete).

GAGE.--Water-stage recorder. Datum of gage is 1,018.59 ft (310.466 m), adjustment of 1928 (levels by Geodetic Survey of Canada); gage readings have been reduced to elevations adjustment of 1928. Prior to Aug. 26, 1970, and Oct. 18, 1979 to Sept. 30, 1980, nonrecording gage at same site and datum.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation observed, 1,036.86 ft (316.035 m) May 13, 1950; minimum observed, 1,019.75 ft (310.820 m) Aug. 16, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in July 1919 reached an elevation of about 1,034 ft (315.2 m).

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,027.77 ft (313.264 m) June 30; minimum observed, 1,021.39 ft (311.320 m) May 20, 22.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---					---	22.82	---	23.29	27.65	21.80	---
2	---					---	22.82	---	23.31	27.50	22.01	---
3	---					---	22.82	---	23.35	27.32	21.95	---
4	---					---	22.72	---	23.26	27.10	21.87	---
5	---					---	22.64	---	23.31	26.82	21.77	---
6	---					---	22.49	---	23.39	26.40	21.92	---
7	22.98					---	22.38	---	23.51	25.87	22.46	21.79
8	23.03					---	22.28	---	23.55	25.56	22.82	23.09
9	23.05					---	22.18	---	23.56	---	22.97	23.77
10	23.07					21.81	22.14	---	23.55	---	22.91	24.34
11	23.08					---	---	---	23.37	---	22.62	24.47
12	23.07					---	---	---	23.16	---	22.29	24.19
13	23.08					---	---	---	23.18	---	21.96	23.77
14	23.08					---	---	---	23.76	---	21.75	23.38
15	23.06					---	---	---	25.34	---	21.61	22.96
16	23.06					---	---	---	---	---	---	22.63
17	---					---	---	---	---	---	---	22.38
18	---					---	---	---	---	---	---	22.18
19	---					---	---	21.42	---	---	---	22.01
20	---					---	---	21.39	26.25	---	---	21.91
21	---					---	---	21.40	26.02	---	---	21.86
22	---					---	---	21.39	25.99	22.09	---	21.83
23	---					---	---	21.45	25.85	21.92	---	21.89
24	---					---	---	22.39	25.84	21.79	---	22.06
25	---					---	---	23.37	26.37	21.70	---	22.11
26	---					---	---	24.02	26.36	21.65	---	22.19
27	---					---	---	24.08	26.20	---	---	22.23
28	---					---	---	23.96	26.47	---	---	22.26
29	---					---	---	23.82	27.45	---	---	22.33
30	---					---	---	23.69	27.74	---	---	22.41
31	---					---	---	23.51	---	---	---	---
MEAN	---					---	---	---	---	---	---	---
MAX	---					---	---	---	---	---	---	---
MIN	---					---	---	---	---	---	---	---

NOTE.--Add 1,000 ft to obtain elevations in adjustment of 1928.

RED RIVER OF THE NORTH BASIN

05107500 ROSEAU RIVER AT ROSS, MN

LOCATION.--Lat 48°54'37", long 95°55'18", in NE¼SE¼ sec.27, T.163 N., R.41 W., Roseau County, Hydrologic Unit 09020314, on left bank 300 ft (91 m) downstream from highway bridge, 0.2 mi (0.3 km) north of Ross, and 2.3 mi (3.7 km) downstream from Pine Creek.

DRAINAGE AREA.--1,220 mi^2 (3,160 km^2), approximately.

PERIOD OF RECORD.--July 1928 to current year.

REVISED RECORDS.--WSP 1055: 1945. WSP 1175: Drainage area. WSP 1308: 1936(M). WSP 1508: 1948-49(P).

GAGE.--Water-stage recorder. Datum of gage is 1,018.44 ft (310.42 m), adjustment of 1928 (levels by Geodetic Survey of Canada). Prior to Mar. 13, 1929, nonrecording gage at same site and datum.

REMARKS.--Records fair except those for winter period, which are poor. High flow affected by natural storage in Roseau Lake.

AVERAGE DISCHARGE.--53 years, 262 ft^3/s (7.420 m^3/s), 189,800 acre-ft/yr (234 hm^3/yr); median of yearly mean discharges, 239 ft^3/s (6.77 m^3/s), 173,000 acre-ft/yr (213 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,560 ft^3/s (186 m^3/s) May 12, 1950, gage height, 18.25 ft (5.563 m); no flow Aug. 29, 30, 1961, Jan. 3 to Mar. 3, 1977, Aug. 23-25, 1977 and Aug. 3, 1980.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, about 19 ft (5.8 m) in 1896. Other outstanding floods reached the following stages, from information by local residents: flood of July 1919, 17.5 ft (5.3 m); flood of 1927, about 16 ft (4.9 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 821 ft^3/s (23.3 m^3/s) June 30, gage height, 8.25 ft (2.515 m); minimum daily, 2.8 ft^3/s (0.079 m^3/s) Jan. 15-25; minimum gage height, 1.23 ft (0.375 m) Jan. 18-21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.9	35	19	4.5	3.0	80	86	22	157	809	41	16
2	6.6	35	18	4.3	3.1	60	79	23	155	783	63	17
3	5.8	34	16	4.2	3.1	45	80	24	159	751	66	17
4	5.1	34	15	4.1	3.1	35	72	25	153	716	62	16
5	6.5	32	14	4.0	3.1	30	65	25	155	669	54	14
6	7.9	33	13	3.8	3.1	27	58	25	162	604	58	16
7	7.7	33	13	3.6	3.1	24	51	24	176	526	99	49
8	7.7	35	12	3.5	3.1	22	45	24	180	449	144	166
9	7.7	44	11	3.4	3.0	20	40	23	182	379	161	245
10	7.7	49	11	3.2	3.0	18	36	23	181	312	163	315
11	8.1	50	10	3.1	3.0	18	34	22	166	257	141	336
12	8.1	50	9.8	3.0	3.0	20	32	22	146	216	112	306
13	8.1	49	9.5	2.9	3.0	25	30	22	147	183	87	258
14	9.7	48	9.0	2.9	2.9	30	29	28	202	155	69	211
15	10	46	8.6	2.8	2.9	35	28	26	451	138	56	169
16	11	43	8.2	2.8	2.9	45	26	24	730	119	48	136
17	19	39	8.0	2.8	3.0	50	24	21	742	103	38	111
18	39	37	7.6	2.8	3.1	55	23	20	694	87	32	93
19	53	35	7.3	2.8	3.5	55	21	19	640	73	28	79
20	53	34	7.0	2.8	4.2	48	20	17	587	66	26	65
21	47	32	6.7	2.8	5.0	43	20	17	550	75	24	57
22	39	30	6.4	2.8	20	40	20	17	542	76	22	52
23	41	28	6.2	2.8	60	39	23	22	518	67	21	48
24	45	27	6.0	2.8	120	38	25	42	525	58	23	55
25	47	25	5.8	2.8	150	38	24	119	595	52	25	56
26	51	24	5.6	2.9	140	38	23	211	596	47	25	59
27	53	23	5.4	2.9	120	43	22	228	572	41	25	61
28	45	22	5.2	3.0	100	53	22	218	608	36	23	61
29	40	21	5.0	3.0	---	70	22	204	759	32	21	62
30	39	20	4.8	3.0	---	90	22	193	815	28	19	66
31	37	---	4.7	3.0	---	96	---	176	---	27	18	---
TOTAL	774.6	1047	288.8	99.1	777.2	1330	1102	1906	12245	7934	1794	3212
MEAN	25.0	34.9	9.32	3.20	27.8	42.9	36.7	61.5	408	256	57.9	107
MAX	53	50	19	4.5	150	96	86	228	815	809	163	336
MIN	5.1	20	4.7	2.8	2.9	18	20	17	146	27	18	14
AC-FT	1540	2080	573	197	1540	2640	2190	3780	24290	15740	3560	6370

CAL YR 1980 TOTAL 23835.21 MEAN 65.1 MAX 1200 MIN .00 AC-FT 47280
WTR YR 1981 TOTAL 32509.70 MEAN 89.1 MAX 815 MIN 2.8 AC-FT 64480

05112000 ROSEAU RIVER BELOW STATE DITCH 51, NEAR CARIBOU, MN
(International gaging station)

LOCATION.--Lat 48°58'54", long 96°27'46", in SE¼SW¼ sec.34, T.164 N., R.45 W., Kittson County, Hydrologic Unit 09020314, on left bank 400 ft (122 m) downstream from State ditch 51 (known locally as Caribou cutoff ditch) and 0.6 mi (1.0 km) west of Caribou.

DRAINAGE AREA.--1,570 mi^2 (4,070 km^2), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April to October 1917, April 1920 to current year (some winter records incomplete). Published as "at Caribou," prior to April 1929; as "below Cutoff ditch, near Caribou" April 1929 to September 1936. Records published for both sites April 1929 to September 1930. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1308: 1938(M). WSP 1508: 1917(M), 1920, 1932(M), 1934-35(M). WSP 1913: 1954(M).

GAGE.--Water-stage recorder. Datum of gage is 1,002.14 ft (305.452 m), adjustment of 1928, (levels by Geodetic Survey of Canada). Prior to Apr. 1, 1929, nonrecording gage at site at Caribou 0.6 mi (1.0 km) upstream at datum 0.95 ft (0.290 m) lower.

REMARKS.--Records fair except those for the winter period, which are poor. Occasionally, at high stages, there is some natural diversion of flow above station to headwaters of Two Rivers.

COOPERATION.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

AVERAGE DISCHARGE.--24 years (water years 1921-30, 1933, 1937, 1941-43, 1973-81), 279 ft^3/s (7.901 m^3/s), 202,100 acre-ft/yr (249 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,080 ft^3/s (116 m^3/s) May 19, 1950, gage height, 11.81 ft (3.600 m); no flow Aug. 13, 1936.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of 1916 is reported to have reached a stage of about 15.5 ft (4.72 m) at former site.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 742 ft^3/s (21.0 m^3/s) July 4, gage height, 5.31 ft (1.618 m); maximum gage height, 5.32 ft (1.622 m) Feb. 28 (backwater from ice); minimum daily discharge, 3.5 ft^3/s (0.099 m^3/s) Jan. 11-13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.2	38	23	5.5	4.0	200	124	20	190	683	22	19
2	9.7	33	24	5.3	4.1	170	99	19	182	719	40	18
3	8.4	42	23	5.0	4.1	140	85	21	167	736	59	16
4	8.8	41	18	4.9	4.1	110	81	21	164	739	61	15
5	8.4	46	18	4.7	4.2	90	73	22	162	736	61	15
6	7.1	38	18	4.4	4.2	70	64	22	154	722	66	27
7	6.4	38	17	4.2	4.2	60	55	22	158	688	92	83
8	6.4	40	15	4.0	4.2	50	48	23	167	643	88	85
9	6.4	41	14	3.9	4.2	40	43	25	175	572	125	145
10	8.4	33	13	3.7	4.2	32	40	23	173	494	158	231
11	7.7	44	12	3.5	4.2	30	33	22	171	423	169	288
12	8.8	54	12	3.5	4.1	30	32	22	165	356	156	319
13	8.1	53	11	3.5	4.1	31	30	22	162	297	129	326
14	7.8	51	11	3.6	4.1	34	25	22	173	252	102	299
15	7.7	41	10	3.6	4.1	37	24	22	216	216	79	262
16	7.5	46	9.5	3.6	4.1	40	22	26	335	190	61	231
17	15	48	9.1	3.6	4.2	45	24	27	492	165	50	210
18	14	42	8.8	3.6	4.2	56	21	25	572	140	41	194
19	18	45	8.5	3.6	4.3	64	21	21	605	115	34	179
20	50	47	8.2	3.6	4.4	78	18	19	608	91	28	164
21	58	46	7.9	3.6	4.8	77	16	18	583	73	24	143
22	56	53	7.6	3.6	5.5	73	18	18	557	70	22	99
23	52	39	7.3	3.7	6.5	68	17	22	536	78	19	75
24	45	33	7.0	3.7	9.0	62	16	26	538	81	19	65
25	46	35	6.8	3.7	15	59	18	33	528	69	19	60
26	48	29	6.6	3.8	50	56	20	72	546	56	19	63
27	48	29	6.4	3.8	150	53	20	171	567	46	18	60
28	50	27	6.2	3.9	200	75	20	220	575	38	18	68
29	50	26	6.0	3.9	---	100	19	231	589	33	18	68
30	52	25	5.8	3.9	---	125	20	216	634	28	18	68
31	42	---	5.6	4.0	---	135	---	200	---	28	22	---
TOTAL	770.8	1203	356.3	122.9	524.1	2290	1146	1673	10844	9577	1837	3895
MEAN	24.9	40.1	11.5	3.96	18.7	73.9	38.2	54.0	361	309	59.3	130
MAX	58	54	24	5.5	200	200	124	231	634	739	169	326
MIN	6.4	25	5.6	3.5	4.0	30	16	18	154	28	18	15
AC-FT	1530	2390	707	244	1040	4540	2270	3320	21510	19000	3640	7730

CAL YR 1980 TOTAL 24834.94 MEAN 67.9 MAX 1050 MIN .05 AC-FT 49260
WTR YR 1981 TOTAL 34239.10 MEAN 93.8 MAX 739 MIN 3.5 AC-FT 67910

05112000 ROSEAU RIVER BELOW STATE DITCH 51, NEAR CARIBOU, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1972 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1973 to current year.
WATER TEMPERATURES: October 1980 to September 1981.

INSTRUMENTATION.--Water-quality minimonitor since October 1980.

REMARKS.--Extremes are published for those years with 80 percent or more record. Letter K indicates non-ideal colony count.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water year 1981): Maximum, 803 micromhos Jan. 21, 1981; minimum, 261 micromhos Mar. 30, Apr. 1, 2, 1981.
WATER TEMPERATURES (water year 1981): Maximum, 27.0°C July 19, 1981; minimum, 0.0°C several days during winter period.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 803 micromhos Jan. 21; minimum, 261 micromhos Mar. 30, Apr. 1, 2.
WATER TEMPERATURES: Maximum, 27.0°C July 19; minimum, 0.0°C several days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
OCT 16...	1025	7.1	400	--	7.2	9.5	5.5	.90	11.8	97
NOV 19...	1045	46	470	474	6.8	-2.0	.5	.75	13.8	100
DEC 17...	1130	9.8	585	610	7.5	-3.0	.0	1.3	4.2	30
JAN 21...	1000	3.6	--	788	7.3	-7.0	.0	4.2	1.0	7
FEB 25...	1320	12	630	671	7.4	-5.0	.0	2.6	4.7	33
MAR 25...	1130	62	280	285	8.2	5.5	.5	1.0	12.4	88
MAY 19...	1155	20	460	471	8.6	22.0	17.0	1.4	9.5	98
JUL 21...	1200	71	460	442	8.3	16.7	22.0	8.0	8.1	95
SEP 22...	1020	102	355	348	8.0	15.0	13.0	4.0	9.1	89

DATE	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML) (31501)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3) (95902)	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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
OCT 16...	160	K23	K27	200	.00	38	25	14	.4	3.2
NOV 19...	--	K12	K11	220	.00	48	25	10	.3	3.3
DEC 17...	--	K4	K3	300	.00	67	31	12	.3	2.5
JAN 21...	--	K11	K14	420	.00	94	44	15	.3	3.3
FEB 25...	--	K4	K21	360	.00	82	37	13	.3	3.2
MAR 25...	--	K2	110	140	8.0	34	13	5.3	.2	4.1
MAY 19...	--	120	23	250	11	56	27	9.5	.3	2.8
JUL 21...	--	46	83	250	12	63	23	6.1	.2	2.9
SEP 22...	--	36	100	200	8.0	48	19	4.2	.1	1.4

05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLORIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUORIDE, 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)	SOLIDS, SUM OF CONSTITUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)
OCT 16...	200	20	7.3	.2	.9	255	229	4.9	.00	.00
NOV 19...	240	24	4.5	.2	11	313	270	38.9	.00	.00
DEC 17...	320	22	4.2	.2	15	406	346	10.7	.02	.02
JAN 21...	440	27	5.9	.3	23	550	477	5.4	.01	.01
FEB 25...	370	16	5.0	.2	20	433	400	14.0	.01	.01
MAR 25...	130	12	5.2	.1	5.3	181	157	30.3	.01	.01
MAY 19...	240	25	4.2	.2	.5	297	270	16.0	<.01	<.01
JUL 21...	240	15	2.8	.2	27	361	285	69.2	.02	.02
SEP 22...	190	6.9	2.6	.1	13	268	210	73.8	.02	.02

DATE	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DIS-SOLVED (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, DIS-SOLVED (MG/L AS P) (00666)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	SEDIMENT, SUS-PENDED (MG/L) (80154)	SEDIMENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
OCT 16...	.030	.030	.80	.64	.040	.020	--	5	.10	100
NOV 19...	.020	.010	.62	.60	.030	.020	21	9	1.1	100
DEC 17...	.000	.000	.61	.59	.020	.010	22	41	1.1	100
JAN 21...	.270	.270	.80	.80	.130	.090	29	67	.65	99
FEB 25...	.470	.440	1.50	1.0	.140	.020	--	18	.58	91
MAR 25...	.020	.020	.80	.56	.100	.070	10	3	.50	92
MAY 19...	.030	.010	.62	.57	.050	.020	--	7	.38	82
JUL 21...	.010	.010	1.70	1.4	.120	.050	--	15	2.9	98
SEP 22...	.030	.020	.92	.91	.040	.030	29	13	3.6	96

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA) (01007)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)	CHROMIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO) (01037)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)
OCT 16...	1025	2	2	100	30	2	2	40	10	0	0
FEB 25...	1320	4	4	100	100	1	0	20	10	2	2
MAY 19...	1155	2	2	100	50	1	<1	10	10	1	0
JUL 21...	1200	6	5	100	50	2	<1	20	20	2	1

05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)
OCT 16...	3	3	310	10	1	1	20	6	.1	<.1
FEB 25...	2	1	1300	490	12	12	890	890	.5	.4
MAY 19...	55	3	160	10	4	0	30	20	<.1	<.1
JUL 21...	7	3	440	40	24	6	160	5	--	--

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)
OCT 16...	3	0	0	0	0	0	40	0	22	.5
FEB 25...	2	2	0	0	0	0	20	20	15	.8
MAY 19...	30	2	0	0	0	0	30	<4	14	.3
JUL 21...	12	6	1	1	0	0	20	<4	27	2.1

DATE	TIME	LENGTH OF EXPO-SURE (DAYS) (00022)	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M (00573)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M (00572)	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2) (70957)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2) (70958)
OCT 16...	1025	37	3.23	1.50	9.68	3.14

05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1980 TO SEPTEMBER 1981

DATE	OCT 16,80		NOV 19,80		MAR 25,81		MAY 19,81		JUL 21,81	
TIME	1025		1045		1130		1155		1200	
TOTAL CELLS/ML	300		270		1200		2900		140000	
DIVERSITY: DIVISION	1.0		1.5		1.5		1.1		1.2	
.CLASS	1.0		1.5		1.5		1.1		1.2	
..ORDER	1.8		1.5		2.1		1.1		1.3	
...FAMILY	2.2		1.5		2.1		1.1		1.7	
....GENUS	2.3		1.5		2.1		1.2		1.8	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)										
.BACILLARIOPHYCEAE										
..BACILLARIALES										
...NITZSCHIACEAE										
....NITZSCHIA	13	4	--	-	120	10	26	1	*	0
..EUPODISCALES										
...COSCINODISCACEAE										
....CYCLOTELLA	39	13	120#	43	13	1	180	6	8000	6
....MELOSIRA	--	-	--	-	--	-	26	1	--	-
..FRAGILARIALES										
...FRAGILARIACEAE										
....DIATOMA	120#	39	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	39	3	--	-	--	-
....SYNEDRA	--	-	--	-	26	2	--	-	--	-
..NAVICULALES										
...NAVICULACEAE										
....NAVICULA	--	-	--	-	13	1	--	-	--	-
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	*	0
...DICTYOSPHAERIACEAE										
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	4500	3
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	*	0
....MICRACTINIUM	--	-	--	-	--	-	--	-	7700	5
...OOCYSTACEAE										
....ANKISTRODESMUS	13	4	--	-	77	6	52	2	5600	4
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	6600	5
....SELENASTRUM	26	9	--	-	--	-	*	0	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	*	0
...SCENEDESMACEAE										
....SCENEDESMUS	77#	26	52#	19	--	-	--	-	2100	1
....TETRASTRUM	--	-	--	-	--	-	--	-	1400	1
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	13	4	--	-	630#	53	--	-	*	0
CHRYSOPHYTA										
.CHRYSOPHYCEAE										
..OCHROMONADALES										
...OCHROMONADACEAE										
....OCHROMONAS	--	-	--	-	--	-	--	-	*	0
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	100#	38	--	-	220	8	1000	1
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	*	0	1400	1
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	--	-	--	-	2300#	80	100000#	71
..OSCILLATORIALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	260#	22	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	*	0
....TRACHELOMONAS	--	-	--	-	13	1	26	1	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..DINOKONTAE										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	13	1	*	0	--	-
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	--	-	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	447	442	444	475	471	473	644	642	643
2	---	---	---	443	435	438	488	476	482	652	644	649
3	---	---	---	435	429	432	497	489	494	657	653	656
4	---	---	---	435	429	431	499	496	497	666	657	662
5	---	---	---	438	431	435	499	497	498	677	667	672
6	---	---	---	447	432	439	502	498	500	684	676	679
7	---	---	---	448	441	444	509	501	505	700	685	692
8	---	---	---	440	424	430	522	510	516	711	700	706
9	453	448	451	425	419	422	535	523	528	721	710	715
10	452	446	449	439	419	429	552	536	544	738	722	730
11	447	442	445	446	439	443	563	553	558	758	739	749
12	443	436	440	439	422	428	572	563	566	772	759	765
13	437	427	432	431	422	427	585	572	579	780	772	777
14	428	419	424	433	427	429	595	586	591	780	776	777
15	419	411	415	439	430	436	601	595	599	776	774	775
16	413	397	408	444	438	441	604	601	603	782	776	779
17	399	393	395	460	445	454	605	600	604	783	781	782
18	399	392	395	466	461	464	601	599	600	787	782	784
19	402	393	398	469	461	465	607	600	603	799	787	793
20	413	393	405	460	455	457	625	607	616	802	799	800
21	422	401	409	462	456	459	643	626	636	803	800	802
22	452	424	440	456	443	449	652	643	648	800	796	798
23	451	446	448	448	439	441	653	651	652	796	789	792
24	461	450	456	459	449	454	657	654	656	789	783	786
25	471	462	467	466	459	461	660	658	659	783	778	780
26	478	472	475	473	466	469	663	658	660	778	769	774
27	483	478	480	482	474	479	668	662	666	769	762	765
28	486	482	484	484	482	483	667	664	666	762	753	757
29	486	467	479	484	478	482	665	661	663	753	747	750
30	464	451	456	479	471	475	661	650	656	747	746	747
31	451	447	449	---	---	---	649	644	646	747	744	746
MONTH				484	419	448	668	471	586	803	642	745

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	744	739	741	368	312	326	274	261	267	414	407	411
2	741	739	740	356	336	349	273	261	265	421	413	417
3	744	741	742	360	356	358	284	272	279	448	417	423
4	744	743	744	359	356	358	286	283	284	427	415	422
5	744	742	743	362	357	360	288	282	285	486	420	428
6	742	740	741	364	361	362	286	283	285	433	420	427
7	740	736	738	365	363	364	288	273	285	433	419	427
8	736	732	734	367	364	365	293	284	287	434	421	428
9	737	732	734	371	366	368	291	286	288	435	426	431
10	748	737	742	376	370	373	301	291	295	444	433	438
11	760	748	754	379	368	376	304	300	302	455	445	451
12	772	761	767	379	365	372	307	303	305	463	452	458
13	780	772	777	365	358	362	309	304	306	461	448	455
14	785	780	783	365	351	358	307	304	305	457	450	454
15	785	782	784	353	344	350	315	308	312	458	451	455
16	782	778	780	353	340	347	317	311	314	455	446	451
17	778	773	775	340	331	335	324	317	317	458	451	454
18	773	766	769	344	332	339	338	324	330	461	453	458
19	765	755	760	354	344	349	346	337	340	463	452	459
20	755	740	748	356	348	353	351	344	346	451	438	444
21	739	539	682	352	343	348	357	350	352	446	429	436
22	614	417	545	342	323	332	365	357	361	440	423	431
23	594	554	581	322	310	316	372	366	370	426	409	417
24	626	583	607	310	294	301	374	368	372	413	406	410
25	662	628	643	294	284	287	375	371	373	434	412	422
26	661	463	580	288	279	283	378	374	376	465	436	450
27	450	339	374	282	275	278	386	377	381	474	457	467
28	339	313	328	276	264	268	396	387	390	466	438	455
29	---	---	---	266	263	264	403	397	399	440	434	438
30	---	---	---	267	261	264	410	405	408	439	425	431
31	---	---	---	275	263	271	---	---	---	425	423	424
MONTH	785	313	694	379	261	333	410	261	326	486	406	438

05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	424	410	419	366	364	365				---	---	---
2	415	409	413	372	362	366				---	---	---
3	414	407	410	371	365	369				---	---	---
4	410	402	407	364	353	358				---	---	---
5	412	403	410	353	348	350				---	---	---
6	413	410	412	352	345	348				---	---	---
7	421	414	418	360	349	354				---	---	---
8	427	420	423	367	359	363				---	---	---
9	434	428	432	380	365	371				---	---	---
10	435	431	433	385	379	382				---	---	---
11	433	427	430	397	386	390				---	---	---
12	428	423	425	416	398	405				---	---	---
13	423	408	415	416	402	409				---	---	---
14	431	422	428	414	409	411				---	---	---
15	431	420	424	418	411	415				---	---	---
16	430	416	423	425	415	420				---	---	---
17	415	400	410	434	425	431				---	---	---
18	399	383	388	442	433	437				---	---	---
19	389	382	385	450	442	448				---	---	---
20	389	385	387	461	449	456				---	---	---
21	386	382	383	462	448	456				---	---	---
22	382	377	380	446	433	441				---	---	---
23	378	369	374	---	---	---				---	---	---
24	374	368	371	---	---	---				354	348	350
25	374	370	372	---	---	---				354	352	353
26	377	370	374	---	---	---				353	349	351
27	377	369	373	---	---	---				350	349	349
28	369	365	367	---	---	---				349	346	348
29	368	366	367	---	---	---				348	346	347
30	366	363	365	---	---	---				349	343	346
31	---	---	---	---	---	---				---	---	---
MONTH	435	363	401									

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	1.0	.0	.5	.0	.0	.0	.0	.0	.0
2	---	---	---	2.0	.0	1.0	.0	.0	.0	.0	.0	.0
3	---	---	---	2.5	1.0	2.0	.0	.0	.0	.0	.0	.0
4	---	---	---	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
5	---	---	---	3.0	1.5	2.5	.0	.0	.0	.0	.0	.0
6	---	---	---	3.5	2.5	3.0	.0	.0	.0	.0	.0	.0
7	---	---	---	3.0	2.5	3.0	.0	.0	.0	.0	.0	.0
8	---	---	---	2.5	2.0	2.5	.0	.0	.0	.0	.0	.0
9	12.0	9.5	11.0	2.0	.5	1.5	.0	.0	.0	.0	.0	.0
10	11.0	8.0	9.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
11	7.5	6.5	7.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
12	7.5	5.5	6.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
13	6.0	4.5	5.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
14	5.5	4.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
15	6.0	5.0	5.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
16	6.0	5.5	5.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
17	6.5	5.5	6.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
18	5.5	4.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19	5.5	4.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20	6.0	4.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
21	5.5	4.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
22	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
23	3.5	3.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
24	3.0	2.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	2.0	.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	1.5	.0	.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	1.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	1.0	.0	.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	1.5	.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	2.0	.5	1.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH				3.5	.0	.5	.0	.0	.0	.0	.0	.0

05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	2.0	1.0	1.5	15.0	9.5	12.0
2	.0	.0	.0	.0	.0	.0	5.0	2.0	3.5	14.0	12.0	13.0
3	.0	.0	.0	.0	.0	.0	5.0	4.0	4.5	17.0	12.0	14.0
4	.0	.0	.0	.0	.0	.0	5.5	3.0	4.5	14.5	12.0	13.5
5	.0	.0	.0	.0	.0	.0	6.5	3.0	5.0	15.5	10.5	13.0
6	.0	.0	.0	.0	.0	.0	6.5	4.5	5.5	16.5	11.0	14.0
7	.0	.0	.0	.0	.0	.0	8.0	5.0	6.5	17.0	12.5	15.0
8	.0	.0	.0	.0	.0	.0	8.0	5.5	7.0	15.0	13.0	14.0
9	.0	.0	.0	.0	.0	.0	9.0	5.5	7.5	14.0	9.5	12.0
10	.0	.0	.0	.0	.0	.0	10.5	7.5	9.0	12.5	9.0	11.0
11	.0	.0	.0	.0	.0	.0	8.0	6.0	6.5	15.5	10.5	12.5
12	.0	.0	.0	.0	.0	.0	7.0	4.5	5.5	18.0	12.0	14.5
13	.0	.0	.0	.0	.0	.0	8.5	6.0	6.5	17.0	14.0	15.5
14	.0	.0	.0	.0	.0	.0	7.0	3.5	5.5	19.5	14.0	16.5
15	.0	.0	.0	.0	.0	.0	10.0	4.5	7.0	19.5	15.5	17.5
16	.0	.0	.0	.0	.0	.0	13.0	8.5	10.5	17.5	15.0	16.0
17	.0	.0	.0	.0	.0	.0	12.0	7.5	10.0	18.5	14.0	16.0
18	.0	.0	.0	.0	.0	.0	9.0	6.0	7.5	20.0	14.5	17.0
19	.0	.0	.0	.0	.0	.0	11.0	6.0	8.5	21.5	16.0	18.5
20	.0	.0	.0	.0	.0	.0	11.5	6.5	9.0	22.0	17.0	19.5
21	.0	.0	.0	.0	.0	.0	9.0	7.5	8.0	22.5	17.0	19.5
22	.0	.0	.0	.0	.0	.0	7.5	6.0	7.0	23.0	19.0	20.5
23	.0	.0	.0	.0	.0	.0	8.5	5.0	6.5	20.0	18.0	19.5
24	.0	.0	.0	.0	.0	.0	11.5	6.0	8.0	18.0	15.5	17.0
25	.0	.0	.0	.0	.0	.0	9.0	8.0	9.0	15.5	14.0	14.5
26	.0	.0	.0	.0	.0	.0	13.5	7.5	10.5	16.5	13.0	14.5
27	.0	.0	.0	.0	.0	.0	13.0	11.5	12.5	17.0	15.0	16.0
28	.0	.0	.0	.5	.0	.0	14.5	11.0	13.0	18.0	16.0	17.0
29	---	---	---	1.0	.0	.0	15.5	12.0	14.0	17.5	16.5	17.0
30	---	---	---	1.0	.0	.5	14.0	11.5	13.0	17.5	14.5	16.0
31	---	---	---	1.0	.0	.0	---	---	---	19.0	15.5	17.0
MONTH	.0	.0	.0	1.0	.0	.0	15.5	1.0	8.0	23.0	9.0	15.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	18.0	16.0	17.0	22.0	19.5	20.5				---	---	---
2	17.0	15.5	16.0	21.5	20.5	21.0				---	---	---
3	19.5	15.5	17.5	23.0	20.5	21.5				---	---	---
4	19.0	17.5	18.5	24.0	21.5	23.0				---	---	---
5	20.0	17.0	18.5	25.0	23.0	24.0				---	---	---
6	21.0	17.5	19.5	26.0	23.5	25.0				---	---	---
7	21.5	19.5	20.5	26.5	24.5	25.5				---	---	---
8	20.5	19.0	19.5	26.0	24.0	25.0				---	---	---
9	20.5	17.5	19.0	25.0	22.5	23.5				---	---	---
10	20.0	18.0	19.0	24.5	22.5	23.5				---	---	---
11	21.0	18.0	19.5	24.0	22.0	23.0				---	---	---
12	22.0	18.5	20.5	26.0	23.0	24.5				---	---	---
13	21.5	19.5	20.0	26.5	23.5	25.0				---	---	---
14	19.0	18.5	19.0	26.0	23.5	24.5				---	---	---
15	19.0	17.5	18.0	23.5	22.0	22.5				---	---	---
16	19.5	16.5	18.0	24.0	21.0	22.5				---	---	---
17	19.0	17.0	18.0	25.0	22.0	23.5				---	---	---
18	17.0	15.5	16.0	26.0	22.5	24.0				---	---	---
19	17.5	15.5	16.5	27.0	24.0	25.5				---	---	---
20	19.0	16.5	17.5	26.0	23.0	24.0				---	---	---
21	18.5	17.5	18.0	24.0	20.5	22.5				---	---	---
22	19.0	17.0	18.0	24.0	21.0	22.5				---	---	---
23	18.0	17.5	18.0	23.5	21.0	22.0				---	---	---
24	19.0	17.0	18.0	---	---	---				12.5	11.0	11.5
25	20.0	17.5	18.5	---	---	---				14.0	11.5	12.5
26	21.0	18.0	19.5	---	---	---				14.0	12.0	13.5
27	20.0	19.5	19.5	---	---	---				11.5	8.5	10.0
28	21.0	19.5	20.0	---	---	---				8.5	7.0	7.5
29	21.5	19.5	20.5	---	---	---				9.0	6.5	7.5
30	20.5	19.5	20.0	---	---	---				9.0	7.0	8.0
31	---	---	---	---	---	---				---	---	---
MONTH	22.0	15.5	18.5									
YEAR		.0										

05124480 KAWISHIWI RIVER NEAR ELY, MN

(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'22", long 91°32'06", in SE¼SE¼ sec.24, T.63 N., R.10 W., Lake County, Hydrologic Unit 09030001, in Superior National Forest, on left bank upstream from rapids, 2 mi (3 km) upstream from South Kawishiwi River, 2.2 mi (3.5 km) southwest of Fernberg Lookout Tower and 14 mi (23 km) east of Ely.

DRAINAGE AREA.--253 mi^2 (655 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,450 ft (442 m), from topographic map.

REMARKS.--Records good.

AVERAGE DISCHARGE.--15 years, 219 ft^3/s (6.202 m^3/s), 11.76 in/yr (299 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,720 ft^3/s (48.7 m^3/s) Apr. 24, 1976, gage height, 5.92 ft (1.804 m); minimum 4.5 ft^3/s (0.13 m^3/s) Jan. 30 to Feb. 2, 1977, gage height, 2.14 ft (0.652 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,220 ft^3/s (34.6 m^3/s) Apr. 30, gage height, 5.56 ft (1.695 m); minimum, 25 ft^3/s (0.71 m^3/s) Sept. 22-26, gage height, 2.75 ft (0.838 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	677	299	148	102	70	70	103	1190	438	340	107	63
2	645	222	146	100	69	69	113	1180	480	326	103	58
3	620	219	141	97	68	68	125	1160	508	313	102	56
4	602	210	141	96	66	68	135	1130	536	300	103	53
5	571	210	139	94	66	68	150	1080	559	279	105	51
6	553	206	139	94	66	68	170	1050	577	266	107	48
7	530	203	137	92	66	68	184	1010	583	244	110	48
8	508	194	134	91	65	67	203	967	583	240	110	48
9	480	197	132	90	64	67	229	932	577	236	110	46
10	459	194	130	88	63	65	275	883	559	216	110	45
11	448	192	128	86	62	65	326	835	548	203	108	43
12	422	192	127	85	60	64	373	795	530	192	106	40
13	402	192	125	85	60	64	438	761	519	182	103	39
14	383	192	125	84	59	63	508	716	508	174	100	37
15	363	192	122	82	59	63	577	677	491	165	97	35
16	354	186	122	81	59	62	633	633	459	156	93	33
17	349	184	123	79	59	62	700	596	438	156	90	32
18	336	179	122	79	60	60	780	559	417	152	88	31
19	322	176	118	79	60	60	850	525	402	148	85	28
20	308	176	116	78	60	60	900	491	392	141	83	28
21	291	172	116	77	62	60	960	464	378	135	82	27
22	279	172	116	76	70	60	1000	443	383	132	79	26
23	275	169	115	76	76	60	1050	417	368	127	76	25
24	275	165	110	74	74	60	1090	422	373	127	74	25
25	270	161	108	73	72	60	1110	433	387	125	72	25
26	266	158	108	72	70	60	1150	433	373	123	72	28
27	262	158	107	70	69	64	1170	433	359	122	69	29
28	251	156	105	70	70	74	1190	438	354	116	65	29
29	247	152	103	69	---	88	1200	443	359	113	64	28
30	240	152	102	69	---	92	1210	433	349	111	63	28
31	236	---	103	66	---	94	---	422	---	107	62	---
TOTAL	12224	5630	3808	2554	1824	2073	18902	21951	13787	5767	2798	1132
MEAN	394	188	123	82.4	65.1	66.9	630	708	460	186	90.3	37.7
MAX	677	299	148	102	76	94	1210	1190	583	340	110	63
MIN	236	152	102	66	59	60	103	417	349	107	62	25
CFSM	1.56	.74	.49	.33	.26	.26	2.49	2.80	1.82	.74	.36	.15
IN.	1.80	.83	.56	.38	.27	.30	2.78	3.23	2.03	.85	.41	.17

CAL YR 1980 TOTAL 55053 MEAN 150 MAX 782 MIN 35 CFSM .59 IN 8.09
WTR YR 1981 TOTAL 92450 MEAN 253 MAX 1210 MIN 25 CFSM 1.00 IN 13.59

05124480 KAWISHIWI RIVER NEAR ELY, MN--Continued
(Hydrologic bench-mark station)

WATER-QUALITY DATA

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

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: July 1966 to current year.

INSTRUMENTATION.--Recording thermograph since July 1966.

REMARKS.--Letter K indicates non-ideal colony count. Extremes are for water years with 80 percent or more days of record.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES (water years 1967-70, 1972-77, 80-81): Maximum, 24.5°C July 9, 10, 11, 12, 13, 1974; minimum, 0.0°C several days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 24.0°C July 13-18; minimum, 0.0°C several days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD-NESS (MG/L AS CACO3) (00900)
NOV											
04...	1115	210	32	28	7.0	3.5	12.6	100	K1	K2	12
MAY											
06...	1215	1050	34	30	6.8	9.5	11.2	100	<1	<1	12
JUN											
23...	1400	368	26	34	7.3	17.5	8.6	95	K2	--	13
AUG											
25...	1200	72	30	32	7.3	21.5	--	--	K2	K2	13

DATE	HARD-NESS NONCAR-BONATE (MG/L AS CACO3) (95902)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)
NOV											
04...	--	2.6	1.4	.9	.3	13	3.8	.8	.0	3.2	42
MAY											
06...	5.0	2.7	1.2	1.2	.3	7.0	4.3	.6	<.1	5.4	41
JUN											
23...	7.0	2.9	1.3	.9	.3	6.0	3.8	.6	<.1	4.2	43
AUG											
25...	6.0	2.8	1.4	1.1	.2	7.0	2.7	.7	<.1	3.5	41

DATE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P) (00666)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
NOV											
04...	21	23.8	.04	.03	.040	.030	.43	.37	.020	.010	13
MAY											
06...	20	116	.09	.09	.050	.040	.54	.41	.010	<.010	11
JUN											
23...	18	42.7	.01	.01	.020	.020	.38	.38	.010	<.010	12
AUG											
25...	17	8.0	.02	.02	.050	.050	.28	.28	<.010	<.010	8.9

05124480 KAWISHIWI RIVER NEAR ELY, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	15.0	15.0	15.0	4.0	4.0	4.0	---	---	---	.5	.5	.5
2	15.0	15.0	15.0	3.5	3.5	3.5	---	---	---	.5	.5	.5
3	15.0	15.0	15.0	3.5	3.5	3.5	.5	.5	.5	.5	.5	.5
4	15.0	15.0	15.0	3.5	3.5	3.5	.5	.5	.5	.5	.5	.5
5	14.5	14.5	14.5	---	---	---	.5	.5	.5	.5	.5	.5
6	14.5	14.0	14.0	---	---	---	.5	.5	.5	.5	.5	.5
7	14.0	14.0	14.0	---	---	---	.5	.5	.5	.5	.5	.5
8	14.0	14.0	14.0	---	---	---	.5	.5	.5	.5	.5	.5
9	14.0	14.0	14.0	---	---	---	.5	.5	.5	.5	.5	.5
10	13.5	13.5	13.5	---	---	---	.5	.5	.5	.5	.5	.5
11	13.5	13.0	13.5	---	---	---	.5	.5	.5	.5	.5	.5
12	13.0	12.0	12.5	---	---	---	.5	.5	.5	.5	.5	.5
13	12.0	12.0	12.0	---	---	---	.5	.5	.5	.0	.0	.0
14	11.5	11.0	11.5	---	---	---	.5	.5	.5	.0	.0	.0
15	11.0	11.0	11.0	---	---	---	.5	.5	.5	.0	.0	.0
16	11.0	10.5	10.5	---	---	---	.5	.5	.5	.0	.0	.0
17	10.0	10.0	10.0	---	---	---	.5	.5	.5	.0	.0	.0
18	10.0	10.0	10.0	---	---	---	.5	.5	.5	.0	.0	.0
19	10.0	10.0	10.0	---	---	---	.5	.5	.5	.0	.0	.0
20	10.0	9.5	9.5	---	---	---	.5	.5	.5	.0	.0	.0
21	9.0	8.5	8.5	---	---	---	.5	.5	.5	.0	.0	.0
22	8.5	8.5	8.5	---	---	---	.5	.5	.5	.0	.0	.0
23	8.5	8.0	8.0	---	---	---	.5	.5	.5	.0	.0	.0
24	8.0	8.0	8.0	---	---	---	.5	.5	.5	.0	.0	.0
25	7.0	6.5	6.5	---	---	---	.5	.5	.5	.0	.0	.0
26	6.5	6.0	6.0	---	---	---	.5	.5	.5	.0	.0	.0
27	5.5	5.0	5.5	---	---	---	.5	.5	.5	.0	.0	.0
28	5.0	5.0	5.0	---	---	---	.5	.5	.5	.0	.0	.0
29	5.0	5.0	5.0	---	---	---	.5	.5	.5	.0	.0	.0
30	4.5	4.5	4.5	---	---	---	.5	.5	.5	.0	.0	.0
31	4.5	4.0	4.0	---	---	---	.5	.5	.5	.0	.0	.0
MONTH	15.0	4.0	10.5							.5	.0	.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	---	---	---	8.0	7.0	7.5
2	.0	.0	.0	.0	.0	.0	---	---	---	8.0	8.0	8.0
3	.0	.0	.0	.0	.0	.0	---	---	---	8.0	8.0	8.0
4	.0	.0	.0	.0	.0	.0	---	---	---	8.0	8.0	8.0
5	.0	.0	.0	.0	.0	.0	---	---	---	9.5	8.0	9.0
6	.0	.0	.0	.0	.0	.0	---	---	---	9.5	9.5	9.5
7	.0	.0	.0	.0	.0	.0	4.5	4.5	4.5	9.5	9.5	9.5
8	.0	.0	.0	.0	.0	.0	4.5	4.5	4.5	9.5	9.5	9.5
9	.0	.0	.0	.0	.0	.0	4.5	4.5	4.5	9.5	9.5	9.5
10	.0	.0	.0	.0	.0	.0	4.5	4.5	4.5	9.5	9.5	9.5
11	.0	.0	.0	.0	.0	.0	4.5	4.5	4.5	9.5	9.5	9.5
12	.0	.0	.0	.0	.0	.0	5.0	4.5	5.0	9.5	9.5	9.5
13	.0	.0	.0	.0	.0	.0	5.0	5.0	5.0	10.0	9.5	9.5
14	.0	.0	.0	.0	.0	.0	5.0	5.0	5.0	10.5	10.0	10.0
15	.0	.0	.0	.0	.0	.0	5.0	5.0	5.0	11.0	10.5	11.0
16	.0	.0	.0	.0	.0	.0	5.5	5.0	5.5	11.5	11.0	11.0
17	.0	.0	.0	.0	.0	.0	6.0	6.0	6.0	12.0	11.5	11.5
18	.0	.0	.0	.0	.0	.0	6.0	6.0	6.0	13.0	12.0	12.5
19	.0	.0	.0	.0	.0	.0	7.0	6.0	6.5	13.5	13.0	13.0
20	.0	.0	.0	.0	.0	.0	7.0	7.0	7.0	14.0	13.5	13.5
21	.0	.0	.0	---	---	---	7.0	7.0	7.0	14.5	14.0	14.5
22	.0	.0	.0	---	---	---	7.0	7.0	7.0	15.0	14.5	14.5
23	.0	.0	.0	---	---	---	7.0	7.0	7.0	15.0	15.0	15.0
24	.0	.0	.0	---	---	---	7.0	6.5	6.5	15.5	15.0	15.0
25	.0	.0	.0	---	---	---	6.5	6.5	6.5	15.5	15.5	15.5
26	.0	.0	.0	---	---	---	6.5	6.5	6.5	15.5	15.5	15.5
27	.0	.0	.0	---	---	---	7.0	6.5	7.0	16.0	15.5	15.5
28	.0	.0	.0	---	---	---	7.0	6.5	6.5	16.0	16.0	16.0
29	---	---	---	---	---	---	8.0	7.0	7.5	16.5	16.5	16.5
30	---	---	---	---	---	---	8.0	7.0	7.5	16.5	16.5	16.5
31	---	---	---	---	---	---	---	---	---	16.5	16.5	16.5
MONTH	.0	.0	.0							16.5	7.0	12.0

05124480 KAWISHIWI RIVER NEAR ELY, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	16.5	16.5	16.5	19.0	19.0	19.0	22.0	22.0	22.0	22.0	22.0	22.0
2	16.5	16.5	16.5	19.5	19.0	19.0	22.0	22.0	22.0	21.5	21.5	21.5
3	16.5	16.5	16.5	19.5	19.5	19.5	21.5	21.5	21.5	21.5	21.5	21.5
4	16.5	16.5	16.5	21.0	19.5	20.0	21.5	21.5	21.5	21.5	21.5	21.5
5	17.0	16.5	16.5	21.0	21.0	21.0	21.5	21.5	21.5	21.5	21.5	21.5
6	18.0	17.0	17.5	21.5	21.0	21.0	21.5	21.5	21.5	21.5	21.5	21.5
7	18.0	18.0	18.0	22.0	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5
8	18.0	18.0	18.0	23.0	22.0	22.5	21.5	21.5	21.5	21.5	21.0	21.0
9	18.0	18.0	18.0	23.0	23.0	23.0	21.5	21.5	21.5	21.0	20.5	20.5
10	18.0	18.0	18.0	23.0	23.0	23.0	21.5	21.5	21.5	20.5	20.5	20.5
11	18.0	18.0	18.0	23.5	23.0	23.0	---	---	---	20.5	20.5	20.5
12	18.5	18.0	18.0	23.5	23.5	23.5	---	---	---	20.5	20.5	20.5
13	18.5	18.5	18.5	24.0	23.5	23.5	---	---	---	20.5	20.5	20.5
14	18.5	18.5	18.5	24.0	24.0	24.0	---	---	---	20.0	20.0	20.0
15	18.5	18.5	18.5	24.0	24.0	24.0	---	---	---	20.0	19.5	20.0
16	18.5	18.5	18.5	24.0	24.0	24.0	---	---	---	19.5	19.0	19.0
17	19.0	18.5	18.5	24.0	24.0	24.0	---	---	---	19.0	18.0	18.5
18	19.0	19.0	19.0	24.0	24.0	24.0	---	---	---	18.0	18.0	18.0
19	19.0	19.0	19.0	23.5	23.5	23.5	---	---	---	18.0	18.0	18.0
20	19.0	19.0	19.0	23.5	23.5	23.5	---	---	---	18.0	17.0	17.5
21	19.0	19.0	19.0	23.5	23.5	23.5	---	---	---	17.0	17.0	17.0
22	19.0	19.0	19.0	23.5	23.5	23.5	---	---	---	17.0	16.5	16.5
23	19.0	19.0	19.0	23.5	23.5	23.5	---	---	---	16.5	16.5	16.5
24	19.0	19.0	19.0	23.5	23.5	23.5	---	---	---	16.5	16.5	16.5
25	19.0	19.0	19.0	23.5	23.0	23.0	21.5	21.5	21.5	16.5	16.5	16.5
26	19.0	19.0	19.0	23.0	22.0	22.5	21.5	21.5	21.5	16.5	16.0	16.5
27	19.0	19.0	19.0	22.0	22.0	22.0	21.5	21.5	21.5	16.0	15.5	15.5
28	19.0	19.0	19.0	22.0	22.0	22.0	22.0	21.5	21.5	15.0	14.5	15.0
29	19.0	19.0	19.0	22.0	22.0	22.0	22.0	22.0	22.0	14.5	14.0	14.0
30	19.5	19.0	19.0	22.0	22.0	22.0	22.0	22.0	22.0	14.0	13.5	13.5
31	---	---	---	22.0	22.0	22.0	22.0	22.0	22.0	---	---	---
MONTH	19.5	16.5	18.5	24.0	19.0	22.5				22.0	13.5	19.0

05124990 FILSON CREEK NEAR ELY, MN

LOCATION.--Lat 47°50'05", long 91°40'27", in SE¼SW¼ sec.24, T.61 N., R.10 W., Lake County, Hydrologic Unit 09030001, in Superior National Forest, on right bank 25 ft (7.6 m) upstream from culverts on Forest Route 181, also known as Spruce Road, 0.8 mi (1.3 km) upstream from mouth, and 10 mi (16 km) southeast of Ely.

DRAINAGE AREA.--9.66 mi^2 (25.02 km^2).

PERIOD OF RECORD.--October 1974 to current year.

REVISED RECORDS.--WDR MN-79-1: 1975-76, 1978.

GAGE.--Water-stage recorder. Altitude of gage is 1,440 ft (439 m), from topographic map.

REMARKS.--Records fair except those for winter period, which are poor.

AVERAGE DISCHARGE.--7 years, 7.54 ft^3/s (0.214 m^3/s), 10.60 in/yr (269 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 426 ft^3/s (12.1 m^3/s) Sept. 13, 1980, gage height, 8.87 ft (2.704 m); no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 70 ft^3/s (1.98 m^3/s) Apr. 28, gage height, 6.18 ft (1.884 m); minimum discharge, 0.09 ft^3/s (0.003 m^3/s) Mar. 18-22, gage height, 4.77 ft (1.454 m); minimum gage height, 4.60 ft (1.402 m) Sept. 4, 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	6.6	3.8	.96	1.1	.45	42	52	8.7	20	.49	.36
2	15	6.6	3.6	.87	1.1	.37	43	45	18	15	.46	.36
3	15	6.2	3.4	.78	1.0	.42	44	40	23	10	.42	.42
4	14	6.2	3.2	.70	.90	.31	51	35	25	7.0	.51	.18
5	12	6.2	3.1	.62	.83	.26	57	30	22	5.0	.48	.15
6	12	5.7	2.9	.62	.76	.26	51	27	20	4.0	.66	.15
7	11	5.7	2.8	.55	.70	.22	39	22	16	3.0	.90	.31
8	10	5.7	2.8	.48	.64	.18	35	19	14	2.5	1.1	.18
9	9.0	5.7	2.2	.48	.59	.15	33	18	12	3.0	1.1	.12
10	8.5	5.7	2.2	.42	.55	.15	35	16	9.5	2.0	1.1	.15
11	8.5	5.3	2.2	.42	.49	.12	35	14	8.7	1.5	1.0	.18
12	8.5	4.9	1.9	.48	.45	.15	31	12	6.2	1.0	.90	.31
13	8.0	4.9	1.7	.48	.42	.15	34	11	5.2	.80	.67	.31
14	8.0	5.3	1.6	.36	.39	.15	39	9.2	5.0	.60	.56	.31
15	7.6	5.3	1.4	.31	.36	.15	35	7.5	4.2	.50	.46	.31
16	6.6	5.3	1.4	.48	.42	.15	33	5.0	2.9	.70	.40	.26
17	6.6	5.3	1.3	.87	.96	.12	37	4.5	2.1	1.0	.34	.26
18	6.2	5.3	1.3	1.1	3.0	.09	34	4.3	1.7	1.5	.29	.26
19	6.2	4.9	1.3	1.6	2.5	.09	30	3.2	1.3	1.0	.26	.26
20	6.2	4.9	1.2	1.4	2.1	.09	26	2.5	1.6	.80	.25	.26
21	6.2	4.9	1.2	1.2	1.7	.09	22	1.7	2.0	.60	.23	.31
22	6.2	4.9	1.2	1.1	2.5	.15	23	1.2	5.2	.50	.22	.26
23	6.2	4.9	1.2	1.1	1.8	.26	38	1.2	5.7	.50	.21	.26
24	7.1	4.5	1.1	.96	.86	.42	53	3.0	15	1.8	.21	.26
25	7.6	4.5	1.1	.87	.69	1.6	59	5.5	20	1.9	.22	.26
26	8.5	4.5	1.1	.87	.72	4.2	60	7.7	25	1.4	.22	.42
27	9.0	4.5	1.0	.99	.96	6.6	57	8.1	17	1.1	.22	.62
28	8.0	4.5	1.0	.96	.56	21	68	6.9	14	.78	.18	.62
29	7.1	4.5	.98	1.1	---	36	61	6.3	46	.68	.15	.62
30	7.1	4.2	.96	1.1	---	46	55	5.3	41	.62	.15	.62
31	7.1	---	.96	1.1	---	45	---	3.7	---	.54	.22	---
TOTAL	276.0	157.6	57.10	25.33	29.05	165.35	1260	427.8	398.0	91.32	14.58	9.35
MEAN	8.90	5.25	1.84	.82	1.04	5.33	42.0	13.8	13.3	2.95	.47	.31
MAX	17	6.6	3.8	1.6	3.0	46	68	52	46	20	1.1	.62
MIN	6.2	4.2	.96	.31	.36	.09	22	1.2	1.3	.50	.15	.12
CFSM	.92	.54	.19	.09	.11	.55	4.35	1.43	1.38	.31	.05	.03
IN.	1.06	.61	.22	.10	.11	.64	4.85	1.65	1.53	.35	.06	.04

CAL YR 1980 TOTAL 3237.49 MEAN 8.85 MAX 324 MIN .13 CFSM .92 IN 12.47
WTR YR 1981 TOTAL 2911.48 MEAN 7.98 MAX 68 MIN .09 CFSM .83 IN 11.21

05127000 KAWISHIWI RIVER NEAR WINTON, MN

LOCATION.--Lat 47°56'05", long 91°45'50", in NE¼NW¼ sec.20, T.63 N., R.11 W., Lake County, Hydrologic Unit 09030001, Superior National Forest, at powerplant of Minnesota Power & Light Co., just upstream from Fall Lake, and 1.8 mi (2.9 km) east of Winton.

DRAINAGE AREA.--1,229 mi^2 (3,183 km^2).

PERIOD OF RECORD.--June 1905 to June 1907, October 1912 to September 1919 (fragmentary), September 1923 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WDR MN-77-1: Drainage area.

REMARKS.--Records fair. Daily discharge computed from powerplant records. Flow regulated by powerplant and by Camp Six, Bald Eagle, Gabbro, Little Gabbro, Birch, White Iron, South Farm, and Garden Lakes.

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

AVERAGE DISCHARGE (unadjusted).--62 years (water years 1906, 1916-17, 1919, 1924-81), 1,027 ft^3/s (29.08 m^3/s), 11.35 in/yr (288 mm/yr); median of yearly mean discharges, 962 ft^3/s (27.2 m^3/s) 10.63 in/yr (270 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 16,000 ft^3/s (453 m^3/s) May 18, 1950; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 6,040 ft^3/s (171 m^3/s) Apr. 30, May 1-4; minimum daily, 32 ft^3/s (0.91 m^3/s) Sept. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2500	1200	842	352	161	353	982	6040	2140	2350	497	499
2	2480	1210	760	505	314	321	1080	6040	2270	2350	497	466
3	2200	1140	695	472	352	344	1110	6040	2270	2350	561	402
4	2100	1060	703	472	287	367	1150	6040	2400	2390	529	402
5	2100	928	700	440	320	399	1210	5880	2330	2350	529	129
6	2060	929	668	440	320	399	1280	5750	2420	2320	529	65
7	1940	930	700	505	337	367	1280	5300	2380	2220	529	97
8	1910	962	700	440	97	367	1400	4960	2520	2080	497	435
9	1820	962	662	440	281	396	1710	4400	2870	1850	129	165
10	1480	962	620	375	287	334	1910	4070	3020	1630	660	101
11	1510	1030	587	440	320	428	1990	4150	2930	1540	434	133
12	1450	1060	587	440	320	466	2210	3790	2870	1370	563	65
13	1310	962	619	320	287	482	2710	3350	2670	1170	531	32
14	1080	962	587	384	272	450	2940	3090	2550	960	531	133
15	960	962	587	352	161	450	3200	2900	2500	895	531	133
16	964	865	586	320	249	417	3420	2550	1960	895	531	101
17	1240	962	619	352	288	490	3270	2310	1490	895	531	133
18	1440	897	652	352	353	566	3380	2170	1230	960	531	133
19	1480	962	587	320	256	566	3200	1750	1140	960	530	36
20	1270	930	587	352	321	631	3560	1190	1140	863	530	65
21	1020	962	587	352	306	663	3510	1190	1360	848	530	68
22	960	962	587	352	226	695	3590	1180	1570	880	530	230
23	1020	930	587	320	315	629	4010	1230	1810	783	531	101
24	960	962	587	320	321	635	4420	1570	1910	862	531	133
25	960	930	555	320	288	541	4740	1610	2010	819	466	68
26	960	930	522	352	321	564	4740	1700	2010	792	531	230
27	960	930	417	320	288	730	4750	1790	2280	761	499	133
28	960	930	481	322	353	825	4500	1710	2340	680	466	101
29	960	865	555	320	---	950	5950	1710	2380	607	97	133
30	992	864	522	272	---	918	6040	1570	2390	610	194	101
31	1050	---	505	129	---	982	---	1660	---	531	465	---
TOTAL	44096	29140	18953	11452	8001	16725	89242	98690	65160	40571	15040	5023
MEAN	1422	971	611	369	286	540	2975	3184	2172	1309	485	167
MAX	2500	1210	842	505	353	982	6040	6040	3020	2390	660	499
MIN	960	864	417	129	97	321	982	1180	1140	531	97	32
†	+31.0	-103	-177	-123	-44.0	-177	+590	+25.0	-2.00	-108	-17.0	-46.0
MEAN ‡	1453	868	434	246	242	363	3565	3209	2170	1201	468	121
CFSM ‡	1.18	.71	.35	.20	.20	.30	2.90	2.61	1.77	.98	.38	.10
IN. ‡	1.36	.79	.41	.23	.20	.34	3.24	3.01	1.97	1.13	.44	.11

CAL YR 1980 TOTAL 291442 MEAN 796 MAX 4830 MIN 97 MEAN ‡ 786 CFSM ‡ 0.64 IN. ‡ 8.71
WTR YR 1981 TOTAL 442093 MEAN 1211 MAX 6040 MIN 32 MEAN ‡ 1198 CFSM ‡ 0.97 IN. ‡ 13.23

† Change in contents, equivalent in cubic feet per second, in Camp Six, Bald Eagle, Gabbro, Little Gabbro, Birch, White Iron, Farm, South Farm, and Garden Lakes.
‡ Adjusted for change in reservoir contents.

05127500 BASSWOOD RIVER NEAR WINTON, MN

(International gaging station)

LOCATION.--Lat 48°04'55", long 91°39'10", in SE¼SE¼ sec.30, T.65 N., R.10 W., Lake County, Hydrologic Unit 09030001, in Superior National Forest, on island in Jackfish Bay of Basswood Lake, used to determine discharge at outlet [lat 48°06', long 91°39', in sec.19, T.65 N., R.10 W., on international boundary 14 mi (23 km) northeast of Winton].

DRAINAGE AREA.--1,740 mi^2 (4,510 km^2), approximately (above outlet of Basswood Lake).

PERIOD OF RECORD.--March to June 1924, September 1925 to March 1928, January 1930 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 955: Drainage area. WSP 1145: 1935, 1937.

GAGE.--Water-stage recorder. Datum of gage is 1,296.80 ft (395.265 m), adjustment of 1928, (levels by Geodetic Survey of Canada). Prior to Oct. 27, 1938, nonrecording gages at several sites in vicinity of gage, at datum 3.0 ft (0.914 m) higher. Oct. 28, 1938, to Sept. 30, 1966, water-stage recorder at datum 3.0 ft (0.914 m) higher.

REMARKS.--Records good. Some regulation by powerplant on Kawishiwi River at Winton, MN, and by many lakes located upstream from station.

COOPERATION.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

AVERAGE DISCHARGE.--53 years (water years 1926, 1927, 1931-81), 1,389 ft^3/s (39.34 m^3/s), 10.84 in/yr (275 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 15,600 ft^3/s (442 m^3/s) May 24, 1950, gage height 9.94 ft (3.030 m), present datum; minimum, 55 ft^3/s (1.56 m^3/s) Nov. 18, 1976, gage height, 1.67 ft (0.509 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,840 ft^3/s (194 m^3/s) May 7, gage height, 6.79 ft (2.070 m); minimum, 289 ft^3/s (8.18 m^3/s) Sept. 27, gage height, 2.46 ft (0.750 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3820	1460	1190	850	594	570	960	5890	2900	2890	1280	610
2	3790	1460	1180	840	578	570	1020	6160	3040	2890	1230	594
3	3720	1450	1180	830	570	570	1090	6400	3140	2890	1220	578
4	3590	1440	1170	820	554	570	1170	6580	3250	2900	1210	562
5	3480	1420	1160	800	546	570	1210	6740	3320	2900	1180	554
6	3360	1410	1150	772	546	570	1250	6790	3350	2900	1160	546
7	3250	1400	1130	772	546	570	1280	6810	3370	2890	1140	546
8	3130	1400	1120	772	538	570	1310	6770	3390	2850	1110	523
9	3020	1400	1100	754	530	570	1350	6700	3440	2800	1090	509
10	2900	1380	1090	745	523	570	1420	6490	3500	2750	1080	495
11	2770	1360	1080	745	516	570	1490	6330	3530	2650	1030	481
12	2650	1360	1070	736	516	562	1590	6160	3590	2590	1010	460
13	2550	1350	1060	727	509	562	1700	5940	3610	2490	980	448
14	2440	1340	1050	718	509	570	1870	5700	3590	2380	950	430
15	2320	1330	1030	709	509	562	2070	5450	3530	2260	920	412
16	2240	1320	1030	700	502	562	2260	5190	3460	2140	890	390
17	2150	1300	1030	682	495	562	2430	4950	3390	2100	860	380
18	2060	1290	1020	682	502	562	2560	4710	3190	2040	840	360
19	2020	1280	1010	664	495	578	2680	4490	3070	1950	820	350
20	1960	1280	1000	655	495	594	2820	4240	2960	1870	810	341
21	1930	1280	990	655	495	619	2960	3980	2840	1790	763	332
22	1890	1270	990	637	538	646	3110	3710	2750	1710	772	323
23	1860	1260	980	628	562	655	3460	3500	2680	1680	754	314
24	1810	1250	960	628	562	673	3840	3430	2700	1660	754	305
25	1740	1250	960	619	554	691	4150	3410	2700	1600	736	305
26	1690	1240	950	610	554	691	4430	3340	2700	1550	718	305
27	1640	1220	950	602	562	709	4710	3250	2700	1500	700	301
28	1600	1220	930	594	570	754	4990	3160	2770	1450	691	301
29	1570	1210	910	594	---	800	5280	3070	2840	1400	673	297
30	1520	1200	900	586	---	870	5610	2970	2870	1360	655	310
31	1480	---	900	586	---	910	---	2890	---	1320	646	---
TOTAL	75950	39830	32270	21712	14970	19402	76070	155200	94170	68150	28672	12662
MEAN	2450	1328	1041	700	535	626	2536	5006	3139	2198	925	422
MAX	3820	1460	1190	850	594	910	5610	6810	3610	2900	1280	610
MIN	1480	1200	900	586	495	562	960	2890	2680	1320	646	297
CFSM	1.41	.76	.60	.40	.31	.36	1.46	2.88	1.80	1.26	.53	.24
IN.	1.62	.85	.69	.46	.32	.41	1.63	3.32	2.01	1.46	.61	.27

CAL YR 1980 TOTAL 367199 MEAN 1003 MAX 3890 MIN 290 CFSM .58 IN 7.85
WTR YR 1981 TOTAL 639058 MEAN 1751 MAX 6810 MIN 297 CFSM 1.01 IN 13.66

05128000 NAMAKAN RIVER AT OUTLET OF LAC LA CROIX, ONTARIO

(International gaging station)

LOCATION.--Lat 48°23'00", long 92°10'40", at Campbell's Camp, 2.5 mi (4.0 km) west of outlet of Lac la Croix.

DRAINAGE AREA.--5,170 mi^2 (13,390 km^2).

PERIOD OF RECORD.--September 1921 to January 1922, April 1922 to current year, in reports of Geological Survey. Monthly discharge only for some periods, published in WSP 1308. August 1921 to current year, in reports of Water Survey of Canada.

GAGE.--Water-stage recorder. Gage readings have been reduced to elevations, United States and Canada Boundary Survey datum. Prior to October 1933, nonrecording gages at various sites on Lac la Croix. October 1933 to Mar. 13, 1963, nonrecording gage at present site and datum.

REMARKS.--Records excellent.

COOPERATION.--This station is maintained by Canada under agreement with the United States.

AVERAGE DISCHARGE.--59 years (water years 1923-81), 3,805 ft^3/s (107.8 m^3/s), 9.99 in/yr (254 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 28,200 ft^3/s (799 m^3/s) May 31 to June 2, 1950, elevation, 1,193.30 ft (363.718 m); minimum, 535 ft^3/s (15.2 m^3/s) at times in February, March and April 1924, elevation, 1,181.50 ft (360.121 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 13,000 ft^3/s (368 m^3/s) May 12-15, elevation, 1,188.42 ft (362.230 m); minimum, 1,270 ft^3/s (36.0 m^3/s) Sept. 27, elevation, 1,182.47 ft (360.417 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3860	3850	2970	2520	2000	1790	1880	9690	9790	8300	4300	2370
2	4120	3820	2940	2500	1970	1780	1950	10100	10000	8150	4210	2350
3	4310	3720	2930	2480	1970	1780	2010	10600	10100	8050	4170	2270
4	4490	3620	2930	2460	1950	1780	2090	11000	10200	7900	4090	2230
5	4650	3610	2920	2440	1950	1770	2190	11400	10100	7790	4030	2180
6	4770	3560	2910	2430	1940	1770	2280	11700	10100	7680	3960	2140
7	4900	3510	2870	2400	1930	1770	2380	12000	10100	7540	3920	2090
8	4980	3510	2810	2390	1920	1760	2480	12300	10000	7370	3900	2050
9	5110	3490	2800	2370	1890	1760	2590	12500	10000	7210	3850	2010
10	5260	3460	2730	2350	1870	1750	2730	12700	9980	7100	3810	1990
11	5210	3430	2790	2330	1860	1760	2850	12900	9950	6990	3740	1920
12	5180	3410	2760	2310	1850	1720	3010	13000	9910	6870	3690	1890
13	5170	3400	2720	2290	1840	1710	3170	13000	9890	6730	3640	1840
14	5100	3370	2700	2270	1830	1720	3320	13000	9890	6640	3530	1790
15	5030	3330	2770	2250	1820	1710	3530	13000	9770	6470	3450	1750
16	5020	3280	2710	2240	1820	1700	3720	12900	9670	6320	3360	1710
17	4970	3260	2720	2220	1800	1690	3890	12800	9620	6220	3280	1660
18	4860	3220	2700	2190	1790	1680	4130	12600	9350	6140	3210	1610
19	4790	3210	2620	2160	1780	1680	4360	12400	9400	6010	3150	1580
20	4710	3190	2570	2140	1770	1680	4610	12200	9310	5850	3100	1560
21	4640	3200	2620	2120	1760	1680	4870	11900	9230	5720	3050	1520
22	4580	3190	2660	2100	1780	1670	5210	11700	9220	5560	2980	1480
23	4560	3130	2610	2070	1800	1670	5730	11400	9110	5420	2910	1440
24	4470	3130	2460	2060	1810	1660	6270	11200	9030	5270	2870	1420
25	4360	3100	2540	2040	1800	1660	6820	11100	8940	5120	2790	1410
26	4290	3070	2580	2010	1790	1670	7350	10900	8810	5000	2720	1370
27	4220	3040	2580	2010	1780	1660	7850	10700	8690	4880	2660	1330
28	4140	3040	2550	2030	1800	1720	8380	10400	8570	4750	2600	1410
29	4090	3040	2520	2030	---	1750	8850	10100	8460	4610	2540	1400
30	3960	3020	2520	2010	---	1780	9270	9960	8420	4540	2500	1390
31	3830	---	2520	2000	---	1820	---	9770	---	4410	2450	---
TOTAL	143630	100210	84030	69220	51870	53500	129770	360920	285610	196610	104460	53160
MEAN	4633	3340	2711	2233	1853	1726	4326	11640	9520	6342	3370	1772
MAX	5260	3850	2970	2520	2000	1820	9270	13000	10200	8300	4300	2370
MIN	3830	3020	2460	2000	1760	1660	1880	9690	8420	4410	2450	1330
CFSM	.90	.65	.52	.43	.36	.33	.84	2.25	1.84	1.23	.65	.34
IN.	1.03	.72	.60	.50	.37	.38	.93	2.60	2.06	1.41	.75	.38

CAL YR 1980 TOTAL 771800 MEAN 2109 MAX 5260 MIN 1030 CFSM .41 IN 5.55
WTR YR 1981 TOTAL 1632990 MEAN 4474 MAX 13000 MIN 1330 CFSM .87 IN 11.75

05128200 VERMILION LAKE NEAR SOUDAN, MN

LOCATION.--Lat 47°49'52", long 92°16'20", in SW¼SE¼ sec.20, T.62 N., R.15 W., St. Louis County, Hydrologic Unit 09030002, on south shore of Vermilion Lake, 2 mi (3.2 km) northwest of Soudan.

PERIOD OF RECORD.--October 1913 to July 1915, July 1941 to November 1942, June 1946 to current year (fragmentary during 1947).

GAGE.--Water-stage recorder. Datum of gage is 1,355.10 ft (413.034 m) National Geodetic Vertical Datum of 1929. October 1913 to July 1915, nonrecording gage at Tower, 2 mi (3.2 km) southwest of present gage, at datum about 1,354.60 ft (412.882 m). July 1941 to November 1942, and June 1946 to June 1951, nonrecording gage approximately 13 mi (20.9 km) northwest at Vermilion Dam near Tower, at same datum. All gage readings have been reduced to elevations NGVD.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation observed, 1,359.52 ft (414.382 m) May 16, 1950; minimum observed, 1,356.02 ft (413.315 m) Jan. 29, 1942; minimum 1,355.96 ft (413.297 m) Dec. 14, 1976, result of wind action.

EXTREMES OUTSIDE PERIOD OF RECORD.--Elevation on June 6, 1913, was 1,359.94 ft (414.510 m), determined from reference point set by local observers.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,358.48 ft (414.065 m) May 4; maximum daily, 1,358.47 ft (414.062 m) May 4, 5; minimum, 1,356.77 ft (413.543 m) Sept. 30, result of wind action; minimum daily, 1,356.83 ft (413.562 m) Sept. 30.

MONTHEND ELEVATION, IN FEET NGVD, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

Oct. 31 ..... 1357.57	Feb. 28 ..... 1357.12	June 30 ..... 1358.33
Nov. 30 ..... 1357.36	Mar. 31 ..... 1357.22	July 31 ..... 1357.64
Dec. 31 ..... 1357.20	Apr. 30 ..... 1358.37	Aug. 31 ..... 1357.20
Jan. 31 ..... 1357.06	May 18 ..... 1358.18	Sept.30 ..... 1356.83

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

05129000 VERMILION RIVER BELOW VERMILION LAKE, NEAR TOWER, MN

LOCATION.--Lat 47°57'41", long 92°28'33", in SE¼SW¼ sec.2, T.63 N., R.17 W., St. Louis County, Hydrologic Unit 09030002, on left bank 200 ft (61 m) downstream from dam at outlet of Vermilion Lake, 4.4 mi (7.1 km) upstream from Twomile Creek, and 14.2 mi (22.8 km) northwest of Tower.

DRAINAGE AREA.--483 mi^2 (1,251 km^2).

PERIOD OF RECORD.--May 1911 to September 1917, June 1928 to September 1981 (discontinued).

REVISED RECORD.--WSP 1508: 1913.

GAGE.--Water-stage recorder. Datum of gage is 1,347.36 ft (410.675 m) National Geodetic Vertical Datum of 1929. June 26, 1928, to July 8, 1931, nonrecording gage at same site, at datum 3.05 ft (0.930 m) higher. May 17, 1911, to Sept. 30, 1917, July 9, 1931, to Apr. 11, 1939, nonrecording gages, and Apr. 12, 1939, to Sept. 30, 1967, water-stage recorder at same site, at datum 3.00 ft (0.914 m) higher.

REMARKS.--Records good.

AVERAGE DISCHARGE.--59 years, 319 ft^3/s (9.034 m^3/s), 8.97 in/yr (228 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,710 ft^3/s (76.7 m^3/s) May 23, 1950, gage height, 7.68 ft (2.341 m) present datum; no flow Oct. 25-29, 1955, caused by temporary storage behind new concrete dam at outlet of Vermilion Lake.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,060 ft^3/s (30.0 m^3/s) May 2, gage height, 5.99 ft (1.826 m); minimum, 20 ft^3/s (0.57 m^3/s) Sept. 27, gage height, 2.74 ft (0.835 m), affected by wind action; minimum daily, 40 ft^3/s (1.13 m^3/s) Sept. 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	412	280	219	161	117	129	198	985	684	880	381	165
2	416	270	214	161	118	127	224	1020	714	874	372	176
3	428	258	217	159	117	127	236	1020	745	868	368	157
4	425	249	217	157	115	125	258	1000	767	856	368	146
5	426	268	214	157	115	124	276	1000	756	850	368	149
6	393	265	210	151	113	124	294	1020	767	844	355	149
7	396	265	208	149	113	122	307	1010	784	838	339	138
8	385	280	208	148	113	120	320	1000	756	806	351	133
9	380	271	205	146	113	118	330	954	756	772	339	134
10	375	277	203	144	112	117	346	972	745	756	343	131
11	370	277	201	142	110	115	354	947	734	734	347	120
12	355	277	196	140	108	112	370	923	724	719	335	120
13	345	277	194	138	108	110	382	892	729	699	339	112
14	335	274	190	136	108	110	389	874	719	699	312	103
15	330	271	190	133	108	106	416	850	704	669	288	92
16	325	265	190	133	106	106	426	833	664	634	284	84
17	320	255	192	131	105	103	426	816	694	644	271	83
18	330	258	190	129	105	102	448	784	624	629	262	76
19	330	255	188	127	105	100	439	756	614	614	255	70
20	320	252	186	124	105	102	470	734	614	579	252	70
21	315	258	182	124	108	102	504	724	614	569	246	70
22	310	252	184	120	120	100	509	709	654	549	235	71
23	310	246	180	120	127	100	584	699	664	529	222	65
24	315	243	178	120	129	100	659	704	699	514	227	55
25	320	241	178	117	127	103	719	704	729	475	210	57
26	320	238	174	115	127	108	750	709	745	452	196	64
27	315	232	176	117	127	114	789	704	762	448	192	40
28	310	230	168	115	131	127	850	694	806	421	186	55
29	300	230	165	113	---	138	892	674	828	416	176	59
30	300	224	165	113	---	161	947	654	862	403	176	62
31	295	---	163	113	---	176	---	654	---	398	182	---
TOTAL	10806	7738	5945	4153	3210	3628	14112	26019	21657	20138	8777	3006
MEAN	349	258	192	134	115	117	470	839	722	650	283	100
MAX	428	280	219	161	131	176	947	1020	862	880	381	176
MIN	295	224	163	113	105	100	198	654	614	398	176	40
CFSM	.72	.53	.40	.28	.24	.24	.97	1.74	1.50	1.35	.59	.21
IN.	.83	.60	.46	.32	.25	.28	1.09	2.00	1.67	1.55	.68	.23

CAL YR 1980 TOTAL 70016 MEAN 191 MAX 475 MIN 22 CFSM .40 IN 5.39
WTR YR 1981 TOTAL 129189 MEAN 354 MAX 1020 MIN 40 CFSM .73 IN 9.95

05129115 VERMILION RIVER NEAR CRANE LAKE, MN

LOCATION.--Lat 48°15'53", long 92°33'57", in NE¼NE¼ sec. 30, T.67 N., R.17 W., St. Louis County, Hydrologic Unit 09030002, in Superior National Forest, on left bank 350 ft (107 m) downstream from bridge on Forest Route 491, 3.5 mi (5.6 km) upstream from mouth, and 3.5 mi (5.6 km) west of village of Crane Lake.

PERIOD OF RECORD.--August 1979 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,180 ft (360 m), from topographic map.

REMARKS.--Records good.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,390 ft^3/s (67.7 m^3/s) Apr. 26, 1981, gage height, 11.85 ft (3.612 m); minimum, 38 ft^3/s (1.08 m^3/s) Aug. 13, 14, 1980, gage height, 3.68 ft (1.122 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1979 reached a stage of 15.15 ft (4.618 m), from high-water mark, discharge, about 4,600 ft^3/s (130 m^3/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,390 ft^3/s (67.7 m^3/s) Apr. 26, gage height, 11.85 ft (3.612 m); minimum, 104 ft^3/s (2.95 m^3/s) Sept. 25, 26, gage height, 4.44 ft (1.353 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	740	489	358	258	190	208	961	2200	1140	1580	563	258
2	714	482	347	252	193	204	1110	2170	1530	1550	538	244
3	703	475	339	245	187	198	1240	2180	1810	1520	519	242
4	689	460	338	238	187	197	1280	2160	1940	1480	503	227
5	675	446	338	238	187	197	1240	2120	1980	1430	487	221
6	661	442	343	239	193	194	1170	2060	1940	1380	489	218
7	640	436	341	228	193	190	1110	2010	1850	1330	487	247
8	616	438	336	223	193	190	1060	1940	1760	1280	484	226
9	596	453	330	223	190	189	1020	1880	1660	1240	494	215
10	593	449	323	218	187	186	988	1830	1550	1180	484	207
11	565	442	316	214	182	183	974	1780	1460	1140	489	201
12	550	444	316	215	177	183	978	1730	1380	1100	494	193
13	536	449	310	221	180	183	971	1660	1320	1050	487	182
14	524	449	305	220	183	181	988	1590	1360	1000	475	172
15	517	444	300	217	189	183	1010	1530	1510	974	451	160
16	503	440	300	214	193	183	1000	1450	1440	954	427	152
17	517	431	303	212	192	183	1000	1390	1330	988	410	147
18	526	419	301	211	197	181	1010	1330	1240	971	396	144
19	519	414	288	210	202	178	1000	1270	1140	938	376	134
20	507	414	278	205	204	176	988	1210	1070	889	360	126
21	496	414	266	202	205	174	978	1150	1020	835	351	118
22	489	414	278	197	211	174	1010	1090	1060	793	343	114
23	500	412	286	196	215	176	1320	1050	1140	757	334	112
24	538	402	278	194	217	181	1900	1040	1200	740	325	112
25	553	396	264	193	215	197	2250	1080	1340	723	317	106
26	563	388	268	193	214	230	2370	1130	1590	694	305	110
27	565	384	266	190	211	264	2360	1180	1650	659	291	122
28	553	378	268	182	211	362	2330	1190	1640	632	279	114
29	538	374	266	178	---	548	2290	1170	1610	614	269	108
30	534	368	260	180	---	708	2240	1160	1600	601	256	112
31	514	---	260	185	---	829	---	1120	---	590	255	---
TOTAL	17734	12846	9370	6591	5498	7610	40146	47850	44260	31612	12738	5044
MEAN	572	428	302	213	196	245	1338	1544	1475	1020	411	168
MAX	740	489	358	258	217	829	2370	2200	1980	1580	563	258
MIN	489	368	260	178	177	174	961	1040	1020	590	255	106

CAL YR 1980 TOTAL 130824 MEAN 357 MAX 1620 MIN 38
WTR YR 1981 TOTAL 241299 MEAN 661 MAX 2370 MIN 106

05129400 RAINY LAKE NEAR FORT FRANCES, ONTARIO
(International gaging station)

LOCATION.--Lat 48°38'30", long 93°20'00", at Five Mile dock, approximately 5 mi (8 km) northeast of town of Fort Frances.

PERIOD OF RECORD.--January 1910 to September 1917 and October 1934 to current year, in reports of Geological Survey. August 1911 to September 1979, in reports of Water Survey of Canada. Prior to October 1949, published as "at Ranier, Minn.", and as "at Fort Frances, Ontario" October 1949 to September 1964.

GAGE.--Water-stage recorder. Datum of gage is at National Geodetic Vertical Datum of 1929 (United States and Canadian Boundary Survey). January 1910 to December 1949, nonrecording gage 3 mi (5 km) northeast at Ranier, Minn., at same datum. January 1950 to October 1964, water-stage recorder on Government dock at Pither's Point at Fort Frances and supplementary gage in town pumping station, 0.5 mi (0.8 km) south, used during winter months, at same datum.

COOPERATION.--This station is one of the international gaging stations maintained by Canada under agreement with the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation observed, 1,112.97 ft (339.233 m) July 5, 1950; minimum observed, 1,101.26 ft (335.664 m) Apr. 17, 1923, Apr. 2, 1930.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,108.02 ft (337.724 m) June 26, maximum daily elevation, 1,108.02 ft (337.724 m) June 26; minimum, 1,105.01 ft (336.807 m) Mar. 27; minimum daily, 1,105.03 ft (336.813 m) Mar. 27.

MONTHEND ELEVATION, IN FEET NGVD, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

Oct. 31 ..... 1106.76	Feb. 28 ..... 1105.47	June 30 ..... 1107.96
Nov. 30 ..... 1107.50	Mar. 31 ..... 1105.09	July 31 ..... 1107.70
Dec. 31 ..... 1107.07	Apr. 30 ..... 1106.49	Aug. 31 ..... 1107.37
Jan. 31 ..... 1106.37	May 31 ..... 1107.67	Sept.30 ..... 1107.12

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

05130500 STURGEON RIVER NEAR CHISHOLM, MN

LOCATION.--Lat 47°40'25", long 92°54'00", in NE¼NW¼ sec.20, T.60 N., R.20 W., St. Louis County, Hydrologic Unit 09030005, on left bank 1,000 ft (305 m) upstream from highway bridge, 0.6 mi (1.0 km) downstream from East Branch Sturgeon River, and 11.5 mi (18.5 km) north of Chisholm.

DRAINAGE AREA.--187 mi^2 (484 km^2).

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

REVISED RECORDS.--WSP 1438: 1946.

GAGE.--Water-stage recorder. Datum of gage is 1,305.7 ft (397.977 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 24, 1944, nonrecording gage at site 1,000 ft (305 m) downstream at different datum. Aug. 25, 1944, to Sept. 30, 1975, at present site at datum 1.00 ft (0.305 m) higher.

REMARKS.--Records good except those for winter period, which are fair.

AVERAGE DISCHARGE.--39 years, 123 ft^3/s (3.483 m^3/s), 8.93 in/yr (227 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,630 ft^3/s (103 m^3/s) May 7, 1950, gage height, 7.41 ft (2.259 m), present datum, from rating curve extended above 1,600 ft^3/s (45.3 m^3/s) on basis of slope-area measurement of peak flow; minimum daily, 3.8 ft^3/s (0.11 m^3/s) Jan. 31 to Feb. 3, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 500 ft^3/s (14.2 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Apr. 25	0800	*852	24.1	*4.57	1.393
July 1	0630	526	14.9	3.87	1.180

Minimum discharge, 22 ft^3/s (0.62 m^3/s) Feb. 12-16, Sept. 26; minimum gage height, 1.50 ft (0.457 m) Sept. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	78	64	50	31	25	34	342	480	134	513	36	36
2	79	59	59	31	25	32	294	460	172	425	35	36
3	78	56	61	30	24	31	283	426	258	305	155	35
4	71	55	63	29	24	30	271	389	294	229	156	32
5	69	53	63	29	24	30	237	356	292	184	126	31
6	65	52	61	29	23	29	241	319	255	155	112	30
7	65	51	58	28	23	28	221	288	211	132	98	41
8	60	51	54	28	23	28	193	263	180	115	88	41
9	54	50	50	28	23	27	171	251	153	105	79	38
10	50	50	48	27	23	27	199	244	140	93	70	36
11	53	49	48	26	23	26	219	231	133	91	65	34
12	54	49	50	26	22	27	218	214	119	86	59	32
13	51	48	46	26	22	27	231	199	111	81	56	30
14	50	47	45	26	22	28	271	187	115	79	52	28
15	50	47	44	25	22	30	294	177	114	79	47	28
16	49	46	43	25	22	31	291	168	107	78	42	27
17	55	46	42	25	23	34	283	157	97	81	40	26
18	59	46	39	25	26	33	271	145	89	73	37	28
19	61	47	38	25	34	32	257	136	81	68	35	25
20	60	48	36	25	41	32	225	130	82	63	33	24
21	61	48	34	25	41	33	195	124	90	56	35	24
22	61	50	35	25	42	36	204	115	133	52	35	24
23	61	50	35	25	43	37	458	113	167	49	33	24
24	76	45	34	25	41	39	727	130	249	49	32	24
25	86	47	32	25	39	48	844	165	267	48	32	24
26	92	46	31	26	37	69	788	192	279	46	32	25
27	92	43	31	26	35	91	671	190	268	46	31	33
28	85	43	31	26	34	138	586	173	312	42	30	32
29	75	43	31	25	---	214	522	156	411	37	30	31
30	71	43	30	25	---	301	487	140	481	35	30	33
31	68	---	31	25	---	331	---	126	---	36	34	---
TOTAL	2039	1472	1353	822	806	1933	10494	6844	5794	3531	1775	912
MEAN	65.8	49.1	43.6	26.5	28.8	62.4	350	221	193	114	57.3	30.4
MAX	92	64	63	31	43	331	844	480	481	513	156	41
MIN	49	43	30	25	22	26	171	113	81	35	30	24
CFSM	.35	.26	.23	.14	.15	.33	1.87	1.18	1.03	.61	.31	.16
IN.	.41	.29	.27	.16	.16	.38	2.09	1.36	1.15	.70	.35	.18

CAL YR 1980 TOTAL 22356 MEAN 61.1 MAX 390 MIN 10 CFSM .33 IN 4.45
WTR YR 1981 TOTAL 37775 MEAN 103 MAX 844 MIN 22 CFSM .55 IN 7.51

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN

LOCATION.--Lat 48°23'45", long 93°32'57", in NE¼SE¼ sec.9, T.68 N., R.25 W., Koochiching County, Hydrologic Unit 09030005, on right bank at town of Littlefork, 0.9 mi (1.4 km) upstream from bridge on State Highway 217, 2.8 mi (4.5 km) upstream from Beaver Creek, and 19 mi (31 km) upstream from mouth.

DRAINAGE AREA.--1,730 mi^2 (4,481 km^2), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June to November 1909, April to November 1910, April 1911 to June 1917, September 1917; October 1917 to March 1919 (gage heights only), June 1928 to current year.

REVISED RECORDS.--WSP 955: Drainage area. WSP 1508: 1913, 1916, 1928-32, 1934. WRD MN-74: 1963.

GAGE.--Water-stage recorder. Datum of gage is 1,083.59 ft (330.278 m) National Geodetic Vertical Datum of 1929. June 23, 1909, to Mar. 4, 1917, nonrecording gage and July 21, 1937, to Oct. 23, 1979, water-stage recorder at site 1.2 mi (1.9 km) downstream at datum 10.53 ft (3.210 m) lower; Mar. 5 to Sept. 30, 1917, and June 22, 1928, to July 20, 1937, nonrecording gage at site 1.18 mi (1.9 km) downstream at datum 10.53 ft (3.210 m) lower.

REMARKS.--Records good except those for winter period, which are fair.

AVERAGE DISCHARGE.--58 years (water years 1912-16, 1929-81), 1,047 ft^3/s (29.65 m^3/s), 8.22 in/yr (209 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 25,000 ft^3/s (708 m^3/s) Apr. 18, 1916, May 11, 1950, gage height, 37.00 ft (11.278 m); minimum observed, 21 ft^3/s (0.59 m^3/s) Aug. 26, 27, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,160 ft^3/s (174 m^3/s) June 30, gage height, 8.99 ft (2.740 m); minimum daily, 105 ft^3/s (2.97 m^3/s) Feb. 1-19; minimum gage height, 2.13 ft (0.649 m) Sept. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	836	712	356	140	105	180	2960	5440	1390	5570	286	175
2	761	661	335	140	105	170	2720	5590	2280	4780	263	196
3	706	626	261	140	105	155	2790	5200	3480	3960	256	202
4	682	590	257	135	105	145	2800	4700	4060	3280	284	187
5	674	567	255	135	105	135	2300	4110	4470	2580	277	193
6	660	545	270	135	105	130	1910	3540	4360	1980	596	199
7	628	521	285	130	105	125	1770	3020	4040	1570	874	202
8	581	513	280	130	105	125	1540	2630	3520	1290	793	235
9	542	520	270	130	105	120	1410	2320	3040	1030	682	309
10	514	505	260	130	105	120	1260	2090	2470	853	580	294
11	484	445	250	125	105	125	1190	1900	2100	736	505	298
12	459	478	240	125	105	130	1190	1760	1790	682	449	284
13	448	506	230	125	105	135	1220	1610	1540	624	403	252
14	428	520	220	120	105	142	1240	1460	1590	585	371	226
15	423	483	215	120	105	160	1260	1350	2150	541	335	205
16	419	455	205	120	105	172	1270	1250	2010	495	302	193
17	416	450	200	115	105	199	1260	1140	1630	490	384	220
18	418	412	195	115	105	214	1250	1050	1420	495	266	214
19	430	381	190	115	105	220	1220	962	1240	558	242	178
20	462	398	185	115	110	229	1210	874	1100	618	229	158
21	490	430	180	115	130	214	1140	806	1050	541	232	142
22	502	445	180	110	160	190	1060	742	1360	470	226	138
23	512	416	175	110	200	184	1240	724	3460	426	229	132
24	574	371	170	110	240	184	3340	793	3840	385	220	132
25	738	308	165	110	260	217	5360	1060	4630	373	211	132
26	894	302	160	110	250	274	5640	1420	5040	361	220	140
27	984	342	160	110	230	365	5400	1600	4840	336	220	162
28	980	386	155	110	210	624	5130	1810	4290	320	199	187
29	902	376	150	110	---	940	5260	1780	5260	299	187	220
30	829	354	150	110	---	1460	5240	1650	6090	290	178	226
31	746	---	145	110	---	2120	---	1490	---	292	172	---
TOTAL	19122	14018	6749	3755	3785	9903	72580	65871	89540	36810	10671	6031
MEAN	617	467	218	121	135	319	2419	2125	2985	1187	344	201
MAX	984	712	356	140	260	2120	5640	5590	6090	5570	874	309
MIN	416	302	145	110	105	120	1060	724	1050	290	172	132
CFSM	.36	.27	.13	.07	.08	.18	1.40	1.23	1.73	.69	.20	.12
IN.	.41	.30	.15	.08	.08	.21	1.56	1.42	1.93	.79	.23	.13

CAL YR 1980 TOTAL 205301 MEAN 561 MAX 4840 MIN 57 CFSM .32 IN 4.41
WTR YR 1981 TOTAL 338835 MEAN 928 MAX 6090 MIN 105 CFSM .54 IN 7.29

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1969, 1971, 1973 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1980 to September 1981.
WATER TEMPERATURES: October 1980 to September 1981.

INSTRUMENTATION.--Water-quality minimonitor since October 1980.

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

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 299 micromhos Feb. 21, 1981; minimum, 99 micromhos Apr. 30, May 1, 1981.
WATER TEMPERATURES: Maximum, 26.0°C July 7, 8, 12-14, 1981; minimum, 0.0°C several days during winter period.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 299 micromhos Feb. 21; minimum, 99 micromhos Apr. 30, May 1.
WATER TEMPERATURES: Maximum, 26.0°C July 7, 8, 12-14; minimum, 0.0°C several days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
OCT										
14...	1530	421	120	121	7.5	7.5	7.0	1.8	10.5	89
NOV										
17...	1430	470	138	130	7.6	-2.0	.5	.80	12.9	92
DEC										
15...	1500	213	180	185	7.9	-10.0	.0	1.6	11.8	84
JAN										
20...	0930	113	240	241	7.1	-7.0	.0	4.0	9.6	68
FEB										
23...	1710	194	260	236	7.8	5.0	.0	2.0	9.6	69
MAR										
23...	1400	187	225	231	7.9	5.5	.5	5.0	12.9	91
MAY										
26...	1605	1470	140	136	7.8	20.0	15.0	14	7.5	78
JUL										
28...	1330	321	150	160	7.7	24.0	22.0	7.5	--	--

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3) (95902)	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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
OCT										
14...	K9	K5	66	18	17	5.6	2.6	.1	1.4	48
NOV										
17...	K6	K6	65	18	16	6.2	3.4	.2	1.4	47
DEC										
15...	K3	K5	90	15	23	7.8	4.2	.2	1.3	75
JAN										
20...	K1	K2	110	12	29	9.7	4.9	.2	1.7	100
FEB										
23...	K100	K540	100	3.0	28	8.1	5.1	.2	2.6	100
MAR										
23...	K3	K4	100	7.0	25	9.5	5.3	.2	3.0	95
MAY										
26...	K130	K730	71	4.0	17	6.9	1.9	.1	1.4	67
JUL										
28...	K11	50	88	11	23	7.4	2.9	.1	1.3	77

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
OCT										
14...	7.7	2.7	.1	9.7	126	76	143	.05	.03	.040
NOV										
17...	8.8	2.7	.1	9.6	146	76	185	.04	.04	.030
DEC										
15...	12	3.0	.1	12	165	108	94.9	1.7	1.7	.110
JAN										
20...	15	3.3	.1	15	161	139	49.1	.23	.20	.030
FEB										
23...	13	3.4	.1	13	171	133	89.6	.40	.40	.110
MAR										
23...	13	3.9	.1	12	164	129	80.1	.32	.32	.070
MAY										
26...	6.9	2.1	<.1	3.9	127	80	504	.06	.06	.040
JUL										
28...	7.4	2.2	.1	8.0	144	98	125	.13	.12	.020

DATE	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 TOTAL (MG/L AS C) (00680)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
OCT									
14...	.040	.95	.76	.040	.020	--	5	5.7	88
NOV									
17...	.030	.72	.72	.020	.040	40	9	11	100
DEC									
15...	.110	.65	.56	.030	.010	25	6	3.5	100
JAN									
20...	.010	.33	.30	.050	.020	17	7	2.1	100
FEB									
23...	.050	.79	.75	.090	.060	--	9	4.7	100
MAR									
23...	.070	.62	.59	.060	.050	12	5	2.5	100
MAY									
26...	.020	.83	.78	.040	.020	--	37	147	97
JUL									
28...	.010	.86	.85	.070	.030	--	14	12	97

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA) (01007)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO) (01037)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)
OCT											
14...	1530	1	1	100	20	0	0	50	10	0	0
FEB											
23...	1710	0	0	100	100	1	0	20	10	0	0
MAY											
26...	1605	1	1	100	20	1	1	10	10	1	0
JUL											
28...	1330	1	1	100	30	2	<1	10	10	4	4

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)
OCT										
14...	2	2	920	490	1	0	40	30	.1	<.1
FEB										
23...	3	3	900	620	6	6	50	30	.2	.1
MAY										
26...	9	5	990	270	2	0	70	10	<.1	<.1
JUL										
28...	10	8	1200	420	2	2	60	30	.2	<.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)
OCT										
14...	2	2	0	0	0	0	20	4	31	.5
FEB										
23...	2	0	0	0	0	0	10	10	14	.5
MAY										
26...	5	5	0	0	0	0	30	<4	54	--
JUL										
28...	5	5	0	0	<1	0	40	7	39	.5

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1980 TO SEPTEMBER 1981

DATE	OCT 14,80	NOV 17,80	MAR 23,81	MAY 26,81	JUL 28,81
TIME	1530	1430	1400	1605	1330
TOTAL CELLS/ML	78	100	700	930	1100
DIVERSITY: DIVISION	0.9	1.0	1.7	1.5	1.6
.CLASS	0.9	1.0	1.7	1.5	1.6
..ORDER	1.3	1.0	2.3	1.9	2.2
...FAMILY	1.3	1.0	2.3	2.3	2.7
....GENUS	1.3	1.0	2.5	2.7	3.0

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)										
.BACILLARIOPHYCEAE										
..ACHNANTHALES										
...ACHNANTHACEAE										
....COCCONEIS	--	-	--	-	--	-	--	-	14	1
..BACILLARIALES										
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	42	6	100	11	70	6
..EUPODISCALES										
...COSCINODISCACEAE										
....CYCLOTELLA	13#	17	--	-	--	-	52	6	28	2
..FRAGILARIALES										
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	52#	50	14	2	--	-	--	-
....FRAGILARIA	--	-	--	-	56	8	39	4	--	-
....TABELLARIA	--	-	--	-	--	-	26	3	--	-
..NAVICULALES										
...GOMPHONEMACEAE										
....GOMPHONEMA	--	-	--	-	--	-	--	-	14	1
...NAVICULACEAE										
....NAVICULA	13#	17	--	-	14	2	--	-	--	-
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....SCHROEDERIA	--	-	--	-	--	-	13	1	--	-
...DICTYOSPHAERIACEAE										
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	14	1
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	56	8	52	6	42	4
....OOCYSTIS	--	-	--	-	56	8	--	-	130	11
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	--	-	260#	28	56	5
....SCENEDESMUS	--	-	52#	50	--	-	130	14	310#	27
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	56	8	--	-	14	1
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	--	-	13	1	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	28	4	--	-	70	6
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	52#	67	--	-	14	2	250#	26	280#	25
..OSCILLATORIALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	350#	50	--	-	98	9
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..DINOKONTAE										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	14	2	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	---	---	---	159	155	157	211	209	210
2	---	---	---	---	---	---	163	158	161	212	210	211
3	---	---	---	---	---	---	166	161	164	215	211	213
4	---	---	---	---	---	---	168	166	167	218	215	217
5	---	---	---	---	---	---	169	166	168	220	217	219
6	---	---	---	---	---	---	167	164	165	221	220	220
7	---	---	---	---	---	---	167	164	166	224	220	222
8	---	---	---	---	---	---	166	163	165	226	223	224
9	---	---	---	---	---	---	168	165	166	227	224	226
10	---	---	---	132	131	131	171	167	169	229	226	228
11	---	---	---	134	132	133	173	170	171	233	230	231
12	---	---	---	135	133	134	176	173	174	236	233	235
13	---	---	---	135	133	134	178	174	175	237	235	236
14	---	---	---	135	133	134	177	174	176	238	236	237
15	127	126	126	137	134	136	181	177	179	238	237	237
16	129	127	128	140	137	138	185	180	183	238	237	238
17	130	129	129	143	140	141	186	184	185	239	238	238
18	131	129	130	145	142	144	189	187	188	241	238	239
19	134	131	132	145	143	144	190	188	189	245	239	242
20	135	133	134	---	---	---	190	187	189	245	243	244
21	135	134	134	---	---	---	191	188	189	245	244	245
22	---	---	---	---	---	---	192	189	190	245	244	245
23	---	---	---	---	---	---	191	189	190	246	244	245
24	---	---	---	---	---	---	194	191	192	246	244	245
25	---	---	---	---	---	---	198	193	195	247	245	246
26	---	---	---	161	152	153	199	196	197	248	246	247
27	---	---	---	155	153	154	202	198	200	250	247	249
28	---	---	---	155	153	154	204	200	202	252	250	251
29	---	---	---	155	153	154	206	203	205	253	251	252
30	---	---	---	157	153	155	208	205	207	255	252	254
31	---	---	---	---	---	---	211	208	209	256	254	255
MONTH							211	155	182	256	209	236

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	256	255	255	224	215	220	168	149	159	101	99	100
2	257	255	256	215	212	213	161	155	158	102	101	101
3	259	257	258	214	212	213	153	149	150	101	99	100
4	261	258	259	214	212	213	147	143	145	102	100	101
5	261	260	260	216	213	214	146	141	144	105	102	101
6	261	260	261	218	216	217	142	139	140	107	104	106
7	261	259	260	220	218	219	140	137	139	110	106	108
8	261	259	260	227	221	224	138	135	137	112	109	111
9	261	259	260	232	226	230	141	135	137	110	101	104
10	261	260	261	237	231	234	147	138	142	104	102	103
11	263	261	262	238	220	232	148	145	147	110	103	106
12	264	262	263	232	223	227	149	145	147	112	109	110
13	264	262	263	235	226	231	149	145	147	115	111	113
14	264	262	263	233	208	225	149	147	148	116	111	114
15	265	263	264	229	221	225	150	145	148	120	110	115
16	264	263	263	231	212	225	153	148	150	121	113	118
17	265	263	264	231	226	229	152	150	151	123	114	119
18	265	263	264	231	228	229	151	148	149	128	122	125
19	266	263	265	233	230	232	148	146	147	127	123	125
20	297	266	270	235	232	234	151	146	148	132	124	128
21	299	267	278	235	231	233	147	145	146	132	128	130
22	267	255	261	236	231	234	145	143	144	137	130	134
23	266	249	256	235	229	233	141	139	140	137	132	134
24	261	230	237	231	217	225	140	138	139	135	129	132
25	245	235	240	222	211	216	137	125	131	141	127	134
26	253	236	244	212	200	216	122	114	118	141	134	139
27	253	238	244	197	190	193	112	107	109	134	126	130
28	238	224	230	218	180	193	107	105	106	141	133	137
29	---	---	---	180	171	175	105	103	104	140	135	137
30	---	---	---	170	153	161	102	99	100	133	130	131
31	---	---	---	152	147	149	---	---	---	130	127	128
MONTH	299	224	258	238	147	217	168	99	139	141	99	119

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	139	126	129	127	124	125	170	161	166	181	178	180
2	139	131	134	128	124	126	175	168	172	184	180	182
3	133	129	131	128	125	127	175	173	174	185	182	183
4	137	133	135	133	127	130	175	167	171	184	182	183
5	134	129	132	135	129	132	173	170	171	186	183	184
6	131	128	129	142	135	138	171	168	170	187	181	186
7	130	126	128	149	171	145	168	162	164	186	184	185
8	132	130	131	149	143	147	163	159	161	186	184	185
9	131	129	130	149	143	146	160	156	157	185	182	183
10	131	128	130	150	144	147	157	138	147	184	180	182
11	131	128	129	154	148	152	138	133	134	181	178	180
12	134	129	131	158	150	155	134	132	133	182	180	181
13	134	131	133	160	153	157	138	134	135	182	176	179
14	135	132	133	157	153	155	141	136	138	180	176	178
15	140	135	138	155	151	153	145	140	142	179	176	178
16	139	137	138	154	150	152	148	145	147	177	174	175
17	139	137	138	160	149	154	150	147	148	181	177	179
18	141	133	135	158	153	155	154	150	152	184	180	181
19	140	132	135	158	149	153	158	153	155	184	181	182
20	136	130	133	152	147	150	161	149	158	183	181	182
21	139	134	136	152	147	150	164	159	161	187	183	184
22	134	132	133	160	151	154	166	162	163	185	182	183
23	132	130	131	160	157	158	170	165	166	186	183	184
24	133	130	132	162	158	160	172	167	169	189	186	187
25	130	128	129	161	155	157	174	171	172	191	188	189
26	131	129	130	156	153	155	176	173	174	189	181	186
27	129	127	128	153	150	152	179	175	177	189	186	187
28	128	125	127	154	150	152	180	177	178	191	186	189
29	129	126	127	157	149	153	180	177	179	187	183	185
30	129	127	128	163	155	158	182	179	180	197	175	182
31	---	---	---	161	150	155	183	178	181	---	---	---
MONTH	141	125	132	163	124	148	183	132	161	197	174	183

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
2	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
3	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
4	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
5	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
6	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
7	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
8	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
9	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
10	---	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
11	---	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
12	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
13	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
14	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
15	7.0	5.5	6.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
16	6.0	5.5	5.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
17	6.5	6.0	6.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
18	7.0	5.5	6.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
19	6.5	5.0	5.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
20	6.0	4.0	5.0	---	---	---	.0	.0	.0	.0	.0	.0
21	4.0	4.0	4.0	---	---	---	.0	.0	.0	.0	.0	.0
22	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
23	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
24	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
25	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
26	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
MONTH							.0	.0	.0	.0	.0	.0

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	.5	.0	.0	8.5	7.5	8.0
2	.0	.0	.0	.5	.0	.0	.5	.0	.0	8.0	8.0	8.0
3	.0	.0	.0	.0	.0	.0	.0	.0	.0	9.0	8.0	8.5
4	.0	.0	.0	.0	.0	.0	.5	.0	.0	9.5	8.5	9.0
5	.0	.0	.0	.0	.0	.0	.5	.0	.0	11.0	9.5	10.0
6	.0	.0	.0	.5	.0	.0	2.0	.0	1.0	11.5	10.0	11.0
7	.0	.0	.0	.0	.0	.0	3.0	1.5	2.0	12.5	11.0	12.0
8	.0	.0	.0	.5	.0	.0	3.5	2.0	3.0	12.5	12.0	12.0
9	.0	.0	.0	.0	.0	.0	4.0	2.5	3.0	12.0	11.0	11.5
10	.0	.0	.0	.5	.0	.0	6.0	4.0	5.0	12.0	10.5	11.0
11	.0	.0	.0	1.0	.0	.0	6.0	5.5	6.0	12.5	10.5	11.5
12	.0	.0	.0	.5	.0	.0	6.5	5.5	6.0	13.0	11.0	12.0
13	.0	.0	.0	1.0	.0	.5	6.5	6.0	6.0	13.5	12.0	13.0
14	.0	.0	.0	1.0	.0	.0	6.0	5.0	5.5	13.5	12.5	13.0
15	.0	.0	.0	.5	.0	.0	6.5	5.0	6.0	14.0	13.0	13.5
16	.0	.0	.0	1.0	.0	.0	7.5	6.5	7.0	14.5	13.5	14.0
17	.0	.0	.0	1.0	.0	.5	7.5	6.5	7.0	15.0	13.5	14.5
18	.0	.0	.0	.5	.0	.0	7.0	6.0	6.5	16.5	14.0	15.0
19	.0	.0	.0	.0	.0	.0	8.0	6.5	7.5	17.0	14.5	16.0
20	.0	.0	.0	.5	.0	.0	8.5	7.0	7.5	18.0	16.0	17.0
21	.0	.0	.0	.5	.0	.0	7.5	7.0	7.0	19.0	16.5	18.0
22	.0	.0	.0	.5	.0	.0	7.0	6.5	7.0	19.5	17.5	18.5
23	.5	.0	.0	1.0	.0	.0	6.5	6.0	6.5	19.0	18.5	18.5
24	.0	.0	.0	1.0	.0	.5	6.0	5.0	5.5	18.5	17.5	18.0
25	.5	.0	.0	.5	.0	.0	5.0	4.0	4.5	17.5	16.5	17.0
26	.5	.0	.0	1.0	.0	.0	5.0	4.0	4.5	16.5	15.5	16.0
27	.0	.0	.0	.5	.0	.0	5.5	5.0	5.0	17.0	15.0	16.0
28	.0	.0	.0	.5	.0	.0	7.0	5.5	6.0	17.5	16.5	17.0
29	---	---	---	.0	.0	.0	8.0	7.0	7.5	17.5	17.0	17.0
30	---	---	---	.0	.0	.0	8.0	7.5	7.5	17.0	16.0	16.5
31	---	---	---	.0	.0	.0	---	---	---	17.0	15.5	16.5
MONTH	.5	.0	.0	1.0	.0	.0	8.5	.0	4.5	19.5	7.5	14.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	16.5	15.5	16.0	19.5	18.0	18.5	25.0	22.0	23.0	21.5	19.0	20.0
2	15.5	14.5	15.0	20.5	19.0	19.5	23.5	22.0	23.0	21.5	17.5	19.5
3	16.0	14.5	15.5	21.5	20.0	20.5	23.0	22.0	22.5	20.0	18.0	19.0
4	16.5	15.0	16.0	22.5	20.5	21.5	24.5	21.5	23.0	20.0	16.5	18.0
5	17.5	16.0	16.5	23.5	21.5	22.5	24.5	22.5	23.5	19.5	16.0	17.5
6	18.0	16.5	17.5	25.0	22.5	23.5	23.5	22.5	23.0	19.5	16.5	18.0
7	18.5	17.5	18.0	26.0	24.0	25.0	24.0	22.0	23.0	20.0	17.5	19.0
8	18.5	18.0	18.0	26.0	24.5	25.5	23.0	22.5	23.0	20.5	17.5	18.5
9	18.0	17.5	18.0	25.5	24.0	24.5	22.5	21.5	22.0	20.5	18.0	19.0
10	18.5	17.5	18.0	25.5	23.5	24.0	22.0	20.5	21.5	21.0	18.5	19.5
11	18.5	17.0	18.0	25.5	23.5	24.5	22.0	20.5	21.5	20.5	19.0	19.5
12	19.5	17.5	18.5	26.0	24.0	25.0	23.5	21.5	22.5	21.0	18.5	19.5
13	19.0	18.5	18.5	26.0	24.0	25.0	24.0	22.0	23.0	21.0	18.5	19.5
14	18.5	18.5	18.5	26.0	25.0	25.5	25.0	23.0	23.5	19.5	17.5	18.0
15	19.5	18.5	19.0	25.0	23.5	24.0	24.0	22.0	23.0	17.5	16.0	16.5
16	19.5	18.0	19.0	23.5	22.5	22.5	23.0	21.0	22.0	17.0	15.0	16.0
17	19.0	18.5	19.0	23.5	21.5	22.5	22.5	20.0	21.5	17.0	14.5	15.5
18	18.5	17.5	18.0	25.0	22.0	23.5	23.0	20.5	21.5	17.0	13.5	15.0
19	17.5	16.5	17.0	25.0	23.5	24.0	23.5	20.5	22.0	16.5	13.5	15.0
20	18.5	16.5	17.5	25.0	23.5	24.5	22.5	20.0	21.0	16.0	13.0	14.5
21	18.5	17.0	18.0	25.0	23.0	24.0	22.5	20.0	21.0	15.5	13.0	14.5
22	18.0	17.0	17.5	24.5	23.0	23.5	22.0	20.0	21.0	16.0	13.0	14.5
23	17.5	16.0	16.5	23.0	22.0	22.5	23.0	20.5	22.0	13.5	12.5	12.5
24	16.5	15.5	16.0	22.5	21.5	22.0	23.0	21.5	22.0	15.0	12.5	13.5
25	16.5	15.5	16.0	22.5	20.5	21.5	22.0	21.0	21.5	14.0	13.0	13.5
26	17.0	16.0	16.5	22.5	20.0	21.0	23.5	20.5	22.0	14.0	12.0	13.5
27	17.0	16.5	17.0	22.5	20.0	21.0	24.0	20.5	22.0	12.5	10.5	11.5
28	18.0	17.0	17.5	23.0	20.0	21.5	23.5	20.0	22.0	10.5	9.0	9.5
29	18.0	17.5	18.0	22.5	20.5	21.5	23.0	20.5	21.5	10.0	8.5	9.5
30	18.5	17.5	18.0	22.5	21.0	21.5	23.5	20.5	22.0	9.0	7.0	8.0
31	---	---	---	24.0	21.5	22.5	21.5	20.0	21.0	---	---	---
MONTH	19.5	14.5	17.5	26.0	18.0	23.0	25.0	20.0	22.0	21.5	7.0	16.0

05133500 RAINY RIVER AT MANITOU RAPIDS, MN

(International gaging station)

LOCATION.--Lat 48°38'04", long 93°54'47", in NW¼SE¼ sec.36, T.160 N., R.26 W., Koochiching County, Hydrologic Unit 09030004, on left bank at Manitou Rapids, 4 mi (6 km) west of Indus.

DRAINAGE AREA.--19,400 mi^2 (50,200 km^2), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1928 to current year. Monthly discharge only for some periods, published in WSP 1308. October 1911 to October 1924 (gage heights only) at site near Birchdale in files of Corps of Engineers. Published as "near Birchdale" 1932-34.

GAGE.--Water-stage recorder. Datum of gage is 1,062.48 ft (323.844 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 10, 1934, nonrecording gage at site near Birchdale 7 mi (11 km) downstream at different datum.

REMARKS.--Records good. Diurnal fluctuation caused by powerplant at International Falls. Some regulation at low and medium flows by Rainy and Namakan Lakes.

COOPERATION.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

AVERAGE DISCHARGE.--53 years, 12,780 ft^3/s (361.9 m^3/s), 8.95 in/yr (227 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 71,600 ft^3/s (2,030 m^3/s) May 12, 1950, gage height, 21.04 ft (6.413 m); minimum daily, 928 ft^3/s (26.3 m^3/s) Dec. 26, 1929.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 30,400 ft^3/s (861 m^3/s) June 5, gage height, 12.12 ft (3.694 m); minimum, 4,080 ft^3/s (116 m^3/s) Oct. 15, 16, gage height, 1.96 ft (0.597 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5120	5690	10500	7700	10000	9000	9210	16000	20000	29800	10800	6210
2	5040	6120	10300	6000	10000	8160	8990	18300	21200	28600	10800	5860
3	4920	6120	10300	9000	10000	8060	9400	19200	27000	27600	10700	5650
4	4770	6090	10200	9500	10000	7800	9760	19100	29700	25700	10100	5670
5	4740	6080	10200	9500	10000	7520	9820	18500	29800	24400	8590	5570
6	4680	6030	10500	9500	10000	7760	9260	17700	26800	23200	7710	5290
7	4600	6030	11000	9500	10000	7560	8650	17100	25500	19100	7770	5180
8	4530	6070	11000	9500	10000	7470	8170	16600	24900	16700	8140	5090
9	4450	6270	11000	9500	10000	7570	7620	16000	25300	15600	8470	5190
10	4300	6420	10500	9500	10000	7530	7180	15600	24500	13900	8490	5430
11	4300	7780	10400	9500	10000	6760	7010	15300	22000	13000	8320	5480
12	4250	9060	10300	9500	10000	6500	6740	14800	20800	12700	8160	5450
13	4200	9540	10200	9500	10000	6510	6580	13900	20200	12500	7990	5340
14	4140	9930	10100	9500	10000	6260	6730	13200	19800	12300	7770	5220
15	4100	9780	10000	9500	10000	6460	6860	14600	20000	11900	7600	5120
16	4120	9610	9800	9500	10000	6460	6820	15400	20800	11800	7580	5040
17	4180	9530	9500	9500	10000	6790	6700	15300	20900	11900	7490	4980
18	4300	9370	9500	9600	9500	7330	6800	15100	19400	11900	7430	4930
19	4450	8650	9500	9600	9500	7250	6620	14900	18500	11800	6830	4910
20	4530	8460	9500	9700	9500	7600	6580	13700	15900	11900	6310	4880
21	4590	9760	9500	9700	9500	7210	6560	12600	14300	11900	6190	4820
22	4600	10300	9500	9700	9500	8010	6420	12200	14100	11700	6140	4770
23	4560	10500	9500	9800	9500	7650	6490	12400	14700	11600	6200	4720
24	4800	10500	9000	9800	9500	7720	7010	12800	16400	11500	6400	4720
25	4980	10400	7200	9800	9500	7220	9210	13800	19300	11500	6600	4720
26	5370	10800	5000	9800	9500	7340	11700	19400	21700	11400	6700	4770
27	5660	10600	7100	9800	9500	7700	12400	21800	25200	11400	6740	4940
28	5780	10600	7400	9800	9500	7920	12400	22300	26200	11100	6660	5090
29	5660	10600	7300	10000	---	8140	12300	22100	27200	11000	6600	5110
30	5450	10700	7800	10300	---	8570	13500	21100	29200	10900	6490	5230
31	5390	---	7700	10300	---	8930	---	20400	---	10800	6240	---
TOTAL	146560	257390	291300	293400	274500	232760	253490	511200	661300	471100	238010	155380
MEAN	4728	8580	9397	9465	9804	7508	8450	16490	22040	15200	7678	5179
MAX	5780	10800	11000	10300	10000	9000	13500	22300	29800	29800	10800	6210
MIN	4100	5690	5000	6000	9500	6260	6420	12200	14100	10800	6140	4720
CFSM	.24	.44	.48	.49	.51	.39	.44	.85	1.14	.78	.40	.27
IN.	.28	.49	.56	.56	.53	.45	.49	.98	1.27	.90	.46	.30

CAL YR 1980 TOTAL 2625960 MEAN 7175 MAX 17200 MIN 3140 CFSM .37 IN 5.04
WTR YR 1981 TOTAL 3786390 MEAN 10370 MAX 29800 MIN 4100 CFSM .54 IN 7.26

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1968-70, October 1977 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1980 to September 1981.
WATER TEMPERATURES: October 1980 to September 1981.

INSTRUMENTATION.--Water-quality minimonitor since October 1980.

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

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 162 micromhos Apr. 1, 2, 1981; minimum, 76 micromhos July 6, 1981.
WATER TEMPERATURES: Maximum, 25.0°C July 18, Aug. 14, 1981; minimum, 0.0°C several days during winter period.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 162 micromhos Apr. 1,2; minimum, 76 micromhos July 6.
WATER TEMPERATURES: Maximum, 25.0°C July 18, Aug. 14; minimum, 0.0°C several days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
OCT 15...	1100	4100	115	104	7.3	7.5	7.0	1.0	9.8	83
NOV 18...	1000	9480	98	75	7.5	-3.0	.5	.50	13.7	98
DEC 16...	0950	9800	100	76	7.4	-13.0	.0	.50	12.9	91
JAN 20...	1200	9300	90	93	7.3	-2.0	.0	.80	11.4	81
FEB 24...	1000	9500	113	76	7.5	-3.0	.0	.50	12.4	88
MAR 24...	1030	7780	118	124	7.4	7.0	.5	1.9	11.2	82
MAY 28...	1230	22400	89	89	7.4	25.0	15.0	2.1	--	--
JUL 28...	0900	11200	100	71	7.5	15.0	20.0	1.5	--	--

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3) (95902)	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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
OCT 15...	--	49	41	8.0	11	3.2	5.5	.4	1.0	33
NOV 18...	K8	26	27	1.0	6.9	2.4	3.9	.3	.8	26
DEC 16...	40	45	29	8.0	7.7	2.3	3.2	.3	.7	21
JAN 20...	>120	42	38	11	10	3.1	3.0	.2	.8	27
FEB 24...	>1200	36	31	11	8.4	2.3	3.0	.2	.7	20
MAR 24...	K7500	20	46	6.0	13	3.4	3.8	.2	1.2	40
MAY 28...	K3800	91	31	6.0	8.1	2.6	2.3	.2	.8	25
JUL 28...	>1200	23	30	5.0	7.9	2.4	3.2	.3	.8	25

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
OCT										
15...	6.3	8.0	.1	2.6	81	57	897	.01	.01	.070
NOV										
18...	6.2	4.4	.1	2.1	62	42	1580	.08	.08	.000
DEC										
16...	5.1	3.3	.1	2.4	67	37	1770	.06	.06	<.350
JAN										
20...	5.8	3.3	<.1	3.6	72	46	1810	2.0	.90	<.100
FEB										
24...	6.0	3.9	<.1	2.5	53	39	1360	.17	.17	.010
MAR										
24...	6.1	4.7	<.1	4.0	84	60	1760	.09	.09	.030
MAY										
28...	6.2	2.6	<.1	2.3	74	40	4380	.03	.03	.020
JUL										
28...	5.1	3.5	<.1	1.8	42	40	1270	.04	.04	.010

DATE	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 TOTAL (MG/L AS C) (00680)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
OCT									
15...	.060	.69	.51	.060	.020	--	15	166	84
NOV									
18...	.000	.31	.31	.020	.010	11	7	179	94
DEC									
16...	<.200	.35	.20	.020	.010	14	1	26	100
JAN									
20...	<.010	.40	.18	.050	<.010	11	--	--	--
FEB									
24...	.010	.44	.38	.030	.020	--	3	77	100
MAR									
24...	.030	.76	.42	.050	.030	9.6	--	--	--
MAY									
28...	.020	.42	.39	.030	<.010	--	14	847	69
JUL									
28...	.010	.48	.43	.030	.030	--	19	575	33

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA) (01007)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO) (01037)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)
OCT 15...	1100	3	2	<50	20	0	0	30	10	0	0
FEB 24...	1000	1	1	100	100	1	0	20	10	1	1
MAY 28...	1230	0	0	<50	20	1	1	30	20	2	0
JUL 28...	0900	1	1	<50	20	1	<1	10	10	3	3

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)
OCT 15...	3	3	600	150	2	0	30	20	<.1	<.1
FEB 24...	3	3	130	40	5	5	20	10	.2	.2
MAY 28...	6	4	390	80	2	0	30	7	.1	.1
JUL 28...	10	10	270	80	2	2	20	4	.2	.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)
OCT 15...	2	0	0	0	0	0	20	9	16	1.3
FEB 24...	2	2	0	0	1	0	10	20	14	.5
MAY 28...	5	5	0	0	0	0	30	<4	11	.4
JUL 28...	5	1	0	0	<1	0	90	20	11	.6

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1980 TO SEPTEMBER 1981

DATE	OCT 15,80		NOV 18,80		MAR 24,81		MAY 28,81		JUL 28,81	
TIME	1100		1000		1030		1230		0900	
TOTAL CELLS/ML	2600		710		3100		2700		26000	
DIVERSITY: DIVISION	1.0		1.3		1.5		0.6		0.3	
.CLASS	1.0		1.3		1.5		0.6		0.3	
..ORDER	1.5		2.1		2.1		1.1		0.6	
...FAMILY	1.5		2.1		2.1		1.1		0.7	
....GENUS	1.6		2.3		2.5		1.2		1.0	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)										
.BACILLARIOPHYCEAE										
..ACHNANTHALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	18	1	--	-	--	-
..BACILLARIALES										
...NITZSCHIACEAE										
....NITZSCHIA	26	1	13	2	70	2	39	1	*	0
..EUPODISCALES										
...COSCINODISCACEAE										
....CYCLOTELLA	26	1	90	13	1200#	39	*	0	*	0
....MELOSIRA	790#	30	90	13	330	11	91	3	*	0
....STEPHANODISCUS	*	0	--	-	--	-	--	-	--	-
..FRAGILARIALES										
...FRAGILARIACEAE										
....ASTERIONELLA	100	4	52	7	--	-	130	5	--	-
....DIATOMA	--	-	--	-	--	-	--	-	*	0
....FRAGILARIA	--	-	--	-	70	2	--	-	--	-
..NAVICULALES										
...NAVICULACEAE										
....NAVICULA	--	-	--	-	53	2	--	-	--	-
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	*	0
...DICTYOSPHAERIACEAE										
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	550	2
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	*	0
...OOCYSTACEAE										
....ANKISTRODESMUS	*	0	--	-	320	10	*	0	*	0
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	*	0
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	*	0
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	70	2	--	-	220	1
....SCENEDESMUS	--	-	26	4	--	-	26	1	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	*	0	--	-	160	5	*	0	*	0
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	13	2	35	1	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	210	8	1200	5
....ANACYSTIS	100	4	90	13	--	-	--	-	22000#	86
..NOSTOCALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	280	1
....APHANIZOMENON	--	-	--	-	--	-	--	-	280	1
..OSCILLATORIALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	1600#	59	340#	47	740#	24	2200#	81	500	2
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	*	0
....TRACHELOMONAS	--	-	--	-	--	-	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	118	115	117	96	91	94	110	106	107
2	---	---	---	116	110	112	98	92	95	129	112	124
3	---	---	---	110	105	108	95	92	94	129	90	110
4	---	---	---	106	103	104	94	92	93	93	88	90
5	---	---	---	105	103	104	96	93	94	102	93	99
6	---	---	---	106	104	105	96	94	95	102	101	102
7	---	---	---	105	103	104	95	94	94	104	102	103
8	---	---	---	103	101	102	98	95	96	106	104	105
9	---	---	---	104	103	104	100	98	99	106	105	105
10	---	---	---	104	102	104	101	99	100	105	103	105
11	---	---	---	103	95	98	101	97	99	104	102	103
12	---	---	---	95	87	89	101	97	99	105	103	104
13	---	---	---	89	84	87	102	99	101	105	103	104
14	---	---	---	93	88	90	100	98	99	103	102	102
15	---	---	---	93	91	92	99	97	98	104	101	102
16	---	---	---	94	92	93	109	99	103	104	102	103
17	---	---	---	94	91	93	111	102	104	104	101	103
18	---	---	---	93	92	93	106	102	103	101	100	101
19	---	---	---	102	94	98	107	102	106	102	100	101
20	---	---	---	103	99	101	107	100	102	101	100	101
21	---	---	---	101	95	98	101	100	101	102	100	101
22	---	---	---	96	94	95	107	100	102	102	101	102
23	---	---	---	98	91	96	108	102	103	102	101	101
24	---	---	---	100	88	93	107	102	104	104	101	103
25	149	134	139	96	93	95	117	107	111	104	102	104
26	136	127	131	94	91	93	135	118	129	106	102	104
27	128	124	125	94	91	93	135	99	122	102	98	100
28	124	121	123	95	93	94	101	95	97	107	102	105
29	122	119	120	95	93	93	108	101	105	106	101	103
30	122	120	121	97	94	95	112	108	111	104	100	102
31	121	115	118	---	---	---	111	107	109	110	104	107
MONTH				118	84	98	135	91	102	129	88	103

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	120	103	110	119	117	118	162	140	149	126	122	124
2	117	101	107	125	120	123	162	155	158	122	119	121
3	105	100	102	146	123	126	157	144	152	127	119	122
4	103	102	102	157	120	133	144	137	139	131	122	126
5	104	102	103	152	124	135	138	135	136	129	122	125
6	102	100	101	144	113	125	137	135	136	129	122	126
7	101	100	100	138	112	115	137	134	135	134	128	130
8	102	100	101	131	110	119	137	134	135	138	129	134
9	103	100	101	123	107	111	137	133	135	135	131	133
10	104	100	103	131	113	117	138	134	135	148	131	136
11	104	101	103	134	112	119	137	131	134	147	132	141
12	102	99	101	136	104	122	136	132	135	133	123	127
13	103	100	102	109	103	106	135	130	133	130	117	126
14	102	100	101	109	103	106	135	129	131	128	117	121
15	103	100	101	109	104	106	133	127	130	122	106	115
16	106	100	103	110	104	107	135	128	131	104	101	103
17	104	99	102	110	107	109	135	125	130	105	101	103
18	103	99	102	111	108	109	130	125	128	104	101	103
19	111	94	97	112	107	109	132	127	130	103	100	101
20	105	95	99	116	113	115	130	126	128	102	97	100
21	107	104	105	118	114	116	129	125	127	101	98	99
22	109	105	107	120	114	117	125	120	123	99	95	97
23	137	108	115	117	113	114	128	121	124	105	99	101
24	123	108	114	118	115	116	134	128	131	108	105	106
25	115	109	111	120	114	117	141	133	137	115	109	112
26	124	115	119	122	120	121	155	141	149	113	102	105
27	148	123	125	123	118	121	149	133	140	106	103	104
28	124	118	122	135	122	130	137	127	131	105	88	96
29	---	---	---	138	131	134	128	123	125	89	85	88
30	---	---	---	138	136	137	128	121	123	89	85	87
31	---	---	---	141	138	140	---	---	---	89	85	87
MONTH	148	94	106	157	103	119	162	120	134	148	85	113

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	90	88	89	87	79	83	100	91	96	111	107	109
2	100	90	95	85	80	83	96	88	93	125	110	118
3	99	93	94	80	79	80	100	89	94	129	123	125
4	92	86	88	82	80	81	102	92	97	127	118	124
5	96	88	91	81	77	79	109	93	102	127	120	124
6	106	96	102	79	76	77	108	101	104	123	118	121
7	106	102	104	88	78	83	133	98	113	137	115	126
8	107	103	104	91	80	85	126	108	115	138	117	126
9	108	100	103	85	79	81	142	111	126	130	123	128
10	99	86	90	85	78	82	135	112	124	135	118	127
11	93	88	91	88	81	83	123	108	116	136	116	126
12	92	87	90	88	80	84	124	107	116	129	108	121
13	87	80	82	90	80	85	120	104	114	121	110	117
14	83	80	82	97	83	90	118	97	108	121	117	119
15	82	80	82	107	90	100	102	92	98	119	115	117
16	86	81	83	104	86	98	111	92	103	120	114	116
17	87	83	85	103	89	97	111	95	102	118	110	112
18	91	83	87	103	89	96	116	100	108	121	111	114
19	100	92	96	103	89	94	112	94	102	121	114	118
20	108	98	104	94	87	90	114	94	97	119	114	116
21	109	106	108	96	87	91	114	93	98	125	115	120
22	114	108	112	99	92	94	98	93	96	126	112	124
23	116	114	115	98	93	95	109	96	99	124	120	122
24	123	116	119	102	94	97	124	107	117	125	112	117
25	129	118	121	103	94	98	124	109	116	119	115	118
26	126	118	121	104	95	100	120	110	117	122	115	118
27	126	100	113	100	93	97	118	112	115	117	113	114
28	101	82	88	104	97	100	126	113	121	117	113	115
29	88	83	85	102	95	99	124	113	121	120	115	117
30	89	82	86	104	97	101	118	112	115	123	119	121
31	---	---	---	102	94	98	113	107	110	---	---	---
MONTH	129	80	97	107	76	90	142	88	108	138	107	120

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	2.5	1.0	1.5	.0	.0	.0	.0	.0	.0
2	---	---	---	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
3	---	---	---	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
4	---	---	---	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
5	---	---	---	3.0	1.5	2.5	.0	.0	.0	.0	.0	.0
6	---	---	---	4.0	2.5	3.5	.0	.0	.0	.0	.0	.0
7	---	---	---	3.5	2.5	3.0	.0	.0	.0	.0	.0	.0
8	---	---	---	2.5	1.0	2.0	.0	.0	.0	.0	.0	.0
9	---	---	---	2.0	1.0	1.5	.0	.0	.0	.0	.0	.0
10	---	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
11	---	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
12	---	---	---	.5	.0	.5	.0	.0	.0	.0	.0	.0
13	---	---	---	1.0	.5	1.0	.0	.0	.0	.0	.0	.0
14	---	---	---	1.0	.5	1.0	.0	.0	.0	.0	.0	.0
15	---	---	---	1.0	.5	.5	.0	.0	.0	.0	.0	.0
16	---	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
17	---	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
18	---	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
19	---	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
20	---	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
21	---	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
22	---	---	---	1.0	.0	.5	.0	.0	.0	.0	.0	.0
23	---	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
24	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	3.0	1.5	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	2.0	.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	2.0	.5	1.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	3.5	1.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	2.5	1.0	2.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH				4.0	.0	1.0	.0	.0	.0	.0	.0	.0

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	2.0	1.0	1.5	9.5	7.5	8.5
2	.0	.0	.0	.0	.0	.0	4.0	1.0	2.5	9.0	8.5	8.5
3	.0	.0	.0	.0	.0	.0	3.0	1.0	2.0	9.5	8.0	8.5
4	.0	.0	.0	.0	.0	.0	2.5	.5	1.5	10.0	8.5	9.0
5	.0	.0	.0	.0	.0	.0	3.5	.5	2.0	10.5	8.5	9.5
6	.0	.0	.0	.0	.0	.0	4.0	1.5	3.0	11.5	9.5	10.5
7	.0	.0	.0	.0	.0	.0	5.5	3.0	4.0	12.5	10.0	11.0
8	.0	.0	.0	.0	.0	.0	6.0	3.5	4.5	11.5	11.0	11.0
9	.0	.0	.0	.0	.0	.0	7.5	4.0	6.0	11.0	9.5	10.0
10	.0	.0	.0	.5	.0	.0	9.0	5.5	7.0	11.0	9.0	10.0
11	.0	.0	.0	1.0	.0	.5	7.5	5.0	6.0	12.0	9.5	10.5
12	.0	.0	.0	1.0	.0	.5	7.5	4.5	6.0	12.5	10.0	11.5
13	.0	.0	.0	1.0	.0	.5	7.5	5.0	6.0	13.0	11.0	12.0
14	.0	.0	.0	2.0	.0	1.0	6.0	2.5	4.5	14.0	11.5	12.5
15	.0	.0	.0	1.0	.5	1.0	8.5	3.5	6.0	14.0	12.5	13.0
16	.0	.0	.0	1.5	.0	1.0	10.5	6.0	8.5	13.5	12.0	12.5
17	.0	.0	.0	1.0	.0	.5	9.0	6.0	7.5	14.0	12.0	13.0
18	.0	.0	.0	1.0	.0	.5	9.0	5.0	7.0	14.5	12.0	13.0
19	.0	.0	.0	.5	.0	.5	9.5	6.0	7.5	15.0	12.5	13.5
20	.0	.0	.0	1.5	.0	1.0	10.0	5.0	7.5	16.5	13.0	14.5
21	.0	.0	.0	2.5	.5	1.5	8.0	5.5	6.0	17.5	14.0	15.5
22	.0	.0	.0	2.5	1.0	2.0	6.5	5.5	6.0	17.0	14.5	15.5
23	.0	.0	.0	3.5	1.0	2.0	6.0	5.0	5.5	15.5	14.0	14.5
24	.0	.0	.0	4.0	1.5	2.5	5.5	4.5	5.0	14.0	13.5	14.0
25	.0	.0	.0	3.5	2.5	3.0	6.0	4.5	5.0	14.0	13.5	14.0
26	.0	.0	.0	5.0	2.5	3.5	8.0	5.0	6.5	14.5	13.0	14.0
27	.0	.0	.0	4.0	2.5	3.5	7.5	6.5	7.0	15.5	13.5	14.5
28	.0	.0	.0	3.5	2.5	3.0	9.0	6.5	7.5	15.5	15.0	15.0
29	---	---	---	2.5	2.0	2.5	9.5	7.5	8.5	16.0	15.0	15.5
30	---	---	---	3.5	2.0	2.5	9.0	8.5	8.5	15.0	14.0	14.5
31	---	---	---	2.5	2.0	2.5	---	---	---	15.0	13.5	14.0
MONTH	.0	.0	.0	5.0	.0	1.0	10.5	.5	5.5	17.5	7.5	12.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	14.0	14.0	14.0	19.0	18.0	18.5	23.5	21.0	22.0	21.0	18.0	19.5
2	14.0	13.5	13.5	19.5	18.5	19.0	22.5	20.5	21.5	21.5	17.0	19.5
3	15.0	13.5	14.0	20.5	19.0	20.0	22.5	20.5	21.5	20.0	17.5	18.5
4	15.5	14.5	15.0	21.5	20.0	20.5	24.5	21.0	22.5	19.5	15.5	17.5
5	16.0	15.5	15.5	22.0	21.0	21.5	24.0	21.5	23.0	19.5	16.0	18.0
6	16.5	15.0	16.0	23.0	21.5	22.5	23.0	21.5	22.5	19.5	16.5	18.0
7	16.5	16.0	16.0	24.0	22.0	23.0	24.5	21.5	23.0	20.0	17.5	18.5
8	16.5	16.0	16.0	23.0	21.5	22.5	23.0	21.5	22.5	20.5	16.5	18.5
9	16.5	16.0	16.0	22.0	20.5	21.5	22.0	20.5	21.0	21.5	17.0	19.5
10	16.0	15.0	15.5	23.0	20.5	21.5	23.0	20.0	21.0	21.5	17.5	19.5
11	16.5	15.0	15.5	22.0	20.0	21.0	23.5	20.0	22.0	20.0	18.5	19.5
12	17.5	15.5	16.5	23.0	20.5	21.5	24.0	21.0	22.5	21.0	17.0	19.0
13	16.5	16.5	16.5	24.5	21.0	22.5	24.0	21.0	22.5	20.0	17.5	19.0
14	17.0	16.5	17.0	24.5	23.0	23.5	25.0	22.0	23.5	18.0	16.0	17.0
15	18.0	17.0	17.5	23.0	22.0	22.5	23.5	21.0	22.0	17.0	15.0	16.0
16	18.5	17.0	18.0	23.5	21.5	22.5	22.5	19.5	21.0	16.5	13.5	15.0
17	18.0	17.0	17.5	24.0	22.0	22.5	22.5	19.0	21.0	16.0	14.5	15.5
18	17.0	15.5	16.0	25.0	21.5	23.0	24.0	20.0	22.0	17.0	13.5	15.5
19	16.5	15.0	16.0	24.5	22.5	23.5	24.0	20.0	22.0	17.0	14.0	15.5
20	18.0	15.5	16.5	24.5	22.5	23.5	22.5	20.5	21.5	16.5	12.5	14.5
21	17.5	16.0	16.5	24.5	22.0	23.0	22.5	20.0	21.5	16.5	13.0	15.0
22	17.5	16.0	16.5	24.0	21.5	23.0	22.0	19.5	21.0	15.5	13.0	14.5
23	17.0	16.5	16.5	22.5	21.5	22.0	23.5	20.0	22.0	14.0	12.0	12.5
24	17.5	16.0	16.5	22.5	21.0	21.5	22.5	21.5	22.0	16.5	12.5	14.0
25	17.5	16.5	17.0	22.0	20.5	21.0	21.5	20.0	21.0	15.5	13.5	14.5
26	18.5	16.5	17.5	22.5	20.0	21.0	23.5	20.0	21.5	14.5	12.5	14.0
27	17.5	17.5	17.5	22.0	19.5	21.0	23.5	20.0	21.5	12.0	9.5	10.5
28	17.5	17.0	17.5	23.0	19.5	21.0	23.5	20.0	21.5	9.5	8.0	9.0
29	18.0	17.0	17.5	22.0	20.0	21.0	22.0	20.5	21.5	10.0	8.5	9.0
30	18.5	17.5	18.0	22.0	20.5	21.0	23.0	20.0	21.5	9.5	6.5	8.0
31	---	---	---	23.0	20.5	21.5	22.0	19.5	20.5	---	---	---
MONTH	18.5	13.5	16.5	25.0	18.0	21.5	25.0	19.0	22.0	21.5	6.5	16.0

05134200 RAPID RIVER NEAR BAUDETTE, MN

LOCATION.--Lat 48°32'10", long 94°33'45", in SE¼NE¼ sec.1, T.158 N., R.31 W., Lake of the Woods County, Hydrologic Unit 09030007, on left bank 20 ft (6 m) upstream from bridge on State Highway 72, 1.2 mi (1.9 km) downstream from North Branch Rapid River, and 12 mi (19 km) south of Baudette.

DRAINAGE AREA.--543 mi^2 (1,406 km^2).

PERIOD OF RECORD.--October 1956 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,093.92 ft (333.427 m) National Geodetic Vertical Datum of 1929 (Minnesota Department of Transportation bench mark).

REMARKS.--Records good except those for winter period, which are poor.

AVERAGE DISCHARGE.--25 years, 308 ft^3/s (8.723 m^3/s), 7.70 in/yr (196 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,550 ft^3/s (214 m^3/s) Apr. 26, 1979, gage height, 21.13 ft (6.440 m); no flow Dec. 20, 1976 to Mar. 9, 1977.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of May 11, 1950, reached a stage of 21.1 ft (6.431 m), from information by local residents and Minnesota Department of Transportation, discharge, about 7,500 ft^3/s (210 m^3/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,010 ft^3/s (56.9 m^3/s) June 29, gage height, 9.49 ft (2.893 m); minimum daily, 8.3 ft^3/s (0.24 m^3/s) Feb. 4-15; minimum gage height, 2.20 ft (0.671 m) Feb. 13, 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	135	183	90	16	8.5	50	220	128	215	1430	74	62
2	132	176	85	15	8.5	45	245	136	510	1230	80	68
3	136	173	80	15	8.4	40	240	142	797	1050	74	60
4	149	173	75	14	8.3	37	220	148	773	881	90	54
5	148	182	70	14	8.3	34	207	147	785	704	99	50
6	144	171	67	13	8.3	32	196	134	788	585	98	48
7	134	166	65	13	8.3	30	180	129	696	486	133	90
8	126	175	61	12	8.3	29	162	118	633	396	154	162
9	120	242	58	12	8.3	29	148	118	561	325	155	157
10	113	244	54	11	8.3	28	134	131	488	264	140	139
11	111	250	50	11	8.3	28	129	131	427	219	118	122
12	112	245	48	11	8.3	28	122	125	367	197	100	103
13	110	235	46	10	8.3	29	110	115	314	172	88	85
14	106	220	44	10	8.3	30	99	113	322	154	78	71
15	102	200	42	10	8.3	31	88	110	409	140	68	61
16	102	190	39	10	8.5	31	82	106	446	132	60	54
17	138	190	37	9.5	10	31	80	100	429	121	53	50
18	217	190	34	9.5	15	31	76	94	407	109	47	63
19	266	188	32	9.5	25	30	75	87	385	100	45	39
20	259	180	30	9.0	50	29	71	75	355	100	46	32
21	241	170	28	9.0	100	28	70	71	366	144	123	30
22	224	160	27	9.0	95	28	72	78	511	167	227	29
23	218	150	26	9.0	85	29	73	69	543	145	196	29
24	242	145	24	9.0	80	30	82	94	567	130	182	36
25	262	135	23	9.0	70	32	79	229	575	120	173	60
26	255	125	22	8.5	65	45	75	358	568	115	157	61
27	243	115	21	8.5	60	70	75	365	521	101	129	78
28	222	105	20	8.5	55	100	84	335	957	91	102	107
29	197	100	19	8.5	---	130	107	296	1940	79	83	106
30	215	95	18	8.5	---	160	111	265	1740	70	70	120
31	190	---	17	8.5	---	190	---	229	---	70	64	---
TOTAL	5369	5273	1352	330.5	843.5	1494	3712	4776	18395	10027	3306	2226
MEAN	173	176	43.6	10.7	30.1	48.2	124	154	613	323	107	74.2
MAX	266	250	90	16	100	190	245	365	1940	1430	227	162
MIN	102	95	17	8.5	8.3	28	70	69	215	70	45	29
CFSM	.32	.32	.08	.02	.06	.09	.23	.28	1.13	.60	.20	.14
IN.	.37	.36	.09	.02	.06	.10	.25	.33	1.26	.69	.23	.15

CAL YR 1980 TOTAL 41436.5 MEAN 113 MAX 1390 MIN 1.6 CFSM .21 IN 2.84
WTR YR 1981 TOTAL 57104.0 MEAN 156 MAX 1940 MIN 8.3 CFSM .29 IN 3.91

NOTE.--No gage-height record Jan. 4 to Feb. 4.

05140520 LAKE OF THE WOODS AT WARROAD, MN

(International gaging station)

LOCATION.--Lat 48°54'15", long 95°18'57", revised, in SW¼SE¼ sec.29, T.163 N., R.36 W., Roseau County, Hydrologic Unit 09030009, on left bank of Warroad River in Warroad, 300 ft (91 m) downstream from Canadian National railroad bridge, 1,000 ft (305 m) downstream from bridge on State Highway 11, and 4,000 ft (1,200 m) upstream from mouth of Warroad River.

DRAINAGE AREA.--27,200 mi^2 (70,400 km^2).

PERIOD OF RECORD.--April to September 1978 (monthend elevations only), October 1978 to current year. Records collected prior to April 1978 are in reports of the Water Survey of Canada.

GAGE.--Water-stage recorder. Datum of gage is 1,000.00 ft (304.800 m) Lake of the Woods datum; gage readings have been reduced to elevations based on Lake of the Woods datum.

REMARKS.--Runoff conditions of the Warroad River can affect water levels obtained at this station. Water level subject to fluctuation caused by change in direction and velocity of wind and seiches.

COOPERATION.--This station is one of the International gaging stations maintained by the United States under agreement with Canada.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation, 1,062.36 ft (323.807 m) Sept. 12, 1978; maximum daily, 1,061.84 ft (323.649 m) Sept. 12, 1978; minimum elevation recorded, 1,055.94 ft (321.851 m) Sept. 4, 1980; minimum daily recorded, 1,056.52 ft (322.027 m) Apr. 15, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,059.74 ft (323.009 m) Sept. 30, stage rising, peak occurred Oct. 1, 1981; maximum daily, 1,059.43 ft (322.914 m) Aug. 15; minimum elevation recorded, 1,056.11 ft (321.902 m) Apr. 15; minimum daily recorded, 1056.52 ft (322.027 m) Apr. 15.

ELEVATION, IN FEET, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	1057.61	1057.37	1056.99	1056.69	1056.60	1056.85	1057.94	1059.03	1059.28	1059.23
2	---	---	1057.64	1057.38	1056.98	1056.71	1056.65	1056.77	1057.96	1059.08	1059.30	1059.10
3	---	---	1057.67	1057.35	1056.96	1056.73	1056.67	1056.95	1057.83	1059.24	1059.28	1059.05
4	---	---	1057.67	1057.36	1056.96	1056.70	1056.68	1057.10	1057.77	1059.26	1059.26	1059.22
5	---	---	1057.64	1057.34	1056.94	1056.69	1056.67	1057.06	1057.85	1059.25	1059.24	1059.07
6	---	---	1057.61	1057.30	1056.95	1056.69	1056.70	1057.06	1058.02	1059.32	1059.30	1059.14
7	---	---	1057.61	1057.31	1056.95	1056.68	1056.65	1057.02	1058.02	1059.19	1059.36	1059.22
8	1057.61	---	1057.62	1057.29	1056.92	1056.67	1056.68	1057.15	1058.03	1059.15	1059.34	1059.27
9	1057.52	---	1057.60	1057.25	1056.90	1056.64	1056.71	1057.45	1058.10	1059.14	1059.38	1059.14
10	1056.83	---	1057.59	1057.26	1056.90	1056.64	1056.63	1057.16	1058.20	1059.25	1059.25	1059.26
11	---	---	1057.61	1057.25	1056.89	1056.62	1056.72	1057.19	1058.19	1059.36	1059.21	1059.18
12	---	---	1057.58	1057.23	1056.88	1056.59	1056.73	1057.21	1058.34	1059.33	1059.32	1059.07
13	---	---	1057.57	1057.22	1056.88	1056.60	1056.72	1057.18	1058.43	1059.34	1059.29	1059.28
14	---	---	1057.57	1057.21	1056.88	1056.60	1056.71	1057.22	1058.42	1059.31	1059.32	1059.18
15	---	---	1057.60	1057.20	1056.84	1056.59	1056.52	1057.48	1058.17	1059.31	1059.43	1059.27
16	---	---	1057.60	1057.18	1056.82	1056.58	1056.65	1057.82	1058.48	1059.22	1059.20	1059.23
17	---	---	1057.56	1057.15	1056.82	1056.58	1056.55	1057.43	1058.10	1059.30	1059.05	1059.03
18	---	---	1057.53	1057.16	1056.79	1056.55	1056.75	1057.27	1057.89	1059.30	1059.08	1058.85
19	---	---	1057.54	1057.16	1056.80	1056.56	1056.95	1057.26	1058.49	1059.28	1059.08	1059.13
20	---	1057.60	1057.54	1057.13	1056.81	1056.57	1056.75	1057.20	1058.55	1059.40	1059.16	1059.16
21	---	1057.46	1057.56	1057.11	1056.77	1056.57	1056.63	1057.25	1058.66	1059.35	1059.14	1059.11
22	---	1057.51	1057.55	1057.09	1056.75	1056.55	1056.76	1057.38	1058.65	1059.25	1059.23	1058.96
23	---	1057.61	1057.52	1057.11	1056.74	1056.56	1056.91	1057.56	1058.63	1059.24	1059.25	1058.86
24	---	1057.55	1057.49	1057.10	1056.71	1056.57	1056.83	1057.93	1058.63	1059.11	1059.32	1058.97
25	---	1057.57	1057.52	1057.07	1056.73	1056.56	1056.84	1057.84	1058.67	1059.26	1059.26	1059.09
26	---	1057.64	1057.50	1057.05	1056.75	1056.55	1056.77	1057.65	1058.75	1059.22	1059.27	1058.47
27	---	1057.63	1057.49	1057.03	1056.73	1056.56	1056.79	1057.54	1058.72	1059.09	1059.24	1058.44
28	---	1057.66	1057.44	1057.03	1056.70	1056.59	1056.81	1057.57	1058.91	1059.05	1059.18	1059.07
29	---	1057.58	1057.45	1057.03	---	1056.60	1056.84	1057.54	1058.98	1059.03	1059.14	1059.20
30	---	1057.65	1057.44	1057.03	---	1056.61	1056.90	1057.68	1058.99	1059.11	1059.12	1059.33
31	---	---	1057.39	1057.02	---	1056.62	---	1057.63	---	1059.13	1059.10	---
MEAN	---	---	1057.56	1057.19	1056.85	1056.61	1056.73	1057.34	1058.35	1059.22	1059.24	1059.09
MAX	---	---	1057.67	1057.38	1056.99	1056.73	1056.95	1057.93	1058.99	1059.40	1059.43	1059.33
MIN	---	---	1057.39	1057.02	1056.70	1056.55	1056.52	1056.77	1057.77	1059.03	1059.05	1058.44

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 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 high-flow stations. Discharge measurements made at miscellaneous sites for both low flow and high flow are given in a third table.

Low-flow partial-record stations

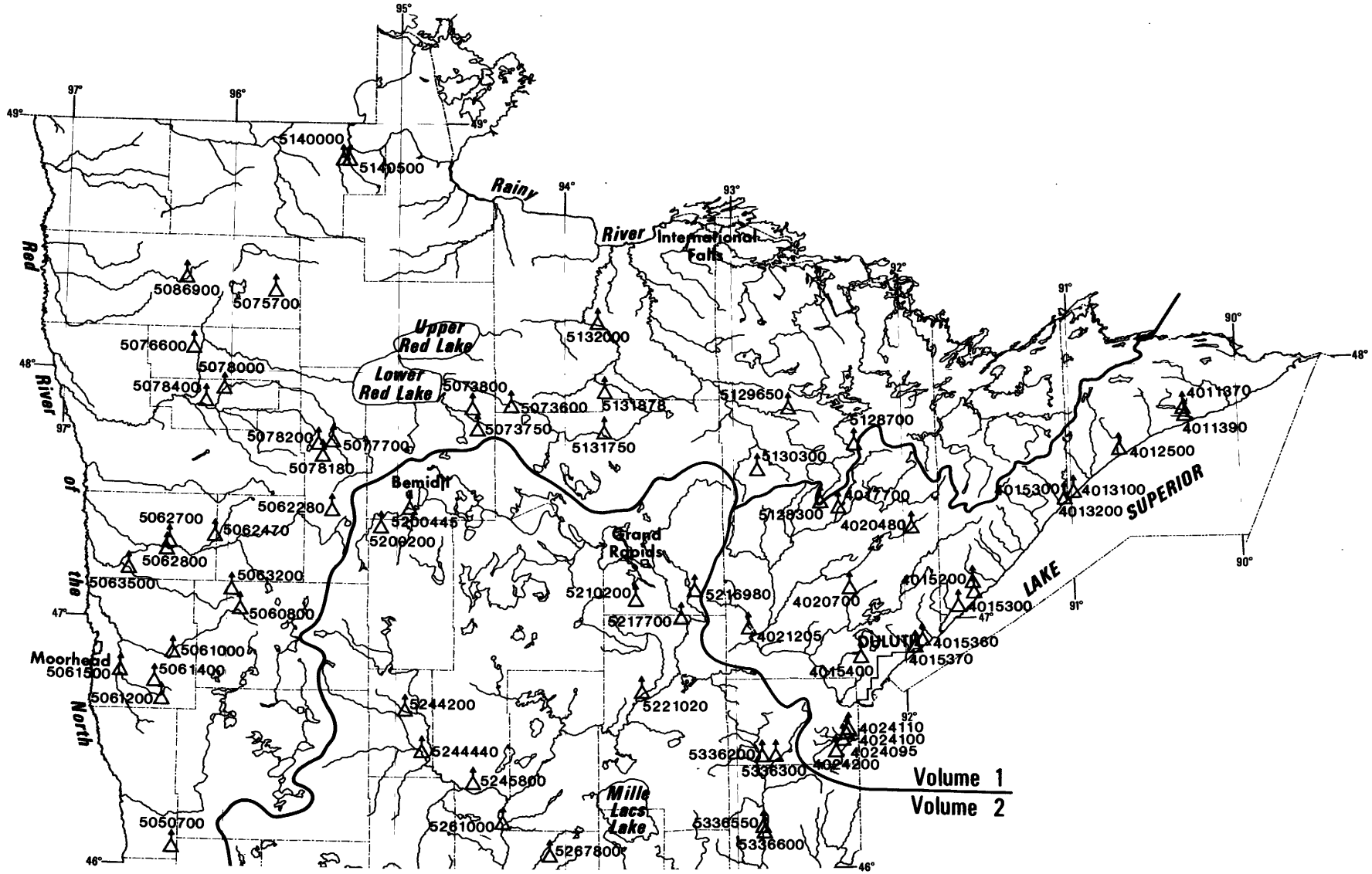
Measurements of streamflow in the area covered by this report made at low-flow partial-record stations are given in the following table. These measurements were made during periods of base flow when streamflow is primarily from ground-water storage. These measurements, when correlated with the simultaneous discharge of a nearby stream when continuous records are available, will give a picture of the low-flow potentiality of a stream. The column headed "Period of record" shows the water years in which measurements were made at the same, or practically the same site.

Discharge measurements made at low-flow partial-record stations during water year 1981

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements	
					Date	Discharge (ft^3/s)
		Streams tributary to the Red River of the North				
*05105300	Roseau River below Roseau, MN	Lat 48°53'28", long 95°43'50", in SW¼SE¼ sec.31, T.163 N., R.39 W., Roseau County, Hydrologic Unit 09020314, at bridge on County Highway 28, 900 ft downstream from Hay Creek, and 3.2 miles northeast of Roseau, MN.	-	1973-81	12-18-80	5.7
					1-21-81	2.5
					5-18-81	9.1
					7-28-81	33
					9-21-81	8.0

* Also a miscellaneous water-quality site.

HIGH-FLOW PARTIAL-RECORD STATIONS


Red River of the North
Rainy River
Upper Red Lake
Lower Red Lake
Mille Lacs Lake
LAKE SUPERIOR
International Falls
Bemidji
Grand Rapids
Moorhead
DULUTH
5140000
5140500
5086900
5075700
5076600
5078000
5078400
5078200
5077700
5078180
5062700
5062470
5062800
5063500
5063200
5060800
5061000
5061500
5061400
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5129650
5128700
5130300
5128300
4017700
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4020700
4021205
4011870
4011390
4012500
4015300
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4013200
4015200
4015300
4015360
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4015400
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Volume 1
Volume 2

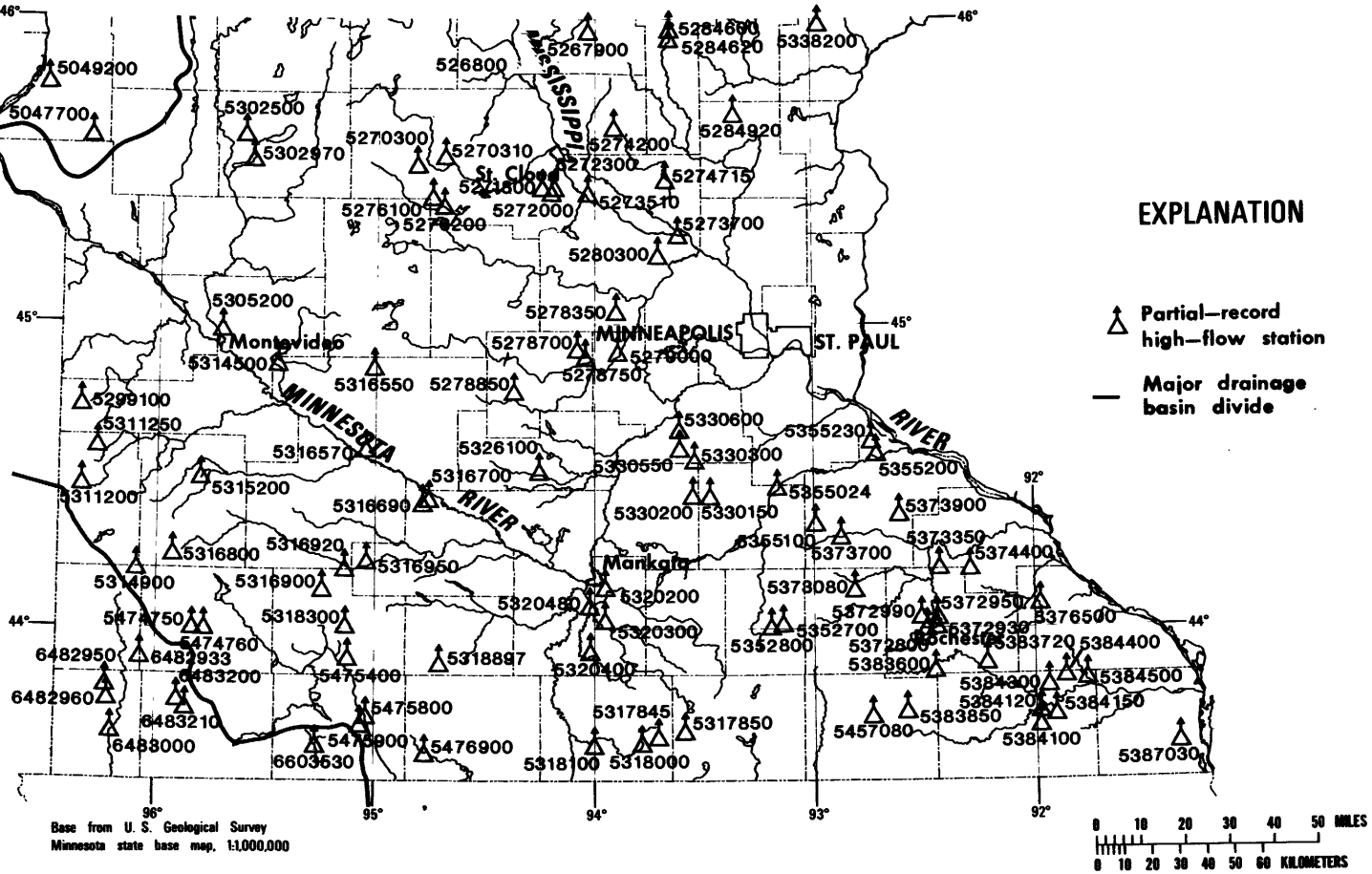


Figure 8.--Location of high-flow partial-record stations

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 1981

Station No.	Station name	Location	Drainage area (mi^2)	Period of Record	Annual maximum Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake Superior					
04011370	Little Devil Track River near Grand Marais, MN	Lat 47°47'09", long 90°19'44", in NE¼ NW¼ sec.9, T.61 N., R.1 E., Cook County, Hydrologic Unit 04010101, at culvert on County Highway 12, 1.6 miles upstream from mouth, and 2.5 miles north of Grand Marais.	7.49	1961-81	7-20-81	16.76	101
04011390	Little Devil Track River tributary near Grand Marais, MN	Lat 47°47'17", long 90°19'20", in SE¼ SE¼ sec.4, T.61 N., R.1 E., Cook County, Hydrologic Unit 04010101, at culvert on County Highway 55, 0.2 mile upstream from mouth, and 2.8 miles north of Grand Marais.	.47	1966-81	10-23-80	13.72	11
04012500	Poplar River at Lutsen, MN	Lat 47°38'23", long 90°42'31", in SW¼ NE¼ sec.33, T.60 N., R.3 W., Cook County, Hydrologic Unit 04010101, 350 ft upstream from bridge on U.S. Highway 61 at Lutsen, and 0.3 mile upstream from mouth.	112	1912-17#, 1928-47#, 1952-61#, 1972-81	4-23-81	5.00	870
04013100	Lake Superior tributary near Taconite Harbor, MN	Lat 47°29'14", long 90°59'19", in SW¼ SE¼ sec.20, T.58 N., R.5 W., Cook County, Hydrologic Unit 04010101, at culvert on U.S. Highway 61, 0.2 mile upstream from mouth, and 3.7 miles southwest of Taconite Harbor.	1.56	1964-81	9- 4-80 4-13-81	10.07 9.59	110 29
04013200	Caribou River near Little Marais, MN	Lat 47°27'51", long 91°01'50", in NW¼ SE¼ sec.36, T.58 N., R.6 W., Lake County, Hydrologic Unit 04010101, at culvert on U.S. Highway 61, 0.2 mile upstream from mouth, and 5.2 miles northeast of Little Marais.	22.7	1961-81	4-23-81	12.12	310
04015200	Encampment River tributary at Silver Creek, MN	Lat 47°07'01", long 91°36'04", in NE¼ SE¼ sec.33. T.54 N., R.10 W., Lake County, Hydrologic Unit 04010102, at culvert on County Highway 3, 0.3 mile north of Silver Creek, and 1.4 miles upstream from mouth.	.96	1960-81	6- 3-81	9.19	82
04015250	Silver Creek tributary near Two Harbors, MN	Lat 47°04'40", long 91°36'49", in SW¼ NE¼ sec.16, T.53 N., R.10 W., Lake County, Hydrologic Unit 04010102, at culvert on County Highway 3, 1.0 mile upstream from mouth, and 4.5 miles northeast of Two Harbors.	3.72	1965-81	6-17-73 10- 9-74 4-24-75 6-15-76 7-18-78 5-10-79 9- 4-80 6- 3-81	7.06 11.00 b4.74 2.77 6.85 10.30 7.86 7.01	455 950 200 97 430 838 540 450
04015300	Little Stewart River near Two Harbors, MN	Lat 47°03'52", long 91°40'03", in SE¼ NE¼ sec.24, T.53 N., R.11 W., Lake County, Hydrologic Unit 04010102, at culvert on county highway, 2.0 miles upstream from mouth, and 2.7 miles north of Two Harbors.	5.54	1960-81	6- 3-81	10.71	(†)
04015360	Lake Superior tributary No. 2 at French River, MN	Lat 46°53'43", long 91°54'31", in SW¼ SE¼ sec.18, T.51 N., R.12 W., St. Louis County, Hydrologic Unit 04010102, at culvert on U.S. Highway 61, 0.3 mile upstream from mouth, and 0.7 mile west of French River.	1.41	1964-81	4-23-81	18.72	69
04015370	Talmadge River at Duluth, MN	Lat 46°53'20", long 91°55'21", in SE¼ NE¼ sec.24, T.51 N., R.13 W., St. Louis County, Hydrologic Unit 04010102, at culvert on U.S. Highway 61, 0.6 mile upstream from mouth, and 0.5 mile northeast of Duluth city limits.	5.79	1964-81	4-23-81	14.59	235

"See footnotes at end of the table."

Annual maximum discharge at high-flow partial-record stations during water year 1981

Station No.	Station name	Location	Drainage area (mi^2)	Period of Record	Annual maximum Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake Superior--Continued					
04015400	Miller Creek at Duluth, MN	Lat 46°49'01", long 92°10'42", in SE¼ NE¼ sec.13, T.50 N., R.15 W., St. Louis County, Hydrologic Unit 04010201, at culvert on U.S. Highway 53, 0.2 mile northwest of Duluth city limits.	4.92	1960-81	4-23-81	16.19	199
04017700	McKinley Lake tributary at McKinley, MN	Lat 47° 30'41", long 92°25'11", in SW¼NE¼ sec.18, T.58 N., R.16 W., St. Louis County, Hydrologic Unit 04010201, at culvert on State Highway 135 at west edge of McKinley.	.37	1960-81	6-28-81	8.08	11
04020480	North Branch Whiteface River near Fairbanks, MN	Lat 47°22'20", long 91°56'28", at common corner of secs.35, 36, 1, and 2, along line between T.57 N., and T.56 N., R.13 W., St. Louis County, Hydrologic Unit 04010201, on right downstream wingwall of double box culvert on County Highway 16, 2 miles upstream from the mouth of Jenkins Creek, and 0.7 mile west of Fairbanks.	17.1	1979-81	6-28-81	13.00	370
04020700	Bug Creek at Shaw, MN	Lat 47°06'40", long 92°21'03", in SW¼ SE¼ sec.34, T.54 N., R.16 W., St. Louis County, Hydrologic Unit 04010201, at left bank on downstream side of culverts on County Road 15 at Shaw, and 7.5 miles upstream from mouth.	24.0	1979-81	4-23-81	13.89	310
04021205	Floodwood River above Floodwood, MN	Lat 46°17'15", long 92°53'40", in NE¼NW¼ sec.32, T.52 N., R.20 W., St. Louis County, Hyrologic Unit 04010201, at bridge on County Highway 835, 500 ft west of State Highway 73, and 2 miles north of Floodwood.	198	1972-81	4-24-81	15.30	926
04024095	Nemadji River near Holyoke,	Lat 46°31'04", long 92°23'22", in NE¼NE¼ sec.32, T.47 N., R.16 W., Carlton County, Hydrologic Unit 04010301, at bridge on State Highway 23, 3.5 miles north of Holyoke.	118	1972-81	6-14-81	13.20	2300
04024100	Rock Creek near Blackhoof, MN	Lat 46°32'10", long 92°22'12", in SW¼ SE¼ sec.21, T.47 N., R.16 W., Carlton County, Hydrologic Unit 04010301, at culvert on State Highway 23, 4.0 miles upstream from mouth, and 4.4 miles east of Blackhoof.	4.94	1961-65, 1967-81	6-13-81	17.39	485
04024110	Rock Creek tributary near Blackhoof, MN	Lat 46°32'14", long 92°22'05", in NE¼SE¼ sec.21, T.47 N., R.16 W., Carlton County, Hydrologic Unit 04010301, at culvert on State Highway 23, 0.1 mile upstream from mouth, and 4.5 miles east of Blackhoof.	.20	1961-81	6-13-81	12.06	(†)
04024200	South Fork Nemadji River near Holyoke, MN	Lat 46°29'38", long 92°24'36", in SE¼SE¼ sec.6, T.46 N., R.16 W., Carlton County, Hydrologic Unit 04010301, at culvert on State Highway 23, 1.7 miles downstream from Clear Creek, and 2.0 miles northwest of Holyoke.	19.4	1961-81	6-14-81	14.17	1060
		Red River of the North basin					
05047700	West Branch Mustinka River tributary near Graceville, MN	Lat 45°36'53", long 96°19'47", in NE¼NW¼ sec.28, T.125 N., R.45 W., Traverse County, Hydrologic Unit 09020102, at culvert on county highway, 6.0 miles northeast of Graceville.	3.37	1964-81	6-13-81	b7.83	30
05049200	Eighteenmile Creek near Wheaton, MN	Lat 45°47'18", long 96°31'52", on west quarter of line between secs.24 and 25, T.127 N., R.47 W., Traverse County, Hydologic Unit 09020102, at culvert on County Highway 67, 1.4 miles upstream from mouth, and 2.0 miles southwest of Wheaton.	68.5	1965-68, 1970-81	6-13-81	4.93	26

"See footnotes at end of the table."

Annual maximum discharge at high-flow partial-record stations during water year 1981

Station No.	Station name	Location	Drainage area (mi^2)	Period of Record	Annual maximum Date	Gage height (feet)	Discharge (ft^3/s)
		Red River of the North basin--Continued					
05050700	Rabbit River near Nashua, MN	Lat 46°04'30", long 96°18'24", in SE¼ NE¼ sec.15, T.130 N., R.45 W., Wilkin County, Hydrologic Unit 09020101, at right downstream piling of bridge on County Road 19, 2.6 miles north of Nashua, 4.8 miles upstream from mouth of South Fork Rabbit River.	56.1	1979-81	4-12-79 6- 5-80 6-13-81	a13.43 10.47 10.77	838 214 273
05060800	Buffalo River near Callaway, MN	Lat 47°01'17", long 95°54'43", in SW¼ SE¼ sec.17, T.141 N., R.41 W., Becker County, Hydrologic Unit 09020106, at culvert on U.S. Highway 59, 2.7 miles north of Callaway.	94.5	1960-81	3-30-81	13.18	(f)
05061000	Buffalo River near Hawley, MN	Lat 46°51'00", long 96°19'45", in NW¼ SE¼ sec.14, T.139 N., R.45 W., Clay County, Hydrologic Unit 09020106, near left downstream end of bridge on farm lane, 2 miles southwest of Hawley.	322	1945-80#, 1981	7-31-81	4.47	74
05061200	Whiskey Creek at Barnesville, MN	Lat 46°39'35", long 96°23'54", in SE¼ SW¼ sec.20, T.137 N., R.45 W., Clay County, Hydrologic Unit 09020106, at culvert on State Highway 34, 0.7 mile upstream from Blue Eagle Lake, and 1.0 mile northeast of Barnesville.	25.3	1961-64, 1965-66#, 1967-81	7-30-81	b4.13	74
f05061400	Spring Creek above Downer, MN	Lat 46°44'37", long 96°25'12", in NW¼ NW¼ sec.30, T.138 N., R.45 W., Clay County, Hydrologic Unit 09020106, at culvert on county road, 3.1 miles east of Downer.	5.81	1961-81	7-30-81	b6.26	(f)
05061500	South Branch Buffalo River at Sabin, MN	Lat 46°46'20", long 96°37'40", in SW¼ SW¼ sec.9, T.138 N., R.47 W., Clay County, Hydrologic Unit 09020106, near center of span on downstream side of highway bridge, 0.3 mile downstream from Stony Creek, and 1 mile east of Sabin.	522	1945-80#, 1981	5-23-81	b11.33	500
05062280	Mosquito Creek near Bagley, MN	Lat 47°27'02", long 95°22'55", in SW¼NW¼ sec.21, T.146 N., R.37 W., Clearwater County, Hydrologic Unit 09020108, at culvert on State Highway 92, 5.0 miles south of Bagley.	3.98	1961-81	6-28-81	(d)	c6.0
05062470	Marsh creek tributary near Mahnomen, MN	Lat 47°19'31", long 96°04'41", in SE¼SW¼ sec.36, T.145 N., R.43 W., Norman County, Hydrologic Unit 09020108, at culvert on State Highway 31, 0.1 mile upstream from mouth, and 5.2 miles west of Mahnomen.	11.9	1961-81	3-30-81	9.98	78
05062700	Wild Rice River tributary near Twin Valley, MN	Lat 47°17'47", long 96°19'42", in SW¼SE¼ sec.12, T.144 N., R.45 W., Norman County, Hydrologic Unit 09020107, at culvert on State Highway 31, 1.2 miles upstream from mouth, and 4.1 miles northwest of Twin Valley.	4.72	1961-81	9- 7-81	11.93	74
05062800	Coon Creek near Twin Valley, MN	Lat 47°15'51", long 96°20'34", in NE¼NE¼ sec.26, T.144 N., R.45 W., Norman County, Hydrologic Unit 09020108, at bridge on County Highway 28, 1.3 miles upstream from mouth, and 4.0 miles west of Twin Valley.	50.8	1962-81	3-30-81	9.90	40
05063200	Spring Creek tributary near Ogema, MN	Lat 47°07'22", long 95°57'35", in SE¼SE¼ sec.11, T.142 N., R.42 W., Becker County, Hydrologic Unit 09020108, at culvert on county highway, 2.0 miles northwest of Ogema.	4.99	1963-81	3-30-81	-	c15
05063500	South Branch Wild Rice River near Borup, MN	Lat 47°11'40", long 96°34'40", in NW¼ NW¼ sec.24, T.143 N., R.47 W., Norman County, Hydrologic Unit 09020108, at bridge on County Highway 193, 3.5 miles upstream from Wild Rice River, and 4.0 miles northwest of Borup.	254	1944-49#, 1972-81	5-23-81	13.11	(f)

"See footnotes at end of the table."

Annual maximum discharge at high-flow partial-record stations during water year 1981

Station No.	Station name	Location	Drainage area (mi^2)	Period of Record	Annual maximum Date	Gage height (feet)	Discharge (ft^3/s)
		Red River of the North basin--Continued					
05073600	South Branch Battle River at Northome, MN	Lat 47°52'17", long 94°17'45", in NW¼NE¼ sec.25, T.151 N., R.29 W., Koochiching County, Hydrologic Unit 09020302, at culvert on U.S. High-71, 0.7 mile west of Northome, and 3.1 miles upstream from Battle Lake.	2.80	1960-81	6-28-81	14.18	50
05073750	Spring Creek near Blackduck, MN	Lat 47°46'23", long 94°31'22", in NW¼NW¼ sec.32, T.150 N., R.30 W., Beltrami County, Hydrologic Unit 09020302, at culvert on County Highway 304, 3.1 miles north of Blackduck, and 3.2 miles upstream from mouth.	7.96	1960-81	6-28-81	13.09	(†)
05073800	Perry Creek tributary near Shooks, MN	Lat 47°52'00", long 94°32'52", in NW¼SW¼ sec.30, T.151 N., R.30 W., Beltrami County, Hydrologic Unit 09020302, at culvert on State Highway 72, 5.2 miles west of Shooks.	1.14	1960-81	6-28-81	6.54	19
05075700	Mud River near Grygla, MN	Lat 48°19'31", long 95°44'35", at common corner of secs.13, 14, 23, and 24, T.156 N., R.40 W., Hydrologic Unit 09020304, Marshall County, at bridge on State Highway 89, 6 miles west of Grygla.	170	1979-81	6-28-81	15.12	455
05076600	Red Lake River tributary near Thief River Falls, MN	Lat 48°04'44", long 96°12'15", in SW¼SE¼ sec.8, T.153 N., R.43 W., Pennington County, Hydrologic Unit 09020303, at culvert on County Highway 7, 0.5 mile upstream from mouth, and 3.1 miles south of Thief River Falls.	2.33	1962-81	9- 7-81	(d)	c35
05077700	Ruffy Brook near Gonvick, MN	Lat 47°44'50", long 95°24'45", in SE¼SE¼ sec.5, T.149 N., R.37 W., Clearwater County, Hydrologic Unit 09020305, on downstream side of bridge on County Highway 17, 4.0 miles upstream from mouth, and 4.8 miles east of Gonvick.	45.2	1960-78#, 1979-81	6-28-81	(d)	c150
05078000	Clearwater River at Plummer, MN	Lat 47°55'24", long 96°02'46", in SE¼ SW¼ sec.4, T.151 N., R.42 W., Red Lake County, Hydrologic Unit 09020305, on right bank 200 ft downstream from Soo Line Railroad bridge, 300 ft downstream from bridge on U.S. Highway 59, 0.9 mile northwest of railroad depot in Plummer, and 8.0 miles upstream from Hill River.	512	1939-79#, 1980-81e	6-29-81	7.37	1150
05078180	Silver Creek near Clearbrook, MN	Lat 47°38'43", long 95°26'33", in NW¼ sec.13, T.148 N., R.38 W., Clearwater County, Hydrologic unit 09020305, at culvert on county highway, 3.4 miles south of Clearbrook.	4.96	1960-81	9- 7-81	7.12	(†)
05078200	Silver Creek tributary at Clearbrook, MN	Lat 47°41'49", long 95°25'50", in SW¼NW¼ sec.29, T.149 N., R.37 W., Clearwater County, Hydrologic Unit 09020305, at culvert on county highway at north edge of Clearbrook, and 0.9 mile upstream from mouth.	6.02	1960-81	6-27-81	b9.23	14
05078400	Clearwater River tributary near Plummer, MN	Lat 47°52'34", long 96°08'35", in SE¼SE¼ sec.22, T.151 N., R.43 W., Red Lake County, Hydrologic Unit 09020305, at culvert on county highway, 1.2 miles upstream from mouth, and 5.3 miles southwest of Plummer.	6.51	1961-81	6-28-81	16.92	(†)
05086900	Middle River near Newfolden, MN	Lat 48°22'04", long 96°16'47", in NE¼NE¼ sec.3, T.156 N., R.44 W., Marshall County, Hydrologic Unit 09020309, at bridge on township road, 2.0 miles northeast of Newfolden.	91.1	1979-81	6-28-81	b13.46	55

"See footnotes at end of the table."

Annual maximum discharge at high-flow partial-record stations during water year 1981

Station No.	Station name	Location	Drainage area (mi^2)	Period of Record	Annual maximum Date	Gage height (feet)	Discharge (ft^3/s)
		Lake of the Woods basin					
05128300	Pike River near Gilbert, MN	Lat 47°29'34", long 92°29'15", in NE¼SW¼ sec.22, T.58 N., R.17 W., St. Louis County, Hydrologic Unit 09030002, at culvert on State Highway 135, 1.1 miles west of Gilbert.	.73	1966-81	6-28-81	7.42	22
05128700	Pike River tributary near Wahlsten, MN	Lat 47°43'04", long 92°17'12", in SW¼SW¼ sec.32, T.61 N., R.15 W., St. Louis County, Hydrologic Unit 09030002, at culvert on State Highway 135, 1.2 miles south of Wahlsten, and 2.7 miles upstream from mouth.	1.93	1961-81	6-28-81	7.43	65
05129650	Little Fork River at Cook, MN	Lat 47°51'15", long 92°41'55", in SE¼NE¼ sec.13, T.62 N., R.19 W., St. Louis County, Hydrologic Unit 09030005, at bridge on U.S. Highway 53, 0.6 mile west of Cook.	61.5	1968-81	6-29-81	14.85	354
05130300	Boriin Creek near Chisholm, MN	Lat 47°36'14", long 92°51'58", in SE¼SE¼ sec.9, T.59 N., R.20 W., St. Louis County, Hydrologic Unit 09030005, at culvert on State Highway 73, 1.3 miles upstream from mouth, and 7.8 miles north of Chisholm.	13.7	1959-81	4-23-81	12.10	155
05131750	Big Fork River near Bigfork, MN	Lat 47°44'56", long 93°46'31", in SW¼NE¼ sec.27, T.61 N., R.27 W., Itasca County, Hydrologic Unit 09030006, at bridge on State Highway 6, 5.5 miles west of Bigfork.	602	1973-81	5- 1-81	-	c520
05131878	Bowerman Brook near Craigville, MN	Lat 47°55'29", long 93°45'34", in NE¼NW¼ sec.26, T.63 N., R.27 W., Koochiching County, Hydrologic Unit 09030006, on left downstream wingwall of bridge on State Highway 6, 2.4 miles upstream from mouth, and 7.0 miles west of Craigville.	25.0	1979-81	5- 1-81	11.36	84
05132000	Big Fork River at Big Falls, MN	Lat 48°11'45", long 93°48'25", in SW¼SE¼ sec.35, T.155 N., R.25 W., Koochiching County, Hydrologic Unit 09030006, on left bank at village of Big Falls, 700 ft downstream from falls, 0.3 mile downstream from bridge on U.S. Highway 71, and 4.8 miles upstream from Sturgeon River.	1460	1929-79#, 1980-81	5- 2-81	6.32	2500
05140000	Bulldog Run near Warroad, MN	Lat 48°51'30", long 95°20'18", in SW¼SE¼ sec.7, T.162 N., R.36 W., Roseau County, Hydrologic Unit 09030009, 10 ft (revised) downstream from culvert on county highway, 0.8 mile upstream from mouth, and 2.5 miles south of Warroad.	11.1	1946-51#, 1966-77#, 1978-81	6-28-81	(d)	c20
05140500	East Branch Warroad River near Warroad, MN	Lat 48°51'29", long 95°18'40", in NE¼ NE¼ sec.17, T.162 N., R.36 W., Roseau County, Hydrolgoic Unit 09030009, at upstream side of highway bridge, 3.3 miles upstream from mouth, and 2.5 miles south of Warroad.	45.8	1946-54#, 1966-77#, 1978-81	6-28-81	7.82	b133

† Discharge not determined.
# Operated as a continuous-record gaging station.
a Backwater from ice.
b Affected by shifting control.
c Estimated; gage height unknown.
d Peak stage did not reach bottom of gage.
e Discontinued as a high-flow partial-record station; established as a continuous-record station October 1, 1981.
f Name revised.

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 1981

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Superior				
South Branch Partridge River	St. Louis River	Lat 47°33'59", long 91°56'30", in SE¼NW¼ sec.25, T.59 N., R.13 W., St. Louis County, Hydrologic Unit 04010201, in Superior National Forest, on left bank 65 feet upstream from twin culverts on National Forest Development Road 116, 4.5 miles upstream from mouth, 10 miles northeast of Hoyt Lakes, and 10 miles south of Babbitt, MN (04015455).	18.5	1974-76, 1977-80#	10- 1-80 11- 5-80	15 7.5
		Red River of the North basin				
Marsh River Ditch	Marsh River	Lat 47°17'29", long 96°26'09", in NE¼NE¼ sec.13, T.144 N., R.46 W., Norman County, Hydrologic Unit 09020108, at bridge on County Highway 24, 3.5 miles east of Ada, MN.	-	1945-51, 1965, 1967, 1969-70, 1972-76 1978-80	10-21-80 5-14-81 7-15-81	*0 *0 *0
aRoseau River	Red River of the North	Lat 48°53'28", long 95°43'50", in SW¼SE¼ sec.31, T.163 N., R.39 W., Roseau County, Hydrologic Unit 09020314, at bridge on County Highway 28, 900 feet downstream from Hay Creek, and 3.2 miles northeast of Roseau, MN (05105300).	-	1973-80	10-17-80 12-18-80 1-21-81 3-26-81 5-18-81 7-20-81 9-21-81	10 *5.8 *2.5 27 *9.1 *33 *8.0
		Lake of the Woods basin				
Stony River	South Kawishiwi River	Lat 47°41'39", long 91°45'38", in SW¼SW¼ sec.8, T.60 N., R.11 W., Lake County, Hydrologic Unit 09030001, in Superior National Forest, on left bank, 400 feet downstream from bridge on Forest Route 424, 4.7 miles upstream from mouth, and 8.5 miles southeast of Babbitt, MN (05125550).	219	1975-80#	10- 1-80	383
Dunka River	South Kawishiwi River	Lat 47°41'55", long 91°52'05", in NW¼NE¼ sec.9, T.60 N., R.12 W., St. Louis County, Hydrologic Unit 09030001, in Superior National Forest, on left bank, 1.8 miles upstream from mouth, and 3.8 miles southeast of Babbitt, MN (05126000).	53.4	1951-62#, 1971-73, 1975-80#	10- 1-80 11- 5-80	54 27
Gold Portage outlet from Kabetogama Lake	Rainy River	Lat 48°31'56", long 93°05'14", in SW¼SW¼ sec.19, T.70 N., R.21 W., St. Louis County, Hydrologic Unit 09030003, 10 miles northeast of Ray, MN (05129290).	-	-	6-18-80 7- 1-80 7-30-80 8-27-80 9-24-80 10- 9-80 5- 7-81 6-23-81	125 153 227 218 358 451 178 488
Warroad River	Lake of the Woods	Lat 48°51'57", long 95°21'07", in SW¼NW¼ sec.7, T.162 N., R.36 W., Roseau County, Hydrologic Unit 09030009, on downstream handrail of bridge near center of span, 0.9 mile upstream from Bulldog Run, and 2.5 miles south of Warroad, MN (05139500).	162	1946-80#	10- 8-80	*1.4

Operated as a continuous-record gaging station.
a Also published under low-flow.

Water-quality partial-record stations are particular sites where chemical-quality, biological and (or) sediment data are collected systematically over a period of years for use in hydrologic analyses.

482056092282001 SANDPOINT LAKE ABOVE HARRISON NARROWS NEAR CRANE LAKE, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMP-LING DEPTH (FT) (00003)	RESER-VOIR DEPTH (FEET) (72025)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	GROSS ALPHA TOTAL (UG/L AS U NATRL) (80029)	GROSS BETA TOTAL (PCI/L AS CS-137) (03519)	GROSS BETA TOTAL (PCI/L AS SR/YT-90) (80049)	OIL AND GREASE, TOTAL RECOV. GRAVI-METRIC (MG/L) (00556)
AUG 17...	1115	7.60	26	2.50	<1.3	3.7	3.6	<1

482226092283301 SANDPOINT LAKE BELOW HARRISON NARROWS NEAR CRANE LAKE, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMP-LING DEPTH (FT) (00003)	RESER-VOIR DEPTH (FEET) (72025)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	BICAR-BONATE FET-FLD (MG/L AS HCO3) (00440)
MAY 04...	1045	5.80	36	43	53	6.9	7.6	1.90	10.5	91	22
AUG 17...	1045	8.80	20	59	59	6.8	21.7	2.90	6.8	80	26

DATE	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	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)	GROSS ALPHA TOTAL (UG/L AS U NATRL) (80029)	GROSS BETA TOTAL (PCI/L AS CS-137) (03519)	GROSS BETA TOTAL (PCI/L AS SR/YT-90) (80049)	PHENOLS (UG/L) (32730)	OIL AND GREASE, TOTAL RECOV. GRAVI-METRIC (MG/L) (00556)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
MAY 04...	.06	.61	.015	.004	--	--	--	--	--	2.79	.000
AUG 19...	.01	.59	.014	.006	<1.2	3.5	3.4	<1	<1	3.87	<.010

PHYTOPLANKTON ANALYSES, MAY 1981 TO AUGUST 1981

	MAY 4,81	AUG 17,81
DATE		
TIME	1045	1045
TOTAL CELLS/ML	570	4800
DIVERSITY: DIVISION	0.7	0.0
.CLASS	0.7	0.0
..ORDER	1.1	0.1
...FAMILY	1.1	0.1
....GENUS	1.2	0.1

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)				
.BACILLARIOPHYCEAE				
..BACILLARIALES				
...NITZSCHIACEAE				
....NITZSCHIA	39	7	--	-
..EUPODISCALES				
...COSCINODISCACEAE				
....CYCLOTELLA	13	2	--	-
....MELOSIRA	450#	80	--	-
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS .	13	2	--	-
CRYPTOPHYTA (CRYPTOMONADS)				
.CRYPTOPHYCEAE				
..CRYPTOMONADALES				
...CRYPTOMONADACEAE				
....CRYPTOMONAS	13	2	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	26	5	28	1
....GOMPHOSPHAERIA	--	-	4700#	99
..NOSTOCALES				
...NOSTOCACEAE				
....ANABAENA	--	-	*	0
....APHANIZOMENON	--	-	28	1
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..DINOKONTAE				
...GLENODINIACEAE				
....GLENODINIUM	13	2	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

482451092471001 ASH RIVER AT ENTRANCE TO SULLIVAN BAY NEAR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMP-LING DEPTH (FT) (00003)	RESER-VOIR DEPTH (FEET) (72025)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	BICAR-BONATE FET-FLD (MG/L AS HCO3) (00440)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)
MAY												
06...	1525	2.70	13	156	154	7.4	13.8	.90	9.5	95	87	<.00
AUG												
19...	1150	2.40	7	191	180	8.8	23.1	.80	8.8	105	110	.02

DATE	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	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)	GROSS ALPHA TOTAL (UG/L AS U NATRL) (80029)	GROSS BETA TOTAL (PCI/L AS CS-137) (03519)	GROSS BETA TOTAL (PCI/L AS SR/YT-90) (80049)	PHENOLS (UG/L) (32730)	OIL AND GREASE, TOTAL RECOV. GRAVI-METRIC (MG/L) (00556)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
MAY												
06...	--	--	.79	.023	.008	--	--	--	--	--	6.23	.000
AUG												
19...	.030	1.3	1.30	.067	.011	<3.7	5.0	4.8	<1	1	20.9	.000

482451092471001 ASH RIVER AT ENTRANCE TO SULLIVAN BAY NEAR RAY, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1981 TO AUGUST 1981

DATE	MAY 6,81	AUG 19,81
TIME	1525	1150
TOTAL CELLS/ML	1200	190000
DIVERSITY: DIVISION	1.5	0.3
.CLASS	1.5	0.3
..ORDER	2.7	1.1
...FAMILY	2.9	1.1
....GENUS	3.2	1.3

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)				
.BACILLARIOPHYCEAE				
..BACILLARIALES				
...NITZSCHIACEAE				
....NITZSCHIA	130	11	--	-
..EUPODISCALES				
...COSCINODISCACEAE				
....CYCLOTELLA	--	-	*	0
....MELOSIRA	78	6	5600	3
....STEPHANODISCUS	140	12	--	-
..FRAGILARIALES				
...FRAGILARIACEAE				
....ASTERIONELLA	91	7	--	-
....FRAGILARIA	--	-	*	0
....SYNEDRA	52	4	--	-
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...CHLOROCOCCACEAE				
....TETRAEDRON	13	1	--	-
...COCCOMYXACEAE				
....ELAKATOTHRIX	--	-	*	0
...OOCYSTACEAE				
....ANKISTRODESMUS	91	7	--	-
....OOCYSTIS	--	-	*	0
...PALMELLACEAE				
....SPHAEROCYSTIS	--	-	1200	1
...SCENEDESMACEAE				
....CRUCIGENIA	--	-	*	0
....SCENEDESMUS	100	9	--	-
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	26	2	*	0
CRYPTOPHYTA (CRYPTOMONADS)				
.CRYPTOPHYCEAE				
..CRYPTOMONADALES				
...CRYPTOCHRYSIDACEAE				
....CHROOMONAS	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	39	3	--	-
..NOSTOCALES				
...NOSTOCACEAE				
....ANABAENA	130	11	13000	7
....APHANIZOMENON	--	-	30000#	16
..OSCILLATORIALES				
...OSCILLATORIACEAE				
....OSCILLATORIA	320#	27	140000#	73
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....TRACHELOMONAS	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

482545092495401 KABETOGAMA LAKE AT SULLIVAN BAY OUTLET NEAR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMP-LING DEPTH (FT) (00003)	RESER-VOIR DEPTH (FEET) (72025)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	OXYGEN, DIS-SOLVED (MG/L) (00300)
MAY									
06...	1450	5.20	23	145	160	7.3	12.2	1.70	9.4
AUG									
19...	1125	2.10	22	155	148	9.2	22.7	.70	9.2

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	BICAR-BONATE FET-FLD (MG/L AS HCO3) (00440)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	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)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
MAY								
06...	91	81	<.00	.78	.020	.005	2.24	.000
AUG								
19...	110	88	.05	1.50	.082	.017	69.2	.000

482545092495401 KABETOGAMA LAKE AT SULLIVAN BAY OUTLET NEAR RAY, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1981 TO AUGUST 1981

DATE	MAY 6,81	AUG 19,81
TIME	1450	1125
TOTAL CELLS/ML	3100	320000
DIVERSITY: DIVISION	1.6	0.1
.CLASS	1.6	0.1
..ORDER	2.6	1.2
...FAMILY	3.1	1.2
....GENUS	3.6	1.9

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)				
.BACILLARIOPHYCEAE				
..BACILLARIALES				
...NITZSCHIACEAE				
....NITZSCHIA	120	4	--	-
..EUPODISCALES				
...COSCINODISCACEAE				
....CYCLOTELLA	90	3	*	0
....MELOSIRA	320	10	*	0
....STEPHANODISCUS	230	7	*	0
..FRAGILARIALES				
...FRAGILARIACEAE				
....ASTERIONELLA	390	12	*	0
....SYNEDRA	100	3	--	-
..NAVICULALES				
...NAVICULACEAE				
....NAVICULA	26	1	--	-
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...CHLOROCOCCACEAE				
....TETRAEDRON	*	0	--	-
...DICTYOSPHAERIACEAE				
....DICTYOSPHAERIUM	260	8	--	-
...MICRACTINIACEAE				
....MICRACTINIUM	52	2	--	-
...OOCYSTACEAE				
....ANKISTRODESMUS	180	6	--	-
....CHODATELLA	*	0	--	-
....KIRCHNERIELLA	*	0	*	0
....TREUBARIA	*	0	--	-
...SCENEDESMACEAE				
....SCENEDESMUS	280	9	*	0
....TETRASTRUM	--	-	*	0
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CARTERIA	--	-	*	0
....CHLAMYDOMONAS	52	2	--	-
..ZYGNEMATALES				
...DESMIDIACEAE				
....COSMARIUM	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	460	15	13000	4
..NOSTOCALES				
...NOSTOCACEAE				
....ANABAENA	--	-	7200	2
....APHANIZOMENON	--	-	70000#	22
..OSCILLATORIALES				
...OSCILLATORIACEAE				
....LYNGBYA	--	-	59000#	18
....OSCILLATORIA	450	15	170000#	52
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....TRACHELOMONAS	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..DINOKONTAE				
...GLENODINIACEAE				
....GLENODINIUM	26	1	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

482607092511701 KABETOGAMA LAKE AT MOUTH OF MEADWOOD BAY NEAR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMP-LING DEPTH (FT) (00003)	RESER-VOIR DEPTH (FEET) (72025)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	OXYGEN, DIS-SOLVED (MG/L) (00300)
MAY									
06...	1210	9.50	35	60	66	7.0	9.1	3.1	11.0
AUG									
19...	1100	5.70	38	77	80	8.5	22.4	1.90	7.8

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	BICAR-BONATE FET-FLD (MG/L AS HCO3) (00440)	SULFIDE TOTAL (MG/L AS S) (00745)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	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)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
MAY									
06...	98	32	--	.02	.60	.008	.004	1.22	.210
AUG									
19...	92	39	<.1	.02	.68	.023	.005	17.8	.000

482607092511701 KABETOGAMA LAKE AT MOUTH OF MEADWOOD BAY NEAR RAY, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1981 TO AUGUST 1981

DATE	MAY 6,81	AUG 19,81
TIME	1210	1100
TOTAL CELLS/ML	450	63000
DIVERSITY: DIVISION	1.3	0.3
.CLASS	1.3	0.3
..ORDER	1.9	1.8
...FAMILY	1.9	1.8
....GENUS	2.1	2.5

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)				
.BACILLARIOPHYCEAE				
..BACILLARIALES				
...NITZSCHIACEAE				
....NITZSCHIA	13	3	--	-
..EUPODISCALES				
...COSCINODISCACEAE				
....CYCLOTELLA	13	3	--	-
....MELOSIRA	--	-	330	1
..FRAGILARIALES				
...FRAGILARIACEAE				
....ASTERIONELLA	180#	40	--	-
....FRAGILARIA	--	-	3000	5
....SYNEDRA	13	3	--	-
..NAVICULALES				
...CYMBELLACEAE				
....CYMBELLA	--	-	*	0
...NAVICULACEAE				
....NAVICULA	13	3	--	-
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...COCCOMYXACEAE				
....ELAKATOTHRIX	--	-	*	0
...MICRACTINIACEAE				
....MICRACTINIUM	13	3	--	-
...OOCYSTACEAE				
....OOCYSTIS	--	-	*	0
....SELENASTRUM	13	3	--	-
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	13	3	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	180#	40	5300	8
....GOMPHOSPHAERIA	--	-	19000#	30
..NOSTOCALES				
...NOSTOCACEAE				
....ANABAENA	--	-	11000#	17
....APHANIZOMENON	--	-	12000#	19
..OSCILLATORIALES				
...OSCILLATORIACEAE				
....OSCILLATORIA	--	-	12000#	20
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..DINOKONTAE				
...GYMNODINIACEAE				
....GYMNODINIUM	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

482616092372201 NAMAKAN LAKE NEAR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (UMHOS) (00095)	SPECIFIC CONDUCTANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE FET-FLD (MG/L AS HCO3) (00440)
MAY											
06...	1020	12.2	84	41	49	6.8	7.3	4.0	10.9	93	26
AUG											
19...	0910	13.0	90	43	47	6.6	21.7	4.3	6.8	80	16

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	GROSS ALPHA TOTAL (UG/L AS U NATRL) (80029)	GROSS BETA TOTAL (PCI/L AS CS-137) (03519)	GROSS BETA TOTAL (PCI/L AS SR/YT-90) (80049)	OIL AND GREASE, TOTAL RECOV. GRAVIMETRIC (MG/L) (00556)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
MAY										
06...	.05	.55	.010	<.001	--	--	--	--	.630	.000
AUG										
19...	.04	.36	.011	.003	<1.2	3.7	3.5	2	2.45	.000

PHYTOPLANKTON ANALYSES, MAY 1981 TO AUGUST 1981

	MAY 6,81	AUG 19,81
DATE		
TIME	1020	0910
TOTAL CELLS/ML	750	14
DIVERSITY: DIVISION	1.2	0.0
.CLASS	1.2	0.0
..ORDER	1.6	0.0
...FAMILY	1.6	0.0
....GENUS	1.7	0.0

ORGANISM	CELLS /ML	PERCENT	CELLS /ML	PERCENT
BACILLARIOPHYTA (DIATOMS)				
.BACILLARIOPHYCEAE				
..BACILLARIALES				
...NITZSCHIACEAE				
....NITZSCHIA	13	2	--	-
..EUPODISCALES				
...COSCINODISCACEAE				
....CYCLOTELLA	13	2	--	-
....MELOSIRA	350#	47	--	-
..FRAGILARIALES				
...FRAGILARIACEAE				
....SYNEDRA	--	-	14#	100
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...OOCYSTACEAE				
....ANKISTRODESMUS	13	2	--	-
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	13	2	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	39	5	--	-
..OSCILLATORIALES				
...OSCILLATORIACEAE				
....OSCILLATORIA	310#	41	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

482630093011701 KABETOGAMA LAKE, AT GAPPAS LANDING, NEAR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (UMHOS) (00095)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
AUG 20...	0810	6.40	8	90	20.7	2.10	7.0

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	GROSS ALPHA TOTAL (UG/L AS U NATRL) (80029)	GROSS BETA TOTAL (PCI/L AS CS-137) (03519)	GROSS BETA TOTAL (PCI/L AS SR/YT-90) (80049)	PHENOLS (UG/L) (32730)	OIL AND GREASE, TOTAL RECOV. GRAVIMETRIC (MG/L) (00556)
AUG 20...	81	<1.6	3.7	3.5	<1	1

482721093003901 KABETOGAMA LAKE NEAR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMP-LING DEPTH (FT) (00003)	RESER-VOIR DEPTH (FEET) (72025)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
MAY										
06...	1400	11.3	32	83	88	7.3	8.5	3.7	10.7	95
AUG										
20...	0835	4.80	33	89	86	8.5	21.4	1.60	8.2	95

DATE	BICAR-BONATE FET-FLD (MG/L AS HCO3) (00440)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	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)	GROSS ALPHA TOTAL (UG/L AS U NATRL) (80029)	GROSS BETA TOTAL (PCI/L AS CS-137) (03519)	GROSS BETA TOTAL (PCI/L AS SR/YT-90) (80049)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
MAY										
06...	46	<.00	.58	.012	.006	--	--	--	.810	.000
AUG										
20...	46	.28	.65	.033	.009	<1.6	3.8	3.7	25.0	.000

PHYTOPLANKTON ANALYSES, MAY 1981 TO AUGUST 1981

DATE	MAY 6,81	AUG 20,81
TIME	1400	0835
TOTAL CELLS/ML	1100	98000
DIVERSITY: DIVISION	0.2	0.0
.CLASS	0.2	0.0
..ORDER	1.0	1.1
...FAMILY	1.0	1.1
....GENUS	1.1	1.7

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)				
.BACILLARIOPHYCEAE				
..BACILLARIALES				
...NITZSCHIACEAE				
....NITZSCHIA	26	2	*	0
..EUPODISCALES				
...COSCINODISCACEAE				
....STEPHANODISCUS	830#	76	--	-
..FRAGILARIALES				
...FRAGILARIACEAE				
....ASTERIONELLA	180#	17	--	-
....SYNEDRA	13	1	--	-
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...PALMELLACEAE				
....SPHAEROCYSTIS	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	39	4	5200	5
....GOMPHOSPHAERIA	--	-	50000#	51
..NOSTOCALES				
...NOSTOCACEAE				
....ANABAENA	--	-	7900	8
....APHANIZOMENON	--	-	33000#	34
..OSCILLATORIALES				
...OSCILLATORIACEAE				
....OSCILLATORIA	--	-	1900	2

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

482747092503001 KABETOGAMA LAKE IN LOST BAY NEAR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMP-LING DEPTH (FT) (00003)	RESER-VOIR DEPTH (FEET) (72025)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	OXYGEN, DIS-SOLVED (MG/L) (00300)
MAY									
06...	1300	10.7	32	76	81	7.0	9.1	3.5	10.3
AUG									
20...	0930	6.40	38	88	--	8.2	22.9	2.10	8.5

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	BICAR-BONATE FET-FLD (MG/L AS HCO3) (00440)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	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)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
MAY								
06...	92	44	.01	.59	.015	.014	.000	.000
AUG								
20...	102	44	.02	.83	.033	.006	15.1	.000

PHYTOPLANKTON ANALYSES, MAY 1981 TO AUGUST 1981

	MAY 6,81	AUG 20,81
DATE		
TIME	1300	0930
TOTAL CELLS/ML	920	73000
DIVERSITY: DIVISION	0.9	0.0
.CLASS	0.9	0.0
..ORDER	1.5	1.0
...FAMILY	1.5	1.0
....GENUS	1.5	1.5

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)				
.BACILLARIOPHYCEAE				
..BACILLARIALES				
...NITZSCHIACEAE				
....NITZSCHIA	13	1	--	-
..EUPODISCALES				
...COSCINODISCACEAE				
....STEPHANODISCUS	610#	66	--	-
..FRAGILARIALES				
...FRAGILARIACEAE				
....ASTERIONELLA	65	7	--	-
..NAVICULALES				
...CYMBELLACEAE				
....CYMBELLA	13	1	--	-
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...CHLOROCOCCACEAE				
....SCHROEDERIA	13	1	--	-
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	13	1	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	190#	21	3500	5
....GOMPHOSPHAERIA	--	-	35000#	48
..NOSTOCALES				
...NOSTOCACEAE				
....ANABAENA	--	-	29000#	41
....APHANIZOMENON	--	-	5000	7

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

482855093032401 KABETOGAMA LAKE NEAR WOODEN FROG CAMP NEAR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (UMHOS) (00095)	SPECIFIC CONDUCTANCE LAB (UMHOS) (90095)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
AUG 20...	1015	6.40	19	91	82	21.0	2.10	7.4

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	GROSS ALPHA TOTAL (UG/L AS U NATRL) (80029)	GROSS BETA TOTAL (PCI/L AS CS-137) (03519)	GROSS BETA TOTAL (PCI/L AS SR/YT-90) (80049)	PHENOLS (UG/L) (32730)	OIL AND GREASE, TOTAL RECOV. GRAVIMETRIC (MG/L) (00556)	PCB, TOTAL (UG/L) (39516)
AUG 20...	86	<1.7	3.2	3.1	<1	1	<.10

483000092392601 NAMAKAN LAKE ABOVE KETTLE FALLS NEAR INTERNATIONAL FALLS, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMP-LING DEPTH (FT) (00003)	RESER-VOIR DEPTH (FEET) (72025)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	OXYGEN, DIS-SOLVED (MG/L) (00300)
MAY 06...	1120	11.3	93	45	52	6.8	5.9	3.7	11.6
AUG 19...	1005	9.30	79	44	47	6.7	22.1	3.1	7.2

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	BICAR-BONATE FET-FLD (MG/L AS HCO3) (00440)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	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)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
MAY 06...	97	22	.05	.72	.007	.001	1.14	.000
AUG 19...	85	18	.04	.27	.005	.003	2.43	.000

PHYTOPLANKTON ANALYSES, MAY 1981 TO AUGUST 1981

	MAY 6,81		AUG 19,81	
DATE				
TIME	1120		1005	
TOTAL CELLS/ML	480		56	
DIVERSITY: DIVISION	1.2		0.0	
.CLASS	1.2		0.0	
..ORDER	1.7		0.0	
...FAMILY	1.7		0.0	
....GENUS	1.9		0.0	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)				
.BACILLARIOPHYCEAE				
..EUPODISCALES				
...COSCINODISCACEAE				
....CYCLOTELLA	26	5	--	-
....MELOSIRA	150#	32	--	-
..FRAGILARIALES				
...FRAGILARIACEAE				
....SYNEDRA	13	3	--	-
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...OOCYSTACEAE				
....ANKISTRODESMUS	13	3	--	-
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	13	3	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	26	5	--	-
..NOSTOCALES				
...NOSTOCACEAE				
....ANABAENA	--	-	56#100	
..OSCILLATORIALES				
...OSCILLATORIACEAE				
....OSCILLATORIA	230#	49	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

483304093062701 RAINY LAKE AT BLACK BAY NEAR INTERNATIONAL FALLS, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMP-LING DEPTH (FT) (00003)	RESER-VOIR DEPTH (FEET) (72025)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	BICAR-BONATE FET-FLD (MG/L AS HCO3) (00440)
MAY											
05...	0915	3.80	4	82	94	6.9	10.2	1.20	9.6	88	50
AUG											
18...	0945	3.90	7	92	88	7.6	20.9	1.30	6.8	79	48

DATE	SULFIDE TOTAL (MG/L AS S) (00745)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	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)	GROSS ALPHA TOTAL (UG/L AS U NATRL) (80029)	GROSS BETA TOTAL (PCI/L AS CS-137) (03519)	GROSS BETA TOTAL (PCI/L AS SR/YT-90) (80049)	PHENOLS (UG/L) (32730)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L) (70954)
MAY											
05...	--	.02	.73	.024	.017	--	--	--	--	6.43	.000
AUG											
18...	<.1	<.00	.48	.041	.017	<1.8	3.5	3.4	<1	15.0	<.010

483304093062701 RAINY LAKE AT BLACK BAY NEAR INTERNATIONAL FALLS, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1981 TO AUGUST 1981

DATE	MAY 5,81	AUG 18,81
TIME	0915	0945
TOTAL CELLS/ML	3500	46000
DIVERSITY: DIVISION	1.1	0.1
.CLASS	1.1	0.1
..ORDER	2.0	1.0
...FAMILY	2.1	1.0
....GENUS	2.6	1.3

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)				
.BACILLARIOPHYCEAE				
..BACILLARIALES				
...NITZSCHIACEAE				
....NITZSCHIA	130	4	--	-
..EUPODISCALES				
...COSCINODISCACEAE				
....COSCINODISCUS	--	-	*	0
....CYCLOTELLA	220	6	--	-
....MELOSIRA	1800#	52	--	-
....STEPHANODISCUS	--	-	*	0
..FRAGILARIALES				
...FRAGILARIACEAE				
....ASTERIONELLA	380	11	--	-
....SYNEDRA	160	4	*	0
..NAVICULALES				
...NAVICULACEAE				
....NAVICULA	*	0	--	-
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...HYDRODICTYACEAE				
....PEDIASTRUM	--	-	330	1
...MICRACTINIACEAE				
....MICRACTINIUM	26	1	--	-
...OOCYSTACEAE				
....ANKISTRODESMUS	78	2	--	-
....OOCYSTIS	--	-	*	0
...PALMELLACEAE				
....SPHAEROCYSTIS	--	-	*	0
...SCENEDESMACEAE				
....COELASTRUM	100	3	--	-
....SCENEDESMUS	160	4	--	-
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	130	4	1100	2
....GOMPHOSPHAERIA	--	-	31000#	67
..NOSTOCALES				
...NOSTOCACEAE				
....ANABAENA	--	-	12000#	26
....APHANIZOMENON	--	-	1500	3
..OSCILLATORIALES				
...OSCILLATORIACEAE				
....OSCILLATORIA	280	8	*	0
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....TRACHELOMONAS	*	0	--	-
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..DINOKONTAE				
...GYMNODINIACEAE				
....GYMNODINIUM	*	0	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

483538093100001 RAINY LAKE AT BLACK BAY NARROWS NEAR ISLAND VIEW, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (UMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)
AUG 18...	0945	3.00	8	104	6.9	21.1	1.00

DATE	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	SULFIDE TOTAL (MG/L AS S) (00745)	GROSS ALPHA TOTAL (UG/L AS U NATRL) (80029)	GROSS BETA TOTAL (PCI/L AS CS-137) (03519)	GROSS BETA TOTAL (PCI/L AS SR/YT-90) (80049)
AUG 18...	7.6	88	<.1	<2.0	4.0	3.9

483622092560701 RAINY LAKE AT BRULE NARROWS NEAR INTERNATIONAL FALLS, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1981 TO AUGUST 1981

DATE	MAY 5,81	AUG 18,81
TIME	1040	1040
TOTAL CELLS/ML	1900	6800
DIVERSITY: DIVISION	0.8	1.1
.CLASS	0.8	1.1
..ORDER	1.3	1.1
...FAMILY	1.3	1.2
....GENUS	1.7	2.3

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
BACILLARIOPHYTA (DIATOMS)				
.BACILLARIOPHYCEAE				
..BACILLARIALES				
...NITZSCHIACEAE				
....NITZSCHIA	39	2	*	0
..EUPODISCALES				
...COSCINODISCACEAE				
....CYCLOTELLA	120	6	56	1
....MELOSIRA	1200#	63	--	-
....STEPHANODISCUS	26	1	*	0
..FRAGILARIALES				
...FRAGILARIACEAE				
....ASTERIONELLA	100	5	110	2
....SYNEDRA	--	-	*	0
....TABELLARIA	--	-	56	1
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...CHLOROCOCCACEAE				
....TETRAEDRON	--	-	*	0
...DICTYOSPHAERIACEAE				
....DICTYOSPHAERIUM	--	-	1600#	23
...HYDRODICTYACEAE				
....PEDIASTRUM	--	-	56	1
...OOCYSTACEAE				
....OOCYSTIS	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....AGMENELLUM	--	-	890	13
....ANACYSTIS	39	2	2500#	37
....GOMPHOSPHAERIA	--	-	1400#	21
..OSCILLATORIALES				
...OSCILLATORIACEAE				
....OSCILLATORIA	360#	19	--	-
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..DINOKONTAE				
...GYMNODINIACEAE				
....GYMNODINIUM	13	1	--	-
...PERIDINIACEAE				
....PERIDINIUM	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

483622092560701 RAINY LAKE AT BRULE NARROWS NEAR INTERNATIONAL FALLS, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (UMHOS) (00095)	SPECIFIC CONDUCTANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE FET-FLD (MG/L AS HCO3) (00440)
MAY 05...	1040	10.4	19	40	46	6.7	5.2	3.4	12.2	100	20
AUG 18...	1040	10.0	22	45	47	6.9	20.8	1.30	7.2	83	19

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	GROSS ALPHA TOTAL (UG/L AS U NATRL) (80029)	GROSS BETA TOTAL (PCI/L AS CS-137) (03519)	GROSS BETA TOTAL (PCI/L AS SR/YT-90) (80049)	PHENOLS (UG/L) (32730)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
MAY 05...	.04	.57	.005	.005	--	--	--	--	2.96	.000
AUG 18...	<.00	.40	.009	.004	<1.0	3.4	3.3	1	4.08	<.010

WATER QUALITY DATA AT STREAMFLOW STATIONS

Periodic field determinations of water temperature and specific conductance are made at many stream-gaging stations other than regular water-quality stations. These data are usually collected at monthly intervals during routine visits to the station. Additional data for each station are published in Volume 1 of this report.

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (^oC)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (^oC)	SPECIFIC CONDUCTANCE (MICROMHOS)
04010500 PIGEON RIVER AT MIDDLE FALLS NEAR GRAND PORTAGE, MN							
OCT. 22, 1980	395	1.0	---	APR. 15	2370	3.0	52
NOV. 05	522	1.5	60	APR. 30	1620	---	---
JAN. 07, 1981	173	.0	83	MAY 06	1780	8.0	55
JAN. 08	174	.5	---	JULY 08	433	25.0	60
FEB. 11	133	.0	113	AUG. 20	176	20.0	---
FEB. 27	163	.5	---	SEPT. 10	119	22.0	80
MAR. 11	206	.0	90				
04014500 BAPTISM RIVER NEAR BEAVER BAY, MN							
NOV. 04, 1980	122	3.0	65	APR. 15	592	5.0	50
DEC. 09	54	.5	65	MAY 05	599	7.0	52
JAN. 06, 1981	20	.0	106	JULY 07	99	22.5	59
FEB. 10	12	.0	122	SEPT. 09	22	13.5	104
MAR. 10	25	.0	112				
04015330 KNIFE RIVER NEAR TWO HARBORS, MN							
OCT. 01, 1980	31	10.5	140	MAR. 12	17	.0	200
NOV. 05	29	2.5	122	APR. 13	382	3.5	81
DEC. 11	5.4	.5	220	MAY 06	291	11.5	77
JAN. 08, 1981	3.9	.0	234	JULY 14	15	20.5	150
FEB. 12	2.7	.0	---	SEPT. 10	5.6	17.5	195
04015475 PARTRIDGE RIVER ABOVE COLBY LAKE NEAR HOYT LAKES, MN							
OCT. 01, 1980	133	11.0	110	MAR. 04	5.4	.5	230
NOV. 05	62	2.0	104	APR. 08	294	3.0	64
DEC. 04	19	.5	147	JUNE 25	152	17.0	90
JAN. 28, 1981	1.5	.0	205	AUG. 26	6.9	20.0	225
04016000 PARTRIDGE RIVER NEAR AURORA, MN							
OCT. 02, 1980	99	11.5	265	MAR. 04	23	.5	520
NOV. 05	51	4.0	300	APR. 08	59	5.0	440
DEC. 04	25	.5	370	JUNE 26	156	16.5	292
JAN. 28, 1981	23	.0	430	AUG. 26	24	21.5	510
04016500 ST. LOUIS RIVER NEAR AURORA, MN							
OCT. 02, 1980	319	10.0	60	MAR. 04	53	.5	380
NOV. 06	148	2.5	87	APR. 09	248	3.0	48
DEC. 04	77	.0	110	JUNE 26	347	19.0	46
JAN. 28, 1981	48	.0	307	AUG. 26	49	19.0	320

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
04018750 ST. LOUIS RIVER AT FORBES, MN							
NOV. 06, 1980...	419	3.0	195	APR. 09.....	822	5.5	168
DEC. 04.....	272	.0	245	JULY 02.....	1800	19.5	116
JAN. 29, 1981...	22	.0	160	AUG. 27.....	143	22.0	260
04024000 ST. LOUIS RIVER AT SCANLON, MN							
NOV. 03, 1980...	1020	4.0	178	MAR. 09.....	1060	.0	152
DEC. 08.....	1540	.5	160	MAY 04.....	8450	9.5	113
JAN. 05, 1981...	1050	.0	145	JULY 06.....	5180	24.5	110
FEB. 09.....	830	.0	150	SEPT. 08.....	638	18.0	155
04024098 DEER CREEK NEAR HOLYOKE, MN							
OCT. 09, 1980...	1.8	10.0	325	APR. 15.....	4.4	---	---
NOV. 06.....	2.1	3.0	330	APR. 21.....	4.1	4.0	295
DEC. 11.....	1.8	.0	330	MAY 07.....	8.4	13.0	195
JAN. 14, 1981...	1.9	.5	215	JULY 01.....	4.9	19.0	265
MAR. 12.....	14.7	.5	225	AUG. 26.....	142	16.0	180
APR 14.....	9.8	5.0	---	SEPT. 02.....	1.5	15.0	---
05046000 OTTER TAIL RIVER BELOW ORWELL DAM NEAR FERGUS FALLS, MN							
OCT. 03, 1980...	42	11.0	425	MAR. 24.....	224	7.0	440
OCT. 24.....	97	7.0	435	MAY 20.....	145	17.0	450
NOV. 24.....	122	3.0	570	JULY 28.....	147	23.0	380
DEC. 18.....	112	1.5	520	SEPT. 30.....	55	13.0	420
JAN. 23, 1981...	111	3.5	540				
05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, SOUTH DAKOTA							
OCT. 10, 1980...	1.1	11.0	810	MAR. 30.....	1.2	7.0	1030
NOV. 20.....	.37	2.0	1210	MAY 14.....	1.1	15.5	1530
DEC. 22.....	.0	---	---	JUNE 03.....	2.2	23.0	1800
FEB. 03, 1981...	.0	---	---	JULY 24.....	1.4	22.0	1260
FEB. 27.....	.35	.5	640	SEPT. 30.....	.0	---	---
05061000 BUFFALO RIVER NEAR HAWLEY, MN							
OCT. 23, 1980...	23	5.0	780	JAN. 23, 1981....	16	---	---
NOV. 25.....	28	1.0	1000	FEB. 24.....	40	.5	540
DEC. 18.....	18	.5	750	MAR. 24.....	27	3.5	640
05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MN							
OCT. 24, 1980...	12	4.0	940	MAR. 23.....	33	.5	570
NOV. 25.....	10	1.0	910	APR. 09.....	42	9.0	760
DEC. 17.....	3.5	.5	1470	MAY 23.....	500	13.0	220
JAN. 22, 1981...	2.3	.5	1240	MAY 26.....	47	14.5	500
FEB. 24.....	37	.5	570				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05062000 BUFFALO RIVER NEAR DILWORTH, MN							
OCT. 23, 1980...	38	5.0	750	MAY 21.....	26	17.5	1075
NOV. 24.....	41	.0	1050	MAY 23.....	1090	14.0	---
DEC. 17.....	22	.5	890	MAY 26.....	388	14.0	300
JAN. 22, 1981...	17	.5	860	JUNE 23.....	39	17.0	690
FEB. 24.....	39	.5	715	JULY 22.....	40	22.0	680
MAR. 23.....	69	.5	570	AUG. 26.....	44	23.0	640
APR. 09.....	96	10.0	680	SEPT. 24.....	12	14.5	725
APR. 23.....	56	8.0	---				
05062500 WILD RICE RIVER AT TWIN VALLEY, MN							
OCT. 21, 1980...	23	6.0	290	MAR. 18.....	52	.0	500
NOV. 19.....	27	.0	550	MAY 20.....	62	17.0	---
DEC. 16.....	18	.5	793	JULY 15.....	182	22.0	350
JAN. 21, 1981...	15	.0	---	SEPT. 16.....	130	13.5	340
05064000 WILD RICE RIVER AT HENDRUM, MN							
OCT. 21, 1980...	42	6.5	570	MAR. 17.....	41	.0	450
NOV. 18.....	27	.5	650	MAY 20.....	62	20.0	---
DEC. 17.....	15	.0	865	JULY 15.....	192	24.0	350
JAN. 21, 1981...	8.2	.0	---	SEPT. 15.....	172	16.5	425
05067500 MARSH RIVER NEAR SHELLY, MN							
OCT. 21, 1980...	0	---	---	MAY 14.....	0	---	---
NOV. 18.....	0	---	---	MAY 21.....	0	---	---
DEC. 17.....	0	---	---	JULY 14.....	1.0	22.0	---
JAN. 20, 1981...	0	---	---	SEPT. 15.....	6.4	15.5	550
MAR. 17.....	0.81	1.0	340				
05069000 SANDHILL RIVER AT CLIMAX, MN							
OCT. 22, 1980...	17	5.0	630.	MAR. 17.....	28	.0	480
NOV. 18.....	8.6	.5	650	MAY 14.....	15	15.0	645
DEC. 17.....	9.3	.5	775	JULY 14.....	26	25.5	---
JAN. 20, 1981...	7.9	.0	663	SEPT. 15.....	76	16.0	540
05074500 RED LAKE RIVER NEAR RED LAKE, MN							
OCT. 06, 1980...	78	12.5	275	MAY 22.....	72	---	---
NOV. 17.....	65	.5	272	JULY 24.....	404	21.5	135
MAR. 30, 1981...	71	6.5	262	SEPT. 25.....	382	15.0	265
05075000 RED LAKE RIVER AT HIGH LANDING NEAR GOODRIDGE, MN							
OCT. 06, 1980...	80	11.0	315	MAR. 30.....	117	.5	265
NOV. 17.....	76	.0	315	MAY 21.....	74	17.0	385
DEC. 15.....	59	.0	310	JULY 27.....	384	22.0	375
FEB. 02, 1981...	61	.0	---	SEPT. 24.....	438	13.0	245

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (^oC)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (^oC)	SPECIFIC CONDUCTANCE (MICROMHOS)
05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN							
OCT. 07, 1980...	2.9	9.0	750	MAR. 31.....	52	.5	300
NOV. 18.....	6.6	.0	815	MAY 21.....	4.1	20.5	750
DEC. 15.....	.41	.0	1250	JULY 29.....	19	19.5	614
FEB. 03, 1981...	0	---	---	SEPT. 24.....	3.0	13.5	615
05078230 LOST RIVER AT OKLEE, MN							
OCT. 22, 1980...	16	5.0	660	MAR. 16.....	14	-.5	470
NOV. 17.....	20	.5	710	MAY 12.....	24	12.0	750
DEC. 18.....	3.0	.5	725	JULY 13.....	126	26.0	550
JAN. 19, 1981...	2.7	.5	700	SEPT. 14.....	56	17.0	625
05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN							
OCT. 22, 1980...	105	4.5	610	MAR. 16.....	50	.5	440
NOV. 17.....	56	1.0	640	MAY 13.....	48	14.0	700
DEC. 17.....	58	.0	565	JULY 14.....	852	24.0	440
JAN. 19, 1981...	50	.5	525	SEPT. 14.....	374	18.0	555
05079000 RED LAKE RIVER AT CROOKSTON, MN							
OCT. 07, 1980...	154	11.0	535	MAR. 17.....	285	.0	370
NOV. 18.....	149	.5	530	MAY 12.....	147	15.0	540
DEC. 17.....	150	.5	580	JULY 14.....	1510	25.0	415
JAN. 20, 1981...	124	.0	514	SEPT. 15.....	813	17.0	455
05087500 MIDDLE RIVER AT ARGYLE, MN							
OCT. 07, 1980...	.03	14.0	700	MAR. 31.....	17.0	.5	298
NOV. 18.....	.01	2.5	630	MAY 20.....	.14	18.0	475
DEC. 16.....	.01	.0	1160	JULY 28.....	.29	22.5	529
FEB. 03, 1981...	0	---	---	SEPT. 24.....	1.0	12.0	350
05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN							
OCT. 07, 1980...	.93	13.0	400	APR. 01.....	48	2.5	405
NOV. 18.....	2.0	2.5	390	MAY 20.....	1.4	20.5	400
DEC. 16.....	.34	.5	485	JULY 28.....	2.2	20.5	225
FEB. 03, 1981...	2.2	.5	480	SEPT. 23.....	.97	14.0	435
05104500 ROSEAU RIVER BELOW SOUTH FORK NEAR MALUNG, MN							
OCT. 09, 1980...	.13	10.0	428	APR. 01.....	28	.5	---
NOV. 19.....	14	.5	330	MAY 20.....	4.9	15.0	395
DEC. 17.....	5.3	.0	390	JULY 23.....	9.5	20.5	150
FEB. 04, 1981...	1.9	.0	---	SEPT. 22.....	4.7	13.0	360

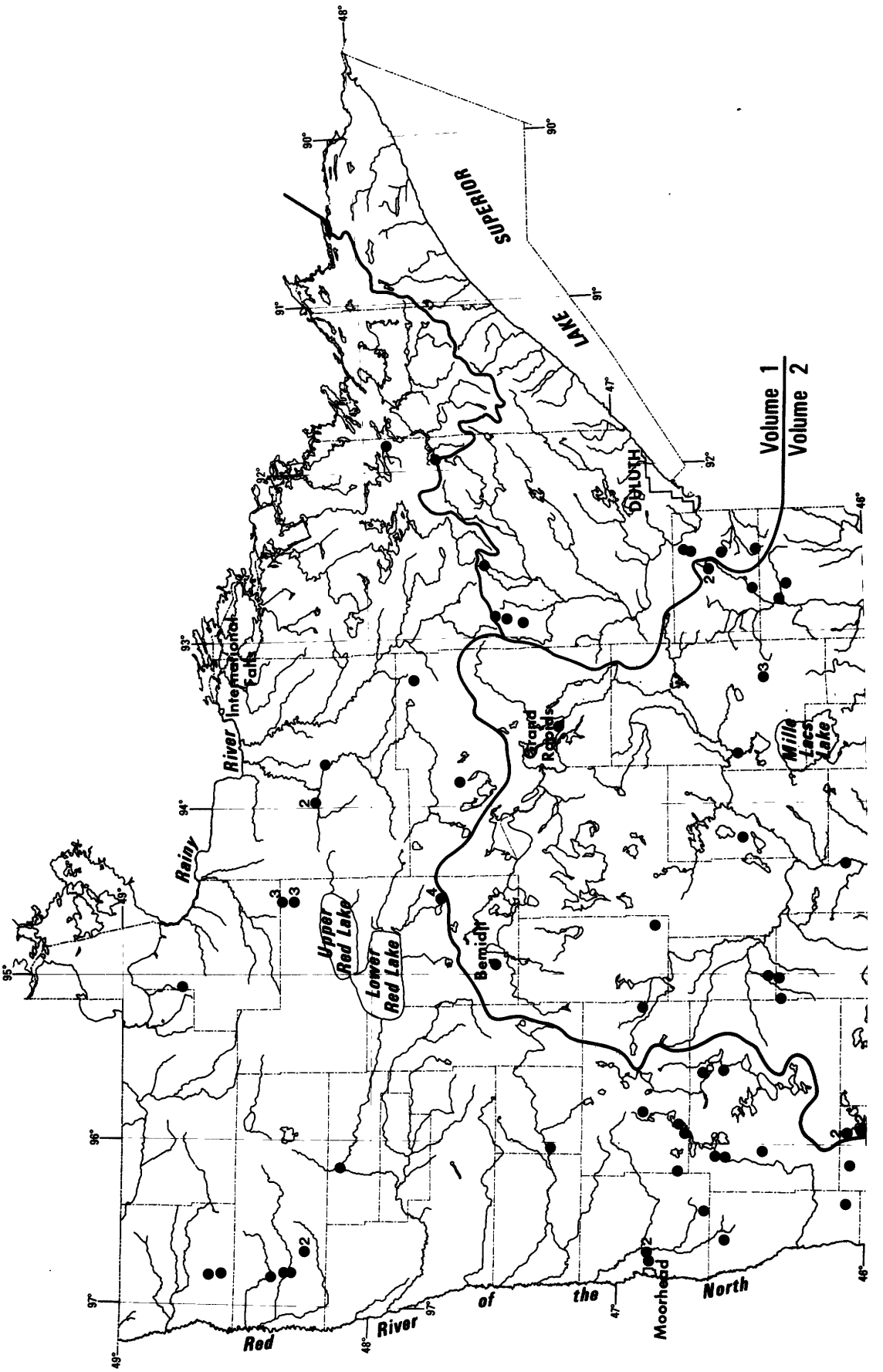
WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (^oC)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (^oC)	SPECIFIC CONDUCTANCE (MICROMHOS)
05106000 SPRAGUE CREEK NEAR SPRAGUE, MANITOBA							
OCT. 06, 1980...	3.4	10.0	485	MAY 19.....	3.7	17.0	480
NOV. 19.....	9.8	.0	358	JUNE 01.....	38	14.0	---
DEC. 17.....	1.7	---	---	JULY 22.....	30	18.0	320
DEC. 17.....	1.6	.0	530	SEPT. 10.....	234	18.0	---
FEB. 04, 1981...	.77	.0	650	SEPT. 23.....	36	12.0	205
APR. 01.....	20	.5	248				
05107500 ROSEAU RIVER AT ROSS, MN							
OCT. 06, 1980...	7.6	10.5	390	APR. 01.....	87	1.0	255
NOV. 18.....	37	.5	405	MAY 19.....	19	15.0	460
DEC. 17.....	8.0	.0	490	JULY 21.....	77	23.0	420
FEB. 04, 1981...	3.1	.0	535	SEPT. 22.....	53	13.0	305
05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MN							
OCT. 16, 1980...	6.9	5.5	400	APR. 01.....	122	1.5	260
NOV. 19.....	46	.5	470	MAY 19.....	21	16.0	460
DEC. 16.....	7.7	.0	---	JUNE 02.....	180	15.0	---
DEC. 17.....	9.8	.0	585	JULY 21.....	71	20.5	460
JAN. 21, 1981...	3.6	.0	500	SEPT. 10.....	234	17.5	---
FEB. 25.....	12	.0	630	SEPT. 22.....	102	13.0	355
MAR. 25.....	62	.5	280				
05124480 KAWISHIWI RIVER NEAR ELY, MN							
NOV. 04, 1980...	212	3.5	32	MAY 06.....	1080	9.5	34
DEC. 03.....	144	.5	32	JUNE 23.....	368	19.0	26
JAN. 27, 1981...	70	.0	43	AUG. 25.....	71	21.5	30
APR. 07.....	174	4.5	---				
05124990 FILSON CREEK NEAR ELY, MN							
NOV. 04, 1980...	6.0	3.0	27	APR. 08.....	35	.5	25
DEC. 03.....	3.4	.5	31	JUNE 22.....	5.8	16.0	26
JAN. 27, 1981...	1.0	.5	77	AUG. 25.....	.22	23.0	38
MAR. 03.....	.81	.5	55				
05127000 KAWISHIWI RIVER NEAR WINTON, MN							
APR. 07, 1981...	851	3.5	68				
05127500 BASSWOOD RIVER NEAR WINTON, MN							
OCT. 23, 1980...	1820	8.0	58	JUNE 24, 1981....	2620	19.5	53
05128000 NAMAKAN RIVER AT OUTLET OF LAC LA CROIX, ONTARIO							
JUNE 11, 1981...	9250	16.5	60				

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05129000 VERMILION RIVER BELOW VERMILION LAKE NEAR TOWER, MN							
NOV. 03, 1980...	260	4.0	65	APR. 06.....	298	4.5	73
DEC. 01.....	216	.5	75	JUNE 29.....	807	19.5	65
JAN. 26, 1981...	117	1.5	81	AUG. 24.....	230	23.0	65
MAR. 02.....	127	2.0	90				
05129115 VERMILLION RIVER NEAR CRANE LAKE, MN							
NOV. 03, 1980...	480	3.5	107	APR. 06.....	1130	4.0	50
DEC. 01.....	367	.0	73	JUNE 30.....	1510	19.5	60
JAN. 26, 1981...	189	.0	87	AUG. 24.....	323	22.5	65
MAR. 02.....	211	.5	90				
05130500 STURGEON RIVER NEAR CHISHOLM, MN							
NOV. 03, 1980...	55	2.5	110	APR. 10.....	200	6.5	75
DEC. 05.....	62	.0	100	JUNE 30.....	480	18.0	55
JAN. 30, 1981...	25	.0	105	AUG. 28.....	30	18.0	110
MAR. 06.....	29	.5	125				
05131500 LITTLE FORK RIVER AT LITTLEFORK, MN							
OCT. 14, 1980...	408	7.0	120	MAR. 23.....	186	.5	233
NOV. 17.....	460	.5	138	APR. 30.....	5240	8.0	100
DEC. 15.....	213	.0	180	MAY 26.....	1460	15.0	140
JAN. 20, 1981...	113	.0	240	JULY 28.....	322	22.0	150
FEB. 23.....	194	.0	260				
05133500 RAINY RIVER AT MANITOU RAPIDS, MN							
OCT. 15, 1980...	4240	7.0	115	MAY 28.....	23200	15.0	89
APR. 30, 1981...	14100	9.0	135				
05134200 RAPID RIVER NEAR BAUDETTE, MN							
OCT. 08, 1980...	126	10.0	170	APR. 02.....	226	1.0	158
NOV. 19.....	200	.5	272	JUNE 02.....	524	13.5	225
DEC. 18.....	34	.0	120	JULY 27.....	100	21.0	150
FEB. 05, 1981...	8.3	.0	380	SEPT. 30.....	118	7.5	198

GROUND-WATER RECORDS


SUPERIOR
LAKE
Volume 1
Volume 2
Duluth
International Falls
Rainy River
Grand Rapids
Mille Lacs Lake
Upper Red Lake
Lower Red Lake
Bemidji
Red River of the North
Moorhead
90°
91°
92°
93°
94°
95°
96°
97°
46°
47°
48°
49°

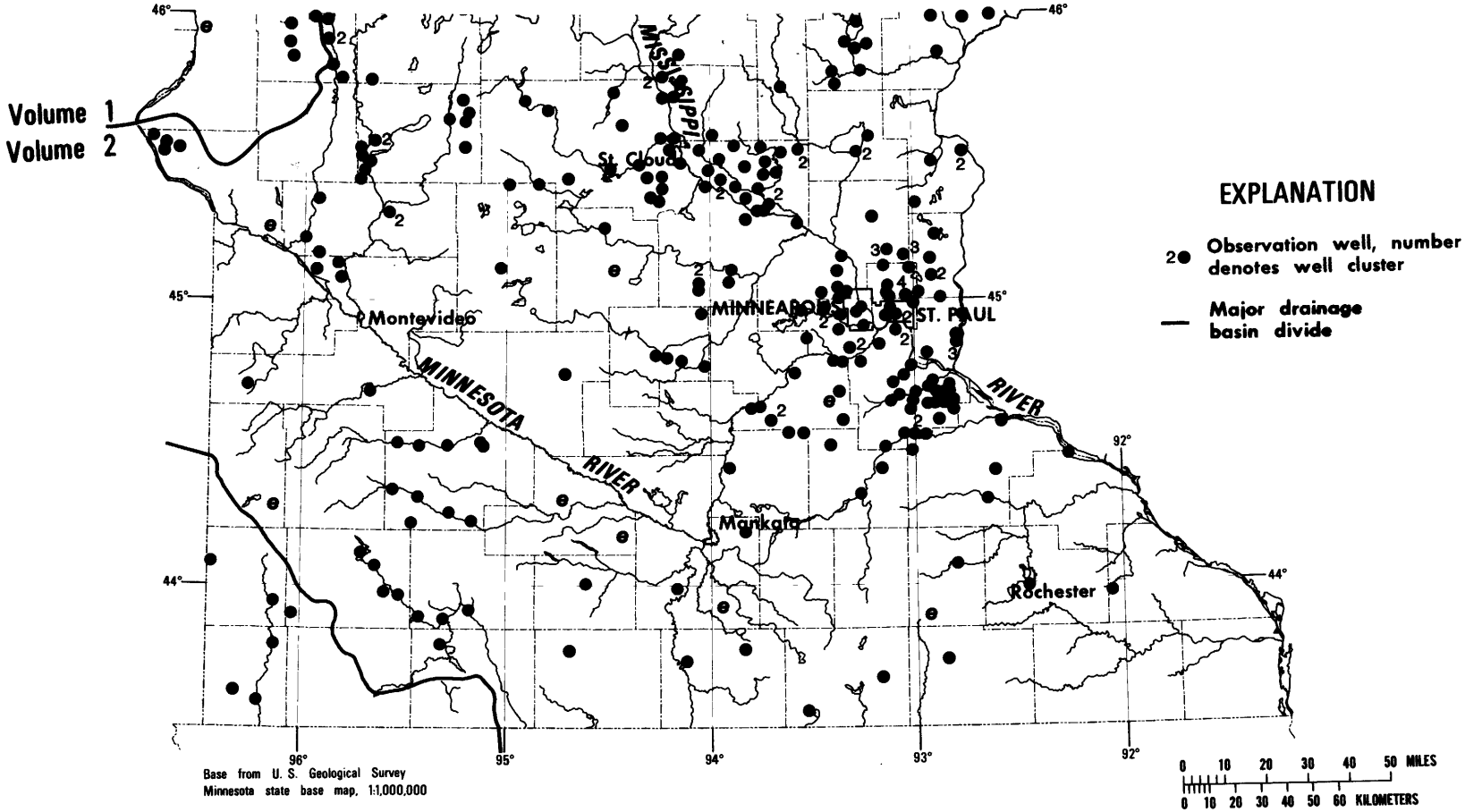


Figure 9.--Location of ground-water wells

BECKER COUNTY

464613095524801. Local number, 138N41W17ADA01.
LOCATION.--Lat 46°46'13", long 95°52'48", in NE¼SE¼NE¼ sec.17, T.138 N., R.41 W., Hydrologic Unit 09020103, east shore of Lake Sallie.
Owner: U.S. Geological Survey.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 6 in (0.15 m), depth 234 ft (71.3 m), screened 222 to 234 ft (67.7 to 71.3 m).
DATUM.--Land-surface datum is 1,333.2 ft (406.4 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 4.40 ft (1.34 m) above land-surface datum.
REMARKS.--Water level affected by pumping of nearby well.
PERIOD OF RECORD.--March 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.44 ft (1.35 m) above land-surface datum, May 23, 27, 1975; lowest, 2.47 ft (0.75 m) below land-surface datum, July 25, 1977.

WATER LEVEL, IN FEET ABOVE LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	2.50	.....	3.00	3.20	2.95	3.00	3.05	1.20	1.55	0.90	1.82	1.50
10	1.80	.....	2.95	3.05	2.90	3.00	3.10	2.50	0.85	0.10	2.00	0.95
15	2.50	.....	3.00	3.10	3.00	3.00	3.00	0.70	1.20	1.60	1.40	0.95
20	2.60	.....	2.80	3.10	2.95	3.00	3.05	0.55	2.20	1.50	0.80	1.20
25	.....	2.85	3.05	3.10	2.90	3.00	2.85	2.10	1.05	2.00	2.10	1.35
EOM	.....	2.95	3.10	2.90	3.00	3.20	2.70	0.65	0.95	0.55	1.40	1.45

WTR YEAR 1981 HIGHEST 3.30 JAN 23, 1981 LOWEST 0.00 JUL 13, 1981

464401095571301. Local number, 138N42W26CDA01.
LOCATION.--Lat 46°44'01", long 95°57'13", in NE¼SE¼SW¼ sec.26, T.138 N., R.42 W., Hydrologic Unit 09020103, on Don Bullock farm.
Owner: Don Bullock.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 90 ft (27.4 m), screened 88 to 90 ft (26.8 to 27.4 m).
DATUM.--Altitude of land-surface datum is 1,390 ft (424 m). Measuring point: Top of casing, 3.00 ft (0.91 m) above land-surface datum.
PERIOD OF RECORD.--November 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 52.62 ft (16.04 m) below land-surface datum, June 13, 1980, Nov. 23, 1980; lowest, 53.99 ft (16.46 m) below land-surface datum, Jan. 22, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 10	53.08	NOV 22	52.62	JAN 17	53.19	FEB 28	53.30	APR 16	53.14	MAY 30	53.36
25	53.19	DEC 20	53.31	30	52.96	MAR 17	53.24	MAY 1	53.29	JUN 29	53.73
NOV 7	53.00	JAN 3	53.40	FEB 15	52.99	31	53.11	16	53.49		

464550096095901. Local number, 138N43W18CDA01.
LOCATION.--Lat 46°45'50", long 96°09'59", in NE¼SE¼SW¼ sec.18, T.138 N., R.18 W., Hydrologic Unit 09020103, on Fred Kraft farm.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in(0.03 m), depth 77 ft (23.5 m), screened 75 to 77 ft (22.9 to 23.5 m).
DATUM.--Altitude of land-surface datum is 1,420 ft (433 m). Measuring point: Top of casing, 3.75 ft (1.14 m) above land-surface datum.
PERIOD OF RECORD.--November 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 58.47 ft (17.82 m) below land-surface datum, June 1, 1980; lowest, 60.04 ft (18.30 m) below land-surface datum, June 1, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 3	59.53	JAN 2	58.83	MAR 2	59.09	APR 2	59.89	MAY 2	59.16	JUN 1	60.04
DEC 1	59.73	FEB 2	59.03								

BECKER COUNTY--Continued

465422095495501. Local number, 140N41W26CCD01.
LOCATION.--Lat 46°54'22", long 95°49'55", in SE¼SW¼SW¼ sec.26, T.140 N., R.41 W., Hydrologic Unit 09020103, on Paul Scarie farm.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 53 ft (16.2 m), screened 51 to 53 ft (15.5 to 16.2 m).
DATUM.--Altitude of land-surface datum is 1,422 ft (433 m). Measuring point: Top of casing, 2.40 ft (0.73 m) above land-surface datum.
PERIOD OF RECORD.--December 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 30.75 ft (9.37 m) below land-surface datum, May 8, 1978; lowest, 33.13 ft (10.10 m) below land-surface datum, June 29, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 10	32.06	NOV 22	32.22	JAN 17	32.44	FEB 28	32.56	APR 16	31.78	MAY 30	32.92
25	32.12	DEC 20	32.33	30	32.52	MAR 17	32.61	MAY 1	32.85	JUN 29	33.13
NOV 7	32.17	JAN 3	32.39	FEB 15	32.58	31	32.69	16	32.94		

BELTRAMI COUNTY

474111094331401. Local number, 149N31W25DCD01.
LOCATION.--Lat 47°41'11", long 94°33'14", in SE¼SW¼SE¼ sec.25, T.149 N., R.31 W., Hydrologic Unit 07010101, at Blackduck Lookout Tower.
Owner: U.S. Geological Survey.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in (0.05 m), depth 157 ft (47.8 m), screened 154 to 157 ft (46.9 to 47.8 m).
DATUM.--Land-surface datum is 1,450 ft (442 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 0.43 ft (0.13 m) below land-surface datum.
PERIOD OF RECORD.--July 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 70.63 ft (21.53 m) below land-surface datum, July 28, 1980; lowest, 104.5 ft (31.85 m) below land-surface datum, July 27, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
APR 2	103.9	JUL 27	104.5	SEP 30	104.2

474111094331402. Local number, 149N31W25DCD02.
LOCATION.--Lat 47°41'11", long 94°33'14", in SE¼SW¼SE¼ sec.25, T.149 N., R.31 W., Hydrologic Unit 07010101, at Blackduck Lookout Tower.
Owner: U.S. Geological Survey
AQUIFER.--Sandy till of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in (0.05 m), depth 65 ft (19.8 m), screened 62 to 65 ft (18.9 to 19.8 m).
DATUM.--Land-surface datum is 1,448 ft (441.4 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 0.40 ft (0.12 m) below land-surface datum.
PERIOD OF RECORD.--July 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 6.49 ft (1.98 m) below land-surface datum, July 27, 1981; lowest, 9.71 ft (2.96 m) below land-surface datum, June 1, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JUN 1	9.71	JUL 27	6.49	SEP 30	7.04

BELTRAMI COUNTY--Continued

474111094331403. Local number, 149N31W25DCD03.
LOCATION.--Lat 47°41'11", long 94°33'14", in SE¼SW¼SE¼ sec.25, T.149 N., R.31 W., Hydrologic Unit 07010101, at Blackduck Lookout Tower.
Owner: U.S. Geological Survey
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in (0.05 m), depth 130 ft (39.6 m), screened 127 to 130 ft (38.7 to 39.6 m).
DATUM.--Land-surface datum is 1,449.7 ft (441.9 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 0.30 ft (0.09 m) below land-surface datum.
PERIOD OF RECORD.--July 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 69.60 ft (21.21 m) below land-surface datum, July 28, 1980; lowest, 102.6 ft (31.27 m) below land-surface datum, July 27, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
APR 2	102.5	JUL 27	102.6	SEP 30	102.0

474111094331404. Local number, 149N31W25DCD04.
LOCATION.--Lat 47°41'11", long 94°33'14", in SE¼SW¼SE¼ sec.25, T.149 N., R.31 W., Hydrologic Unit 07010101, at Blackduck Lookout Tower.
Owner: U.S. Geological Survey.
AQUIFER.--Sandy till of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in (0.05 m), depth 77 ft (23.5 m), screened 74 to 77 ft (22.6 to 23.5 m).
DATUM.--Land-surface datum is 1,449.3 ft (441.8 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 0.75 ft (0.23 m) below land-surface datum.
PERIOD OF RECORD.--July 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.45 ft (7.15 m) below land-surface datum, July 28, 1980; lowest, 62.57 ft (19.07 m) below land-surface datum, Sept. 30, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
APR 2	54.69	JUN 1	57.41	JUL 27	59.93	SEP 30	62.57

482154094334201. Local number, 156N31W01ABA01.
LOCATION.--Lat 48°21'54", long 94°33'42", in NE¼NW¼NE¼ sec.1, T.156 N., R.31 W., Hydrologic Unit 09030007, in Red Lake Wildlife Management Area.
Owner: U.S. Geological Survey.
AQUIFER.--Sandy till of Pleistocene Age.
WELL CHARACTERISTICS.--Driven observation water-table well, diameter 1¼ in (0.03 m), depth 13 ft (4.0 m), screened 11 to 13 ft (3.4 to 4.0 m).
DATUM.--Altitude of land-surface datum is 1,188 ft (362 m). Measuring point: Top of platform, 0.50 ft (0.15 m) above land-surface datum.
PERIOD OF RECORD.--October 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.09 ft (0.01 m) above land-surface datum, May 11, 1979; lowest, 4.25 ft (1.30 m) below land-surface datum, Mar. 3, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	2.91	DEC 18	1.90	APR 23	1.89	JUL 20	1.42	JUL 27	1.40	SEP 30	1.61
NOV 19	1.96										

BELTRAMI COUNTY--Continued

482154094334202. Local number, 156N31W01ABA02.
LOCATION.--Lat 48°21'54", long 94°33'42", in NE¼NW¼NE¼ sec.1, T.156 N., R.31 W., Hydrologic Unit 09030007, in Red Lake Wildlife Management Area.
Owner: U.S. Geological Survey.
AQUIFER.--Sand and peat of Quaternary Age.
WELL CHARACTERISTICS.--Driven observation water-table well, diameter 2 in (0.05 m), depth 3 ft (0.91 m), screened 0 to 3 ft (0 to 0.91 m).
DATUM.--Altitude of land-surface datum is 1,188 ft (362 m). Measuring point: Top of platform, 0.50 ft (0.15 m) above land-surface datum.
REMARKS.--Water level subject to freezing during winter periods.
PERIOD OF RECORD.--October 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.03 ft (0.01 m) below land-surface datum, May 15, 1974; lowest, dry below land-surface datum, Dec. 14, 1973; Feb. 7, 1975; Aug. 6, 1976 to Mar. 3, 1977, Aug. 15, 1977; Aug. 21, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	2.05	NOV 19	1.68	APR 23	1.08	JUL 20	0.76	JUL 27	1.14	SEP 30	1.67

482154094334203. Local number, 156N31W01ABA03.
LOCATION.--Lat 48°21'54", long 94°33'42", in NE¼NW¼NE¼ sec.1, T.156 N., R.31 W., Hydrologic Unit 09030007, in Red Lake Wildlife Management Area.
Owner: U.S. Geological Survey.
AQUIFER.--Sand and peat of Quaternary Age.
WELL CHARACTERISTICS.--Dug observation water-table well, diameter 8 in (0.20 m), depth 3.5 ft (1.1 m), perforated stovepipe 2.3 to 3.5 ft (0.7 to 1.1 m).
DATUM.--Altitude of land-surface datum is 1,188 ft (362 m). Measuring point: Top of platform, 0.50 ft (0.15 m) above land-surface datum.
REMARKS.--Water level subject to freezing during winter periods.
PERIOD OF RECORD.--November 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.27 ft (0.08 m) below land-surface datum, May 10, 1979; lowest, dry below land-surface datum, Oct. 28, 1976 to Mar. 3, 1977; Aug. 10 to Aug. 25, 1977; July 10 to Aug. 25, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	0.95	APR 23	1.17	JUN 1	1.10	JUL 20	1.07	JUL 27	1.34	SEP 30	2.19
NOV 19	0.93										

481711094331601. Local number, 156N31W36DAA01.
LOCATION.--Lat 48°17'11", long 94°33'16", in sec.36, T.156 N., R.31 W., Hydrologic Unit 09020302, at Ludlow Lookout Tower.
Owner: U.S. Geological Survey.
AQUIFER.--Sandy clay of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in (0.05 m), depth 139 ft (42.4 m), screened 136 to 139 ft (41.4 to 42.4 m).
DATUM.--Land-surface datum is 1,194.6 ft (364.1 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.15 ft (6.55 m) above land-surface datum.
PERIOD OF RECORD.--July 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.96 ft (0.29 m) below land-surface datum, July 26, 1980; lowest, 3.16 ft (0.96 m) below land-surface datum, Sept. 30, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
APR 23	2.32	JUN 1	1.40	JUL 27	1.57	SEP 30	3.16

BELTRAMI COUNTY--Continued

481711094331602. Local number, 156N31W36DAA02.
LOCATION.--Lat 48°17'11", long 94°33'16", in NE¼NE¼SE¼ sec.36, T.156 N., R.31 W., Hydrologic Unit 09020302, at Ludlow Lookout Tower.
Owner: U.S. Geological Survey
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in (0.05 m), depth 107 ft (32.6 m), screened 104 to 107 ft (31.7 to 32.6 m).
DATUM.--Land-surface datum is 1,195.8 ft (364.5 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 1.90 ft (0.58 m) above land-surface datum.
PERIOD OF RECORD.--July 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.03 ft (1.23 m) below land-surface datum, July 26, 1980; lowest, 4.78 ft (1.46 m) below land-surface datum, Apr. 23, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
APR 2	4.67	APR 23	4.78	JUN 1	4.76	JUL 27	4.69	SEP 30	4.66

481711094331603. Local number, 156N31W36DAA03.
LOCATION.--Lat 48°17'11", long 94°33'16", in NE¼NE¼SW¼ sec.36, T.156 N., R.31 W., Hydrologic Unit 09020302, at Ludlow Lookout Tower.
Owner: U.S. Geological Survey.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in (0.05 m), depth 82 ft (25.0 m), screened 79 to 82 ft (24.1 to 25.0 m).
DATUM.--Land-surface datum is 1,196.7 ft (364.8 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 3.00 ft (0.91 m) above land-surface datum.
PERIOD OF RECORD.--July 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.52 ft (1.07 m) below land-surface datum, July 26, 1980; lowest, 4.81 ft (1.47 m) below land-surface datum, Apr. 23, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
APR 2	4.80	APR 23	4.81	JUN 1	4.63	JUL 27	4.57	SEP 30	4.34

CARLTON COUNTY

462614092305801. Local number, 046N17W29DBD01.
LOCATION.--Lat 46°26'14", long 92°30'58", in SE¼NW¼SE¼ sec.29, T.46 N., R.17 W., Hydrologic Unit 04010301, on Robert Groth farm.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1½ in (0.04 m), depth 41 ft (12.5 m), screened 39 to 41 ft (11.9 to 12.5 m).
DATUM.--Altitude of land-surface datum is 1,100 ft (335 m). Measuring point: Top of casing, 3.50 ft (1.07 m) above land-surface datum.
PERIOD OF RECORD.--December 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.16 ft (5.23 m) below land-surface datum, July 26, 1979; lowest, 20.23 ft (6.17 m) below land-surface datum, June 12, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 13	19.16	JAN 27	19.70	MAR 18	19.66	MAY 21	19.55	JUL 14	19.06	AUG 31	18.89
NOV 4	19.18	FEB 19	19.77	MAY 2	19.79	JUN 23	19.34	JUL 20	19.06	SEP 24	18.92
DEC 23	19.53										

CARLTON COUNTY--Continued

463437092313301. Local number, 047N17W07AAB01.
LOCATION.--Lat 46°34'37", long 92°31'33", in NW¼NE¼NE¼ sec.7, T.47 N., R.17 W., Hydrologic Unit 04010301, on Merle Olson farm.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1½ in (0.04 m), depth 33 ft (10.1 m), screened 31 to 33 ft (9.4 to 10.1 m).
DATUM.--Altitude of land-surface datum is 1,110 ft (338 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.
PERIOD OF RECORD.--October 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.28 ft (2.83 m) below land-surface datum, July 26, 1979; lowest, 11.41 ft (3.48 m) below land-surface datum, Feb. 20, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 10	10.43	DEC 11	10.91	FEB 20	11.41	APR 29	10.85	JUN 23	10.58	AUG 25	10.56
NOV 17	10.64	JAN 22	11.21	MAR 18	11.21	MAY 20	10.49	JUL 17	10.55	SEP 22	10.79

464346092304901. Local number, 049N17W17ADD01.
LOCATION.--Lat 46°43'46", long 92°30'49", in SE¼SE¼NE¼ sec.17, T.49 N., R.17 W., Hydrologic Unit 04010201, 1.5 mi (2.4 km) west of Cloquet.
Owner: City of Cloquet, well 7.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 48 in (1.22 m), depth 49 ft (14.9 m), screened 39 to 49 ft (11.9 to 14.9 m).
DATUM.--Land-surface datum is 1,263.8 ft (385.2 m) National Geodetic Vertical Datum of 1929. Measuring point: Hole in steel cover, 2.30 ft (0.70 m) above land-surface datum.
PERIOD OF RECORD.--March 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 6.75 ft (2.06 m) below land-surface datum, Apr. 10, 1978; lowest, 9.05 ft (2.76 m) below land-surface datum, Mar. 7, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	7.70	NOV 3	7.62	DEC 3	8.00	JAN 2	8.00	FEB 18	8.20	MAR 10	8.30

464217092312501. Local number, 049N17W29BAD01.
LOCATION.--Lat 46°42'17", long 92°31'25", in SE¼NE¼NW¼ sec.29, T.49 N., R.17 W., Hydrologic Unit 04010201, at Cloquet Forest Experiment Station.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1½ in (0.04 m), depth 26 ft (7.9 m), screened 24 to 26 ft (7.3 to 7.9 m).
DATUM.--Altitude of land-surface datum is 1,270 ft (387 m). Measuring point: Top of casing, 3.00 ft (0.91 m) above land-surface datum.
PERIOD OF RECORD.--November 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 16.14 ft (4.92 m) below land-surface datum, June 11, 1980; lowest, 19.64 ft (5.99 m) below land-surface datum, Mar. 18, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 10	18.97	JAN 22	19.49	MAR 18	19.65	MAY 22	19.09	JUL 13	18.90	AUG 25	19.28
NOV 10	19.16	FEB 29	19.62	APR 29	18.88	JUN 23	18.09	17	18.89	SEP 22	19.51
DEC 11	19.26										

CLAY COUNTY

463854096250701. Local number, 137N45W30CDB01.
LOCATION.--Lat 46°38'54", long 96°25'07", in NE¼SE¼SW¼ sec.30, T.137 N., R.45 W., Hydrologic Unit 09020106, in Barnesville.
Owner: City of Barnesville, well 3.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 10 in (0.25 m), depth 73 ft (22.2 m).
DATUM.--Altitude of land-surface datum is 1,022 ft (312 m). Measuring point: Top of casing, 1.50 ft (0.46 m) above land-surface datum.
PERIOD OF RECORD.--January 1949 to January 1975, May 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.86 ft (0.57 m) below land-surface datum, June 9, 1962; lowest, 11.86 ft (3.61 m) below land-surface datum, June 3, 1970.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	9.63	NOV 28	9.50	FEB 6	9.66	APR 10	9.40	JUN 12	9.60	AUG 7	9.32
13	9.63	DEC 5	9.50	13	9.67	17	9.37	19	9.58	14	9.20
17	9.64	19	9.60	20	9.67	24	9.33	26	9.51	21	9.31
24	9.59	26	9.60	27	9.65	MAY 1	9.34	JUL 3	9.48	28	9.18
31	9.58	JAN 2	9.61	MAR 6	9.63	8	9.41	10	9.74	SEP 4	9.15
NOV 3	9.58	9	9.66	13	9.59	15	9.50	17	9.80	11	8.96
10	9.57	16	9.90	20	9.59	22	9.91	24	9.61	18	9.16
17	9.55	23	9.65	27	9.56	29	9.75	31	9.50	25	9.18
24	9.53	30	9.65	APR 3	9.47	JUN 5	9.62				

465237096383901. Local number, 139N47W05CDC01.
LOCATION.--Lat 46°52'37", long 96°38'39", in SW¼SE¼SW¼ sec.5, T.139 N., R.47 W., Hydrologic Unit 09020104, 2.4 mi (3.9 km) east of Dilworth.
Owner: City of Moorhead, MS-1.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 8 in (0.20 m), depth 131 ft (39.9 m), slotted 91 to 107 ft (27.7 to 32.6 m).
DATUM.--Land-surface datum is 916.7 ft (279.4 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of recorder floor, 3.60 ft (1.10 m) above land-surface datum.
REMARKS.--Water level affected by pumping from nearby wells.
PERIOD OF RECORD.--January 1947 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 12.19 ft (3.72 m) below land-surface datum, July 15, 1947; lowest, 30.59 ft (9.32 m) below land-surface datum, July 23, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	29.81	DEC 17	29.71	MAR 23	29.83	MAY 21	30.20	JUL 22	29.31	SEP 24	29.31
NOV 25	29.64	JAN 22	29.76								

465328096391001. Local number, 139N47W06AAA01.
LOCATION.--Lat 46°53'27", long 96°39'08", in NE¼NE¼NE¼ sec.6, T.139 N., R.47 W., Hydrologic Unit 09020104, 2.7 mi (4.3 km) northeast of Dilworth.
Owner: U.S. Geological Survey, M-80.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 3 in (0.08 m), depth 103 ft (31.4 m), casing slotted near bottom.
DATUM.--Altitude of land-surface datum is 915 ft (279 m). Measuring point: Top of casing, 2.50 ft (0.76 m) above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--July 1949 to April 1966, November 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 16.94 ft (5.16 m) below land-surface datum, July 16, 1949; lowest, 28.59 ft (8.71 m) below land-surface datum, May 21, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	28.02	DEC 17	28.10	MAR 23	28.46	MAY 21	28.59	JUL 22	28.27	SEP 24	28.20
NOV 24	27.92	JAN 22	28.20								

CLAY COUNTY--Continued

465231096415801. Local number, 139N48W11ABA01.
LOCATION.--Lat 46°52'31", long 96°41'58", in NE¼NW¼NE¼ sec.11, T.139 N., R.48 W., Hydrologic Unit 09020104, at Dilworth.
Owner: City of Dilworth.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 8 in (0.20 m), depth 152 ft (46.3 m).
DATUM.--Altitude of land-surface datum is 908 ft (277 m). Measuring point: Top of recorder platform, 2.40 ft (0.73 m) above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--May 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 101.3 ft (30.88 m) below land-surface datum, Dec. 29, 1965; lowest, 129.1 ft (39.35 m) below land-surface datum, July 23, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	123.8	DEC 17	122.6	MAR 24	121.8	MAY 21	126.4	JUL 22	123.8	SEP 24	124.1
NOV 25	123.0	JAN 22	122.3								

GRANT COUNTY

455254096051901. Local number, 128N43W21CBB01.
LOCATION.--Lat 45°52'54", long 96°05'19", in NW¼NW¼SW¼ sec.21, T.128 N., R.43 W., Hydrologic Unit 09020101.
Owner: Edward Ellison.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 6 in (0.15 m), depth 56 ft (17.1 m), screened 51 to 56 ft (15.5 to 17.1 m).
DATUM.--Altitude of land-surface datum is 1,090 ft (332 m). Measuring point: Top of casing, 1.00 ft (0.30 m) above land-surface datum.
PERIOD OF RECORD.--October 1980 to September 1981.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 13.42 ft (4.09 m) below land-surface datum, Feb. 24, 1981; lowest, 13.80 ft (4.21 m) below land-surface datum, May 26, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	13.48	FEB 24	13.42	MAY 26	13.80	JUL 29	13.64	AUG 20	13.57	SEP 21	13.51
DEC 4	13.46	APR 15	13.57	JUN 30	13.60						

455143096050201. Local number, 128N43W28CDC01.
LOCATION.--Lat 45°51'43", long 96°05'02", in SW¼SE¼SW¼ sec.28, T.128 N., R.43 W., Hydrologic Unit 09020102.
Owner: Rodney Koser.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled irrigation water-table well, diameter 12 in (0.30 m), depth 49 ft (14.9 m), screened 36 to 49 ft (11.0 to 14.9 m).
DATUM.--Altitude of land-surface datum is 1,085 ft (331 m). Measuring point: Top of casing, 1.00 ft (0.30 m) above land-surface datum.
PERIOD OF RECORD.--October 1980 to September 1981.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 6.38 ft (1.94 m) below land-surface datum, June 30, 1981; lowest, 8.78 ft (2.68 m) below land-surface datum, Oct. 23, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

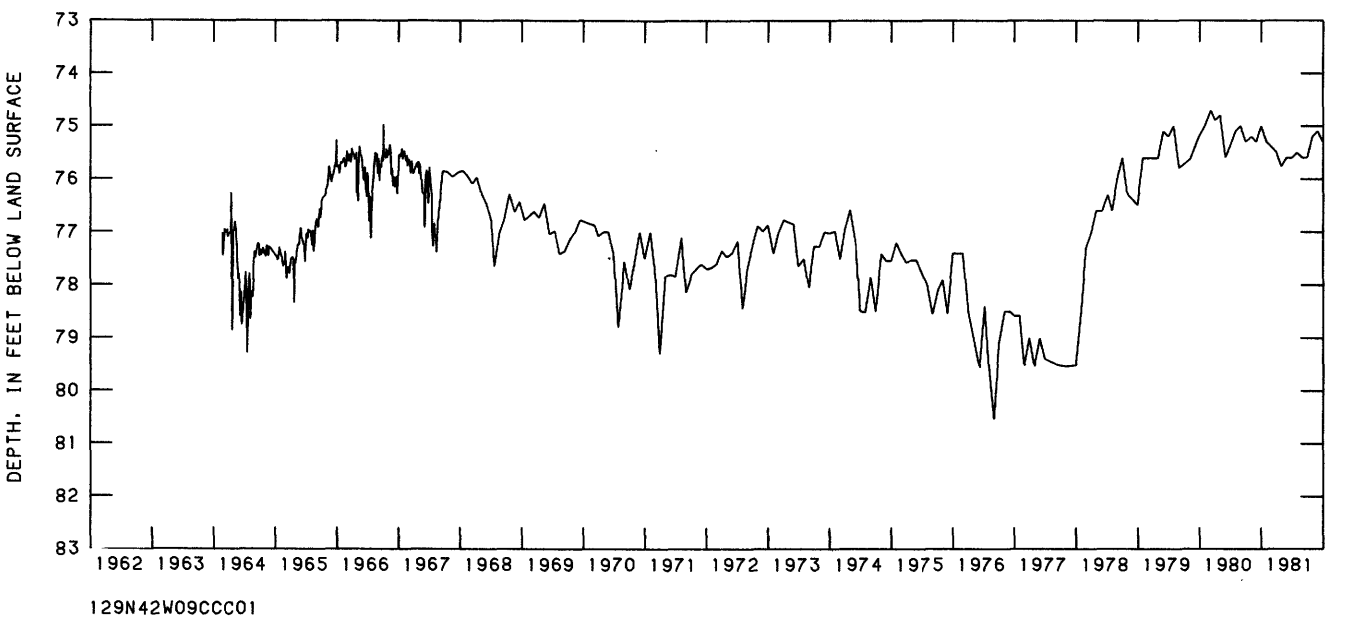
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	8.78	FEB 24	7.61	MAY 26	6.97	JUL 29	6.49	AUG 20	6.90	SEP 21	6.84
DEC 4	8.16	APR 15	7.19	JUN 30	6.38						

GRANT COUNTY--Continued

455932095582601. Local number, 129N42W09CCC01.
LOCATION.--Lat 45°59'32", long 95°58'26", in SW¼SW¼SW¼ sec.9, T.129 N., R.42 W., Hydrologic Unit 09020102, in Elbow Lake.
Owner: City of Elbow Lake, old well 2.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 12 in (0.30 m), depth 214 ft (65.2 m), screened 200 to 220 ft (61.0 to 67.1 m).
DATUM.--Altitude of land-surface datum is 1,222 ft (372 m). Measuring point: Top of platform, 1.40 ft (0.43 m) above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--February 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 74.70 ft (22.77 m) below land-surface datum, Mar. 7, 1980; lowest, 80.54 ft (24.55 m) below land-surface datum, Aug. 31, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	75.20	DEC 31	75.00	MAR 31	75.50	MAY 30	75.60	JUL 31	75.50	SEP 30	75.60
NOV 30	75.30	JAN 31	75.30	APR 30	75.77	JUN 30	75.60	AUG 31	75.60		



455630096035901. Local number, 129N43W34DBA01.
LOCATION.--Lat 45°56'30", long 96°03'59", in NE¼NW¼SW¼ sec.34, T.129 N., R.43 W., Hydrologic Unit 09020102.
Owner: Rudy Rath.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in (0.30 m), depth 186 ft (56.7 m), screened 150 to 186 ft (45.7 to 56.7 m).
DATUM.--Altitude of land-surface datum is 1,138 ft (347 m). Measuring point: Top of casing, 0.10 ft (0.03 m) above land-surface datum.
PERIOD OF RECORD.--October 1980 to September 1981.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 31.65 ft (9.65 m) below land-surface datum, June 30, 1981; lowest, 32.38 ft (9.87 m) below land-surface datum, Oct. 23, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	32.38	APR 15	31.68	JUN 30	31.65	JUL 29	31.74	AUG 20	31.82	SEP 21	32.15
FEB 24	31.66	MAY 26	32.24								

GRANT COUNTY--Continued

460249096094301. Local number, 130N44W25BCB01.
LOCATION.--Lat 46°02'49", long 96°09'43", in NW¼SW¼NW¼ sec.25, T.130 N., R.44 W., Hydrologic Unit 09020101.
Owner: Adams Bros.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 12 in (0.30 m), depth 105 ft (32.0 m), screened 85 to 105 ft (25.9 to 32.0 m).
DATUM.--Altitude of land-surface datum is 1,092 ft (333 m). Measuring point: Opening in casing, 0.20 ft (0.06 m) above land-surface datum.
PERIOD OF RECORD.--June 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 35.80 ft (10.91 m) below land-surface datum, June 16, 1980; lowest, 61.97 ft (18.89 m) below land-surface datum, Aug. 22, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

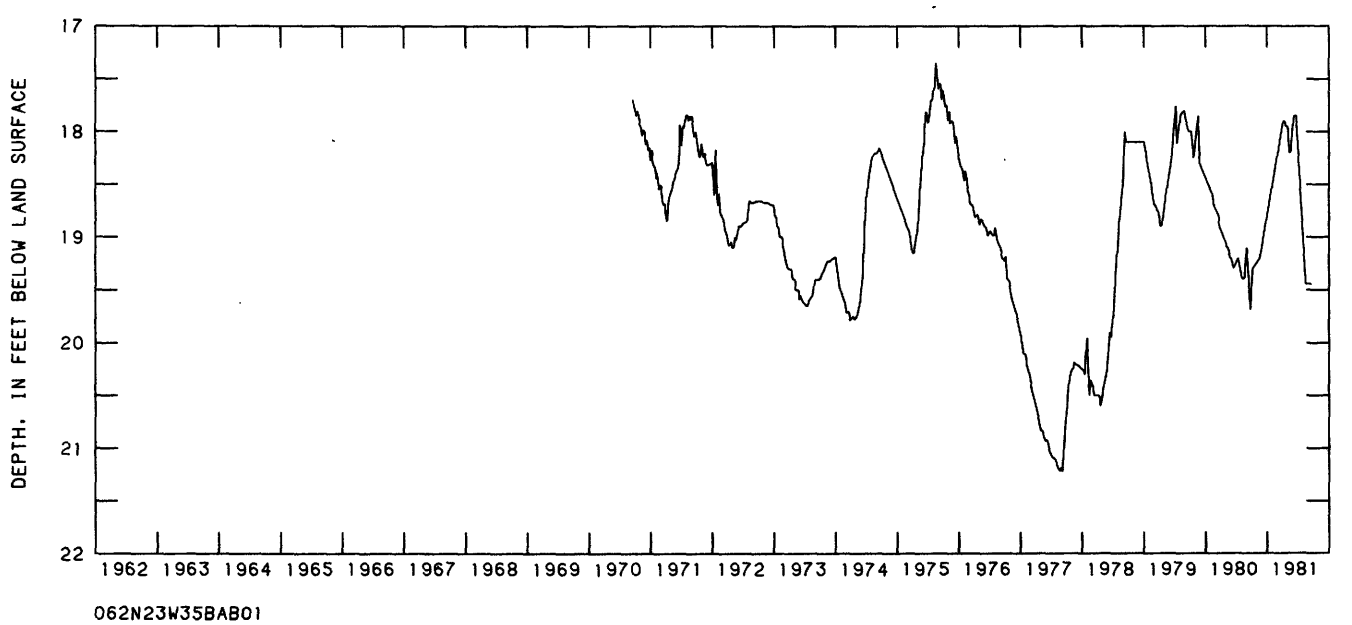
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 4	38.93	APR 15	37.52	JUN 30	40.93	JUL 29	39.65	AUG 20	39.86	SEP 21	39.54
FEB 23	37.62	MAY 26	56.42								

ITASCA COUNTY

474917093144601. Local number, 062N23W35BAB01.
LOCATION.--Lat 47°49'17", long 93°14'46", in NW¼NE¼NW¼ sec.35, T.62 N., R.23 W., Hydrologic Unit 09030005, at Thistledew Ranger Station.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 29 ft (8.8 m), screened 27 to 29 ft (8.2 to 8.8 m).
DATUM.--Altitude of land-surface datum is 1,393 ft (425 m). Measuring point: Top of casing, 3.30 ft (1.01 m) above land-surface datum.
REMARKS.--Measured weekly by State Forestry personnel.
PERIOD OF RECORD.--September 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.35 ft (5.29 m) below land-surface datum, Aug. 20, 1975; lowest, 21.22 ft (6.47 m) below land-surface datum, Aug. 24, Sept. 7, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 8	19.30	APR 8	17.90	APR 24	17.95	MAY 14	18.20	JUN 10	17.85	AUG 19	19.45
NOV 20	19.20	15	17.90	MAY 6	17.95	20	18.20	24	17.85	SEP 16	19.45



ITASCA COUNTY--Continued

473840093515101. Local number, 148N25W08DDD01.
LOCATION.--Lat 47°38'40", long 93°51'51", in SE¼SE¼SE¼ sec.8, T.148 N., R.25 W., Hydrologic Unit 09030006, at Spring Lake.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 10 ft (3.0 m), screened 8 to 10 ft (2.4 to 3.0 m).
DATUM.--Altitude of land-surface datum is 1,350 ft (411 m). Measuring point: Top of casing, 3.40 ft (1.04 m) above land-surface datum.
PERIOD OF RECORD.--September 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.40 ft (1.34 m) below land-surface datum, July 13, 1979; lowest, 7.44 ft (2.27 m) below land-surface datum, Jan. 3, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

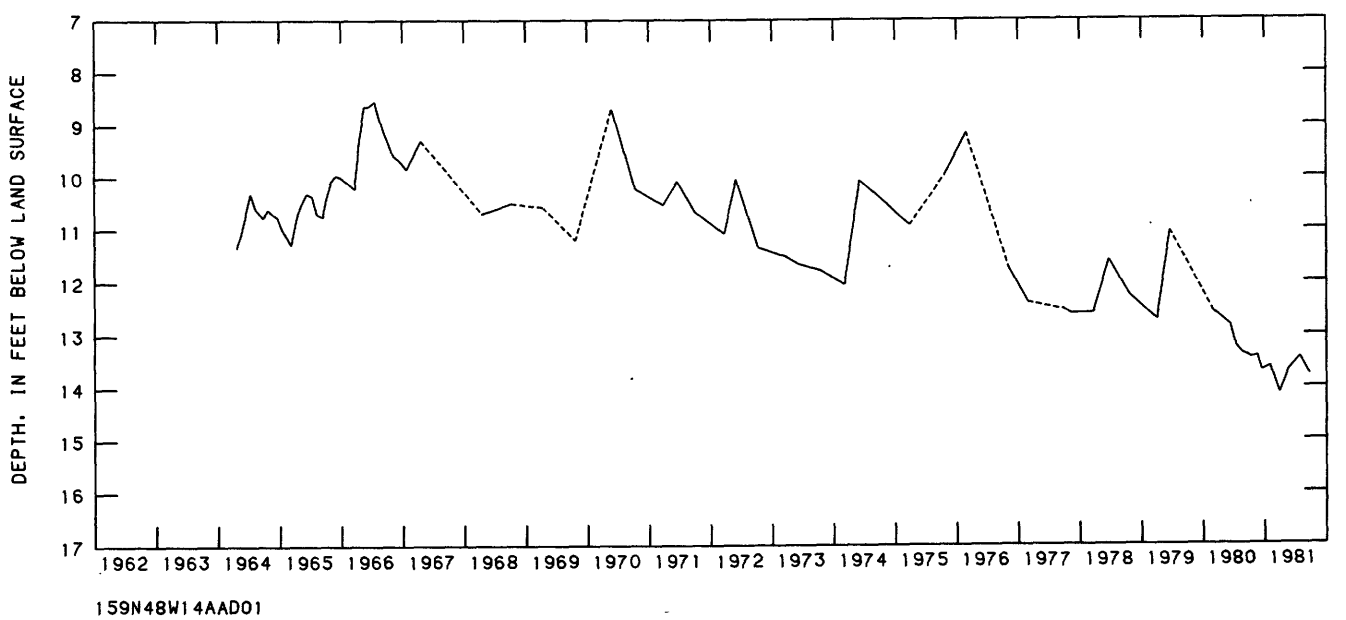
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 14	5.61	DEC 15	6.03	FEB 23	5.93	MAY 26	5.59	JUL 29	5.78	SEP 30	5.40
NOV 17	5.69	JAN 19	6.45	MAR 23	6.21						

KITTSON COUNTY

483557096480601. Local number, 159N48W14AAD01.
LOCATION.--Lat 48°35'57", long 96°48'06", in SE¼NE¼NE¼ sec.14, T.159 N., R.48 W., Hydrologic Unit 09020311, at Davis Township sandpit, southeast of Kennedy.
Owner: Davis Township.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Dug domestic water-table well, diameter 48 in (1.22 m), cased to 16 ft (4.9 m), open end.
DATUM.--Altitude of land-surface datum is 862 ft (263 m). Measuring point: Top of pump platform, 6.00 ft (1.83 m) above land-surface datum.
PERIOD OF RECORD.--April 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.54 ft (2.60 m) below land-surface datum, July 19, 1966; lowest, 14.14 ft (4.31 m) below land-surface datum, Mar. 31, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	13.46	DEC 16	13.70	MAR 31	14.14	MAY 20	13.70	JUL 28	13.44	SEP 23	13.77
NOV 18	13.43	FEB 3	13.62								



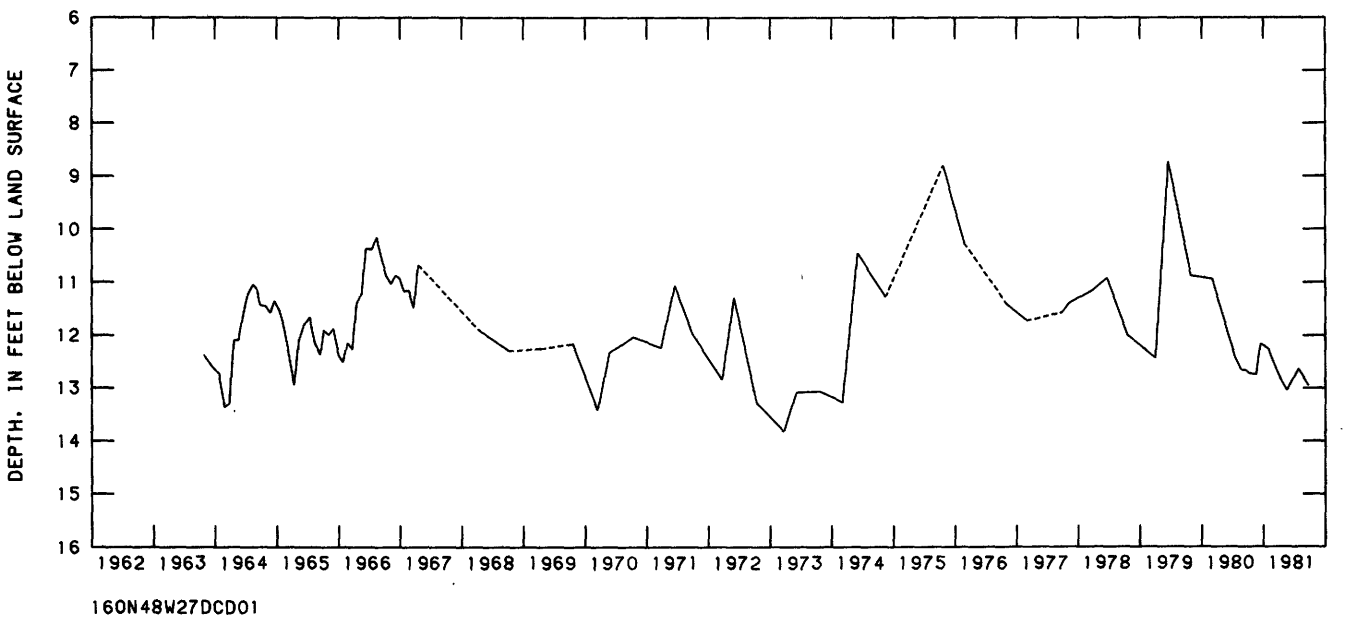
KITTSON COUNTY--Continued

483843096493001. Local number, 160N48W27DCD01.
LOCATION.--Lat 48°38'43", long 96°49'30", in SE¼SW¼SE¼ sec.27, T.160 N., R.48 W., Hydrologic Unit 09020311, 3.6 mi (5.8 km) east of Kennedy.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 2 in (0.05 m), depth 25 ft (7.6 m), screened 22 to 25 ft (6.7 to 7.6 m).
DATUM.--Altitude of land-surface datum is 855 ft (261 m). Measuring point: Top of casing, 3.60 ft (1.10 m) above land-surface datum.
REMARKS.--Water level affected by pumping from nearby well.
PERIOD OF RECORD.--October 1963 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.72 ft (2.66 m) below land-surface datum, June 19, 1979; lowest, 13.82 ft (4.21 m) below land-surface datum, Mar. 21, 1973.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	12.73	DEC 16	12.16	MAR 31	s12.74	MAY 20	13.05	JUL 28	12.63	SEP 23	s12.95
NOV 18	12.75	FEB 3	12.28								

s Nearby well being pumped.



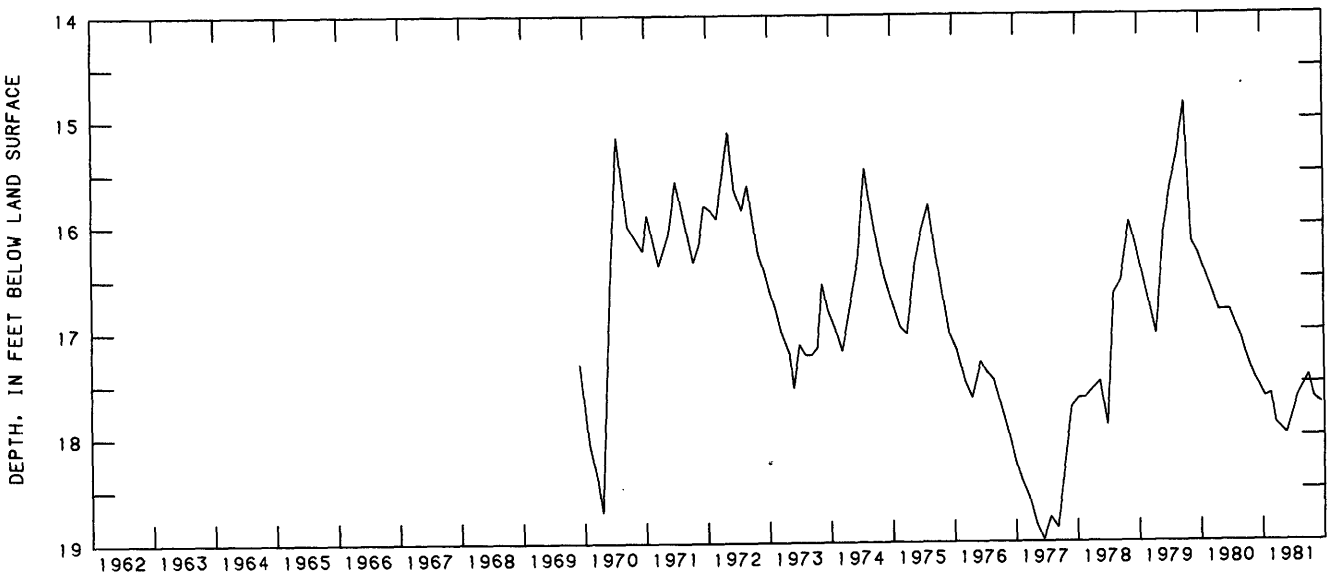
KOOCHICHING COUNTY

481148093445601. Local number, 066N27W24DAA01.
LOCATION.--Lat 48°11'48", long 93°44'56", in NE¼NE¼SE¼ sec.24, T.66 N., R.27 W., Hydrologic Unit 09030006, 2.5 mi (4.0 km) east of Big Falls.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 22 ft (6.7 m), casing perforated near bottom.
DATUM.--Altitude of land-surface datum is 1,234 ft (376 m). Measuring point: Top of casing, 3.12 ft (0.95 m) above land-surface datum.
PERIOD OF RECORD.--December 1969 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 14.85 ft (4.53 m) below land-surface datum, Oct. 4, 1979; lowest, 18.98 ft (5.78 m) below land-surface datum, June 13, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 14	17.30	DEC 15	17.53	FEB 23	17.61	MAR 23	17.88	MAY 26	17.99	JUL 29	17.63
NOV 17	17.45	JAN 19	17.64								

KOOCHICHING COUNTY--Continued



066N27W24DAA01

481345093582801. Local number, 155N26W21DAA01.
LOCATION.--Lat 48°13'45", long 93°58'28", in NE¼NE¼SE¼ sec.21, T.155 N., R.26 W., Hydrologic Unit 09030006, in Pine Island State Forest.
Owner: U.S. Geological Survey.
AQUIFER.--Till of Pleistocene Age.
WELL CHARACTERISTICS.--Driven observation artesian well, diameter 1¼ in (0.03 m), depth 11 ft (3.4 m), screened 8 to 11 ft (2.4 to 3.4 m).
DATUM.--Altitude of land-surface datum is 1,208 ft (368 m). Measuring point: Top of casing, 2.50 ft (0.76 m) above land-surface datum.
REMARKS.--Water level subject to freezing during winter periods.
PERIOD OF RECORD.--October 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.65 ft (0.20 m) above land-surface datum, Dec. 8, 1975; lowest, 3.97 ft (1.21 m) below land-surface datum, Feb. 7, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 14	0.90	DEC 15	1.18	FEB 23	0.79	MAR 23	1.42	MAY 26	0.35	JUL 29	1.07
NOV 17	0.77	JAN 19	1.59								

481345093582802. Local number, 155N26W21DAA02.
LOCATION.--Lat 48°13'45", long 93°58'28", in NE¼NE¼SE¼ sec.21, T.155 N., R.26 W., Hydrologic Unit 09030006, in Pine Island State Park.
Owner: U.S. Geological Survey.
AQUIFER.--Peat of Quaternary Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 2 in (0.05 m), depth 3 ft (0.9 m), screened 0 to 3 ft (0.0 to 0.9 m).
DATUM.--Altitude of land-surface datum is 1,208 ft (368 m). Measuring point: Top of plastic casing, 2.50 ft (0.76 m) above land-surface datum.
PERIOD OF RECORD.--October 1973 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.58 ft (0.18 m) above land-surface datum, May 26, 1981; lowest, dry below land-surface datum, Oct. 4, 1976 to Mar. 21, 1977; Aug. 25, 1980.

WATER LEVEL, IN FEET BELOW OR ABOVE (+) LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 14	0.03	NOV 17	+0.10	MAY 26	+0.58	JUL 29	0.09

LAKE OF THE WOODS COUNTY

484552095052401. Local number, 161N34W18BCC01.
LOCATION.--Lat 48°45'52", long 95°05'24", in SW¼SW¼NW¼ sec.18, T.161 N., R.34 W., Hydrologic Unit 09030009, 2.4 mi (3.9 km) south of Roosevelt.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 11 ft (3.4 m), screened 9 to 11 ft (2.7 to 3.4 m).
DATUM.--Altitude of land-surface datum is 1,210 ft (369 m). Measuring point: Top of casing, 4.60 ft (1.40 m) above land-surface datum.
PERIOD OF RECORD.--September 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.76 ft (1.15 m) below land-surface datum, Apr. 27, 1978; lowest, 8.05 ft (2.45 m) below land-surface datum, Aug. 25, 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 8	6.76	DEC 18	6.15	APR 2	6.90	MAY 18	5.90	JUL 20	4.74	SEP 21	4.82
NOV 19	6.36	FEB 5	6.85								

MAHNOMEN COUNTY

471653096020301. Local number, 144N42W20BBA01.
LOCATION.--Lat 47°16'53", long 96°02'03", in NE¼NW¼NW¼ sec.20, T.144 N., R.42 W., Hydrologic Unit 09020108, about 3 mi (4.8 km) southwest of Mahnomen.
Owner: Tom Wendt.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 4 in (0.10 m), depth 130 ft (39.6 m).
DATUM.--Altitude of land-surface datum is 1,197 ft (365 m). Measuring point: Top of casing, 1.60 ft (0.49 m) above land-surface datum.
PERIOD OF RECORD.--August 1964 to September 1969, August 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 45.43 ft (13.85 m) below land-surface datum, May 18, 1966; lowest, 47.81 ft (14.57 m) below land-surface datum, Sept. 16, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	47.27	DEC 16	47.21	MAR 18	47.08	MAY 15	47.24	JUL 15	47.41	SEP 16	47.81
NOV 19	47.36	JAN 21	47.22								

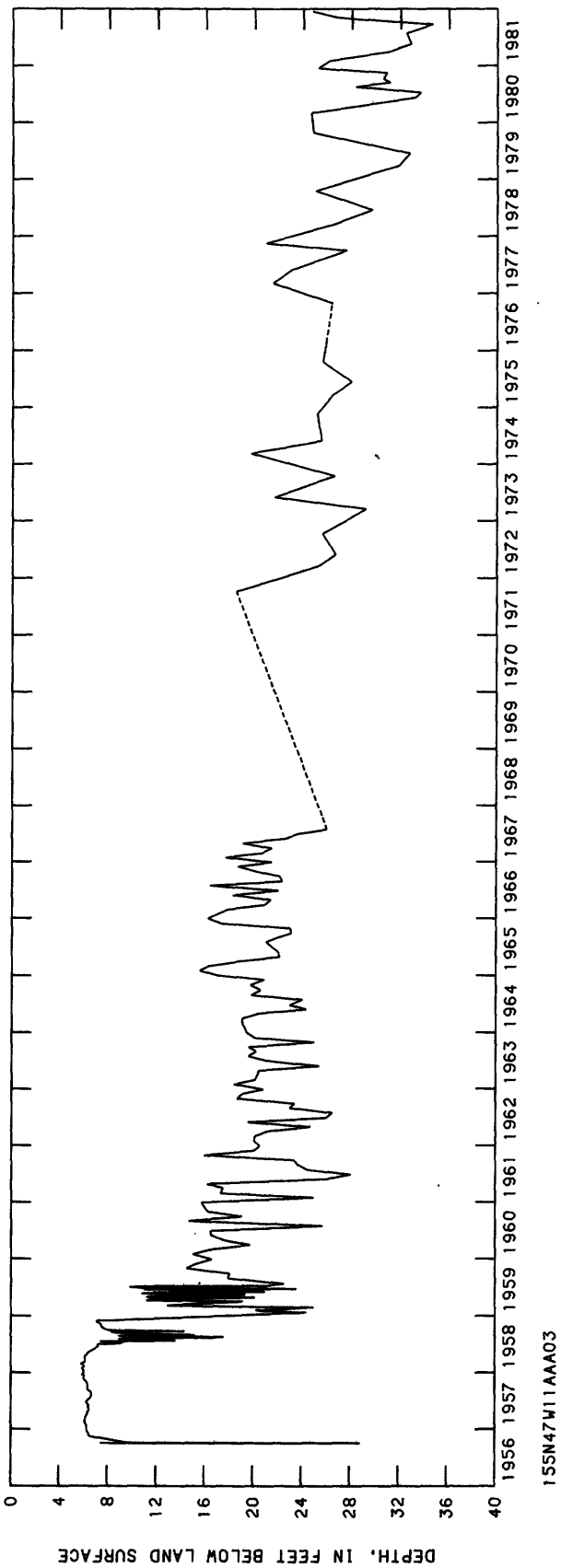
MARSHALL COUNTY

481604096391501. Local number, 155N47W11AAA03.
LOCATION.--Lat 48°16'04", long 96°39'15", in NE¼NE¼NE¼ sec.11, T.155 N., R.47 W., Hydrologic Unit 09020309, 6.5 mi (10.5 km) northeast of Warren.
Owner: U.S. Geological Survey.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 6 in (0.15 m), depth 86 ft (26.2 m), screened 83 to 86 ft (25.3 to 26.2 m).
DATUM.--Altitude of land-surface datum is 905 ft (276 m). Measuring point: Wood floor of instrument shelter, 3.10 ft (0.94 m) above land-surface datum.
REMARKS.--Water level affected by pumping from nearby city well. Water-level hydrograph for this well is in the introduction to this volume.
PERIOD OF RECORD.--October 1956 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.83 ft (1.78 m) below land-surface datum, Feb. 26, 1958; lowest, 33.66 ft (10.26 m) below land-surface datum, July 15, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	s30.57	DEC 16	s25.24	MAR 31	s30.92	MAY 21	32.87	JUL 29	32.45	SEP 24	s34.62
NOV 18	s30.86	FEB 3	26.16								

s Nearby well being pumped.


DEPTH, IN FEET BELOW LAND SURFACE
0
4
8
12
16
20
24
28
32
36
40
1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981
155N47W11AAA03

MARSHALL COUNTY--Continued

481538096400201. Local number, 155N47W11CAB01.
LOCATION.--Lat 48°15'38", long 96°40'02", in NW¼NE¼SW¼ sec.11, T.155 N., R.47 W., Hydrologic Unit 09020309, 7.7 mi (12.4 km) northeast of Warren.
Owner: Carl Mortenson.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled domestic and stock artesian well, diameter 4 in (0.10 m), depth 67 ft (20.4 m), open end.
DATUM.--Altitude of land-surface datum is 897 ft (273 m). Measuring point: Top of casing, 1.00 ft (0.30 m) above land-surface datum.
PERIOD OF RECORD.--July 1954 to July 1967, August 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.40 ft (0.73 m) below land-surface datum, Jan. 28 and Feb. 17, 1956; lowest, 29.68 ft (9.05 m) below land-surface datum, May 21, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	23.25	DEC 16	24.48	MAR 31	26.89	MAY 21	29.68	JUL 29	28.99	SEP 24	29.36
NOV 18	23.58	FEB 3	26.85								

482048096481901. Local number, 156N48W10DAA02.
LOCATION.--Lat 48°20'48", long 96°48'19", in NE¼NE¼SE¼ sec.10, T.156 N., R.48 W., Hydrologic Unit 09020309, northeast of Argyle.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 26 ft (7.9 m), screened 24 to 26 ft (7.3 to 7.9 m).
DATUM.--Altitude of land-surface datum is 851 ft (259 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--September 1963 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 3.55 ft (1.08 m) below land-surface datum, June 19, 1979; lowest, 11.53 ft (3.51 m) below land-surface datum, Mar. 9, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	6.76	DEC 16	6.57	MAR 31	6.92	MAY 20	6.54	JUL 28	6.87	SEP 23	6.66
NOV 18	6.37	FEB 3	7.17								

482008096482401. Local number, 156N48W15AAD02.
LOCATION.--Lat 48°20'08", long 96°48'24", in SE¼NE¼NE¼ sec.15, T.156 N., R.48 W., Hydrologic Unit 09020309, at Argyle.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 20 ft (6.1 m), screened 18 to 20 ft (5.5 to 6.1 m).
DATUM.--Altitude of land-surface datum is 853 ft (260 m). Measuring point: Top of casing, 3.00 ft (0.91 m) above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--September 1963 to April 1966, August 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.99 ft (1.52 m) below land-surface datum, Aug. 8, 1979; lowest, 10.89 ft (3.32 m) below land-surface datum, May 18, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	6.01	DEC 16	6.03	MAR 31	6.37	MAY 20	6.05	JUL 28	5.77	SEP 23	6.07
NOV 18	6.01	FEB 3	6.43								

MARSHALL COUNTY--Continued

482354096501001. Local number, 157N48W27BAA01.
LOCATION.--Lat 48°23'54", long 96°50'10", in NE¼NE¼NW¼ sec.27, T.157 N., R.48 W., Hydrologic Unit 09020311, 4.3 mi (6.9 km) north of Argyle.
Owner: U.S. Geological Survey.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation artesian well, diameter 1¼ in (0.03 m), depth 24 ft (7.3 m), screened 22 to 24 ft (6.7 to 7.3 m).
DATUM.--Altitude of land-surface datum is 844 ft (257 m). Measuring point: Top of casing, 3.00 ft (0.91 m) above land-surface datum.
PERIOD OF RECORD.--October 1971 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.88 ft (0.57 m) below land-surface datum, July 29, 1975; lowest, 5.39 ft (1.64 m) below land-surface datum, Mar. 31, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	5.09	DEC 16	5.14	MAR 31	5.39	MAY 20	5.31	JUL 28	5.10	SEP 23	5.36
NOV 18	5.12	FEB 3	5.24								

OTTER TAIL COUNTY

462522096031901. Local number, 134N43W14ADB01.
LOCATION.--Lat 46°25'22", long 96°03'19", in NW¼SE¼NE¼ sec.14, T.134 N., R.43 W., Hydrologic Unit 09020103, on Ron Heikes farm.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 50 ft (15.2 m), screened 48 to 50 ft (14.6 to 15.2 m).
DATUM.--Altitude of land-surface datum is 1,280 ft (390 m). Measuring point: Top of casing, 2.00 ft (0.61 m) above land-surface datum.
PERIOD OF RECORD.--November 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 24.04 ft (7.33 m) below land-surface datum, May 2, 1980; lowest, 26.52 ft (8.08 m) below land-surface datum, Jan. 2, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 3	26.27	JAN 2	26.52	MAR 3	26.16	APR 2	25.54	MAY 2	26.27	JUN 2	25.34
DEC 1	26.46	FEB 3	26.38								

463418095334201. Local number, 136N39W23DCC01.
LOCATION.--Lat 46°34'18", long 95°33'42", in SW¼SW¼SE¼ sec.23, T.136 N., R.39 W., Hydrologic Unit 09020103, at Perham dump.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 26 ft (7.9 m), screened 24 to 27 ft (7.3 to 7.9 m).
DATUM.--Altitude of land-surface datum is 1,350 ft (411 m). Measuring point: Top of casing, 1.00 ft (0.30 m) above land-surface datum.
PERIOD OF RECORD.--November 1967 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.90 ft (3.02 m) below land-surface datum, Aug. 10, 1972; lowest, 16.67 ft (5.08 m) below land-surface datum, Feb. 9, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	14.65	JAN 21	15.49	MAR 18	15.80	MAY 19	15.95	JUL 16	16.30	SEP 16	15.77
DEC 16	15.25										

OTTER TAIL COUNTY--Continued

463650096042801. Local number, 136N43W10AAA01.
LOCATION.--Lat 46°36'50", long 96°04'28", in NE¼NE¼NE¼ sec.10, T.136 N., R.43 W., Hydrologic Unit 09020103, on Oliver Haugrud farm.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 22 ft (6.7 m), screened 20 to 22 ft (6.1 to 6.7 m).
DATUM.--Altitude of land-surface datum is 1,322 ft (403 m). Measuring point: Top of casing, 2.00 ft (0.61 m) above land-surface datum.
PERIOD OF RECORD.--July 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 6.89 ft (2.10 m) below land-surface datum, Apr. 16, 1980; lowest, 8.67 ft (2.64 m) below land-surface datum, Dec. 1, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 3	8.59	JAN 2	8.65	MAR 2	7.77	APR 2	7.69	MAY 2	8.36	JUN 1	8.12
DEC 1	8.67	FEB 2	8.66								

463430096050201. Local number, 136N43W22CDA02.
LOCATION.--Lat 46°34'30", long 96°05'02", in NE¼SE¼SW¼ sec.22, T.136 N., R.43 W., Hydrologic Unit 09020103, at Pelican Rapids.
Owner: City of Pelican Rapids, well 2.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 10 in (0.25 m), depth 113 ft (34.4 m), screened 87 to 113 ft (26.5 to 34.4 m).
DATUM.--Land-surface datum is 1,354 ft (412.8 m) National Geodetic Vertical Datum of 1929. Measuring point: Bottom lip of access pipe, 2.30 ft (0.70 m) above land-surface datum.
PERIOD OF RECORD.--March 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 46.97 ft (14.32 m) below land-surface datum, June 20, 1979; lowest, 55.33 ft (16.86 m) below land-surface datum, Oct. 13, 1970.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 18	49.30	JAN 23	49.27	MAR 24	49.06

463956095352601. Local number, 137N39W22ACD01.
LOCATION.--Lat 46°39'56", long 95°35'26", in SE¼SW¼NE¼ sec.22, T.137 N., R.39 W., Hydrologic Unit 09020103, 4.5 mi (7.2 km) north of Perham.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 2 in (0.10 m), depth 24 ft (7.3 m), screened 21 to 24 ft (6.4 to 7.3 m).
DATUM.--Altitude of land-surface datum is 1,370 ft (418 m). Measuring point: Top of casing, 0.50 ft (0.15 m) above land-surface datum.
PERIOD OF RECORD.--December 1967 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.29 ft (2.22 m) below land-surface datum, July 15, 1975; lowest, 11.41 ft (3.48 m) below land-surface datum, Mar. 10, 15, 1977.

WATER LEVEL, IN FEET ABOVE LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	9.40	.....	.....	9.82	10.02	10.18	.....	.....	10.24	10.52	10.70	.....
10	9.42	.....	.....	9.88	10.05	10.20	.....	.....	10.28	.....	10.10	.....
15	9.44	.....	.....	9.92	10.09	.....	.....	.....	10.26	10.72	10.06	10.45
20	9.38	.....	9.72	9.94	10.12	.....	.....	10.20	10.36	10.80	10.20	10.47
25	.....	.....	9.76	9.94	10.14	.....	.....	10.22	10.32	10.86	10.26	10.46
EOM	.....	.....	9.79	9.98	10.16	.....	.....	10.24	10.40	10.84	10.26	10.44

WTR YEAR 1981 HIGHEST 9.38 OCT 20, 1980 LOWEST 10.86 JUL 25, 1981

PENNINGTON COUNTY

480707096103501. Local number, 154N43W33ADA01.
LOCATION.--Lat 48°07'07", long 96°10'35", in NE¼SE¼NE¼ sec.33, T.154 N., R.43 W., Hydrologic Unit 09020303, in Thief River Falls.
Owner: Land O'Lakes Hatchery.
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 3 in (0.08 m), depth 124 ft (37.8 m).
DATUM.--Altitude of land-surface datum is 1,127 ft (344 m). Measuring point: Top of casing, 6.40 ft (1.95 m) below land-surface datum.
PERIOD OF RECORD.--February 1965 to September 1969, August 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 34.40 ft (10.49 m) below land-surface datum, Feb. 21, 1967; lowest, 39.16 ft (11.94 m) below land-surface datum, Oct. 7, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	39.16	DEC 15	38.02	FEB 2	38.04	MAR 31	37.50	JUL 29	38.19	SEP 24	38.32
NOV 18	38.39										

ST. LOUIS COUNTY

472638092533601. Local number, 057N20W05DAD01.
LOCATION.--Lat 47°26'38", long 92°53'36", in SE¼NE¼SE¼ sec.5, T.57 N., R.20 W., Hydrologic Unit 04010201, 2.5 mi (4.0 km) east of Hibbing.
Owner: Burlington Northern, Inc.
AQUIFER.--Biwabik Iron Formation of Middle Precambrian Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 12 in (0.30 m), depth 430 ft (131 m), cased to 315 ft (96.0 m).
DATUM.--Altitude of land-surface datum is 1,470 ft (448 m). Measuring point: Top of platform, 1.20 ft (0.37 m) above land-surface datum.
PERIOD OF RECORD.--August 1955 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 55.29 ft (16.85 m) below land-surface datum, Sept. 22, 1972; lowest, 69.07 ft (21.05 m) below land-surface datum, Jan. 15, 1965.

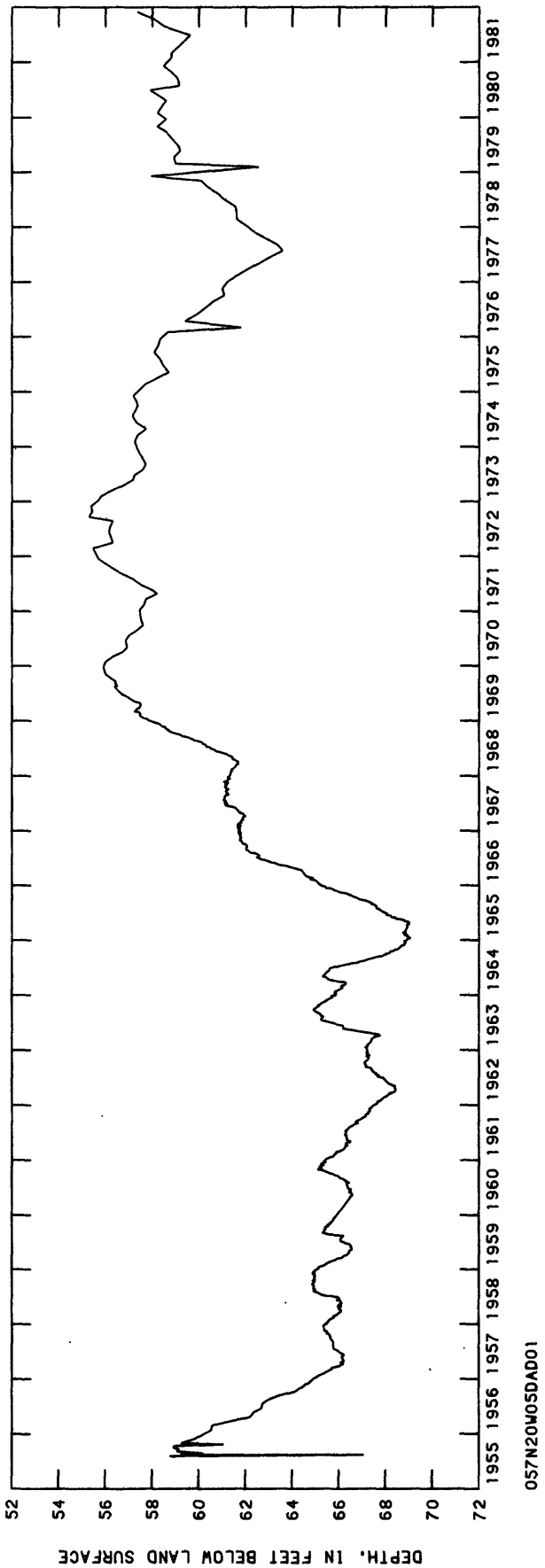
WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 6	58.77	JAN 30	58.81	MAR 5	58.82	APR 9	59.06	JUN 30	59.62	AUG 24	58.51
DEC 5	58.48										

472230092561001. Local number, 057N20W31DBC01.
LOCATION.--Lat 47°22'30", long 92°56'10", in SW¼NW¼SE¼ sec.31, T.57 N., R.20 W., Hydrologic Unit 04010201, 1.4 mi (2.25 km) south of Hibbing.
Owner: Mesaba County Club.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused artesian and water-table well, diameter 18 in (0.46 m), depth 92 ft (28.0 m), screened 82 to 92 ft (25.0 to 28.0 m).
DATUM.--Altitude of land-surface datum is 1,391 ft (424 m). Measuring point: Hole east side of pump base, 3.00 ft (0.91 m) above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--February 1958 to March 1965, July 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.85 ft (1.78 m) below land-surface datum, May 23, 1962; lowest, 15.05 ft (3.56 m) below land-surface datum, June 30, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 6	9.25	JAN 30	10.56	MAR 5	10.03	APR 9	9.05	JUN 30	7.00	AUG 27	7.05
DEC 5	10.54										


DEPTH, IN FEET BELOW LAND SURFACE
52
54
56
58
60
62
64
66
68
70
72
1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981
057N20W05DAD01

ST. LOUIS COUNTY--Continued

473102092345001. Local number, 058N18W12CCC01.
LOCATION.--Lat 47°31'02", long 92°34'50", in SW¼SW¼SW¼ sec.12, T.58 N., R.18 W., Hydrologic Unit 04010201, 1 mi (1.6 km) west of Virginia.
Owner: U.S. Steel Corp.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 6 in (0.15 m), depth 97 ft (29.6 m), slotted casing between 67 to 97 ft (20.4 to 29.6 m).
DATUM.--Land-surface datum is 1,427.5 ft (435.1 m) National Geodetic Vertical Datum of 1929. Measuring point: Edge of vent pipe, 1.90 ft (0.58 m) above land-surface datum.
PERIOD OF RECORD.--December 1954 to July 1964, July 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 10.64 ft (3.24 m) below land-surface datum, July 20, 1957; lowest, 17.47 ft (5.32 m) below land-surface datum, Apr. 2, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	13.35	DEC 5	13.93	MAR 4	14.70	APR 9	14.62	JUN 30	12.38	AUG 26	12.66
NOV 5	13.56	JAN 28	14.86								

473011092524301. Local number, 058N20W16DBC01.
LOCATION.--Lat 47°30'11", long 92°52'43", in SW¼NW¼SE¼ sec.16, T.58 N., R.20 W., Hydrologic Unit 04010201, in Chisholm.
Owner: City of Chisholm.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 12 in (0.30 m), depth 40 ft (12.2 m), screened 30 to 40 ft (9.1 to 12.2 m).
DATUM.--Altitude of land-surface datum is 1,500 ft (457 m). Measuring point: Top of wood platform, 1.70 ft (0.52 m) above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--August 1953 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.23 ft (0.07 m) below land-surface datum, May 10, 1954; lowest, 15.60 ft (4.75 m) below land-surface datum, Mar. 23-24, 1957.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 3	2.55	JAN 30	4.46	MAR 6	5.37	APR 9	2.22	JUN 30	1.65	AUG 28	3.98
DEC 5	3.30										

474253091574101. Local number, 060N13W01BBA01.
LOCATION.--Lat 47°42'53", long 91°57'41", in NE¼NW¼NW¼ sec.1, T.60 N., R.13 W., Hydrologic Unit 09030001, at Babbitt water tower.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 2 in (0.05 m), depth 30 ft (9.1 m), screened 27 to 30 ft (8.2 to 9.1 m).
DATUM.--Altitude of land-surface datum is 1,485 ft (453 m). Measuring point: Top of 3 in (0.08 m) pipe, 4.00 ft (1.22 m) above land-surface datum.
PERIOD OF RECORD.--October 1975 to June 1978, July 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 20.70 ft (6.31 m) below land-surface datum, Oct. 6, 1975; lowest, 26.03 ft (7.93 m) below land-surface datum, June 14, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 1	21.54	DEC 1	21.54	MAR 1	22.29	APR 1	22.38	JUL 1	21.00	SEP 1	21.00

ST. LOUIS COUNTY--Continued

475502091494601. Local number, 063N12W26ABB01.
LOCATION.--Lat 47°55'02", long 91°49'46", in NW¼NW¼NE¼ sec.26, T.63 N., R.12 W., Hydrologic Unit 09030001, at Ely.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 9 ft (2.7 m), screened 7 to 9 ft (2.1 to 2.7 m).
DATUM.--Altitude of land-surface datum is 1,342 ft (409 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.
PERIOD OF RECORD.--October 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.78 ft (0.54 m) below land-surface datum, Oct. 29, 1970; lowest, 6.87 ft (2.09 m) below land-surface datum, Sept. 27, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

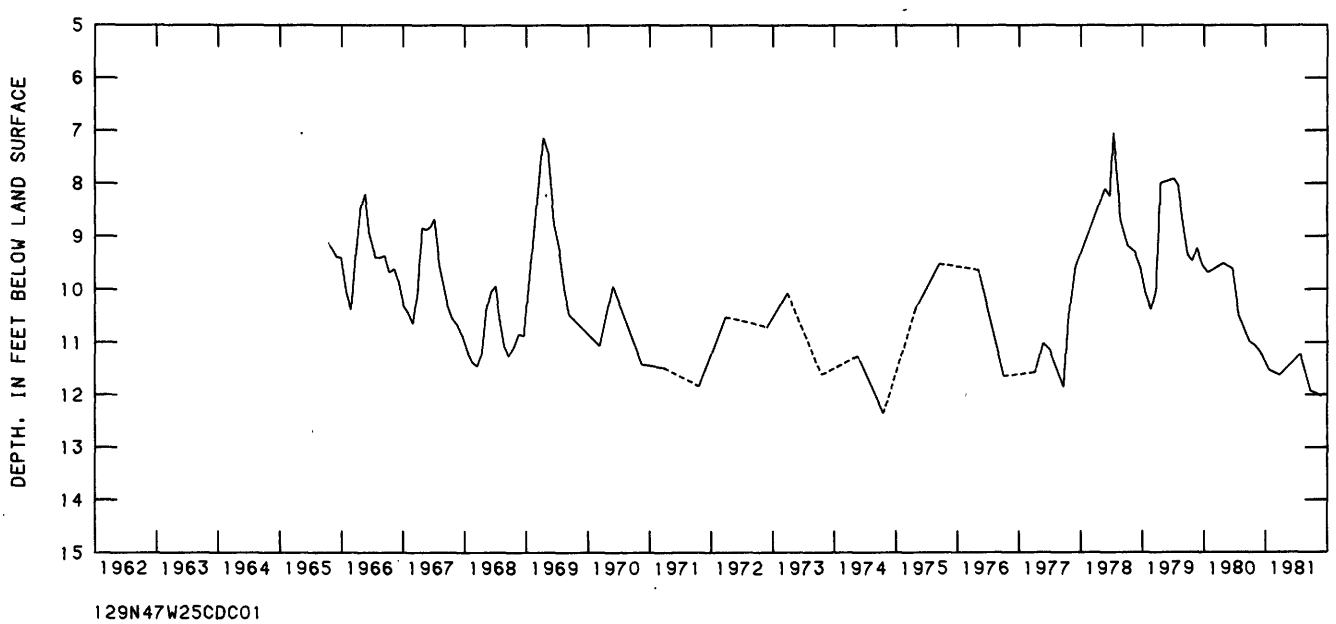
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 5	3.33	JAN 27	4.92	MAR 2	4.06	APR 8	2.40	JUN 30	1.88	AUG 24	5.26
DEC 3	3.68										

TRAVERSE COUNTY

455700096314001. Local number, 129N47W25CDC01.
LOCATION.--Lat 45°57'00", long 93°31'40", in SW¼SE¼SW¼ sec.25, T.129 N., R.47 W., Hydrologic Unit 09020101, 9 mi (14.5 km) north of Wheaton.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 39 ft (11.9 m), open end.
DATUM.--Altitude of land-surface datum is 1,010 ft (308 m). Measuring point: Top of casing, 2.00 ft (0.61 m) above land-surface datum.
PERIOD OF RECORD.--October 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.05 ft (2.15 m) below land-surface datum, July 14, 1978; lowest, 12.36 ft (3.77 m) below land-surface datum, Oct. 18, 1974.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	11.05	DEC 17	11.27	JAN 23	11.53	MAR 24	11.63	JUL 28	11.22	SEP 24	11.93
NOV 20	11.14										



WILKIN COUNTY

460422096193701. Local number, 130N45W15BCC01.
LOCATION.--Lat 46°04'22", long 96°19'37", in SW¼SW¼NW¼ sec.15, T.130 N., R.45 W., Hydrologic Unit 09020101, 2 mi (3.5 km) north of Nashua.
Owner: Earl Davison
AQUIFER.--Buried sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled irrigation artesian well, diameter 16 in (0.41 m), depth 226 ft (68.9 m), screened 181 to 226 ft (55.2 to 68.9 m).
DATUM.--Altitude of land-surface datum is 994 ft (303 m). Measuring point: Top of casing, 1.00 ft (0.30 m) above land-surface datum.
PERIOD OF RECORD.--October 1980 to September 1981.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.67 ft (1.73 m) below land-surface datum, Apr. 15, 1981; lowest, 6.09 ft (1.86 m) below land-surface datum, Oct. 24, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	6.09	APR 15	5.67	MAY 26	5.78	JUL 29	5.75	AUG 20	5.69	SEP 21	5.88
DEC 4	6.02										

463422096341701. Local number, 136N47W23CCC01.
LOCATION.--Lat 46°34'22", long 96°34'17", in SW¼SW¼SW¼ sec.23, T.136 N., R.47 W., Hydrologic Unit 09020106, 7.5 mi (12.1 km) east of Wolverton.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1¼ in (0.03 m), depth 62 ft (18.9 m), screened 58 to 62 ft (17.7 to 18.9 m).
DATUM.--Land-surface datum is 953.9 ft (290.8 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.00 ft (0.61 m) above land-surface datum.
PERIOD OF RECORD.--October 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.61 ft (0.80 m) below land-surface datum, Mar. 21, 1966; lowest, 9.42 ft (2.87 m) below land-surface datum, Feb. 16, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	6.90	DEC 17	7.39	MAR 23	8.15	MAY 21	7.28	JUL 22	7.02	SEP 24	7.77
NOV 25	7.15	JAN 22	7.88								

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

STATION NUMBER	LOCAL IDENT-I-FIER	GEO-LOGIC UNIT	DATE OF SAMPLE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	SAMP-LING DEPTH (FT) (00003)	DEPTH OF WELL, TOTAL (FEET) (72008)	PUMP OR FLOW PERIOD PRIOR TO SAM-PLING (MIN) (72004)	FLOW RATE (GPM) (00058)
			CARLTON						
463130092322901	047N17W30CDD TRIANGLE CO	112OTSH	81-07-23	1525	--	15.4	--	--	--
463949092281801	048N17W02CCD C06	112OTSH	81-06-29	1125	--	25.0	--	--	--
464006092420601	048N18W01CBC C010 HIPPIE	112OTSH	81-07-13	1540	--	17.5	--	--	--
464020092405401	048N18W06BCC C027 PERCH	112OTSH	81-07-16	0930	--	11.3	--	--	--
464217092312501	049N17W29BAD CLOQUET EXP	112OTSH	81-07-13	1230	--	22.0	--	--	--
464312092354201	049N18W23BBB C008 CHURCH	112OTSH	81-07-15	1545	--	10.4	--	--	--
464348092304801	049N17W17ADD CLOQUET #7	112OTSH	81-06-29	0945	--	9.00	--	--	--
			ITASCA						
474300093402801	060N26W05BAA TOM MOORS B	400GRNT	81-07-24	0930	--	--	145	--	--
475119093290201	062N25W13CCD ORIN PATROW	210CRCS	81-07-23	1900	--	--	170	--	--
475209093463001	062N27W15ABA F LEWANDOWS	400GRNT	81-07-23	1700	--	--	300	--	--
			NORMAN						
471457096444301	144N48W34BAD01 BERG BILL	210CRCS	81-07-07	1800	--	--	296	--	--
471716096323101	144N46W17CBB01 JAMISON T	400GRNT	81-07-07	1700	--	322	322	--	--
			PINE						
462614092305801	046N17W29DBD GROTH NR NI	112OTSH	81-07-14	1200	--	22.4	--	--	--
			POLK						
473128096165001	147N44W29ADA01 GRIDVIG A	400GRNT	81-07-07	1545	--	394	394	--	--
			ST LOUIS						
464721092305501	050N17W29ADA SL01 NELSON	112OTSH	81-07-15	1350	--	10.1	--	--	--
465019092421001	050N19W11AAA SL04 MARTIN	112OTSH	81-07-15	1115	--	3.39	--	--	--
465126092365101	051N18W34CCA SL03 KLUG	112OTSH	81-07-15	0930	--	13.9	--	--	--
482607092510001	069N20W25BCC KABATOGAMA	400GRNT	81-07-28	1005	--	20.0	--	--	--
483810092382001	070N18W33DDB KETTLE FALL	112BRDO	81-09-17	1400	7.10	13.8	36	210	150
			WILKIN						
462407096390701	134N47W19CCA01 RIELAND E	210CRCS	81-07-08	0900	--	371	371	--	--
463612096430201	136N48W10CCC01 HOPPE DON	400GRNT	81-07-08	1000	--	221	221	--	--

DATE OF SAMPLE	FLOW RATE, INSTAN-TANEOUS (GPM) (00059)	SPE-CIFIC CON-DUCT-ANCE (UMHOS) (00095)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3) (95902)	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)	PERCENT SODIUM (00932)	SODIUM AD-SORP-TION RATIO (00931)
					CARLTON							
81-07-23	--	200	160	6.6	10.0	65	13	15	6.8	6.2	17	.3
81-06-29	--	740	598	7.3	12.0	240	31	65	19	12	10	.3
81-07-13	--	295	154	7.4	9.0	73	6.0	22	4.5	2.6	7	.1
81-07-16	--	235	202	6.4	10.0	93	15	27	6.2	2.8	6	.1
81-07-13	--	265	224	6.4	10.0	76	10	21	5.6	16	31	.8
81-07-15	--	220	172	6.2	11.0	70	28	18	6.1	4.6	12	.2
81-06-29	--	300	284	8.2	10.0	130	.00	28	15	6.6	10	.3
					ITASCA							
81-07-24	--	380	384	7.8	8.0	160	.00	41	13	33	31	1.2
81-07-23	--	363	384	7.3	8.5	180	.00	46	16	18	18	.6
81-07-23	--	1430	1660	7.2	6.5	850	540	190	92	76	16	1.1

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

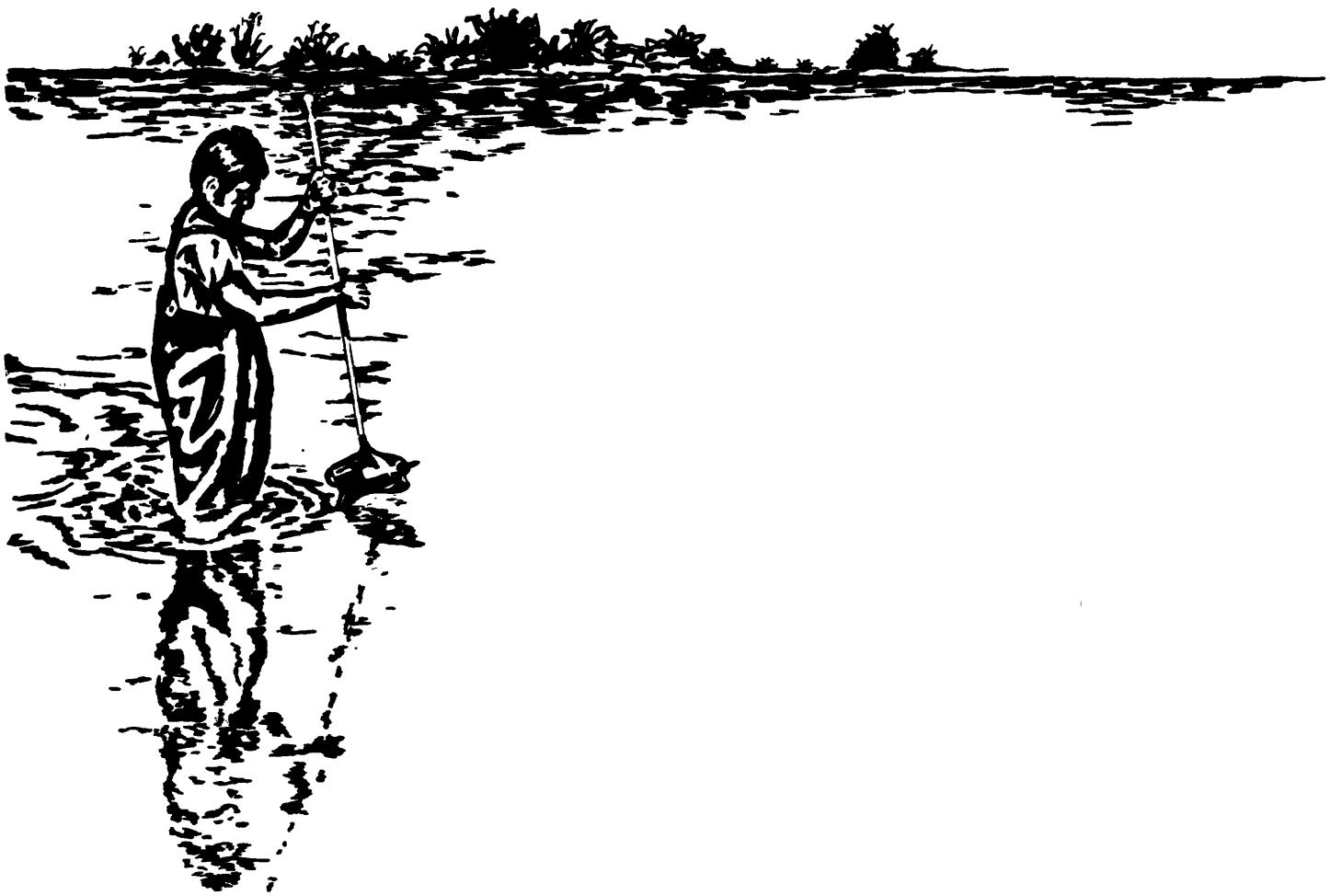
DATE OF SAMPLE	FLOW RATE, INSTANTANEOUS (GPM) (00059)	SPECIFIC CONDUCTANCE (UMHOS) (00095)	SPECIFIC CONDUCTANCE LAB (UMHOS) (90095)	PH (UNITS) (00400)	TEMPERATURE (DEG C) (00010)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS NONCARBONATE (MG/L AS CACO3) (95902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)
						NORMAN						
81-07-07	--	1920	2080	--	10.0	66	.00	15	6.9	460	93	25
81-07-07	--	1360	1400	--	10.0	110	.00	30	8.8	260	83	11
						PINE						
81-07-14	--	145	75	6.9	13.0	30	10	7.3	2.8	2.7	16	.2
						POLK						
81-07-07	--	763	790	--	--	220	.00	42	27	93	48	2.8
						ST LOUIS						
81-07-15	--	675	659	6.3	13.0	250	230	67	21	13	10	.4
81-07-15	--	300	276	7.1	12.0	130	3.0	35	11	3.2	5	.1
81-07-15	--	160	139	6.6	8.0	66	.00	16	6.4	2.9	9	.2
81-07-28	--	410	--	8.5	8.0	--	--	26	--	--	--	--
81-09-17	150	285	178	6.4	8.0	70	9.0	16	7.2	8.0	19	.4
						WILKIN						
81-07-08	--	2060	2180	--	10.0	190	.00	52	14	440	82	14
81-07-08	--	3000	3240	--	10.0	110	.00	4.9	23	700	93	29

DATE OF SAMPLE	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)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P) (00671)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4) (00660)
						CARLTON						
81-07-23	.9	52	11	11	<.1	10	117	99	.04	<.010	--	--
81-06-29	1.7	210	1.5	63	<.1	40	372	344	.01	.020	--	--
81-07-13	.4	67	11	.8	.1	23	96	105	.02	<.010	--	--
81-07-16	.7	78	11	3.1	<.1	16	124	124	2.1	<.010	--	--
81-07-13	1.0	66	13	13	<.1	16	132	137	2.6	<.010	--	--
81-07-15	.8	42	14	7.7	<.1	25	125	124	3.7	<.010	--	--
81-06-29	.9	150	.9	1.9	.3	16	159	161	.02	.060	--	--
						ITASCA						
81-07-24	1.6	210	6.8	.6	.3	27	247	250	.06	--	<.010	--
81-07-23	1.6	210	9.0	3.4	.2	16	235	237	<.01	--	.010	.03
81-07-23	5.1	310	700	4.6	.8	27	1230	1280	.05	--	<.010	--
						NORMAN						
81-07-07	4.4	310	6.2	490	1.2	17	1200	1190	<.01	--	.060	.18
81-07-07	4.1	320	44	230	.6	27	811	798	.02	--	.260	.80
						PINE						
81-07-14	.6	20	9.1	13	<.1	<.1	33	35	.11	<.010	--	--
						POLK						
81-07-07	3.1	350	70	12	.6	22	504	481	.02	--	.020	.06

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE OF SAMPLE	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)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P) (00671)	PHOSPHATE, ORTHO, DISSOLVED (MG/L AS PO4) (00660)
						ST LOUIS						
81-07-15	.9	26	5.6	41	<.1	19	502	431	56	<.010	--	--
81-07-15	1.0	130	11	.7	.1	25	167	166	.06	<.010	--	--
81-07-15	.4	66	4.5	.5	.1	32	97	103	.07	<.010	--	--
81-07-28	--	--	--	2.9	--	--	--	--	<.01	--	--	--
81-09-17	3.2	61	18	--	.1	--	--	--	.54	--	--	--
						WILKIN						
81-07-08	17	280	470	240	1.7	16	1440	1420	.01	--	<.010	--
81-07-08	8.1	220	810	380	1.0	4.6	2070	2070	<.01	--	.010	.03

DATE OF SAMPLE	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	RA-226, DISSOLVED, PLANCHET COUNT (PCI/L) (09510)	RADON 222 DISSOLV (PC/L) (82305)
			CARLTON		
81-07-23	10	6000	150	--	--
81-06-29	30	6900	8200	.1	10
81-07-13	20	170	50	--	--
81-07-16	10	80	450	--	--
81-07-13	30	110	9	--	--
81-07-15	10	5900	100	--	--
81-06-29	30	920	200	<.1	180
			ITASCA		
81-07-24	300	60	40	--	--
81-07-23	80	10	200	--	--
81-07-23	360	1600	90	--	--
			NORMAN		
81-07-07	2200	210	5	--	--
81-07-07	840	210	20	--	--
			PINE		
81-07-14	10	1200	170	--	--
			POLK		
81-07-07	570	<10	20	--	--
			ST LOUIS		
81-07-15	30	110	50	--	--
81-07-15	10	40	60	--	--
81-07-15	10	60	50	--	--
81-07-28	--	460	--	--	--
81-09-17	--	110	50	--	--
			WILKIN		
81-07-08	1300	920	60	--	--
81-07-08	3100	130	20	--	--



INDEX

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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). This report contains both the inch-pound and SI unit equivalents in the station manuscript descriptions.

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

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