Water Resources Data for Minnesota

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

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MN-80-1

WATER YEAR 1980

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 1980

1979

OCTOBER

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1980

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SEPTEMBER

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UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

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1981

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 J. E. Biesecker, 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 Robert J. Dingman, Assistant Chief Hydrologist for Scientific Publication 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

REPORT DOCUMENTATION PAGE	1. REPORT NO. USGS/WRD/HD-81/088	2.	3. Recipient's Accession No.

4. Title and Subtitle
Water Resources for Minnesota, Water Year 1980
Volume 1. Great Lakes and Souris-Red-Rainy River Basins

5. Report Date
August 1981

6.

7. Author(s)

8. Performing Organizetion Rept. No.

9. Performing Organization Name and Address
U.S. Geological Survey, Water Resources Division
702 Post Office Building
St. Paul, Minnesota 55101

10. Project/Task/Work Unit No.
USGS-WRD-MN-80-1

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

12. Sponsoring Organization Name and Address
U.S. Geological Survey, Water Resources Division
702 Post Office Building
St. Paul, Minnesota 55101

13. Type of Report & Period Covered
Annual Oct. 1, 1979
to Sept. 30, 1980

14.

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

16. Abstract (Limit: 200 words)

Water-resources data for the 1980 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 54 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 5 wells; and water levels for 45 observation wells. Also included are 51 high-flow partial-record stations and 86 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. These data, together with the data in Volume 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 No restriction on distribution
This report may be purchased from
National Technical Information Service
Springfield, VA 22161

19. Security Class (This Report) UNCLASSIFIED

20. Security Class (This Page) UNCLASSIFIED

21. No. of Pages 241

22. Price

(See ANSI-Z39.18) See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

CONTENTS

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)

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

INTRODUCTION

Water resources data for the 1980 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 54 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 5 wells; and water levels for 45 observation wells. Also included are 51 high-flow partial-record stations and 86 low-flow partial-record stations. Additional water data were collected at various sites, not involved in the systematic data collection program, and are published as miscellaneous measurements. 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-80-1." 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. Braum, commissioner.

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

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

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

Coon Creek Watershed District, Harold G. Israelson, district engineer.

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 44 gaging stations and 14 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 border 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

During the 1980 water year, streamflow in northern Minnesota began in the deficient range during the fall, increased to normal during the winter and early spring period, but in May returned to the deficient range where it remained for the rest of the water year. Several record or near record lows were recorded in the Baptism, Pigeon, Rainy, Rapid, Roseau, Sand Hill, and Buffalo River basins during this latter period.

Precipitation was above normal over the entire northern and western part of the State at the beginning of the 1980 water year, but was deficient for almost every month that followed. Annual precipitation was about 3 inches below normal over the north and west with the exception of the northwest where it was 5 inches below normal.

Monthly and annual mean discharge is compared with median discharge for the period 1941-70 at three representative gaging stations in figure 1.

At the end of the 1980 water year, ground-water levels in west-central, north-central, and northeast Minnesota were generally within a foot of average for the period of record. Water levels had recovered from the drought of the mid-1970's to a high in 1979. Since 1979, there has been a general decline in water levels to normal predrought conditions. In northwest Minnesota, there was a general decline in water levels during 1980 and levels in several observation wells are 3 feet or more below the average level for the period of record. A hydrograph (fig. 2) shows water levels in a representative network observation well, 1953-80.

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.

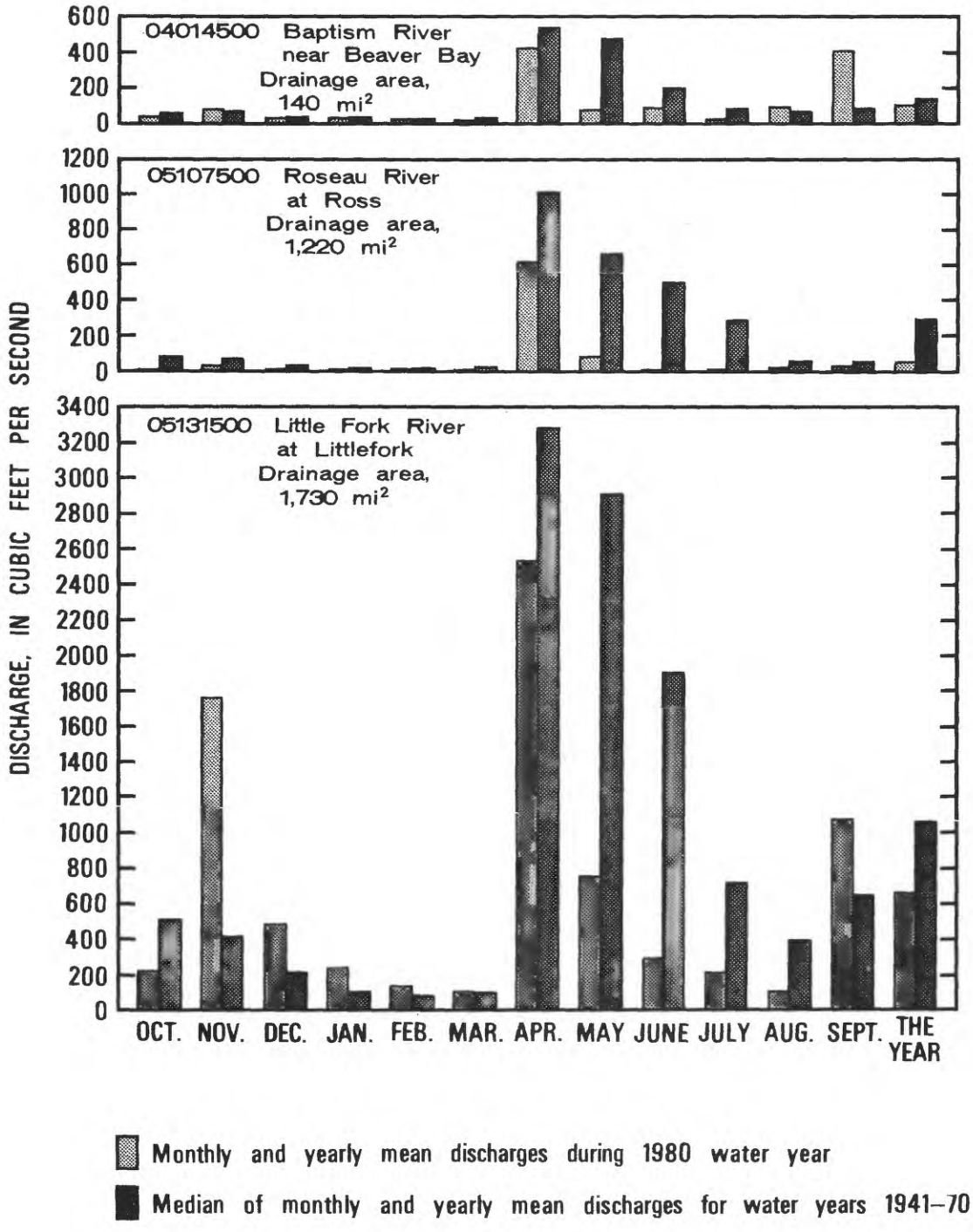


Figure 1.--Comparison of discharge at three long—term representative gaging stations for the current year with median discharge for water years 1941—70

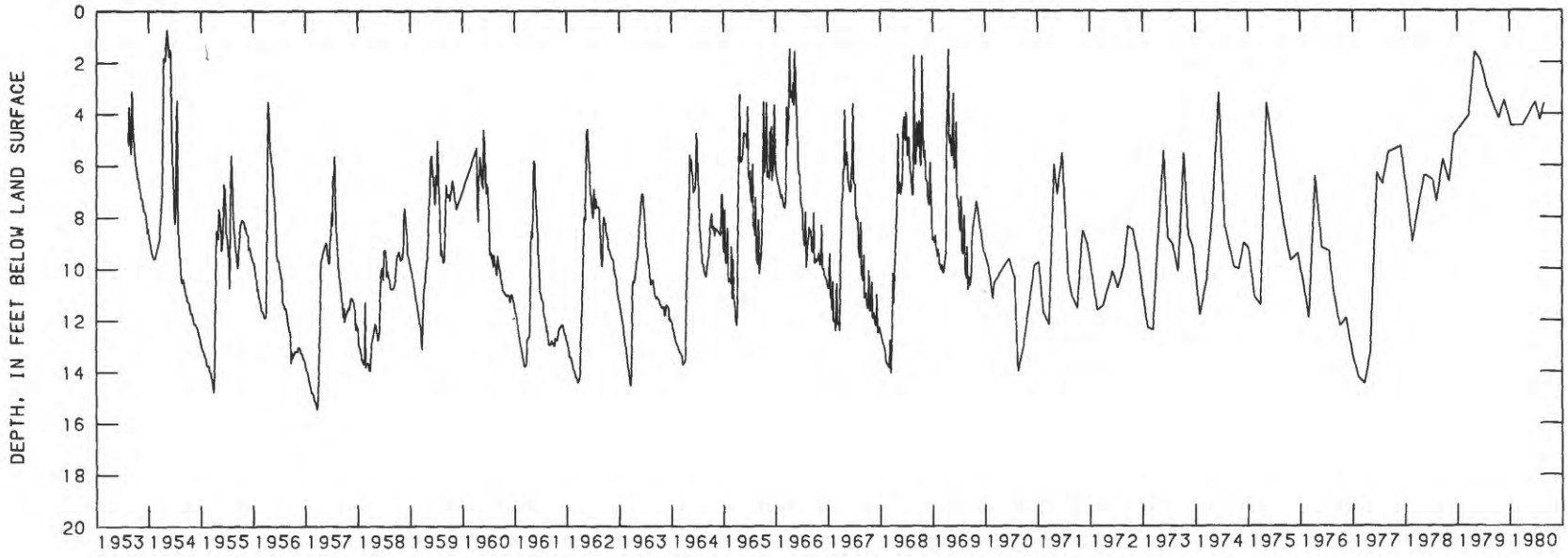


Figure 2.--Hydrograph showing long-term trends of water level for period in well 058N20W16DBC01, St. Louis County

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, rod like, 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.

Fecal streptococcal bacteria are bacteria found also 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 millliliters (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 03041000, which appears just to the left of the station name, includes the 2-digit part number "03" 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 4 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.

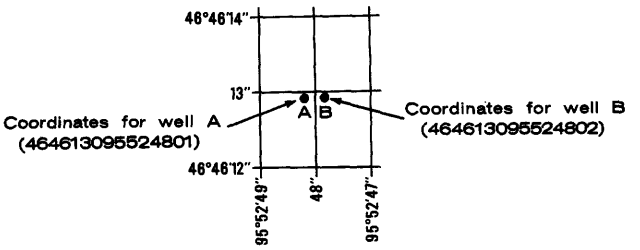


Figure 3.--Example of system for numbering wells and miscellaneous sites

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 bveen 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, including the maximum for the year, above the selected base with the time of occurrence and corresponding gage heights are published in tabular format. 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. A skeleton table of capacity at given stages is published for all reservoirs for which records are published on a daily basis, but is not published for reservoirs for which only monthly data are 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-intergrating 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 concentraiton, 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.

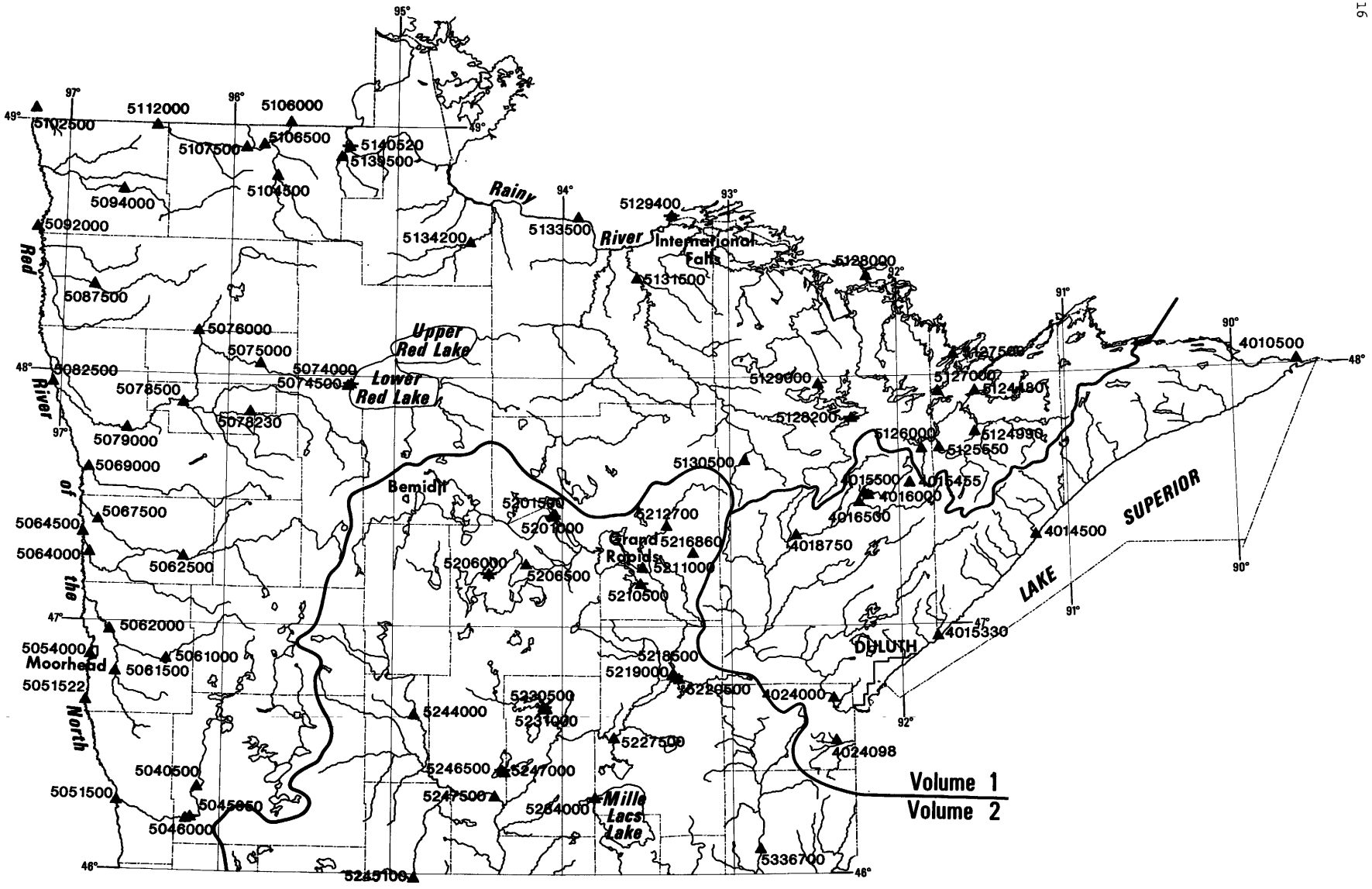
Each well is identified by means of (1) a 15-digit number that is based on latitude and longitude and (2) a local number that is provided for local needs. See figure 3.

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 two representative wells; one bedrock and one surficial-sand well.


Red River of the North
Rainy River
Upper Red Lake
Lower Red Lake
Bemidji
Grand Rapids
International Falls
DULUTH
SUPERIOR LAKE
Mille Lacs Lake
Moorhead
5102500
5112000
5106000
5107500
5106500
5140520
5139500
5104500
5094000
5092000
5087500
5076000
5075000
5074000
5074500
5082500
5078500
5078230
5079000
5069000
5067500
5064500
5064000
5062500
5062000
5054000
5061000
5061500
5051522
5040500
5051500
5045060
5046000
5245100
5244000
5230500
5231000
5227500
5246500
5247000
5247500
5284000
5336700
5134200
5133500
5129400
5131600
5128000
5129000
5128200
5126000
5125650
5124990
5127000
5124180
4010500
4015500
4015455
4016000
4016500
4018750
4014500
4015330
4024000
4024098
5130500
5201500
5201000
5212700
5216860
5211000
5206000
5206500
5210500
5218500
5219000
5220500
Volume 1
Volume 2

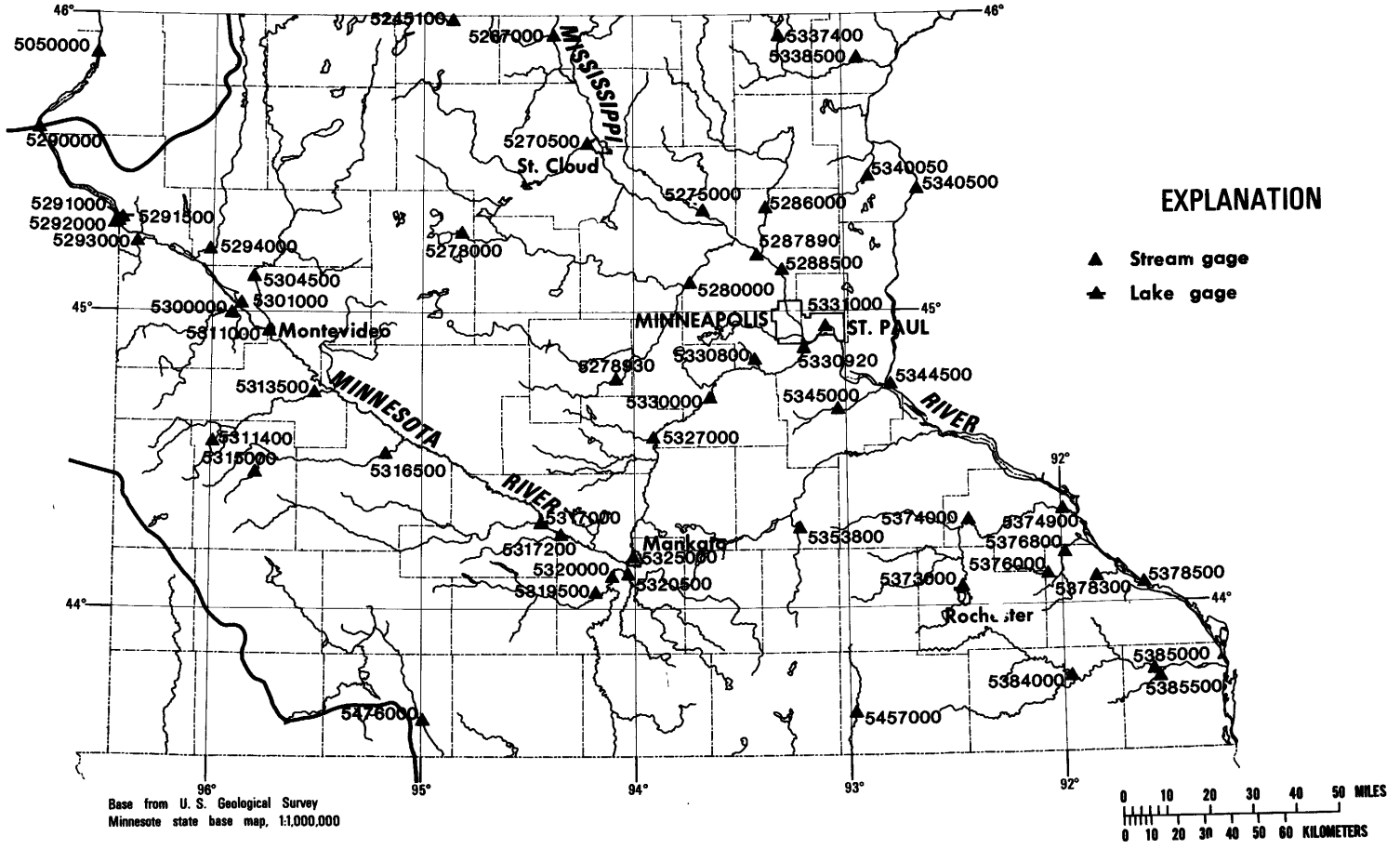
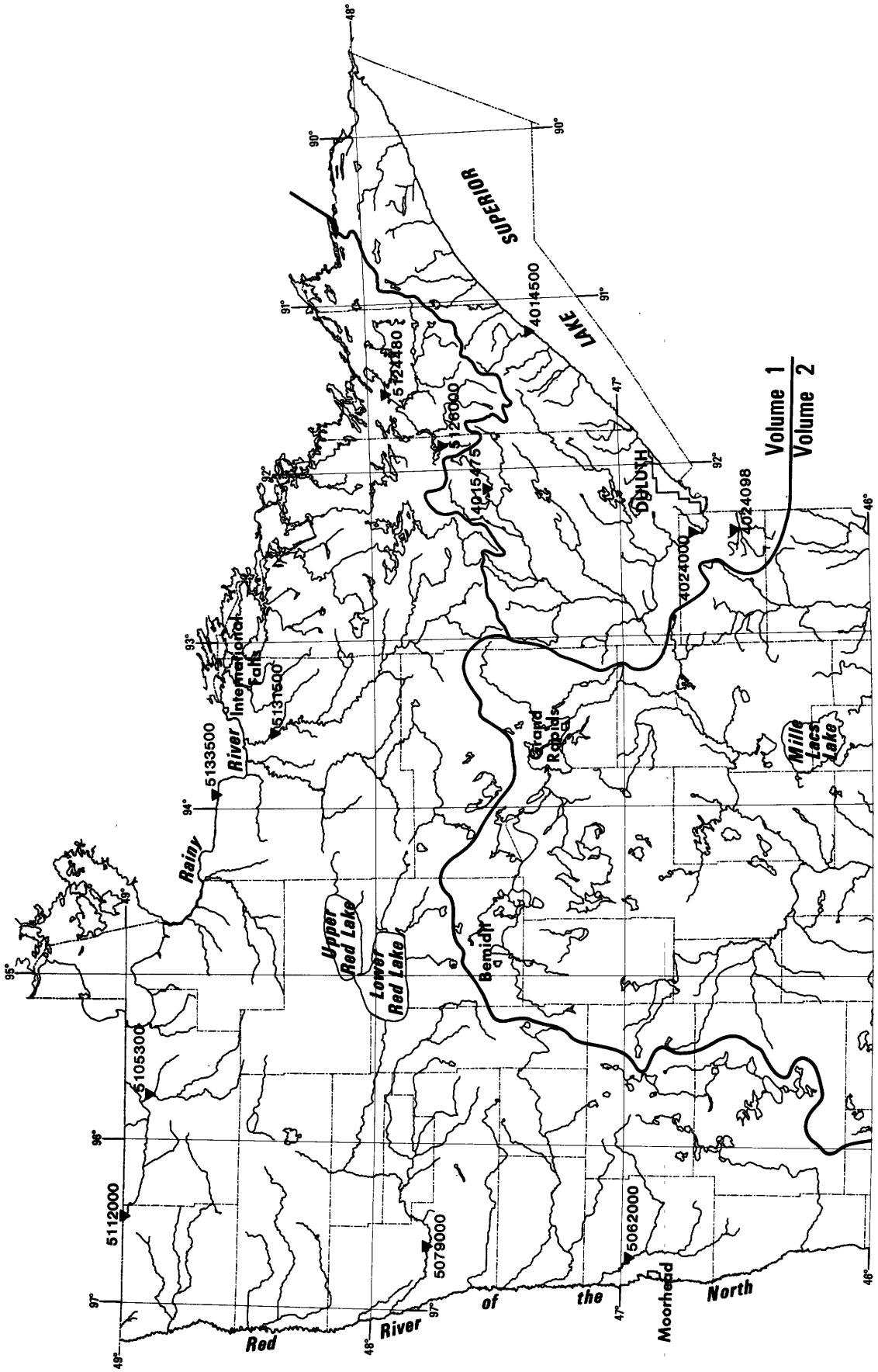


Figure 4.--Location of water—discharge station


Volume 1
Volume 2
SUPERIOR
LAKE
DULUTH
Rainy
River
International
Falls
Upper
Red Lake
Lower
Red Lake
Bemidji
Grand
Rapids
Mille
Lacs
Lake
Red
River
of
the
North
Moorhead
5105300
5112000
5079000
5062000
5131500
5133500
4014500
4015475
4024000
4024098
5124180
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95°
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93°
92°
91°
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49°
48°
47°
46°

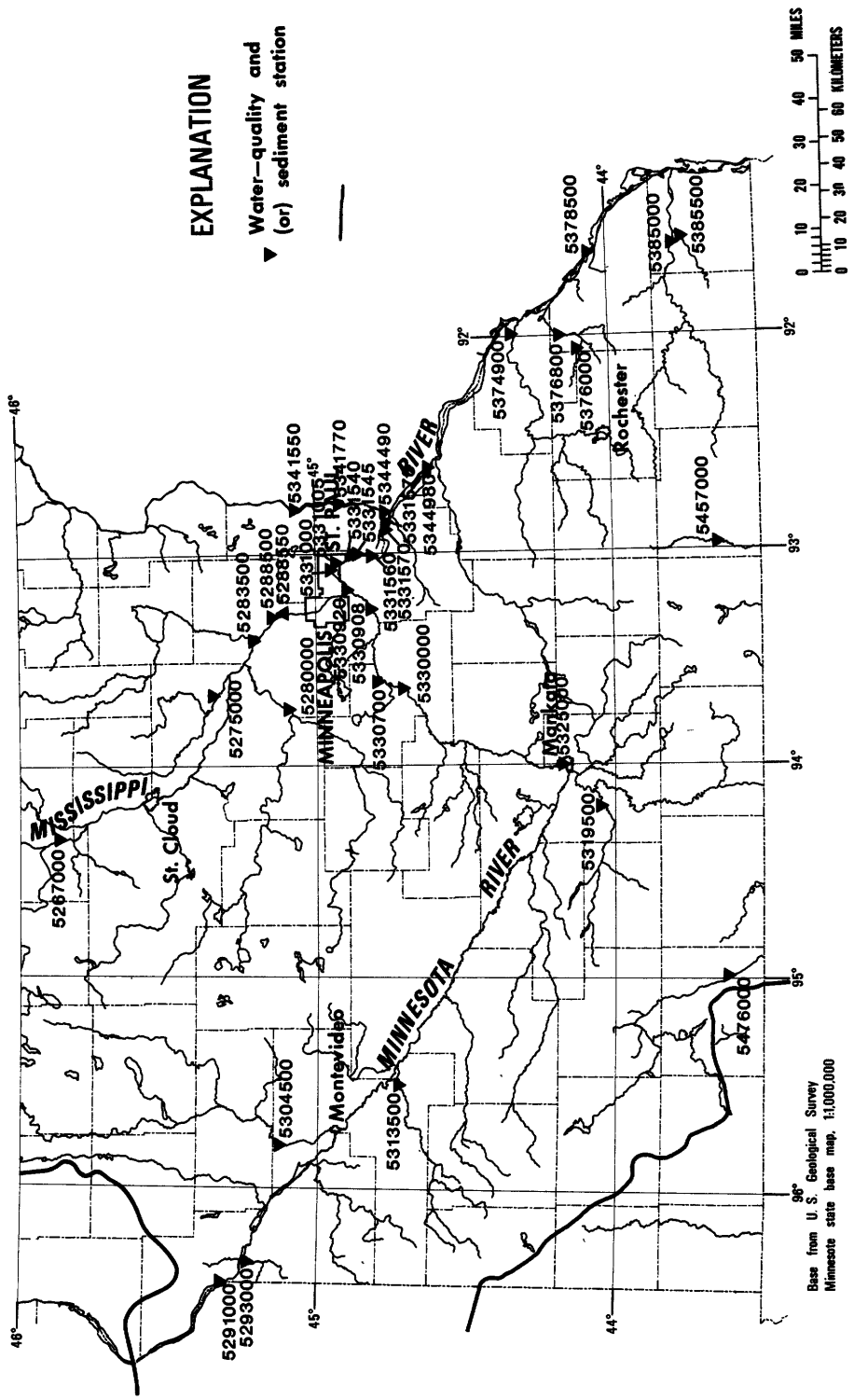
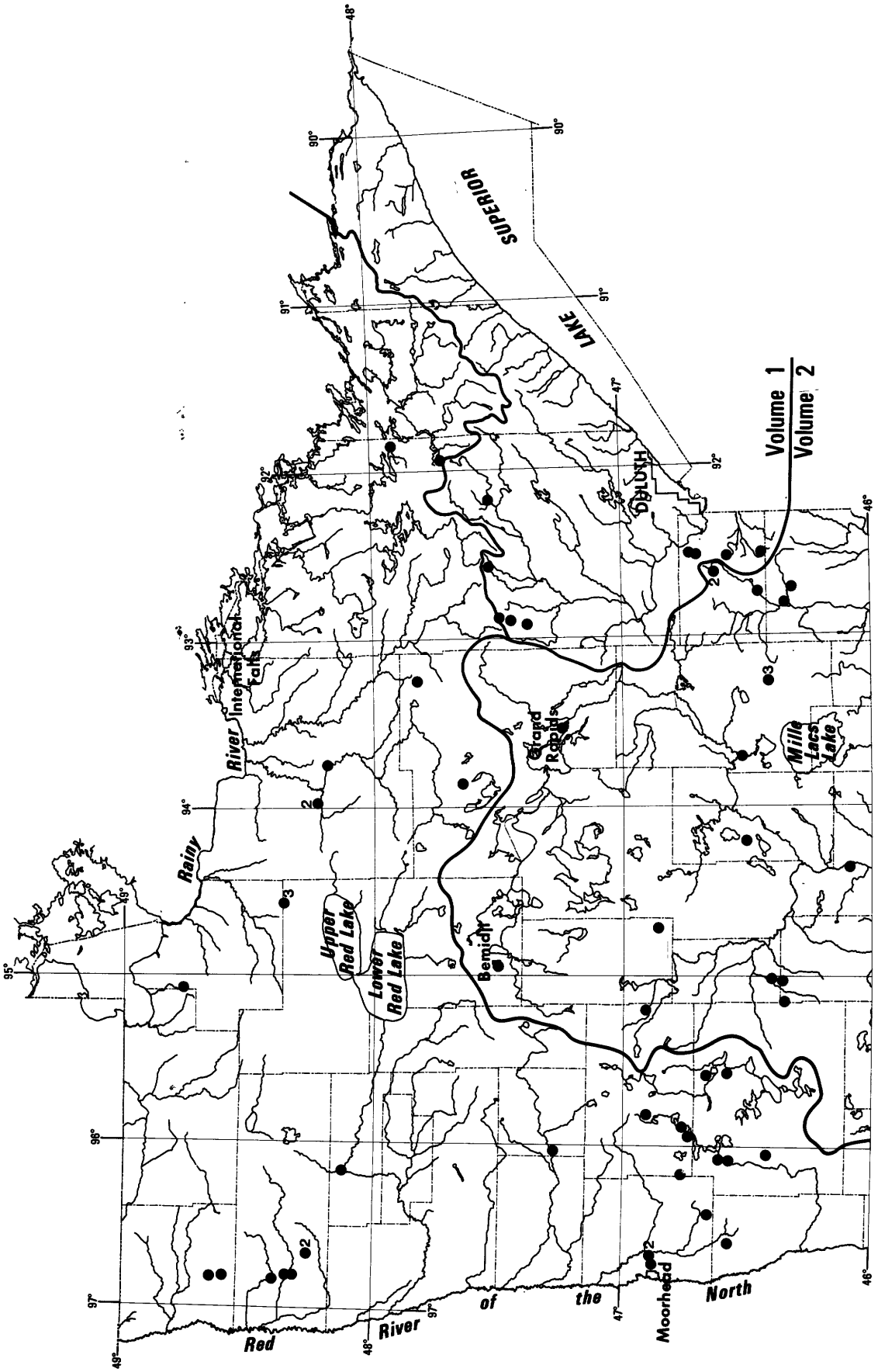


Figure 5.--Location of water-quality stations


SUPERIOR
LAKE
DULUTH
Volume 1
Volume 2
Rainy River
International Falls
Upper Red Lake
Lower Red Lake
Bemidji
Grand Rapids
Mille Lacs Lake
Red River of the North
Moorhead
90°
91°
92°
93°
94°
95°
96°
97°
46°
47°
48°
49°

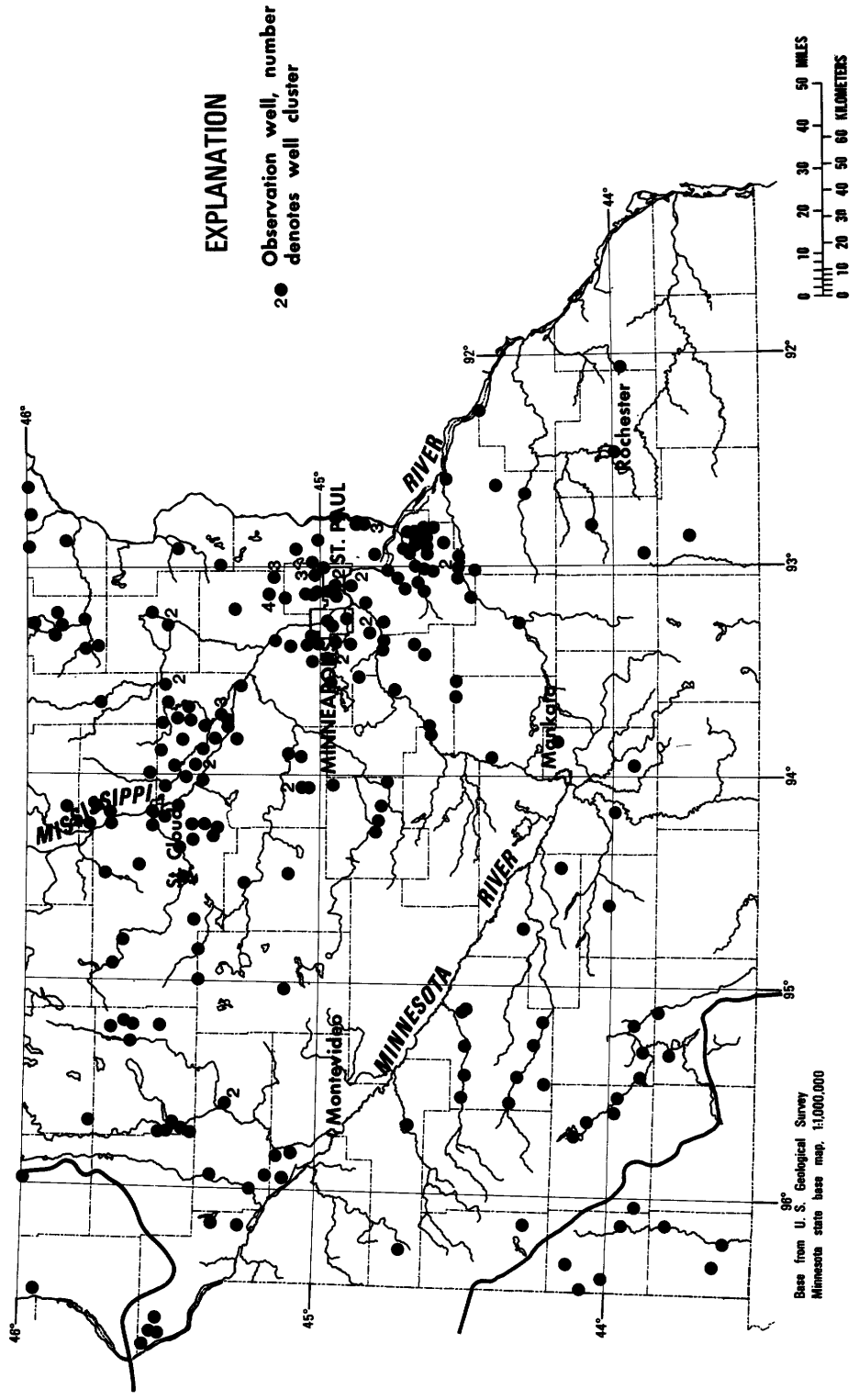
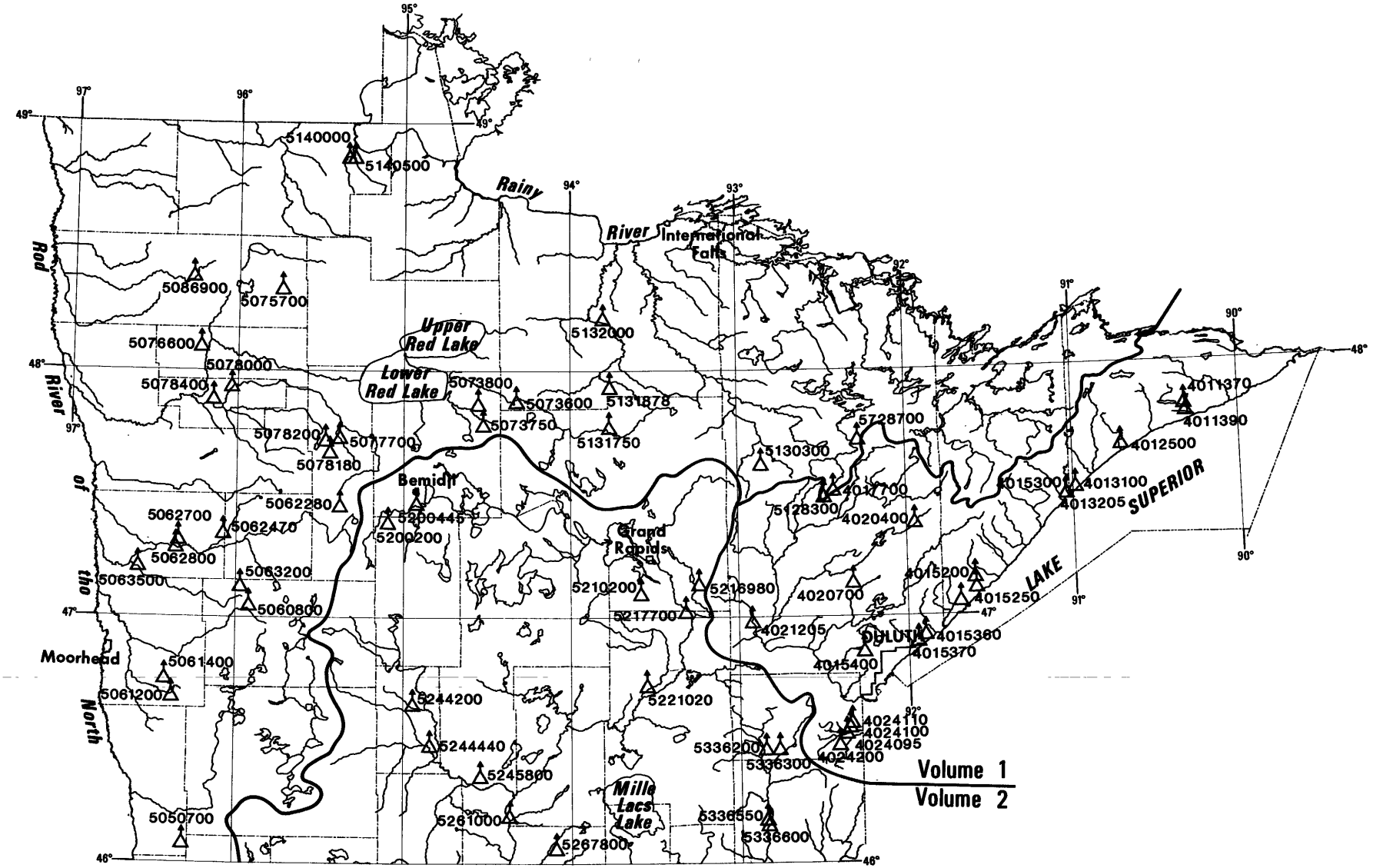


Figure 6.--Location of ground—water wells



Volume 1
Volume 2

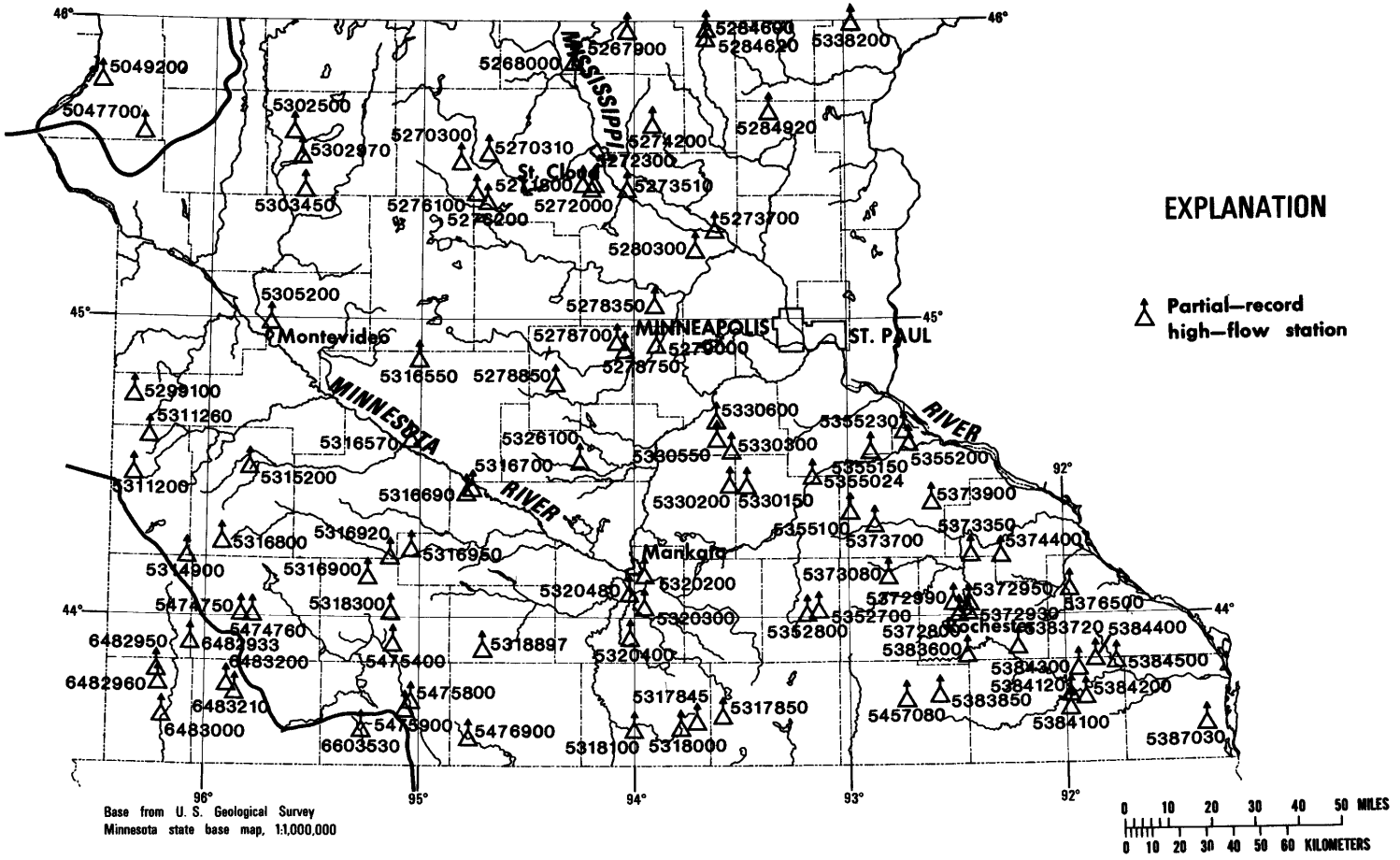


Figure 7.--Location of high—flow partial—record stations

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
04017000	Embarrass River at Embarrass, MN	93.8	1942-64
04018000	Embarrass River near McKinley, MN	171	1953-62
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
†05045500	Otter Tail River (Red River) near Fergus Falls, MN	a1,690	1909-10
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

"See footnotes at end of table."

Station number	Station name	Drainage area (mi^2)	Period of record
	Red River of the North basin--Continued		
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
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

"See footnotes at end of table."

Station number	Station name	Drainage area (mi^2)	Period of record
	Red River of the North basin--Continued		
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
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
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
*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.--57 years (water years 1924-80), 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.--Maximum discharge, 2,990 ft^3/s (84.7 m^3/s) Sept. 14, gage height, 8.13 ft (2.478 m), no peak above base of 3,000 ft^3/s (85.0 m^3/s); minimum, 42 ft^3/s (1.19 m^3/s) Aug. 17, gage height, 2.29 ft (0.698 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	82	992	125	82	96	93	130	790	229	142	59	797
2	80	900	115	82	96	93	134	733	233	129	55	674
3	86	681	116	82	96	93	140	676	232	122	53	562
4	85	532	120	83	96	93	160	635	223	114	55	775
5	83	441	127	83	96	93	190	591	205	126	55	852
6	82	373	128	84	96	93	220	556	191	124	52	704
7	78	333	126	88	96	93	250	539	192	129	48	556
8	77	287	122	92	96	92	300	513	203	124	47	487
9	85	256	118	94	96	92	280	490	204	115	47	1090
10	85	225	115	97	96	92	260	457	199	110	46	1050
11	87	212	112	97	95	92	250	470	182	100	45	803
12	91	206	108	97	95	92	240	499	167	93	44	638
13	94	203	106	97	95	93	230	480	156	87	49	1410
14	96	202	104	97	95	93	230	436	156	82	58	2880
15	97	188	102	97	95	94	250	405	160	80	48	2410
16	87	200	100	97	95	96	300	378	156	85	44	1690
17	66	210	102	97	95	97	400	354	151	87	49	1220
18	54	188	106	97	95	99	800	332	148	90	57	1150
19	129	190	112	97	95	102	1390	313	141	92	54	1210
20	233	239	118	97	94	105	1800	303	129	88	87	1700
21	228	365	120	97	94	105	2160	292	121	102	129	1550
22	207	319	118	97	94	106	2190	278	117	103	124	1260
23	235	210	112	96	94	107	1940	264	116	99	117	1060
24	235	198	104	96	94	108	1530	247	114	94	114	989
25	218	185	95	96	94	109	1290	229	110	88	112	938
26	195	175	90	96	93	110	1170	215	105	82	103	865
27	191	165	86	96	93	112	1070	204	101	76	93	798
28	202	155	84	96	93	114	980	200	121	74	72	738
29	209	145	83	96	93	117	903	193	120	69	57	694
30	231	135	83	96	---	120	839	193	134	65	701	644
31	317	---	82	96	---	125	---	204	---	62	1100	---
TOTAL	4325	9110	3339	2895	2751	3123	22026	12469	4816	3033	3774	32194
MEAN	140	304	108	93.4	94.9	101	734	402	161	97.8	122	1073
MAX	317	992	128	97	96	125	2190	790	233	142	1100	2880
MIN	54	135	82	82	93	92	130	193	101	62	44	487
CFSM	.23	.51	.18	.16	.16	.17	1.22	.67	.27	.16	.20	1.79
IN.	.27	.56	.21	.18	.17	.19	1.37	.77	.30	.19	.23	2.00

CAL YR 1979 TOTAL 216910 MEAN 594 MAX 7270 MIN 54 CFSM .99 IN 13.45
WTR YR 1980 TOTAL 103855 MEAN 284 MAX 2880 MIN 44 CFSM .47 IN 6.44

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 RECORDS.--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 1929 (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.--53 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.--Maximum discharge, 1,570 ft^3/s (44.5 m^3/s) Sept. 4, gage height, 9.37 ft (2.856 m), no other peak above base of 1,300 ft^3/s (36.8 m^3/s); minimum, 9.9 ft^3/s (0.28 m^3/s) Aug. 3, 4, gage height, 5.41 ft (1.649 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	356	45	26	15	14	39	187	261	31	14	276
2	23	322	43	25	15	14	49	171	348	27	12	232
3	22	238	42	25	15	14	75	159	232	24	10	309
4	21	181	41	25	15	13	475	150	160	20	12	1150
5	20	144	39	25	15	13	980	140	123	35	13	742
6	19	123	38	25	15	13	750	130	104	34	11	476
7	18	106	37	24	15	13	630	121	106	34	10	307
8	18	90	36	24	15	12	660	113	120	29	15	209
9	20	79	36	24	15	12	409	105	99	23	14	227
10	21	75	35	24	15	12	309	105	80	20	15	210
11	22	70	34	24	15	12	206	129	66	20	16	163
12	26	66	34	24	15	12	167	127	55	25	15	138
13	24	64	33	23	15	12	143	115	56	23	20	354
14	24	62	32	23	15	12	145	106	52	22	65	708
15	24	60	32	23	15	13	211	98	50	23	86	616
16	23	58	31	22	15	13	267	89	45	23	68	460
17	22	59	31	22	15	13	438	83	38	26	72	335
18	22	59	30	22	15	14	670	76	33	43	101	672
19	113	63	30	21	15	14	863	71	29	60	123	702
20	115	68	29	20	15	14	917	67	26	61	144	792
21	104	66	29	20	15	15	800	62	23	54	191	638
22	103	60	29	19	15	15	692	57	20	46	160	475
23	121	59	28	18	15	16	589	50	19	37	121	358
24	105	57	28	18	15	16	465	45	17	30	165	358
25	88	56	28	17	15	17	390	40	15	24	178	347
26	73	54	28	17	15	18	338	35	14	20	153	290
27	69	51	28	16	14	19	293	31	13	16	121	235
28	72	49	27	16	14	20	253	29	26	16	96	203
29	69	48	27	16	14	23	225	27	33	14	80	183
30	65	47	26	15	---	26	206	63	35	12	228	167
31	121	---	26	15	---	30	---	93	---	13	324	---
TOTAL	1611	2890	1012	658	432	474	12654	2874	2298	885	2653	12332
MEAN	52.0	96.3	32.6	21.2	14.9	15.3	422	92.7	76.6	28.5	85.6	411
MAX	121	356	45	26	15	30	980	187	348	61	324	1150
MIN	18	47	26	15	14	12	39	27	13	12	10	138
CFSM	.37	.69	.23	.15	.11	.11	3.01	.66	.55	.20	.61	2.94
IN.	.43	.77	.27	.17	.11	.13	3.36	.76	.61	.24	.70	3.28

CAL YR 1979 TOTAL 72428 MEAN 198 MAX 2710 MIN 13 CFSM 1.41 IN 19.25
WTR YR 1980 TOTAL 40773 MEAN 111 MAX 1150 MIN 10 CFSM .79 IN 10.83

NOTE: No gage-height record Nov. 28 to Jan. 8.

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.

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE, WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	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)
OCT												
16...	1130	22	98	8.0	9.0	6.0	1.0	12.5	105	K4	K14	46
NOV												
27...	1115	50	90	7.7	-2.0	.0	1.0	13.0	92	20	12	37
JAN												
09...	1230	24	110	--	-5.0	.0	.80	14.0	99	K8	K1	50
FEB												
20...	1400	15	125	7.6	3.0	.5	1.0	15.5	110	K7	K4	50
APR												
01...	1215	34	139	8.1	7.0	.0	.50	14.1	100	62	99	50
JUN												
03...	1120	242	69	7.7	9.0	13.0	12	9.9	99	92	130	31
JUL												
01...	1100	30	100	8.2	19.0	19.0	.35	7.8	87	36	K940	42
AUG												
05...	1415	13	103	7.9	22.0	20.5	.50	9.2	106	22	130	49
SEP												
03...	1040	283	72	8.2	18.5	16.0	1.9	9.1	94	K870	K2000	38
30...	1215	168	55	7.4	9.5	10.5	.40	10.7	99	K4	K48	30

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)	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 (MG/L AS CACO3) (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)
OCT												
16...	14	12	3.8	3.6	.2	.3	32	5.0	2.9	.3	10	81
NOV												
27...	9	9.7	3.1	2.8	.2	.3	28	7.2	2.5	.2	12	85
JAN												
09...	7	13	4.2	4.5	.3	.4	43	8.3	2.9	.3	16	95
FEB												
20...	5	13	4.3	4.4	.3	.3	45	7.4	3.3	.3	14	92
APR												
01...	13	13	4.3	5.9	.4	.6	37	9.3	9.6	.2	12	88
JUN												
03...	13	8.1	2.7	1.9	.1	.3	18	6.8	2.0	.2	7.9	80
JUL												
01...	9	11	3.6	3.5	.2	.5	33	5.8	2.3	.3	6.3	86
AUG												
05...	7	13	4.1	3.9	.2	.5	42	5.4	3.6	.3	6.4	84
SEP												
03...	12	10	3.2	2.7	.2	.4	26	6.6	2.8	.2	11	100
30...	10	7.9	2.6	2.1	.2	.3	20	5.7	1.9	.2	12	83

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT 16...	58	4.96	.04	.03	.010	.000	1.2	.58	.010	.010	0	--
NOV 27...	56	11.6	.28	.28	.090	.090	.40	.40	.010	.000	0	13
JAN 09...	77	6.21	.32	.32	.030	.030	.49	.49	.020	.020	--	9.1
FEB 20...	75	3.73	.27	.27	.020	.020	.43	.36	.010	.010	0	--
APR 01...	80	8.08	.56	.56	.020	.020	.32	.25	.020	.010	0	5.1
JUN 03...	42	52.3	.18	.13	.030	.030	.57	.52	.190	.010	2	--
JUL 01...	53	7.01	.02	.02	.010	.010	.65	.50	.020	.010	0	9.5
AUG 05...	63	2.97	.01	.01	.000	.000	.25	.21	.010	.000	0	--
SEP 03...	53	76.4	.13	.06	.030	.020	1.2	.66	.000	.000	0	--
30...	45	37.6	.02	.02	.000	.000	.54	.51	.010	.010	0	20

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)
OCT 16...	1130	2	2	100	20	0	0	20	<10	0
FEB 20...	1400	0	0	100	10	0	0	20	10	0
JUN 03...	1120	2	2	<50	10	0	0	20	20	0
AUG 05...	1415	3	2	<50	10	2	2	30	20	0

DATE	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	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)
OCT 16...	0	3	3	45000	200	3	0	2	2	.1
FEB 20...	0	3	3	300	180	1	1	10	0	.1
JUN 03...	0	2	0	360	170	1	0	20	3	.2
AUG 05...	0	2	2	140	30	2	1	20	5	.2

DATE	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	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, 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 (MG/L AS C) (00689)
OCT 16...	<.1	0	0	0	0	0	5	5	9.7	.1
FEB 20...	<.1	2	1	0	0	0	20	10	12	.2
JUN 03...	.2	1	0	0	0	0	10	2	19	1.9
AUG 05...	.2	2	0	0	0	0	10	0	15	.9

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980

DATE	OCT 16,79		NOV 27,79		FEB 20,80		APR 1,80		JUN 3,80	
TIME	1130		1115		1400		1215		1120	
TOTAL CELLS/ML	370		250		140		86		360	
DIVERSITY: DIVISION	0.8		0.1		0.0		0.8		1.5	
.CLASS	0.8		0.2		0.0		0.8		1.5	
..ORDER	0.8		0.5		0.0		1.5		1.6	
...FAMILY	2.7		2.0		1.0		2.1		2.6	
....GENUS	2.8		2.1		1.0		2.1		2.6	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	20	5	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	10	3	--	-	--	-	--	-	26	7
....CHLORELLA	25	7	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	--	-	--	-	--	-	20#	24	--	-
....TETRASTRUM	40	11	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	4	2	--	-	--	-	13	4
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	9	3	--	-	20#	24	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	81#	22	41#	16	69#	50	--	-	90#	25
...CYMBELLACEAE										
....CYMBELLA	15	4	--	-	--	-	--	-	13	4
...DIATOMACEAE										
....DIATOMA	--	-	140#	56	69#	50	30#	35	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	26	10	--	-	--	-	--	-
....SYNEDRA	10	3	11	4	--	-	10	12	26	7
...GOMPHONEMATACEAE										
....GOMPHONEMA	5	1	2	1	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	15	4	4	2	--	-	5	6	26	7
...NITZSCHIACEAE										
....NITZSCHIA	15	4	--	-	--	-	--	-	26	7
...TABELLARIACEAE										
....TABELLARIA	130#	36	9	3	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	4	2	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	--	-	--	-	--	-	130#	36
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	--	-	13	4

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

PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980--Continued

DATE	JUL 1,80	AUG 5,80	SEP 3,80	SEP 30,80
TIME	1100	1415	1040	1215
TOTAL CELLS/ML	370	1000	3200	440
DIVERSITY: DIVISION	1.0	0.5	0.3	1.6
.CLASS	1.0	0.5	0.3	1.6
..ORDER	1.6	1.2	0.3	1.8
...FAMILY	1.8	1.9	0.9	2.8
....GENUS	1.8	2.1	1.5	2.8

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....CHLOROCOCCUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	--	-	--	-	--	-	52	12
...OOCYSTACEAE								
....ANKISTRODESMUS	13	3	13	1	--	-	--	-
....CHLORELLA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	180#	48	52	5	--	-	26	6
....TETRASTRUM	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	64#	17	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	--	-	--	-	26	6
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	13	1	58	2	39	9
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	29	1	26	6
...FRAGILARIACEAE								
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	13	3	--	-	--	-	13	3
...NITZSCHIACEAE								
....NITZSCHIA	--	-	13	1	58	2	13	3
...TABELLARIACEAE								
....TABELLARIA	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	160#	15	--	-	--	-
....ANACYSTIS	100#	28	39	4	--	-	--	-
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	190	6	78#	18
....APHANIZOMENON	--	-	250#	24	--	-	--	-
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	580#	18	--	-
....OSCILLATORIA	--	-	490#	48	2200#	68	--	-
...RIVULARIACEAE								
....RAPHIDIOPSIS	--	-	--	-	86	3	160#	35
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	*	0	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	--	-	13	3

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

STREAMS TRIBUTARY TO LAKE SUPERIOR

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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)
FEB						
20...	1400	42	.000	.000	.000	.000

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	TEMPERATURE, WATER (DEG C) (00010)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
OCT						
16...	1110	22	6.0	2	.12	--
NOV						
27...	1115	50	.0	2	.27	--
JAN						
09...	1230	24	.0	11	.72	--
FEB						
20...	1400	15	.5	5	.20	--
APR						
01...	1240	31	.0	4	.34	--
JUN						
03...	1140	236	13.0	3	1.9	--
JUL						
01...	1100	30	19.0	1	.08	--
AUG						
05...	1415	13	20.0	<1	.02	100
SEP						
03...	1050	260	16.0	21	15	99
30...	1215	168	10.5	1	.45	100

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 good except those for winter period and those for periods of no gage-height record Dec. 3 to Jan. 14 and Aug. 16 to Sept. 80, which are fair.

AVERAGE DISCHARGE.--6 years, 82.8 ft^3/s (2.345 m^3/s), 13.14 in/yr (334 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.--Maximum discharge, 3,450 ft^3/s (97.7 m^3/s) Sept. 4, gage height, 8.09 ft (2.466 m), no other peak above base of 800 ft^3/s (22.7 m^3/s); minimum, 1.2 ft^3/s (0.034 m^3/s) Aug. 3, 4, gage height, 2.38 ft (0.725 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.5	295	16	5.6	3.9	6.0	80	56	20	6.3	1.8	270
2	9.1	173	16	5.4	3.9	5.8	130	49	172	4.6	1.6	200
3	10	111	15	5.3	4.0	5.7	220	44	108	3.9	1.3	240
4	9.4	82	14	5.2	4.1	5.6	310	40	55	2.8	1.4	2080
5	9.0	65	14	5.0	4.2	5.5	390	35	35	2.7	1.5	426
6	8.2	54	13	4.9	4.3	5.4	460	31	28	5.7	3.7	300
7	8.2	41	12	4.8	4.4	5.3	480	25	22	5.1	2.8	200
8	8.1	35	12	4.7	4.6	5.2	504	23	23	3.8	2.2	140
9	7.8	31	12	4.6	4.8	5.1	262	21	20	3.0	1.9	87
10	8.1	28	11	4.6	5.1	5.0	193	20	14	2.2	1.8	57
11	9.3	25	10	4.5	5.4	4.9	171	37	9.3	1.8	2.8	374
12	10	23	10	4.4	5.6	4.9	171	41	8.1	1.9	3.2	28
13	11	21	9.8	4.4	5.7	4.9	146	34	19	1.8	6.1	370
14	11	20	9.4	4.3	5.8	5.1	131	31	19	5.2	7.0	298
15	10	19	9.1	4.3	5.7	5.4	196	27	16	4.6	6.7	146
16	9.8	20	8.8	4.3	5.3	5.6	229	21	11	5.0	45	100
17	9.8	21	8.5	4.2	5.2	5.8	290	18	8.1	3.5	39	67
18	10	23	8.2	4.2	5.2	6.0	375	16	6.7	6.7	48	118
19	70	27	8.0	4.2	5.3	6.3	358	15	6.4	19	60	111
20	82	31	7.7	4.1	5.4	6.6	314	14	5.8	17	73	132
21	53	30	7.4	4.1	5.6	7.1	251	13	6.2	17	90	95
22	76	28	7.2	4.1	5.8	7.6	212	12	6.1	15	110	71
23	126	26	7.0	4.0	6.0	8.2	169	11	5.0	10	86	51
24	78	24	6.8	4.0	6.2	8.8	130	9.5	4.2	7.5	88	53
25	56	23	6.5	4.0	6.3	9.5	110	6.7	3.7	5.9	96	105
26	43	21	6.4	4.0	6.3	11	99	5.5	2.9	4.3	104	94
27	38	20	6.2	4.0	6.2	12	89	4.8	2.4	3.6	84	66
28	37	19	6.1	3.9	6.1	13	75	4.1	4.2	3.5	74	48
29	34	18	6.0	3.9	6.1	17	67	3.8	7.9	2.7	65	40
30	31	17	5.8	3.9	---	26	62	4.0	7.7	2.5	60	35
31	57	---	5.7	3.9	---	38	---	6.5	---	2.1	140	---
TOTAL	949.3	1371	295.6	136.8	152.5	268.3	6674	678.9	656.7	180.7	1307.8	6065
MEAN	30.6	45.7	9.54	4.41	5.26	8.65	222	21.9	21.9	5.83	42.2	202
MAX	126	295	16	5.6	6.3	38	504	56	172	19	140	2080
MIN	7.8	17	5.7	3.9	3.9	4.9	62	3.8	2.4	1.8	1.3	28
CFSM	.36	.53	.11	.05	.06	.10	2.59	.26	.26	.07	.49	2.36
IN.	.41	.60	.13	.06	.07	.12	2.90	.30	.29	.08	.57	2.64

CAL YR 1979 TOTAL 40900.1 MEAN 112 MAX 4480 MIN 5.7 CFSM 1.31 IN 17.77
WTR YR 1980 TOTAL 18736.6 MEAN 51.2 MAX 2080 MIN 1.3 CFSM .60 IN 8.14

04015455 SOUTH BRANCH PARTRIDGE RIVER NEAR BABBITT, MN

LOCATION.--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 ft (20 m) upstream from twin culverts on National Forest Delopment Road 116, 4.5 mi (7.2 km) upstream from mouth, 10 mi (16 km) northeast of Hoyt Lakes and 10 mi (16 km) south of Babbitt.

DRAINAGE AREA.--18.5 mi^2 (47.9 km^2).

PERIOD OF RECORD.--June 1977 to September 1980 (discontinued). September 1974 to April 1977, discharge measurements only.

GAGE.--Water-stage recorder. Altitude of gage is 1,540 ft (469 m), from topographic map.

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

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 456 ft^3/s (12.9 m^3/s) Apr. 22, 1979, gage height, 5.31 ft (1.618 m); maximum gage height, 6.67 ft (2.033 m) Mar. 20, 1979 (backwater from ice); minimum daily discharge, 0.02 ft^3/s (0.001 m^3/s) Mar. 1-15, 1979 (see remarks in the 1979 report); minimum gage height, 0.76 ft (0.232 m) Aug. 19, 20, 1977.

EXTREMES OUTSIDE PERIOD OF RECORD.--Stream receded to no flow in 1976 and in 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge 68 ft^3/s (1.93 m^3/s) Apr. 19, gage height, 2.86 ft (0.872 m); maximum gage height, 3.84 ft (1.170 m) Apr. 8 (backwater from ice); minimum discharge, 0.05 ft^3/s (0.001 m^3/s) Aug. 9, 10, gage height, 0.78 ft (0.238 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.9	26	5.8	1.6	.58	.51	1.5	17	5.4	1.8	.09	41
2	1.7	26	5.8	1.5	.57	.51	2.6	16	17	1.7	.07	35
3	1.7	24	5.7	1.4	.57	.50	5.0	15	17	1.4	.06	28
4	3.1	23	5.6	1.4	.57	.50	9.0	14	14	1.3	.07	28
5	2.7	20	5.3	1.3	.56	.50	16	12	12	1.5	.07	22
6	2.2	17	5.1	1.2	.56	.50	25	10	14	1.8	.08	17
7	2.0	15	4.9	1.2	.56	.50	38	9.4	16	1.6	.16	14
8	2.2	15	4.7	1.2	.56	.50	43	8.8	16	1.3	.08	14
9	2.1	12	4.4	1.1	.56	.50	36	8.0	14	1.1	.06	32
10	2.0	11	4.2	1.1	.56	.50	31	7.4	12	.94	.06	31
11	2.3	8.4	4.0	1.0	.55	.50	28	9.1	9.1	.84	.13	26
12	2.4	8.1	3.8	1.0	.55	.50	26	9.7	7.2	.74	.13	21
13	2.3	6.5	3.7	.98	.55	.50	24	9.1	6.4	.58	.24	22
14	2.2	5.6	3.4	.96	.54	.50	22	7.7	5.4	.54	.16	24
15	2.1	5.1	3.1	.94	.54	.50	21	7.4	5.4	.51	.24	21
16	2.0	5.3	2.8	.92	.54	.50	28	7.2	4.2	.45	.45	18
17	1.9	6.0	2.5	.88	.54	.50	34	5.7	3.1	.45	.45	16
18	2.0	5.6	2.5	.86	.54	.50	45	5.7	2.6	.66	.62	25
19	9.4	6.8	2.9	.82	.53	.50	64	4.8	2.1	1.1	.94	34
20	12	8.1	2.8	.78	.53	.50	66	4.4	1.7	1.5	1.6	52
21	11	7.8	2.4	.74	.53	.50	59	3.8	1.4	1.3	3.0	52
22	11	7.0	2.4	.72	.53	.50	48	3.5	1.3	.99	4.2	43
23	10	6.8	2.3	.70	.52	.50	43	3.1	1.1	.70	4.6	34
24	8.7	7.0	2.2	.67	.52	.52	37	2.8	.99	.54	5.7	35
25	7.6	6.8	2.0	.64	.52	.53	33	2.4	.99	.79	5.0	33
26	6.2	5.3	2.0	.62	.52	.56	30	1.9	.74	.94	4.6	28
27	6.1	5.3	2.0	.60	.52	.58	27	1.6	.66	.74	4.0	24
28	6.3	5.6	1.9	.59	.51	.64	24	1.3	.79	.70	3.3	20
29	5.7	5.3	1.8	.58	.51	.72	21	1.2	.99	.66	3.6	18
30	5.4	5.6	1.7	.58	---	.82	19	1.3	1.3	.42	28	16
31	13	---	1.6	.58	---	.95	---	1.7	---	.20	42	---
TOTAL	151.2	317.0	105.3	29.16	15.74	16.84	906.1	213.0	194.86	29.79	113.76	824
MEAN	4.88	10.6	3.40	.94	.54	.54	30.2	6.87	6.50	.96	3.67	27.5
MAX	13	26	5.8	1.6	.58	.95	66	17	17	1.8	42	52
MIN	1.7	5.1	1.6	.58	.51	.50	1.5	1.2	.66	.20	.06	14
CFSM	.26	.57	.18	.05	.03	.03	1.63	.37	.35	.05	.20	1.49
IN.	.30	.64	.21	.06	.03	.03	1.82	.43	.39	.06	.23	1.66

CAL YR 1979 TOTAL 6552.58 MEAN 18.0 MAX 426 MIN .02 CFSM .97 IN 13.18
WTR YR 1980 TOTAL 2916.75 MEAN 7.97 MAX 66 MIN .06 CFSM .43 IN 5.86

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 good except those for winter period, which are fair.

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 daily, 1.3 ft^3/s (0.037 m^3/s) Feb. 10 to Mar. 6, 1979.

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, 314 ft^3/s (8.89 m^3/s) Sept. 22, gage height, 7.20 ft (2.195 m); minimum daily, 1.6 ft^3/s (0.045 m^3/s) Feb. 21 to Mar. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	125	29	7.3	3.3	1.6	8.0	114	15	11	4.0	204
2	19	177	28	7.1	3.1	1.6	13	103	35	12	3.7	222
3	19	199	27	6.9	2.9	1.6	20	93	81	12	3.5	209
4	19	189	26	6.7	2.6	1.6	30	85	96	11	3.9	189
5	19	164	25	6.5	2.3	1.6	44	77	86	11	3.5	167
6	19	142	23	6.3	2.1	1.6	61	68	81	11	3.2	143
7	18	121	22	6.2	2.0	1.6	115	61	78	12	2.9	115
8	17	105	21	6.0	2.0	1.6	185	55	80	13	2.8	99
9	16	92	19	5.9	1.9	1.6	196	51	80	12	2.7	122
10	15	81	18	5.8	1.9	1.6	177	49	69	11	2.8	148
11	15	65	17	5.7	1.8	1.6	149	51	58	11	3.5	158
12	14	55	16	5.6	1.8	1.6	123	55	48	11	4.0	148
13	14	49	15	5.5	1.8	1.6	104	56	46	11	5.5	136
14	14	45	14	5.4	1.8	1.6	91	54	40	11	6.1	141
15	15	42	13	5.3	1.8	1.6	96	51	37	11	6.1	156
16	15	40	13	5.2	1.8	1.6	112	48	35	9.3	6.1	171
17	15	40	12	5.1	1.7	1.6	138	43	31	8.6	6.5	169
18	16	39	12	5.0	1.7	1.6	168	38	25	10	6.5	171
19	26	40	11	4.9	1.7	1.6	208	35	21	11	6.5	189
20	51	43	11	4.8	1.7	1.6	249	33	18	11	7.4	236
21	71	46	10	4.7	1.6	1.6	274	31	16	9.9	8.1	286
22	75	47	9.8	4.6	1.6	1.6	278	30	13	9.3	9.6	312
23	72	47	9.5	4.5	1.6	1.6	268	28	11	8.5	12	304
24	68	45	9.1	4.3	1.6	1.6	253	24	9.2	7.6	17	283
25	63	43	8.8	4.2	1.6	1.6	222	21	7.4	7.8	20	260
26	56	40	8.6	4.1	1.6	1.6	196	18	6.8	7.9	24	239
27	53	37	8.3	4.0	1.6	1.7	179	16	5.9	7.5	26	225
28	52	35	8.0	3.9	1.6	1.9	161	14	6.6	7.4	25	191
29	50	33	7.8	3.8	1.6	2.1	145	12	7.4	6.8	25	167
30	50	31	7.6	3.6	---	3.0	129	11	8.5	5.5	57	148
31	70	---	7.5	3.4	---	4.5	---	11	---	4.8	141	---
TOTAL	1056	2257	467.0	162.3	56.1	54.8	4392.0	1436	1151.8	303.9	455.9	5708
MEAN	34.1	75.2	15.1	5.24	1.93	1.77	146	46.3	38.4	9.80	14.7	190
MAX	75	199 ~~119~~	29	7.3	3.3	4.5	278	114	96	13	141	312
MIN	14	31	7.5	3.4	1.6	1.6	8.0	11	5.9	4.8	2.7	99
CFSM	.32	.71	.14	.05	.02	.02	1.38	.44	.36	.09	.14	1.79
IN.	.37	.79	.16	.06	.02	.02	1.54	.50	.40	.11	.16	2.00

CAL YR 1979 TOTAL 40533.7 MEAN 111 MAX 1960 MIN 1.3 CFSM 1.05 IN 14.22
WTR YR 1980 TOTAL 17500.8 MEAN 47.8 MAX 312 MIN 1.6 CFSM .45 IN 6.14

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 for those water years with 80 percent or more days of 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.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 268 micromhos Aug. 28 and 29; minimum, 63 micromhos April 11.
WATER TEMPERATURES: Maximum, 27.5°C June 25; minimum, 0.0°C on many days during winter period.

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	128	127	127	114	110	112	133	132	133	134	134	134
2	130	128	129	111	106	109	134	133	134	137	135	136
3	131	130	131	106	93	101	136	134	135	138	136	137
4	131	131	131	92	84	87	139	136	138	141	139	140
5	133	131	132	86	83	84	139	139	139	144	141	142
6	137	133	135	87	86	87	139	138	139	147	144	146
7	138	135	137	87	84	86	139	137	138	149	147	148
8	142	138	140	84	82	84	138	137	137	152	149	150
9	147	143	145	87	84	85	137	135	136	157	144	151
10	150	147	149	89	87	88	135	133	134	167	157	162
11	155	150	152	90	89	89	133	129	131	168	164	166
12	161	155	158	101	90	94	128	127	128	169	164	167
13	163	161	162	108	101	105	127	126	127	171	170	170
14	165	163	163	112	108	110	126	125	125	172	170	171
15	171	165	168	120	112	116	125	124	125	175	173	174
16	174	170	172	128	120	124	124	123	124	176	175	176
17	176	174	175	133	127	130	126	123	125	180	177	179
18	174	166	170	136	134	135	125	124	125	184	181	183
19	164	162	163	136	134	135	124	123	124	188	185	187
20	167	157	164	134	133	134	123	122	123	191	186	188
21	155	129	139	133	131	132	122	121	122	192	189	191
22	128	120	126	131	127	129	122	121	122	193	188	191
23	120	114	117	126	120	123	123	122	122	191	187	189
24	114	110	112	120	117	119	124	123	123	190	188	189
25	110	106	108	124	121	123	125	124	124	189	185	187
26	108	105	107	124	123	124	126	126	126	---	---	---
27	107	106	106	125	123	124	128	127	128	---	---	---
28	109	107	108	129	125	127	130	128	129	---	---	---
29	111	109	110	134	129	132	134	130	132	---	---	---
30	112	110	112	133	133	133	134	133	134	---	---	---
31	110	107	109	---	---	---	134	133	133	---	---	---
MONTH	176	105	137	136	82	112	139	121	130			

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1				---	---	---	206	190	201	81	79	80
2				---	---	---	190	172	182	82	80	81
3				---	---	---	174			81	80	80
4				---	---	---	164	151	159	82	80	81
5				---	---	---	152	129	144	84	82	83
6				---	---	---	128	113	118	86	84	84
7				---	---	---	121	106	115	88	86	87
8				---	---	---	106	84	94	88	87	87
9				---	---	---	78	64	76	88	87	88
10				---	---	---	71	65	67	88	87	88
11				---	---	---	66	63	64	86	84	85
12				196	195	196	66	65	66	84	82	83
13				198	196	197	74	68	70	82	81	82
14				198	197	197	87	76	81	82	81	81
15				199	197	198	93	87	91	84	82	83
16				198	197	198	98	94	96	84	83	84
17				201	198	199	103	98	100	84	82	83
18				204	200	202	99	93	96	85	84	
19				205	204	205	100	90	94	88	85	86
20				205	204	205	90	79	85	91	88	89
21				206	203	204	78	70	74	92	90	91
22				208	204	206	74	69	71	93	92	92
23				209	207	208	70	69	69	94	92	93
24				209	207	208	69	68	69	93	91	92
25				209	207	208	68	68	68	93	92	92
26				209	206	207	68	66	68	95	93	93
27				208	206	206	68	66	67	97	94	95
28				207	206	207	69	67	68	97	96	97
29				205	203	204	74	69	71	99	97	98
30				206	202	204	79	73	77	98	97	97
31				209	202	205	---	---	---	99	97	98
MONTH							206	63	96	99	79	88

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	99	94	97	---	---	---	227	222	225	---	---	---
2	98	95	97	100	95	97	226	223	224	---	---	---
3	100	97	99	105	100	103	227	221	224	---	---	---
4	108	101	107	108	105	107	225	218	221	113	112	113
5	106	93	99	110	108	109	224	219	221	115	113	114
6	92	88	89	113	109	111	224	218	222	117	114	115
7	87	85	86	116	113	115	230	224	227	120	117	118
8	85	80	83	122	116	119	234	229	232	124	120	121
9	79	77	78	129	122	126	233	227	231	124	121	123
10	85	80	83	136	129	132	234	230	232	128	124	125
11	87	85	86	137	134	136	233	229	231	125	119	122
12	86	82	85	140	136	138	233	227	230	118	112	115
13	83	81	82	143	139	141	227	225	227	112	108	110
14	81	80	80	147	142	145	231	226	228	108	108	108
15	80	78	79	151	146	148	230	227	229	108	105	107
16	78	77	78	151	150	150	230	227	228	107	104	105
17	80	78	79	153	149	151	228	226	227	107	105	
18	82	80	81	152	147	149	227	220	226	105	101	103
19	83	81	82	152	147	150	227	225	226	101	91	99
20	84	83	83	158	152	155	226	223	225	99	92	96
21	85	84	85	165	158	162	223	222	223	91	79	85
22	87	84	85	172	165	168	225	221	223	79	73	75
23	90	86	88	179	170	174	225	221	223	73	72	73
24	93	90	92	186	178	182	227	222	225	74	72	73
25	95	92	94	193	185	189	233	228	230	75	74	74
26	96	94	95	197	190	193	242	232	235	77	75	76
27	96	94	95	203	196	200	260	242	251	80	77	79
28	95	94	95	208	203	205	268	260	264	82	80	81
29	96	94	95	214	207	209	268	241	262	86	82	84
30	99	96	98	219	214	216	---	---	---	89	86	87
31	---	---	---	225	219	222	---	---	---	---	---	---
MONTH	108	77	89	225	95	153						

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

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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

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

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

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	20.0	17.0	18.0	21.0	19.5	20.0	23.5	21.0	22.5	---	---	---
2	20.0	16.5	18.0	22.0	17.5	19.5	22.5	20.5	21.5	---	---	---
3	21.0	18.0	20.0	24.5	18.5	21.0	24.0	19.5	21.0	---	---	---
4	20.0	17.5	18.5	24.0	20.0	22.0	21.0	19.0	20.0	17.5	16.0	16.5
5	17.5	17.0	17.0	22.5	20.5	21.0	20.5	18.5	19.5	17.5	15.0	16.5
6	19.5	17.0	18.0	22.0	19.0	20.5	21.0	18.0	19.5	18.0	15.5	17.0
7	18.5	16.5	18.0	22.0	20.0	21.0	21.5	20.0	20.5	19.0	16.5	18.0
8	18.0	15.5	16.5	23.5	19.0	21.0	24.0	20.5	22.0	20.0	18.0	18.5
9	18.5	16.0	17.0	24.5	20.0	22.0	22.0	19.5	21.0	19.0	17.0	18.0
10	19.0	16.0	17.5	25.5	21.0	23.0	21.5	20.0	20.5	17.5	15.5	17.0
11	21.0	17.0	18.5	24.5	21.5	23.0	21.5	19.5	20.0	17.5	15.5	16.5
12	20.0	18.0	19.0	25.5	20.5	22.5	20.5	19.0	19.5	16.5	14.5	15.0
13	21.0	18.5	20.0	24.5	21.0	22.5	20.0	19.0	19.5	14.5	14.0	14.0
14	20.5	19.5	20.0	26.0	22.5	24.0	21.0	18.5	19.5	14.5	13.0	14.0
15	21.0	18.0	20.0	26.0	22.5	24.0	21.0	17.5	19.0	14.0	13.0	13.5
16	22.0	18.5	20.0	24.5	23.0	23.5	19.0	16.5	17.5	13.0	12.0	12.5
17	22.0	19.0	20.5	25.0	21.5	23.0	16.5	15.5	16.0	12.0	11.0	11.5
18	21.0	19.5	20.5	24.0	21.5	22.0	20.0	15.0	17.0	11.5	10.0	11.0
19	21.0	17.5	19.5	23.0	20.0	21.5	20.5	18.0	19.0	10.0	9.0	9.0
20	21.5	18.0	20.0	22.0	20.5	21.0	19.5	18.5	18.5	10.0	8.5	9.0
21	23.5	18.5	21.0	22.5	20.0	21.0	19.0	17.5	18.0	11.0	9.0	10.0
22	25.5	20.0	22.5	22.0	20.0	21.0	20.0	16.0	18.0	11.0	10.5	10.5
23	27.0	21.0	23.5	23.5	19.0	20.5	18.5	17.5	18.0	11.5	10.0	10.5
24	26.5	23.0	25.0	23.5	20.0	22.0	20.0	17.5	18.5	11.5	10.0	10.5
25	27.5	23.5	25.5	22.5	20.5	21.5	20.5	19.0	19.5	11.0	10.0	10.5
26	24.5	22.0	23.5	23.5	19.0	20.5	19.5	17.0	18.0	10.0	9.0	9.5
27	22.0	19.5	21.0	23.0	18.5	21.0	19.5	16.5	18.0	10.0	8.5	9.5
28	20.0	18.5	19.5	23.0	20.0	21.5	19.0	16.5	18.0	10.0	8.5	9.0
29	20.0	18.0	19.0	23.0	19.5	21.0	18.5	17.0	17.5	11.0	9.5	10.0
30	21.0	18.0	19.5	24.0	20.5	22.5	---	---	---	11.0	10.5	10.5
31	---	---	---	25.5	21.0	23.0	---	---	---	---	---	---
MONTH	27.5	15.5	20.0	26.0	17.5	21.5						
YEAR	27.5	.0										

04015500 SECOND CREEK NEAR AURORA, MN

LOCATION.--Lat 47°31'25", long 92°11'35", in NW¼SW¼ sec.12, T.58 N., R.15 W., St. Louis County, Hydrologic Unit 04010201, on left bank 0.1 mi (0.2 km) downstream from First Creek, 0.4 mi (0.6 km) upstream from mouth, and 2.1 mi (3.4 km) east of Aurora.

DRAINAGE AREA.--29 mi^2 (75 km^2) of which 6.6 mi^2 (17.1 km^2) is noncontributing.

PERIOD OF RECORD.--March 1955 to September 1980 (discontinued).

REVISED RECORDS.--WDR MN-71: 1957, 1961. WDR MN-77-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,410.36 ft (429.878 m) National Geodetic Vertical Datum of 1929 (levels by Erie Mining Company).

REMARKS.--Records good except those for winter period and those for period of no gage-height record, Sept. 9-30, which are fair. Natural flow of stream affected by continually changing iron-mining activities that include (1) diversions for iron-ore processing, (2) regulation of tailing ponds, and (3) mine pit dewatering. The amount of water pumped to streams from pit dewatering generally exceeds diversions for ore processing.

AVERAGE DISCHARGE.--25 years, 22.5 ft^3/s (0.637 m^3/s); median of yearly mean discharges, 19.2 ft^3/s (0.544 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 254 ft^3/s (7.19 m^3/s) Apr. 22, 1961, gage height, 5.63 ft (1.716 m); maximum gage height, 5.75 ft (1.753 m) Mar. 28, 1957 (backwater from ice); minimum daily discharge, 1.2 ft^3/s (0.034 m^3/s) Oct. 17, 1976, creek dammed upstream to flood swamp fire; minimum gage height, 3.01 ft (0.917 m) June 24, 25, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 75 ft^3/s (2.12 m^3/s) Sept. 20, from correlation with nearby stations; minimum daily, 1.4 ft^3/s (0.040 m^3/s) June 27; minimum gage height, 3.01 ft (0.917 m) June 24, 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26	48	8.5	9.4	6.6	5.4	28	13	8.0	11	6.1	27
2	23	43	8.2	9.0	6.2	5.3	29	12	15	11	4.4	24
3	26	42	7.9	8.5	5.8	5.2	30	11	15	9.3	3.7	22
4	21	40	7.6	8.0	5.4	5.2	30	9.1	15	8.0	4.2	23
5	23	36	9.9	7.5	5.1	5.1	32	7.5	15	7.7	4.3	21
6	23	34	12	7.0	5.0	5.1	35	5.5	15	7.7	5.8	21
7	23	29	12	6.5	5.0	5.0	40	5.2	16	7.7	6.7	20
8	26	25	9.8	6.0	5.0	5.0	35	5.7	15	6.4	7.3	18
9	25	23	9.0	5.7	5.2	5.0	34	5.8	14	5.1	5.8	22
10	27	22	8.4	5.4	5.3	4.9	31	6.4	11	4.4	4.2	25
11	28	20	8.0	5.3	5.7	4.9	20	8.0	10	5.1	4.6	23
12	23	19	7.5	4.9	5.7	4.9	17	10	9.3	5.9	4.4	20
13	23	18	6.6	4.8	5.8	4.9	16	11	11	5.6	9.0	30
14	20	18	6.5	5.0	5.9	4.9	18	11	7.0	7.4	11	40
15	18	19	6.4	5.1	5.9	4.9	19	11	6.1	7.0	12	50
16	18	21	6.5	5.8	5.9	4.9	20	10	5.6	6.7	11	60
17	20	20	6.4	6.4	5.9	4.9	22	8.0	5.4	6.1	12	55
18	20	19	6.4	7.5	5.9	4.9	25	5.9	5.6	8.3	11	60
19	31	19	6.5	7.9	5.9	4.9	27	4.7	6.7	9.6	8.1	68
20	29	17	7.0	7.9	5.9	5.0	29	4.2	6.4	11	8.4	70
21	28	15	10	7.6	5.8	5.3	27	4.4	4.4	10	9.7	60
22	27	16	13	7.4	5.7	6.0	25	5.1	2.7	9.3	9.2	55
23	24	13	12	6.8	5.7	6.8	22	5.4	2.1	9.3	10	50
24	24	12	9.4	6.7	5.6	8.0	21	5.4	1.6	8.6	11	45
25	24	12	7.4	6.6	5.6	9.4	20	4.4	1.5	9.0	10	40
26	22	11	6.6	6.6	5.5	11	19	3.7	1.6	8.6	14	35
27	20	10	6.3	6.6	5.5	13	18	3.0	1.4	8.0	13	30
28	19	9.6	6.4	6.6	5.4	15	16	2.2	4.0	8.0	13	26
29	19	9.3	7.0	6.7	5.4	18	15	1.7	7.4	7.0	17	23
30	19	8.9	8.2	6.8	---	21	14	2.2	8.6	5.9	28	21
31	43	---	8.3	6.8	---	24	---	3.2	---	6.0	26	---
TOTAL	742	648.8	255.7	208.8	163.3	237.8	734	205.7	247.4	240.7	304.9	1084
MEAN	23.9	21.6	8.25	6.74	5.63	7.67	24.5	6.64	8.25	7.76	9.84	36.1
MAX	43	48	13	9.4	6.6	24	40	13	16	11	28	70
MIN	18	8.9	6.3	4.8	5.0	4.9	14	1.7	1.4	4.4	3.7	18

CAL YR 1979 TOTAL 8938.1 MEAN 24.5 MAX 165 MIN 3.2
WTR YR 1980 TOTAL 5073.1 MEAN 13.9 MAX 70 MIN 1.4

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 except those for the winter period, 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. 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 (station 04015500) basin.
AVERAGE DISCHARGE (adjusted for storage and diversion).--38 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, 318 ft^3/s (9.01 m^3/s) Sept. 24, gage height, 3.80 ft (1.158 m); minimum daily, 9.1 ft^3/s (0.26 m^3/s) Aug. 3, 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	76	42	26	19	12	48	148	31	35	12	51
2	36	83	40	25	18	12	59	140	41	33	11	48
3	39	92	38	24	18	12	63	125	41	30	9.1	48
4	35	95	36	24	17	11	59	113	50	25	12	48
5	36	90	36	24	17	11	61	101	53	25	11	40
6	35	92	41	24	16	11	71	82	54	24	11	41
7	36	96	40	23	16	11	80	67	63	23	11	41
8	40	94	35	23	16	10	72	65	78	21	12	42
9	38	95	34	23	16	10	59	67	89	20	10	59
10	40	91	33	23	16	10	57	68	92	19	9.1	60
11	41	84	33	22	16	10	50	69	77	19	10	62
12	35	75	31	22	16	10	44	72	58	20	9.5	64
13	35	68	29	22	16	10	40	74	62	18	15	88
14	34	63	27	22	17	10	43	75	58	20	16	105
15	32	59	27	22	17	10	46	73	54	19	16	144
16	32	59	24	22	16	10	52	71	50	19	16	168
17	33	56	22	22	16	10	55	63	45	19	17	182
18	34	56	22	23	16	10	59	56	42	23	16	199
19	50	58	22	23	15	10	67	51	38	24	15	212
20	51	57	24	24	15	10	79	46	34	25	15	242
21	55	57	26	24	15	10	90	42	29	24	16	268
22	67	59	28	23	14	11	106	40	24	23	16	294
23	72	59	30	23	14	12	178	37	20	22	19	306
24	66	59	28	24	14	13	201	35	17	19	21	309
25	50	57	27	23	14	14	222	31	15	18	22	285
26	41	54	26	22	13	15	229	26	12	17	28	263
27	40	49	26	22	13	17	220	22	11	16	25	237
28	39	45	26	22	13	20	195	19	19	17	28	212
29	37	44	25	22	13	25	174	17	28	15	35	184
30	37	43	25	21	---	32	163	18	32	14	63	135
31	70	---	25	20	---	39	---	20	---	13	59	---
TOTAL	1325	2065	928	709	452	418	2942	1933	1317	659	585.7	4437
MEAN	42.7	68.8	29.9	22.9	15.6	13.5	98.1	62.4	43.9	21.3	18.9	148
MAX	72	96	42	26	19	39	229	148	92	35	63	309
MIN	32	43	22	20	13	10	40	17	11	13	9.1	40
(†)	+16.1	+40.0	+8.02	+0.25	-0.14	+0.34	+92.7	+13.7	+17.5	+2.15	+8.03	+69.2
MEAN ‡	58.8	109	37.9	23.2	15.5	13.8	191	76.1	61.4	23.4	26.9	217
CFSM ‡	.37	.68	.24	.14	.10	.09	1.19	.47	.38	.15	.17	1.35
IN ‡	.42	.75	.27	.17	.10	.10	1.32	.55	.43	.17	.19	1.51

CAL YR 1979	TOTAL	47592.0	MEAN	130	MAX	2070	MIN	10	MEAN ‡	150	CFSM ‡	0.93	IN ‡	12.65
WTR YR 1980	TOTAL	17770.7	MEAN	48.6	MAX	309	MIN	9.1	MEAN ‡	70.7	CFSM ‡	0.44	IN ‡	5.98

† 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 the period of no gage-height record, Nov. 2 to Dec. 20, 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).--38 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, 610 ft^3/s (17.3 m^3/s) Sept. 24, gage height, 2.80 ft (8.853 m); minimum daily, 25 ft^3/s (0.71 m^3/s) Aug. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	103	215	92	60	40	28	130	351	88	65	30	131
2	101	215	89	59	39	28	130	332	115	63	29	155
3	91	215	86	59	39	28	125	308	112	59	26	192
4	91	215	84	58	38	28	120	282	118	55	34	239
5	85	215	81	57	38	27	145	256	118	54	31	267
6	81	212	79	56	37	27	176	223	115	50	28	276
7	83	210	77	55	36	27	221	190	127	49	28	280
8	85	205	76	54	36	27	245	179	138	46	30	284
9	87	200	74	54	35	27	228	176	150	43	27	322
10	89	190	72	53	35	27	209	174	150	40	25	304
11	86	170	71	52	34	27	178	179	135	39	29	290
12	82	150	69	52	33	26	148	178	113	42	27	287
13	77	140	67	51	32	26	130	176	144	38	38	326
14	70	135	66	51	32	26	126	174	137	42	35	336
15	68	130	64	50	32	26	136	170	135	42	35	366
16	70	125	62	50	31	26	148	162	120	39	33	386
17	76	120	61	49	31	26	163	149	109	38	37	390
18	110	120	60	49	30	26	183	139	96	48	36	435
19	112	120	60	48	30	26	208	129	86	50	34	462
20	110	125	60	48	30	26	229	119	77	51	35	516
21	130	130	65	48	30	26	252	109	71	47	38	550
22	140	130	67	47	30	26	279	101	63	46	34	570
23	140	130	68	47	29	26	361	94	56	44	40	580
24	120	125	66	46	29	26	395	87	50	43	45	600
25	110	120	65	46	29	27	430	80	45	41	44	580
26	100	110	64	45	29	28	459	71	39	38	56	550
27	98	105	63	45	29	33	453	65	36	37	53	512
28	98	100	62	44	28	43	424	61	49	38	55	476
29	100	97	62	43	28	57	395	57	56	37	76	435
30	110	94	61	42	---	74	375	59	62	34	139	382
31	170	---	60	41	---	95	---	61	---	32	121	---
TOTAL	3073	4568	2153	1559	949	996	7201	4891	2910	1390	1328	11479
MEAN	99.1	152	69.5	50.3	32.7	32.1	240	158	97.0	44.8	42.8	383
MAX	170	215	92	60	40	95	459	351	150	65	139	600
MIN	68	94	60	41	28	26	120	57	36	32	25	131
(†)	+16.1	+40.0	+8.02	+0.25	-0.14	+0.34	+92.9	+13.7	+17.5	+2.15	+8.03	+69.2
MEAN ‡	115	192	77.5	50.6	32.6	32.4	333	172	114	47.0	50.8	452
CFSM ‡	.40	.66	.27	.17	.11	.11	1.15	.59	.39	.16	.18	1.56
IN ‡	.46	.74	.31	.20	.12	.13	1.28	.68	.44	.19	.20	1.74

CAL YR 1979	TOTAL	106776	MEAN 293	MAX 3140	MIN 32	MEAN ‡ 312	CFSM ‡ 1.08	IN ‡ 14.62
WTR YR 1980	TOTAL	42497	MEAN 116	MAX 600	MIN 25	MEAN ‡ 138	CFSM ‡ .48	IN ‡ 6.49

† 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 fair 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.--16 years, 547 ft^3/s (15.49 m^3/s), 10.42 in/yr (265 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, 25 ft^3/s (0.71 m^3/s) Mar. 6, 1973; minimum gage height, 5.14 ft (1.567 m) Nov. 26, 1972.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,400 ft^3/s (39.6 m^3/s) Apr. 22, gage height, 9.34 ft (2.847 m); maximum gage height, 11.57 ft (3.527 m) Apr. 8 (backwater from ice); minimum daily, 60 ft^3/s (1.70 m^3/s) Mar. 1; minimum gage height, 5.29 ft (1.612 m) June 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	238	749	305	145	114	60	220	853	251	156	100	320
2	230	792	292	142	114	100	290	795	364	190	93	332
3	222	776	282	139	114	110	400	736	389	183	89	380
4	216	796	272	137	112	120	500	689	355	173	185	548
5	214	816	262	135	112	130	600	638	339	170	125	639
6	208	812	255	133	112	135	700	590	333	167	98	650
7	206	792	245	131	110	135	800	537	361	161	93	628
8	211	752	235	129	110	140	930	500	376	154	100	620
9	257	661	228	127	110	130	1050	468	373	145	107	695
10	144	661	220	125	110	100	1000	452	366	139	100	665
11	206	714	215	125	135	125	940	454	353	131	99	598
12	200	591	210	125	110	130	880	450	331	125	99	577
13	198	531	210	125	100	130	830	438	241	123	104	562
14	196	521	300	123	110	130	800	429	343	122	107	598
15	193	470	210	121	120	130	770	422	346	127	102	598
16	190	454	150	121	125	130	720	416	300	139	92	584
17	188	435	170	121	130	130	667	402	434	135	94	591
18	193	422	180	121	125	130	649	382	290	138	97	665
19	238	419	177	120	130	130	798	365	263	145	98	752
20	263	435	175	120	120	130	794	350	246	150	101	900
21	265	412	171	120	90	130	724	333	237	145	114	988
22	268	403	166	120	130	130	999	316	229	138	119	992
23	279	400	164	120	130	130	924	296	221	128	124	1000
24	297	396	162	120	130	130	975	281	207	124	138	1050
25	300	396	160	118	130	130	999	266	119	123	144	1140
26	288	390	158	118	130	135	1020	254	158	116	208	1050
27	279	380	156	118	130	140	1040	231	148	109	132	1020
28	279	355	154	116	130	145	1020	217	160	113	156	985
29	282	330	152	116	130	150	950	215	196	115	282	903
30	282	315	170	114	---	165	923	206	124	114	254	818
31	464	---	120	114	---	185	---	213	---	108	326	---
TOTAL	7494	16376	6326	3859	3453	4025	23912	13194	8453	4306	4080	21848
MEAN	242	546	204	124	119	130	797	426	282	139	132	728
MAX	464	816	305	145	135	185	1050	853	434	190	326	1140
MIN	144	315	120	114	90	60	220	206	119	108	89	320
CFSM	.34	.77	.29	.17	.17	.18	1.12	.60	.40	.20	.19	1.02
IN.	.39	.85	.33	.20	.18	.21	1.25	.69	.44	.22	.21	1.14

CAL YR 1979 TOTAL 238532 MEAN 654 MAX 6130 MIN 45 CFSM .92 IN 12.45
WTR YR 1980 TOTAL 117326 MEAN 321 MAX 1140 MIN 60 CFSM .45 IN 6.12

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 except those for winter period, which are fair. 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).--72 years, 2,290 ft^3/s (64.85 m^3/s), 9.07 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, 6,860 ft^3/s (194 m^3/s) Apr. 9, gage height, 6.35 ft (1.935 m); minimum, 54 ft^3/s (1.53 m^3/s) July 30, gage height 1.52 ft (0.463 m); minimum daily, 124 ft^3/s (3.51 m^3/s) July 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	449	3480	1680	1550	1300	1300	1840	2600	598	584	185	970
2	563	4670	1450	1550	1300	1300	2100	2410	1010	500	236	970
3	504	4190	1280	750	1300	1300	2610	2260	2210	447	225	972
4	491	3700	1840	1150	1300	1450	2570	2110	2270	435	264	4030
5	470	3320	2130	1600	1350	1400	2770	1940	1780	430	270	3430
6	477	3010	2140	1400	1400	1300	3540	1840	1600	403	240	3170
7	520	2880	2150	1000	1400	1250	4050	1620	1310	293	246	2650
8	519	2460	2050	1300	1450	1250	5530	1510	1340	334	175	2200
9	936	2070	1710	1200	1450	1250	6530	1390	1330	384	205	2450
10	928	1940	2030	1250	1450	1250	5450	1270	1350	346	252	2410
11	1130	1930	1930	1450	1450	1250	4710	1470	1010	325	264	2230
12	1150	2090	1400	1450	1450	1250	4210	1360	1080	310	252	2030
13	1080	2010	1350	1450	1450	1250	3850	1400	945	286	312	2070
14	1010	2110	1400	1500	1450	1200	3370	1400	829	398	442	1950
15	1100	1990	1500	1550	1500	1200	3470	1330	735	340	291	1920
16	1080	1980	1300	1550	1500	1200	3340	1060	674	393	252	1950
17	1060	1970	600	1600	1500	1200	3830	1130	914	332	291	1710
18	1040	1980	2200	1500	1400	1250	3730	1080	707	299	474	1700
19	1260	1980	2250	1600	1520	1250	4020	940	727	472	333	1590
20	1370	2090	1700	1400	1500	1250	3780	1040	819	560	319	1740
21	1430	2090	1800	1400	1500	1300	3940	925	672	543	490	1990
22	1610	1980	1900	1400	1550	1300	3830	839	558	651	570	2200
23	1570	1970	1800	1400	1500	1350	3870	761	502	907	554	2060
24	1420	1830	1700	1350	1450	1400	3660	786	533	381	713	2110
25	1430	1570	1600	1300	1450	1450	3490	663	492	417	821	2080
26	1440	1700	1500	1250	1400	1400	3320	628	425	326	860	2240
27	1370	1700	1750	1200	1400	1400	3240	529	434	285	821	2280
28	1430	1760	1650	1250	1350	1380	3090	568	314	316	840	1990
29	1370	1780	1600	1300	1350	1440	2920	478	381	287	1040	1920
30	1350	1560	1550	1300	---	1510	2640	495	409	147	900	1720
31	1690	---	1550	1300	---	1640	---	475	---	124	794	---
TOTAL	33247	69790	52490	42250	41370	40920	109300	38307	27958	12255	13931	62732
MEAN	1072	2326	1693	1363	1427	1320	3643	1236	932	395	449	2091
MAX	1690	4670	2250	1600	1550	1640	6530	2600	2270	907	1040	4030
MIN	449	1560	600	750	1300	1200	1840	475	314	124	175	970
(†)	-364	-119	-1069	-937	-939	-958	+1155	+246	+208	+40	+156	+981
MEAN ‡	708	2207	624	426	488	362	4798	1482	1140	435	605	3072
CFSM ‡	.21	.64	.18	.12	.14	.11	1.40	.43	.33	.13	.18	.90
IN ‡	.24	.72	.21	.14	.15	.12	1.56	.50	.37	.15	.20	1.00

CAL YR 1979 TOTAL 1233373 MEAN 3379 MAX 33700 MIN 328 MEAN ‡ 3429 CFSM ‡ 1.00 IN ‡ 13.58
WTR YR 1980 TOTAL 544550 MEAN 1488 MAX 6530 MIN 124 MEAN ‡ 1351 CFSM ‡ .39 IN ‡ 5.36

† 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.

REMARKS.--Letter K indicates non-ideal colony count. Letters ND indicate none detected.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE, WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	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)
OCT												
15...	1415	1120	160	8.1	9.5	7.0	3.0	11.3	97	19	K5	74
NOV												
26...	1515	1770	135	7.8	2.5	.0	2.0	13.6	96	14	18	61
JAN												
21...	1500	1400	146	7.6	-5.0	.0	.80	11.6	82	68	37	60
FEB												
19...	1630	1520	150	7.4	--	.5	1.4	12.4	89	>60	110	63
MAR												
31...	1500	1710	159	8.4	10.0	.0	.50	11.9	84	K14	K12	68
JUN												
02...	1400	1000	190	8.3	22.0	19.5	1.8	8.6	96	46	220	84
30...	1600	382	220	8.3	23.0	20.5	1.0	7.5	85	11	28	93
AUG												
04...	1400	277	280	8.1	22.5	24.0	3.1	7.7	93	32	>240	130
SEP												
02...	1335	990	218	7.8	20.0	21.0	1.3	8.0	92	44	110	110
29...	1330	1940	160	7.6	15.5	12.0	.80	10.4	100	K12	59	73

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)	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 (MG/L AS CACO3) (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)
OCT												
15...	20	16	8.2	5.0	.3	1.1	54	13	3.9	.2	5.7	103
NOV												
26...	9	14	6.3	3.8	.2	.9	52	11	3.6	.1	8.6	113
JAN												
21...	7	14	6.0	3.8	.2	.9	53	9.9	3.2	.1	7.9	115
FEB												
19...	12	15	6.2	3.9	.2	.8	51	9.2	2.9	.2	9.6	108
MAR												
31...	4	16	6.9	4.2	.2	1.1	64	9.2	3.5	.1	11	109
JUN												
02...	12	19	8.8	6.4	.3	1.2	72	15	5.0	.2	3.2	174
30...	25	21	9.9	7.9	.4	1.4	68	24	6.7	.2	4.6	171
AUG												
04...	18	28	14	10	.4	1.9	110	24	11	.3	5.7	183
SEP												
02...	23	24	11	7.2	.3	1.7	82	18	7.6	.2	9.2	165
29...	19	16	8.1	5.7	.3	1.4	54	14	5.8	.2	10	148

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)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT												
15...	86	311	.02	.01	.010	.000	1.0	.99	.030	.020	0	--
NOV												
26...	81	540	.37	.37	.150	.150	.72	.70	.020	.020	0	16
JAN												
21...	78	435	.15	.15	.090	.030	.77	.50	.020	.020	--	--
FEB												
19...	80	443	.19	.19	.040	.040	1.2	1.0	.030	.020	0	--
MAR												
31...	92	503	.30	.30	.020	.020	.42	.42	.040	.020	1	10
JUN												
02...	102	470	.04	.01	.040	.000	.76	.47	.040	.020	0	--
30...	117	176	.02	.02	.050	.050	.88	.69	.040	.010	0	19
AUG												
04...	161	137	.01	.01	.000	.000	.56	.28	.050	.010	0	--
SEP												
02...	128	441	.01	.01	.020	.010	.64	.37	.050	.020	0	17
29...	94	775	.12	.12	.010	.010	.88	.70	.040	.030	0	23

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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)
OCT 15...	1415	2	2	100	60	0	0	20	20	1
FEB 19...	1630	1	1	<50	20	0	0	20	10	0
JUN 02...	1400	1	1	<50	20	4	4	20	20	0
AUG 04...	1400	1	1	100	30	1	1	30	20	0

DATE	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	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)
OCT 15...	1	3	3	380	380	2	0	50	30	.1
FEB 19...	0	2	2	750	570	1	0	30	20	.2
JUN 02...	0	5	2	550	230	0	0	100	4	.1
AUG 04...	0	2	2	400	50	3	0	160	4	.2

DATE	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	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, 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 (MG/L AS C) (00689)
OCT 15...	<.1	1	0	0	0	0	4	4	12	.3
FEB 19...	.2	2	2	0	0	0	10	10	17	.1
JUN 02...	<.1	3	0	0	0	0	30	0	21	.4
AUG 04...	.1	5	0	0	0	0	10	1	13	.4

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)
MAR 31...	1500	41	.550	.390	.180	.020
JUN 30...	1600	28	2.68	1.73	3.95	.880
SEP 02...	1335	29	5.91	3.78	3.68	.670

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	PCB TOTAL (UG/L) (39516)	ALDRIN, TOTAL (UG/L) (39330)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39333)	CHLORDANE, TOTAL (UG/L) (39350)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG) (39351)	DDD, TOTAL (UG/L) (39360)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG) (39363)	DDE, TOTAL (UG/L) (39365)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG) (39368)	DDT, TOTAL (UG/L) (39370)	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG) (39373)
NOV 26...	1515	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JUN 02...	1250	--	ND	--	ND	--	ND	--	ND	--	ND	--
AUG 04...	1400	ND	ND	--	ND	--	ND	--	ND	--	ND	--

DATE	DIAZINON, TOTAL (UG/L) (39570)	DIAZINON, TOTAL IN BOTTOM MATERIAL (UG/KG) (39571)	DIELDRIN TOTAL (UG/L) (39380)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39383)	ENDRIN, TOTAL (UG/L) (39390)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG) (39393)	ETHION, TOTAL (UG/L) (39398)	ETHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39399)	HEPTACHLOR, TOTAL (UG/L) (39410)	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG) (39413)	HEPTACHLOR EPOXIDE TOTAL (UG/L) (39420)
NOV 26...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JUN 02...	ND	--	ND	--	ND	--	ND	--	ND	--	ND
AUG 04...	ND	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG) (39423)	LINDANE TOTAL (UG/L) (39340)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG) (39343)	MALATHION, TOTAL (UG/L) (39530)	MALATHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39531)	METHOXYCHLOR, TOTAL (UG/L) (39480)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG) (39481)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL PARATHION, TOT. IN BOTTOM MATL. (UG/KG) (39601)	METHYL TRITHION, TOTAL (UG/L) (39790)
NOV 26...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JUN 02...	--	ND	--	ND	--	ND	--	ND	--	ND
AUG 04...	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	METHYL TRITHION, TOT. IN BOTTOM MATL. (UG/KG) (39791)	PARATHION, TOTAL (UG/L) (39540)	PARATHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39541)	TOXAPHENE, TOTAL (UG/L) (39400)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG) (39403)	TOTAL TRITHION (UG/L) (39786)	TRITHION, TOTAL IN BOTTOM MATERIAL (UG/KG) (39787)	2,4-D, TOTAL (UG/L) (39730)	2,4,5-T TOTAL (UG/L) (39740)	SILVEX, TOTAL (UG/L) (39760)
NOV 26...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JUN 02...	--	ND	--	ND	--	ND	--	--	--	--
AUG 04...	--	ND	--	ND	--	ND	--	--	--	--

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	TEMPERATURE, WATER (DEG C) (00010)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
OCT 15...	1600	974	7.0	3	7.9	--
NOV 26...	1515	1770	.0	6	29	--
JAN 21...	1500	1400	.0	4	15	--
MAR 31...	1515	1550	.0	2	8.4	--
JUN 02...	1330	1010	19.5	5	14	--
30...	1600	382	20.5	3	3.1	--
AUG 04...	1415	284	24.0	5	3.8	100
SEP 02...	1345	1020	21.0	12	33	83
29...	1330	1940	12.0	9	47	97

PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980

DATE	OCT 15,79		NOV 26,79		FEB 19,80		MAR 31,80		JUN 2,80	
TIME	1415		1515		1630		1500		1400	
TOTAL CELLS/ML	3800		420		29		190		2100	
DIVERSITY: DIVISION	0.7		1.5		1.0		0.5		1.4	
.CLASS	0.7		1.5		1.0		0.5		1.4	
..ORDER	0.9		2.1		1.0		0.9		1.5	
...FAMILY	1.0		2.4		1.0		2.2		2.2	
....GENUS	1.1		2.7		0.0		2.7		3.1	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	77	4
....MICRACTINIUM	--	-	--	-	--	-	--	-	370#	18
...OOCYSTACEAE										
....ANKISTRODESMUS	63	2	5	1	14#	50	--	-	150	7
....CHLORELLA	--	-	10	2	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	130	3	--	-	--	-	--	-	--	-
....ECHINOSPHAERELLA	--	-	--	-	--	-	--	-	13	1
....KIRCHNERIELLA	--	-	5	1	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	39	2
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	210	10
...SCENEDESMACEAE										
....ACTINASTRUM	130	3	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	51	12	--	-	20	11	100	5
....TETRASTRUM	--	-	--	-	--	-	--	-	52	2
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	15	4	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	3100#	82	130#	31	--	-	10	5	490#	24
....MELOSIRA	--	-	--	-	--	-	--	-	280	14
....SKELETONEMA	--	-	10	2	--	-	5	3	--	-
....STEPHANODISCUS	32	1	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	32	1	--	-	--	-	5	3	--	-
....COCCONEIS	32	1	--	-	--	-	--	-	13	1
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	--	-	15	8	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	25	13	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	20	5	--	-	15	8	--	-
....FRAGILARIA	--	-	--	-	--	-	81#	42	--	-
....SYNEDRA	--	-	10	2	--	-	5	3	13	1
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	5	1	--	-	--	-	--	-
...NAVICULACEAE	--	-	--	-	14#	50	--	-	--	-
....NAVICULA	32	1	5	1	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	5	1	--	-	10	5	--	-
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CHLOROTHECIACEAE										
....OPHIOCYTIUM	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-

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

DATE TIME	OCT 15,79 1415		NOV 26,79 1515		FEB 19,80 1630		MAR 31,80 1500		JUN 2,80 1400	
ORGANISM	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										
....ANACYSTIS	--	-	10	2	--	-	--	-	260	12
....COCCOCHLORIS	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	220	6	140#	33	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....PHACUS	--	-	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	--	-	--	-

DATE TIME	JUN 30,80 1600		AUG 4,80 1400		SEP 2,80 1335		SEP 29,80 1330	
TOTAL CELLS/ML	12000		5000		31000		620	
DIVERSITY: DIVISION	1.2		1.5		1.3		1.2	
.CLASS	1.2		1.5		1.3		1.2	
..ORDER	1.9		2.1		1.8		1.3	
...FAMILY	2.7		2.4		1.8		1.4	
....GENUS	3.0		2.9		1.9		1.7	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	25	1	--	-	--	-
...COELASTRACEAE								
....COELASTRUM	280	2	--	-	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	--	-	25	1	--	-	--	-
....MICRACTINIUM	480	4	100	2	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	*	0	180	4	*	0	26	4
....CHLORELLA	--	-	--	-	--	-	--	-
....CHODATELLA	*	0	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	6000#	19	--	-
....ECHINOSPHAERELLA	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	100	2	--	-	--	-
....SELENASTRUM	180	1	--	-	--	-	--	-
....TETRAEDRON	*	0	--	-	*	0	--	-
....TREUBARIA	*	0	--	-	*	0	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	--	-	--	-	--	-
....CRUCIGENIA	410	3	--	-	--	-	--	-
....SCENEDESMUS	410	3	300	6	--	-	52	8
....TETRASTRUM	100	1	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	130	1	230	5	780	2	--	-

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

STREAMS TRIBUTARY TO LAKE SUPERIOR

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

PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980--Continued

DATE TIME	JUN 30,80 1600		AUG 4,80 1400		SEP 2,80 1335		SEP 29,80 1330	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	430	4	780#	16	4400	14	78	13
....MELOSIRA	810	7	1800#	36	230	1	--	-
....SKELETONEMA	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE	--	-	--	-	--	-	--	-
....NAVICULA	--	-	50	1	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	*	0	200	4	310	1	13	2
.XANTHOPHYCEAE								
..HETEROCOCCALES								
...CHLOROTHECIACEAE								
....OPHIOCYTIUM	--	-	25	1	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	--	-	13	2
...CRYPTOMONADACEAE								
....CRYPTOMONAS	*	0	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	2600#	21	530	11	17000#	55	410#	67
....COCCOCHLORIS	100	1	--	-	--	-	26	4
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	3200#	27	600	12	--	-	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	2600#	22	--	-	2100	7	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....PHACUS	--	-	25	1	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	*	0	25	1	--	-	--	-

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

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.

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, 214 ft^3/s (6.06 m^3/s) Sept. 3, gage height, 15.30 ft (4.663 m) from rating curve extended above 104 ft^3/s (2.95 m^3/s); minimum daily, 0.90 ft^3/s (0.025 m^3/s) Jan. 29; minimum gage height, 11.34 ft (3.456 m) Aug. 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	21	1.8	1.2	1.3	1.6	17	2.9	4.8	2.1	1.4	4.5
2	2.1	8.1	1.6	1.2	1.4	1.4	19	2.7	7.1	2.0	1.4	6.2
3	2.1	5.5	1.9	1.3	1.4	1.2	21	2.7	4.6	1.9	1.5	87
4	2.2	4.4	2.3	1.3	1.5	1.2	22	2.5	3.3	1.8	1.5	51
5	2.1	3.9	2.7	1.4	1.5	1.1	32	2.4	2.9	1.7	1.6	7.6
6	2.0	3.4	2.5	1.5	1.5	1.1	18	2.1	3.6	1.7	1.6	4.1
7	1.8	3.0	2.4	1.6	1.5	1.1	15	2.1	4.0	1.8	1.6	2.9
8	1.8	2.8	2.4	1.4	1.5	1.1	14	2.1	4.5	1.8	2.1	2.5
9	1.8	2.6	2.4	1.2	1.5	1.1	7.0	2.2	3.3	1.7	1.6	3.8
10	1.8	2.2	2.4	1.0	1.5	1.1	5.3	2.3	2.7	1.6	1.5	2.8
11	2.1	2.2	2.4	1.1	1.5	1.1	7.0	3.2	2.6	1.6	3.4	2.2
12	1.9	2.3	2.5	1.2	1.5	1.2	8.5	2.7	2.5	1.8	1.9	2.7
13	2.0	2.3	2.5	1.3	1.5	1.2	6.9	2.2	5.9	1.8	1.6	5.5
14	2.0	2.5	2.5	1.3	1.5	1.3	6.2	2.3	3.8	5.6	1.6	6.6
15	2.0	2.6	2.5	1.4	1.4	1.4	7.8	2.2	3.2	2.9	1.5	4.3
16	1.9	2.7	2.4	1.4	1.5	1.4	7.6	2.1	2.7	3.3	1.4	3.3
17	1.9	2.7	2.3	1.4	1.6	1.5	8.7	1.8	2.5	2.2	1.9	2.6
18	2.0	2.7	2.4	1.4	1.7	1.6	8.7	2.1	4.1	11	2.0	2.5
19	5.5	3.0	2.5	1.4	1.8	1.7	8.5	1.9	7.6	3.8	1.7	2.4
20	3.5	3.3	2.5	1.4	2.0	2.0	7.6	1.8	4.8	9.9	8.6	2.7
21	3.0	3.0	2.3	1.4	2.0	2.4	6.6	1.8	3.3	4.4	9.6	2.6
22	8.9	2.8	2.0	1.4	2.0	2.9	5.8	1.8	2.9	2.7	2.8	2.3
23	14	2.7	1.8	1.2	1.9	3.4	4.9	1.7	2.5	2.2	2.2	1.9
24	5.8	2.6	1.6	1.3	1.9	4.2	4.1	1.6	2.3	1.8	2.4	2.2
25	4.2	2.4	1.5	1.4	1.8	4.8	3.6	1.6	2.2	1.8	2.2	7.7
26	3.6	2.5	1.5	1.4	1.8	5.1	3.7	1.6	1.9	1.8	2.5	4.6
27	3.4	2.4	1.5	1.3	1.8	5.5	3.4	1.6	2.0	1.8	1.9	3.4
28	3.4	2.2	1.4	1.1	1.8	6.0	3.0	1.6	2.5	1.7	1.7	2.9
29	3.2	2.0	1.3	.90	1.7	10	2.7	1.9	2.5	1.7	1.8	2.6
30	2.9	1.9	1.2	1.2	---	14	2.9	2.1	2.1	1.7	2.2	2.3
31	23	---	1.2	1.3		16	---	3.0	---	1.6	1.8	---
TOTAL	120.2	107.7	64.2	40.30	47.3	100.7	288.5	66.6	104.7	85.2	72.5	239.7
MEAN	3.88	3.59	2.07	1.30	1.63	3.25	9.62	2.15	3.49	2.75	2.34	7.99
MAX	23	21	2.7	1.6	2.0	16	32	3.2	7.6	11	9.6	87
MIN	1.8	1.9	1.2	.90	1.3	1.1	2.7	1.6	1.9	1.6	1.4	1.9
CFSM	.50	.46	.27	.17	.21	.42	1.24	.28	.45	.35	.30	1.03
IN.	.58	.52	.31	.19	.23	.48	1.38	.32	.50	.41	.35	1.15

CAL YR 1979 TOTAL 2711.02 MEAN 7.43 MAX 194 MIN .93 CFSM .96 IN 12.98
WTR YR 1980 TOTAL 1337.60 MEAN 3.65 MAX 87 MIN .90 CFSM .47 IN 6.40

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 current year.

INSTRUMENTATION.--Sediment pumping sampler since October 1976.

REMARKS.--One or more samples taken daily and at stage intervals of about 0.35 ft for storm events. For storm events, suspended-sediment load was obtained by averaging for intervals of a day.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 3,600 mg/L Apr. 6, 1978; minimum daily mean, 1 mg/L Oct. 1-27, 1977.
SEDIMENT LOADS: Maximum daily, 1,670 tons (1,520 tonnes) Apr. 6, 1978; minimum daily, 0 ton (0 tonne) Oct. 1-10, 1977.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 1,610 mg/L Sept. 3; minimum daily mean, 8 mg/L many days.
SEDIMENT LOADS: Maximum daily, 378 tons (343 tonnes) Sept. 3; minimum daily, 0.02 ton (0.02 tonne) Jan. 29.

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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	13	.08	191	11	8	.04	9	.03	9	.03	9	.04
2	15	.09	41	.90	8	.03	9	.03	9	.03	9	.03
3	16	.09	27	.40	8	.04	9	.03	9	.03	9	.03
4	10	.06	21	.25	8	.05	9	.03	9	.04	9	.03
5	12	.07	18	.19	8	.06	9	.03	9	.04	9	.03
6	12	.06	17	.16	8	.05	9	.04	9	.04	9	.03
7	11	.05	15	.12	8	.05	9	.04	9	.04	9	.03
8	10	.05	15	.11	8	.05	9	.03	9	.04	9	.03
9	10	.05	15	.11	8	.05	9	.03	9	.04	9	.03
10	8	.04	15	.09	8	.05	9	.02	9	.04	9	.03
11	8	.05	15	.09	8	.05	9	.03	9	.04	9	.03
12	11	.06	15	.09	8	.05	9	.03	9	.04	9	.03
13	16	.09	15	.09	8	.05	9	.03	9	.04	9	.03
14	18	.10	15	.10	8	.05	9	.03	9	.04	9	.03
15	15	.08	15	.11	8	.05	9	.03	9	.03	9	.03
16	12	.06	15	.11	8	.05	9	.03	9	.04	9	.03
17	12	.06	15	.11	8	.05	9	.03	9	.04	9	.04
18	11	.06	14	.10	9	.06	9	.03	9	.04	9	.04
19	44	.65	14	.11	9	.06	9	.03	9	.04	9	.04
20	10	.09	13	.12	9	.06	9	.03	9	.05	9	.05
21	11	.09	12	.10	9	.06	9	.03	9	.05	9	.06
22	32	.77	11	.08	9	.05	9	.03	9	.05	9	.07
23	49	1.9	10	.07	9	.04	9	.03	9	.05	9	.08
24	30	.47	9	.06	9	.04	9	.03	9	.05	9	.10
25	18	.20	9	.06	9	.04	9	.03	9	.04	9	.12
26	18	.17	9	.06	9	.04	9	.03	9	.04	144	2.0
27	16	.15	8	.05	9	.04	9	.03	9	.04	316	4.7
28	14	.13	8	.05	9	.03	9	.03	9	.04	243	3.9
29	14	.12	8	.04	9	.03	9	.02	9	.04	517	14
30	14	.11	8	.04	9	.03	9	.03	---	---	503	19
31	153	9.5	---	---	9	.03	9	.03	---	---	488	21
TOTAL	---	15.55	---	14.97	---	1.43	---	0.93	---	1.17	---	65.69

04024098 DEER CREEK NEAR HOLYOKE, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	412	19	23	.18	42	.54	35	.20	19	.07	32	.39
2	333	17	27	.20	44	.84	25	.14	19	.07	32	.54
3	100	5.7	28	.20	120	1.5	17	.09	20	.08	1610	378
4	93	5.5	17	.11	95	.85	18	.09	20	.08	1280	176
5	102	8.8	12	.08	57	.45	28	.13	21	.09	72	1.5
6	68	3.3	16	.09	38	.37	21	.10	20	.09	39	.43
7	57	2.3	22	.12	32	.35	25	.12	18	.08	37	.29
8	44	1.7	27	.15	28	.34	22	.11	18	.10	36	.24
9	31	.59	27	.16	23	.20	22	.10	16	.07	35	.36
10	30	.43	23	.14	21	.15	13	.06	13	.05	34	.26
11	39	.74	18	.16	31	.22	18	.08	12	.11	33	.20
12	48	1.1	17	.12	42	.28	32	.16	14	.07	33	.24
13	43	.80	18	.11	73	1.2	22	.11	23	.10	86	1.3
14	42	.70	18	.11	28	.29	53	.80	21	.09	106	1.9
15	48	1.0	17	.10	18	.16	44	.34	16	.06	84	.98
16	45	.92	17	.10	27	.20	62	.55	17	.06	70	.62
17	45	1.1	16	.08	22	.15	38	.23	22	.11	62	.44
18	44	1.0	17	.10	29	.32	125	3.7	25	.14	56	.38
19	43	.99	18	.09	49	1.0	50	.51	25	.11	52	.34
20	43	.88	20	.10	36	.47	115	3.1	73	1.7	48	.35
21	42	.75	18	.09	50	.45	76	.90	104	2.7	43	.30
22	35	.55	19	.09	32	.25	46	.34	54	.41	34	.21
23	27	.36	21	.10	23	.16	38	.23	52	.31	26	.13
24	22	.24	23	.10	32	.20	36	.17	51	.33	29	.17
25	18	.17	26	.11	58	.34	27	.13	50	.30	57	1.2
26	16	.16	24	.10	47	.24	22	.11	48	.32	19	.24
27	15	.14	21	.09	27	.15	20	.10	46	.24	21	.19
28	13	.11	20	.09	27	.18	18	.08	44	.20	22	.17
29	14	.10	20	.10	33	.22	18	.08	42	.20	20	.14
30	17	.13	19	.11	24	.14	19	.09	38	.23	23	.14
31	---	---	23	.19	---	---	19	.08	26	.13	---	---
TOTAL	---	76.26	---	3.67	---	12.21	---	13.03	---	8.70	---	567.65

TOTAL LOAD FOR YEAR: 781.26 TONS.

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	BED MAT. FALL DIAM. % FINER THAN .004 MM (80157)	BED MAT. FALL DIAM. % FINER THAN .062 MM (80158)	BED MAT. FALL DIAM. % FINER THAN .125 MM (80159)	BED MAT. FALL DIAM. % FINER THAN .250 MM (80160)	BED MAT. FALL DIAM. % FINER THAN .500 MM (80161)
AUG 19...	1548	2.0	70	96	96	98	100

05040500 PELICAN RIVER NEAR FERGUS FALLS, MN

LOCATION.--Lat 46°20'10", long 96°07'10", in NE¼ sec.17, T.133 N., R.43 W., Otter Tail County, Hydrologic Unit 09020103, on left bank 990 ft (302 m) downstream from bridge on U.S. Highway 52, 3 mi (4.8 km) northwest of Fergus Falls, and 7.5 mi (12 km) upstream from mouth.

DRAINAGE AREA.--482 mi^2 (1,248 km^2).

PERIOD OF RECORD.--June 1909 to December 1912, July 1942 to current year.

REVISED RECORDS.--WSP 955: Drainage area. WSP 1728: 1958.

GAGE.--Water-stage recorder. Datum of gage is 1,176.98 ft (358.744 m) National Geodetic Vertical Datum of 1929 (levels by Minnesota Department of Transportation). June 19, 1909, to Dec. 31, 1912, nonrecording gage at site 1 mi (1.6 km) downstream at different datum. July 1, 1942, to Nov. 6, 1955, nonrecording gage and Nov. 7, 1955, to Sept. 30, 1963, water stage recorder at site 900 ft (274 m) upstream at datum 3.00 ft (0.91 m) higher.

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

AVERAGE DISCHARGE.--41 years (water years, 1910-12, 1943-80), 79.4 ft^3/s (2.249 m^3/s), 57,530 acre-ft/yr (70.9 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 756 ft^3/s (21.4 m^3/s) Mar. 29, 1943, gage height, 8.53 ft (2.600 m), present datum; maximum gage height, 8.99 ft (2.740 m) Mar. 21, 1966 (backwater from ice); no flow on many days in 1946, 1949-50, 1976-77.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 495 ft^3/s (14.0 m^3/s) Apr. 5, gage height, 5.86 ft (1.786 m) (backwater from ice); maximum gage height, 6.05 ft (1.844 m) Apr. 5 (backwater from ice); minimum discharge, 5.6 ft^3/s (0.16 m^3/s) Sept. 9, 10, gage height, 2.81 ft (0.856 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	80	119	58	83	82	87	150	146	85	31	14	9.7
2	80	126	58	82	82	87	174	145	69	26	13	9.3
3	80	129	58	82	82	87	178	145	80	24	12	9.3
4	80	127	58	82	82	87	114	145	84	22	10	9.7
5	78	112	58	82	83	87	260	145	86	19	9.4	8.6
6	77	93	57	82	83	87	330	148	85	17	9.5	7.9
7	74	87	57	82	83	87	215	145	83	17	11	7.3
8	76	70	56	82	83	87	194	140	80	15	12	6.5
9	72	65	56	82	84	87	215	135	80	14	9.9	6.5
10	70	65	55	82	84	88	207	138	79	13	9.1	6.0
11	68	69	55	82	84	88	186	136	74	14	8.5	7.0
12	67	72	55	82	84	88	167	138	66	15	8.1	25
13	65	72	55	82	84	88	160	135	71	15	10	31
14	65	74	55	82	84	88	156	131	67	17	9.7	30
15	65	74	54	82	84	88	156	131	61	18	8.6	28
16	64	74	54	82	84	88	152	128	57	17	9.3	25
17	63	78	54	82	85	88	123	126	55	14	9.7	21
18	63	78	54	82	85	88	149	126	56	18	11	18
19	65	77	55	82	85	88	135	125	59	22	9.7	17
20	64	75	57	82	85	89	145	123	56	22	9.3	17
21	64	73	62	82	85	89	149	118	52	20	11	16
22	64	73	96	82	86	89	152	112	48	20	12	14
23	64	72	94	82	86	89	151	107	46	20	13	14
24	62	70	92	82	86	89	150	103	43	19	18	14
25	62	67	90	82	86	89	148	98	41	20	18	16
26	60	61	89	82	86	91	145	93	40	23	14	15
27	59	61	87	82	86	93	145	90	40	19	13	14
28	57	56	86	82	86	96	147	85	39	18	12	14
29	56	58	85	82	86	103	149	83	37	16	12	15
30	61	58	84	82	---	110	148	81	37	17	11	14
31	99	---	83	82	---	128	---	77	---	15	9.7	---
TOTAL	2124	2385	2067	2543	2445	2818	5050	3778	1856	577	347.5	445.8
MEAN	68.5	79.5	66.7	82.0	84.3	90.9	168	122	61.9	18.6	11.2	14.9
MAX	99	129	96	83	86	128	330	148	86	31	18	31
MIN	56	56	54	82	82	87	114	77	37	13	8.1	6.0
AC-FT	4210	4730	4100	5040	4850	5590	10020	7490	3680	1140	689	884

CAL YR 1979 TOTAL 41270.3 MEAN 113 MAX 560 MIN 1.8 AC-FT 81860
WTR YR 1980 TOTAL 26436.3 MEAN 72.2 MAX 330 MIN 6.0 AC-FT 52440

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, 12,750 acre-ft (15.7 hm^3) Apr. 9, elevation, 1,068.75 ft (325.755 m); minimum, 1,280 acre-ft (1.58 hm^3) Mar. 18, elevation, 1,049.34 ft (319.839 m).

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1060.50	6080	
Oct. 31	1060.68	6190	+110
Nov. 30	1061.12	6480	+290
Dec. 31	1061.20	6540	+60
CAL YR 1979			+370
Jan. 31	1058.10	4660	-1880
Feb. 29	1054.23	2890	-1770
Mar. 31	1051.86	2010	-880
Apr. 30	1063.00	7800	+5790
May 31	1059.30	5330	-2470
June 30	1058.11	4660	-670
July 31	1058.77	5020	+360
Aug. 31	1061.13	6490	+1470
Sept. 30	1066.38	10540	+4050
WTR YR 1980			+4460

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.--50 years, 305 ft^3/s (8.638 m^3/s), 221,000 acre-ft/yr (272 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, 903 ft^3/s (25.6 m^3/s) Apr. 9, gage height, 3.84 ft (1.170 m) result of regulation; minimum, 36 ft^3/s (1.02 m^3/s) Sept. 7, gage height, 2.11 ft (0.643 m); minimum gage height, 2.10 ft (0.640 m) Aug. 29, result of regulation.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	457	329	356	370	395	424	56	667	345	208	169	47
2	423	354	352	368	391	417	58	617	345	207	169	46
3	339	355	328	367	390	412	113	587	345	183	169	42
4	334	356	297	367	385	411	162	588	345	165	169	42
5	350	356	300	364	384	409	170	593	344	162	152	42
6	356	356	300	355	381	402	179	616	401	163	143	39
7	356	358	300	355	378	420	323	629	471	165	145	39
8	356	356	300	355	378	428	550	628	466	164	145	39
9	356	357	301	355	378	423	792	625	459	161	145	41
10	356	356	304	350	378	420	873	622	447	162	145	41
11	356	356	306	345	376	412	701	619	409	144	144	42
12	356	356	306	345	373	412	582	608	382	133	131	41
13	356	356	306	344	373	416	587	603	386	133	123	41
14	356	356	306	342	372	464	585	596	387	137	123	40
15	356	356	306	180	373	592	568	590	380	137	91	40
16	356	356	306	345	371	587	657	516	354	135	73	42
17	356	355	305	346	373	511	695	473	322	138	73	41
18	356	356	304	347	373	478	690	470	322	167	74	39
19	356	356	306	348	391	488	687	467	316	180	73	39
20	356	356	301	350	412	512	686	423	317	182	73	40
21	356	356	324	350	409	526	681	393	318	180	73	40
22	356	356	337	350	407	538	681	395	319	178	63	41
23	356	356	337	350	406	547	679	397	319	178	62	42
24	324	359	334	350	406	559	673	396	311	178	62	40
25	300	356	334	384	406	593	672	398	284	178	60	41
26	292	359	360	405	427	614	672	393	267	178	62	40
27	283	360	373	406	439	608	674	363	268	177	63	40
28	283	362	373	404	435	594	669	346	269	177	63	40
29	283	359	373	401	429	591	671	349	262	177	53	40
30	283	356	373	398	---	599	670	350	234	173	49	39
31	288	---	371	397	---	347	---	345	---	167	47	---
TOTAL	10647	10671	10079	11093	11389	15154	16456	15662	10394	5167	3186	1226
MEAN	343	356	325	358	393	489	549	505	346	167	103	40.9
MAX	457	362	373	406	439	614	873	667	471	208	169	47
MIN	283	329	297	180	371	347	56	345	234	133	47	39
AC-FT	21120	21170	19990	22000	22590	30060	32640	31070	20620	10250	6320	2430

CAL YR 1979 TOTAL 186830 MEAN 512 MAX 1110 MIN 50 AC-FT 370600
WTR YR 1980 TOTAL 121124 MEAN 331 MAX 873 MIN 39 AC-FT 240200

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.--39 years, 80.0 ft^3/s (2.266 m^3/s), 57,960 acre-ft/yr (71.5 hm^3/yr); median of yearly mean discharges, 53.4 ft^3/s (1.512 m^3/s), 38,690 acre-ft/yr (47.7 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, 169 ft^3/s (4.79 m^3/s) June 14, gage height, 6.19 ft (1.887 m); no flow Oct. 1-10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	2.1	9.1	8.9	11	12	21	34	7.7	48	4.9	.22
2	.00	5.8	9.2	8.9	11	12	12	36	10	32	5.7	.19
3	.00	6.0	9.4	8.9	11	12	9.1	36	11	28	4.1	.16
4	.00	5.2	9.4	8.9	12	12	4.6	35	8.5	31	3.8	.16
5	.00	2.8	9.3	8.9	12	12	4.6	34	11	35	3.1	.11
6	.00	5.5	9.2	8.8	12	12	4.4	32	32	33	2.4	.06
7	.00	5.5	9.2	8.6	12	12	4.4	32	62	28	3.4	.04
8	.00	5.2	9.2	8.5	12	12	4.6	32	62	7.5	3.1	.05
9	.00	5.8	9.2	8.4	12	12	24	32	60	6.3	2.4	.04
10	.00	5.9	9.2	8.3	12	12	44	34	62	8.3	3.2	.02
11	29	6.2	9.2	8.2	12	12	44	32	62	10	3.9	.03
12	55	6.3	9.2	8.2	12	12	40	32	62	7.5	3.2	.08
13	50	7.0	9.2	8.3	12	12	36	32	94	5.8	3.0	.12
14	49	7.3	9.1	8.4	12	12	34	31	163	10	3.4	.09
15	29	7.9	9.1	8.7	12	13	31	31	165	9.1	2.3	.04
16	1.1	8.6	9.1	8.9	12	17	29	30	122	6.6	.69	.10
17	.82	9.6	9.1	9.1	12	22	26	31	82	6.0	.46	.05
18	1.1	10	9.1	9.4	12	28	24	31	79	6.3	.32	.11
19	1.2	11	9.1	9.7	12	61	26	30	73	6.3	.41	.03
20	.85	10	9.0	10	12	78	26	27	68	6.9	.35	.08
21	.45	7.3	9.0	10	12	80	26	24	66	7.2	.32	.04
22	.40	5.4	9.0	10	12	76	31	22	64	5.2	.24	.12
23	.40	8.4	9.0	10	12	77	23	15	61	4.9	.23	.03
24	.55	9.1	8.9	10	12	87	22	11	62	5.5	.20	.07
25	.60	9.1	8.9	10	12	81	24	14	55	6.6	.36	.08
26	1.3	9.1	8.9	10	12	80	27	13	53	4.9	.31	.04
27	.52	9.1	8.9	10	12	83	22	13	52	5.5	.19	.05
28	.62	9.1	8.9	11	12	84	21	12	53	6.0	.10	5.9
29	.48	9.1	8.9	11	12	85	24	7.5	53	5.2	.19	26
30	.38	9.1	8.9	11	---	83	29	8.2	50	7.2	.18	10
31	.48	---	8.9	11	---	60	---	6.8	---	5.8	.15	---
TOTAL	223.25	218.5	281.8	290.0	345	1263	697.7	790.5	1865.2	395.6	56.60	44.11
MEAN	7.20	7.28	9.09	9.35	11.9	40.7	23.3	25.5	62.2	12.8	1.83	1.47
MAX	55	11	9.4	11	12	87	44	36	165	48	5.7	26
MIN	.00	2.1	8.9	8.2	11	12	4.4	6.8	7.7	4.9	.10	.02
AC-FT	443	433	559	575	684	2510	1380	1570	3700	785	112	87

CAL YR 1979 TOTAL 71103.74 MEAN 195 MAX 1020 MIN .00 AC-FT 141000
WTR YR 1980 TOTAL 6471.26 MEAN 17.7 MAX 165 MIN .00 AC-FT 12840

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.--37 years (1943-80), 535 ft^3/s (15.15 m^3/s) 387,600 acre-ft/yr (478 hm^3/yr); median of yearly mean discharges, 480 ft^3/s (13.6 m^3/s) 348,000 acre-ft/yr (429 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, 3,100 ft^3/s (87.8 m^3/s) Apr. 1, gage height, 10.71 ft (3.264 m) (backwater from ice); minimum daily, 27 ft^3/s (0.76 m^3/s) Sept. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	502	390	300	420	440	450	2960	746	422	313	195	40
2	502	373	320	420	440	450	2180	742	389	264	199	45
3	486	417	320	420	430	460	1300	714	372	253	199	40
4	433	418	402	410	430	460	850	674	400	218	185	35
5	353	419	402	410	430	430	746	666	471	182	182	35
6	394	421	354	410	430	440	630	662	743	170	197	35
7	403	421	302	330	430	460	518	682	924	167	250	30
8	412	417	280	330	430	470	590	714	894	167	275	30
9	419	419	225	410	420	510	786	714	775	170	209	30
10	419	382	250	410	420	540	965	706	687	163	179	27
11	419	330	250	410	410	540	1120	706	629	161	163	30
12	419	420	200	330	400	540	1060	698	570	149	159	43
13	428	420	250	410	400	530	854	694	579	131	161	39
14	479	400	310	470	390	520	806	686	736	143	120	36
15	493	390	318	450	390	530	786	681	838	134	115	35
16	488	390	310	310	390	550	758	670	792	131	122	32
17	470	386	325	260	390	600	798	617	670	131	108	32
18	445	386	358	420	380	630	846	546	528	151	94	33
19	436	374	350	410	390	610	838	534	469	170	92	32
20	427	366	350	410	410	550	830	527	433	225	100	33
21	419	350	350	420	420	570	818	482	421	215	90	34
22	417	350	350	420	420	670	802	427	413	209	80	33
23	420	350	380	330	420	720	806	417	404	203	70	33
24	454	350	380	420	420	740	806	416	399	194	60	36
25	430	348	380	420	420	770	790	415	402	197	55	38
26	342	348	380	420	420	830	782	389	382	198	50	36
27	318	348	400	440	450	910	774	254	354	194	45	35
28	306	216	420	470	450	1050	770	354	342	196	40	34
29	302	121	430	460	450	1360	758	344	338	197	50	36
30	318	201	430	450	---	1900	750	354	337	229	45	36
31	410	---	430	450	---	2510	---	390	---	215	40	---
TOTAL	12963	10921	10506	12550	12120	22300	28077	17621	16113	5840	3929	1043
MEAN	418	364	339	405	418	719	936	568	537	188	127	34.8
MAX	502	421	430	470	450	2510	2960	746	924	313	275	45
MIN	302	121	200	260	380	430	518	254	337	131	40	27
AC-FT	25710	21660	20840	24890	24040	44230	55690	34950	31960	11580	7790	2070

CAL YR 1979 TOTAL 343580 MEAN 941 MAX 7000 MIN 100 AC-FT 681500
WTR YR 1980 TOTAL 153983 MEAN 421 MAX 2960 MIN 27 AC-FT 305400

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

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1972-80.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, WATER (DEG C) (00010)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
APR								
03...	1900	1030	470	7.5	.5	220	93	45
AUG								
14...	0955	128	459	8.3	22.0	220	21	39

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 (MG/L AS CACO3) (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
APR									
03...	26	12	.4	5.2	126	110	8.0	.1	12
AUG									
14...	30	13	.4	2.6	200	44	7.4	.2	7.9

DATE	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-PHORUS, ORTHOPH OSPHATE DISSOL. (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								
03...	343	299	954	3.6	1.1	230	60	100
AUG								
14...	252	265	87.1	.70	.24	0	20	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.--5 years, 550 ft^3/s (15.58 m^3/s), 398,500 acre-ft/yr (491 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 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, 3,250 ft^3/s (92.0 m^3/s) Apr. 4, gage height, 19.13 ft (5.831 m), from graph based on gage readings; minimum daily, 26 ft^3/s (0.74 m^3/s) Sept. 19-23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	496	372	156	380	470	430	2530	760	384	332	204	55
2	496	392	298	380	470	430	2950	752	424	328	188	53
3	496	383	420	380	460	430	3160	752	420	304	176	48
4	499	388	420	380	440	430	3180	736	420	288	172	44
5	467	400	412	380	430	430	3150	700	424	264	176	41
6	400	400	448	380	420	432	2570	668	436	228	172	43
7	367	402	440	385	396	420	2020	656	540	196	188	43
8	390	406	384	390	396	424	1200	660	760	180	244	37
9	398	378	340	315	384	430	768	688	840	172	276	33
10	402	320	296	286	396	450	812	708	784	172	268	29
11	405	268	248	290	388	470	920	704	700	180	208	35
12	402	292	256	318	380	490	1020	704	636	164	168	37
13	400	356	280	390	380	490	1050	700	588	160	152	39
14	407	476	240	390	368	490	932	696	572	148	152	46
15	423	504	268	390	364	490	840	696	648	128	140	50
16	451	496	272	422	360	500	800	692	780	131	124	37
17	457	456	272	338	368	510	784	688	800	128	120	28
18	459	444	280	290	372	540	776	668	736	140	112	28
19	448	432	292	320	372	580	816	600	620	140	89	26
20	432	408	320	390	372	620	828	560	524	144	78	26
21	420	396	336	400	376	640	828	547	480	164	84	26
22	409	384	328	400	392	640	812	533	448	200	97	26
23	403	348	328	360	408	640	796	484	436	208	93	26
24	404	352	336	370	408	664	792	453	424	200	93	28
25	408	360	356	380	412	720	792	444	416	192	81	28
26	430	360	358	400	420	760	792	440	404	180	64	29
27	395	360	355	410	428	800	792	436	404	180	58	33
28	346	291	355	410	424	868	780	376	376	188	55	35
29	323	176	355	410	420	1040	772	348	352	184	61	35
30	316	162	360	450	---	1530	768	372	336	184	58	37
31	334	---	380	470	---	2090	---	372	---	200	53	---
TOTAL	12883	11162	10189	11654	11674	19878	39030	18593	16112	6007	4204	1081
MEAN	416	372	329	376	403	641	1301	600	537	194	136	36.0
MAX	499	504	448	470	470	2090	3180	760	840	332	276	55
MIN	316	162	156	286	360	420	768	348	336	128	53	26
AC-FT	25550	22140	20210	23120	23160	39430	77420	36880	31960	11910	8340	2140

CAL YR 1979 TOTAL 371068 MEAN 1017 MAX 9550 MIN 100 AC-FT 736000
WTR YR 1980 TOTAL 162467 MEAN 444 MAX 3180 MIN 26 AC-FT 322300

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.

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 observed, 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, 650 micromhos Sept. 8, 19, 20, 22-24; minimum daily, 320 micromhos Mar. 29.
WATER TEMPEATURES: Maximum observed, 30.5°C July 14; minimum daily, 0.0°C on many days during winter months.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	PH FIELD (UNITS) (00400)	COLOR (PLATINUM COBALT UNITS) (00080)	TURBIDITY (NTU) (00076)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)
DEC											
07...	1030	8.5	10	3.4	13.4	91	240	15	43	31	11
MAR											
06...	1035	7.9	10	3.0	12.4	88	270	43	50	36	10
APR											
16...	0945	7.9	15	25	10.0	88	240	59	48	29	12
JUN											
19...	1005	8.0	90	76	6.4	74	230	50	46	28	15
SEP											
10...	0915	8.3	50	52	5.5	60	290	76	52	38	26

DATE	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY (MG/L AS CACO3) (00410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)
DEC											
07...	.3	4.1	220	35	7.3	.2	11	287	275	344	.05
06...	.3	4.5	230	42	7.7	.2	15	307	305	356	.20
APR											
16...	.3	5.6	180	75	6.8	.2	12	308	298	673	.34
JUN											
19...	.4	5.5	180	86	6.2	.2	13	326	309	545	.32
SEP											
10...	.7	6.8	210	110	13	.3	9.9	405	382	33.9	.07

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHOPHOSPHATE TOTAL (MG/L AS P) (70507)	PHOSPHORUS, HYDROLYZABLE TOTAL (MG/L AS P) (00669)	BORON, DISSOLVED (UG/L AS B) (01020)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUSPENDED (MG/L AS C) (00689)	PHENOLS (UG/L) (32730)
DEC											
07...	.05	.030	1.5	.050	.040	.000	.03	60	11	.5	2
MAR											
06...	.20	.210	1.2	.070	.050	.080	.12	80	11	.9	0
APR											
16...	.34	.060	1.3	.160	.070	.100	.06	70	9.2	.6	2
JUN											
19...	.23	.140	1.6	.280	.120	.150	.10	100	11	1.6	5
SEP											
10...	.00	.060	1.6	.180	.080	.060	.00	160	14	1.4	4

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

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	TEMPERATURE, WATER (DEG C) (00010)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)
OCT 03...	1430	385	13.5	--	--
NOV 07...	1500	460	1.5	10	11
DEC 07...	1030	478	.0	6	7.2
JAN 10...	1520	593	.0	10	7.7
FEB 07...	1505	521	.5	8	8.6
MAR 06...	1035	515	.0	17	20
29...	1100	481	.5	28	75
APR 08...	0900	498	3.5	228	788
16...	0945	491	8.0	54	118
MAY 23...	1355	470	21.5	68	84
JUN 19...	1005	500	21.0	222	371
JUL 16...	1145	550	27.5	225	80
AUG 13...	1530	443	23.0	114	48
SEP 10...	0915	630	19.0	54	4.5

DATE	TIME	SED. SUSP. FALL DIAM. % FINER THAN .004 MM (70338)	SED. SUSP. FALL DIAM. % FINER THAN .016 MM (70340)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	SED. SUSP. SIEVE DIAM. % FINER THAN .125 MM (70332)	SED. SUSP. SIEVE DIAM. % FINER THAN .250 MM (70333)	SED. SUSP. SIEVE DIAM. % FINER THAN .500 MM (70334)	SED. SUSP. SIEVE DIAM. % FINER THAN 1.00 MM (70335)	BED MAT. SIEVE DIAM. % FINER THAN .062 MM (80164)
APR 08...	0900	60	92	99	99	99	99	100	6

DATE	BED MAT. SIEVE DIAM. % FINER THAN .125 MM (80165)	BED MAT. SIEVE DIAM. % FINER THAN .250 MM (80166)	BED MAT. SIEVE DIAM. % FINER THAN .500 MM (80167)	BED MAT. SIEVE DIAM. % FINER THAN 1.00 MM (80168)	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM (80169)	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM (80170)	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM (80171)	BED MAT. SIEVE DIAM. % FINER THAN 16.0 MM (80172)	BED MAT. SIEVE DIAM. % FINER THAN 32.0 MM (80173)
APR 08...	11	18	31	55	82	91	94	94	100

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	400	440	480	480	480	510	350	---	---	545	385	530
2	395	400	---	500	510	---	360	460	470	540	---	540
3	395	420	500	500	---	500	380	450	455	545	---	560
4	400	---	540	500	480	590	400	---	490	545	430	565
5	400	410	480	500	480	500	420	430	485	540	420	580
6	440	400	460	---	460	490	---	475	480	---	420	625
7	---	400	500	540	480	480	460	460	455	580	400	---
8	420	460	490	500	470	600	460	460	---	580	420	650
9	440	460	---	460	500	---	500	450	465	550	440	640
10	400	480	500	470	---	550	560	440	460	560	---	645
11	400	---	500	540	490	560	500	---	450	560	420	600
12	400	470	470	640	500	500	450	445	420	560	480	625
13	400	460	625	---	550	520	---	---	465	---	440	605
14	---	460	530	480	460	550	450	---	485	525	420	---
15	410	540	500	470	520	540	500	380	---	530	460	600
16	420	430	---	560	540	---	480	440	470	530	485	600
17	420	420	600	480	---	470	480	430	580	525	---	635
18	420	---	500	480	550	530	470	---	520	520	510	640
19	500	430	470	480	530	460	470	450	500	520	500	650
20	520	430	490	---	540	420	---	460	520	---	495	650
21	---	420	560	570	530	450	450	460	555	500	500	---
22	475	430	480	530	460	480	450	470	---	500	500	650
23	440	470	---	570	500	---	440	460	540	480	575	650
24	430	470	460	580	---	550	450	460	530	460	---	650
25	410	---	500	520	520	580	450	---	530	440	480	645
26	430	450	520	560	500	500	440	485	535	380	480	635
27	440	470	500	---	520	460	---	475	530	---	480	605
28	---	460	520	490	520	460	460	470	530	425	480	---
29	430	480	520	440	580	320	450	465	---	400	480	560
30	450	480	---	520	---	---	460	460	520	430	485	580
31	440	---	480	480	---	360	---	580	---	340	---	---

MEAN
WTR YR 1980 MEAN MAX 650 MIN 320

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.0	4.5	.0	.5	.5	.5	2.5	---	---	21.5	24.0	20.0
2	14.5	4.0	---	.0	.5	---	2.5	19.0	19.5	22.5	---	19.5
3	13.0	3.0	.5	.0	---	.5	2.5	20.0	21.0	24.5	---	22.0
4	12.5	---	1.0	.0	.5	.5	2.5	---	19.5	25.5	21.5	18.0
5	12.5	2.0	2.0	.0	.5	.5	2.0	19.0	19.0	25.0	22.5	24.0
6	10.5	1.5	.5	---	.5	.5	---	17.5	20.0	---	22.0	24.5
7	---	1.0	.0	.0	.5	.5	3.0	14.5	18.5	27.0	21.5	---
8	9.5	.0	.0	.0	.5	.5	4.0	14.0	---	25.5	22.5	23.0
9	8.5	.0	---	.0	.5	---	5.5	13.5	19.0	27.5	22.0	20.5
10	9.0	.0	.5	.0	---	.5	7.0	13.5	20.5	29.5	---	20.5
11	8.0	---	.5	.0	.5	.5	6.0	---	21.0	29.0	24.0	18.0
12	6.5	.0	.0	.0	.5	.5	7.0	14.0	22.5	29.5	22.5	17.5
13	7.0	.0	.0	---	.5	.5	---	14.0	23.0	---	23.0	17.0
14	---	1.0	1.0	.5	.5	.5	8.0	14.0	23.5	30.5	24.5	---
15	7.0	1.0	.0	1.0	.5	1.0	9.0	14.5	---	27.0	24.0	17.0
16	8.0	1.5	---	.5	.0	---	10.5	15.0	22.5	28.0	20.0	16.0
17	8.0	2.0	.5	.0	---	1.5	11.5	16.0	23.0	26.0	---	14.5
18	9.0	---	.5	.0	.0	1.0	13.0	---	21.0	28.0	22.0	14.5
19	9.0	1.5	1.0	.5	.0	1.0	13.5	18.0	22.0	25.0	23.5	14.5
20	9.5	.5	1.0	---	.5	1.5	---	19.0	21.5	---	23.5	16.5
21	---	1.0	1.5	1.0	1.0	1.0	16.5	20.5	22.5	23.5	23.5	---
22	8.0	1.5	.0	.0	.0	1.0	15.5	21.5	---	25.5	27.0	14.5
23	7.5	.5	---	1.0	1.0	---	15.5	22.0	24.5	25.0	24.5	12.5
24	7.5	.0	.0	.5	---	1.5	14.5	22.5	25.0	24.5	---	12.5
25	6.0	---	.0	.0	.0	1.0	14.5	---	25.0	23.5	23.5	12.5
26	6.0	.0	.0	.0	.5	1.0	14.0	23.5	23.0	22.5	21.5	12.5
27	7.5	.5	1.0	---	.5	1.5	---	24.5	23.0	---	25.0	14.5
28	---	.5	.0	.0	.5	1.5	16.0	24.0	21.0	25.0	21.5	---
29	7.5	.0	.0	.0	.0	4.0	17.0	23.5	---	25.5	22.0	17.5
30	7.0	.0	---	.0	---	---	17.0	22.5	21.5	25.0	22.5	15.0
31	5.5	---	.5	.0	---	2.0	---	21.5	---	25.0	---	---

MEAN
WTR YR 1980 MEAN MAX 30.5 MIN .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).--79 years, 558 ft^3/s (15.80 m^3/s), 404,300 acre-ft/yr (499 hm^3/yr); median of yearly mean discharges, 440 ft^3/s (12.5 m^3/s), 319,000 acre-ft/yr (390 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, 5,470 ft^3/s (155 m^3/s) Apr. 5, gage height, 20.74 ft (6.322 m); minimum daily, 13 ft^3/s (0.37 m^3/s) Sept. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	496	369	156	390	450	400	2640	790	345	288	172	39
2	501	379	182	390	450	430	3170	774	358	287	177	35
3	489	387	263	390	450	430	3720	774	392	269	164	39
4	494	372	342	390	420	430	4200	766	449	238	148	33
5	481	382	376	390	410	450	4730	726	499	221	152	30
6	438	397	386	390	400	450	5180	682	513	204	152	30
7	372	398	414	390	390	440	4530	654	500	164	168	30
8	359	395	340	390	390	440	3110	654	654	136	190	25
9	374	388	310	330	380	440	2200	668	827	128	233	16
10	387	318	280	280	380	460	1490	696	876	128	309	13
11	384	274	240	330	370	470	1180	710	834	148	263	39
12	381	258	230	390	360	470	1170	696	777	144	185	121
13	385	300	250	390	360	470	1220	692	698	131	160	48
14	387	390	240	380	360	480	1270	692	642	117	128	35
15	394	440	210	370	360	480	1190	675	658	109	121	41
16	420	450	250	390	360	480	1020	665	824	108	111	39
17	450	440	310	390	360	490	934	663	955	108	97	35
18	474	420	320	350	350	510	886	652	958	136	85	27
19	459	410	300	285	350	550	846	608	842	114	77	25
20	444	390	310	330	350	570	854	542	672	123	80	25
21	419	382	335	390	350	600	886	507	574	120	88	21
22	406	358	335	390	370	602	862	489	509	148	68	19
23	394	350	335	390	380	605	846	458	459	168	82	19
24	388	335	335	400	390	605	822	418	424	168	77	21
25	394	335	350	360	400	670	822	404	399	152	65	21
26	413	335	350	350	400	710	830	396	382	152	55	23
27	419	335	350	400	400	800	830	390	395	152	48	23
28	371	335	350	400	400	960	814	362	366	156	41	25
29	324	249	350	420	400	1380	814	334	335	152	80	25
30	313	177	370	430	---	2020	806	323	311	156	46	23
31	381	---	390	440	---	2670	---	334	---	156	39	---
TOTAL	12791	10748	9559	11705	11190	20962	53872	18194	17427	4981	3861	945
MEAN	413	358	308	378	386	676	1796	587	581	161	125	31.5
MAX	501	450	414	440	450	2670	5180	790	958	288	309	121
MIN	313	177	156	280	350	400	806	323	311	108	39	13
AC-FT	25370	21320	18960	23220	22200	41580	106900	36090	34570	9880	7660	1870
(†)	1029	948	925	941	951	989	1154	1738	1209	1841	1292	1052
MEAN ‡	430	374	323	393	402	692	1815	615	601	191	146	49
AC-FT‡	26400	22270	19880	24160	23150	42570	108050	37830	35780	11720	8950	2920

CAL YR 1979 TOTAL 483712 MEAN 1325 MAX 17200 MIN 90 AC-FT 959400 MEAN ‡ 1343 AC-FT ‡ 972560
WTR YR 1980 TOTAL 176235 MEAN 482 MAX 5180 MIN 13 AC-FT 349600 MEAN ‡ 501 AC-FT ‡ 363680

† Diversions in acre-feet to cities of Fargo and Moorhead.
‡ Adjusted for diversions to cities of Fargo and Moorhead.

PERIOD OF RECORD.--Water years 1956-80.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, WATER (DEG C) (00010)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
APR								
03...	1520	4370	328	7.6	1.5	150	16	27
AUG								
12...	0935	194	446	8.5	22.0	210	9	34

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 (MG/L AS CACO3) (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
APR									
03...	20	8.9	.3	5.5	134	29	7.4	.1	8.9
AUG									
12...	30	14	.4	3.7	199	35	8.7	.2	7.4

DATE	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-PHORUS, ORTHOPH OSPHATE DISSOL. (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								
03...	166	191	1960	2.8	.92	320	110	120
AUG								
12...	254	254	133	1.0	.11	90	20	0

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. Letter E indicates estimated value.

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, 795 micromhos Sept. 28; minimum daily, 340 micromhos Apr. 4.
WATER TEMPERATURES: Maximum daily, 27.0°C July 14; minimum daily, 0.0°C on many days during winter months.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, WATER (DEG C) (00010)	COLOR (PLAT-INUM COBALT UNITS) (00080)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)	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)
OCT												
04...	1220	496	408	8.5	13.0	15	210	12	37	29	9.8	.3
NOV												
08...	1200	E395	460	--	2.0	10	220	27	39	29	13	.4
DEC												
04...	1230	E340	559	8.2	.0	10	270	36	49	35	17	.5
JAN												
10...	1000	E250	551	8.1	.0	5	240	14	45	32	16	.4
FEB												
06...	1630	E415	550	8.1	.5	10	280	42	52	37	13	.3
MAR												
04...	1600	E460	649	8.1	.0	5	320	70	59	42	16	.4
29...	1330	E1380	507	7.6	1.5	30	230	53	47	28	17	.5
APR												
15...	1545	E1030	491	8.3	8.0	20	240	70	50	28	11	.3
MAY												
13...	1225	714	514	8.4	13.0	30	250	50	49	31	15	.4
JUN												
17...	0930	941	550	7.9	22.5	80	250	39	52	29	19	.5
JUL												
15...	1000	106	624	8.2	27.5	35	270	61	51	35	24	.6
AUG												
12...	1100	194	600	8.4	22.0	15	210	10	36	29	18	.5
SEP												
09...	1000	16	628	7.9	20.0	80	240	39	43	32	33	.9

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

DATE	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY (MG/L AS CACO3) (00410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	BORON, DISSOLVED (UG/L AS B) (01020)
OCT												
04...	4.4	200	25	5.6	.2	14	251	246	336	.06	.100	70
NOV												
08...	4.2	190	42	7.5	.2	10	287	261	309	.40	.090	80
DEC												
04...	5.6	230	61	10	.2	12	330	328	372	.02	.160	60
JAN												
10...	6.0	230	54	11	.2	12	331	315	213	.15	.180	70
FEB												
06...	5.4	240	60	11	.1	15	328	339	353	.26	.120	80
MAR												
04...	5.9	250	86	10	.2	15	391	386	481	.24	.100	90
29...	6.6	180	63	11	.1	13	315	297	1150	.62	.260	80
APR												
15...	6.9	170	72	8.7	.2	11	303	293	859	.50	.130	80
MAY												
13...	4.9	200	68	7.7	.1	8.1	308	304	594	.06	.060	90
JUN												
17...	5.8	210	84	8.6	.1	13	356	339	904	.23	.130	100
JUL												
15...	9.8	210	100	12	.4	14	393	374	112	.37	.410	120
AUG												
12...	9.2	200	47	13	.3	7.4	298	283	156	.58	.120	90
SEP												
09...	12	200	99	23	.4	12	430	378	18.6	.71	.440	130

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)
APR										
15...	1545	10	2	200	<1	10	21	2	20	0
AUG										
12...	1100	20	6	200	1	10	<3	4	<10	1

DATE	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	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)
APR										
15...	20	10	.0	<10	7	0	140	1.0	20	.00
AUG										
12...	30	2	.1	<10	7	0	160	5.0	7	.00

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	410	450	525	540	560	565	400	530	520	565	530	590
2	405	455	525	535	515	560	345	520	525	565	520	590
3	400	450	535	550	505	540	345	520	525	555	500	615
4	405	460	550	545	505	560	340	525	505	560	485	570
5	410	460	545	550	510	525	360	530	575	565	500	570
6	400	465	540	540	510	520	420	520	580	580	525	580
7	400	460	530	515	540	530	425	530	530	585	515	585
8	405	445	545	535	535	545	445	525	520	580	495	585
9	400	445	520	510	540	540	450	530	525	655	495	620
10	395	460	500	510	510	540	475	525	520	630	480	625
11	445	455	505	500	515	520	475	530	465	630	470	650
12	430	485	530	505	500	540	495	540	515	650	495	570
13	440	480	580	490	500	550	490	520	505	670	495	565
14	440	480	580	490	535	560	500	505	520	670	460	570
15	445	490	530	490	540	540	480	515	520	610	480	540
16	435	480	535	515	540	555	495	495	535	600	495	580
17	425	485	550	510	550	550	500	505	530	625	550	570
18	435	480	555	475	550	560	540	490	530	635	565	560
19	425	475	540	505	535	590	540	500	535	600	560	630
20	430	480	540	520	585	595	530	500	590	585	460	635
21	420	485	465	515	560	540	535	500	585	580	480	710
22	435	480	490	500	530	490	530	515	545	560	490	700
23	435	465	515	495	540	470	530	515	540	560	550	700
24	440	460	500	515	575	475	515	520	545	695	555	705
25	465	480	515	550	580	500	520	510	565	690	565	725
26	450	475	525	560	570	575	520	520	565	660	525	730
27	450	470	525	560	540	560	515	525	560	620	520	780
28	460	480	515	555	535	550	515	520	565	595	540	795
29	460	500	520	580	540	510	520	520	560	560	580	790
30	465	500	520	590	---	490	530	565	555	555	590	775
31	425	---	520	575	---	485	---	540	---	535	585	---
MEAN	429	471	528	527	536	536	476	520	539	604	518	640

WTR YR 1980 MEAN 527 MAX 795 MIN 340

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.5	4.5	.5	.5	.5	.5	2.0	17.0	21.5	21.5	23.5	16.5
2	15.0	4.0	.5	.5	.5	.5	2.0	18.0	21.5	22.0	23.5	16.5
3	15.0	4.5	.5	.5	.5	.5	1.5	18.5	21.0	23.0	23.0	18.0
4	14.5	4.5	1.0	.0	.5	.5	2.0	18.5	20.5	23.5	22.0	18.0
5	14.0	4.0	.5	.0	.5	.0	2.5	19.5	20.5	24.0	20.5	18.5
6	12.5	4.0	.5	.0	.5	.0	3.5	18.5	20.5	24.5	22.0	20.0
7	11.0	4.0	.5	.0	.5	.0	4.0	15.5	20.0	24.0	20.5	22.5
8	11.0	3.0	.5	.0	.5	.0	4.0	14.5	19.5	24.0	22.0	23.0
9	10.5	1.0	.5	.0	.0	.0	4.0	15.0	19.5	25.5	22.0	20.5
10	10.0	1.0	.5	.0	.0	.0	4.5	14.0	19.5	26.0	22.5	18.5
11	10.0	.5	.5	.0	.0	.0	5.0	14.0	20.0	26.0	22.0	17.5
12	9.0	.5	.5	.0	.0	.0	5.5	14.0	20.5	26.5	21.5	18.0
13	8.5	1.0	.5	.0	.0	.0	6.0	13.5	20.5	26.5	20.5	16.5
14	9.0	1.5	.5	.0	.0	.5	7.0	13.5	21.0	27.0	20.5	16.0
15	9.0	3.0	.5	.0	.5	.5	8.0	13.5	21.0	26.0	21.5	15.5
16	9.0	2.5	.5	.0	.5	.5	8.5	14.5	21.0	25.5	20.5	14.0
17	8.5	2.5	.5	.0	.5	.5	9.0	15.0	20.5	25.0	20.0	13.5
18	8.5	3.0	1.0	.0	.5	.5	10.0	16.0	20.5	25.0	20.0	13.0
19	8.5	3.0	1.0	.0	.5	1.0	12.0	16.0	20.0	24.5	21.5	12.5
20	9.0	2.0	1.5	.0	.5	1.0	14.0	17.5	20.5	24.0	22.5	12.5
21	8.5	1.5	2.0	.0	.5	1.0	15.0	18.5	22.0	24.0	20.5	12.0
22	8.0	1.5	2.5	.0	.0	2.0	16.5	19.0	23.0	23.5	21.0	12.5
23	8.0	1.0	3.0	.0	.0	2.0	16.0	20.0	24.5	24.0	22.0	13.0
24	8.5	.5	3.0	.0	.0	2.5	15.5	21.0	24.5	24.5	24.5	12.0
25	8.5	.5	2.5	.0	.0	2.0	15.0	21.5	25.5	24.5	24.0	11.5
26	8.0	.5	2.0	.0	.0	2.0	15.0	22.0	25.0	24.0	20.5	12.0
27	8.5	1.0	1.0	.0	.0	1.5	15.5	22.5	24.5	24.0	18.5	13.0
28	8.5	.5	1.0	.0	.0	2.0	15.5	23.0	24.0	23.5	19.5	14.0
29	8.0	.5	1.0	.0	.0	2.5	16.0	22.5	22.0	24.0	19.5	14.5
30	8.0	1.0	1.0	.0	---	2.0	16.5	22.0	21.5	24.0	18.0	16.5
31	7.5	---	1.0	.0	---	2.0	---	22.0	---	24.0	17.0	---
MEAN	10.0	2.0	1.0	.0	.5	1.0	9.0	18.0	21.5	24.5	21.0	15.5

WTR YR 1980 MEAN 10.5 MAX 27.0 MIN .0

05061000 BUFFALO RIVER NEAR HAWLEY, MN

LOCATION.--Lat 46°51'00", long 96°19'45", in NW¼SE¼ sec.14, T.139 N., R.45 W., Clay County, Hydrologic Unit 09020106, near left downstream end of bridge on farm lane, 2 mi (3 km) southwest of Hawley.

DRAINAGE AREA.--322 mi^2 (834 km^2).

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

REVISED RECORDS.--WSP 1308: 1945-46(M), 1948(M).

GAGE.--Water-stage recorder. Datum of gage is 1,111.91 ft (338.910 m) National Geodetic Vertical Datum of 1929. Prior to Jan. 29, 1953, nonrecording gage at bridge 1,800 ft (549 m) upstream at datum 3.17 ft (0.97 m) lower.

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

AVERAGE DISCHARGE.--35 years, 72.7 ft^3/s (2.059 m^3/s), 52,670 acre-ft/yr (64.9 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,050 ft^3/s (58.1 m^3/s) July 1, 1975, gage height, 9.76 ft (2.975 m); minimum, 2.8 ft^3/s (0.079 m^3/s) Aug. 26, 1977; minimum gage height, 2.55 ft (0.777 m) Sept. 5, 1961.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, about 11.3 ft (3.44 m), present datum, spring of 1921, from information by local resident.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 619 ft^3/s (17.5 m^3/s) Apr. 3, gage height, 7.42 ft (2.262 m); minimum, 8.4 ft^3/s (0.24 m^3/s) Aug. 1, 2, gage height, 3.19 ft (0.972 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	50	22	18	19	23	314	53	27	14	8.9	18
2	10	56	22	18	19	23	450	48	25	13	9.0	17
3	11	43	21	18	19	23	550	45	25	12	9.0	19
4	10	36	20	18	19	23	413	43	26	20	9.3	19
5	11	33	20	18	19	24	332	41	26	20	9.3	16
6	11	32	19	18	20	24	295	40	25	19	9.6	16
7	12	31	19	18	20	24	298	38	30	18	10	15
8	12	27	19	18	20	24	325	37	29	16	10	13
9	12	27	18	18	20	24	331	39	30	14	10	13
10	12	27	18	18	20	24	289	37	25	14	10	12
11	13	26	18	18	20	24	237	33	22	12	11	14
12	13	26	18	18	20	24	201	46	20	11	10	20
13	13	26	18	18	21	24	178	48	19	12	12	37
14	14	27	18	18	21	24	165	48	26	12	11	39
15	14	27	18	18	21	24	149	47	29	11	11	35
16	14	28	18	18	21	25	139	41	28	11	11	32
17	15	29	18	18	21	25	131	35	26	11	12	29
18	16	31	18	18	21	25	122	36	27	17	14	24
19	16	32	18	18	22	26	111	37	25	14	12	21
20	15	32	18	18	22	27	105	36	25	15	15	18
21	17	32	18	18	22	28	102	37	23	15	19	17
22	17	30	18	18	22	31	95	34	22	13	18	16
23	18	29	18	18	22	36	90	32	21	12	18	16
24	18	28	18	18	22	44	81	30	20	11	16	16
25	18	27	18	18	22	51	78	28	18	11	15	15
26	18	26	18	18	23	31	73	26	17	10	13	16
27	17	25	18	19	23	18	70	24	16	10	12	16
28	23	24	18	19	23	16	66	22	16	10	12	16
29	23	23	18	19	23	32	62	26	17	9.6	17	16
30	22	23	18	19	---	62	58	27	15	9.2	20	15
31	31	---	18	19	---	155	---	27	---	9.2	20	---
TOTAL	476	913	576	563	607	988	5910	1141	700	406.0	394.1	586
MEAN	15.4	30.4	18.6	18.2	20.9	31.9	197	36.8	23.3	13.1	12.7	19.5
MAX	31	56	22	19	23	155	550	53	30	20	20	39
MIN	10	23	18	18	19	16	58	22	15	9.2	8.9	12
AC-FT	944	1810	1140	1120	1200	1960	11720	2260	1390	805	782	1160

CAL YR 1979 TOTAL 27762.5 MEAN 76.1 MAX 962 MIN 9.8 AC-FT 55070
WTR YR 1980 TOTAL 13260.1 MEAN 36.2 MAX 550 MIN 8.9 AC-FT 26300

05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MN

LOCATION.--Lat 46°46'20", long 96°37'40", in SW¼SW¼ 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 mi (0.5 km) downstream from Stony Creek and 1 mi (1.6 km) east of Sabin.

DRAINAGE AREA.--522 mi^2 (1,351 km^2).

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

REVISED RECORDS.--WSP 1308: 1949(M).

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 902.39 ft (275.05 m) National Geodetic Vertical Datum of 1929 (levels by Soil Conservation Service). Prior to Aug. 17, 1948, nonrecording gage at site 1 mi (1.6 km) downstream at different datum.

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

AVERAGE DISCHARGE.--35 years, 56.0 ft^3/s (1.586 m^3/s), 40,570 acre-ft/yr (50.0 hm^3/yr); median of yearly mean discharges, 41.4 ft^3/s (1.172 m^3/s), 29,990 acre-ft/yr (37.0 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,500 ft^3/s (241 m^3/s) July 2, 1975, gage height, 19.90 ft (6.066 m); no flow for many days in most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,260 ft^3/s (35.7 m^3/s) Apr. 2, gage height, 12.99 ft (3.959 m); no flow on many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.0	39	7.6	2.5	1.4	3.2	1030	26	.73	2.7	.00	5.1
2	1.2	40	7.4	2.4	1.4	3.3	1190	25	.68	2.0	.00	4.3
3	1.2	42	7.2	2.3	1.4	3.3	935	22	.00	.88	.00	4.6
4	1.2	47	7.0	2.2	1.4	3.4	772	19	.00	.49	.00	3.1
5	1.2	43	6.8	2.1	1.4	3.4	655	16	3.4	.22	1.0	3.5
6	1.4	37	6.6	2.0	1.4	3.5	542	15	8.4	.02	.88	2.9
7	1.2	26	6.4	1.9	1.4	3.6	452	15	16	.00	.30	2.5
8	1.1	14	6.3	1.9	1.4	3.6	389	12	24	.00	.00	2.1
9	.96	12	6.1	1.8	1.4	3.7	347	11	28	.00	.00	2.6
10	1.0	12	5.9	1.7	1.4	3.7	300	10	22	.00	.00	2.3
11	1.1	11	5.7	1.6	1.4	3.8	245	10	18	.00	.00	2.5
12	1.5	11	5.6	1.6	1.5	3.9	188	9.6	18	.00	.00	3.0
13	2.1	11	5.5	1.5	1.6	3.9	149	9.4	16	.00	1.7	5.1
14	2.6	11	5.3	1.4	1.7	4.0	123	8.2	14	.00	.52	4.2
15	3.6	11	5.2	1.4	1.9	4.1	107	8.1	11	.00	1.9	3.2
16	4.8	11	5.0	1.4	2.1	4.3	93	6.1	7.9	.00	2.2	5.6
17	4.1	11	4.8	1.4	2.2	4.5	83	5.6	3.9	.00	2.2	7.9
18	4.1	13	4.7	1.4	2.4	4.7	75	4.8	4.2	.00	2.4	11
19	3.9	20	4.6	1.4	2.6	4.9	70	4.2	6.1	.00	1.3	13
20	3.9	21	4.4	1.4	2.8	5.1	66	4.1	3.1	.00	2.3	13
21	3.9	15	4.3	1.4	2.8	5.4	62	4.9	2.8	.00	3.4	11
22	4.6	13	4.2	1.4	2.9	5.8	58	4.1	2.7	.00	3.2	9.2
23	18	11	4.0	1.4	2.9	6.4	53	2.2	2.7	.00	3.0	8.4
24	9.1	11	3.8	1.4	3.0	7.2	51	1.3	3.4	.00	2.9	7.7
25	3.4	9.8	3.6	1.4	3.0	13	48	.73	2.9	.00	2.8	6.5
26	3.5	9.2	3.4	1.4	3.0	24	45	.30	2.3	.00	4.5	5.1
27	3.5	8.8	3.3	1.4	3.1	38	40	.74	2.8	.00	5.2	5.4
28	3.6	8.4	3.1	1.4	3.1	73	36	.38	2.6	.00	5.2	4.8
29	3.9	8.1	3.0	1.4	3.2	133	31	.15	2.3	.00	7.7	4.2
30	5.4	7.8	2.8	1.4	---	253	29	.12	2.0	.26	6.8	4.1
31	25	---	2.7	1.4	---	570	---	.80	---	.15	6.0	---
TOTAL	127.06	545.1	156.3	50.7	61.2	1206.7	8264	256.82	231.91	6.72	67.40	167.9
MEAN	4.10	18.2	5.04	1.64	2.11	38.9	275	8.28	7.73	.22	2.17	5.60
MAX	25	47	7.6	2.5	3.2	570	1190	26	28	2.7	7.7	13
MIN	.96	7.8	2.7	1.4	1.4	3.2	29	.12	.00	.00	.00	2.1
AC-FT	252	1080	310	101	121	2390	16390	509	460	13	134	333

CAL YR 1979 TOTAL 26568.85 MEAN 72.8 MAX 2700 MIN .18 AC-FT 52700
WTR YR 1980 TOTAL 11141.81 MEAN 30.4 MAX 1190 MIN .00 AC-FT 22100

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.--49 years, 130 ft^3/s (3.682 m^3/s), 94,180 acre-ft/yr (116 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, 1,850 ft^3/s (52.4 m^3/s) Apr. 4, gage height, 16.78 ft (5.115 m); minimum, 3.2 ft^3/s (0.091 m^3/s) Aug 3, gage height, 1.93 ft (0.588 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	43	50	24	21	33	575	118	31	19	5.9	20
2	8.5	59	48	24	21	33	880	110	31	18	5.5	22
3	7.8	87	47	24	21	34	1420	102	32	17	4.1	23
4	7.7	95	47	23	21	34	1800	93	30	16	5.1	24
5	9.7	92	47	23	21	35	1480	88	33	14	5.5	24
6	14	86	46	23	21	35	1200	81	35	13	4.8	22
7	11	77	45	23	21	35	968	75	36	18	4.8	19
8	10	65	45	22	22	36	732	72	36	20	6.9	16
9	12	60	44	21	22	36	580	68	39	18	7.2	13
10	14	56	43	21	22	36	515	66	43	17	7.7	12
11	14	53	42	21	22	37	469	64	46	15	6.9	11
12	14	52	40	21	21	37	409	60	42	13	7.0	16
13	14	51	36	21	21	37	354	56	37	11	7.9	34
14	14	50	33	21	21	37	316	66	35	11	8.2	53
15	14	50	31	21	21	38	290	66	32	9.2	9.0	66
16	16	50	29	21	21	38	270	65	39	8.4	9.3	60
17	17	50	28	21	21	38	253	63	43	9.5	9.1	52
18	18	51	27	21	21	38	242	53	43	9.0	10	46
19	19	53	26	21	22	38	229	47	41	9.8	10	41
20	20	59	25	21	23	38	226	44	40	14	11	36
21	25	60	25	21	25	38	213	41	38	17	14	34
22	26	61	25	21	27	39	202	39	35	14	16	32
23	27	60	24	21	28	39	193	38	33	14	19	31
24	25	58	24	21	29	39	181	35	30	13	18	30
25	22	56	24	21	29	50	172	33	27	11	18	28
26	34	56	24	21	30	75	162	31	24	9.9	16	28
27	33	55	24	21	31	105	156	30	24	8.9	14	26
28	29	54	24	21	32	130	146	28	22	8.7	12	26
29	26	53	24	21	32	180	135	27	21	8.4	13	25
30	29	51	24	21	---	275	127	24	20	7.8	18	24
31	38	---	24	21	---	405	---	28	---	6.0	20	---
TOTAL	578.7	1803	1045	669	690	2098	14895	1811	1018	398.6	323.9	894
MEAN	18.7	60.1	33.7	21.6	23.8	67.7	497	58.4	33.9	12.9	10.4	29.8
MAX	38	95	50	24	32	405	1800	118	46	20	20	66
MIN	7.7	43	24	21	21	33	127	24	20	6.0	4.1	11
AC-FT	1150	3580	2070	1330	1370	4160	29540	3590	2020	791	642	1770

CAL YR 1979 TOTAL 66502.2 MEAN 182 MAX 4350 MIN 7.7 AC-FT 131900
WTR YR 1980 TOTAL 26224.2 MEAN 71.7 MAX 1800 MIN 4.1 AC-FT 52020

05062000 BUFFALO RIVER NEAR DILWORTH, MN--Continued

WATER-QUALITY RECORDS

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

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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	---	---	---	---	---	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---	---	---	---	---	---
3	---	---	---	---	---	---	---	---	---	---	---	---
4	---	---	---	---	---	---	---	---	---	---	---	---
5	---	---	---	---	---	---	---	---	---	---	---	---
6	---	---	---	---	---	---	---	---	---	---	---	---
7	---	---	---	---	---	---	---	---	---	---	---	---
8	---	---	---	---	---	---	---	---	---	---	---	---
9	---	---	---	---	---	---	---	---	---	---	---	---
10	---	---	---	---	---	---	---	---	---	---	---	---
11	---	---	---	---	---	---	---	---	---	---	---	---
12	---	---	---	---	---	---	---	---	---	---	---	---
13	---	---	---	---	---	---	---	---	---	---	---	---
14	---	---	---	---	---	---	---	---	---	---	---	---
15	---	---	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	---	---	---
17	---	---	---	---	---	---	---	---	---	---	---	---
18	---	---	---	---	---	---	---	---	---	---	---	---
19	---	---	---	---	131	9.2	---	---	---	---	---	---
20	---	---	28	4.5	---	---	---	---	---	---	---	---
21	---	---	---	---	---	---	---	---	190	13	---	---
22	---	---	---	---	---	---	---	---	---	---	---	---
23	27	2.0	---	---	---	---	---	---	---	---	---	---
24	---	---	---	---	---	---	188	11	---	---	70	7.4
25	---	---	---	---	---	---	---	---	---	---	---	---
26	---	---	---	---	---	---	---	---	---	---	---	---
27	---	---	---	---	---	---	---	---	---	---	---	---
28	---	---	---	---	---	---	---	---	---	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	---	---	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	58	63

DAY	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	87	135	117	37	---	---	---	---	---	---	---	---
2	102	242	108	32	---	---	---	---	---	---	---	---
3	110	422	---	---	---	---	---	---	---	---	---	---
4	84	408	---	---	---	---	---	---	---	---	---	---
5	101	404	---	---	---	---	---	---	---	---	---	---
6	106	343	---	---	---	---	---	---	---	---	---	---
7	109	285	---	---	---	---	---	---	---	---	---	---
8	119	235	---	---	---	---	---	---	---	---	---	---
9	135	211	---	---	---	---	---	---	---	---	---	---
10	140	195	---	---	---	---	---	---	---	---	---	---
11	123	156	---	---	---	---	---	---	---	---	---	---
12	122	135	---	---	---	---	---	---	---	---	---	---
13	98	94	---	---	---	---	---	---	---	---	---	---
14	87	74	---	---	---	---	---	---	---	---	---	---
15	85	67	---	---	---	---	---	---	---	---	---	---
16	90	66	---	---	---	---	---	---	---	---	---	---
17	88	60	---	---	---	---	---	---	---	---	---	---
18	91	59	---	---	77	8.9	---	---	---	---	---	---
19	95	59	---	---	---	---	---	---	---	---	---	---
20	107	65	---	---	---	---	---	---	---	---	---	---
21	101	58	---	---	---	---	---	---	76	2.9	---	---
22	96	52	---	---	---	---	---	---	---	---	---	---
23	94	49	113	12	---	---	86	3.3	---	---	---	---
24	84	41	---	---	---	---	---	---	---	---	43	3.5
25	101	47	---	---	---	---	---	---	---	---	---	---
26	112	49	---	---	---	---	---	---	---	---	---	---
27	112	47	---	---	---	---	---	---	---	---	---	---
28	106	42	---	---	---	---	---	---	---	---	---	---
29	103	38	---	---	---	---	---	---	---	---	---	---
30	102	35	---	---	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	---	4173	---		---		---		---		---	

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 Geodeti#0V$ptical 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.--58 years, 174 ft^3/s (4.928 m^3/s), 126,060 acre-ft/yr (155 hm^3/yr); median of yearly mean discharges, 154 ft^3/s (4.361 m^3/s), 111,600 acre-ft/yr (138 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, 1,080 ft^3/s (30.6 m^3/s) Apr. 3, gage height, 6.08 ft (1.853 m); maximum gage height, 7.67 ft (2.338 m) Apr. 3 (backwater from ice); minimum discharge, 5.1 ft^3/s (0.14 m^3/s) Aug. 12, gage height, 1.15 ft (0.351 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	64	73	47	46	52	400	248	42	20	7.4	12
2	43	90	70	47	46	52	600	240	42	19	7.6	11
3	40	118	69	46	46	52	950	246	41	18	6.8	11
4	35	114	68	46	46	53	850	238	40	18	6.3	11
5	30	114	68	46	47	53	758	215	36	17	6.6	11
6	25	115	68	46	47	54	747	193	35	16	6.9	11
7	22	95	67	46	47	54	828	174	37	15	6.7	11
8	20	70	67	46	47	54	786	154	38	14	6.5	9.5
9	18	55	66	46	47	54	713	135	41	12	6.1	8.4
10	20	80	66	46	47	54	583	135	37	11	6.0	8.1
11	19	110	65	46	47	54	542	146	33	11	5.9	8.4
12	17	118	64	46	47	55	515	180	31	10	5.5	10
13	17	115	63	46	47	55	512	169	30	9.8	5.8	12
14	17	115	62	46	47	55	508	154	28	9.3	5.7	11
15	17	121	61	46	48	55	488	129	27	8.4	6.0	11
16	24	108	60	46	48	56	476	114	27	8.4	6.2	13
17	22	102	59	46	48	56	457	108	27	8.1	6.5	13
18	20	102	58	46	48	56	428	103	28	8.1	7.1	13
19	22	106	57	46	48	56	404	94	27	7.9	5.9	13
20	23	100	56	46	49	56	383	84	27	8.4	6.8	14
21	24	105	55	46	49	56	368	73	27	8.3	9.5	13
22	33	115	54	46	49	56	350	72	27	8.6	10	12
23	35	113	53	46	49	57	355	64	27	8.1	11	12
24	38	112	52	46	50	60	346	59	26	8.0	12	12
25	35	110	51	46	50	70	320	51	24	7.8	11	11
26	30	105	50	46	50	88	313	43	21	7.5	11	12
27	27	100	50	46	50	105	304	38	20	7.6	12	12
28	25	93	49	46	51	120	295	35	20	7.9	11	13
29	24	85	49	46	51	140	280	53	20	7.7	12	13
30	24	78	48	46	---	180	260	54	20	7.2	12	13
31	42	---	47	46	---	250	---	45	---	7.2	14	---
TOTAL	836	3028	1845	1428	1392	2268	15119	3846	906	335.3	253.8	345.4
MEAN	27.0	101	59.5	46.1	48.0	73.2	504	124	30.2	10.8	8.19	11.5
MAX	48	121	73	47	51	250	950	248	42	20	14	14
MIN	17	55	47	46	46	52	260	35	20	7.2	5.5	8.1
AC-FT	1660	6010	3660	2830	2760	4500	29990	7630	1800	665	503	685

CAL YR 1979 TOTAL 105577.0 MEAN 289 MAX 5830 MIN 17 AC-FT 209400
WTR YR 1980 TOTAL 31602.5 MEAN 86.3 MAX 950 MIN 5.5 AC-FT 62680

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.--36 years, 261 ft^3/s (7.392 m^3/s), 189,100 acre-ft/yr (233 hm^3/yr); median of yearly mean discharges, 210 ft^3/s (5.95 m^3/s), 152,000 acre-ft/yr (190 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, 1,800 ft^3/s (51.0 m^3/s) Apr. 5, gage height, 17.36 ft (5.291 m) from highwater mark, backwater from Red River of the North; minimum daily, 0.82 ft^3/s (0.023 m^3/s) Aug. 12; minimum gage height, 0.97 ft (0.296 m) Aug. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	43	63	78	48	47	50	600	279	62	25	3.2	18
2	47	80	74	47	47	50	950	267	63	23	2.8	17
3	51	104	72	47	47	50	1350	262	61	22	2.8	16
4	51	137	69	47	47	51	1700	258	59	21	2.6	12
5	50	144	68	47	47	51	1770	256	57	19	2.3	9.6
6	47	138	68	46	48	52	1550	243	63	19	3.0	9.6
7	41	115	68	46	48	52	1300	222	58	17	3.4	9.3
8	40	105	68	46	48	52	1100	205	60	16	2.6	8.4
9	36	100	68	46	48	53	935	191	62	14	1.8	9.3
10	32	110	67	46	48	53	781	177	66	13	1.4	7.8
11	30	125	66	46	48	54	678	157	66	13	1.1	8.5
12	30	130	65	46	48	54	564	157	60	11	.82	9.3
13	31	137	64	46	48	54	530	168	53	10	1.1	10
14	28	147	63	46	48	55	494	178	53	9.6	.86	13
15	29	141	62	46	48	55	484	166	48	8.4	.90	20
16	28	147	61	46	48	56	465	155	42	8.4	.90	14
17	28	143	60	46	48	56	450	144	38	11	1.4	13
18	29	138	59	46	48	57	434	133	35	9.6	1.4	12
19	40	139	58	47	48	57	412	130	39	9.6	3.3	13
20	39	142	57	47	48	58	392	118	43	10	3.0	13
21	39	138	56	47	49	59	377	114	39	11	4.9	13
22	39	120	55	47	49	60	355	103	36	10	14	13
23	40	95	54	47	49	61	334	97	35	9.1	16	12
24	43	117	53	47	49	62	338	95	41	8.2	15	12
25	51	138	52	47	49	64	332	85	34	8.0	13	12
26	55	130	51	47	49	68	320	76	26	7.8	11	12
27	54	110	50	47	50	72	308	72	25	6.5	9.6	12
28	50	100	49	47	50	80	306	70	26	6.1	12	13
29	48	90	49	47	50	95	298	62	26	5.2	13	13
30	47	82	48	47	---	160	289	64	27	4.4	20	13
31	49	---	48	47	---	350	---	64	---	3.6	18	---
TOTAL	1265	3605	1880	1445	1399	2201	20196	4768	1403	369.5	187.18	367.8
MEAN	40.8	120	60.6	46.6	48.2	71.0	673	154	46.8	11.9	6.04	12.3
MAX	55	147	78	48	50	350	1770	279	66	25	20	20
MIN	28	63	48	46	47	50	289	62	25	3.6	.82	7.8
AC-FT	2510	7150	3730	2870	2770	4370	40060	9460	2780	733	371	730

CAL YR 1979 TOTAL 172412.00 MEAN 472 MAX 8650 MIN 28 AC-FT 342000
WTR YR 1980 TOTAL 39086.48 MEAN 107 MAX 1770 MIN .82 AC-FT 77530

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.--19 years (1961-80), 1,830 ft^3/s (51.83 m^3/s), 1,326,000 acre-ft/yr (1.63 km^3/yr); median of yearly mean discharges, 1,760 ft^3/s (49.8 m^3/s), 1,275,000 acre-ft/yr (1.6 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, 12,900 ft^3/s (365 m^3/s) Apr. 5, gage height, 21.98 ft (6.700 m); minimum daily, 173 ft^3/s (4.90 m^3/s) Sept. 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	646	790	700	482	530	510	2830	1420	525	514	203	275
2	646	841	700	499	530	510	3600	1380	519	563	203	225
3	656	867	630	510	530	510	4700	1330	522	517	203	198
4	670	875	575	510	530	510	7310	1300	553	467	212	198
5	666	954	555	510	520	510	9000	1270	598	427	212	189
6	670	958	670	510	500	510	11100	1230	678	394	203	191
7	666	905	719	510	500	515	10100	1170	756	370	198	181
8	638	870	720	512	500	515	8880	1110	780	332	196	173
9	577	670	716	505	490	515	7460	1070	794	305	203	218
10	541	780	698	500	450	515	5680	1050	894	273	212	229
11	548	770	684	480	410	520	4350	1060	1050	261	252	202
12	577	790	568	450	410	525	3650	1070	1100	252	301	193
13	586	800	525	460	410	540	3380	1080	1080	248	321	194
14	586	800	492	480	405	545	3230	1100	1050	252	283	303
15	586	800	479	500	400	550	3020	1080	938	242	267	390
16	590	820	434	500	400	560	2740	1060	866	229	234	305
17	593	850	386	500	400	570	2490	1030	822	209	214	285
18	607	915	380	500	400	580	2300	1000	954	203	200	285
19	652	915	383	500	400	600	2140	986	1090	202	189	279
20	691	920	383	500	400	635	2000	958	1110	223	181	267
21	708	950	370	480	400	670	1900	898	1020	225	189	257
22	680	865	373	460	400	720	1840	832	878	212	211	254
23	666	745	396	486	415	775	1780	784	756	212	310	267
24	656	740	412	510	430	812	1700	752	675	220	273	283
25	646	750	415	510	440	823	1640	719	614	238	252	301
26	642	710	421	510	460	880	1600	675	575	246	250	336
27	624	685	440	510	480	1100	1550	627	547	240	240	343
28	621	690	453	510	495	1450	1520	607	519	233	218	329
29	638	695	456	515	510	1720	1490	595	522	227	225	321
30	691	690	456	520	---	2010	1450	572	505	220	220	318
31	733	---	466	530	---	2290	---	553	---	214	246	---
TOTAL	19697	24410	16055	15459	13145	23995	116430	30368	23290	8970	7121	7789
MEAN	635	814	518	499	453	774	3881	980	776	289	230	260
MAX	733	958	720	530	530	2290	11100	1420	1110	563	321	390
MIN	541	670	370	450	400	510	1450	553	505	202	181	173
AC-FT	39070	48420	31850	30660	26070	47590	230900	60230	46200	17790	14120	15450

CAL YR 1979 TOTAL 1114410 MEAN 3053 MAX 41500 MIN 160 AC-FT 2210000
WTR YR 1980 TOTAL 306729 MEAN 838 MAX 11100 MIN 173 AC-FT 608400

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 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; minimum daily, 0.0°C on many days during winter months.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 880 micromhos Sept. 15; minimum daily, 380 micromhos Apr. 5.
WATER TEMPERATURES: Maximum daily, 31.0°C July 13, 14; minimum observed, 0.5°C on many days during winter months.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	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)	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)
OCT												
02...	1300	645	478	8.5	14.0	22	9.8	92	K13	90	240	26
NOV												
06...	1300	959	700	8.5	2.5	7.3	13.2	100	K13	260	280	42
DEC												
06...	1655	689	734	8.2	.0	5.1	9.9	69	38	67	330	69
JAN												
08...	1400	511	665	8.2	.0	--	10.2	71	K2	K4	350	41
FEB												
06...	1225	499	678	7.8	.5	1.8	9.4	65	K2	K1	330	60
MAR												
04...	1240	510	693	7.9	.0	3.5	10.0	71	K12	35	300	36
28...	1030	1450	658	7.9	.0	33	9.6	68	K21	14000	270	56
APR												
15...	1145	3010	594	8.2	7.5	80	10.4	90	K17	220	260	79
MAY												
12...	2000	1040	646	8.7	14.5	33	11.7	119	K7	35	290	61
JUN												
16...	1500	860	638	8.2	22.0	99	6.2	72	77	72	280	68
JUL												
14...	1310	243	764	8.3	26.5	22	6.6	86	K21	38	310	83
AUG												
11...	1250	264	602	8.6	22.5	54	8.6	102	130	240	250	36
SEP												
08...	1340	168	830	8.6	24.5	37	10.2	125	K33	170	310	87

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 (MG/L AS CACO3) (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	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)
OCT												
02...	45	30	16	.5	5.2	210	47	8.7	.2	14	293	293
NOV												
06...	65	29	31	.8	6.8	240	100	15	.2	12	437	404
DEC												
06...	69	38	36	.9	7.2	260	110	17	.3	16	466	451
JAN												
08...	73	41	25	.6	4.8	310	110	14	.3	16	477	472
FEB												
06...	66	40	22	.5	5.9	270	90	16	.1	18	410	422
MAR												
04...	59	36	22	.6	5.4	260	78	13	.2	17	404	389
28...	57	30	34	.9	7.0	210	110	26	.2	15	409	409
APR												
15...	59	27	23	.6	8.4	180	120	11	.2	16	397	376
MAY												
12...	62	33	28	.7	6.5	230	110	12	.1	9.7	399	400
JUN												
16...	60	31	28	.7	7.4	210	110	13	.2	14	412	392
JUL												
14...	66	36	42	1.0	10	230	140	27	.5	18	497	480
AUG												
11...	49	30	31	.9	11	210	80	24	.4	12	373	364
SEP												
08...	62	37	59	1.5	10	220	150	41	.6	16	555	513

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	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)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT											
02...	510	.16	.12	.030	.040	1.0	.80	.130	.090	--	15
NOV											
06...	1130	.11	.11	.080	.090	1.0	1.0	.198	.160	--	22
DEC											
06...	867	.21	.16	1.200	1.200	2.9	2.5	.590	.570	0	13
JAN											
08...	658	.25	.26	.220	.250	1.6	1.7	.110	.080	0	16
FEB											
06...	552	.43	.43	.460	.460	1.3	1.2	.140	.140	--	7.8
MAR											
04...	556	.41	.41	.270	.270	1.9	1.0	.120	.100	0	14
28...	1600	.72	.71	.460	.420	1.5	1.4	.280	.190	0	14
APR											
15...	3230	.65	.66	.340	.290	2.1	1.1	.340	.140	--	14
MAY											
12...	1120	.21	.13	.410	.390	1.3	1.1	.440	.310	0	--
JUN											
16...	957	.58	.52	.040	.070	1.2	.91	.340	.200	4	--
JUL											
14...	326	.55	.56	.010	.000	1.2	1.0	.240	.190	--	21
AUG											
11...	266	.24	.25	.280	.120	3.3	1.5	.210	.120	1	--
SEP											
08...	252	1.0	1.2	.000	.000	1.5	1.1	.950	.870	0	21

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)
OCT										
02...	1300	--	--	--	--	--	--	--	--	--
DEC										
06...	1655	3	3	400	90	0	<1	0	0	2
MAR										
04...	1240	2	1	0	100	1	<1	0	0	0
MAY										
12...	2000	5	5	100	100	0	<1	0	0	0
JUN										
16...	1500	7	6	100	90	0	<1	0	0	2
AUG										
11...	1250	8	7	0	80	1	1	10	0	2

DATE	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	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)
OCT										
02...	--	--	--	--	--	--	--	--	--	--
DEC										
06...	<3	8	8	300	20	9	0	70	40	1.5
MAR										
04...	<3	14	1	240	<10	5	0	70	60	.1
MAY										
12...	<3	10	5	1200	<10	11	0	170	4	.2
JUN										
16...	<3	19	6	3100	<10	10	0	320	5	1.8
AUG										
11...	<3	24	13	1800	<10	23	1	160	6	.4

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	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, 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 (MG/L AS C) (00689)
OCT										
02...	--	--	--	--	--	--	--	--	14	.6
DEC										
06...	1.8	7	2	0	0	0	10	10	12	1.4
MAR										
04...	.0	0	0	0	0	0	40	30	13	.5
MAY										
12...	.1	16	4	0	0	0	30	<3	13	2.1
JUN										
16...	1.0	15	3	1	0	0	20	<3	13	1.1
AUG										
11...	.1	17	16	1	1	0	110	7	18	--

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	GROSS ALPHA, DIS-SOLVED (UG/L AS U-NAT) (80030)
APR								
15...	1145	3010	594	8.2	7.5	10.4	90	11
AUG								
11...	1250	264	602	8.6	22.5	8.6	102	<6.3

DATE	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)
APR								
15...	5.4	7.5	3.7	9.3	4.7	9.2	4.7	.11
AUG								
11...	3.0	<4.3	2.0	11	2.7	11	2.6	.11

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						
02...	1300	23	3.07	2.83	2.74	.000
DEC						
06...	1655	31	.160	.160	.480	.000
MAR						
04...	1240	27	.080	.080	.020	.000
MAY						
12...	2000	27	2.99	2.76	.080	.000
AUG						
11...	1250	29	7.56	5.35	9.38	2.74

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

PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980

DATE	NOV 6,79		MAR 4,80		JUL 14,80		AUG 11,80		SEP 8,80	
TIME	1300		1240		1310		1250		1340	
TOTAL CELLS/ML	47000		120		3600		34000		74000	
DIVERSITY: DIVISION	1.6		1.0		1.5		1.4		1.2	
.CLASS	1.6		1.0		1.5		1.4		1.3	
..ORDER	1.9		1.9		1.7		2.0		1.4	
...FAMILY	2.4		1.9		2.7		2.3		2.3	
....GENUS	2.6		2.3		3.5		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
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	*	0	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	650#	18	530	2	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	6200	8
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	*	0	--	-
....MICRACTINIUM	3100	7	--	-	--	-	*	0	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	1500	3	29#	25	97	3	*	0	460	1
....DICTYOSPHAERIUM	--	-	--	-	97	3	--	-	3700	5
....FRANCEIA	--	-	--	-	32	1	--	-	--	-
....GLOEOACTINIUM	--	-	--	-	--	-	--	-	25000#	34
....KIRCHNERIELLA	--	-	--	-	190	5	--	-	*	0
....OOCYSTIS	*	0	--	-	130	4	1400	4	920	1
....POLYEDRIOPSIS	--	-	--	-	--	-	*	0	--	-
....SELENASTRUM	510	1	--	-	--	-	*	0	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	1200	3	--	-	--	-	1600	5	--	-
....CRUCIGENIA	--	-	--	-	130	4	920	3	5300	7
....SCENEDESMUS	15000#	31	--	-	520	15	1700	5	4200	6
....TETRASTRUM	--	-	--	-	190	5	1600	5	3700	5
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	510	1	29#	25	65	2	790	2	1200	2
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	11000#	23	14	13	270	8	1300	4	4200	6
....MELOSIRA	340	1	--	-	180	5	260	1	460	1
....STEPHANODISCUS	--	-	29#	25	*	0	--	-	--	-
..PENNALES										
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	14	13	--	-	--	-	--	-
....SYNEDRA	340	1	--	-	--	-	*	0	--	-
...NAVICULACEAE										
....NAVICULA	--	-	--	-	*	0	200	1	*	0
...NITZSCHIACEAE										
....NITZSCHIA	1000	2	--	-	180	5	1300	4	1600	2
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	*	0	--	-
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CENTRITRACTACEAE										
....CENTRITRACTUS	--	-	--	-	--	-	--	-	*	0
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	*	0	*	0
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	4200	13	3700	5
....ANACYSTIS	690	1	--	-	710#	20	9800#	29	12000#	16
....COCCOCHLORIS	--	-	--	-	--	-	2600	8	--	-
....GOMPHOSPHAERIA	--	-	--	-	--	-	530	2	--	-
..HORMOGONALES										
...NOSTOCACEAE										

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 1979 TO SEPTEMBER 1980--Continued

DATE TIME	NOV 6,79 1300		MAR 4,80 1240		JUL 14,80 1310		AUG 11,80 1250		SEP 8,80 1340	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
....ANABAENA	--	-	--	-	--	-	1100	3	--	-
....APHANIZOMENON	--	-	--	-	--	-	2800	8	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	11000#	24	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	200	1	460	1
....TRACHELOMONAS	510	1	--	-	65	2	*	0	*	0
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	*	0	--	-

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

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	TEMPER-ATURE, WATER (DEG C) (00010)	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						
02...	1300	645	14.0	53	92	94
NOV						
06...	1300	959	2.5	26	67	98
DEC						
06...	1655	689	.0	15	28	81
JAN						
08...	1400	511	.0	12	17	58
FEB						
06...	1225	499	.5	9	12	77
MAR						
04...	1240	510	.0	12	17	82
28...	1030	1450	.0	55	215	97
APR						
15...	1145	3010	7.5	195	1590	99
MAY						
12...	2000	1040	14.5	60	168	98
JUN						
16...	1500	860	22.0	180	418	99
JUL						
14...	1310	243	26.5	47	31	96
AUG						
11...	1250	264	22.5	88	63	100
SEP						
08...	1340	168	24.5	52	24	100

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	570	650	540	650	700	625	450	600	610	660	700	760
2	550	660	603	640	750	650	410	630	630	650	680	750
3	530	640	582	650	700	640	430	620	600	675	670	740
4	500	650	624	625	675	650	400	600	650	690	650	750
5	530	660	645	650	625	620	380	620	640	675	660	725
6	540	650	666	---	678	620	400	600	630	680	675	760
7	530	660	728	---	650	610	400	600	645	620	670	800
8	490	670	707	620	660	650	420	620	675	640	660	850
9	500	640	728	640	650	660	460	610	680	660	590	850
10	520	620	728	650	670	710	490	620	670	650	620	820
11	480	620	707	630	0	700	500	620	650	630	640	800
12	500	640	697	625	620	670	530	630	600	650	600	850
13	540	640	686	650	600	750	560	620	590	670	620	855
14	600	660	666	620	600	810	600	620	580	710	580	855
15	600	660	676	640	620	700	610	600	600	700	560	880
16	580	640	676	640	600	800	595	580	630	700	550	720
17	560	600	697	680	620	725	600	600	620	680	550	650
18	600	625	683	670	600	700	605	610	610	730	560	700
19	580	640	704	660	560	750	620	600	600	700	540	750
20	580	650	735	680	550	730	610	590	580	720	510	745
21	600	650	693	670	580	650	640	600	600	750	500	750
22	590	630	735	660	780	680	610	590	630	740	580	725
23	580	600	683	680	590	700	600	600	650	750	600	750
24	580	610	672	660	640	650	580	580	640	700	630	800
25	600	620	693	650	620	600	560	600	620	725	650	760
26	590	600	693	650	630	580	600	620	630	720	700	740
27	610	600	742	630	650	500	610	610	650	740	680	700
28	620	610	689	620	660	520	620	600	655	730	710	720
29	600	600	657	650	640	550	600	600	675	700	700	730
30	600	600	678	620	---	550	610	600	660	720	750	750
31	620	---	689	640	---	540	---	580	---	740	755	---
MEAN	564	633	681	647	618	655	537	605	630	694	630	768
WTR YR 1980	MEAN	638	MAX	880	MIN	0						

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17.0	4.5	1.0	1.0	.5	.5	1.5	19.0	21.0	23.5	23.0	19.0
2	15.5	4.5	1.0	1.0	1.0	.5	2.0	19.0	20.0	24.5	23.0	20.0
3	14.0	4.5	1.0	1.0	1.0	.5	2.0	16.0	21.0	25.5	23.0	21.0
4	13.0	4.0	1.0	1.0	1.0	.5	2.0	20.0	21.5	22.5	23.0	21.0
5	13.0	3.5	1.0	1.0	.5	.5	2.0	19.0	21.0	26.0	21.0	23.0
6	13.0	3.5	1.0	---	.5	.5	3.0	17.0	21.5	25.0	21.0	25.0
7	12.0	2.5	1.0	---	.5	.5	3.5	14.0	18.0	24.0	23.5	25.0
8	11.0	1.5	1.0	1.0	.5	.5	4.0	16.0	18.0	25.0	24.5	23.5
9	11.0	1.5	1.0	1.0	.5	.5	6.0	16.0	21.5	27.0	22.0	23.0
10	10.0	1.0	1.0	1.0	.5	.5	6.0	15.0	22.0	28.0	21.0	22.0
11	10.0	.5	1.0	1.0	.5	.5	6.0	15.0	23.0	28.0	24.0	20.0
12	8.0	.5	1.0	1.0	.5	.5	7.0	14.0	24.0	30.0	23.0	17.5
13	9.0	.5	1.0	1.0	.5	.5	5.0	14.0	23.5	31.0	23.0	17.0
14	6.0	.5	1.0	1.0	.5	.5	7.0	14.5	24.0	31.0	23.0	17.0
15	9.5	1.0	1.0	1.0	.5	.5	9.0	16.0	21.0	30.0	24.0	16.0
16	8.5	1.0	1.0	1.0	.5	1.0	10.0	16.5	23.0	29.0	24.0	14.0
17	9.0	1.5	1.0	1.0	.5	1.0	11.5	17.0	22.5	29.0	24.0	13.5
18	8.0	2.0	1.0	1.0	.5	1.0	13.0	17.0	21.0	27.0	24.0	12.5
19	9.5	1.0	1.0	1.0	.5	1.0	14.0	18.0	23.0	26.0	26.0	12.5
20	8.0	1.0	1.0	1.0	.5	1.0	16.0	20.5	23.0	25.0	25.0	13.0
21	8.0	1.0	1.0	1.0	.5	1.0	17.0	21.5	23.0	24.0	24.0	13.0
22	7.5	1.5	1.0	1.0	.5	1.0	16.0	23.0	23.0	25.0	23.5	13.0
23	7.0	1.5	1.0	1.0	.5	1.0	16.0	23.0	26.0	26.5	24.0	13.0
24	7.0	1.5	1.0	1.0	.5	1.0	16.5	19.0	25.0	25.0	25.0	12.0
25	7.0	1.0	1.0	.5	.5	1.0	16.5	23.0	26.0	26.0	24.0	12.5
26	7.0	1.0	1.0	.5	.5	1.0	15.5	25.0	23.0	24.0	21.0	13.0
27	7.5	1.0	1.0	.5	.5	1.0	14.5	26.0	23.0	26.0	22.5	10.0
28	7.5	1.0	1.0	.5	.5	1.0	16.5	25.0	21.0	23.0	21.0	14.5
29	7.0	1.0	1.0	.5	.5	1.0	17.0	24.0	21.0	26.0	20.0	15.0
30	7.0	1.0	1.0	.5	---	1.0	18.0	23.0	23.0	26.0	19.5	16.0
31	5.5	---	1.0	.5	---	1.0	---	23.0	---	27.0	18.5	---
MEAN	9.5	1.5	1.0	1.0	.5	1.0	10.0	19.0	22.5	26.5	23.0	17.0
WTR YR 1980	MEAN	11.0	MAX	31.0	MIN	.5						

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 fair. 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.--36 years, 68.0 ft^3/s (1.926 m^3/s), 49,270 acre-ft/yr (60.7 hm^3/yr); median of yearly mean discharges, 39 ft^3/s (1.10 m^3/s), 28,300 acre-ft/yr (35 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, 615 ft^3/s (17.4 m^3/s) Apr. 3, gage height, 9.99 ft (3.045 m); no flow on many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.01	.29	.03	.00	.00	221	.70	.00	.00	.00	.00
2	.00	.01	.25	.03	.00	.00	414	.60	.00	.00	.00	.00
3	.00	.02	.21	.03	.00	.00	566	.50	.00	.00	.00	.00
4	.00	1.4	.19	.03	.00	.00	521	.48	.00	.00	.00	.00
5	.00	.89	.16	.03	.00	.00	413	.54	.00	.00	.00	.00
6	.00	.82	.14	.03	.00	.00	287	.62	.00	.00	.00	.00
7	.00	.78	.12	.03	.00	.00	197	.41	.00	.00	.00	.00
8	.00	.75	.10	.03	.00	.00	122	.25	.00	.00	.00	.00
9	.00	.50	.09	.03	.00	.00	82	.28	.00	.00	.00	.00
10	.00	.50	.08	.03	.00	.00	65	.28	.00	.00	.00	.00
11	.00	.47	.07	.03	.00	.00	50	.25	.00	.00	.00	.00
12	.00	.44	.06	.03	.00	.00	39	.17	.00	.00	.00	.00
13	.00	.42	.05	.02	.00	.00	34	.17	.00	.00	.00	.00
14	.00	.42	.04	.02	.00	.00	26	.14	.00	.00	.00	.00
15	.00	.42	.03	.02	.00	.00	20	10	.00	.00	.00	.00
16	.00	.44	.03	.01	.00	.00	18	6.2	.00	.00	.00	.00
17	.00	.46	.02	.01	.00	.00	29	2.7	.00	.00	.00	.00
18	.00	.50	.02	.01	.00	.00	21	1.1	.00	.00	.00	.00
19	.00	.56	.01	.01	.00	.00	12	.62	.00	.00	.00	.00
20	.00	.68	.00	.00	.00	.00	12	.40	.00	.00	.00	.00
21	.00	1.0	.00	.00	.00	.00	7.4	.20	.00	.00	.00	.00
22	.00	1.2	.01	.00	.00	.00	5.2	.10	.00	.00	.00	.00
23	.00	1.4	.01	.00	.00	.00	3.6	.04	.00	.00	.00	.00
24	.00	1.3	.02	.00	.00	.00	2.5	.02	.00	.00	.00	.00
25	.00	1.0	.02	.00	.00	.00	1.7	.02	.00	.00	.00	.00
26	.00	.68	.02	.00	.00	.00	1.4	.02	.00	.00	.00	.00
27	.00	.56	.02	.00	.00	.10	3.1	.02	.00	.00	.00	.00
28	.00	.46	.02	.00	.00	4.0	1.4	.01	.00	.00	.00	.00
29	.00	.36	.02	.00	.00	32	1.1	.01	.00	.00	1.0	.00
30	.00	.34	.03	.00	---	57	.90	.00	.00	.00	.02	.00
31	.00	---	.03	.00	---	116	---	.00	---	.00	.00	---
TOTAL	.00	18.79	2.16	.46	.00	209.10	3177.30	26.85	.00	.00	1.02	.00
MEAN	.000	.63	.070	.015	.000	6.75	106	.87	.000	.000	.033	.000
MAX	.00	1.4	.29	.03	.00	116	566	10	.00	.00	1.0	.00
MIN	.00	.01	.00	.00	.00	.00	.90	.00	.00	.00	.00	.00
AC-FT	.00	37	4.3	.9	.00	415	6300	53	.00	.00	2.0	.00

CAL YR 1979	TOTAL	30323.03	MEAN	83.1	MAX	4740	MIN	.00	AC-FT 60150
WTR YR 1980	TOTAL	3435.68	MEAN	9.39	MAX	566	MIN	.00	AC-FT 6810

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.--34 years (water years 1947-80), 71.0 ft^3/s (2.011 m^3/s), 51,440 acre-ft/yr (63.4 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, 879 ft^3/s (24.9 m^3/s) Apr. 5, gage height, 10.10 ft (3.078 m); maximum gage height, 12.06 ft (3.676 m) Apr. 3 (backwater from ice); minimum discharge observed, 2.8 ft^3/s (0.079 m^3/s) Aug. 5, gage height, 4.10 ft (1.250 m); minimum gage height, 3.98 ft (1.213 m) July 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	28	24	25	17	27	370	67	15	9.5	9.5	19
2	11	28	25	24	17	32	470	63	15	12	6.7	15
3	12	29	25	23	17	32	650	57	14	8.9	5.3	12
4	19	29	25	22	17	32	745	51	14	8.2	4.5	11
5	15	29	25	20	17	32	850	45	16	7.2	3.3	11
6	14	32	25	19	17	31	743	40	19	6.7	5.9	10
7	14	31	25	17	17	31	703	38	25	7.2	6.1	9.9
8	14	30	24	15	17	30	536	36	18	6.7	5.7	9.8
9	15	29	24	10	17	29	388	36	16	7.0	5.7	7.0
10	14	29	24	7.9	17	28	326	36	14	6.3	6.1	7.2
11	13	29	23	10	18	27	290	36	13	7.2	6.3	6.7
12	14	29	23	16	18	26	257	35	10	6.1	6.7	9.0
13	15	29	23	21	18	25	230	34	12	8.9	7.0	11
14	16	28	22	19	18	24	198	34	11	21	9.2	14
15	17	28	22	18	19	23	181	33	11	12	11	12
16	17	28	22	18	21	22	163	33	10	8.7	9.5	12
17	17	29	22	18	30	22	144	31	8.9	7.9	11	11
18	18	30	22	18	30	22	136	31	8.7	8.4	11	9.8
19	19	31	22	20	30	22	121	29	8.7	8.9	12	11
20	26	33	22	24	29	22	112	29	8.9	9.8	12	11
21	23	31	22	24	28	23	105	27	8.2	13	11	12
22	21	29	22	24	26	25	92	27	7.5	13	12	12
23	22	24	23	24	24	28	86	26	7.5	11	16	12
24	23	25	24	23	23	31	77	27	7.0	9.2	15	10
25	20	25	25	22	23	35	72	26	6.3	8.2	18	10
26	23	25	26	21	23	45	70	26	6.7	8.2	12	10
27	21	24	26	20	23	56	73	20	6.3	8.2	11	11
28	21	23	27	19	23	78	71	17	8.0	8.2	10	12
29	21	24	27	18	24	110	72	16	9.8	7.6	12	13
30	24	24	27	18	---	160	70	16	10	6.4	23	13
31	26	---	26	17	---	200	---	16	---	5.7	21	---
TOTAL	557	842	744	594.9	618	1330	8401	1038	345.5	277.3	315.5	334.4
MEAN	18.0	28.1	24.0	19.2	21.3	42.9	280	33.5	11.5	8.95	10.2	11.1
MAX	26	33	27	25	30	200	850	67	25	21	23	19
MIN	11	23	22	7.9	17	22	70	16	6.3	5.7	3.3	6.7
AC-FT	1100	1670	1480	1180	1230	2640	16660	2060	685	550	626	663

CAL YR 1979 TOTAL 43666.6 MEAN 120 MAX 3360 MIN 9.0 AC-FT 86610
WTR YR 1980 TOTAL 15397.6 MEAN 42.1 MAX 850 MIN 3.3 AC-FT 30540

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, 5.85 ft (1.783 m) Oct. 31; maximum daily, 5.61 ft (1.710 m) Nov. 18; minimum, 3.45 ft (1.052 m) ~~Nov.~~ Aug 5; minimum daily, 4.05 ft (1.234 m) Aug. 5.

MONTHEND GAGE HEIGHT, IN FEET, OCTOBER 1979 TO SEPTEMBER 1980

Oct. 31 ..... 5.52	Feb. 29 ..... 5.20	June 30 ..... 4.70
Nov. 30 ..... 5.51	Mar. 31 ..... 5.10	July 31 ..... 4.40
Dec. 31 ..... 5.32	Apr. 30 ..... 5.36	Aug. 31 ..... 4.69
Jan. 31 ..... 5.23	May 31 ..... 5.07	Sept.30 ..... 4.52

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.--47 years, 492 ft^3/s (13.93 m^3/s), 356,500 acre-ft/yr (440 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, 972 ft^3/s (27.5 m^3/s) Oct. 1, gage height, 5.32 ft (1.622 m), occurred on recession following peak of Sept. 10, 1979; maximum independent peak discharge, 742 ft^3/s (21.0 m^3/s) Nov. 29, gage height, 4.97 ft (1.515 m); maximum gage height, 6.18 ft (1.884 m) Nov. 12 (backwater from ice); minimum daily, 87 ft^3/s (2.46 m^3/s) Sept. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	965	896	930	833	831	825	515	598	495	570	119	99
2	946	867	930	833	831	825	196	592	505	560	118	99
3	946	863	910	833	831	825	193	609	508	550	116	97
4	938	859	890	833	830	825	323	620	508	540	116	97
5	927	859	880	833	830	825	536	630	519	530	116	97
6	923	848	860	833	830	825	550	609	529	470	114	97
7	915	841	850	833	830	825	553	584	550	300	114	96
8	911	844	840	833	830	825	546	560	546	220	114	96
9	908	844	840	833	830	825	542	542	550	190	114	97
10	896	840	835	833	830	820	542	553	542	170	121	96
11	900	830	834	833	830	820	546	539	550	165	118	94
12	900	830	833	833	830	820	556	519	556	160	119	102
13	885	780	832	833	830	815	532	515	567	160	112	94
14	885	600	832	833	830	815	542	508	581	160	112	99
15	882	400	832	834	830	815	536	512	598	155	112	102
16	878	218	832	834	830	810	542	522	602	130	111	92
17	874	186	832	834	830	810	623	525	606	118	111	89
18	870	167	832	834	830	810	712	512	620	107	111	90
19	870	158	832	834	830	805	705	505	630	102	102	89
20	870	267	832	834	825	805	698	505	630	116	107	94
21	863	471	832	834	825	805	694	495	630	114	111	92
22	863	522	832	834	825	800	723	488	640	114	107	93
23	859	546	832	834	825	796	666	485	651	116	107	94
24	856	578	833	834	825	782	637	491	626	118	107	96
25	852	630	833	834	825	782	637	488	570	118	107	96
26	844	709	833	833	825	782	623	481	560	118	102	92
27	848	796	833	833	825	796	634	471	553	121	101	90
28	841	840	833	833	825	789	648	471	630	123	99	87
29	844	889	833	832	825	793	637	485	600	119	107	89
30	848	920	833	832	---	796	616	495	580	119	114	92
31	893	---	833	832	---	804	---	491	---	118	101	---
TOTAL	27500	19898	26248	25831	24023	25095	17003	16400	17232	6771	3440	2837
MEAN	887	663	847	833	828	810	567	529	574	218	111	94.6
MAX	965	920	930	834	831	825	723	630	651	570	121	102
MIN	841	158	832	832	825	782	193	471	495	102	99	87
AC-FT	54550	39470	52060	51240	47650	49780	33730	32530	34180	13430	6820	5630

CAL YR 1979 TOTAL 276007 MEAN 756 MAX 1220 MIN 110 AC-FT 547500
WTR YR 1980 TOTAL 212278 MEAN 580 MAX 965 MIN 87 AC-FT 421100

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 fair. Flow regulated by outlet dam on Lower Red Lake.

AVERAGE DISCHARGE.--51 years, 544 ft^3/s (15.41 m^3/s), 394,100 acre-ft/yr (486 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, 1,500 ft^3/s (42.5 m^3/s) Apr. 5, gage height, 9.05 ft (2.758 m); maximum gage height, 9.30 ft (2.835 m) Apr. 1 (backwater from ice); minimum daily discharge, 86 ft^3/s (2.44 m^3/s) Sept. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	967	1080	940	800	840	860	680	701	656	524	124	206
2	972	1050	940	800	840	860	470	694	650	521	124	159
3	968	1020	920	810	840	860	250	686	654	514	126	137
4	957	1020	890	810	840	860	520	679	659	508	130	131
5	958	1020	880	810	840	860	1420	678	663	504	129	111
6	952	1020	870	810	840	860	1350	682	666	510	128	112
7	957	1010	860	810	840	850	1120	691	662	508	128	108
8	958	1010	840	810	840	850	1030	690	657	457	124	105
9	954	1070	820	810	840	850	906	685	649	303	118	101
10	957	986	800	820	840	850	843	692	653	221	118	96
11	955	940	790	820	840	850	809	687	653	193	124	95
12	951	968	785	820	840	850	771	683	648	187	143	93
13	954	940	785	820	840	850	755	684	638	182	154	99
14	960	920	790	820	840	850	741	684	660	182	147	98
15	958	890	790	820	850	850	727	681	658	179	138	95
16	959	700	790	820	850	850	700	679	654	183	131	91
17	958	500	790	820	850	850	682	672	641	177	136	86
18	966	300	790	820	850	840	786	668	642	154	139	91
19	966	220	790	825	850	840	837	670	649	130	138	91
20	968	200	790	825	850	840	819	669	642	137	132	95
21	953	200	800	825	850	840	793	661	634	134	134	93
22	959	280	800	825	850	840	764	664	633	128	128	95
23	963	400	800	825	850	840	767	665	631	124	134	91
24	967	500	800	827	850	840	748	661	626	123	137	99
25	970	540	800	830	850	840	722	661	591	123	128	95
26	979	570	800	830	850	840	721	658	538	123	120	93
27	972	640	800	840	850	840	707	652	540	125	111	92
28	970	710	800	840	850	840	699	653	563	126	101	91
29	971	830	800	840	850	840	695	655	521	123	341	90
30	978	910	800	840	---	840	702	654	523	125	659	88
31	1030	---	800	840	---	840	---	659	---	125	358	---
TOTAL	29907	22444	25450	25462	24510	26270	23534	20898	18854	7653	4982	3127
MEAN	965	748	821	821	845	847	784	674	628	247	161	104
MAX	1030	1080	940	840	850	860	1420	701	666	524	659	206
MIN	951	200	785	800	840	840	250	652	521	123	101	86
AC-FT	59320	44520	50480	50500	48620	52110	46680	41450	37400	15180	9880	6200

CAL YR 1979 TOTAL 338447 MEAN 927 MAX 3620 MIN 200 AC-FT 671300
WTR YR 1980 TOTAL 233091 MEAN 637 MAX 1420 MIN 86 AC-FT 462300

NOTE: No gage-height record Jan. 26 to Mar. 6.

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.--63 years, 160 ft^3/s (4.531 m^3/s), 115,900 acre-ft/yr (143 hm^3/yr); median of yearly mean discharges, 108 ft^3/s (3.059 m^3/s), 78,200 acre-ft/yr (96 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, 1,710 ft^3/s (48.4 m^3/s) Apr. 7, gage height, 10.45 ft (3.185 m); no flow on many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	15	60	1.1	.00	.00	2.5	176	.47	.00	.00	6.2
2	20	7.4	60	1.1	.00	.00	20	176	.16	.00	.00	54
3	21	5.5	60	1.1	.00	.00	275	173	.10	.00	.00	52
4	28	5.0	60	1.1	.00	.00	500	170	.08	.00	.00	47
5	109	4.5	53	1.1	.00	.00	800	176	.06	.00	.00	42
6	111	66	35	1.1	.00	.00	1200	173	.06	.00	.00	36
7	109	111	20	1.0	.00	.00	1640	170	.03	.00	.00	29
8	106	113	9.0	.95	.00	.00	1500	163	.00	.00	.00	20
9	106	106	4.0	.85	.00	.00	1160	111	.00	.00	.00	13
10	106	91	2.0	.70	.00	.00	1000	98	.00	.00	.00	9.1
11	106	78	1.6	.70	.00	.00	947	89	.00	.00	.00	6.5
12	106	63	1.3	.70	.00	.00	896	24	.00	.00	.00	6.2
13	109	56	1.2	.70	.00	.00	886	72	.00	.00	.00	3.8
14	109	57	1.2	.65	.00	.00	872	57	.00	.00	.00	4.5
15	106	59	.91	.60	.00	.00	841	27	.00	.00	.00	4.3
16	104	60	1.0	.35	.00	.00	838	17	.00	.00	.00	4.8
17	106	60	1.1	.15	.00	.00	818	12	.00	.00	.00	5.0
18	106	60	.90	.07	.00	.00	785	12	.00	.00	.00	4.8
19	102	60	.60	.03	.00	.00	772	23	.00	.00	.00	5.7
20	98	60	.40	.01	.00	.00	739	15	.00	.00	.00	5.3
21	106	60	.27	.01	.00	.00	696	6.8	.00	.00	.00	5.5
22	104	60	.40	.00	.00	.00	192	4.8	.00	.00	.00	6.2
23	104	60	.50	.00	.00	.00	87	3.8	.00	.00	.00	7.0
24	102	60	.70	.00	.00	.00	78	3.5	.00	.00	.00	7.0
25	102	60	.85	.00	.00	.01	80	3.1	.00	.00	.00	7.0
26	102	60	.95	.00	.00	.02	178	2.8	.00	.00	.00	6.8
27	102	60	1.0	.00	.00	.03	181	2.1	.00	.00	.00	6.2
28	102	60	1.1	.00	.00	.06	178	1.6	.00	.00	.00	5.7
29	100	60	1.1	.00	.00	.10	178	1.3	.00	.00	.00	5.0
30	95	60	1.1	.00	---	.20	176	1.2	.00	.00	.00	4.1
31	30	---	1.1	.00	---	.60	---	.81	---	.00	.00	---
TOTAL	2835	1737.4	382.28	14.07	.00	1.02	18515.5	1965.81	.96	.00	.00	419.7
MEAN	91.5	57.9	12.3	.45	.000	.033	617	63.4	.032	.000	.000	14.0
MAX	111	113	60	1.1	.00	.60	1640	176	.47	.00	.00	54
MIN	18	4.5	.27	.00	.00	.00	2.5	.81	.00	.00	.00	3.8
AC-FT	5620	3450	758	28	.00	2.0	36730	3900	1.9	.00	.00	832

CAL YR 1979 TOTAL 122472.48 MEAN 336 MAX 3230 MIN .27 AC-FT 242900
WTR YR 1980 TOTAL 25871.74 MEAN 70.7 MAX 1640 MIN .00 AC-FT 51320

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.--20 years, 77.8 ft^3/s (2.203 m^3/s), 56,370 acre-ft/yr (69.5 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, 670 ft^3/s (19.0 m^3/s) Apr. 3, gage height, 9.95 ft (3.033 m) from highwater mark (backwater from ice); minimum daily, 0.58 ft^3/s (0.016 m^3/s) July 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.3	33	15	12	10	10	100	32	7.0	6.7	2.0	14
2	9.0	46	15	12	10	10	500	31	5.8	5.4	1.9	10
3	9.3	45	15	12	10	10	660	28	5.0	5.2	1.8	9.0
4	11	38	14	12	10	10	640	25	4.8	2.9	1.7	5.4
5	13	31	14	12	10	10	580	22	6.2	.58	1.7	6.7
6	8.6	27	14	11	10	10	543	11	7.6	.62	1.1	6.7
7	12	25	14	11	10	10	494	7.1	6.2	.65	1.4	6.4
8	14	22	14	11	10	10	396	5.2	6.8	2.1	1.3	6.0
9	9.9	20	14	11	10	10	344	5.4	7.3	3.6	1.6	5.0
10	11	19	14	11	10	10	336	9.0	6.9	3.1	1.6	3.5
11	11	18	14	11	10	10	239	13	6.7	6.2	1.6	5.6
12	13	17	14	11	10	10	172	17	6.2	5.6	4.2	7.8
13	12	17	14	11	10	10	149	18	6.0	3.7	4.0	13
14	14	17	14	11	10	10	126	12	17	1.7	4.6	13
15	13	17	14	11	10	10	116	11	14	1.2	4.6	14
16	14	17	13	11	10	10	110	8.6	12	3.6	4.8	9.0
17	26	24	13	11	10	11	91	5.6	9.9	3.1	4.6	9.3
18	28	24	13	11	10	11	72	4.3	4.8	2.6	4.4	9.9
19	34	22	13	11	10	11	92	3.0	3.6	2.0	3.8	9.9
20	29	21	13	11	10	11	88	2.4	12	2.6	4.6	9.0
21	28	21	13	11	10	12	85	1.9	12	3.3	5.0	8.0
22	24	18	13	11	10	12	75	1.3	12	4.8	5.0	7.1
23	22	16	13	11	10	13	65	1.1	12	6.2	6.5	6.7
24	22	17	13	11	10	13	62	.86	10	5.8	7.4	6.2
25	16	17	12	11	10	14	58	2.6	6.9	3.8	8.3	6.2
26	18	17	12	11	10	15	52	4.3	3.8	3.0	6.7	8.6
27	17	16	12	11	10	15	48	6.0	5.8	4.0	5.6	9.6
28	15	15	12	11	10	16	43	8.0	7.7	5.0	7.6	9.3
29	14	15	12	11	10	18	39	10	11	4.2	63	9.0
30	17	15	12	11	---	21	35	9.9	9.0	2.8	36	9.0
31	29	---	12	11	---	30	---	8.3	---	2.1	19	---
TOTAL	521.1	667	414	346	290	383	6410	324.86	246.0	108.15	227.4	252.9
MEAN	16.8	22.2	13.4	11.2	10.0	12.4	214	10.5	8.20	3.49	7.34	2 8.43
MAX	34	46	15	12	10	30	660	32	17	6.7	63	14
MIN	7.3	15	12	11	10	10	35	.86	3.6	.58	1.1	3.5
AC-FT	1030	1320	821	686	575	760	12710	644	488	215	451	502

CAL YR 1979 TOTAL 36711.20 MEAN 101 MAX 2090 MIN 1.9 AC-FT 72820
WTR YR 1980 TOTAL 10190.41 MEAN 27.8 MAX 660 MIN .58 AC-FT 20210

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.--54 years, 317 ft^3/s (8.977 m^3/s), 229,700 acre-ft/yr (283 hm^3/yr); median of yearly mean discharges, 284 ft^3/s (8.04 m^3/s), 205,800 acre-ft/yr (254 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, 1,910 ft^3/s (54.1 m^3/s) Apr. 8, gage height, 5.59 ft (1.704 m); maximum gage height, 8.03 ft (2.448 m) Apr. 4 (backwater from ice); minimum discharge, 10 ft^3/s (0.28 m^3/s) June 23, gage height, 1.57 ft (0.479 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	72	134	137	100	90	115	600	157	20	71	95	362
2	70	210	135	100	90	114	900	152	19	65	89	241
3	68	310	132	99	91	112	1100	138	17	54	83	180
4	65	300	130	99	91	111	1200	126	18	46	71	146
5	61	274	129	98	91	110	1300	117	19	37	67	123
6	62	250	128	98	91	108	1400	104	19	34	55	110
7	62	220	127	97	92	106	1650	94	19	50	61	95
8	63	190	125	97	92	110	1830	80	18	52	69	83
9	64	180	123	96	92	115	1530	74	20	54	60	72
10	63	170	122	96	92	120	1210	70	22	58	61	62
11	65	190	121	96	92	130	1020	72	22	57	78	57
12	64	220	120	95	93	135	866	72	20	57	89	64
13	62	240	118	95	93	140	795	81	17	66	86	65
14	62	250	118	94	94	140	717	89	51	60	97	65
15	64	230	117	94	95	135	649	77	54	69	128	85
16	64	210	116	94	100	130	589	75	31	79	118	103
17	64	200	115	94	105	120	534	65	24	99	100	99
18	64	210	114	93	110	110	490	59	28	107	85	95
19	76	220	112	93	115	100	457	54	22	119	71	94
20	79	220	110	93	120	90	425	51	17	138	79	96
21	83	200	109	93	120	80	388	47	14	163	79	104
22	87	190	108	93	120	70	401	39	13	183	69	120
23	91	170	108	92	120	65	337	35	11	189	105	115
24	88	160	107	92	120	60	281	32	18	201	115	109
25	89	150	106	92	120	56	248	26	41	205	141	104
26	89	145	106	92	119	55	235	23	42	204	156	101
27	80	142	105	91	118	60	207	21	32	194	131	88
28	78	140	104	91	117	80	191	22	50	172	107	80
29	77	140	103	91	116	100	181	24	48	135	264	77
30	77	138	102	90	---	150	168	22	48	116	345	71
31	98	---	101	90	---	300	---	21	---	111	466	---
TOTAL	2251	6003	3608	2928	2999	3427	21899	2119	794	3245	3620	3266
MEAN	72.6	200	116	94.5	103	111	730	68.4	26.5	105	117	109
MAX	98	310	137	100	120	300	1830	157	54	205	466	362
MIN	61	134	101	90	90	55	168	21	11	34	55	57
AC-FT	4460	11910	7160	5810	5950	6800	43440	4200	1570	6440	7180	6480

CAL YR 1979 TOTAL 186594 MEAN 511 MAX 9930 MIN 48 AC-FT 370100
WTR YR 1980 TOTAL 56159 MEAN 153 MAX 1830 MIN 11 AC-FT 111400

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.--79 years, 1,122 ft^3/s (31.78 m^3/s), 812,900 acre-ft/yr (1,000 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, 6,600 ft^3/s (187 m^3/s) Apr. 9, gage height, 12.31 ft (3.752 m); maximum gage height, 14.77 ft (4.502 m) Apr. 7 (backwater from ice); minimum discharge, 158 ft^3/s (4.47 m^3/s) Sept. 11, gage height, 2.83 ft (0.863 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1110	1290	800	1150	1050	1030	2000	1070	658	509	252	2190
2	1130	1260	888	1140	1050	1030	2300	1050	661	555	245	1220
3	1080	1300	987	1140	1050	1030	2800	1040	640	537	235	910
4	1100	1310	1350	1130	1050	1030	3300	1010	639	523	220	593
5	1080	1310	1390	1130	1040	1030	4000	980	654	514	210	527
6	1080	1300	1380	1120	1040	1030	4700	954	673	504	200	392
7	1170	1310	1350	1120	1040	1030	5600	945	691	527	210	345
8	1180	1110	1320	1110	1040	1030	6290	941	660	514	230	307
9	1160	1010	1300	1110	1040	1030	5990	932	654	518	255	226
10	1170	879	1270	1110	1040	1030	4350	914	659	495	225	248
11	1150	872	1250	1100	1040	1030	3540	844	649	409	240	180
12	1120	969	1250	1100	1040	1030	2950	831	635	409	260	201
13	1150	814	1240	1090	1040	1030	2670	816	640	215	280	245
14	1170	1020	1240	1090	1040	1030	2510	782	664	261	300	194
15	1120	1090	1230	1080	1040	1030	2420	846	703	268	320	230
16	1130	1300	1230	1080	1040	1030	2290	784	674	274	290	198
17	1130	1280	1220	1070	1040	1030	2180	764	669	242	370	215
18	1150	1290	1210	1070	1040	1030	2110	752	664	295	245	252
19	1120	981	1210	1060	1040	1030	2060	739	659	292	252	194
20	1180	731	1200	1060	1040	1030	2110	715	640	353	215	212
21	1130	607	1200	1060	1030	1030	2100	704	640	374	252	219
22	1130	470	1190	1050	1030	1030	1990	694	640	345	219	234
23	1150	371	1190	1050	1030	1030	1510	673	626	368	272	241
24	1140	332	1180	1050	1030	1030	1230	671	616	302	264	279
25	1160	525	1180	1050	1030	1030	1160	674	611	392	312	260
26	1170	557	1170	1050	1030	1050	1110	669	578	370	245	252
27	1110	721	1170	1050	1030	1070	1110	665	560	374	312	241
28	1140	591	1160	1050	1030	1100	1160	653	602	359	272	215
29	1130	752	1160	1050	1030	1200	1120	661	607	310	396	215
30	1120	742	1160	1050	---	1400	1080	658	616	279	2120	204
31	1220	---	1150	1050	---	1600	---	640	---	244	3150	---
TOTAL	35280	28094	37225	33620	30110	33170	79740	25071	19282	11931	12868	11439
MEAN	1138	936	1201	1085	1038	1070	2658	809	643	385	415	381
MAX	1220	1310	1390	1150	1050	1600	6290	1070	703	555	3150	2190
MIN	1080	332	800	1050	1030	1030	1080	640	560	215	200	180
AC-FT	69980	55720	73840	66690	59720	65790	158200	49730	38250	23670	25520	22690

CAL YR 1979 TOTAL 750759 MEAN 2057 MAX 21200 MIN 332 AC-FT 1489000
WTR YR 1980 TOTAL 357830 MEAN 978 MAX 6290 MIN 180 AC-FT 709800

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.

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE, WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	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)
OCT												
29...	1430	1000	315	8.7	9.0	5.5	7.0	11.8	97	2000	400	160
DEC												
10...	1430	1280	350	7.9	5.0	.5	3.0	--	--	1200	960	190
JAN												
22...	1300	1050	400	7.8	-17.0	.0	.60	13.2	94	1800	570	200
MAR												
03...	1600	1030	340	7.7	-5.0	.0	1.0	12.1	86	940	240	180
JUN												
09...	1630	654	305	8.4	24.5	19.5	.80	--	--	--	510	150
JUL												
14...	1500	279	335	8.3	27.5	27.0	17	7.6	97	K7400	2000	160
AUG												
18	1500	252	420	8.4	30.0	18.0	8.4	--	--	K1700	700	--
SEP												
16...	1600	151	527	8.5	16.0	15.0	.60	9.2	94	>3500	400	250

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)	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 (MG/L AS CACO3) (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)
OCT												
29...	0	41	13	3.4	.1	2.2	160	15	2.1	.1	6.9	209
DEC												
10...	6	48	16	4.1	.1	2.7	180	9.3	2.6	.1	10	230
JAN												
22...	7	51	17	4.9	.2	2.0	190	11	2.8	.2	11	238
MAR												
03...	2	48	15	4.5	.1	2.4	180	7.0	2.5	.1	11	220
JUN												
09...	0	38	13	3.5	.1	1.9	150	8.6	2.1	.1	7.7	189
JUL												
14...	0	39	15	4.7	.2	2.7	170	16	3.0	.2	11	226
AUG												
18	--	--	--	7.1	--	3.3	170	48	4.3	.2	4.9	287
SEP												
16...	95	64	23	7.0	.2	3.8	160	88	5.5	.2	5.8	320

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)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT												
29...	180	564	.08	.02	.09	.00	.74	.62	.050	.010	0	--
DEC												
10...	201	795	.05	.02	.60	.13	.75	.28	.030	.010	--	12
JAN												
22...	214	675	.08	.08	.10	.10	1.0	1.0	.030	.030	--	13
MAR												
03...	199	612	.11	.05	.00	.00	.80	.63	.030	.010	0	--
JUN												
09...	165	334	.00	.00	.03	.03	.90	.78	.070	.010	0	--
JUL												
14...	194	170	.09	.09	.88	.73	1.9	1.6	1.100	.970	1	12
AUG												
18	68	195	.05	.03	.05	.01	.75	.70	.120	.060	0	--
SEP												
16...	294	130	.03	.02	.050	.050	.61	.61	.080	.000	0	13

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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)
OCT 29...	1430	3	3	<50	40	0	0	30	10	1
MAR 03...	1600	1	1	<50	<50	4	4	10	<10	0
JUN 09...	1630	4	3	100	60	0	0	20	10	0
AUG 18...	1500	8	6	<50	0	0	0	20	10	0

DATE	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	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)
OCT 29...	1	2	2	380	10	2	2	60	6	.1
MAR 03...	0	2	2	220	10	0	0	50	20	.1
JUN 09...	0	2	1	570	10	210	0	130	20	.2
AUG 18...	0	3	3	510	100	4	1	90	20	.4

DATE	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	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, 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 (MG/L AS C) (00689)
OCT 29...	<.1	3	3	0	0	0	10	10	69	1.3
MAR 03...	<.1	2	0	0	0	0	40	40	11	--
JUN 09...	.2	2	0	0	0	0	10	0	18	1.5
AUG 18...	.4	2	0	0	0	0	10	10	16	.5

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)
SEP 16...	1600	29	.709	.551	.670	.210

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued
PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980

DATE	OCT 29,79		DEC 10,79		MAR 3,80		JUN 9,80	
TIME	1430		1430		1600		1630	
TOTAL CELLS/ML	29000		7800		10000		46000	
DIVERSITY: DIVISION	0.3		0.3		0.2		0.9	
.CLASS	0.3		0.3		0.2		0.9	
..ORDER	1.1		0.7		0.3		0.9	
...FAMILY	1.2		0.7		0.4		1.1	
....GENUS	1.6		0.8		0.4		1.2	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	210	1	--	-	--	-	810	2
...MICRACTINIACEAE								
....GOLENKINIA	--	-	--	-	--	-	*	0
....MICRACTINIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	*	0	40	1	*	0	*	0
....CHLORELLA	--	-	--	-	*	0	*	0
....CHODATELLA	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	*	0	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	*	0	--	-	--	-
....OOCYSTIS	*	0	--	-	--	-	910	2
....SELENASTRUM	*	0	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	260	1	60	1	61	1	6200	14
....TETRASTRUM	--	-	--	-	--	-	600	1
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	*	0
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	*	0	45	1	--	-	*	0
....MELOSIRA	*	0	--	-	*	0	--	-
..PENNALES								
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	66	1	250	1
....FRAGILARIA	--	-	--	-	*	0	--	-
....SYNEDRA	--	-	--	-	--	-	*	0
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	45	1	--	-	--	-
...NAVICULACEAE								
....NAVICULA	*	0	--	-	*	0	--	-
...NITZSCHIACEAE								
....NITZSCHIA	*	0	*	0	*	0	600	1
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBRYON	--	-	*	0	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	*	0	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	8100#	28	6900#	88	9700#	95	36000#	78
....COCCOCHLORIS	--	-	--	-	--	-	--	-
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	260	1	--	-	--	-	--	-
...OSCILLATORIACEAE								
....LYNGBYA	2300	8	--	-	--	-	--	-
....OSCILLATORIA	17000#	60	200	3	--	-	--	-
....SCHIZOTHRIX	--	-	460	6	190	2	--	-

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

DATE / TIME	OCT 29,79 1430		DEC 10,79 1430		MAR 3,80 1600		JUN 9,80 1630	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..GYMNODINIALES								
...GYMNODINIACEAE								
....GYMNODINIUM	--	-	*	0	--	-	--	-
DATE / TIME	JUL 14,80 1500		AUG 18,80 1500		SEP 16,80 1600			
TOTAL CELLS/ML	5000		7200		620			
DIVERSITY: DIVISION	1.8		1.5		1.7			
.CLASS	1.8		1.5		1.7			
..ORDER	2.3		1.8		2.2			
...FAMILY	2.8		2.4		2.8			
....GENUS	3.3		2.9		3.0			
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT		
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	25	1	--	-	--	-		
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	440	6	--	-		
...MICRACTINIACEAE								
....GOLENKINIA	--	-	--	-	--	-		
....MICRACTINIUM	--	-	81	1	--	-		
...OOCYSTACEAE								
....ANKISTRODESMUS	130	3	61	1	26	4		
....CHLORELLA	--	-	--	-	--	-		
....CHODATELLA	--	-	*	0	13	2		
....DICTYOSPHAERIUM	--	-	420	6	--	-		
....KIRCHNERIELLA	--	-	--	-	--	-		
....OOCYSTIS	280	6	480	7	--	-		
....SELENASTRUM	76	2	61	1	26	4		
....TREUBARIA	--	-	*	0	--	-		
....WESTELLA	--	-	480	7	--	-		
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	480	7	--	-		
....SCENEDESMUS	300	6	240	3	150#	25		
....TETRASTRUM	1000#	20	--	-	--	-		
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	40	1	--	-		
...PALMELLACEAE								
....SPHAEROCYSTIS	100	2	--	-	--	-		
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	350	7	240	3	90	15		
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	380	8	360	5	13	2		
....MELOSIRA	450	9	--	-	--	-		
..PENNALES								
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-		
....FRAGILARIA	50	1	--	-	--	-		
....SYNEDRA	--	-	--	-	--	-		
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-		
...NAVICULACEAE								
....NAVICULA	25	1	*	0	39	6		
...NITZSCHIACEAE								
....NITZSCHIA	150	3	120	2	130#	21		
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	13	2		
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	--	-		

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

PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980--Continued

DATE TIME	JUL 14,80 1500		AUG 18,80 1500		SEP 16,80 1600	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	380	8	220	3	52	8
...CRYPTOMONADACEAE						
....CRYPTOMONAS	25	1	40	1	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	1200#	24	3300#	46	65	10
....COCCOCHLORIS	50	1	--	-	--	-
..HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	--	-
...OSCILLATORIACEAE						
....LYNGBYA	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-
....SCHIZOTHRIX	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)						
.DINOPHYCEAE						
..GYMNODINIALES						
...GYMNODINIACEAE						
....GYMNODINIUM	--	-	--	-	--	-

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

WATER QUALITY DATA WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	TEMPER-ATURE, WATER (DEG C) (00010)	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 29...	1440	1000	6.0	12	32	100
DEC 10...	1430	1280	.5	10	34	--
JAN 22...	1300	1050	.0	8	23	--
MAR 03...	1600	1030	.0	17	47	--
APR 14...	1415	2500	5.0	49	331	--
JUN 09...	1630	654	19.5	78	138	--
JUL 14...	1515	279	27.0	26	20	98
AUG 18...	1500	252	18.0	21	14	100
SEP 16...	1600	151	15.0	23	9.4	100

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.--98 years, 2,551 ft^3/s (72.24 m^3/s) 1,848,000 acre-ft/yr (2.28 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, 22,000 ft^3/s (623 m^3/s) Apr. 6, gage height, 31.01 ft (9.452 m); minimum daily, 312 ft^3/s (8.84 m^3/s) Sept. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1640	1980	1250	1360	1350	1440	7230	2500	1290	1090	425	2910
2	1620	2100	1300	1360	1350	1440	9000	2450	1260	1060	396	3120
3	1590	2140	1300	1360	1370	1450	11100	2390	1230	1020	389	2060
4	1600	2230	1300	1360	1400	1460	14000	2350	1240	1050	374	1400
5	1600	2330	1320	1350	1420	1470	19600	2290	1240	1020	356	964
6	1610	2400	1600	1350	1420	1480	21800	2210	1280	972	365	775
7	1610	2400	1800	1350	1420	1480	21300	2190	1370	932	356	667
8	1650	2280	2000	1340	1410	1490	20300	2110	1440	892	348	495
9	1700	1900	2000	1340	1410	1500	18800	2040	1490	828	345	312
10	1660	1500	2000	1340	1410	1500	16600	2010	1490	786	341	396
11	1620	1350	2030	1330	1400	1510	12700	1980	1510	764	345	432
12	1600	1600	2030	1330	1400	1520	9880	1900	1610	688	330	450
13	1600	1650	1880	1330	1400	1530	8020	1880	1720	640	363	452
14	1610	1700	1680	1330	1400	1540	7000	1870	1760	600	425	432
15	1610	1800	1600	1330	1400	1540	6400	1860	1780	550	495	420
16	1620	2040	1510	1330	1400	1550	6000	1860	1750	500	535	458
17	1620	2200	1500	1340	1400	1560	5550	1850	1650	480	520	526
18	1630	2290	1400	1350	1400	1560	5050	1830	1560	460	512	526
19	1620	2590	1360	1350	1400	1570	4700	1780	1580	440	465	520
20	1660	2260	1360	1340	1400	1580	4380	1730	1660	490	445	520
21	1700	2030	1360	1340	1400	1590	4180	1690	1740	495	485	506
22	1730	1850	1360	1330	1410	1600	4000	1640	1720	508	445	495
23	1730	1740	1360	1310	1410	1600	3820	1590	1610	515	470	490
24	1710	1620	1360	1300	1420	1610	3400	1520	1460	490	492	488
25	1700	1400	1360	1320	1420	1700	3040	1480	1340	488	508	495
26	1680	1190	1360	1340	1420	1800	2810	1470	1220	490	515	512
27	1700	1100	1360	1350	1420	1900	2700	1440	1170	518	508	526
28	1670	1000	1360	1350	1430	2230	2660	1390	1130	529	495	553
29	1640	1100	1360	1370	1430	3000	2610	1360	1140	495	520	562
30	1680	1200	1360	1350	---	4400	2580	1330	1100	495	580	559
31	1790	---	1360	1350	---	5830	---	1310	---	465	992	---
TOTAL	51200	54970	47180	41580	40720	57430	261210	57300	43540	20750	14140	23021
MEAN	1652	1832	1522	1341	1404	1853	8707	1848	1451	669	456	767
MAX	1790	2590	2030	1370	1430	5830	21800	2500	1780	1090	992	3120
MIN	1590	1000	1250	1300	1350	1440	2580	1310	1100	440	330	312
AC-FT	101600	109000	93580	82470	80770	113900	518100	113700	86360	41160	28050	45660

CAL YR 1979 TOTAL 2254504 MEAN 6177 MAX 80900 MIN 650 AC-FT 4472000
WTR YR 1980 TOTAL 713041 MEAN 1948 MAX 21800 MIN 312 AC-FT 1414000

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1956-80.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, WATER (DEG C) (00010)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
APR 07...	1445	21300	340	7.7	1.5	160	21	34

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 (MG/L AS CACO3) (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
APR 07...	18	8.3	.3	7.0	138	41	5.5	.1	11

DATE	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-PHORUS, ORTHOPH OSPHATE DISSOL. (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 07...	243	214	13300	5.0	.56	130	130	70

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.--30 years (water years 1951-80), 42.5 ft^3/s (1.204 m^3/s), 30,790 acre-ft/yr (38.0 hm^3/yr); median of yearly mean discharges, 38 ft^3/s (1.08 m^3/s), 27,500 acre-ft/yr (34 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, 357 ft^3/s (10.1 m^3/s) Apr. 9, gage height, 6.91 ft (2.106 m); maximum gage height, 7.09 ft (2.161 m) Apr. 7 (backwater from ice); no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.09	2.0	1.6	1.3	1.2	.92	34	12	3.7	.04	.00	.00
2	.04	1.9	1.4	1.3	1.2	.92	60	12	3.1	.01	.00	.00
3	.03	1.7	1.4	1.3	1.2	.91	120	11	2.4	.01	.00	.00
4	.09	1.6	1.5	1.3	1.2	.90	140	10	2.5	.00	.00	.00
5	.11	1.4	1.5	1.3	1.1	.90	180	9.8	1.7	.00	.18	.00
6	.13	1.3	1.6	1.3	1.1	.90	240	9.2	2.2	.00	.09	.00
7	.15	1.3	1.7	1.3	1.1	.90	320	8.6	2.2	.01	.01	.00
8	.22	1.1	1.6	1.3	1.1	.90	340	8.3	1.5	.01	.01	.00
9	.22	1.1	1.5	1.3	1.1	.90	346	8.0	.87	.00	.00	.00
10	.18	1.0	1.5	1.3	1.1	.90	302	7.6	.53	.00	.00	.00
11	.28	1.2	1.6	1.3	1.1	.90	235	7.1	.18	.00	.00	.00
12	.28	1.7	1.6	1.3	1.1	.90	210	7.0	.04	.00	.75	.49
13	.28	2.0	1.5	1.3	1.1	.90	153	6.7	.03	.00	.53	1.4
14	.28	1.8	1.2	1.3	1.0	.90	110	6.6	.44	.00	.11	.98
15	.28	1.8	1.1	1.3	1.0	.90	89	6.4	.13	.00	.01	.38
16	.28	1.8	.94	1.3	1.0	.90	74	6.2	.03	.00	.00	.17
17	.28	2.0	.90	1.3	1.0	.90	64	5.9	.01	.00	.01	.16
18	.33	2.1	.94	1.3	.99	.90	54	5.7	.02	.00	.02	.17
19	.33	2.0	1.0	1.3	.98	.90	48	5.9	.03	.00	.01	.70
20	.33	1.9	1.1	1.3	.97	.90	42	6.3	.02	.00	.65	1.1
21	.33	1.7	1.2	1.3	.97	.90	36	5.3	.01	.33	1.2	.98
22	.33	1.6	1.2	1.3	.96	.90	31	4.9	.01	.11	.16	1.4
23	.33	1.7	1.3	1.3	.96	.90	26	4.5	.00	.01	.43	1.4
24	.33	1.7	1.3	1.2	.95	.90	22	4.8	.00	.00	.11	1.2
25	.33	1.6	1.3	1.2	.95	.92	20	4.9	.00	.00	.01	1.1
26	.33	1.5	1.3	1.2	.94	1.0	20	4.6	.00	.00	.00	1.3
27	.33	1.6	1.3	1.2	.94	1.7	18	4.0	.28	.00	.00	1.4
28	.33	1.6	1.3	1.2	.93	3.0	16	4.1	1.5	.00	.00	1.3
29	.33	1.6	1.3	1.2	.93	5.6	14	4.0	.28	.00	.00	1.2
30	.48	1.6	1.3	1.2	---	10	13	3.5	.09	.01	.00	.98
31	1.5	---	1.3	1.2	---	18	---	3.4	---	.01	.00	---
TOTAL	9.16	48.9	41.28	39.5	30.17	61.87	3377	208.3	23.80	.55	4.29	17.81
MEAN	.30	1.63	1.33	1.27	1.04	2.00	113	6.72	.79	.018	.14	.59
MAX	1.5	2.1	1.7	1.3	1.2	18	346	12	3.7	.33	1.2	1.4
MIN	.03	1.0	.90	1.2	.93	.90	13	3.4	.00	.00	.00	.00
AC-FT	18	97	82	78	60	123	6700	413	47	1.1	8.5	35

CAL YR 1979 TOTAL 24337.75 MEAN 66.7 MAX 1980 MIN ~~00~~ 03 AC-FT 48270
WTR YR 1980 TOTAL 3862.63 MEAN 10.6 MAX 346 MIN .00 AC-FT 7660

NOTE.--No gage-height record, Dec. 18 to Apr. 2.

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.--31 years (1949-80), 3,843 ft^3/s (108.8 m^3/s) 2,784,000 acre-ft/yr (3.43 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, 22,400 ft^3/s (634 m^3/s) Apr. 10, gage height, 29.00 ft (8.839 m); minimum, 388 ft^3/s (11.0 m^3/s) Aug. 8, gage height, 9.45 ft (2.880 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1710	1840	1210	1470	1400	1490	5300	2920	1440	1190	530	640
2	1690	1930	1220	1450	1460	1490	7000	2840	1380	1180	495	1230
3	1640	2040	1230	1430	1480	1500	8200	2750	1330	1150	474	2620
4	1640	2120	1260	1410	1480	1500	9580	2670	1310	1130	448	2530
5	1590	2180	1260	1400	1500	1510	11400	2600	1300	1120	424	1940
6	1620	2270	1260	1380	1480	1530	14800	2530	1280	1130	436	1450
7	1620	2320	1290	1380	1470	1550	20300	2470	1340	1100	412	1140
8	1620	2100	1420	1380	1460	1590	21700	2420	1380	1070	394	900
9	1630	2110	1600	1380	1460	1600	22200	2350	1420	1010	400	770
10	1670	1900	1760	1380	1460	1590	22300	2270	1490	990	400	632
11	1690	1500	1770	1380	1450	1590	21600	2210	1540	890	394	481
12	1660	1300	1770	1380	1450	1600	20300	2150	1510	850	418	460
13	1630	1480	1770	1380	1450	1600	17300	2110	1550	810	406	488
14	1590	1600	1800	1380	1450	1610	13300	2060	1760	734	412	530
15	1590	1620	1710	1380	1460	1610	10700	2060	1940	698	406	516
16	1600	1700	1600	1380	1460	1610	9000	2060	1940	632	424	481
17	1640	1880	1540	1380	1460	1600	7900	2040	1840	558	495	488
18	1640	2010	1500	1380	1460	1590	6900	2030	1780	516	565	495
19	1640	2160	1490	1380	1460	1590	6100	2000	1700	495	565	558
20	1640	2290	1490	1380	1460	1550	5500	1960	1600	495	565	593
21	1640	2340	1480	1380	1460	1520	5100	1900	1590	495	551	624
22	1660	2120	1480	1380	1460	1520	4800	1840	1700	516	558	632
23	1700	1960	1480	1380	1460	1520	4700	1770	1740	530	551	640
24	1730	1690	1480	1380	1460	1530	4500	1700	1730	523	544	608
25	1740	1580	1480	1380	1470	1550	4200	1630	1600	537	516	608
26	1730	1510	1480	1380	1470	1580	3800	1560	1480	537	537	624
27	1710	1350	1480	1380	1470	1600	3440	1510	1400	509	551	640
28	1710	1160	1480	1380	1480	1650	3210	1480	1350	502	558	680
29	1710	930	1480	1370	1480	1850	3090	1450	1290	530	572	680
30	1700	1010	1480	1370	---	2250	3000	1430	1240	530	565	707
31	1710	---	1480	1380	---	3400	---	1460	---	544	586	---
TOTAL	51490	54000	46230	43020	42420	51270	301220	64230	45950	23501	15152	25385
MEAN	1661	1800	1491	1388	1463	1654	10040	2072	1532	758	489	846
MAX	1740	2340	1800	1470	1500	3400	22300	2920	1940	1190	586	2620
MIN	1590	930	1210	1370	1400	1490	3000	1430	1240	495	394	460
AC-FT	102100	107100	91700	85330	84140	101700	597500	127400	91140	46610	30050	50350

CAL YR 1979 TOTAL 2654610 MEAN 7273 MAX 91000 MIN 705 AC-FT 5265000
WTR YR 1980 TOTAL 763868 MEAN 2087 MAX 22300 MIN 394 AC-FT 1515000

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

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1972-80.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, WATER (DEG C) (00010)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
APR								
07...	1545	20500	380	7.9	1.5	160	24	36
10...	1535	22300	400	7.9	2.5	170	25	38
SEP								
10...	1235	649	578	8.1	17.5	190	55	41

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 (MG/L AS CACO3) (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
APR									
07...	17	13	.4	7.3	136	43	11	.2	11
10...	18	15	.5	7.1	144	46	16	.1	11
SEP									
10...	21	59	1.9	3.6	134	72	85	.2	9.8

DATE	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-PHORUS, ORTHOPH OSPHATE DISSOL. (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								
07...	246	227	13600	5.5	.57	130	80	100
10...	254	246	15300	7.9	.45	190	60	20
SEP								
10...	370	373	648	1.0	.16	60	30	0

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) (revised) 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 current year. 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 fair. Flow partly regulated since 1937 by Bronson Lake, usable capacity, 3,700 acre-ft (4.56 hm^3).

AVERAGE DISCHARGE.--39 years (water years 1929-36, 1942, 1943, 1946, 1947, 1954-80), 89.2 ft^3/s (2.526 m^3/s), 64,630 acre-ft/yr (79.7 hm^3/yr); median of yearly mean discharges, 57 ft^3/s (1.61 m^3/s), 41,300 acre-ft/yr (51 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, 820 ft^3/s (23.2 m^3/s) Apr. 8, gage height, 6.90 ft (2.103 m); minimum, 0.37 ft^3/s (0.010 m^3/s) July 26-28, Aug. 1, 2, gage height, 3.24 ft (0.988 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.6	1.2	1.5	2.4	1.9	1.7	30	40	1.5	1.1	.41	.96
2	4.4	1.0	2.2	2.4	1.9	1.7	40	2.4	1.5	1.1	.41	.92
3	4.4	.90	2.4	2.3	1.9	1.7	50	1.9	1.4	.83	.56	1.1
4	4.8	.80	1.9	2.3	1.9	1.7	100	1.5	1.7	.85	1.3	1.0
5	4.8	.80	1.9	2.3	1.9	1.7	200	1.7	2.2	.98	11	.88
6	4.8	.80	1.9	2.3	1.9	1.7	450	1.7	1.7	1.1	2.5	.88
7	5.2	.90	1.9	2.3	1.9	1.7	600	1.9	1.5	.98	.92	.81
8	5.2	.90	2.4	2.3	1.9	1.7	765	2.2	1.4	1.2	.65	.88
9	5.2	.90	2.8	2.2	1.9	1.7	752	2.2	1.5	1.1	.64	.90
10	5.2	.90	2.8	2.2	1.9	1.7	668	3.2	1.4	1.4	.77	.84
11	4.8	.90	3.2	2.2	1.9	1.7	602	3.6	1.4	1.2	.70	1.1
12	4.4	.90	3.3	2.2	1.8	1.7	500	3.6	1.4	.91	1.2	1.5
13	5.2	.90	3.3	2.2	1.8	1.7	344	4.0	1.4	.89	.98	1.2
14	5.6	1.0	3.2	2.2	1.8	1.7	237	4.4	1.4	.83	.98	1.0
15	5.6	.90	3.1	2.1	1.8	1.7	157	4.8	1.2	.81	.94	1.1
16	4.8	.90	3.0	2.1	1.8	1.7	144	5.2	1.1	27	.95	.92
17	4.8	.90	2.9	2.1	1.8	1.7	153	5.2	1.1	41	1.0	1.0
18	5.2	.90	2.8	2.1	1.8	1.7	151	4.8	1.1	3.1	1.0	1.1
19	36	.90	2.7	2.1	1.8	1.7	140	4.4	1.0	1.0	.92	1.4
20	41	1.0	2.6	2.1	1.8	1.7	99	4.0	1.1	1.5	1.4	1.1
21	1.0	.90	2.6	2.1	1.8	1.7	102	3.2	1.7	2.1	1.2	1.1
22	.80	1.0	2.6	2.0	1.8	1.7	61	2.8	1.1	.98	.92	1.7
23	.70	1.1	2.5	2.0	1.8	1.7	3.2	2.4	1.0	.75	1.1	.90
24	.70	1.1	2.5	2.0	1.8	1.7	3.6	2.2	1.5	.43	.94	.58
25	.70	1.1	2.5	2.0	1.8	2.0	12	2.8	1.2	.50	.88	.56
26	.70	1.1	2.5	2.0	1.8	10	18	3.6	.92	.47	.85	.53
27	.90	1.2	2.4	2.0	1.7	9.0	20	2.2	1.5	.41	.89	.57
28	.70	1.2	2.4	2.0	1.7	6.0	20	1.7	2.7	.46	.85	.58
29	.58	1.4	2.4	2.0	1.7	5.0	18	1.7	1.9	.52	1.7	.70
30	.64	1.4	2.4	2.0	---	10	67	1.5	1.4	.54	1.1	1.0
31	1.1	---	2.4	1.9	---	20	---	1.5	---	.53	.97	---
TOTAL	173.52	29.80	79.0	66.4	53.0	102.8	6506.8	128.3	42.92	96.57	40.63	28.81
MEAN	5.60	.99	2.55	2.14	1.83	3.32	217	4.14	1.43	3.12	1.31	.96
MAX	41	1.4	3.3	2.4	1.9	20	765	40	2.7	41	11	1.7
MIN	.58	.80	1.5	1.9	1.7	1.7	3.2	1.5	.92	.41	.41	.53
AC-FT	344	59	157	132	105	204	12910	254	85	192	81	57

CAL YR 1979 TOTAL 53726.42 MEAN 147 MAX 3120 MIN .58 AC-FT 106600
WTR YR 1980 TOTAL 7348.55 MEAN 20.1 MAX 765 MIN .41 AC-FT 14580

NOTE.--No gage-height record Jan. 27 to Mar. 3.

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 partially regulated by reservoirs on tributaries.

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

AVERAGE DISCHARGE.--68 years (water years 1913-80), 3,310 ft^3/s (93.74 m^3/s), 2,398,000 acre-ft/yr (2.96 km^3/yr); median of yearly mean discharges, 2,640 ft^3/s (74.8 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, gage height, 44.00 ft (13.411 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 22,000 ft^3/s (623 m^3/s) Apr. 9, gage height, 74.56 ft (22.726 m); minimum daily, 409 ft^3/s (11.6 m^3/s) Aug. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1830	1800	1370	1380	1330	1340	2950	3230	1640	1370	563	573
2	1820	1840	1420	1370	1330	1350	4760	3200	1630	1320	561	580
3	1800	1890	1510	1370	1330	1350	6510	3200	1620	1270	553	781
4	1760	1960	1490	1370	1330	1350	8490	3150	1600	1240	540	1930
5	1740	2040	1430	1370	1330	1360	10800	3060	1570	1200	500	2340
6	1710	2110	1400	1370	1330	1360	12900	2880	1540	1170	460	2210
7	1700	2170	1370	1370	1330	1360	15400	2780	1510	1160	440	1810
8	1700	2220	1370	1360	1330	1370	17800	2760	1490	1130	430	1370
9	1700	2270	1430	1360	1330	1370	20700	2740	1500	1120	425	1090
10	1710	2140	1540	1360	1330	1370	21700	2690	1520	1090	422	902
11	1730	2020	1690	1360	1330	1370	21300	2570	1540	1070	422	749
12	1740	2170	1830	1360	1330	1380	20000	2510	1580	1010	419	619
13	1740	1980	1890	1350	1330	1380	18400	2450	1590	950	417	538
14	1740	1800	1910	1350	1330	1380	16400	2400	1600	900	415	456
15	1710	1750	1890	1350	1330	1390	14000	2330	1630	845	412	453
16	1700	1770	1830	1350	1330	1390	12200	2300	1740	800	411	463
17	1690	1840	1720	1350	1330	1400	9700	2270	1810	750	409	470
18	1710	1920	1620	1350	1330	1410	8290	2270	1830	700	414	469
19	1720	2010	1540	1350	1330	1410	7270	2260	1830	670	430	465
20	1730	2140	1480	1340	1330	1410	6590	2230	1790	630	461	482
21	1730	2280	1460	1340	1330	1420	6120	2190	1720	610	492	521
22	1730	2330	1450	1340	1330	1430	5800	2130	1670	600	502	595
23	1740	2280	1440	1340	1330	1450	5570	2090	1670	585	514	641
24	1770	2140	1430	1340	1330	1480	5410	2030	1680	570	528	657
25	1790	1930	1420	1340	1330	1520	5180	1970	1700	563	542	661
26	1810	1740	1410	1340	1330	1590	4810	1910	1690	560	552	653
27	1810	1620	1400	1340	1330	1630	4320	1850	1630	560	553	649
28	1810	1540	1400	1330	1340	1700	3860	1790	1600	560	553	649
29	1800	1490	1390	1330	1340	1810	3540	1750	1530	561	557	661
30	1800	1460	1390	1330	---	2030	3330	1710	1450	562	560	674
31	1790	---	1380	1330	---	2300	---	1660	---	563	564	---
TOTAL	54260	58650	47300	41890	38590	45860	304100	74360	48900	26689	15021	25111
MEAN	1750	1955	1526	1351	1331	1479	10140	2399	1630	861	485	837
MAX	1830	2330	1910	1380	1340	2300	21700	3230	1830	1370	564	2340
MIN	1690	1460	1370	1330	1330	1340	2950	1660	1450	560	409	453
AC-FT	107600	116300	93820	83090	76540	90960	603200	147500	96990	52940	29790	49810

CAL YR 1979 TOTAL 3139522 MEAN 8601 MAX 92400 MIN 532 AC-FT 6227000
WTR YR 1980 TOTAL 780731 MEAN 2133 MAX 21700 MIN 409 AC-FT 1549000

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 1977 to current year.

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

REMARKS.--Specific conductance and temperature monitor operated by Canada. Letter K indicates non-ideal colony count. Letter ND indicates none detected.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily mean, 1,200 micromhos Sept. 24, 1978, and Aug. 30, 1980; minimum daily mean, 330 micromhos Apr. 10, 16, 17, 1978.
WATER TEMPERATURES: Maximum daily mean, 25.0°C on several days in 1978, 1979 and 1980; minimum daily mean, 0.0°C on many days during winter months.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily mean, 1,200 micromhos Aug. 30; minimum daily mean, 450 micromhos Apr. 11.
WATER TEMPERATURES: Maximum daily mean, 25.0°C July 9, 11, 28; minimum daily mean, 0.5°C on many days during winter months.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	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)	HARD-NESS NONCAR-BONATE (MG/L CACO3) (00902)
OCT 24...	1115	1770	495	8.4	6.5	25	11.8	98	K14	K7	210	33
NOV 28...	0900	1540	740	8.2	.5	5.8	14.7	104	K3	K9	280	63
DEC 20...	1115	1490	720	7.8	1.0	6.3	12.8	90	56	28	260	34
JAN 30...	1055	1330	599	7.8	1.0	3.3	11.6	80	130	360	260	37
FEB 27...	1000	1330	607	7.7	.0	3.4	10.0	69	70	120	270	35
MAR 25...	1200	1550	611	7.8	.5	6.3	10.8	77	250	780	250	34
APR 30...	1025	3330	612	8.5	17.5	31	8.1	89	K5	K16	260	65
MAY 12...	1200	2510	618	8.4	13.0	55	9.2	89	K7	35	250	44
JUN 06...	1430	1540	575	8.4	22.0	54	7.7	92	29	24	230	53
JUL 10...	0900	1090	595	8.2	26.0	110	6.5	82	30	48	250	67
AUG 07...	0900	440	593	8.5	20.5	58	7.4	85	31	68	220	40
SEP 11...	1105	750	611	8.2	18.5	90	8.0	88	63	130	180	61

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 (MG/L AS CACO3) (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	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)
OCT 24...	49	22	25	.7	5.4	180	44	29	.2	8.9	312	293
NOV 28...	64	30	44	1.1	6.4	220	87	43	.2	12	430	419
DEC 20...	61	27	36	1.0	5.6	230	73	43	.2	13	410	398
JAN 30...	60	26	26	.7	4.3	220	53	27	.2	13	377	343
FEB 27...	60	28	33	.9	4.1	230	47	41	.2	14	363	367
MAR 25...	59	26	29	.8	4.0	220	47	34	.2	14	347	347
APR 30...	61	25	28	.8	7.1	190	93	25	.2	8.8	382	363
MAY 12...	59	26	25	.7	5.8	210	77	26	.2	7.1	381	352
JUN 06...	52	25	33	.9	5.9	180	74	32	.1	7.1	349	338
JUL 10...	56	26	35	1.0	6.0	180	100	31	.1	14	383	378
AUG 07...	50	23	33	1.0	5.5	180	62	42	.3	8.4	357	333
SEP 11...	41	19	50	1.6	5.9	120	58	81	.2	9.8	419	339

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	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)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT											
24...	1490	.21	.19	.000	.030	1.6	1.1	.110	.010	0	17
NOV											
28...	1790	.08	.11	.010	.010	1.4	1.0	.200	.150	--	16
DEC											
20...	1650	.26	.26	.330	.340	1.2	1.5	.210	.190	--	--
JAN											
30...	1350	.28	.28	.180	.170	.47	.54	.040	.030	0	15
FEB											
27...	1300	.34	.32	.160	.150	1.1	1.1	.070	.060	0	19
MAR											
25...	1450	.34	.36	.150	.150	1.1	1.0	.200	.080	--	13
APR											
30...	3440	.07	.04	.150	.110	1.5	1.1	.160	.030	0	11
MAY											
12...	2580	.04	.03	.120	.040	--	.69	.140	.050	0	14
JUN											
06...	1450	.12	.13	.040	.030	1.3	.67	.170	.060	0	--
JUL											
10...	1130	.35	.33	.010	.010	1.3	1.0	.130	.100	0	--
AUG											
07...	424	.02	.04	.090	.030	.86	.92	.150	.100	2	12
SEP											
11...	848	.39	.43	.000	.000	1.3	1.4	.190	.080	--	17

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)
OCT										
24...	1115	2	2	200	60	0	<1	0	0	1
JAN										
30...	1055	2	1	--	100	0	<1	0	0	2
APR										
30...	1025	4	3	300	80	1	<1	0	0	2
JUN										
06...	1430	4	4	100	70	0	<1	0	0	1
JUL										
10...	0900	6	4	200	100	0	<1	10	0	1

DATE	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	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)
OCT										
24...	<3	3	0	810	<10	4	0	100	3	.1
JAN										
30...	<3	7	2	250	10	10	0	30	30	.1
APR										
30...	<3	12	7	2100	30	8	1	100	5	.9
JUN										
06...	<3	19	4	2100	<10	8	0	180	5	.1
JUL										
10...	<3	14	9	6200	20	0	0	270	50	.2

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	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, 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 (MG/L AS C) (00689)
OCT 24...	.1	5	3	0	0	0	40	6	16	.8
JAN 30...	.0	6	0	0	0	0	10	10	14	.4
APR 30...	.2	13	2	1	1	0	50	6	10	.8
JUN 06...	.0	7	4	1	1	0	10	3	14	.8
JUL 10...	.0	6	5	1	1	0	50	6	9.6	.7

DATE	TIME	PCB, TOTAL (UG/L) (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)	HEPTA-CHLOR, TOTAL (UG/L) (39410)
OCT 24...	1115	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAN 30...	1055	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
APR 30...	1025	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	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)	2,4-D, TOTAL (UG/L) (39730)	2,4,5-T TOTAL (UG/L) (39740)	SILVEX, TOTAL (UG/L) (39760)
OCT 24...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAN 30...	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--
APR 30...	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--

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 24...	1115	27	5.04	4.72	4.57	.000
JAN 30...	1055	41	.000	.000	.050	.000
MAY 12...	1200	13	1.97	1.81	.450	.070
JUN 06...	1430	26	9.53	8.50	8.51	.000
JUL 10...	0900	35	.472	.394	.690	.050

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

PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980

DATE	MAR 25,80		MAY 12,80		JUN 6,80		JUL 10,80		AUG 7,80		SEP 11,80	
TIME	1200		1200		1430		0900		0900		1105	
TOTAL CELLS/ML	0		15000		15000		4000		5200		10000	
DIVERSITY: DIVISION	0.0		1.1		1.7		1.7		1.5		1.3	
.CLASS	0.0		1.1		1.8		1.7		1.6		1.3	
..ORDER	0.0		1.4		2.1		2.0		1.9		1.9	
...FAMILY	0.0		2.9		2.9		2.8		2.0		2.2	
....GENUS	0.0		3.8		3.5		3.6		2.9		2.9	
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
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...COELASTRACEAE												
....COELASTRUM	--	-	1400	9	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE												
....PEDIASTRUM	--	-	610	4	2000	13	540	14	--	-	--	-
...MICRACTINIACEAE												
....GOLENKINIA	--	-	--	-	78	1	--	-	--	-	--	-
....MICRACTINIUM	--	-	1100	7	--	-	160	4	--	-	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	730	5	780	5	39	1	120	2	100	1
....CHODATELLA	--	-	*	0	--	-	--	-	--	-	--	-
....CLOSTERIDIUM	--	-	--	-	--	-	--	-	*	0	--	-
....DICTYOSPHAERIUM	--	-	1200	8	390	3	--	-	340	6	--	-
....GLOEOACTINIUM	--	-	1500	10	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	1100	7	--	-	99	2	--	-
....OOCYSTIS	--	-	--	-	--	-	78	2	610	12	--	-
....SELENASTRUM	--	-	420	3	--	-	65	2	--	-	1500#	15
....TETRAEDRON	--	-	--	-	160	1	*	0	*	0	--	-
....TREUBARIA	--	-	*	0	--	-	--	-	--	-	--	-
...SCENEDESMACEAE												
....ACTINASTRUM	--	-	1600	11	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	52	1	--	-	130	1
....SCENEDESMUS	--	-	2100	14	780	5	160	4	79	2	670	7
....TETRASTRUM	--	-	150	1	310	2	570	14	--	-	540	5
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	--	-	77	1	390	3	78	2	79	2	--	-
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	--	-	340	2	2600#	17	620#	16	300	6	270	3
....MELOSIRA	--	-	--	-	240	2	590	15	2200#	42	340	3
....STEPHANODISCUS	--	-	--	-	--	-	*	0	39	1	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	--	-	160	1	--	-	--	-	--	-
...FRAGILARIACEAE												
....SYNEDRA	--	-	270	2	--	-	--	-	--	-	--	-
...NAVICULACEAE												
....GYROSIGMA	--	-	--	-	78	1	*	0	--	-	--	-
....NAVICULA	--	-	--	-	--	-	26	1	*	0	*	0
...NITZSCHIACEAE												
....NITZSCHIA	--	-	150	1	1000	7	230	6	360	7	200	2
...SURIRELLACEAE												
....SURIRELLA	--	-	--	-	78	1	26	1	--	-	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...CHROMULINACEAE												
...CHRYSOCOCCUS	--	-	--	-	78	1	--	-	--	-	--	-
...OCHROMONADACEAE												
....OCHROMONAS	--	-	--	-	--	-	--	-	59	1	--	-
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	*	0	160	1	*	0	--	-	*	0
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	*	0	160	1	39	1	39	1	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....AGMENELLUM	--	-	610	4	3800#	25	--	-	630	12	1100	10
....ANACYSTIS	--	-	1400	10	630	4	130	3	200	4	3000#	29

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 1979 TO SEPTEMBER 1980--Continued

DATE TIME	MAR 25,80 1200		MAY 12,80 1200		JUN 6,80 1430		JUL 10,80 0900		AUG 7,80 0900		SEP 11,80 1105	
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
....COCCOCHLORIS	--	-	--	-	78	1	470	12	--	-	--	-
..HORMOGONALES												
...OSCILLATORIACEAE												
....OSCILLATORIA	--	-	1000	7	--	-	--	-	--	-	2400#	23
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	*	0	--	-	26	1	--	-	--	-
....PHACUS	--	-	--	-	78	1	--	-	*	0	--	-
....TRACHELOMONAS	--	-	--	-	--	-	52	1	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..PERIDINIALES												
...GLENODINIACEAE												
....GLENODINIUM	--	-	*	0	--	-	--	-	--	-	--	-

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

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	TEMPER-ATURE, WATER (DEG C) (00010)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062MM (70331)
OCT						
24...	1115	1770	6.5	54	258	99
NOV						
28...	0900	1540	.5	17	71	94
DEC						
20...	1115	1490	1.0	9	36	97
JAN						
30...	1055	1330	1.0	9	32	74
FEB						
27...	1000	1330	.0	16	57	81
MAR						
25...	1200	1550	.5	10	42	75
APR						
30...	1025	3330	17.5	118	1060	98
MAY						
12...	1200	2510	13.0	115	779	98
JUN						
06...	1430	1540	22.0	108	449	97
JUL						
10...	0900	1090	26.0	230	677	99
AUG						
07...	0900	440	20.5	100	119	100
SEP						
11...	1105	750	18.5	160	324	100

05102500 RED RIVER AT EMERSON, MANITOBA--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	570	485	820	720	685	715	750	490	640	660	660	1030
2	620	490	830	720	680	715	770	580	640	650	640	980
3	640	490	840	730	680	715	730	600	---	660	650	1020
4	660	500	920	720	680	715	650	590	700	730	630	1080
5	680	540	930	725	680	710	640	590	680	630	660	1120
6	685	560	930	710	700	715	---	570	640	620	670	700
7	695	640	910	690	750	730	550	570	630	650	670	540
8	700	670	900	700	750	730	530	720	620	670	670	520
9	705	660	900	700	760	735	500	720	610	650	670	560
10	520	670	900	700	760	735	500	690	650	660	680	600
11	500	690	870	720	760	740	450	690	650	660	650	640
12	470	710	850	700	760	740	480	690	670	590	660	660
13	465	700	830	670	755	740	510	690	670	610	650	700
14	465	750	800	670	755	740	520	690	650	620	640	700
15	465	760	780	670	770	740	580	700	630	630	750	680
16	460	780	---	660	740	735	640	700	630	620	730	720
17	460	800	---	650	730	735	660	---	650	620	640	730
18	460	820	750	650	740	725	680	---	640	630	630	750
19	470	820	760	670	740	725	700	---	630	610	610	720
20	460	820	760	690	735	720	680	---	650	610	620	800
21	470	---	750	670	725	725	690	690	650	610	620	880
22	470	---	760	660	710	730	730	680	650	620	930	900
23	475	750	780	640	700	745	730	650	660	650	950	800
24	490	720	780	630	690	735	710	700	650	610	940	810
25	480	690	760	640	685	735	720	650	650	680	910	840
26	490	710	770	640	710	730	700	660	640	750	880	910
27	490	710	770	---	725	740	700	660	650	740	860	880
28	490	760	760	655	720	730	650	650	630	730	880	920
29	495	780	750	680	715	730	620	640	650	680	1020	950
30	500	800	750	700	---	730	620	640	660	660	1200	1000
31	500	---	730	705	---	735	---	640	---	680	1080	---
MEAN	532	688	815	683	724	730	634	650	647	651	756	805

WTR YR 1980 MEAN 693 MAX 1200 MIN 450

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12.5	3.5	.5	1.0	1.0	1.0	1.0	13.5	21.0	19.5	22.0	17.0
2	12.0	2.5	.5	1.0	1.0	1.0	1.0	13.0	21.0	20.0	21.5	17.5
3	11.5	2.5	.5	1.0	1.0	1.0	1.0	13.0	21.0	21.5	21.5	17.0
4	10.5	2.5	.5	1.0	1.0	1.0	1.5	14.0	20.0	23.0	21.0	17.0
5	10.0	2.5	.5	1.0	1.0	1.0	2.0	13.5	20.0	23.0	19.5	17.0
6	9.0	2.0	.5	1.0	1.0	1.0	---	13.0	21.0	23.0	19.0	17.0
7	9.0	3.0	.5	1.0	1.0	1.0	1.0	13.0	19.0	23.0	19.5	16.0
8	9.0	3.0	.5	1.0	1.0	1.0	1.0	14.0	19.0	23.0	20.0	19.0
9	8.5	2.0	.5	1.5	1.0	1.0	1.5	13.5	20.0	25.0	20.0	21.0
10	8.5	1.0	.5	1.5	1.0	1.0	2.5	13.0	20.0	25.0	19.5	17.0
11	8.0	1.0	.5	1.0	1.0	1.0	3.0	13.0	22.0	25.0	19.5	17.0
12	7.0	1.0	.5	1.0	1.0	1.0	3.5	12.5	22.0	22.5	19.5	17.5
13	5.5	1.5	.5	1.0	1.0	1.0	4.0	12.5	21.5	23.0	20.0	17.0
14	6.0	1.5	.5	1.0	1.0	1.0	5.0	13.0	21.5	23.0	20.5	17.0
15	7.0	1.5	.5	1.0	1.0	1.0	5.5	13.5	21.5	23.0	21.0	16.5
16	7.0	1.5	---	1.0	1.0	1.0	6.0	13.5	21.5	23.0	19.5	15.5
17	7.0	1.5	---	1.0	1.0	1.0	6.5	---	21.0	23.0	17.5	14.0
18	7.0	1.5	1.0	1.0	1.0	1.0	8.0	---	21.0	24.0	17.0	13.0
19	7.0	1.5	1.0	1.0	1.0	1.0	9.0	---	21.0	23.0	19.0	12.0
20	7.5	1.0	1.0	1.0	1.0	1.0	12.0	---	21.0	23.0	20.5	11.5
21	7.0	---	1.0	1.0	1.0	1.0	13.0	19.0	21.0	23.0	20.5	11.5
22	6.5	---	1.0	1.0	1.0	1.0	11.0	20.0	22.0	23.5	19.5	12.0
23	5.5	1.0	1.0	1.0	1.0	1.0	11.0	20.0	23.0	22.5	19.5	11.0
24	5.5	.5	1.0	1.0	1.0	1.0	11.0	22.0	23.0	21.0	19.0	10.5
25	5.0	.5	1.0	1.0	1.0	1.0	12.5	22.0	23.0	23.0	21.0	10.0
26	5.0	.5	1.0	1.0	1.0	1.0	13.0	22.0	22.0	24.5	19.0	10.5
27	5.5	.5	1.0	---	1.0	1.0	14.0	23.0	21.0	24.0	18.5	10.5
28	6.0	1.0	1.0	1.0	1.0	1.0	15.5	23.0	20.0	25.0	18.0	11.0
29	6.0	.5	1.0	1.0	1.0	1.0	16.0	22.5	20.0	24.0	18.0	13.0
30	6.0	.5	1.0	1.0	---	1.0	17.0	23.0	20.0	21.5	17.5	---
31	5.0	---	1.0	1.0	---	1.0	---	22.0	---	22.0	17.5	---
MEAN	7.5	1.5	.5	1.0	1.0	1.0	7.0	16.5	21.0	23.0	19.5	14.5

WTR YR 1980 MEAN 9.5 MAX 25.0 MIN .5

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 poor. 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.--34 years, 148 ft^3/s (4.191 m^3/s), 107,200 acre-ft/yr (132 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, 2,950 ft^3/s (83.5 m^3/s) Apr. 7, gage height, 16.03 ft (4.886 m); no flow Sept. 9-11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.2	9.8	12	6.7	3.6	4.9	6.9	85	9.8	.33	.02	.02
2	1.3	12	11	6.2	3.3	5.3	7.7	79	8.5	.32	.01	.02
3	1.4	12	11	5.0	3.3	5.5	8.5	74	8.2	.28	.01	.02
4	1.5	14	11	5.4	3.3	5.1	13	69	9.8	.23	.03	.02
5	1.5	15	12	5.6	3.3	4.9	219	64	11	.18	.04	.01
6	1.6	14	11	6.0	3.4	4.9	1450	58	9.8	.12	.04	.01
7	1.8	14	11	6.5	3.6	4.8	2760	53	9.8	.10	.04	.01
8	1.8	15	10	6.2	3.8	4.9	2200	50	11	.07	.04	.01
9	1.7	14	10	6.0	4.2	5.1	898	48	9.8	.05	.04	.00
10	1.7	14	11	5.9	4.2	4.6	596	44	8.2	.05	.04	.00
11	1.8	13	10	5.9	4.2	4.4	487	44	3.9	.05	.05	.00
12	1.8	13	9.8	5.9	4.3	4.8	376	44	3.4	.05	.06	.03
13	1.9	13	9.1	5.9	4.3	4.9	317	44	3.2	.06	.06	.08
14	2.0	13	8.5	5.7	4.3	4.9	310	42	3.0	.06	.07	.09
15	2.0	13	7.1	5.7	4.3	5.1	306	42	2.7	.06	.07	.08
16	2.1	14	7.3	5.7	4.4	5.1	296	40	2.3	.06	.07	.08
17	2.0	14	6.3	5.9	4.4	5.1	296	42	1.8	.06	.07	.08
18	2.1	14	6.3	5.9	4.8	5.3	282	42	1.7	.06	.06	.11
19	2.2	14	6.3	5.8	4.8	5.5	271	38	1.1	.06	.06	.17
20	2.2	15	6.5	5.7	4.8	5.5	245	32	1.1	.06	.06	.22
21	2.2	14	6.7	5.7	4.8	5.3	222	35	.94	.06	.04	.23
22	2.3	14	7.0	5.5	4.8	5.5	204	32	.66	.06	.04	.25
23	2.3	13	7.4	5.3	4.9	5.7	181	27	.62	.06	.04	.23
24	2.3	13	7.7	5.3	4.9	5.7	159	23	.55	.06	.03	.20
25	2.4	13	7.9	4.9	4.9	5.9	149	20	.40	.06	.02	.16
26	3.7	13	7.9	4.8	4.9	5.9	132	17	.35	.06	.02	.14
27	4.4	13	7.9	4.8	4.9	5.9	121	15	.31	.05	.02	.13
28	4.9	12	7.6	4.4	5.5	5.9	110	13	.32	.04	.02	.11
29	5.5	12	7.0	4.3	5.3	6.1	101	11	.36	.04	.02	.11
30	6.1	12	7.0	4.0	---	6.3	93	9.5	.34	.03	.02	.13
31	7.7	---	6.9	3.7	---	6.5	---	9.2	---	.03	.02	---
TOTAL	79.4	398.8	268.2	170.3	125.5	165.3	12817.1	1245.7	124.95	2.86	1.23	2.75
MEAN	2.56	13.3	8.65	5.49	4.33	5.33	427	40.2	4.17	.092	.040	.092
MAX	7.7	15	12	6.7	5.5	6.5	2760	85	11	.33	.07	.25
MIN	1.2	9.8	6.3	3.7	3.3	4.4	6.9	9.2	.31	.03	.01	.00
AC-FT	157	791	532	338	249	328	25420	2470	248	5.7	2.4	5.5

CAL YR 1979 TOTAL 74590.70 MEAN 204 MAX 5300 MIN 1.1 AC-FT 148000
WTR YR 1980 TOTAL 15402.09 MEAN 42.1 MAX 2760 MIN .00 AC-FT 30550

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.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)
OCT												
22...	1515	1.8	800	9.3	4.0	5.5	30	--	7.5	61	K32	K24
DEC												
03...	1430	11	550	8.1	1.0	.0	30	4.0	9.2	65	1000	81
JAN												
14...	1515	1.8	741	8.7	--	.0	--	--	2.0	14	92	<1
FEB												
25...	1410	5.8	595	8.1	-18.0	.0	20	.80	3.6	26	1200	240
APR												
08...	1635	2100	205	7.8	4.0	.5	50	--	10.4	74	>320	69
JUN												
09...	1615	7.6	620	8.3	21.0	19.0	25	--	9.6	107	100	50
JUL												
07...	1415	.84	510	8.3	27.0	24.0	22	--	7.1	86	320	--
AUG												
11...	1335	.60	600	8.4	22.0	23.0	12	24	8.1	98	240	240
SEP												
08...	1430	.52	400	8.1	20.0	22.0	20	--	5.1	60	190	122

DATE	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)
OCT												
22...	K40	310	3	66	36	37	4.4	310	45	27	.2	8.6
DEC												
03...	710	260	0	63	25	12	2.4	270	13	5.2	.2	10
JAN												
14...	470	340	--	82	32	15	3.5	--	24	6.6	.3	17
FEB												
25...	K180	320	0	74	32	18	2.5	320	18	5.1	.2	19
APR												
08...	K2000	85	11	22	7.4	1.8	5.1	74	14	3.5	.1	4.8
JUN												
09...	140	220	0	50	23	42	3.5	240	31	44	.3	2.2
JUL												
07...	380	230	4	49	27	14	2.9	230	29	5.5	.2	7.5
AUG												
11...	120	280	35	53	37	21	4.0	250	57	8.7	.2	8.7
SEP												
08...	100	180	5	41	20	14	4.0	180	25	10	.2	7.8

DATE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, SUS-PENDED (MG/L)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N)	NITRO-GEN, DIS-SOLVED (MG/L AS N)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	BORON, DIS-SOLVED (UG/L AS B)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)
OCT											
22...	411	44	.03	1.5	1.5	.050	100	40	40	--	--
DEC											
03...	293	2	.00	.65	.65	.010	60	70	20	14	.5
JAN											
14...	--	24	--	--	--	--	--	80	90	--	--
FEB											
25...	362	15	.11	.96	1.1	.040	8	30	90	11	.4
APR											
08...	110	16	1.6	1.5	3.1	.270	70	100	40	49	.8
JUN											
09...	348	14	1.8	1.2	3.0	.240	130	20	40	22	--
JUL											
07...	274	18	.02	1.1	1.1	.000	90	10	80	13	--
AUG											
11...	344	14	.80	.37	1.2	.060	140	0	50	13	.6
SEP											
08...	231	15	.02	.53	.55	.060	100	330	20	8.4	--

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.--169 mi^2 (438 km^2). 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 current year (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 fair 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.--41 years (water years 1929, 1941-80), 57.8 ft^3/s (1.637 m^3/s), 41,880 acre-ft/yr (51.6 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 YEAR.--Maximum discharge, about 185 ft^3/s (5.24 m^3/s) Apr. 7, gage height, 7.68 ft (2.341 m) (backwater from ice); no flow July 12-17, and July 26 to Aug. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.91	3.4	1.7	1.0	.80	1.5	2.1	5.8	.20	.05	.00	.70
2	.98	3.1	1.5	.96	.80	1.5	3.0	5.4	.22	.05	.00	.38
3	.98	2.6	1.6	.90	.82	1.5	9.0	4.3	.18	.05	.00	.38
4	1.1	2.2	1.6	.86	.84	1.6	13	4.0	.18	.05	.00	2.4
5	1.1	2.1	1.7	.82	.85	1.6	25	4.4	.20	.05	.00	5.0
6	1.2	2.1	1.8	.77	.86	1.6	90	4.0	.20	.05	.00	1.8
7	1.3	2.1	1.8	.73	.86	1.6	170	3.6	.18	.04	.00	1.9
8	1.4	1.9	1.7	.68	.86	1.6	130	2.9	.16	.04	.00	1.5
9	1.3	1.9	1.6	.66	.86	1.7	92	2.8	.14	.02	.00	1.5
10	1.3	1.7	1.6	.65	.86	1.7	64	2.8	.14	.01	.02	1.2
11	1.4	1.6	1.5	.64	.87	1.7	50	2.8	.12	.01	1.0	.66
12	1.5	1.6	1.5	.63	.87	1.7	43	2.8	.12	.00	.94	2.8
13	1.4	1.8	1.5	.63	.88	1.7	35	2.5	.11	.00	1.1	4.4
14	1.6	2.0	1.4	.63	.90	1.7	29	1.9	.12	.00	4.0	2.8
15	3.9	2.2	1.4	.63	.92	1.7	22	1.7	.12	.00	9.2	1.6
16	1.6	2.0	1.4	.63	.94	1.7	21	1.6	.12	.00	12	1.3
17	1.4	2.1	1.4	.63	.97	1.7	17	1.3	.12	.00	7.4	1.5
18	1.3	2.1	1.3	.64	1.0	1.7	15	1.6	.10	.12	7.2	1.8
19	1.5	2.0	1.3	.64	1.0	1.7	16	2.0	.09	.14	5.7	2.9
20	1.7	2.0	1.3	.65	1.1	1.8	15	1.8	.08	.07	6.2	5.0
21	2.4	1.9	1.3	.66	1.1	1.8	14	1.8	.08	.06	5.2	4.9
22	2.5	1.8	1.3	.66	1.2	1.8	12	1.5	.08	.06	4.9	10
23	2.1	1.7	1.3	.67	1.3	1.8	12	1.2	.08	.04	4.3	7.2
24	1.8	1.6	1.3	.68	1.3	1.8	13	1.2	.06	.02	3.8	6.6
25	1.6	1.6	1.2	.69	1.4	1.8	13	1.0	.05	.01	2.5	6.0
26	1.5	1.7	1.2	.70	1.4	1.8	11	.94	.03	.00	1.9	5.8
27	1.6	1.7	1.2	.70	1.4	1.9	10	.30	.02	.00	1.5	5.4
28	1.6	1.7	1.2	.72	1.4	1.9	9.2	.19	.03	.00	1.8	4.7
29	1.8	1.7	1.2	.74	1.5	1.9	7.6	.17	.04	.00	2.8	3.9
30	2.0	1.7	1.1	.76	---	2.0	7.0	.16	.05	.00	1.9	3.5
31	2.5	---	1.1	.78	---	2.0	---	.15	---	.00	1.2	---
TOTAL	50.27	59.6	44.0	22.14	29.86	53.5	969.9	68.61	3.42	.94	86.56	99.52
MEAN	1.62	1.99	1.42	.71	1.03	1.73	32.3	2.21	.11	.030	2.79	3.32
MAX	3.9	3.4	1.8	1.0	1.5	2.0	170	5.8	.22	.14	12	10
MIN	.91	1.6	1.1	.63	.80	1.5	2.1	.15	.02	.00	.00	.38
AC-FT	100	118	87	44	59	106	1920	136	6.8	1.9	172	197

CAL YR 1979	TOTAL	20949.95	MEAN 57.4	MAX 937	MIN .69	AC-FT	41550	
WTR YR 1980	TOTAL	1488.32	MEAN 4.07	MAX 170	MIN .00	AC-FT	2950	

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.--Nonrecording gage. 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. Aug. 27, 1970, to Oct. 17, 1979, water-stage recorder 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, 1,031.35 ft (314.355 m) Apr. 8, from high water mark; minimum observed, 1,021.57 ft (311.375 m) July 8, 15.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21.80						---			---	21.63	22.45
2	21.78						---			---	21.61	---
3	21.77						22.86			---	21.59	22.44
4	21.76						---			---	21.65	---
5	21.76						---			---	21.67	22.62
6	21.75						---			---	21.77	---
7	21.74						---			---	21.79	22.62
8	21.73						---			21.57	21.81	22.65
9	21.76						31.13			21.59	21.83	22.47
10	21.81						---			21.59	21.83	---
11	21.84						---			21.61	21.83	---
12	21.90						---			21.61	21.87	---
13	21.93						---			21.59	21.91	---
14	21.94						---			21.59	22.01	---
15	21.95						---			21.57	22.13	---
16	21.99						---			21.59	22.17	---
17	22.00						---			21.61	22.23	---
18	---						---			21.73	22.01	---
19	---						---			21.81	22.19	---
20	---						---			21.85	---	---
21	---						---			21.83	22.25	---
22	---						---			21.85	---	---
23	---						---			21.83	22.27	---
24	---						---			21.79	22.32	---
25	---						---			21.77	---	---
26	---						---			21.73	22.36	---
27	---						---			21.71	---	---
28	---						---			21.69	22.38	---
29	---						---			21.69	---	---
30	---						---			21.67	22.39	22.95
31	---						---			21.63	---	---
MEAN	---						---			---	---	---
MAX	---						---			---	---	---
MIN	---						---			---	---	---

NOTE.--Add 1000 ft to obtain elevations in adjustment of 1928.

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 poor. High flow affected by natural storage in Roseau Lake.

AVERAGE DISCHARGE.--52 years, 266 ft^3/s (7.533 m^3/s), 192,700 acre-ft/yr (238 hm^3/yr); median of yearly mean discharges, 239 ft^3/s (6.768 m^3/s), 173,200 acre-ft/yr (214 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, 1,220 ft^3/s (34.6 m^3/s) Apr. 11, gage height, 10.15 ft (3.094 m); no flow Aug. 3; minimum gage height, 0.74 ft (0.226 m) July 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	26	17	8.6	5.8	6.4	13	214	19	.52	.15	.58
2	1.4	31	16	8.5	5.7	6.4	17	171	18	.59	.08	.19
3	1.4	27	16	8.4	5.7	6.4	25	147	16	.62	.00	.05
4	1.4	27	15	8.3	5.6	6.5	40	131	14	.44	.42	.13
5	1.3	28	15	8.2	5.6	6.5	60	116	12	.35	.34	1.0
6	1.4	30	14	8.1	5.6	6.6	150	106	13	.24	.29	2.1
7	1.0	30	14	8.0	5.6	6.6	500	97	13	.33	.20	1.9
8	1.2	27	13	8.0	5.6	6.6	800	88	10	.36	.16	1.5
9	1.3	26	13	8.0	5.6	6.7	1000	82	7.7	.76	.06	1.1
10	1.6	25	12	7.9	5.6	6.7	1120	77	6.2	.46	.05	.59
11	1.9	24	12	7.9	5.6	6.7	1200	74	4.7	.50	.01	.17
12	2.2	23	11	7.8	5.6	6.8	1190	73	3.8	.40	.04	.75
13	2.7	23	10	7.8	5.6	6.8	1170	71	4.9	.30	.30	4.3
14	3.1	23	9.8	7.8	5.6	6.8	1120	70	6.4	.12	.58	12
15	3.3	23	9.5	7.7	5.7	6.9	1050	66	7.3	.08	2.6	9.9
16	4.0	25	9.2	7.6	5.7	7.0	992	63	6.7	.08	7.9	5.8
17	5.9	26	9.0	7.5	5.8	7.0	934	60	8.1	.11	13	3.5
18	6.2	27	9.0	7.5	5.8	7.1	882	58	6.5	.87	12	2.3
19	4.0	27	9.0	7.4	5.9	7.2	832	56	5.2	2.0	8.0	1.6
20	3.1	26	9.0	7.3	6.0	7.3	766	54	4.4	5.4	5.0	3.2
21	2.6	25	9.0	7.2	6.0	7.4	698	54	3.9	7.1	5.5	10
22	3.1	24	9.0	7.0	6.1	7.6	630	51	3.6	6.2	5.6	15
23	3.8	23	9.0	6.8	6.1	7.8	561	47	2.8	4.6	5.5	26
24	5.2	22	9.0	6.7	6.2	8.0	496	40	2.4	3.4	4.9	15
25	7.0	21	9.0	6.6	6.2	8.1	445	33	1.5	2.3	2.7	11
26	11	20	8.9	6.4	6.2	8.3	404	31	.87	1.7	1.5	8.9
27	11	19	8.9	6.2	6.2	8.5	363	30	.80	1.2	1.3	5.5
28	7.5	19	8.8	6.2	6.3	9.0	326	27	.90	.82	1.5	5.4
29	10	18	8.8	6.1	6.3	9.5	295	24	.75	.55	1.7	9.3
30	11	17	8.8	6.0	---	10	263	21	.54	.45	1.6	12
31	14	---	8.7	5.9	---	11	---	19	---	.26	1.1	---
TOTAL	136.0	732	340.4	229.4	169.3	230.2	18342	2251	204.96	43.11	84.08	170.76
MEAN	4.39	24.4	11.0	7.40	5.84	7.43	611	72.6	6.83	1.39	2.71	5.69
MAX	14	31	17	8.6	6.3	11	1200	214	19	7.1	13	26
MIN	1.0	17	8.7	5.9	5.6	6.4	13	19	.54	.08	.00	.05
AC-FT	270	1450	675	455	336	457	36380	4460	407	86	167	339

CAL YR 1979 TOTAL 140873.16 MEAN 386 MAX 4520 MIN .42 AC-FT 279400
WTR YR 1980 TOTAL 22933.21 MEAN 62.7 MAX 1200 MIN .00 AC-FT 45490

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. 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.--23 years (water years 1921-30, 1933, 1937, 1941-43, 1973-80), 287 ft^3/s (8.128 m^3/s), 207,900 acre-ft/yr (256 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, 1,050 ft^3/s (29.7 m^3/s) Apr. 14, gage height, 6.46 ft (1.969 m); maximum gage height, 8.22 ft (2.505 m) occurred some time during period Apr. 9-13, from highwater mark (backwater from ice); minimum discharge, 0.03 ft^3/s (0.001 m^3/s) Aug. 3, 4, gage height, 1.13 ft (0.344 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.9	11	17	17	14	13	20	284	21	1.7	.09	2.1
2	3.7	9.6	17	17	14	13	22	240	19	1.8	.09	1.6
3	3.9	13	17	17	14	13	34	200	17	1.8	.05	2.3
4	3.7	15	17	17	14	13	55	160	15	1.6	.05	2.8
5	3.9	17	17	16	14	13	85	140	14	1.5	.09	2.4
6	3.7	14	17	16	14	13	140	120	12	1.3	.15	2.1
7	3.7	14	17	16	14	13	230	110	11	1.1	.25	2.0
8	3.7	15	16	16	14	13	375	100	10	.90	.40	2.7
9	3.2	20	16	16	14	13	530	91	9.0	.72	.60	3.1
10	3.0	22	16	16	14	13	700	71	6.9	.57	.90	3.7
11	3.0	29	16	15	14	13	870	64	6.5	.51	1.5	4.4
12	2.8	31	16	15	14	13	950	59	5.2	.40	2.2	7.4
13	2.4	34	15	15	14	13	1000	58	5.0	.31	2.4	7.1
14	2.2	33	15	15	14	14	1050	56	5.0	.23	1.7	5.8
15	2.0	31	15	15	14	14	1050	56	5.0	.20	1.2	5.0
16	2.0	26	15	15	14	14	1040	53	4.8	.14	.95	4.2
17	2.0	26	15	15	14	14	1040	51	4.2	.14	1.5	4.7
18	2.2	26	15	15	14	14	1020	50	4.2	.31	1.9	8.1
19	2.2	28	15	15	14	14	1010	49	4.1	.27	1.7	8.1
20	3.4	27	15	15	14	14	994	48	3.9	.45	4.6	6.7
21	5.2	31	15	15	13	14	973	47	3.5	.72	12	6.1
22	4.0	29	16	15	13	14	889	46	3.1	.81	8.8	6.1
23	3.5	25	16	15	13	14	815	42	2.5	.64	6.6	5.0
24	3.5	22	17	15	13	14	708	42	1.7	.51	5.5	8.8
25	3.2	21	17	14	13	15	613	39	1.3	.40	5.0	15
26	3.1	20	17	14	13	15	531	36	1.1	.35	3.5	12
27	3.6	19	17	14	13	15	456	33	.80	.27	3.9	10
28	4.8	18	17	14	13	15	399	30	.96	.20	4.4	11
29	6.3	18	17	14	13	16	351	28	1.5	.17	4.9	10
30	7.5	17	17	14	---	17	317	25	1.8	.13	3.9	8.4
31	8.7	---	17	14	---	18	---	23	---	.11	3.0	---
TOTAL	114.0	661.6	502	472	397	434	18267	2451	201.06	20.26	83.82	178.7
MEAN	3.68	22.1	16.2	15.2	13.7	14.0	609	79.1	6.70	.65	2.70	5.96
MAX	8.7	34	17	17	14	18	1050	284	21	1.8	12	15
MIN	2.0	9.6	15	14	13	13	20	23	.80	.11	.05	1.6
AC-FT	226	1310	996	936	787	861	36230	4860	399	40	166	354

CAL YR 1979 TOTAL 143503.50 MEAN 393 MAX 2970 MIN 2.0 AC-FT 284600
WTR YR 1980 TOTAL 23782.44 MEAN 65.0 MAX 1050 MIN .05 AC-FT 47170

NOTE.--No gage-height record Jan. 11 to Apr. 7 and May 2 to June 9.

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.

INSTRUMENTATION.--Continuous conductance recorder since November 1973.

REMARKS.--Extremes are published for those years with 80 percent or more record. Less than 80 percent of the daily specific conductance record was obtained because of instrument malfunctions. Letter K indicates non-ideal colony count. Letters ND indicate none detected.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE, WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML) (31501)
OCT										
23...	1330	3.4	460	7.0	1.5	6.0	5.0	11.0	92	K52
DEC										
04...	1200	17	660	8.2	-1.0	.0	3.0	9.0	64	80
JAN										
15...	1100	15	742	--	--	.0	.30	2.6	18	23
FEB										
26...	1215	13	755	7.6	-5.0	.0	1.5	1.2	8	190
APR										
08...	1145	375	265	7.8	3.5	.5	.50	7.9	56	>320
JUN										
10...	1045	7.7	410	8.7	19.5	19.0	3.0	8.6	96	130
JUL										
08...	0945	.90	330	8.3	21.0	22.0	2.5	6.0	71	260
AUG										
12...	1335	2.2	310	8.6	23.0	21.0	7.0	7.6	89	440
SEP										
09...	1030	3.0	330	8.0	13.0	15.0	4.0	6.2	63	290

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 CACO3) (00902)	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									
23...	K60	K68	210	0	45	24	11	.3	3.6
DEC									
04...	K1	K15	310	0	73	32	15	.4	3.6
JAN									
15...	K2	K15	400	69	92	41	13	.3	4.1
FEB									
26...	37	K3	430	0	99	44	14	.3	3.8
APR									
08...	190	K600	120	14	30	12	5.0	.2	5.2
JUN									
10...	110	120	190	0	43	20	7.6	.2	2.5
JUL									
08...	220	260	160	0	32	19	9.0	.3	2.3
AUG									
12...	330	470	150	12	36	15	8.5	.3	1.9
SEP									
09...	170	230	150	1	29	19	9.8	.3	2.1

05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	ALKALINITY (MG/L AS CACO3) (00410)	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)
OCT									
23...	220	9.4	4.4	.2	1.2	276	231	2.53	.05
DEC									
04...	340	19	6.9	.2	12	396	366	18.2	.01
JAN									
15...	330	23	5.2	.3	14	463	391	18.8	.10
FEB									
26...	440	7.7	4.2	.2	21	509	460	18.0	.03
APR									
08...	110	16	4.9	.2	7.1	183	154	185	1.6
JUN									
10...	200	16	2.8	.2	1.1	260	214	5.41	.02
JUL									
08...	160	13	2.6	.2	5.6	221	180	.54	.03
AUG									
12...	140	10	2.2	.2	15	232	173	1.38	.14
SEP									
09...	150	7.9	5.5	.2	1.4	213	165	1.73	.01

DATE	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	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)	SILVER, TOTAL RECOVERABLE (UG/L AS AG) (01077)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT									
23...	.05	.130	.110	1.8	.83	.020	.020	0	--
DEC									
04...	.01	.010	.000	.93	.82	.040	.030	0	15
JAN									
15...	.10	.270	.220	1.9	1.4	.050	.020	0	27
FEB									
26...	.02	.700	.640	1.8	1.5	.170	.050	0	--
APR									
08...	1.6	.420	.420	1.3	1.0	.330	.240	0	--
JUN									
10...	.00	.030	.010	1.3	.79	.070	.060	0	--
JUL									
08...	.03	.020	.020	.99	.99	.070	.060	0	19
AUG									
12...	.01	.360	.020	1.6	1.0	.130	.060	0	--
SEP									
09...	.01	.010	.010	.93	.79	.040	.010	0	20

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA) (01007)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOVERABLE (UG/L AS CO) (01037)
OCT										
23...	1330	3	3	300	50	2	2	20	20	1
FEB										
26...	1215	3	3	<50	<50	0	0	10	<10	0
JUN										
10...	1045	3	3	<50	40	0	0	10	10	0
AUG										
12...	1335	11	10	100	<50	1	0	20	20	3

05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	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)
OCT 23...	1	3	3	230	60	3	0	30	10	<.1
FEB 26...	0	2	0	1600	800	0	0	1100	1100	.1
JUN 10...	0	5	4	210	30	1	0	50	30	.1
AUG 12...	0	4	4	370	40	7	0	140	100	.4

DATE	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	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, 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 (MG/L AS C) (00689)
OCT 23...	<.1	2	2	0	0	0	20	0	--	--
FEB 26...	<.1	1	0	0	0	0	20	0	18	.3
JUN 10...	.1	4	2	0	0	0	10	0	16	.6
AUG 12...	.2	4	2	0	0	0	10	0	28	.3

DATE	TIME	PCB, TOTAL (UG/L) (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)
DEC 04	1130	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB 26...	1215	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JUN 10...	1045	--	ND	ND	ND	ND	ND	ND	ND	ND	ND
AUG 12...	1335	--	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)
DEC 04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB 26...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JUN 10...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AUG 12...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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)
JUL 08...	0945	28	5.20	2.68	21.7	5.90
SEP 09...	1030	28	--	--	61.6	22.8

PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980

DATE	OCT 23,79		FEB 26,80		APR 8,80		JUN 10,80	
TIME	1330		1215		1145		1045	
TOTAL CELLS/ML	480		9700		6100		720	
DIVERSITY: DIVISION	0.2		0.0		0.6		1.9	
.CLASS	0.2		0.0		0.6		1.9	
..ORDER	0.2		0.1		0.7		2.3	
...FAMILY	0.2		0.1		0.8		2.9	
....GENUS	0.2		0.1		0.8		3.1	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	28	4
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	120	2	14	2
....DICTYOSPHAERIUM	--	-	--	-	--	-	69	10
...SCENEDESMACEAE								
....SCENEDESMUS	--	-	--	-	--	-	55	8
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	13	3	*	0	120	2	41	6
..ZYGNEMATALES								
...DESMIDIACEAE								
....COSMARIUM	--	-	--	-	--	-	14	2
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	--	-	39	1	14	2
..PENNALES								
...ACHNANTHACEAE								
....COCCONEIS	--	-	--	-	--	-	120#	17
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	78	1	--	-
...NITZSCHIACEAE								
....NITZSCHIA	--	-	--	-	310	5	69	10
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	39	1	55	8
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	86	1	--	-	210#	29
....COCCOCHLORIS	--	-	--	-	--	-	28	4
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	460#	97	9600#	99	5400#	89	--	-
....SPIRULINA	--	-	*	0	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	--	-

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

PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980--Continued

DATE	JUL 8,80		AUG 12,80		SEP 9,80	
TIME	0945		1335		1030	
TOTAL CELLS/ML	320		310		160	
DIVERSITY: DIVISION	0.2		1.4		0.9	
.CLASS	0.2		1.4		0.9	
..ORDER	0.2		1.4		0.9	
...FAMILY	0.2		1.5		1.3	
....GENUS	0.2		1.5		1.3	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHARACIACEAE						
....SCHROEDERIA	--	-	39	13	--	-
...HYDRODICTYACEAE						
....PEDIASTRUM	--	-	--	-	--	-
...OOCYSTACEAE						
....ANKISTRODESMUS	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-
...SCENEDESMACEAE						
....SCENEDESMUS	--	-	--	-	52#	33
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	--	-	--	-	--	-
..ZYGNEMATALES						
...DESMIDIACEAE						
....COSMARIUM	--	-	--	-	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	13	4	--	-	--	-
..PENNALES						
...ACHNANTHACEAE						
....COCCONEIS	--	-	--	-	13	8
...CYMBELLACEAE						
....CYMBELLA	--	-	13	4	--	-
...NAVICULACEAE						
....NAVICULA	--	-	--	-	--	-
...NITZSCHIACEAE						
....NITZSCHIA	--	-	--	-	90#	58
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	13	4	--	-
...CRYPTOMONADACEAE						
....CRYPTOMONAS	--	-	13	4	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	--	-	--	-	--	-
....COCCOCHLORIS	--	-	--	-	--	-
..HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	220#	71	--	-
...OSCILLATORIACEAE						
....OSCILLATORIA	310#	96	--	-	--	-
....SPIRULINA	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....EUGLENA	--	-	13	4	--	-

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	TEMPER-ATURE, WATER (DEG C) (00010)	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						
23...	1300	3.4	6.0	7	.06	--
DEC						
04...	1205	16	.0	29	1.3	--
JAN						
15...	1100	15	.0	105	4.3	35
FEB						
26...	1230	13	.0	40	1.4	--
APR						
08...	1145	375	.5	30	30	--
JUN						
10...	1045	7.7	19.0	23	.48	--
JUL						
08...	0945	.90	22.0	7	.02	88
AUG						
12...	1345	2.1	21.0	12	.07	100
SEP						
09...	1030	3.0	15.0	9	.07	84

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 except those for period of no gage-height record, Nov. 10 to Dec. 17, which are fair.

AVERAGE DISCHARGE.--14 years, 217 ft^3/s (6.145 m^3/s), 11.65 in/yr (296 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, 782 ft^3/s (22.1 m^3/s) Sept. 24, gage height, 4.95 ft (1.509 m); minimum, 34 ft^3/s (0.96 m^3/s) Aug. 29, gage height, 2.78 ft (0.847 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	59	58	70	73	62	46	36	118	163	79	53	86
2	57	59	70	72	62	45	36	125	167	76	52	92
3	57	59	70	72	62	45	35	134	165	74	50	100
4	56	59	70	70	60	45	36	141	163	77	52	111
5	53	59	70	70	60	44	37	148	158	85	52	115
6	51	59	69	72	60	43	39	154	152	82	51	120
7	50	60	68	72	59	42	46	156	150	82	50	127
8	50	62	68	73	59	42	51	163	146	82	47	135
9	48	62	69	73	58	40	51	172	144	81	44	165
10	48	62	69	73	57	39	51	184	137	79	43	172
11	48	62	70	72	57	38	50	200	135	79	50	186
12	46	62	71	72	56	39	48	206	130	79	50	203
13	45	62	72	72	54	43	48	210	127	76	50	279
14	44	62	72	69	54	44	48	213	128	79	50	397
15	44	62	72	69	53	43	48	216	132	82	48	475
16	43	62	72	69	52	43	50	219	125	81	44	553
17	43	62	72	69	52	43	52	222	120	81	43	602
18	42	63	72	69	52	43	58	219	116	78	43	652
19	47	63	72	69	52	42	64	219	113	78	43	683
20	51	64	73	69	52	42	69	216	108	77	43	728
21	51	65	73	68	52	40	73	210	105	76	42	748
22	50	66	73	66	52	39	77	200	100	76	40	768
23	47	67	73	65	51	39	84	197	97	73	39	775
24	46	68	73	65	51	38	88	189	92	70	40	782
25	45	68	73	64	50	38	91	184	88	66	40	775
26	44	69	73	64	47	38	97	174	84	65	39	761
27	43	69	72	64	47	37	100	169	82	62	36	748
28	43	70	73	64	46	37	105	165	84	59	35	735
29	42	70	73	63	46	37	108	161	84	59	37	709
30	42	70	73	63	---	37	113	156	81	59	79	696
31	52	---	73	63	---	37	---	158	---	57	85	---
TOTAL	1487	1905	2213	2128	1575	1268	1889	5598	3676	2309	1470	13478
MEAN	48.0	63.5	71.4	68.6	54.3	40.9	63.0	181	123	74.5	47.4	449
MAX	59	70	73	73	62	46	113	222	167	85	85	782
MIN	42	58	68	63	46	37	35	118	81	57	35	86
CFSM	.19	.25	.28	.27	.22	.16	.25	.72	.49	.29	.19	1.78
IN.	.22	.28	.33	.31	.23	.19	.28	.82	.54	.34	.22	1.98

CAL YR 1979 TOTAL 73513 MEAN 201 MAX 1320 MIN 23 CFSM .79 IN 10.81
WTR YR 1980 TOTAL 38996 MEAN 107 MAX 782 MIN 35 CFSM .42 IN 5.73

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): Maximum, 24.5°C July 9, 10, 11, 12, 13, 1974; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 23.5°C June 25-29, July 10-16, 24, 25; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE, WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML) (31501)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
OCT 30...	1130	42	30	6.9	--	5.5	11.6	94	K190	K1
MAR 11...	1045	38	37	7.0	-15.0	.0	13.1	93	K14	<1
APR 23...	1045	85	31	6.9	12.0	6.0	12.0	100	32	<1
JUL 08...	1200	82	35	7.3	23.0	23.0	--	--	24	<1

DATE	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)	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 (MG/L AS CACO3) (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)
OCT 30...	34	13	6	3.0	1.4	1.0	.1	.4	7	3.6
MAR 11...	K11	14	3	3.3	1.5	1.2	.1	.3	11	4.7
APR 23...	<1	12	3	2.8	1.2	.9	.1	.3	9	4.1
JUL 08...	39	13	3	3.0	1.4	1.1	.1	.4	10	4.6

DATE	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)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P) (00671)
OCT 30...	.5	.0	2.9	40	17	4.54	.04	.02	.010	.000
MAR 11...	.6	.1	3.0	16	22	1.64	.88	.08	.010	.010
APR 23...	.5	.0	3.1	32	19	7.34	.09	.09	.010	.000
JUL 08...	.5	.1	1.9	42	19	9.30	.02	.01	.000	.000

05124480 KAWISHIWI RIVER NEAR ELY, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	17.0	17.0	17.0	5.5	5.5	5.5	---	---	---	1.0	1.0	1.0
2	16.5	16.5	16.5	5.5	5.5	5.5	---	---	---	1.0	1.0	1.0
3	16.5	16.5	16.5	5.5	5.0	5.0	---	---	---	1.0	1.0	1.0
4	16.5	16.5	16.5	5.0	5.0	5.0	---	---	---	1.0	1.0	1.0
5	16.5	16.0	16.0	5.0	4.5	5.0	---	---	---	.5	.5	.5
6	16.0	15.5	15.5	4.5	4.5	4.5	---	---	---	.5	.5	.5
7	15.0	14.5	14.5	4.5	4.5	4.5	---	---	---	.5	.5	.5
8	14.5	14.0	14.5	4.5	3.5	3.5	---	---	---	.5	.5	.5
9	14.0	13.5	14.0	3.5	3.5	3.5	---	---	---	.5	.5	.5
10	13.5	13.0	13.5	---	---	---	---	---	---	.5	.5	.5
11	13.0	12.0	13.0	---	---	---	---	---	---	.5	.5	.5
12	11.5	10.5	11.0	---	---	---	---	---	---	.5	.5	.5
13	10.5	10.5	10.5	---	---	---	---	---	---	.5	.5	.5
14	10.5	10.0	10.5	---	---	---	---	---	---	.5	.5	.5
15	10.0	10.0	10.0	---	---	---	---	---	---	.5	.5	.5
16	10.0	10.0	10.0	---	---	---	---	---	---	.5	.5	.5
17	10.0	10.0	10.0	---	---	---	---	---	---	.5	.5	.5
18	9.5	9.5	9.5	---	---	---	1.0	1.0	1.0	.5	.5	.5
19	9.5	9.5	9.5	---	---	---	1.0	1.0	1.0	.5	.5	.5
20	9.5	9.5	9.5	---	---	---	1.0	1.0	1.0	.5	.5	.5
21	9.5	9.5	9.5	---	---	---	1.0	1.0	1.0	.0	.0	.0
22	9.5	9.5	9.5	---	---	---	1.0	1.0	1.0	.0	.0	.0
23	9.0	8.5	8.5	---	---	---	1.0	1.0	1.0	.0	.0	.0
24	8.5	7.0	8.0	---	---	---	1.0	1.0	1.0	.0	.0	.0
25	7.0	6.5	7.0	---	---	---	1.0	1.0	1.0	.0	.0	.0
26	6.5	6.0	6.0	---	---	---	1.0	1.0	1.0	.0	.0	.0
27	6.0	6.0	6.0	---	---	---	1.0	1.0	1.0	.0	.0	.0
28	5.5	5.5	5.5	---	---	---	1.0	1.0	1.0	.0	.0	.0
29	5.5	5.5	5.5	---	---	---	1.0	1.0	1.0	.0	.0	.0
30	5.5	5.5	5.5	---	---	---	1.0	1.0	1.0	.0	.0	.0
31	5.5	5.5	5.5	---	---	---	1.0	1.0	1.0	.0	.0	.0
MONTH	17.0	5.5	11.0							1.0	.0	.5

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	12.0	11.0	11.0
2	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.0	12.0	12.0
3	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.0	13.0	13.5
4	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.5	14.5	14.5
5	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.5	14.5	14.5
6	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.5	14.5	14.5
7	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.5	14.0	14.5
8	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.0	13.0	13.5
9	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.0	13.0	13.0
10	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.0	12.0	13.0
11	.0	.0	.0	.0	.0	.0	.0	.0	.0	12.0	12.0	12.0
12	.0	.0	.0	.0	.0	.0	.0	.0	.0	12.0	11.5	11.5
13	.0	.0	.0	.0	.0	.0	.0	.0	.0	11.5	11.5	11.5
14	.0	.0	.0	.0	.0	.0	.0	.0	.0	11.5	11.5	11.5
15	.0	.0	.0	.0	.0	.0	.0	.0	.0	11.5	11.5	11.5
16	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.0	11.5	12.0
17	.0	.0	.0	.0	.0	.0	.5	.5	.5	13.0	13.0	13.0
18	.0	.0	.0	.0	.0	.0	1.5	1.0	1.5	14.0	13.0	13.5
19	.0	.0	.0	.0	.0	.0	3.5	2.0	3.0	15.0	14.0	14.5
20	.0	.0	.0	.0	.0	.0	4.5	4.0	4.0	15.0	15.0	15.0
21	.0	.0	.0	.0	.0	.0	6.0	5.0	5.5	15.5	15.0	15.5
22	.0	.0	.0	.0	.0	.0	6.5	6.0	6.0	16.5	15.5	16.0
23	.0	.0	.0	.0	.0	.0	6.5	6.0	6.0	18.5	16.5	17.0
24	.0	.0	.0	.0	.0	.0	6.5	6.0	6.0	19.5	18.5	19.0
25	.0	.0	.0	.0	.0	.0	6.5	6.5	6.5	19.5	19.5	19.5
26	.0	.0	.0	.0	.0	.0	6.5	6.5	6.5	19.5	19.5	19.5
27	.0	.0	.0	.0	.0	.0	8.0	6.5	7.0	21.0	20.0	20.5
28	.0	.0	.0	.0	.0	.0	9.0	8.0	8.5	21.5	21.0	21.0
29	.0	.0	.0	.0	.0	.0	9.5	9.0	9.0	21.5	21.5	21.5
30	---	---	---	.0	.0	.0	11.0	9.5	10.0	21.5	21.5	21.5
31	---	---	---	.0	.0	.0	---	---	---	21.5	21.5	21.5
MONTH	.0	.0	.0	.0	.0	.0	11.0	.0	2.5	21.5	11.0	15.0

05124480 KAWISHIWI RIVER NEAR ELY, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	21.5	21.0	21.5	23.0	23.0	23.0	23.0	23.0	23.0	20.5	20.5	20.5
2	21.0	21.0	21.0	23.0	23.0	23.0	23.0	23.0	23.0	20.0	20.0	20.0
3	21.0	21.0	21.0	23.0	23.0	23.0	23.0	23.0	23.0	20.0	20.0	20.0
4	21.0	21.0	21.0	23.0	23.0	23.0	22.0	22.0	22.0	20.0	20.0	20.0
5	21.0	21.0	21.0	23.0	23.0	23.0	22.0	21.5	22.0	20.0	20.0	20.0
6	21.0	21.0	21.0	23.0	23.0	23.0	22.0	21.5	21.5	20.0	20.0	20.0
7	21.0	20.5	21.0	23.0	23.0	23.0	22.0	22.0	22.0	20.0	20.0	20.0
8	20.0	20.0	20.0	23.0	23.0	23.0	22.0	22.0	22.0	20.0	20.0	20.0
9	20.0	20.0	20.0	23.0	23.0	23.0	22.0	22.0	22.0	20.5	20.5	20.5
10	20.0	20.0	20.0	23.5	23.0	23.0	22.0	22.0	22.0	20.5	20.0	20.0
11	20.0	20.0	20.0	23.5	23.5	23.5	22.0	22.0	22.0	20.0	20.0	20.0
12	20.0	20.0	20.0	23.5	23.5	23.5	21.5	21.5	21.5	20.0	20.0	20.0
13	20.5	20.0	20.0	23.5	23.5	23.5	21.5	21.5	21.5	20.0	19.0	19.5
14	20.5	20.5	20.5	23.5	23.5	23.5	21.5	21.5	21.5	19.0	18.5	18.5
15	20.5	20.5	20.5	23.5	23.5	23.5	21.5	21.5	21.5	18.5	17.5	18.5
16	20.5	20.5	20.5	23.5	23.5	23.5	21.5	21.5	21.5	18.0	16.5	17.0
17	20.5	20.5	20.5	23.0	23.0	23.0	21.5	21.5	21.5	17.0	17.0	17.0
18	21.0	21.0	21.0	23.0	23.0	23.0	21.5	21.5	21.5	17.0	16.5	16.5
19	21.0	21.0	21.0	23.0	23.0	23.0	21.0	21.0	21.0	16.5	15.5	16.0
20	21.0	21.0	21.0	23.0	23.0	23.0	21.0	21.0	21.0	15.5	15.5	15.5
21	21.0	21.0	21.0	23.0	23.0	23.0	21.0	21.0	21.0	15.5	15.5	15.5
22	22.0	21.0	21.5	23.0	23.0	23.0	21.0	21.0	21.0	15.0	15.0	15.0
23	23.0	22.0	23.0	23.0	23.0	23.0	21.0	21.0	21.0	15.0	15.0	15.0
24	23.0	23.0	23.0	23.5	23.5	23.5	21.0	21.0	21.0	15.0	15.0	15.0
25	23.5	23.0	23.0	23.5	23.5	23.5	21.0	21.0	21.0	15.0	15.0	15.0
26	23.5	23.5	23.5	23.0	23.0	23.0	20.5	20.5	20.5	15.5	15.0	15.0
27	23.5	23.5	23.5	23.0	23.0	23.0	20.5	20.5	20.5	15.0	15.0	15.0
28	23.5	23.5	23.5	23.0	23.0	23.0	20.5	20.5	20.5	15.0	15.0	15.0
29	23.5	23.0	23.0	22.0	22.0	22.0	20.5	20.5	20.5	15.0	15.0	15.0
30	23.0	23.0	23.0	22.0	22.0	22.0	20.5	20.5	20.5	15.0	15.0	15.0
31	---	---	---	23.0	23.0	23.0	20.5	20.5	20.5	---	---	---
MONTH	23.5	20.0	21.5	23.5	22.0	23.0	23.0	20.5	21.5	20.5	15.0	17.5
YEAR	23.5	.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 good except those for winter period, which are fair.

AVERAGE DISCHARGE.--6 years, 7.46 ft^3/s (0.211 m^3/s), 10.49 in/yr (266 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, 426 ft^3/s (12.1 m^3/s) Sept. 13, gage height, 8.87 ft (2.704 m); minimum discharge, 0.12 ft^3/s (0.003 m^3/s)June 26, Aug. 10, 11; minimum gage height, 4.72 ft (1.439 m) Aug. 10, 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.78	9.0	2.2	.78	.49	.60	.50	13	3.0	.48	2.9	97
2	.78	8.0	3.8	.78	.71	.60	.70	13	7.3	.55	1.1	68
3	.78	7.6	4.2	.87	.70	.60	1.1	12	5.0	.55	.38	51
4	.78	7.1	3.0	.96	.70	.55	1.7	11	2.9	.52	.36	45
5	.78	6.2	2.8	.87	.70	.55	2.8	10	2.3	2.3	.42	37
6	.87	6.2	2.8	.87	.70	.50	3.4	8.5	2.4	2.6	.39	31
7	.96	5.7	2.2	.78	.70	.50	4.2	5.9	2.1	7.2	.26	27
8	.96	5.3	2.1	.78	.62	.50	5.3	5.3	2.0	4.4	.24	27
9	1.1	4.9	2.1	.78	.70	.50	4.9	3.8	1.7	3.1	.21	37
10	1.1	4.5	2.2	.78	.70	.50	4.2	3.6	1.7	2.2	.14	35
11	1.2	4.2	2.2	.78	.70	.42	3.8	5.2	1.3	2.1	.31	30
12	1.4	4.2	2.5	.70	.70	.42	3.8	5.7	.60	2.1	.48	28
13	1.4	4.2	2.8	.55	.62	.42	3.0	5.4	.55	1.8	1.1	153
14	1.6	3.4	2.5	.55	.70	.70	3.0	5.3	.95	1.3	3.4	324
15	1.7	3.4	1.9	.55	.70	.70	4.9	5.0	2.4	1.3	3.8	184
16	1.7	2.8	1.9	.55	.70	.62	7.6	4.6	1.5	1.0	2.2	103
17	1.7	2.8	2.1	.62	.70	.48	10	4.5	1.1	1.6	1.6	65
18	1.7	2.5	1.6	.55	.70	.42	16	3.8	.55	1.6	1.9	57
19	2.2	2.8	1.4	.55	.70	.36	22	3.8	.66	2.0	1.9	55
20	2.5	2.8	1.3	.55	.72	.42	24	2.9	.49	1.4	1.7	69
21	3.0	2.8	1.4	.55	.69	.55	21	2.5	.38	1.6	1.6	62
22	3.0	2.5	1.4	.62	.58	.42	18	2.3	.26	2.3	1.2	50
23	3.0	3.0	1.4	.62	.51	.22	17	2.0	.31	1.9	.96	40
24	2.5	3.4	1.2	.70	.48	.22	18	1.7	.24	1.4	1.1	36
25	2.5	3.4	1.1	.78	.52	.22	18	1.5	.16	1.2	1.1	32
26	2.2	3.4	1.1	.78	.67	.22	18	1.1	.13	.94	1.1	27
27	2.2	3.4	.96	.78	.67	.22	17	1.2	.30	.53	.78	25
28	2.5	2.8	.96	.71	.60	.22	17	1.1	.81	.50	.62	21
29	2.5	2.2	.87	.63	.60	.22	14	.95	.96	.68	1.9	20
30	2.5	2.2	.87	.55	---	.26	14	.89	.92	.73	129	17
31	4.5	---	.87	.48	---	.36	---	.99	---	.49	131	---
TOTAL	56.39	126.7	59.73	21.40	18.98	13.49	298.90	148.53	44.97	52.37	295.15	1853
MEAN	1.82	4.22	1.93	.69	.65	.44	9.96	4.79	1.50	1.69	9.52	61.8
MAX	4.5	9.0	4.2	.96	.72	.70	24	13	7.3	7.2	131	324
MIN	.78	2.2	.87	.48	.48	.22	.50	.89	.13	.48	.14	17
CFSM	.19	.44	.20	.07	.07	.05	1.03	.50	.16	.18	.99	6.40
IN.	.22	.49	.23	.08	.07	.05	1.15	.57	.17	.20	1.14	7.14

CAL YR 1979 TOTAL 2816.42 MEAN 7.72 MAX 235 MIN .19 CFSM .80 IN 10.84
WTR YR 1980 TOTAL 2989.61 MEAN 8.17 MAX 324 MIN .13 CFSM .85 IN 11.51

05125550 STONY RIVER NEAR BABBITT, MN

LOCATION.--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 ft (122 m) downstream from bridge on Forest Route 424, 4.7 mi (7.6 km) upstream from mouth, and 8.5 mi (13.7 km) southeast of Babbitt.

DRAINAGE AREA.--219 mi^2 (567 km^2).

PERIOD OF RECORD.--August 1975 to September 1980 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 1,564.42 ft (476.835 m) National Geodetic Vertical Datum of 1929 (levels by Minnesota Department of Natural Resources).

REMARKS.--Records fair.

AVERAGE DISCHARGE.--5 years, 173 ft^3/s (4.899 m^3/s), 10.73 in/yr (273 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,490 ft^3/s (70.5 m^3/s) Apr. 19, 1976, gage height, 8.71 ft (2.655 m); minimum, 6.4 ft^3/s (0.18 m^3/s) Nov. 29, 1976, gage height, 2.16 ft (0.658 m), result of freeze up; minimum daily, 6.7 ft^3/s (0.19 m^3/s) Sept. 11, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 700 ft^3/s (19.8 m^3/s) Sept. 4, gage height, 5.26 ft (1.603 m); minimum daily, 19 ft^3/s (0.54 m^3/s) Mar. 6-8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	87	151	84	42	28	20	27	328	71	52	31	476
2	80	168	82	41	28	20	30	301	79	49	29	612
3	78	185	79	40	28	20	32	277	88	46	28	664
4	74	194	77	40	27	20	39	256	102	45	26	697
5	71	199	76	39	26	20	44	237	114	49	26	691
6	68	203	74	38	26	19	48	218	121	47	25	655
7	67	201	72	38	26	19	62	201	131	46	25	612
8	71	197	70	37	26	19	71	188	131	44	25	574
9	67	190	68	36	27	20	77	179	135	43	23	542
10	63	180	66	36	26	20	78	176	135	43	22	500
11	63	165	65	35	26	20	80	176	131	45	22	484
12	63	154	64	35	26	20	83	170	131	42	22	460
13	61	145	62	34	26	21	87	168	129	39	28	464
14	59	135	61	34	26	22	90	163	131	40	32	456
15	59	129	60	33	26	24	91	159	126	40	35	444
16	59	123	58	33	26	25	93	156	118	39	34	456
17	58	118	57	33	25	26	98	151	112	40	38	472
18	59	115	56	32	25	25	110	144	104	42	52	492
19	76	113	55	32	24	25	126	137	97	41	79	504
20	84	109	53	32	25	25	159	131	90	41	98	552
21	94	106	52	31	26	25	213	121	83	44	110	583
22	104	102	51	31	26	24	291	116	76	44	113	606
23	108	100	50	31	27	23	362	112	71	43	117	614
24	106	100	49	31	27	23	424	103	64	41	120	624
25	110	97	48	31	26	22	444	94	58	39	122	606
26	114	95	47	30	24	23	456	87	54	38	123	578
27	116	92	46	30	24	24	432	81	51	38	121	547
28	120	90	45	30	23	24	409	74	54	38	119	504
29	123	88	44	31	21	23	386	71	52	37	124	460
30	123	86	43	29	---	24	362	67	52	34	183	424
31	135	---	43	29	---	25	---	66	---	32	270	---
TOTAL	2620	4130	1857	1054	747	690	5304	4908	2891	1301	2222	16353
MEAN	84.5	138	59.9	34.0	25.8	22.3	177	158	96.4	42.0	71.7	545
MAX	135	203	84	42	28	26	456	328	135	52	270	697
MIN	58	86	43	29	21	19	27	66	51	32	22	424
CFSM	.39	.63	.27	.16	.12	.10	.81	.72	.44	.19	.33	2.49
IN.	.45	.70	.32	.18	.13	.12	.90	.83	.49	.22	.38	2.78

CAL YR 1979 TOTAL 76489 MEAN 210 MAX 1580 MIN 26 CFSM .96 IN 12.99
WTR YR 1980 TOTAL 44077 MEAN 120 MAX 697 MIN 19 CFSM .55 IN 7.49

NOTE.--No gage-height record Dec. 1 to Jan. 27.

05126000 DUNKA RIVER NEAR BABBITT, MN

LOCATION.--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 mi (2.9 km) upstream from mouth, and 3.8 mi (6.1 km) southeast of Babbitt.

DRAINAGE AREA.--53.4 mi^2 (138 km^2) of which 6.0 mi^2 (15.5 km^2) is noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1951 to September 1962, February 1975 to September 1980 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 1,488.98 ft (453.841 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for period of no gage-height record, Jan. 30 to Mar. 9, which are fair. Natural flow of stream affected by continually changing iron-mining activities that include diversions for iron ore processing, and mine pit dewatering. The amount of water pumped to stream from pit dewatering generally exceeds diversions for ore processing.

AVERAGE DISCHARGE.--16 years, 38.2 ft^3/s (1.082 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 876 ft^3/s (24.8 m^3/s) Apr. 22, 1979, gage height, 8.02 ft (2.444 m); no flow on many days in 1976, 1977, and Jan. 16-19, Feb. 18, 19, 1979.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 140 ft^3/s (3.96 m^3/s) Apr. 20, gage height, 5.68 ft (1.731 m); maximum gage height, 5.73 ft (1.747 m) Sept. 20; minimum daily discharge, 0.11 ft^3/s (0.003 m^3/s) Aug. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.9	50	12	4.8	1.9	.72	8.3	65	7.6	4.9	.51	66
2	3.9	73	12	4.7	1.9	.70	15	54	27	10	.28	61
3	4.2	97	11	4.4	1.7	.68	22	53	42	11	.22	60
4	4.5	74	10	4.2	1.7	.67	39	50	39	6.6	.53	59
5	4.5	58	10	4.0	1.6	.66	45	44	34	10	1.0	53
6	4.6	46	10	4.0	1.5	.65	53	41	38	14	.81	46
7	5.0	41	10	4.2	1.5	.64	76	39	41	21	.66	40
8	5.0	36	9.4	4.1	1.4	.64	101	35	43	21	.59	37
9	11	31	9.1	3.8	1.4	.63	95	33	40	20	.32	44
10	14	25	8.8	3.5	1.3	.62	87	31	31	15	.19	51
11	16	20	8.5	3.4	1.2	.55	71	35	26	6.9	.15	49
12	15	18	8.0	3.2	1.2	.40	61	38	23	5.3	.11	44
13	17	18	7.8	3.1	1.1	.52	53	37	19	4.2	2.7	64
14	17	17	7.4	3.0	1.1	1.5	48	34	18	3.9	6.6	80
15	15	23	7.2	3.2	1.1	2.0	54	34	18	3.1	7.2	84
16	8.0	25	7.0	3.3	1.0	1.9	68	33	18	2.8	7.2	78
17	6.8	24	6.4	3.2	.99	1.7	84	29	23	2.7	6.7	68
18	7.0	24	5.6	3.2	.97	1.5	102	25	22	3.7	7.0	74
19	20	25	5.4	3.2	.94	2.2	126	23	19	5.9	7.6	88
20	33	27	5.2	3.3	.91	2.4	139	20	17	4.2	17	110
21	34	22	5.1	3.5	.88	2.5	137	18	8.3	4.6	20	116
22	31	25	5.1	3.6	.86	2.4	134	16	5.8	12	20	112
23	29	27	5.2	3.5	.84	2.4	129	13	5.0	13	20	101
24	27	26	5.3	3.3	.82	2.4	118	10	4.8	13	20	94
25	25	23	5.3	3.0	.80	2.4	107	8.3	4.4	13	19	92
26	22	16	5.1	2.8	.78	2.5	99	7.2	3.7	13	14	86
27	20	14	5.0	2.6	.76	2.5	94	6.4	3.0	14	9.1	78
28	20	13	5.0	2.4	.74	2.6	86	5.4	3.4	15	14	69
29	20	13	5.0	2.2	.73	3.2	78	4.8	3.5	4.5	13	62
30	20	12	4.9	2.1	---	3.8	71	4.8	4.3	1.9	40	58
31	31	---	4.8	2.0	---	4.6	---	5.0	---	1.1	62	---
TOTAL	494.4	943	226.6	104.8	33.62	52.58	2400.3	851.9	591.8	281.3	318.47	2124
MEAN	15.9	31.4	7.31	3.38	1.16	1.70	80.0	27.5	19.7	9.07	10.3	70.8
MAX	34	97	12	4.8	1.9	4.6	139	65	43	21	62	116
MIN	3.9	12	4.8	2.0	.73	.40	8.3	4.8	3.0	1.1	.11	37

CAL YR 1979 TOTAL 18745.86 MEAN 51.4 MAX 828 MIN .00
WTR YR 1980 TOTAL 8422.77 MEAN 23.0 MAX 139 MIN .11

05126000 DUNKA RIVER NEAR BABBITT, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--September 1955. September 1957 to April 1963. March 1976 to September 1980 (discontinued).

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

INSTRUMENTATION.--Water-quality monitor since October 1975.

REMARKS.--Extremes are for water years with 80 percent or more days of record.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water year 1978): Maximum, 426 micromhos Mar. 14, 1978; minimum, 62 micromhos Apr. 21, 1978.
WATER TEMPERATURES (water year 1978): Maximum, 29.5°C June 25, 1980; minimum, 0.0°C on many days each year.

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	140	133	135	129	105	119	145	144	145	218	214	216
2	140	133	137	127	107	119	147	144	146	220	213	216
3	138	133	135	237	143	207	147	146	146	219	216	218
4	144	135	138	176	155	161	146	144	145	222	218	220
5	147	137	142	154	126	145	146	144	145	225	221	224
6	150	149	150	123	111	116	148	145	147	231	225	227
7	153	146	151	110	106	108	153	147	151	233	227	228
8	154	140	147	106	104	105	164	153	158	230	227	229
9	301	140	254	107	104	106	171	164	168	---	---	---
10	311	298	304	109	106	108	173	171	172	---	---	---
11	307	301	304	113	109	111	171	168	169	---	---	---
12	305	296	300	115	112	113	175	168	171	---	---	---
13	296	280	291	120	115	117	178	174	176	---	---	---
14	298	281	291	122	120	121	186	178	182	---	---	---
15	306	271	293	225	121	188	186	182	185	---	---	---
16	269	219	239	229	222	225	187	181	184	---	---	---
17	226	205	216	230	223	226	191	187	189	---	---	---
18	213	171	189	231	225	228	195	190	193	---	---	---
19	173	149	159	229	216	224	196	193	195	---	---	---
20	197	174	189	215	167	202	193	188	191	---	---	---
21	172	127	142	164	146	153	189	187	188	---	---	---
22	129	125	127	211	165	200	192	188	190	---	---	---
23	130	126	129	211	207	209	197	192	195	---	---	---
24	134	131	132	222	206	214	200	196	198	---	---	---
25	134	130	132	237	200	226	204	198	201	---	---	---
26	136	134	135	196	163	174	208	203	205	---	---	---
27	135	131	133	162	153	157	211	206	208	---	---	---
28	139	133	135	153	152	153	212	206	208	---	---	---
29	135	133	133	150	147	148	213	208	211	---	---	---
30	136	114	133	148	146	147	216	212	213	---	---	---
31	133	126	131	---	---	---	218	213	214	---	---	---
MONTH	311	114	181	237	104	161	218	144	180			

05126000 DUNKA RIVER NEAR BABBITT, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1				---	---	---	256	244	251	118	98	113
2				---	---	---	273	248	264	96	88	90
3				---	---	---	286	250	273	90	87	88
4				---	---	---	335	250	299	91	87	90
5				---	---	---	304	266	287	95	90	92
6				---	---	---	270	217	250	94	91	93
7				---	---	---	215	149	177	97	94	95
8				---	---	---	148	123	131	97	95	96
9				---	---	---	137	123	128	102	97	99
10				---	---	---	143	132	137	102	98	100
11				299	292	296	154	143	149	104	96	100
12				295	292	294	162	154	159	107	99	104
13				296	291	294	168	162	165	105	101	103
14				297	288	292	175	162	168	104	100	102
15				299	288	294	162	147	157	104	99	101
16				310	300	305	158	135	145	107	103	105
17				324	310	318	135	115	128	106	97	100
18				347	323	338	116	102	109	111	105	109
19				358	342	351	101	91	94	122	110	115
20				356	335	350	90	90	90	120	101	109
21				342	330	337	90	89	90	114	100	109
22				332	325	328	91	90	90	119	111	113
23				327	320	324	91	90	91	130	115	119
24				324	311	318	93	91	93	125	113	118
25				311	300	307	96	93	95	122	113	118
26				299	289	296	99	94	96	127	113	118
27				289	285	287	109	99	104	131	123	127
28				292	281	288	111	108	109	138	131	134
29				288	266	282	113	110	112	146	138	142
30				270	239	260	116	112	114	146	141	143
31				258	240	248	---	---	---	143	134	138
MONTH							335	89	152	146	87	109

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	142	132	137	233	213	222	306	264	284	---	---	---
2	151	136	143	340	228	305	293	275	284	---	---	---
3	150	123	138	346	334	340	305	269	286	131	124	128
4	124	110	119	335	201	269	294	272	281	131	113	123
5	135	107	112	207	166	194	298	279	287	112	98	104
6	163	140	154	233	159	175	346	275	304	108	97	101
7	164	157	161	281	244	273	330	292	303	120	108	113
8	156	151	153	276	258	266	327	287	306	138	121	126
9	155	118	143	302	272	280	335	286	307	142	125	133
10	116	107	109	316	282	306	326	291	300	126	123	124
11	108	103	105	272	210	240	310	285	299	124	122	123
12	105	96	101	208	175	192	---	---	---	125	118	121
13	115	97	105	204	181	194	---	---	---	156	115	146
14	118	112	116	214	190	198	---	---	---	151	148	150
15	115	105	109	213	181	200	---	---	---	149	140	144
16	131	105	110	204	176	190	---	---	---	140	131	135
17	218	133	191	199	167	186	---	---	---	134	130	132
18	227	214	219	200	184	193	---	---	---	134	124	131
19	249	226	236	279	201	256	---	---	---	130	120	124
20	262	246	255	250	225	236	---	---	---	121	108	112
21	247	160	183	237	205	215	---	---	---	---	---	---
22	165	157	161	336	233	307	---	---	---	---	---	---
23	161	149	154	361	324	341	---	---	---	---	---	---
24	150	144	148	375	356	364	---	---	---	---	---	---
25	155	146	150	384	369	377	---	---	---	---	---	---
26	168	154	160	394	366	382	---	---	---	---	---	---
27	175	168	172	386	363	377	---	---	---	---	---	---
28	194	172	185	409	364	382	---	---	---	---	---	---
29	216	192	204	394	319	346	---	---	---	---	---	---
30	218	211	215	364	285	314	---	---	---	---	---	---
31	---	---	---	339	268	294	---	---	---	---	---	---
MONTH	262	96	155	409	159	271						

05126000 DUNKA RIVER NEAR BABBITT, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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

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

05126000 DUNKA RIVER NEAR BABBITT, MN--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	19.0	16.0	17.5	25.5	19.5	22.0	26.5	22.5	24.5	---	---	---
2	20.5	15.5	18.0	23.5	17.5	21.0	25.5	22.5	24.0	---	---	---
3	21.0	16.5	19.0	25.5	19.5	22.5	27.0	20.5	23.5	18.5	16.5	17.5
4	19.0	17.0	18.0	25.5	21.5	23.0	23.0	20.5	21.5	18.5	16.5	17.5
5	18.0	16.0	17.0	24.0	21.5	22.5	23.0	19.5	20.5	18.0	15.5	17.0
6	21.0	16.0	18.5	23.5	19.5	22.0	26.0	19.5	23.0	18.5	15.5	17.5
7	19.5	15.5	17.5	23.0	21.0	21.5	25.0	22.0	24.0	20.5	17.0	19.0
8	18.0	14.0	16.0	24.5	20.0	22.0	26.5	23.0	24.5	21.5	18.5	20.0
9	19.5	15.5	17.5	25.5	21.5	23.5	26.5	21.5	24.0	19.5	16.5	18.0
10	20.0	15.0	17.5	26.5	22.5	24.5	24.0	21.5	23.0	18.0	15.5	16.5
11	22.0	16.0	19.0	26.5	23.0	24.5	24.0	21.0	22.5	18.0	15.5	17.0
12	20.5	18.5	19.5	28.0	21.5	24.5	---	---	---	15.5	14.5	14.5
13	23.0	18.5	21.0	26.5	22.5	24.5	---	---	---	14.5	13.0	14.0
14	21.0	18.5	19.5	28.0	23.5	25.0	---	---	---	15.0	13.0	14.0
15	22.5	17.0	19.5	29.0	23.5	26.5	---	---	---	13.5	12.0	13.0
16	23.0	17.0	20.0	26.0	24.0	25.0	---	---	---	13.0	11.0	12.0
17	22.5	18.0	20.5	28.5	23.0	25.0	---	---	---	12.0	11.0	11.5
18	20.5	18.0	19.5	25.0	23.0	23.5	---	---	---	11.5	9.0	10.5
19	21.5	15.5	18.5	25.0	21.0	23.0	---	---	---	9.5	9.0	9.5
20	21.5	17.0	19.5	23.5	22.0	23.0	---	---	---	10.5	9.0	10.0
21	24.0	18.0	21.0	24.5	21.0	22.5	---	---	---	---	---	---
22	26.5	20.0	23.0	24.0	20.0	22.0	---	---	---	---	---	---
23	29.0	21.5	25.0	25.0	19.0	22.5	---	---	---	---	---	---
24	29.0	23.5	26.0	24.5	21.5	23.0	---	---	---	---	---	---
25	29.5	23.5	26.5	24.0	21.0	22.0	---	---	---	---	---	---
26	25.5	23.0	24.0	24.5	18.0	21.5	---	---	---	---	---	---
27	22.5	19.0	21.0	24.5	19.0	22.0	---	---	---	---	---	---
28	21.5	17.5	19.5	24.5	21.0	22.5	---	---	---	---	---	---
29	22.5	17.5	19.5	26.0	19.5	23.0	---	---	---	---	---	---
30	24.0	18.0	21.0	26.5	21.5	24.5	---	---	---	---	---	---
31	---	---	---	28.5	22.5	25.0	---	---	---	---	---	---
MONTH	29.5	14.0	20.0	29.0	17.5	23.0						
YEAR	29.5	.0										

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 good. 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).--61 years (water years 1906, 1916-17, 1919, 1924-80), 1,024 ft^3/s (29.00 m^3/s), 11.31 in/yr (287 mm/yr); median of yearly mean discharges, 955 ft^3/s (27.0 m^3/s) 10.55 in/yr (268 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, 4,830 ft^3/s (137 m^3/s) Sept. 17; minimum daily, 97 ft^3/s (2.75 m^3/s) Aug. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	385	484	484	597	417	384	349	980	392	249	168	1190
2	482	484	484	531	384	352	381	818	366	363	134	1560
3	482	514	484	483	384	352	413	851	398	298	97	2200
4	450	516	484	461	417	320	413	787	398	266	281	2400
5	482	484	516	461	352	352	446	819	398	381	168	2750
6	450	484	484	428	384	320	413	884	398	399	199	2520
7	450	484	484	428	352	320	477	755	647	519	200	2400
8	482	484	484	428	384	320	555	690	553	431	201	2310
9	450	581	484	396	352	320	528	755	663	367	266	2670
10	450	484	581	461	352	351	560	492	631	399	266	2350
11	417	484	484	396	417	287	558	493	663	334	283	2320
12	450	484	484	396	384	415	557	495	663	284	285	2350
13	417	484	484	396	352	448	590	463	549	194	265	2700
14	482	549	484	428	352	352	524	527	695	428	367	3310
15	430	581	484	396	353	352	685	496	598	350	201	3450
16	336	625	484	428	321	352	782	528	566	234	184	4050
17	281	614	484	398	353	415	778	464	663	380	266	4830
18	517	614	484	398	321	366	778	528	663	367	234	4140
19	496	614	484	398	321	398	778	682	728	399	266	3780
20	399	580	484	398	352	306	832	701	663	334	251	3300
21	399	494	575	366	320	418	940	731	663	367	170	2970
22	399	552	742	398	359	482	872	764	598	350	215	2760
23	399	529	708	398	320	561	761	632	631	266	215	3180
24	399	549	770	366	320	536	648	531	628	283	129	3540
25	399	516	770	398	320	565	842	596	499	317	183	3710
26	399	516	834	333	352	532	1070	531	317	266	183	3690
27	399	516	650	398	320	620	1060	531	261	266	151	3630
28	399	484	534	366	352	251	1070	531	194	200	183	3670
29	399	484	566	371	352	413	1040	319	194	216	348	3460
30	399	484	534	384	---	381	913	330	297	281	1010	2970
31	657	---	630	384	---	413	---	297	---	184	1120	---
TOTAL	13435	15752	17122	12868	10319	12254	20613	19001	15577	9972	8489	90160
MEAN	433	525	552	415	356	395	687	613	519	322	274	3005
MAX	657	625	834	597	417	620	1070	980	728	519	1120	4830
MIN	281	484	484	333	320	251	349	297	194	184	97	1190
(†)	-61	+147	-171	-170	-148	-220	+260	+243	+29	-15	+145	+3
MEAN ‡	372	672	381	245	208	175	947	856	548	307	419	3008
CFSM ‡	.30	.55	.31	.20	.17	.14	.77	.70	.45	.25	.34	2.45
IN ‡	.35	.61	.36	.23	.18	.16	.86	.80	.50	.29	.39	2.73

CAL YR 1979 TOTAL 423735 MEAN 1161 MAX 6530 MIN 102 MEAN ‡ 1178 CFSM ‡ .96 IN ‡ 13.01
WTR YR 1980 TOTAL 245562 MEAN 671 MAX 4830 MIN 97 MEAN ‡ 674 CFSM ‡ .55 IN ‡ 7.47

† Change in contents, equivalent in cubic feet per second, in Camp Six, Bald Eagle, Gabro, Little Gabro, 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.--52 years (water years 1926, 1927, 1931-80), 1,382 ft^3/s (39.14 m^3/s), 10.79 in/yr (274 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, 3,900 ft^3/s (110 m^3/s) Sept. 30, gage height, 5.34 ft (1.628 m); minimum, 277 ft^3/s (7.84 m^3/s) Aug. 29, gage height, 2.42 ft (0.738 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	544	522	597	703	558	500	597	1070	780	622	380	405
2	540	522	597	703	551	500	597	1070	800	597	370	423
3	525	522	588	703	544	494	597	1070	780	580	363	468
4	518	529	588	703	536	494	597	1060	760	573	364	551
5	509	522	588	703	536	494	597	1050	732	580	344	674
6	496	522	597	703	529	488	597	1030	712	580	338	850
7	494	522	597	712	529	488	614	1030	703	573	333	960
8	488	529	597	712	522	488	631	1030	656	558	319	1080
9	487	522	606	694	522	481	640	1030	665	544	309	1210
10	487	522	614	684	514	474	648	1030	665	544	309	1320
11	482	522	614	684	514	474	665	1040	656	536	309	1400
12	473	514	622	674	507	488	684	1040	665	529	309	1520
13	468	522	622	665	507	507	703	1030	674	522	314	1740
14	466	522	622	656	507	514	722	1020	703	514	319	1920
15	462	522	614	665	507	514	750	1010	712	507	314	2080
16	459	522	614	665	507	522	770	980	712	507	309	2240
17	455	529	614	656	507	529	790	950	694	522	304	2550
18	459	536	614	648	500	529	830	930	694	507	304	2850
19	487	544	606	640	494	529	870	910	694	500	304	3130
20	488	551	606	631	494	529	900	900	684	494	304	3380
21	481	565	606	614	494	529	940	880	684	494	304	3540
22	479	573	606	606	494	529	980	880	674	494	300	3560
23	465	580	614	597	494	529	1000	870	684	488	300	3580
24	460	588	631	588	494	529	1020	880	684	468	304	3620
25	455	588	648	588	500	536	1040	880	665	462	304	3650
26	448	580	665	580	500	551	1050	860	656	448	295	3700
27	442	580	684	573	500	565	1050	830	665	436	295	3750
28	442	588	694	573	500	580	1060	830	694	430	290	3820
29	442	588	694	565	500	588	1060	810	674	430	300	3850
30	448	597	703	565	---	588	1070	800	656	417	399	3890
31	507	---	703	565	---	597	---	780	---	411	399	---
TOTAL	14856	16345	19365	20018	14861	16157	24069	29580	20877	15867	10009	67711
MEAN	479	545	625	646	512	521	802	954	696	512	323	2257
MAX	544	597	703	712	558	597	1070	1070	800	622	399	3890
MIN	442	514	588	565	494	474	597	780	656	411	290	405
CFSM	.28	.31	.36	.37	.29	.30	.46	.55	.40	.29	.19	1.30
IN.	.32	.35	.41	.43	.32	.35	.51	.63	.45	.34	.21	1.45

CAL YR 1979 TOTAL 542357 MEAN 1486 MAX 7260 MIN 344 CFSM .85 IN 11.60
WTR YR 1980 TOTAL 269715 MEAN 737 MAX 3890 MIN 290 CFSM .42 IN 5.77

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.--58 years (water years 1923-80), 3,794 ft^3/s (107.4 m^3/s), 9.97 in/yr (253 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, 3,850 ft^3/s (109 m^3/s) Sept. 30, elevation, 1,184.46 ft (361.022 m); stage rising, peak occurred Oct. 10, 1980; maximum peak discharge, 2,560 ft^3/s (72.4 m^3/s) May 17, elevation, 1,183.60 ft (360.761 m); minimum, 968 ft^3/s (27.4 m^3/s) Aug. 21, elevation, 1,182.07 ft (360.296 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1570	1380	1520	1510	1520	1350	1300	2060	2350	1630	1300	1120
2	1560	1370	1520	1500	1510	1350	1300	2100	2350	1610	1290	1110
3	1520	1430	1520	1500	1510	1350	1310	2140	2330	1600	1280	1120
4	1500	1440	1520	1500	1500	1330	1300	2150	2350	1630	1300	1110
5	1490	1440	1520	1500	1500	1320	1310	2150	2300	1710	1240	1120
6	1450	1420	1530	1510	1490	1320	1320	2170	2260	1700	1250	1140
7	1460	1430	1530	1550	1490	1320	1320	2190	2220	1640	1230	1130
8	1440	1420	1530	1550	1490	1310	1330	2220	2140	1630	1200	1120
9	1430	1440	1540	1550	1480	1310	1340	2270	2160	1600	1200	1110
10	1430	1440	1560	1560	1480	1300	1350	2320	2130	1580	1180	1110
11	1430	1450	1550	1570	1470	1300	1350	2350	2130	1570	1170	1140
12	1400	1430	1550	1580	1470	1310	1360	2400	2110	1530	1150	1170
13	1390	1450	1560	1590	1460	1340	1370	2430	2100	1510	1140	1230
14	1420	1470	1560	1580	1450	1340	1380	2460	2100	1490	1140	1270
15	1400	1470	1560	1610	1440	1330	1380	2480	2090	1470	1130	1290
16	1400	1470	1550	1600	1440	1340	1400	2510	2030	1480	1120	1250
17	1380	1470	1550	1590	1430	1350	1410	2510	2000	1490	1100	1350
18	1370	1480	1550	1590	1430	1340	1430	2520	1980	1490	1070	1410
19	1380	1490	1550	1590	1430	1340	1450	2530	1930	1480	1080	1530
20	1400	1490	1550	1580	1430	1340	1480	2510	1910	1480	1080	1650
21	1370	1510	1560	1580	1420	1330	1540	2500	1880	1480	1050	1800
22	1380	1500	1550	1570	1420	1330	1580	2510	1870	1460	1040	1900
23	1330	1500	1540	1560	1410	1330	1640	2500	1850	1450	1070	2150
24	1350	1500	1540	1570	1410	1320	1690	2490	1820	1430	1080	2360
25	1340	1500	1530	1560	1390	1320	1760	2500	1730	1420	1060	2580
26	1340	1500	1530	1550	1390	1320	1830	2450	1710	1410	1040	2790
27	1320	1500	1520	1550	1380	1320	1880	2420	1720	1390	1040	3010
28	1320	1510	1520	1540	1370	1320	1930	2420	1690	1390	1030	3270
29	1320	1510	1520	1540	1360	1320	1960	2380	1680	1380	1050	3490
30	1320	1520	1520	1540	---	1310	2010	2340	1670	1360	1120	3720
31	1420	---	1520	1530	---	1310	---	2320	---	1340	1130	---
TOTAL	43630	43930	47670	48200	41970	41120	45010	73300	60590	46830	35360	51550
MEAN	1407	1464	1538	1555	1447	1326	1500	2365	2020	1511	1141	1718
MAX	1570	1520	1560	1610	1520	1350	2010	2530	2350	1710	1300	3720
MIN	1320	1370	1520	1500	1360	1300	1300	2060	1670	1340	1030	1110
CFSM	.27	.28	.30	.30	.28	.26	.29	.46	.39	.29	.22	.33
IN.	.31	.32	.34	.35	.30	.30	.32	.53	.44	.34	.25	.37

CAL YR 1979 TOTAL 1457600 MEAN 3993 MAX 15200 MIN 1300 CFSM .77 IN 10.49
WTR YR 1980 TOTAL 579160 MEAN 1582 MAX 3720 MIN 1030 CFSM .31 IN 4.17

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, 1,357.94 ft (413.900 m) Sept. 22, result of wind action; maximum daily, 1,357.85 ft (413.873 m) ~~May 11~~; minimum, 1,356.70 ft (413.522 m) Aug. 4; minimum daily, 1,356.75 ft (413.537 m) Aug. 10. Sept 21

MONTHEND ELEVATION, IN FEET NGVD, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

Oct. 31 ..... 1357.02	Feb. 29 ..... 1357.04	June 30 ..... 1357.08
Nov. 30 ..... 1357.20	Mar. 31 ..... 1357.04	July 31 ..... 1356.85
Dec. 31 ..... 1357.14	Apr. 30 ..... 1357.62	Aug. 31 ..... 1357.14
Jan. 31 ..... 1357.10	May 31 ..... 1357.25	Sept.30 ..... 1357.77

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 current year.

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.--58 years, 318 ft^3/s (9.006 m^3/s), 8.94 in/yr (227 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, 494 ft^3/s (14.0 m^3/s) Sept. 28, gage height, 5.02 ft (1.530 m); minimum, 15 ft^3/s (0.42 m^3/s) Aug. 8, gage height, 2.64 ft (0.805 m), affected by wind action; minimum daily, 22 ft^3/s (0.62 m^3/s) Aug. 8,10.

REVISIONS.--The minimum discharges for the water years 1978 and 1979 have been revised to 133 ft^3/s (3.77 m^3/s) Apr. 2, 1978, gage height, 3.77 ft (1.149 m) and 85 ft^3/s (2.41 m^3/s) Sept. 9, 1979, gage height 3.54 ft (1.079 m), affected by wind action, superceding figures published in reports for 1978 and 1979.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	112	130	170	140	129	111	107	378	206	125	39	148
2	122	140	173	140	126	110	107	378	201	120	31	154
3	101	150	168	135	124	107	108	370	196	117	32	170
4	99	160	167	135	124	105	109	360	210	141	50	194
5	99	165	165	130	123	105	111	329	196	137	33	189
6	85	170	167	140	123	104	115	318	191	144	28	203
7	90	170	163	143	122	102	120	313	182	137	28	206
8	83	170	164	143	121	101	128	311	168	133	22	216
9	77	165	165	143	121	101	138	321	164	131	23	206
10	89	165	165	143	122	99	148	314	169	125	22	210
11	77	165	164	144	122	98	155	308	174	126	24	214
12	69	165	166	145	122	107	161	309	177	118	27	226
13	72	160	166	144	121	120	167	304	162	117	41	262
14	77	160	166	140	120	119	172	302	172	113	48	305
15	76	160	162	151	118	118	176	300	174	103	48	345
16	74	160	161	149	117	120	186	297	167	99	50	295
17	73	160	161	146	116	124	196	293	157	96	49	329
18	80	170	159	146	116	123	214	280	158	99	37	348
19	80	170	156	145	115	121	234	279	146	94	40	395
20	93	170	157	144	117	121	261	273	145	87	44	405
21	85	170	152	142	116	119	285	264	141	82	49	434
22	85	170	149	139	118	118	297	258	141	76	43	413
23	85	165	149	139	119	116	306	249	138	77	48	439
24	80	165	148	139	117	114	327	243	135	76	51	458
25	75	165	148	137	117	114	344	249	132	64	51	444
26	75	165	147	137	117	113	356	234	130	63	54	467
27	75	169	147	136	114	113	362	217	130	63	56	448
28	75	170	146	135	112	112	371	216	132	57	62	475
29	75	171	146	134	110	111	374	203	132	55	57	458
30	90	171	145	132	---	110	376	187	130	54	124	464
31	110	---	140	131	---	109	---	186	---	48	138	---
TOTAL	2638	4906	4902	4347	3459	3465	6511	8843	4856	3077	1449	9520
MEAN	85.1	164	158	140	119	112	217	285	162	99.3	46.7	317
MAX	122	171	173	151	129	124	376	378	210	144	138	475
MIN	69	130	140	130	110	98	107	186	130	48	22	148
CFSM	.18	.34	.33	.29	.25	.23	.45	.59	.34	.21	.10	.66
IN.	.20	.38	.38	.33	.27	.27	.50	.68	.37	.24	.11	.73

CAL YR 1979 TOTAL 132583 MEAN 363 MAX 1410 MIN 69 CFSM .75 IN 10.21
WTR YR 1980 TOTAL 57973 MEAN 158 MAX 475 MIN 22 CFSM .33 IN 4.46

NOTE.--No gage-height record Oct. 22 to Nov. 26.

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 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 PERIOD.--August to September 1979: Maximum discharge during period, 600 ft^3/s (17.0 m^3/s), Aug. 1, from correlation with nearby station; minimum, 223 ft^3/s (6.32 m^3/s) Aug. 31, gage height, 5.50 ft (1.676 m).

Water year 1980: Maximum discharge, 1,650 ft^3/s (46.7 m^3/s) Apr. 21, gage height, 10.56 ft (3.219 m), from high-water mark; minimum, 38 ft^3/s (1.08 m^3/s) Aug. 13, 14, gage height, 3.68 ft (1.122 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1								3270†			595	319
2											580	326
3											560	325
4											540	328
5											520	332
6											500	319
7											480	298
8											450	289
9											430	284
10											400	296
11											380	328
12											360	360
13										694†	350	374
14											340	372
15											330	364
16											314	356
17											301	351
18											289	330
19											271	316
20											255	310
21											248	298
22											253	286
23											276	278
24											279	274
25											274	261
26											264	250
27											261	247
28											256	242
29											250	236
30											236	230
31											264	---
TOTAL											11106	9179
MEAN											358	306
MAX											595	374
MIN											236	230

† Result of discharge measurement.

NOTE.--No gage-height record Aug. 1-14.

05129115 VERMILION RIVER NEAR CRANE LAKE, MN--Continued

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	220	469	354	239	223	179	236	845	256	144	65	255
2	211	573	349	235	224	183	256	823	273	138	59	303
3	210	614	347	230	224	200	264	793	273	134	55	317
4	202	601	347	226	236	202	271	763	269	136	55	368
5	194	588	349	221	220	193	308	706	271	136	55	438
6	186	563	349	221	221	185	388	648	276	133	53	498
7	177	531	345	230	220	181	491	608	260	137	50	507
8	176	503	334	227	218	183	588	580	248	134	47	482
9	170	478	332	220	214	186	632	565	230	135	44	464
10	164	455	330	220	212	190	645	555	223	135	41	455
11	165	436	330	230	210	189	629	570	220	135	40	440
12	159	429	321	226	208	191	598	575	220	131	39	431
13	157	414	319	230	208	205	565	565	221	126	38	478
14	154	404	312	235	204	208	546	546	214	123	38	553
15	153	400	312	235	202	215	583	538	211	121	40	645
16	151	398	298	239	197	218	667	522	210	121	42	708
17	148	398	293	244	193	215	832	498	198	115	46	706
18	146	396	289	245	196	217	1100	473	189	118	50	708
19	156	402	289	241	201	218	1400	449	183	111	54	743
20	173	412	289	235	204	220	1600	438	177	107	53	889
21	183	419	286	230	202	217	1620	419	169	101	59	995
22	185	421	284	232	202	214	1550	398	165	97	58	1060
23	186	414	279	220	202	212	1430	378	162	93	60	1050
24	187	406	276	217	204	210	1310	360	158	89	63	1010
25	187	396	269	223	200	207	1200	343	153	85	65	961
26	187	390	266	220	191	207	1110	334	137	80	68	911
27	190	386	263	226	191	210	1040	321	129	78	64	867
28	190	384	260	227	190	211	978	301	156	78	62	817
29	189	368	252	226	182	214	928	283	152	75	68	790
30	189	362	247	224	---	217	879	260	150	74	140	760
31	274	---	244	221	---	221	---	247	---	71	190	---
TOTAL	5619	13410	9414	7095	5999	6318	24644	15704	6153	3491	1861	19609
MEAN	181	447	304	229	207	204	821	507	205	113	60.0	654
MAX	274	614	354	245	236	221	1620	845	276	144	190	1060
MIN	146	362	244	217	182	179	236	247	129	71	38	255

WTR YR 1980 TOTAL 119317 MEAN 326 MAX 1620 MIN 38

NOTE.--No gage-height record Apr. 19, 20.

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, 1,107.59 ft (337.593 m) Nov. 28, maximum daily elevation, 1,107.54 ft (337.578 m) Dec. 5, 6; minimum daily, 1,104.67 ft (336.703 m) Apr. 4.

MONTHEND ELEVATION, IN FEET NGVD, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

Oct. 31 ..... 1107.04	Feb. 29 ..... 1105.33	June 30 ..... 1105.01
Nov. 30 ..... 1107.53	Mar. 31 ..... 1104.73	July 31 ..... 1104.96
Dec. 31 ..... 1107.21	Apr. 30 ..... 1105.34	Aug. 31 ..... 1105.04
Jan. 31 ..... 1106.32	May 31 ..... 1105.28	Sept.30 ..... 1105.21

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 and those for periods of no gage-height record, Oct. 22 to Nov. 25, Dec. 1 to Jan. 13, Jan. 21 to Feb. 24, which are fair.

AVERAGE DISCHARGE.--38 years, 124 ft^3/s (3.512 m^3/s), 9.00 in/yr (229 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.--Maximum discharge, 397 ft^3/s (11.2 m^3/s) Apr. 20, gage height, 3.59 ft (1.094 m), no peak above base of 500 ft^3/s (14.2 m^3/s); minimum, 9.9 ft^3/s (.28 m^3/s) Aug. 9, 10, gage height, 1.21 ft (0.369 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	190	65	31	27	26	39	135	32	46	14	33
2	33	230	63	31	27	26	53	123	46	42	13	32
3	35	230	61	30	27	26	72	114	45	35	12	30
4	37	200	59	30	27	26	84	108	42	38	13	48
5	37	170	57	30	27	26	116	99	38	88	13	71
6	35	135	56	29	27	26	166	89	37	72	13	97
7	33	115	54	29	27	26	226	81	44	62	12	94
8	34	100	53	29	27	26	281	75	45	50	11	82
9	33	90	51	28	27	26	310	74	41	39	10	91
10	31	80	49	28	27	26	305	73	37	32	10	88
11	34	75	48	28	27	26	266	78	33	26	11	79
12	32	70	47	28	26	26	218	77	31	22	13	74
13	33	66	46	28	26	26	181	73	54	19	19	104
14	33	64	45	28	26	26	169	70	64	17	18	134
15	34	63	44	27	26	26	202	66	74	15	16	157
16	35	64	42	27	26	25	227	62	63	15	16	164
17	36	65	41	27	26	25	285	57	52	14	17	142
18	36	68	40	27	26	25	337	54	41	14	18	144
19	41	74	39	27	26	25	371	51	34	22	19	152
20	47	79	39	27	26	25	390	49	28	28	24	183
21	50	83	38	27	26	25	388	51	24	28	40	188
22	56	85	37	27	26	25	366	48	22	30	42	174
23	58	86	36	27	26	25	327	43	20	29	50	150
24	57	84	36	27	26	25	285	39	19	33	56	144
25	55	82	35	27	26	25	251	34	17	28	53	136
26	53	80	34	27	26	25	227	30	15	24	53	130
27	52	77	34	27	26	25	206	27	16	22	47	121
28	55	65	33	27	26	26	189	25	31	20	42	107
29	60	69	33	27	26	27	175	24	46	18	36	96
30	70	67	32	27	---	29	159	24	46	17	38	84
31	110	---	32	27	---	32	---	23	---	16	34	---
TOTAL	1377	3006	1379	866	765	804	6871	1976	1137	961	783	3329
MEAN	44.4	100	44.5	27.9	26.4	25.9	229	63.7	37.9	31.0	25.3	111
MAX	110	230	65	31	27	32	390	135	74	88	56	188
MIN	31	63	32	27	26	25	39	23	15	14	10	30
CFSM	.24	.54	.24	.15	.14	.14	1.23	.34	.20	.17	.14	.59
IN.	.27	.60	.27	.17	.15	.16	1.37	.39	.23	.19	.16	.66

CAL YR 1979 TOTAL 48840 MEAN 134 MAX 2370 MIN 22 CFSM .72 IN 9.72
WTR YR 1980 TOTAL 23254 MEAN 63.5 MAX 390 MIN 10 CFSM .34 IN 4.63

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. Prior to Oct. 24, 1979, at site 1.2 mi (1.9 km) downstream.

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.--57 years (water years 1912-16, 1929-80), 1,049 ft^3/s (29.71 m^3/s), 8.23 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, 5,600 ft^3/s (159 m^3/s) Nov. 2, gage height, 8.26 ft (2.518 m); maximum gage height, 9.47 ft (2.886 m) Apr. 17 (backwater from ice); minimum discharge, 57 ft^3/s (1.61 m^3/s) Aug. 13, 14, 15, gage height, 1.74 ft (0.530 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	155	3430	750	310	170	135	150	1810	232	142	91	365
2	151	5500	720	300	168	134	160	1660	196	162	82	447
3	147	4980	700	290	166	134	200	1520	187	205	74	593
4	142	4280	680	285	164	133	300	1390	223	223	71	566
5	137	3610	660	280	162	133	500	1280	260	249	70	490
6	139	3090	640	275	160	132	1000	1140	302	245	66	433
7	136	2660	620	270	158	132	2000	1030	302	229	64	492
8	136	2260	600	260	156	131	3000	943	302	440	62	596
9	137	1820	580	255	154	131	3500	874	298	514	60	598
10	139	1520	560	250	152	130	3000	843	288	474	60	571
11	143	1350	550	245	151	130	2500	842	284	409	60	571
12	148	1200	530	240	150	129	2100	835	284	351	59	707
13	153	1100	520	235	149	129	1900	813	273	297	57	735
14	150	1050	510	230	148	128	1800	808	260	256	57	710
15	163	1000	500	225	147	128	2000	784	242	223	58	1090
16	160	1000	480	220	146	127	2500	749	238	202	64	1580
17	155	1000	470	215	145	126	3200	699	260	181	80	1640
18	156	1050	450	210	144	125	4100	656	357	165	87	1550
19	160	1100	440	205	143	124	4660	606	361	158	95	1470
20	177	1100	430	200	142	124	4840	562	329	150	93	1610
21	201	1100	420	197	141	123	4740	531	298	140	89	1960
22	259	1100	405	194	140	123	4520	496	263	128	87	2160
23	336	1050	390	191	139	123	4210	450	229	140	99	2080
24	370	1000	380	188	138	124	3720	424	205	148	135	1850
25	375	950	370	185	137	125	3300	397	181	140	260	1630
26	354	900	360	182	137	126	2950	373	162	132	242	1440
27	346	850	350	180	136	127	2660	349	142	128	229	1300
28	339	810	340	178	136	129	2400	317	140	118	232	1140
29	336	800	330	176	135	132	2160	294	150	114	245	1030
30	339	780	320	174	---	136	1980	274	150	110	291	919
31	501	---	315	172	---	140	---	246	---	103	317	---
TOTAL	6740	53440	15370	7017	4314	4003	76050	23995	7398	6676	3636	32323
MEAN	217	1781	496	226	149	129	2535	774	247	215	117	1077
MAX	501	5500	750	310	170	140	4840	1810	361	514	317	2160
MIN	136	780	315	172	135	123	150	246	140	103	57	365
CFSM	.13	1.03	.29	.13	.09	.08	1.47	.45	.14	.12	.07	.62
IN.	.14	1.15	.33	.15	.09	.09	1.64	.52	.16	.14	.08	.70

CAL YR 1979 TOTAL 473622 MEAN 1298 MAX 20500 MIN 105 CFSM .75 IN 10.18
WTR YR 1980 TOTAL 240962 MEAN 658 MAX 5500 MIN 57 CFSM .38 IN 5.18

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.

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE, WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	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)
OCT												
01...	1430	155	155	8.5	12.0	15.0	6.0	8.2	83	K9	K4	88
NOV												
19...	1300	1250	120	7.9	8.0	.5	4.0	--	--	14	33	63
DEC												
19...	1500	460	175	7.2	4.0	.5	4.0	11.8	85	K1	K2	85
FEB												
04...	1630	165	230	7.6	-11.0	.0	5.0	9.9	70	K3	K8	110
MAR												
20...	1545	125	265	7.5	6.0	.5	1.9	10.2	73	K3	<1	120
APR												
21...	1430	4690	100	7.6	30.0	7.0	40	--	--	K2	K17	46
JUN												
24...	1130	200	200	8.0	28.0	24.0	3.0	7.1	86	58	33	90
JUL												
28...	1540	118	200	8.5	26.0	24.0	6.8	7.9	96	53	36	100
AUG												
25...	1400	278	240	8.2	27.0	22.5	3.4	7.9	93	63	72	120
SEP												
23...	1005	2100	101	7.9	9.0	10.5	4.0	--	--	100	80	54

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)	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 (MG/L AS CACO3) (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)
OCT												
01...	15	23	7.3	3.5	.2	1.4	73	14	2.5	.1	7.5	195
NOV												
19...	12	16	5.7	2.2	.1	1.2	51	8.1	2.3	.1	8.8	121
DEC												
19...	16	22	7.2	2.8	.1	1.4	69	7.3	2.3	.1	8.8	137
FEB												
04...	0	29	9.0	4.3	.2	1.8	110	9.9	3.1	.1	12	174
MAR												
20...	0	31	10	5.8	.2	2.0	120	12	2.5	.2	14	187
APR												
21...	2	13	3.3	2.5	.2	1.6	44	5.6	1.9	.1	6.3	88
JUN												
24...	7	24	7.3	6.1	.3	1.9	83	7.9	2.2	.2	4.4	147
JUL												
28...	10	27	8.3	4.6	.2	1.6	92	11	3.4	.1	5.6	154
AUG												
25...	6	30	10	5.4	.2	1.9	110	12	2.3	.2	5.3	155
SEP												
23...	14	14	4.5	2.4	.1	1.4	42	8.8	3.3	.1	11	133

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT												
01...	104	81.6	.01	.01	.040	.040	.74	.74	.040	.010	0	--
NOV												
19...	75	408	.06	.06	.050	.050	1.1	.95	.030	.020	0	27
DEC												
19...	94	170	.07	.07	.020	.000	.93	.91	.030	.010	--	34
FEB												
04...	137	77.5	.14	.14	.060	.060	.72	.71	.050	.020	0	--
MAR												
20...	151	63.1	.29	.29	.010	.010	.38	.38	.040	.030	--	17
APR												
21...	62	1110	.14	.14	.010	.010	1.0	1.0	.100	.050	0	--
JUN												
24...	104	79.4	.01	.01	.030	.030	.60	.60	.020	.020	--	16
JUL												
28...	117	49.1	.00	.00	.020	.020	.86	.55	.040	.020	0	20
AUG												
25...	133	116	.00	.00	.010	.000	.43	.39	.040	.020	0	--
SEP												
23...	71	754	.07	.06	.010	.000	1.3	.99	.090	.030	0	45

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)
OCT										
01...	1430	3	3	100	30	0	0	30	10	0
FEB										
04...	1630	2	2	100	40	1	1	20	20	3
APR										
21...	1430	3	3	<50	20	0	0	40	<10	0
AUG										
25...	1400	3	3	<50	0	0	0	30	20	0

DATE	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	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)
OCT										
01...	0	4	4	1100	540	3	3	80	40	<.5
FEB										
04...	0	4	3	1200	760	1	0	50	40	.1
APR										
21...	0	6	6	2700	270	2	0	80	20	.1
AUG										
25...	0	3	3	410	100	2	2	70	10	.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	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, 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 (MG/L AS C) (00689)
OCT										
01...	<.5	3	2	0	0	0	20	20	19	--
FEB										
04...	<.1	9	0	0	0	0	40	40	17	.8
APR										
21...	.1	7	0	0	0	0	40	30	17	--
AUG										
25...	.1	3	1	0	0	0	10	10	19	.1

PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980

DATE TIME	OCT 1,79 1430		NOV 19,79 1300		DEC 19,79 1500		MAR 20,80 1545	
TOTAL CELLS/ML	52		13		250		40	
DIVERSITY: DIVISION	0.8		0.0		1.7		1.9	
.CLASS	0.8		0.0		1.7		1.9	
..ORDER	1.5		0.0		1.8		2.5	
...FAMILY	1.5		0.0		1.9		2.5	
....GENUS	1.5		0.0		1.9		2.5	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	81#	32	5	13
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....FRANCEIA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	5	2	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	13#	25	--	-	--	-	5	13
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	26#	50	--	-	45#	18	10#	25
....MELOSIRA	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	13#	100	--	-	--	-
..PENNALES								
...CYMBELLACEAE								
....RHOPALODIA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....SYNEDRA	--	-	--	-	--	-	5	13
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	13#	25	--	-	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	--	-	--	-	5	2	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	--	-	--	-	10#	25
..HORMOGONALES								
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	--	-
....SCHIZOTHRIX	--	-	--	-	110#	42	--	-
...RIVULARIACEAE								
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	5	2	--	-
....TRACHELOMONAS	--	-	--	-	--	-	5	13
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	5	2	--	-

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

PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980--Continued

DATE	APR 21,80		JUN 24,80		JUL 28,80		SEP 23,80	
TIME	1430		1130		1540		1005	
TOTAL CELLS/ML	1600		2600		1800		1000	
DIVERSITY: DIVISION	0.7		1.2		1.3		1.3	
.CLASS	0.7		1.2		1.3		1.3	
..ORDER	0.7		1.4		1.5		1.4	
...FAMILY	1.2		1.4		1.6		1.9	
....GENUS	1.5		1.7		1.9		2.5	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	26	1	13	1	--	-
....DICTYOSPHAERIUM	--	-	180	7	--	-	--	-
....FRANCEIA	--	-	26	1	--	-	--	-
....OOCYSTIS	--	-	65	2	13	1	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	150	8	--	-
....SCENEDESMUS	--	-	--	-	130	7	140	14
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	83	5	*	0	52	3	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	390	15	52	3	29	3
....MELOSIRA	--	-	120	4	100	6	29	3
....STEPHANODISCUS	--	-	--	-	--	-	--	-
..PENNALES								
...CYMBELLACEAE								
....RHOPALODIA	--	-	--	-	--	-	14	1
...FRAGILARIACEAE								
....SYNEDRA	28	2	--	-	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	14	1	--	-	13	1	--	-
...NAVICULACEAE								
....NAVICULA	41	3	--	-	--	-	14	1
...NITZSCHIACEAE								
....NITZSCHIA	28	2	77	3	26	1	72	7
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	52	3	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	1700#	66	1200#	67	--	-
..HORMOGONALES								
...OSCILLATORIACEAE								
....LYNGBYA	110	7	--	-	--	-	220#	21
....OSCILLATORIA	1200#	74	--	-	--	-	420#	40
....SCHIZOTHRIX	--	-	--	-	--	-	--	-
...RIVULARIACEAE								
....RAPHIDIOPSIS	110	7	--	-	--	-	87	8
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	14	1
....TRACHELOMONAS	14	1	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	--	-	--	-

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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)
FEB						
04...	1630	45	.080	.080	.000	.000
JUN						
24...	1130	74	12.8	11.6	.860	.310
JUL						
28...	1540	34	6.93	3.94	6.44	.600
SEP						
23...	1005	29	1.58	1.42	.270	.000

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	TEMPERATURE, WATER (DEG C) (00010)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
OCT						
01...	1535	156	15.0	8	3.4	100
NOV						
19...	1300	1250	.5	14	47	--
DEC						
19...	1500	460	.5	10	12	--
FEB						
04...	1615	164	.0	11	4.9	--
MAR						
20...	1545	125	.5	12	4.0	--
APR						
21...	1430	4690	7.0	222	2810	93
JUN						
24...	1130	200	24.0	8	4.3	--
JUL						
28...	1545	119	26.0	11	3.5	100
AUG						
25...	1400	278	22.5	10	7.5	100
SEP						
23...	1025	2110	10.5	75	427	98

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 ga[u 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.--52 years, 12,830 ft^3/s (363.3 m^3/s), 8.98 in/yr (228 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, 17,400 ft^3/s (493 m^3/s) Apr. 20, gage height, 7.97 ft (2.429 m); minimum, 3,130 ft^3/s (88.6 m^3/s) Aug. 14, 15, gage height, 1.11 ft (0.338 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4950	7260	9200	9100	10900	9950	7360	10700	3780	3480	3350	5040
2	4950	12200	9100	8900	11000	9600	8180	10000	3720	3510	3360	5320
3	4790	15700	9000	8900	11000	9600	8580	9640	3710	3520	3370	5010
4	4810	15900	8900	9000	10900	8400	8030	9330	3680	3560	3370	4980
5	4780	15100	8800	9000	11000	8050	9150	9010	3660	3580	3340	5040
6	4620	14000	9200	9000	11000	8300	9770	8590	3700	3590	3360	4920
7	4370	13300	9500	9000	11000	8400	10600	8000	3740	3550	3340	4710
8	4370	12300	9400	9000	10900	8300	13100	7190	3810	3560	3270	4640
9	4490	10800	9400	9100	11000	8250	14500	6660	3880	3590	3260	4740
10	4650	9210	9300	9150	10900	8250	15000	6430	3870	3690	3340	4710
11	4660	8160	9200	8900	11000	8300	14900	6390	3810	3720	3360	4600
12	4550	7610	9100	8800	10900	8350	13700	6470	3780	3640	3340	4520
13	4580	7360	9100	9000	10900	8400	13000	6340	3770	3600	3180	4880
14	4630	7420	9100	9400	10900	8300	12200	6210	3740	3510	3140	5110
15	4760	7630	8900	9300	10900	8200	12100	6080	3720	3480	3140	5240
16	4880	8120	8800	9300	10100	8000	12600	5960	3680	3500	3160	5560
17	4900	8460	8900	9400	10100	7300	13300	5800	3660	3460	3260	6030
18	4600	8520	9400	9400	10100	8250	14800	5610	3670	3440	3370	6140
19	4440	8610	9500	10500	10200	8300	16800	5470	3700	3450	3360	6180
20	4720	9040	9800	10800	10000	7900	17200	5290	3750	3400	3350	6270
21	4850	9060	9800	11200	10000	8200	16600	5130	3760	3380	3360	6490
22	4860	8960	9700	11200	10100	8400	16000	4930	3710	3370	3370	7120
23	4950	9070	9700	11000	10100	8150	15600	4690	3620	3370	3410	7560
24	5140	9150	9600	11200	10100	7950	14800	4590	3550	3360	3420	7420
25	5150	9050	9600	10700	10100	7500	13500	4480	3450	3390	3430	7100
26	5030	8920	8800	10600	10100	7500	13100	4320	3460	3390	3530	6740
27	5230	8830	9500	11100	10100	7400	12600	4240	3480	3380	3620	6280
28	5360	8770	9400	11000	10000	7300	11600	4180	3460	3380	3620	5940
29	5350	9400	9400	11100	10000	7200	10900	4010	3470	3390	3810	5560
30	5410	9300	9400	11000	---	7100	10700	3850	3500	3370	4140	5380
31	5740	---	9400	11000	---	7020	---	3800	---	3370	4350	---
TOTAL	150570	297210	287900	306050	305300	252120	380270	193390	110290	107980	106080	169230
MEAN	4857	9907	9287	9873	10530	8133	12680	6238	3676	3483	3422	5641
MAX	5740	15900	9800	11200	11000	9950	17200	10700	3880	3720	4350	7560
MIN	4370	7260	8800	8800	10000	7020	7360	3800	3450	3360	3140	4520
CFSM	.25	.51	.48	.51	.54	.42	.65	.32	.19	.18	.18	.29
IN.	.29	.57	.55	.59	.59	.48	.73	.37	.21	.21	.20	.32

CAL YR 1979 TOTAL 5069560 MEAN 13890 MAX 60800 MIN 4370 CFSM .72 IN 9.72
WTR YR 1980 TOTAL 2666390 MEAN 7285 MAX 17200 MIN 3140 CFSM .38 IN 5.11

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.

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE, WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	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)
OCT												
02...	1300	5000	95	8.0	13.5	14.0	2.0	6.2	61	K10	140	37
NOV												
13...	1400	7340	100	7.8	.0	.5	3.0	11.4	82	16	62	41
DEC												
20...	1300	9800	135	7.3	3.0	.5	1.0	11.2	81	--	27	53
FEB												
05...	1045	11000	93	7.5	-7.0	.0	1.0	11.7	83	K19	K10	40
MAR												
19...	1430	8300	75	7.2	8.0	.5	.59	12.0	86	490	K1	25
APR												
22...	1030	15600	120	7.7	15.0	8.0	32	--	--	K10	K10	41
JUN												
25...	1300	3470	130	7.6	29.0	23.0	1.2	6.5	76	31	K10	40
JUL												
29...	1115	3390	122	8.1	25.5	23.0	2.5	7.5	89	K630	K8	39
AUG												
26...	1130	3550	130	7.5	10.0	18.0	1.7	6.1	67	K150	20	43
SEP												
23...	1400	7580	123	7.7	11.0	11.5	2.6	--	--	E80	64	49

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)	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 (MG/L AS CACO3) (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)
OCT												
02...	7	10	2.8	5.6	.4	.8	30	5.0	7.4	.1	1.6	70
NOV												
13...	4	11	3.4	4.4	.3	1.1	37	6.5	5.3	.1	4.9	111
DEC												
20...	1	14	4.3	3.2	.2	.9	52	5.8	3.0	.1	4.9	87
FEB												
05...	2	11	3.0	2.7	.2	.7	38	5.3	2.7	--	3.7	147
MAR												
19...	0	6.9	1.9	3.3	.3	.8	25	5.3	3.2	.1	2.6	60
APR												
22...	0	11	3.2	2.7	.2	1.1	41	5.4	3.3	.1	4.7	130
JUN												
25...	11	11	3.0	7.4	.5	1.0	29	6.5	9.4	.1	1.7	80
JUL												
29...	8	11	2.8	6.6	.5	.9	31	6.8	11	.1	1.6	104
AUG												
26...	5	12	3.2	6.8	.5	1.6	38	6.5	8.4	.1	1.7	78
SEP												
23...	12	13	4.0	4.5	.3	1.0	39	7.4	6.0	.1	6.0	107

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT												
02...	52	945	.03	.02	.050	.040	.36	.35	.040	.010	0	--
NOV												
13...	59	2200	.07	.07	.070	.020	.71	.66	.040	.020	--	16
DEC												
20...	68	2300	.10	.08	.020	.000	.69	.69	.030	.020	--	15
FEB												
05...	53	4370	.09	.09	.020	.020	.57	.43	.030	.030	0	--
MAR												
19...	40	1350	.11	.10	.040	.010	.21	.18	.030	.020	--	3.6
APR												
22...	57	5480	.13	.10	.060	.030	.76	.62	.070	.050	0	--
JUN												
25...	58	750	.02	.02	.030	.030	.58	.28	.060	.040	--	12
JUL												
29...	59	952	.00	.00	.030	.020	.48	.22	.040	.020	0	10
AUG												
26...	63	748	.04	.04	.080	.080	.50	.36	.100	.070	0	--
SEP												
23...	66	2190	.04	.04	.030	.010	.84	.72	.080	.030	0	38

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)
OCT										
02...	1300	3	3	100	30	1	1	30	<10	1
FEB										
05...	1045	1	1	100	20	0	0	20	20	3
APR										
22...	1030	1	1	<50	20	0	0	40	<10	0
AUG										
26...	1130	4	3	<50	0	0	0	30	20	0

DATE	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	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)
OCT										
02...	1	5	5	280	80	3	3	40	10	.9
FEB										
05...	0	4	4	200	100	0	0	10	10	<.1
APR										
22...	0	5	4	1200	130	1	0	40	10	.2
AUG										
26...	0	8	8	240	50	1	0	50	30	.2

DATE	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	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, 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 (MG/L AS C) (00689)
OCT										
02...	<.5	0	0	0	0	0	10	10	8.6	--
FEB										
05...	<.1	2	0	0	0	0	60	40	12	.7
APR										
22...	.2	8	0	0	0	0	250	250	14	.2
AUG										
26...	<.1	3	2	0	0	0	10	10	11	.4

PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980

DATE	OCT 2,79		NOV 13,79		DEC 20,79		MAR 19,80	
TIME	1245		1400		1300		1430	
TOTAL CELLS/ML	3100		570		15000		1600	
DIVERSITY: DIVISION	1.3		0.5		0.3		0.3	
.CLASS	1.3		0.5		0.3		0.3	
..ORDER	1.5		0.6		0.6		0.9	
...FAMILY	1.8		0.6		0.8		0.9	
....GENUS	2.0		0.6		0.9		1.6	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	*	0	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	77	2	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	26	1	--	-	*	0	43	3
....CHODATELLA	*	0	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	400	3	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	77	2	--	-	*	0	--	-
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CARTERIA	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	*	0	13	2	--	-	14	1
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	51	2	13	2	150	1	--	-
....MELOSIRA	1100#	34	--	-	--	-	--	-
....STEPHANODISCUS	39	1	--	-	*	0	--	-
..PENNALES								
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	90	3	--	-	*	0	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	*	0	--	-	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	13	2	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	--	-	13	2	--	-	14	1
...TABELLARIACEAE								
....TABELLARIA	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	*	0	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	110	1	--	-
....ANACYSTIS	*	0	--	-	580	4	200	12
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	77	2	--	-	480	3	--	-
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	420#	26
....OSCILLATORIA	1500#	50	520#	91	13000#	87	930#	58

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

DATE	OCT 2,79		NOV 13,79		DEC 20,79		MAR 19,80	
TIME	1245		1400		1300		1430	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..GYMNODINIALES								
...GYMNODINIACEAE								
....GYMNODINIUM	--	-	--	-	*	0	--	-
DATE	APR 22,80		JUN 25,80		JUL 29,80		SEP 23,80	
TIME	1030		1300		1115		1400	
TOTAL CELLS/ML	260		3200		11000		770	
DIVERSITY: DIVISION	1.2		1.4		0.8		1.3	
.CLASS	1.2		1.4		0.8		1.3	
..ORDER	2.1		2.2		1.0		1.6	
...FAMILY	2.5		2.8		1.1		1.8	
....GENUS	2.5		3.0		1.3		1.9	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	--	-	--	-	*	0	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	39	1	77	1	--	-
....CHODATELLA	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	230	7	--	-	--	-
....OOCYSTIS	--	-	52	2	--	-	--	-
....SELENASTRUM	--	-	--	-	100	1	--	-
....TETRAEDRON	--	-	26	1	*	0	--	-
....WESTELLA	--	-	--	-	410	4	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	52#	20	180	6	130	1	26	3
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	*	0	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CARTERIA	13	5	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	90	3	64	1	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	77#	30	77	2	*	0	--	-
....MELOSIRA	--	-	26	1	300	3	180#	23
....STEPHANODISCUS	--	-	--	-	--	-	13	2
..PENNALES								
...CYMBELLACEAE								
....CYMBELLA	26	10	--	-	--	-	13	2
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	39	1	--	-	52	7
....FRAGILARIA	--	-	350	11	--	-	--	-
....SYNEDRA	--	-	--	-	*	0	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	13	5	26	1	*	0	13	2
...NITZSCHIACEAE								
....NITZSCHIA	52#	20	100	3	*	0	26	3
...TABELLARIACEAE								
....TABELLARIA	--	-	100	3	400	4	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	--	-

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

PHYTOPLANKTON ANALYSES, OCTOBER 1979 TO SEPTEMBER 1980--Continued

DATE TIME	APR 22,80 1030		JUN 25,80 1300		JUL 29,80 1115		SEP 23,80 1400	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	*	0	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	210	2	--	-
....ANACYSTIS	26	10	1200#	36	8800#	81	--	-
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	130	4	210	2	--	-
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	570#	18	--	-	440#	57
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	13	2
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..GYMNODINIALES								
...GYMNODINIACEAE								
....GYMNODINIUM	--	-	--	-	--	-	--	-

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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)
FEB						
05...	1045	47	.000	.000	.000	.000
JUL						
29...	1115	34	6.38	4.72	12.6	4.52
SEP						
23...	1400	28	.551	.315	.080	.000

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	TEMPERATURE, WATER (DEG C) (00010)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
OCT						
02...	1445	4620	14.0	6	75	--
NOV						
13...	1400	7340	.5	7	139	97
DEC						
20...	1300	9800	.5	5	132	--
FEB						
05...	1045	11000	.0	3	89	--
MAR						
19...	1430	8300	.5	1	22	--
APR						
22...	1030	15600	8.0	95	4000	96
JUN						
25...	1300	3470	23.0	3	28	--
JUL						
29...	1140	3410	23.0	10	92	74
AUG						
26...	1130	3550	18.0	7	64	100
SEP						
23...	1415	7580	11.5	1	20	80

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 and period of no gage-height record, Oct. 26 to Dec. 5, which are fair.

AVERAGE DISCHARGE.--24 years, 314 ft^3/s (8.892 m^3/s), 7.85 in/yr (199 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, 1,420 ft^3/s (40.2 m^3/s) Apr. 8, gage height, 8.83 ft (2.691 m) (backwater from ice); minimum, 1.4 ft^3/s (0.040 m^3/s) Aug. 4; minimum gage height, 1.72 ft (0.524 m) Aug. 1, 2, 3, 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.8	33	48	23	14	10	20	345	33	5.9	1.8	105
2	4.6	60	46	23	14	10	25	320	36	6.6	1.6	110
3	4.5	75	45	23	13	10	60	305	33	5.3	1.6	105
4	4.5	80	43	22	13	10	120	287	31	5.3	1.9	100
5	4.3	82	42	22	13	10	230	259	29	4.2	2.0	95
6	4.9	83	41	22	13	10	480	234	34	3.6	1.9	85
7	4.8	82	40	22	13	10	1000	218	32	3.6	2.3	75
8	4.5	80	38	21	12	10	1390	204	25	3.5	2.7	65
9	4.5	76	37	21	12	10	1150	195	20	2.9	2.3	75
10	4.6	70	36	21	12	10	950	202	11	2.8	2.6	78
11	4.6	68	35	20	12	10	840	222	14	2.8	2.3	72
12	4.3	63	34	20	12	10	760	227	10	2.7	3.0	63
13	4.4	62	33	20	12	10	760	217	18	2.6	2.2	80
14	4.8	61	32	19	11	10	737	202	14	2.4	1.9	119
15	5.5	61	31	19	11	10	782	190	12	2.2	1.6	138
16	5.4	63	30	19	11	10	761	180	9.7	2.9	1.6	136
17	5.0	65	29	18	11	10	741	168	8.7	2.9	1.9	127
18	7.4	68	29	18	11	11	729	156	7.2	3.1	2.0	124
19	13	71	28	18	11	11	715	142	6.9	2.7	1.9	144
20	11	72	27	18	11	11	692	129	6.0	3.2	2.3	186
21	7.9	71	27	17	11	11	673	124	6.3	5.8	7.1	206
22	10	68	26	17	10	12	640	114	5.3	3.3	7.5	211
23	9.6	65	26	17	10	12	601	97	4.8	3.6	7.1	223
24	7.3	62	25	16	10	12	562	92	4.4	3.3	7.0	217
25	6.0	60	25	16	10	13	525	82	3.6	2.6	5.0	211
26	5.8	57	25	16	10	14	492	73	3.5	2.9	5.1	200
27	5.6	55	24	16	10	14	468	64	3.7	3.4	4.8	185
28	5.6	53	24	15	10	15	435	53	4.9	2.8	4.3	176
29	5.7	51	24	15	10	16	408	55	9.2	2.6	15	163
30	7.8	49	24	15	---	17	372	50	7.8	2.5	40	148
31	18	---	23	14	---	18	---	39	---	2.2	90	---
TOTAL	200.7	1966	997	583	333	357	18118	5245	444.0	106.2	234.3	4022
MEAN	6.47	65.5	32.2	18.8	11.5	11.5	604	169	14.8	3.43	7.56	134
MAX	18	83	48	23	14	18	1390	345	36	6.6	90	223
MIN	4.3	33	23	14	10	10	20	39	3.5	2.2	1.6	63
CFSM	.01	.12	.06	.04	.02	.02	1.11	.31	.03	.006	.01	.25
IN.	.01	.13	.07	.04	.02	.02	1.24	.36	.03	.01	.02	.28

CAL YR 1979 TOTAL 136543.8 MEAN 374 MAX 7430 MIN 4.3 CFSM .69 IN 9.35
WTR YR 1980 TOTAL 32606.2 MEAN 89.1 MAX 1390 MIN 1.6 CFSM .16 IN 2.23

05139500 WARROAD RIVER NEAR WARROAD, MN

LOCATION.--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 mi (1.4 km) upstream from Bulldog Run and 2.5 mi (4.0 km) south of Warroad.

DRAINAGE AREA.--162 mi^2 (420 km^2).

PERIOD OF RECORD.--March 1946 to September 1980 (discontinued). Published as West Branch Warroad River near Warroad, October 1971 to September 1975. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1308: 1949(M). WSP 1508: 1947(M). WDR MN-75-1: Drainage area.

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 1,070.74 ft (326.362 m) National Geodetic Vertical Datum of 1929 (levels by Stanley Johnson, consulting engineer and instructor at University of North Dakota).

REMARKS.--Records fair.

AVERAGE DISCHARGE.--34 years, 43.2 ft^3/s (1.223 m^3/s), 3.62 in/yr (92 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,070 ft^3/s (58.6 m^3/s) Apr. 25, 1979, gage height, 9.66 ft (2.944 m); no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 300 ft^3/s (8.50 m^3/s) Apr. 7, gage height, 7.29 ft (2.222 m) (backwater from ice); no flow July 11-20, Aug. 2-11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.64	2.0	3.0	2.1	2.0	1.1	1.7	23	1.3	.32	.01	.22
2	.64	3.7	3.1	2.2	2.0	1.1	1.8	19	1.3	.28	.00	.20
3	.70	3.2	2.8	2.2	2.0	1.3	2.1	19	1.2	.15	.00	.20
4	.70	3.1	2.8	2.1	1.8	1.3	5.0	18	.88	.17	.00	.24
5	.76	3.0	2.8	2.1	1.5	1.4	20	14	.88	.12	.00	.24
6	.82	2.8	2.8	2.1	1.5	1.3	100	11	1.0	.12	.00	.24
7	.82	2.1	2.5	2.2	1.5	1.2	280	9.5	1.0	.08	.00	.38
8	.88	2.5	2.5	2.2	1.4	1.1	188	8.2	1.2	.08	.00	.40
9	.94	2.5	2.5	2.0	1.6	1.3	128	7.8	1.2	.08	.00	.46
10	.94	2.5	2.6	1.9	1.6	1.3	109	6.9	1.0	.07	.00	.52
11	.94	2.2	2.5	2.0	1.6	1.3	82	6.9	.88	.00	.00	.82
12	1.0	2.6	2.5	2.0	1.4	1.2	82	6.7	1.1	.00	.07	1.2
13	1.0	2.6	2.2	2.0	1.4	1.2	80	6.4	1.2	.00	.11	1.1
14	1.0	2.6	2.2	2.0	1.4	1.2	74	6.4	1.5	.00	.13	1.3
15	1.1	2.5	2.0	1.9	1.5	1.3	84	6.0	1.0	.00	.15	1.6
16	1.3	2.6	~~2.0~~	1.8	1.5	1.4	74	6.0	1.0	.00	.18	2.1
17	1.1	2.5	2.1	1.8	1.5	1.4	75	5.0	1.0	.00	.22	2.2
18	1.1	2.6	2.1	1.9	1.3	1.4	82	4.8	.88	.00	.22	2.7
19	1.3	2.8	2.2	2.0	1.3	1.5	71	4.0	.88	.00	.22	2.8
20	2.0	2.8	2.4	2.0	1.3	1.5	60	3.5	.88	.00	.32	2.7
21	1.7	2.8	2.4	2.0	1.3	1.5	56	3.3	.82	.06	.32	3.1
22	1.3	2.7	2.2	2.0	1.3	1.5	51	3.1	.82	.11	.32	3.5
23	.82	3.0	2.1	2.0	1.4	1.5	43	2.6	1.2	.15	.32	3.6
24	1.1	3.0	2.1	1.9	1.4	1.5	41	1.9	.82	.17	.32	3.5
25	1.0	2.8	2.1	1.9	1.4	1.5	39	1.9	.76	.20	.30	3.6
26	.94	2.8	2.0	1.8	1.3	1.5	33	1.9	.70	.22	.28	3.2
27	1.4	3.0	1.9	1.9	.94	1.5	30	2.0	.64	.17	.28	2.7
28	1.4	3.2	1.9	1.9	1.1	1.5	27	1.9	.64	.15	.28	2.6
29	1.7	3.2	2.0	2.0	1.4	1.5	26	1.9	.64	.06	.22	2.2
30	1.5	3.0	2.1	2.0	---	1.6	23	1.7	.64	.05	.22	1.7
31	1.9	---	2.1	2.1	---	1.6	---	1.7	---	.03	.22	---
TOTAL	34.44	82.7	72.5	62.0	42.64	42.5	1968.6	216.0	28.96	2.84	4.71	51.32
MEAN	1.11	2.76	2.34	2.00	1.47	1.37	65.6	6.97	.97	.092	.15	1.71
MAX	2.0	3.7	3.1	2.2	2.0	1.6	280	23	1.5	.32	.32	3.6
MIN	.64	2.0	1.9	1.8	.94	1.1	1.7	1.7	.64	.00	.00	.20
CFSM	.007	.02	.01	.01	.009	.008	.41	.04	.006	.001	.001	.01
IN.	.01	.02	.02	.01	.01	.01	.45	.05	.01	.00	.00	.01

CAL YR 1979 TOTAL 22906.72 MEAN 62.8 MAX 1940 MIN .22 CFSM .39 IN 5.26
WTR YR 1980 TOTAL 2609.21 MEAN 7.13 MAX 280 MIN .00 CFSM .04 IN .60

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, 1,056.78 ft (322.107 m) Sept. 4, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,059.61 ft (322.969 m) Oct. 1; maximum daily, 1,059.07 ft (322.805 m) Oct. 1; minimum elevation recorded, 1,055.94 ft (321.851 m) Sept. 4; minimum daily recorded, 1056.78 ft (322.107 m) Sept. 4.

ELEVATION, IN FEET, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1059.07	1058.32	1058.53	1058.42	1058.35	1058.19	1057.73	1058.03	1057.98	1057.78	1057.53	1057.51
2	1058.84	1058.26	1058.53	1058.42	1058.37	1058.18	1057.70	1058.04	1058.09	1057.52	1057.64	1057.45
3	1058.77	1058.53	1058.47	1058.43	1058.38	1058.15	1057.69	1058.04	1058.06	1057.73	1057.65	1057.48
4	1058.86	1058.58	1058.51	1058.44	1058.39	1058.13	1057.65	1058.02	1058.12	1057.83	1057.49	1056.78
5	1058.75	1058.62	1058.49	1058.42	1058.37	1058.11	1057.68	1058.08	1057.95	1057.89	1057.31	1057.42
6	1058.83	1058.35	1058.50	1058.44	1058.36	1058.10	1057.74	1058.19	1057.98	1057.71	1057.71	1057.52
7	1058.76	1058.64	1058.45	1058.39	1058.35	1058.10	1057.78	1058.16	1058.20	1057.64	1057.75	1057.49
8	1058.76	1058.62	1058.47	1058.38	1058.35	1058.08	1057.74	1058.06	1057.81	1057.71	1057.56	1057.42
9	1058.69	1058.58	1058.49	1058.40	1058.36	1058.07	1057.72	1058.05	1058.00	1057.56	1057.63	1057.35
10	1058.61	1058.55	1058.51	1058.44	1058.35	1058.01	1057.74	1058.06	1057.97	1057.71	1057.61	1057.24
11	1058.83	1058.49	1058.48	1058.36	1058.34	1058.06	1057.74	1057.91	1057.81	1057.79	1057.61	1057.74
12	1058.91	1058.37	1058.52	1058.45	1058.36	1058.08	1057.75	1058.03	1057.74	1057.65	1057.38	1057.99
13	1058.63	1058.61	1058.47	1058.40	1058.34	1058.03	1057.76	1058.10	1057.97	1057.65	1057.59	1058.03
14	1058.52	1058.48	1058.51	1058.43	1058.34	1058.03	1057.77	1058.04	1058.16	1057.66	1057.66	1057.60
15	1058.68	1058.59	1058.45	1058.42	1058.33	1058.07	1057.77	1058.04	1058.08	1057.72	1057.67	1057.06
16	1058.61	1058.43	1058.45	1058.38	1058.32	1057.98	1057.78	1058.05	1057.76	1057.72	1057.72	1057.10
17	1058.58	1058.57	1058.48	1058.38	1058.32	1057.96	1057.78	1058.02	1057.87	1057.75	1057.53	1057.53
18	1058.56	1058.59	1058.48	1058.38	1058.33	1057.98	1057.80	1058.04	1058.02	1057.76	1057.54	---
19	1058.62	1058.49	1058.46	1058.36	1058.33	1057.95	1057.81	1058.05	1057.82	1057.73	1057.54	---
20	1058.30	1058.51	1058.46	1058.38	1058.31	1057.91	1057.86	1057.80	1057.64	1057.80	1057.61	---
21	1058.41	1058.54	1058.46	1058.36	1058.33	1057.89	1057.89	1057.81	1057.78	1057.90	1057.30	---
22	1058.66	1058.55	1058.45	1058.34	1058.29	1057.90	1057.87	1057.89	1057.74	1057.79	1057.21	---
23	1058.65	1058.54	1058.45	1058.37	1058.27	1057.89	1057.91	1057.96	1057.80	1057.61	1057.57	---
24	1058.58	1058.48	1058.45	1058.40	1058.26	1057.87	1057.94	1058.03	1057.58	1057.54	1057.59	---
25	1058.52	1058.56	1058.46	1058.35	1058.25	1057.85	1057.95	1058.08	1057.65	1057.82	1057.46	---
26	1058.51	1058.53	1058.44	1058.34	1058.24	1057.84	1057.98	1058.05	1057.95	1057.67	1057.53	---
27	1058.43	1058.49	1058.44	1058.35	1058.22	1057.82	1057.99	1057.99	1058.11	1057.54	1057.59	---
28	1058.48	1058.53	1058.43	1058.34	1058.22	1057.81	1058.00	1057.96	1057.35	1057.66	1057.47	---
29	1058.48	1058.50	1058.42	1058.35	1058.20	1057.79	1058.02	1057.92	1057.75	1057.69	1057.53	---
30	1058.60	1058.53	1058.42	1058.36	---	1057.77	1058.02	1058.13	1057.66	1057.62	1057.38	---
31	1059.00	---	1058.42	1058.36	---	1057.74	---	1058.01	---	1057.53	1057.49	---
MEAN	1058.66	1058.51	1058.47	1058.39	1058.32	1057.98	1057.82	1058.02	1057.88	1057.70	1057.54	---
MAX	1059.07	1058.64	1058.53	1058.45	1058.39	1058.19	1058.02	1058.19	1058.20	1057.90	1057.75	---
MIN	1058.30	1058.26	1058.42	1058.34	1058.20	1057.74	1057.65	1057.80	1057.35	1057.52	1057.21	---

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 1980

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements	
					Date	Discharge (ft^3/s)
		Streams tributary to Lake Superior				
04010850	Brule River near Grand Marais, MN	Lat 47°55'57", long 90°18'37", in SE¼SW¼ sec.15, T.63 N., R.1 E., Cook County, Hydrologic Unit 04010101, at bridge on National Forest Development Road 309, 0.5 mile upstream from South Brule River, and 13 miles north of Grand Marais, MN.	88.8	1970-71, 1974, 1976, 1980	5-15-80	110
04010900	South Brule River near Grand Marais, MN	Lat 47°55'34", long 90°18'22", in SW¼NE¼ sec.22, T.63 N., R.1 E., Cook County, Hydrologic Unit 04010101, at bridge on County Highway 12 (Gunflint Trail), 0.1 mile upstream from mouth, and 12 miles north of Grand Marais.	76.5	1970-71, 1974, 1976, 1980	5-15-80	63
04011000	Brule River near Hovland, MN	Lat 47°49'06", long 90°03'04", in SE¼SW¼ sec.27, T.62 N., R.3 E., Cook County, Hydrologic Unit 04010101, at bridge on U.S. Highway 61, 0.3 mile upstream from mouth, and 4.5 miles southwest of Hovland.	264	1912, 1970-71, 1974, 1976-77, 1980	5-15-80	286
04011500	Devil Track River near Grand Marais, MN	Lat 47°46'12", long 90°15'39", in SW¼NE¼ sec.13, T.61 N., R.1 E., Cook County, Hydrologic Unit 04010101, at bridge on U.S. Highway 61, 0.1 mile upstream from mouth, and 3.9 miles northeast of Grand Marais.	74.8	1911-12, 1970-71, 1974, 1976-77, 1980	5-15-80	99
04012000	Cascade River near Grand Marais, MN	Lat 47°42'26", long 90°31'21", in NE¼SW¼ sec.1, T.60 N., R.2 W., Cook County, Hydrologic Unit 04010101, at bridge on U.S. Highway 61, at mouth, and 9.2 miles southwest of Grand Marais.	111	1911-12, 1970-71, 1974, 1976-77,	5-14-80	135
*04012500	Poplar River at Lutsen, MN	Lat 47°38'23", long 90°42'31", in SW¼NE¼ 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#, 1962-63, 1970-77, 1980	5-14-80 8- 5-80	112 22
04012600	Temperance River near Tofte, MN	Lat 47°48'04", long 90°50'43", in NE¼NW¼ sec.4, T.61 N., R.4 W., Cook County, Hydrologic Unit 04010101, at bridge on National Forest Development Road 165, 1.8 miles downstream from Sawbill Creek, and 16 miles north of Tofte.	87.6	1970-71, 1974, 1976, 1980	5-14-80	86
04012700	Temperance River near Schroeder, MN	Lat 47°33'17", long 90°52'28", in SE¼NE¼ sec.31, T.59 N., R.4 W., Cook County, Hydrologic Unit, 04010101, at bridge on U.S. Highway 61, 0.1 mile upstream from mouth, and 1.2 miles northeast of Schroeder.	185	1911-12, 1970-71, 1974, 1976, 1980	5-14-80	171
04015140	Gooseberry River near Two Harbors, MN	Lat 47°08'37", long 91°28'05", in SW¼SW¼ sec.22, T.54 N., R.9 W., Lake County, Hydrologic Unit 04010102, at bridge on U.S. Highway 61, in Gooseberry Falls State Park, about 1 mile upstream from mouth, 2.5 miles northeast of Castle Danger, and 12.5 miles northeast of Two Harbors.	74.6	1911, 1970-71, 1974, 1976, 1980	5-15-80	29

"See footnotes at end of the table."

Discharge measurements made at low-flow partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements: Date	Measurements: Discharge (ft^3/s)
		Streams tributary to Lake Superior--Continued				
04015340	Sucker River near Duluth, MN	Lat 46°55'27", long 91°51'02", in SE¼SW¼ sec.3, T.51 N., R.12 W., St. Louis County, Hydrologic Unit 04010102, at culvert on County Highway 61, 0.2 mile upstream from mouth, and 15 miles northeast of aerial bridge in Duluth.	38.5	1970-71, 1974, 1976, 1980	5-16-80	10
04015350	French River near Duluth, MN	Lat 46°53'59", long 91°53'32", in NE¼SW¼ sec.17, T.51 N., R.12 W., St. Louis County, Hydrologic Unit 04010102, at bridge on County Highway 61, at mouth, and 12.7 miles northeast of aerial bridge in Duluth.	18.4	1970-71, 1974, 1976, 1980	5-16-80	5.7
04015387	Amity Creek at Duluth, MN	Lat 46°50'39", long 92°00'36", in SE¼NE¼ sec.5, T.50 N., R.13 W., St. Louis County, Hydrologic Unit 04010102, at bridge on Parkway Road, 0.4 mile upstream from Lester River, and 6 miles northeast of aerial bridge in Duluth.	16.2	1970-71, 1974, 1976,	5-16-80	2.8
04015390	Lester River at Duluth, MN	Lat 46°50'12", long 92°00'21", in NE¼NE¼ sec.8, T.50 N., R.13 W., St. Louis County, Hydrologic Unit 04010102, at bridge on U.S. Highway 61, at mouth, and 5.7 miles northeast of aerial bridge in Duluth.	53.1	1970-71, 1974, 1976, 1980	5-16-80	18
04018710	Mud Hen Creek near Forbes, MN	Lat 47°21'29", long 92°28'24", on line between secs.3 and 10, T.56 N., R.17 W., St. Louis County, Hydrologic Unit 04010201, at bridge on County Highway 16, 0.9 mile upstream from mouth, 4.5 miles north of Central Lakes, and 6 miles southeast of Forbes.	101	1970-71, 1973-77, 1980	5- 9-80	58
04020800	Paleface River near Cotton, MN	Lat 47°12'37", long 92°29'17", in NW¼NW¼ sec.34, T.55 N., R.17 W., St. Louis County, Hydrologic Unit 04010201, at bridge on U.S. Highway 53, about 2 miles upstream from mouth, and 2.9 miles north of Cotton.	62.6	1970-71, 1973-77, 1980	5- 9-80	25
04021200	Floodwood River near Floodwood, MN	Lat 46°58'05", long 92°54'29", in SW¼SW¼ sec.20, T.52 N., R.20 W., St. Louis County, Hydrologic Unit 04010201, at bridge on farm driveway, 2.8 miles north of Floodwood, and 3.8 miles upstream from mouth.	190	1970-71, 1973-77, 1980	5-15-80	109
04021250	East Savanna River at Floodwood, MN	Lat 46°55'17", long 92°54'43", in SE¼NE¼ sec.7, T.51 N., R.20 W., St. Louis County, Hydrologic Unit 04010201, at bridge on U.S. Highway 2, 0.4 mile upstream from mouth at Floodwood.	114	1970-71, 1973-77, 1980	5-15-80	39
04021530	Stoney Brook at Brookston, MN	Lat 46°51'42", long 92°36'17", in NW¼SE¼ sec.34, T.51 N., R.18 W., St. Louis County, Hydrologic Unit 04010201, at bridge on County Highway 31, 0.8 mile upstream from mouth at Brookston.	97.3	1970-71, 1973-77, 1980	5-12-80	58
04021700	Cloquet River near Brimson, MN	Lat 47°15'24", long 91°52'02", in SE¼SW¼ sec.9, T.55 N., R.12 W., St. Louis County, Hydrologic Unit 04010202, at bridge on County Highway 44 (Forest Service Road 6202), about 1 mile upstream from Pine Creek, and 1.5 miles south of Brimson.	144	1970-71, 1973-77, 1980	5-12-80	83
04021960	Cloquet River near Island Lake, MN	Lat 47°06'57", long 92°01'28", in SW¼SW¼ sec.32, T.54 N., R.13 W., St. Louis County, Hydrologic Unit 04010202, at boat launching site on State Forest Road (Carroll Forest Road), 1.7 miles upstream from Little Cloquet River, and 7.5 miles northeast of village of Island Lake.	327	1970-71, 1974-77, 1980	5-12-80	200
04022970	Us-Kab-Wan-Ka River near Twig, MN	Lat 46°58'55", long 92°20'01", in SE¼SW¼ sec.14, T.52 N., R.16 W., St. Louis County, Hydrologic Unit 04010202, at bridge on trail, 0.8 mile upstream from mouth, and 6.2 miles north of Twig.	38.9	1970-71, 1973-77, 1980	5-12-80	24

"See footnotes at end of table."

Discharge measurements made at low-flow partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Superior--Continued				
04023400	Pine River near Cloquet, MN	Lat 46°47'52", long 92°26'58", on line between secs.23 and 24,T.50 N., R.17 W., St. Louis County, Hydrologic Unit 04010201, at concrete box culvert on State Highway 33, 0.9 mile upstream from mouth, and 5.2 miles north of Cloquet.	43.2	1970-71, 1973-77, 1980	5-15-80	19
04024010	Midway River at Thomson, MN	Lat 46°40'56", long 92°23'08", in NE¼SE¼ sec.32, T.49 N., R.16 W., Carlton County, Hydrologic Unit 04010201, at bridge on county road, 0.2 mile north of Thomson city limits, and 0.9 mile upstream from Thomson Reservoir.	64.2	1968, 1970-71, 1974-77, 1980	5-15-80	24
		Red River of the North basin				
05033960	Sucker Creek near Detroit Lakes, MN	Lat 46°46'25", long 95°48'23", in NW¼ sec.13, T.138 N., R.41 W., Becker County, Hydrologic Unit 09020103, on left bank, 200 ft upstream from lake, and 3.5 miles southeast of Detroit Lakes.	4.11	1968-70, 1980	7-22-80	.63
05036100	Pelican River tributary to Lake Sallie at Fish Hatchery near Detroit Lakes, MN	Lat 46°47'02", long 95°53'07", in NE¼ sec.8, T.138 N., R.41 W., Becker County, Hydrologic Unit 09020103, at State Fish Hatchery, at bridge over outlet from rearing ponds, 1,000 ft south of Muskrat Lake outlet, and 3 miles southwest of Detroit Lakes.	1.24	1968-70, 1972-74, 1980	7-22-80	0
05061020	Buffalo River near Glyndon, MN	Lat 46°53'59", long 96°36'34", in SW¼NW¼ sec.34, T.140 N., R.47 W., Clay County, Hydrologic Unit 09020106, at bridge on County Highway 68, 1.6 miles north of State Highway 10, 2.1 miles northwest of Glyndon.	-	1947, 1977-78, 1980	7-23-80	11.6
05061040	South Branch Buffalo River near Lawndale; MN	Lat 46°43'31", long 96°30'59", on line between secs.30 and 31, T.136 N., R.46 W., Wilkin County, Hydrologic Unit 09020106, at bridge on County Highway 30, 7.2 miles directly west of Lawndale.	-	1978, 1980	7-24-80	0
05061250	Whiskey Creek near Baker, MN	Lat 46°41'28", long 96°36'37", on line between secs.9 and 10, T.173 N., R.47 W., Clay County, Hydrologic Unit 09020106, at bridge on county road, 3.3 miles southwest of Baker, and 0.2 mile above mouth.	-	1978, 1980	7-23-80	.04
05061700	South Branch Buffalo River near Glyndon, MN	Lat 46°52'36", long 96°37'59", in SE¼SE¼ sec.5, T.139 N., R.47 W., Clay County, Hydrologic Unit 09020106, at U.S. Highway 10, 2.5 miles west of Glyndon.	-	1947, 1976-78, 1980	7-23-80	0
05062335	Wild Rice River near Roy Lake, MN	Lat 47°23'14", long 95°38'11", in NW¼SW¼ sec.9, T.145 N., R.39 W., Mahnomen County, Hydrologic Unit 09020108, at bridge on County Highway 4, 5.8 miles northwest of Roy Lake.	a270	1965-67, 1970-73, 1976, 1980	5-20-80	58
05062435	White Earth River near Mahnomen, MN	Lat 47°18'53", long 95°55'58", in NW¼SW¼ sec.6, T.144 N., R.41 W., Mahnomen County, Hydrologic Unit 09020108, at bridge on county road, 1.2 miles east of Mahnomen.	a190	1964-67, 1970-73, 1976, 1980	5-20-80	22
05062440	Wild Rice River at Mahnomen, MN	Lat 47°18'40", long 95°57'07", in SW¼SW¼ sec.1, T.144 N., R.42 W., Mahnomen County, Hydrologic Unit 09020108, at bridge on County Highway 25, at southeast corner of Mahnomen, and 0.5 mile east of intersection of U.S. Highway 59 with County Highway 25.	a610	1964-67, 1970-73, 1976, 1980	5-20-80	80
05062465	Marsh Creek near Mahnomen, MN	Lat 47°19'31", long 96°03'19", in NE¼NW¼ sec.6, T.144 N., R.42 W., Mahnomen County, Hydrologic Unit 09020108, at bridge on State Highway 200, 4.2 miles west of Mahnomen.	a130	1964-67, 1970-73, 1976, 1980	5-20-80	1.4

"See footnotes at end of table".

Discharge measurements made at low-flow partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements Date	Measurements Discharge (ft^3/s)
		Red River of the North basin--Continued				
05062650	Mashaug Creek at Heiberg, MN	Lat 47°17'05", long 96°16'35", in SW¼SW¼ sec.16, T.144 N., R.44 W., Norman County, Hydrologic Unit 09020108, at footbridge in park at Heiberg, 0.2 mile upstream from mouth, and 1.5 miles northwest of Twin Valley.	72.3	1964-67, 1970-73, 1976, 1980	5-20-80	.08
*05063500	South Branch Wild Rice River near Borup, MN	Lat 47°11'40", long 96°34'40", in NW¼NW¼ 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 miles northwest of Borup.	254	1944-49#, 1966-67, 1972-76, 1980	10-10-79 8-12-80	2.6 .06
e05067900	Sand Hill River at Fertile, MN	Lat 47°32'35", long 96°15'31", in NE¼NE¼ sec.21, T.147 N., R.44 W., Polk County, Hydrologic Unit 09020301, at bridge on County Highway 12, about 1 mile northeast of Fertile.	a225	1964-67, 1970-73, 1975-76, 1980	5-19-80 7-14-80	13 b4.9
05073530	Tamarac River at Waskish, MN	Lat 48°10'31", long 94°30'45", in NE¼NE¼ sec.8, T.154 N., R.30 W., Beltrami County, Hydrologic Unit 09020302, at bridge on State Highway 72 at Waskish, 0.2 mile upstream from mouth.	280	1964-67, 1980	5-13-80	222
05073560	Shotley Brook near Shotley, MN	Lat 48°04'38", long 94°35'05", in NW¼NE¼ sec.14, T.153 N., R.31 W., Beltrami County, Hydrologic Unit 09020302, at bridge on County Highway 23, 2 miles upstream from mouth, and 3.2 miles northeast of Shotley.	42.4	1964-67, 1970-73, 1975-76, 1980	5-13-80	18
05073630	South Branch Battle River near Kelliher, MN	Lat 47°56'24", long 94°31'54", in NW¼SE¼ sec.31, T.152 N., R.30 W., Beltrami County, Hydrologic Unit 09020302, at bridge on County Highway 36, 3.4 miles west of Kelliher, and about 11 miles upstream from Lower Red Lake.	47.1	1964-67, 1970-73, 1975-76, 1980	5-13-80	7.1
05073770	Blackduck River at Quiring, MN	Lat 47°52'36", long 94°43'16", in SE¼SE¼ sec.22, T.151 N., R.32 W., Beltrami County, Hydrologic Unit 09020302, at bridge on County Highway 101, 0.2 mile downstream from South Branch Cormorant River, and 0.5 mile southwest of Quiring.	a200	1964-67, 1971-73, 1975-76, 1980	5-13-80	43
05073790	North Cormorant River near Shooks, MN	Lat 47°54'19", long 94°32'51", in SW¼SW¼ sec.7, T.151 N., R.30 W., Beltrami County, Hydrologic Unit 09020302, at bridge on County Highway 36, 5.5 miles northwest of Shooks.	33.8	1964-67, 1970-73, 1975-76, 1980	5-13-80	3.1
05073980	Sandy River near Red Lake, MN	Lat 47°50'44", long 95°13'33", in NE¼NW¼ sec.2, T.150 N., R.36 W., Clearwater County, Hydrologic Unit 09020302, at U.S. Indian Service Road, 2.5 miles upstream from mouth, and 4.2 miles southwest of village of Red Lake.	67.9	1964-67, 1970-73, 1975-76, 1980	5-19-80	16
e,* 05075700	Mud River near Grygla, MN	Lat 48°19'31", long 95°44'35", in SE¼SE¼ sec.14, T.156 N., R.40 W., Marshall County, Hydrologic Unit 09020304, at bridge on State Highway 89, 6 miles west of Grygla.	170	1970-73, 1975-76, 1979, 1980	6-17-80 7-14-80 8-21-80	.01 0 0
e,* 05077700	Ruffy Brook near Gonvick, MN	Lat 47°44'50", long 95°24'45", on line between secs.5 and 8, T.149 N., R.37 W., Clearwater County, Hydrologic Unit 09020305, at bridge on County Highway 67, 4 miles upstream from mouth, and 4.8 miles east of Gonvick.	45.2	1957, 1960-78#, 1980	7-16-80	.66
f,e,* 05078000	Clearwater River at Plummer, MN	Lat 47°55'24", long 96°02'46", in SE¼SW¼ sec.4, T.151 N., R.42 W., Red Lake County, Hydrologic Unit 09020305, at bridge on U.S. Highway 59, at Plummer, and 8 miles upstream from Hill River.	512	1933, 1939-79#, 1980	10-31-79 6-17-80	57 2.2

"See footnotes at end of table."

Discharge measurements made at low-flow partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements Date	Measurements Discharge (ft^3/s)
		Red River of the North basin--Continued				
e05078340	Hill River at Brooks, MN	Lat 47°49'22", long 96°00'00", in NE¼SW¼ sec.11, T.150 N., R.42 W., Red Lake County, Hydrologic Unit 09020305, at bridge on U.S. Highway 59, at Brooks.	a185	1934, 1966, 1970-73, 1975-76, 1980	5-19-80 7-16-80	7.2 .92
e05078380	Poplar River near Brooks, MN	Lat 47°48'13", long 96°03'30", in NW¼NE¼ sec.20, T.150 N., R.42 W., Red Lake County, Hydrologic Unit 09020305, at bridge on County Highway B3, 2.5 miles upstream from mouth, and 2.8 miles west of Brooks.	a155	1964-67, 1970-73, 1975-76, 1980	5-19-80 7-16-80	10 0
e05078490	Badger Creek near Red Lake Falls, MN	Lat 47°50'48", long 96°13'53", on line between sec.1, T.150 N., R.44 W., and sec.36, T.151 N., R.44 W., Red Lake County, Hydrologic Unit 09020305, at bridge on County Highway A4, about 1 mile upstream from mouth, and 3 miles southeast of Red Lake Falls.	105	1970-73, 1975-76, 1980	5-19-80 7-16-80	.14 0
e05079900	Burnham Creek at Girard, MN	Lat 47°43'53", long 96°39'41", in NW¼NE¼ sec.15, T.149 N., R.47 W., Polk County, Hydrologic Unit 09020303, at bridge on county road, 0.2 mile upstream from U.S. Highway 75, and 0.8 mile northeast of Girard.	135	1964-67, 1970-73, 1975-76, 1980	5-19-80 7-10-80	0 0
e05085500	Snake River at Warren, MN	Lat 48°11'50", long 96°46'45", in SE¼ sec.36, T.155 N., R.48 W., Marshall County, Hydrologic Unit 09020309, at bridge on Minnesota Street in Warren.	175	1945#, 1946, 1948-49, 1953-56#, 1971-73, 1976, 1980	10-30-79 7-15-80	0 d.01
e05086000	Snake River at Alvarado, MN	Lat 48°11'50", long 97°00'20", in SW¼SE¼ sec.31, T.155 N., R.49 W., Marshall County, Hydrologic Unit 09020309, at bridge on State Highway 1 on west edge of Alvarado, and 22 miles upstream from mouth.	309	1945, 1946, 1948, 1951, 1953-56#, 1979, 1980	cd9-20-79 10-30-79 6-10-80 7-15-80	0 .01 0 0
e,* 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	1971, 1979, 1980	7-16-80	0
e05095000	Two Rivers at Hallock, MN	Lat 48°46'30", long 96°55'52", in SE¼SE¼ sec.12, T.161 N., R.49 W., Kittson County, Hydrologic Unit 09020312, at bridge on State Highway 175 at east edge of Hallock, and 0.2 mile downstream from South Branch Two Rivers.	a625	1911-14#, 1929-30#, 1941-43#, 1967, 1969, 1976, 1980	7-15-80	.92
05102900	Roseau River near Skime, MN	Lat 48°38'30", long 95°35'47", in SE¼SW¼ sec.30, T.160 N., R.38 W., Roseau County, Hydrologic Unit 09020314, at bridge on County Highway 4, 6.5 miles north of Skime, and about 11 miles southeast of Malung.	134	1971-73, 1975-76, 1979-80	7- 9-80	.12
05105200	Hay Creek near Salol, MN	Lat 48°51'39", long 95°35'39", in SE¼SE¼ sec.7, T.162 N., R.38 W., Roseau County, Hydrologic Unit 09020314, at culvert on State Highway 11, 1.3 miles southwest of Salol, and about 8.5 miles northeast of Malung.	66.1	1930, 1949, 1971-73, 1975-77, 1979-80	7- 7-80	.06
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.	-	1973-80	10-22-79 12- 3-79 1-14-80 2-25-80 6- 9-80 7- 7-80 8-11-80 9- 8-80	1.8 11 5.0 5.8 7.6 .85 .60 .50

"See footnotes at end of table."

Discharge measurements made at low-flow partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements Date	Measurements Discharge (ft^3/s)
		Lake of the Woods basin				
05129105	Pelican River near Orr, MN	Lat 48°08'09", long 92°45'40", in NE¼NE¼ sec.10, T.65 N., R.19 W., St. Louis County, Hydrologic Unit 09030002, at bridge on trail, 4.5 miles northeast of Cusson, 5.7 miles northeast of Orr, and about 10 miles upstream from mouth.	177	1970-73, 1975-76, 1980	5-13-80	127
05129280	Ash River near Ray, MN	Lat 48°20'07", long 92°54'57", in SW¼NW¼ sec.33, T.68 N., R.20 W., St. Louis County, Hydrologic Unit 09030003, at bridge on county road, 0.5 mile upstream from Black Duck River, 8 miles north of Ash Lake, and 14 miles southeast of Ray.	54.7	1970-73, 1975-76, 1980	5-13-80	29
05129380	Rat Root River near Littlefork, MN	Lat 48°24'35", long 93°21'55", at center of sec.1, T.68 N., R.24 W., Koochiching County, Hydrologic Unit 09030003, at bridge on county road, 5. 7 miles southwest of Ericsburg, and 9 miles east of Littlefork.	89.6	1970-73, 1975-76, 1980	5-14-80	60
05129390	East Branch Rat Root River near Ray, MN	Lat 48°26'32", long 93°11'58", on line between secs.29 and 30, T.69 N., R.22 W., Koochiching County, Hydrologic Unit 09030003, at bridge on County Highway 3, 2 miles north of Ray.	63.9	1970-73, 1975-76, 1980	5-14-80	38
*05129650	Little Fork River at Cook, MN	Lat 47°51'16", long 92°41'56", in NE¼SE¼ sec.13, T.61 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	1958-66, 1968, 1971-73, 1975-76, 1980	9-24-80	174
05129920	Little Fork River near Gheen, MN	Lat 47°51'46", long 92°54'15", in NE¼NW¼ sec.16, T.62 N., R.20 W., St. Louis County, Hydrologic Unit 09030005, at bridge on State Highway 1, 2.5 miles east of Meadow Brook, and 8.5 miles southwest of Gheen.	a290	1970-73, 1975-76, 1980	5-13-80	144
05131310	Bear River near Togo, MN	Lat 47°49'20", long 93°03'04", on line between secs.29 and 32, T.62 N., R.21 W., St. Louis County, Hydrologic Unit 09030005, at bridge on County Highway 5, 2 miles upstream from mouth, and 4.5 miles east of Togo.	a170	1970-73, 1975-76, 1980	5-13-80	59
05131320	Sturgeon River near Togo, MN	Lat 47°51'56", long 93°02'07", on line between secs.9 and 16, T.62 N., R.21 W., St. Louis County, Hydrologic Unit 09030005, at bridge on State Highway 1, 2 miles upstream from mouth, 3.8 miles west of Meadow Brook, and 6 miles northeast of Togo.	a375	1970-73, 1975-76, 1980	5-13-80	215
05131325	Valley River near Rauch, MN	Lat 47°57'28", long 93°11'21", in SE¼NE¼ sec.7, T.63 N., R.22 W., Koochiching County, Hydrologic Unit 09030005, at bridge on County Highway 57, 2 miles upstream from mouth, 2 miles west of Rauch, and 9.5 miles northwest of Togo.	68.5	1970-73, 1975-76, 1980	5-13-80	29
05131470	Nett Lake River near Littlefork, MN	Lat 48°13'00", long 93°26'40", in SE¼SE¼ sec.8, T.66 N., R.24 W., Koochiching County, Hydrologic Unit 09030005, at bridge on County Highway 8, 2.2 miles upstream from mouth, and 13 miles southeast of Littlefork.	a215	1970-73, 1975-76, 1980	5-14-80	163
05131510	Beaver Brook near Littlefork, MN	Lat 48°24'12", long 93°30'57", on line between secs.2 and 11, T.68 N., R.25 W., Koochiching County, Hydrologic Unit 09030005, at bridge on State Highway 217, 1.5 miles upstream from mouth, and 1.5 miles east of Littlefork.	97.4	1970-73, 1975-76, 1980	5-14-80	59
05131600	Bowstring River near Talmoon, MN	Lat 47°32'12", long 93°47'45", on line between secs.23 and 24, T.147 N., R.25 W., Itasca County, Hydrologic Unit 09030006, at bridge on State Highway 6, 0.4 mile south of Bowstring, and 4.5 miles southwest of Talmoon.	90.2	1969-72, 1975-76, 1980	5-12-80	56

"See footnotes at end of table."

Discharge measurements made at low-flow partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements Date	Measurements Discharge (ft^3/s)
		Lake of the Woods basin--Continued				
*05131750	Big Fork River near Bigfork, MN	Lat 47°44'56", long 93°46'31", in SE¼SE¼ sec.21, T.149 N., R.25, W., Itasca County, Hydrologic Unit 09030006, at bridge on State Highway 6, 5.5 miles west of Bigfork.	602	1970-73, 1976, 1980	5-12-80	409
05131760	Rice River near Bigfork, MN	Lat 47°40'28", long 93°39'17", on line between secs.16 and 21, T.60 N., R.26 W., Itasca County, Hydrologic Unit 09030006, at bridge on County Highway 254, 5 miles south of Bigfork.	82.8	1969-72, 1975-76, 1980	5-12-80	21
05131770	Gale Brook near Bigfork, MN	Lat 47°43'22", long 93°39'26", in NE¼NW¼ sec.4, T.60 N., R.26 W., Itasca County, Hydrologic Unit 09030006, at culvert on County Highway 7, 1.5 miles south of Bigfork.	27.8	1969-72, 1975-76, 1980	5-12-80	4.0
05131870	Big Fork River near Effie, MN	Lat 47°57'13", long 93°45'16", in NW¼NE¼ sec.14, T.63 N., R.27 W., Koochiching County, Hydrologic Unit 09030006, at bridge on State Highway 6, 0.2 mile upstream from Bowerman Brook, 1 mile south of County Highway 5, and 9 miles northwest of Effie.	a1,020	1970-72, 1976, 1980	5-13-80	568
05131880	Bowerman Brook Caldwell Road near Effie, MN	Lat 47°56'44", long 93°45'52", in SW¼SW¼ sec.14, T.63 N., R.27 W., Koochiching County, Hydrologic Unit 09030006, at culvert on Caldwell Road, 8 miles northwest of Effie.	25.9	1970-72, 1975-76, 1980	5-13-80	6.1
05131900	Caldwell Brook at Caldwell Road near Effie, MN	Lat 47°57'15", long 93°52'54", in NW¼SW¼ sec.29, T.152 N., R.25 W., Koochiching County, Hydrologic Unit 09030006, at bridge on Caldwell Road, 12 miles northwest of Effie.	122	1969-72, 1975-76, 1980	5-13-80	16
05132200	Sturgeon River near Big Falls, MN	Lat 48°12'57", long 93°55'54", in NE¼SE¼ sec.26, T.155 N., R.26 W., Koochiching County, Hydrologic Unit 09030006, at bridge on County Highway 30, 6.2 miles northwest of Big Falls.	a280	1970-72, 1975-76, 1980	10- 4-79 5-14-80	34 262
05132400	Bear River near Littlefork, MN	Lat 48°24'13", long 93°41'21", on line between secs.4 and 9, T.68 N., R.26 W., Koochiching County, Hydrologic Unit 09030006, at bridge on County Highway 1, 5.5 miles west of Littlefork.	105	1969-72, 1975-76, 1980	10- 3-79 5-14-80	3.1 94
05132900	Black River near Loman, MN	Lat 48°27'19", long 93°49'38", in SW¼SE¼ sec.34, T.158 N., R.25 W., Koochiching County, Hydrologic Unit 09030004, at end of county road, near farm house, 4 miles southwest of Loman.	a280	1970-72, 1975-76, 1980	10- 3-79 5-14-80	11 241
05133200	West Fork Black River near Loman, MN	Lat 48°31'37", long 93°49'54", in SE¼SW¼ sec.3, T.158 N., R.25 W., Koochiching County, Hydrologic Unit 09030004, at bridge on County Highway 82, 1.6 miles northwest of Loman.	a288	1969-72, 1975-76, 1980	10- 3-79 5-14-80	2.0 94
05134100	North Branch Rapid River near Baudette, MN	Lat 48°31'56", long 94°38'50", in NW¼SW¼ sec.4, T.158 N., R.31 W., Lake of the Woods County, Hydrologic Unit 09030007, at bridge on County Highway 1, 13 miles southwest of Baudette.	a180	1969-72, 1975-76, 1980	5-13-80	99
05135000	East Fork Rapid River near Clementson, MN	Lat 48°40'00", long 94°24'33", in NE¼NE¼ sec.19, T.160 N., R.29 W., Koochiching County, Hydrologic Unit 09030007, at Eidems Rapid, 1.9 miles upstream from Rapid River, and 2 miles southeast of Clementson.	a300	1970-72, 1975-76, 1980	5-14-80	111
05135100	Rapid River at Clementson, MN	Lat 48°41'28", long 94°25'59", in NE¼SE¼ sec.12, T.160 N., R.30 W., Lake of the Woods County, Hydrologic Unit 09030007, at bridge on State Highway 11 at Clementson, 0.3 mile upstream from mouth.	a700	1969-72, 1975-76, 1980	5-14-80	352

"See footnotes at end of table."

Discharge measurements made at low-flow partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements	
					Date	Discharge (ft^3/s)
		Lake of the Woods basin--Continued				
05136000	Baudette River near Baudette, MN	Lat 48°39'25", long 94°37'23", on line between secs.22 and 27, T.160 N., R.31 W., Lake of the Woods County, Hydrologic Unit 09030008, at bridge on county road, 4 miles southwest of Baudette.	45.6	1969-72, 1975-76, 1980	5-14-80	7.2
05137000	Winter Road River near Baudette, MN	Lat 48°42'51", long 94°41'50", in SE¼SE¼ sec.36, T.161 N., R.32 W., Lake of the Woods County, Hydrologic Unit 09030008, at bridge on old State Highway 11, 4.5 miles west of Baudette.	145	1969-72, 1975-76, 1980	5-14-80	30
05138000	Lake of the Woods County ditch No. 1 near Williams, MN	Lat 48°50'38", long 94°57'32", in NE¼NE¼ sec.24, T.162 N., R.34 W., Lake of the Woods County, Hydrologic Unit 09030009, at triple box culvert on County Highway 2, 5.2 miles north of Williams.	17.5	1969-72, 1975-76, 1980	5-14-80	2.8
*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#, 1978-80	10-24-79 6-12-80 7- 9-80 8-20-80 9-10-80	0 0 0 0 0
*05140500	East Branch Warroad River near Warroad, MN	Lat 48°51'29", long 95°18'40", in NE¼NE¼ sec.17, T.162 N., R.36 W., Roseau County, Hydrologic 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#, 1978-80	7- 9-80 8-20-80 9-10-80	0 0 0

* Also a high-flow partial-record station.
\# Operated as a continuous-record gaging station.
a Approximately.
b Measured 1 mile downstream.
c Not previously published.
d Estimate.
e Also published under low-flow investigations of streams tributary to Red River of the North.
f Possible regulation due to extensive wild rice cultivation upstream.

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 1980

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	1961-80	9- 4-80	16.87	115
04011390	Little Devil Track River tributary near Grand Marais, MN	Lat 47°47'17", long90°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	1966-80	9- 4-80	15.81	b14
*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#, 1972-80	8-30-80	4.82	b648
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	1964-80	9- 4-80	10.07	(†)
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	1961-80	9- 4-80	12.61	410
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	1960-80	9- 4-80	8.42	60
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	1965-80	9- 4-80	7.86	(†)
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	1960-80	9- 4-80	10.10	(†)
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, 0.35 mile upstream from mouth, and 0.7 mile west of French River.	1.41	1964-80	9- 4-80	29.91	500
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	1964-80	9- 4-80	15.95	415

"See footnotes at end of the table."

Annual maximum discharge at high-flow partial-record stations during water year 1980

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	1960-80	9- 4-80	18.19	360
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	1960-80	4- 8-80	a8.24	3.4
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	1979-80	4-21-80	11.26	52
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	1979-80	4-20-80	11.79	78
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	1972-80	4- 8-80	a14.34	386
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	1972-80	9- 3-80	11.37	1500
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, 1967-80	9- 3-80	b17.96	490
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	1961-80	9- 3-80	11.41	24
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	1961-80	9- 3-80	12.15	610
		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	1964-80	6- 5-80	b7.81	29
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, 1970-80	6- 5-80	7.03	207

"See footnotes at end of the table."

Annual maximum discharge at high-flow partial-record stations during water year 1980

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	1979-80	6- 5-80	10.47	(†)
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	1960-80	4- 3-80	a14.23	(†)
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#, 1967-80	4- 4-80	b4.94	118
05061400	Hay 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	1961-80	3-28-80	a7.42	(†)
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	1961-80	4- 6-80	9.03	b23
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	1961-80	4- 2-80	10.63	135
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	1961-80	4- 2-80	a12.45	75
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	1962-80	4- 2-80	a10.94	500
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	1963-80	4- 2-80	a6.03	24
*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#, 1972-80	4- 2-80	a16.22	527
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	1960-80	4- 8-80	a15.05	28
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	1960-80	4- 8-80	12.83	(†)

"See footnotes at end of the table."

Annual maximum discharge at high-flow partial-record stations during water year 1980

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					
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	1960-80	4- 8-80	a6.83	17
*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	1979-80	4- 6-80	16.38	670
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 Theif River Falls.	2.33	1962-80	3-31-80	a7.40	67
*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#, 1979-80	4- 5-80	3.36	137
*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 mi northwest of railroad depot in Plummer, and 8.0 miles upstream from Hill River.	512	1939-79#, 1980	4- 8-80	6.57	898
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	1960-80	4- 5-80	-	c35
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, 0.9 mile upstream from mouth.	6.02	1960-80	4- 1-80	9.91	b25
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	1961-80	4- 2-80	12.56	(†)
*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	1979-80	4- 6-80	14.32	270
		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	1966-80	4-19-80	6.85	9.6
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	1961-80	6- 1-80	6.90	27

"See footnotes at end of the table."

Annual maximum discharge at high-flow partial-record stations during water year 1980

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--Continued					
*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	1968-80	9-21-80	14.63	305
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	1959-80	4- 7-80	11.28	86
*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	1973-80	4-18-80	11.58	1140
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	1979-80	4-18-80	12.13	152
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	4-19-80	7.57	3800
*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 miles upstream from mouth, and 2.5 miles south of Warroad.	11.1	1946-51#, 1966-77#, 1978-80	4- 6-80	6.42	173
*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#, 1978-80	4- 6-80	6.22	112

* Also a low-flow partial-record station.
† Discharge not determined.
# Operated as a continuous-record gaging station.
a Backwater from ice.
b Affected by shifting control.
c Estimated; gage height unknown.

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 1980

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Superior				
East Two River	St. Louis River	Lat 47°24'04", long 92°39'52", in NW¼NW¼ sec.29, T.57 N., R.18 W., St. Louis County, Hydrologic Unit 04010201, on right bank 30 ft downstream from bridge on State Highway 37 and 2.2 miles southwest of Iron Junction, MN.	40.0	1957-62, 1966-79#	2- 2-80	*6.8
					4- 8-80	106
					7-22-80	*14
					9-23-80	52
West Two River	St. Louis River	Lat 47°24'55", long 92°42'18", in NW¼NW¼ sec.24, T.57 N., R.19 W., St. Louis County, Hydrologic Unit 04010201, on left bank 40 ft upstream from bridge on County Highway 452, 4.8 miles west of Iron Junction, MN, and 11.0 mi upstream from St. Louis River.	65.3	1954-62#, 1966-79	10-16-79	*8.7
					2-22-80	*8.5
					7-22-80	*8.2
					9-23-80	37
		Red River of the North basin				
Pelican River at Sallie Lake outlet	Ottertail River	Lat 46°45'27", long 95°53'57", in NW¼ sec.20, T.138 N., R.41 W., Becker County, Hydrologic Unit 09020103, on left bank near downstream end of culvert on County Highway 22, 250 ft downstream from Sallie Lake, 800 ft upstream from Minnesota Department of Natural Resources dam and 5 miles southwest of Detroit Lakes, MN (05037100).	-	1968-75#,	9-12-79	20.0
					9-25-79	10.9
					10-22-79	2.75
					11-11-79	19.3
					12-18-79	24.2
					1-23-80	26.4
					2-22-80	26.8
					3-25-80	36.8
					4-22-80	74.8
					6-17-80	0.20
					7-22-80	0
					8-22-80	0.09
					9-25-80	0
East tributary to Lake Melissa	Pelican River	Lat 46°44'16", long 95°52'26", in NW¼SW¼ sec.28, T.138 N., R.41 W., Becker County, Hydrologic Unit 09020103, at bridge on Old Highway 59, 2000 ft upstream from Lake Melissa, MN.	-	-	9-12-79	0.73
					9-25-79	0.37
					10-22-79	0.24
					11-19-79	3.01
					12-18-79	3.24
					1-23-80	2.41
					2-22-80	2.11
					3-25-80	3.11
					4-22-80	7.50
					6-17-80	0.58
					7-22-80	0.25
					8-22-80	0.07
					9-25-80	0.20
Pelican River at Lake Melissa outlet	Ottertail River	Lat 46°43'50", long 95°53'40", in NW¼ sec.32, T.138 N., R.41 W., Becker County, Hydrologic Unit 09020103, on left bank, 50 ft downstream from Lake Melissa, 400 ft upstream from culvert on county road, and 6 miles southwest of Detroit Lakes, MN (05039100).	-	1968-72#	9-12-79	26.6
					9-25-79	14.9
					10-22-79	6.27
					11-19-79	17.4
					12-18-79	29.4
					1-23-80	37.0
					2-22-80	39.3
					3-25-80	36.4
					4-22-80	90.0
					6-17-80	9.73
					7-22-80	3.39
					8-22-80	1.73
					9-25-80	0.94
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, 1978-79	10- 9-79	*0
					11-27-79	*0
					5- 5-80	*0
					7-10-80	*0
					8-12-80	*0
					9- 9-80	*0
bRoseau 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 ft downstream from Hay Creek, and 3.2 miles northeast of Roseau, MN (05105300).	-	1973-79	10-22-79	*1.8
					12- 3-79	11.0
					1-14-80	*5.0
					2-25-80	*5.8
					4- 8-80	2030
					6- 9-80	*7.6
					7- 7-80	*0.85
					8-11-80	*0.60
					9- 8-80	*0.50

"See footnotes at end of table."

Discharge measurements made at miscellaneous sites during water year 1980--Continued

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Lake of the Woods basin				
Dark River	Sturgeon River	Lat 47°41'27", long 92°49'15", in SW¼SW¼ sec.12, T.60 N., R.20 W., St. Louis County, Hydrologic Unit 09030005, in Superior National Forest, on right bank 50 ft downstream from snowmobile bridge, 3.5 miles upstream from mouth, and 12.2 miles northeast of Chisholm, MN.	50.6	1942-61#, 1966-79#	10-18 79 2-25-80 4- 7-80 6-30-80 9-25-80	9.9 11 74 20 54

Operated as a continuous-record gaging station.
a Approximately.
b Also published under measurements made at low-flow partial-record stations.

Low-flow investigations of streams tributary to the Red River of the North

Drought conditions existed in northwestern Minnesota during the summer of 1980. These measurements were made in order to give more thorough coverage to this event.

The U.S. Weather Bureau gage at Crookston, MN, reported only 0.02 inch of precipitation during April, 0.33 inch during May, 1.14 inches during June, and 0.70 inch during the first 14 days of July. Therefore, good base-flow conditions existed at the time of these measurements.

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Date	Discharge (ft^3/s)
		Sand Hill River basin				
Sand Hill River	Red River of the North	Lat 47°30'50", long 95°58'54", in SW¼SW¼ sec.26, T.147 N., R.42 W., Polk County, Hydrologic Unit 09020301, at bridge on U.S. Highway 59, 1.5 miles south of Winger, MN.	-	1967	7-14-80	0
Sand Hill River	Red River of the North	Lat 47°30'51", long 96°09'11", in NE¼NE¼ sec.32, T.147 N., R.43 W., Polk County, Hydrologic Unit 09020301, at bridge on county road, 2.5 miles northwest of Rindal, MN.	-	1967	7-14-80	0.26
*Sand Hill River	Red River of the North	Lat 47°32'35", long 96°15'31", in NE¼NE¼ sec.21, T.147 N., R.44 W., Polk County, Hydrologic Unit 09020301, at bridge on County Highway 12, about 1 mile northeast of Fertile, MN (05067900).	a225	1964-67, 1970-73, 1975-76	7-14-80	b4.9
Sand Hill River	Red River of the North	Lat 47°31'41", long 96°24'31", in NE¼NE¼ sec.29, T.147 N., R.45 W., Polk County, Hydrologic Unit 09020301, 300 ft below mouth of Kittleson Creek, at bridge on county road, 5.5 miles west of Fertile, MN.	-	-	7-15-80	7.1
County ditch 73	Sand Hill River	Lat 47°34'02", long 96°46'18", in SE¼NE¼ sec.9, T.147 N., R.48 W., Polk County, Hydrologic Unit 09020301, at bridge on county road, about 0.4 mile upstream from mouth, and 3.8 miles southeast of Climax, MN.	-	-	7-15-80	0
County ditch 46	Sand Hill River	Lat 47°36'01", long 96°47'32", in NW¼NW¼ sec.33, T.148 N., R.48 W., Polk County, Hydrologic Unit 09020301, at mouth, 1 mile southeast of Climax, MN.	-	-	7-15-80	0
County ditch 6	Sand Hill River	Lat 47°36'36", long 96°47'34", in SE¼NE¼ sec.29, T.148 N., R.48 W., Polk County, Hydrologic Unit 09020301, at bridge on county road, 1 mile east of Climax, MN, and 0.2 mile upstream from mouth.	-	-	7-15-80	0
Sand Hill River	Red River of the North	Gaging station at Climax, MN (05069000).	426	1943-79#	7-15-80	10
		Red Lake River basin				
Moose River	Thief River	Lat 48°27'24", long 95°43'52", in SE¼SE¼ sec.36, T.158 N., R.40 W., Marshall County, Hydrologic Unit 09020304, at bridge on State Highway 89, 3.5 miles northeast of Gatzke, MN.	-	1964-66, 1968-69	7-14-80	0
*Mud River	Thief River	Lat 48°19'31", long 95°44'35", SE¼SE¼ sec.14, T.156 N., R.40 W., Marshall County, Hydrologic Unit 09020304, at bridge on State Highway 89, 6 miles northwest of Grygla, MN (05075700).	170	1937, 1957, 1966, 1970-73, 1975-76, 1979	7-14-80	0
Thief River	Red Lake River	Gaging station near Thief River Falls, MN (05076000).	959	1909-17, 1920-21, 1922-24, 1928-79#	7-16-80	0
eClearwater River	Red Lake River	Lat 47°40'22", long 95°10'22", NW¼NE¼ sec.6, T.148 N., R.35 W., Beltrami County, Hydrologic Unit 09020305, at bridge on County Highway 24, about 2.5 miles west of Aure, and 5.5 miles northwest of Pinewood, MN.	-	1931, 1933, 1966	7-16-80	25

"See footnotes at end of table."

Low-flow investigations of streams tributary to the Red River of the North--Continued

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Date	Discharge (ft^3/s)
		Red Lake River basin--Continued				
eClearwater River	Red Lake River	Lat 47°46'30", long 95°21'05", NW¼NE¼ sec.35, T.150 N., R.37 W., Clearwater County, Hydrologic Unit 09020305, at bridge on County Highway 11, 6.6 miles northeast of Clearbrook, MN.	-	1967	7-16-80	32
*,c Ruffy Brook	Clearwater River	Lat 47°44'50", long 95°24'45", in SE¼SE¼ sec.5, T.149 N., R.37 W., Clearwater County, Hydrologic Unit 09020305, at bridge on County Highway 17, 4 miles upstream from mouth, and 4.8 miles east of Gonvick, MN (05077700).	45.2	1960-78#, 1979	7-16-80	.66
eClearwater River	Red Lake River	Lat 47°49'58", long 92°25'36", NW¼NW¼ sec.8, T.150 N., R.37 W., Clearwater County, Hydrologic Unit 09020305, at bridge on County Road 5, at boundary of Red Lake Indian Reservation, 3 miles northeast of Berner, MN.	-	1940, 1959	7-16-80	47
Lost River	Clearwater River	Lat 47°45'54", long 95°29'42", in NE¼SE¼ sec.34, T.150 N., R.38 W., Clearwater County, Hydrologic Unit 09020305, at bridge on county road, 2 miles northeast of Gonvick, MN.	-	1967	7-16-80	1.4
Silver Creek	Lost River	Lat 47°46'21", long 95°29'41", in NW¼NW¼ sec.35, T.150 N., R.38 W., Clearwater County, Hydrologic Unit 09020305, at bridge on county road, 2.5 miles north of Gonvick, MN.	-	1967	7-16-80	0
Lost River	Clearwater River	Lat 47°48'16", long 95°33'42", in SE¼SE¼ sec.18, T.150 N., R.38 W., Clearwater County, Hydrologic Unit 09020305, at bridge on county road, 4 miles west of Berner, MN.	-	1949, 1950, 1966	7-16-80	.55
Lost River	Clearwater River	Gaging station at Oklee, MN (05078230).	266	1960-79	7-16-80	3.4
Hill River	Lost River	Lat 47°40'25", long 95°49'42", in SE¼SW¼ sec.31, T.149 N., R.40 W., Polk County, Hydrologic Unit 09020305, at bridge on county road, about 4 miles northeast of McIntosh, MN.	-	-	7-17-80	0
*Hill River	Lost River	Lat 47°49'22", long 96°00'00", in NE¼SW¼ sec.11, T.150 N., R.42 W., Red Lake County, Hydrologic Unit 09020305, at bridge on U.S. Highway 59, at Brooks, MN (05078340).	a185	1934, 1966, 1970-73, 1975-76	7-16-80	.92
Poplar River	Lost River	Lat 47°38'40", long 95°52'45", in SE¼SE¼ sec.9, T.148 N., R.41 W., Polk County, Hydrologic Unit 09020305, at culvert on County Highway 30, 0.5 mile northeast of McIntosh, MN.	-	-	7-17-80	.04
*Poplar River	Lost River	Lat 47°48'13", long 96°03'30", in NW¼NE¼ sec.20, T.150 N., R.42 W., Red Lake County, Hydrologic Unit 09020305, at bridge on County Highway B3, 2.5 miles upstream from mouth, and 2.8 miles west of Brooks, MN (05078380).	a155	1964-67, 1970-73, 1975-76	7-16-80	0
Beau Gerlot Creek	Clearwater River	Lat 47°50'48", long 96°12'10", in NW¼NW¼ sec.5, T.150 N., R.43 W., Red Lake County, Hydrologic Unit 09020305, at bridge on County Highway A-4, about 1 mile upstream from mouth, and 4 miles southeast of Red Lake Falls, MN.	-	1966	7-16-80	.04
Badger Creek	Clearwater River	Lat 47°46'42", long 96°09'32", in NE¼SE¼ sec.28, T.150 N., R.43 W., Red Lake County, Hydrologic Unit 09020305, at bridge on county road, about 4 miles southwest of Terrebonne, MN.	-	-	7-16-80	0

"See footnotes at end of table."

Low-flow investigations of streams tributary to the Red River of the North--Continued

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Date	Discharge (ft^3/s)
		Red Lake River basin--Continued				
*Badger Creek	Clearwater River	Lat 47°50'48", long 96°13'53", in SW¼SE¼ sec.36, T.151 N., R.44 W., Red Lake County, Hydrologic Unit 09020305, at bridge on County Highway A-4, about 1 mile upstream from mouth, and 3 miles southeast of Red Lake Falls, MN (05078490).	105	1970-73, 1975-76	7-16-80	0
Cyr Creek	Red Lake River	Lat 47°51'44", long 96°21'53", in SE¼SW¼ sec.25, T.151 N., R.45 W., Red Lake County, Hydrologic Unit 09020303, at bridge on County Highway 11, about 0.5 mile upstream from mouth, and 3 miles east of Huot, MN.	-	-	7-16-80	0
Black River	Red Lake River	Lat 47°52'40", long 96°24'37", in SE¼SW¼ sec.22, T.151 N., R.45 W., Red Lake County, Hydrologic Unit 09020303, at bridge on County Highway 18, 1.5 miles upstream from mouth, and 1.5 miles north of Huot, MN.	-	-	7-16-80	.07
Gentilly River	Red Lake River	Lat 47°47'23", long 96°26'58", in SE¼SW¼ sec.20, T.150 N., R.45 W., Polk County, Hydrologic Unit 09020303, at bridge on County Highway 11, about 0.5 mile upstream from mouth on the west edge of Gentilly, MN.	-	-	7-15-80	0
Kripple Creek	Gentilly River	Lat 47°48'28", long 96°26'17", in NE¼SE¼ sec.17, T.150 N., R.45 W., Polk County, Hydrologic Unit 09020303, at culvert on county road, about 1 mile upstream from mouth, and 1.5 miles northeast of Gentilly, MN.	-	-	7-15-80	0
Red Lake River tributary	Red Lake River	Lat 47°47'22", long 96°39'10", in SW¼SW¼ sec.23, T.150 N., R.47 W., Polk County, Hydrologic Unit 09020303, at bridge on County Road 61, 0.3 mile upstream from mouth, and 2 miles west of Crookston, MN.	-	-	7-15-80	0
*Burnham Creek	Red Lake River	Lat 47°43'53", long 96°39'41", in NW¼NE¼ sec.15, T.149 N., R.47 W., Polk County, Hydrologic Unit 09020303, at bridge on county road, 0.2 mile upstream from U.S. Highway 75, and 0.8 mile northeast of Girard, MN (05079900).	135	1964-67, 1970-73, 1975-76	7-15-80	0
Burnham Creek	Red Lake River	Lat 47°46'32", long 96°46'15", in SW¼SE¼ sec.26, T.150 N., R.48 W., Polk County, Hydrologic Unit 09020303, at bridge on County Road 216, 0.8 mile usptream from mouth, and about 2 miles southeast of Fisher, MN.	-	-	7-15-80	0
		Grand Marais Creek basin				
County ditch 2	Grand Marais Creek	Lat 48°02'59", long 96°50'45", in NE¼NE¼ sec.29, T.153 N., R.48 W., Polk County, Hydrologic Unit 09020306, at bridge on County Road 67, 3.5 miles northwest of Sherack, MN.	-	-	7-15-80	0
County ditch 2	Grand Marais Creek	Lat 48°02'59", long 97°01'09", in NE¼NE¼ sec.25, T.153 N., R.50 W., Polk County, Hydrologic Unit 09020306, at bridge on State Highway 220, 8 miles north of East Grand Forks, MN.	-	-	7-15-80	0
		Snake River basin				
Snake River	Red River of the North	Lat 48°13'41", long 96°33'56", in SE¼SE¼ sec.21, T.155 N., R.46 W., Marshall County, Hydrologic Unit 09020309, at bridge on county road, 2 miles east of Radium, MN.	-	-	7-15-80	0
State ditch	Snake River	Lat 48°12'36", long 96°33'56", in NE¼NE¼ sec.33, T.155 N., R.46 W., Marshall County, Hydrologic Unit 09020309, at bridge on county road, 2.4 miles southeast of Radium, MN.	-	-	7-15-80	0

"See footnotes at end of table."

Low-flow investigations of streams tributary to the Red River of the North--Continued

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Date	Discharge (ft^3/s)
		Snake River basin--Continued				
*Snake River	Red River of the North	Lat 48°11'50", long 96°46'45", in SE¼ sec.36, T.155 N., R.48 W., Marshall County, Hydrologic Unit 09020309, at bridge on Minnesota Street in Warren, MN (05085500).	175	1945#, 1946-49, 1953-56#, 1970-72, 1974-76, 1978-79	7-15-80	d.01
Snake River tributary	Snake River	Lat 48°05'38", long 96°50'05", in NW¼NE¼ sec.9, T.153 N., R.48 W., Polk County, Hydrologic Unit 09020309, at bridge on county road, about 1.5 miles northeast of Tabor, MN.	-	-	7-15-80	0
Snake River tributary 2	Snake River	Lat 48°06'27", long 96°49'31", in NE¼NE¼ sec.4, T.153 N., R.48 W., Polk County, Hydrologic Unit 09020309, at bridge on county road, about 2.6 miles northeast of Tabor, MN.	-	-	7-15-80	0
Snake River tributary 3	Snake River	Lat 48°07'22", long 96°50'08", in SW¼SE¼ sec.28, T.154 N., R.48 W., Polk County, Hydrologic Unit 09020309, at bridge on county road, about 3.3 miles northeast of Tabor, MN.	-	-	7-15-80	0
Snake River tributary 4	Snake River	Lat 48°09'24", long 96°54'43", in NE¼SE¼ sec.14, T.154 N., R.49 W., Polk County, Hydrologic Unit 09020309, at bridge on county road, about 4.7 miles southeast of Alvarado, MN.	-	-	7-15-80	0
*Snake River	Red River of the North	Lat 48°11'50", long 97°00'20", in SW¼SE¼ sec.31, T.155 N., R.49 W., Marshall County, Hydrologic Unit 09020309, at bridge on State Highway 1, on west edge of Alvarado, MN, and 22 miles upstream from mouth (05086000).	309	1945#, 1953-56#, 1978-79	7-15-80	0
County ditch 21	Snake River	Lat 48°13'27", long 97°01'15", in NE¼NE¼ sec.25, T.155 N., R.50 W., Marshall County, Hydrologic Unit 09020309, at bridge on county road, 2.4 miles northwest of Alvarado, MN.	-	-	7-15-80	.02
Snake River tributary 5	Snake River	Lat 48°18'40", long 97°02'37", in NE¼NE¼ sec.26, T.156 N., R.50 W., Marshall County, Hydrologic Unit 09020309, at bridge on county road, 3 miles east of Big Woods, MN.	-	-	7-15-80	0
Snake River	Red River of the North	Lat 48°21'27", long 97°03'56", in SE¼SE¼ sec.3, T.156 N., R.50 W., Marshall County, Hydrologic Unit 09020309, at bridge on County Road 17, about 3.4 miles northeast of Big Woods, MN.	-	-	7-15-80	0
Middle River	Snake River	Lat 48°26'07", long 96°09'56", in SW¼NW¼ sec.11, T.157 N., R.43 W., Marshall County, Hydrologic Unit 09020309, at bridge on State Highway 32, at Middle River, MN.	-	-	7-16-80	0
cMiddle River	Snake River	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, MN (05086900).	91.1	1971, 1979	7-16-80	0
Middle River	Snake River	Lat 48°22'29", long 96°25'51", in NE¼SE¼ sec.34, T.157 N., R.45 W., Marshall County, Hydrologic Unit 09020309, at bridge on county road, about 5 miles northeast of Newfolden, MN.	-	-	7-16-80	0
Middle River	Snake River	Gaging station at Argyle, MN (05087500).	265	1945, 1950-79#	7-15-80	0
Middle River	Snake River	Lat 48°22'12", long 97°03'48", in SE¼SE¼ sec.35, T.157 N., R.50 W., Marshall County, Hydrologic Unit 09020309, at bridge on County Highway 17, 4.5 miles northeast of Big Woods, MN.	-	-	7-15-80	.02

"See footnotes at end of table."

Low-flow investigations of streams tributary to the Red River of the North--Continued

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Date	Discharge (ft^3/s)
		Snake River basin--Continued				
Tamarac River	Red River of the North	Lat 48°26'24", long 96°52'01", in NE¼NE¼ sec.8, T.157 N., R.48 W., Marshall County, Hydrologic Unit 09020311, at bridge on U.S. Highway 75, 0.5 mile south of Stephen, MN.	-	-	7-15-80	0
Tamarac River	Red River of the North	Lat 48°29'35", long 97°06'25", in NE¼SE¼ sec.21, T.158 N., R.50 W., Marshall County, Hydrologic Unit 09020311, at bridge on State Highway 220, about 12 miles northwest of Stephen, MN.	-	-	7-15-80	0
Red River of the North tributary	Red River of the North	Lat 48°40'24", long 97°02'28", in NE¼NE¼ sec.24, T.160 N., R.50 W., Kittson County, Hydrologic Unit 09020311, at bridge on County Highway 1, about 1.8 miles southeast of Mattson, MN.	-	-	7-15-80	0
County ditch 9 tributary to Red River of the North tributary	Red River of the North	Lat 48°39'41", long 97°02'28", in SE¼SE¼ sec.24, T.160 N., R.50 W., Kittson County, Hydrologic Unit 09020311, at bridge on County Highway 1, about 2.5 miles southeast of Mattson, MN.	-	-	7-15-80	0
Middle Branch Two Rivers	South Branch Two Rivers	Lat 48°46'44", long 96°42'22", in NW¼SW¼ sec.11, T.161 N., R.47 W., Kittson County, Hydrologic Unit 09020312, at bridge on U.S. Highway 59, 1.2 miles northwest of Lake Bronson, MN.	-	-	7-15-80	0
Middle Branch Two Rivers tributary	Middle Branch Two Rivers	Lat 48°47'08", long 96°53'12", in SE¼NE¼ sec.8, T.161 N., R.48 W., Kittson County, Hydrologic Unit 09020312, at bridge on county road, 2.5 miles northeast of Hallock, MN.	-	-	7-15-80	0
South Branch Two Rivers	Two Rivers	Lat 48°41'56", long 96°10'41", in NE¼SE¼ sec.10, T.160 N., R.43 W., Roseau County, Hydrologic Unit 09020312, at bridge on State Highway 32, at Greenbush, MN.	-	-	7-14-80	0
South Branch Two Rivers	Two Rivers	Lat 48°39'42", long 96°24'35", in SE¼SE¼ sec.23, T.160 N., R.45 W., Kittson County, Hydrologic Unit 09020312, at bridge on county road, 1.2 miles northwest of Pelan, MN.	-	-	7-14-80	0
South Branch Two Rivers	Two Rivers	Gaging station at Lake Bronson, MN (05094000).	444	1928-36#, 1937#, 1941-43#, 1944#, 1945-47#, 1953-79#	7-15-80	.78
South Branch Two Rivers	Two Rivers	Lat 48°45'38", long 96°55'19", in NE¼NW¼ sec.19, T.161 N., R.48 W., Kittson County, Hydrologic Unit 09020312, at bridge on county road, 1.4 miles southeast of Hallock, MN.	-	-	7-15-80	.01
*Two Rivers	Red River of the North	Lat 48°46'30", long 96°55'52", in SE¼SE¼ sec.12, T.161 N., R.49 W., Kittson County, Hydrologic Unit 09020312, at bridge on State Highway 175 at east edge of Hallock, MN, and 0.25 mile downstream from South Branch Two Rivers (05095000).	625	1911-14#, 1929-30#, 1941-43#, 1967-71, 1974, 1976, 1978-79	7-15-80	.92
Two Rivers	Red River of the North	Lat 48°47'23", long 97°05'35", in SW¼SE¼ sec.2, T.161 N., R.50 W., Kittson County, Hydrologic Unit 09020312, at bridge on County Highway 57, about 5.6 miles southwest of Northcote MN, and about 0.5 mile upstream from North Branch Two Rivers.	-	-	7-15-80	.39
North Branch Two Rivers	Two Rivers	Lat 48°51'35", long 96°49'03", in NW¼NW¼ sec.13, T.162 N., R.48 W., Kittson County, Hydrologic Unit 09020312, at bridge on State Highway 6, 0.5 mile west of Lancaster, MN.	-	-	7-15-80	0

"See footnotes at end of table."

Low-flow investigations of streams tributary to the Red River of the North--Continued

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Date	Discharge (ft^3/s)
		Snake River basin--Continued				
North Branch Two Rivers	Two Rivers	Lat 48°50'58", long 97°00'19", in SW¼SE¼ sec.16, T.162 N., R.49 W., Kittson County, Hydrologic Unit 09020312, at bridge on U.S. Highway 75, 0.5 mile northwest of Northcote, MN.	-	-	7-15-80	0
North Branch Two Rivers	Two Rivers	Lat 48°48'14", long 97°04'36", NE¼NW¼ sec.1, T.161 N., R.50 W., Kittson County, Hydrologic Unit 09020312, at bridge on County Road 58, 4.5 miles southwest of Northcote, MN.	-	-	7-15-80	0
South Fork Roseau River	Roseau River	Lat 48°39'29", long 95°44'05", in SE¼SE¼ sec.24, T.160 N., R.40 W., Roseau County, Hydrologic Unit 09020314, at bridge on State Highway 89, at Wannaska, MN.	-	-	7-14-80	0

a Approximately.
b Measured 1 mile downstream.
c Also a high-flow partial-record station.
d Estimate.
e Possible regulation due to extensive Wild Rice cultivation upstream.
* Also published under measurements made at low-flow partial-record sites.
# Operated as a continuous-record gaging station.

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 1979 TO SEPTEMBER 1980

DATE	TIME	COLOR (PLATINUM COBALT UNITS)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	SULFIDE TOTAL (MG/L AS S)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, TOTAL (MG/L AS F)	SOLIDS, RESIDUE AT 105 DEG. C, SUSPENDED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)
AUG 07...	1200	13	<1	<1	.0	6.6	1.4	.0	8	.00	.010	.050

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
AUG 07...	1	100	0	15	0	50	0	10	<.1	0	0	10

DATE	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)	METHYLENE BLUE ACTIVE SUBSTANCE (MG/L)	OIL AND GREASE, TOTAL RECOV. GRAVIMETRIC (MG/L)	PCB TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	ATRAZINE, TOTAL (UG/L)	CHLORDANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)
AUG 07...	.00	0	.00	3	.00	.00	.00	.00	.0	.00	.00	.00

DATE	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	ENDOSULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)
AUG 07...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	MIREX, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	PERTHANE TOTAL (UG/L)	PROMETONE TOTAL (UG/L)	PROMETRYNE TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
AUG 07...	.00	.00	.00	.0	.0	.0	0	.00	.00	.00	.00

482226092283301 - SANDPOINT LAKE BELOW HARRISON NARROWS NEAR CRANE LAKE, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	SAMP-LING DEPTH (FT) (00003)	RESER-VOIR DEPTH (FEET) (72025)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, WATER (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 (MG/L AS HCO3) (00440)
MAY 12...	1230	10.5	37	70	7.2	10.0	3.2	9.3	89	18
AUG 07...	1300	9.0	31	50	6.8	21.5	2.8	8.0	90	24

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, TOTAL (MG/L AS N) (00600)	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 12...	52	.06	.06	.45	.51	.021	.015	2.03	.000
AUG 07...	58	.00	.00	.27	.27	.018	.001	2.92	.000

DATE	TIME	COLOR (PLAT-INUM COBALT UNITS)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	SULFIDE TOTAL (MG/L AS S)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, TOTAL (MG/L AS F)	SOLIDS, RESIDUE AT 105 DEG. C, SUS-PENDED (MG/L)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)
AUG 07...	1300	22	<1	<1	.0	5.2	1.4	.1	4	.00	.000	.030

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)
AUG 07...	1	20	0	10	0	50	0	0	<.1	0	0	10

DATE	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)	OIL AND GREASE, TOTAL RECOV. GRAVI-METRIC (MG/L)	PCB TOTAL (UG/L)	NAPH-THA-LENES, POLY-CHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	ATRA-ZINE, TOTAL (UG/L)	CHLOR-DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)
AUG 07...	.00	3	.00	4	.00	.00	.00	.00	.0	.00	.00	.00

DATE	DI-AZINON, TOTAL (UG/L)	DI-ELDRIN TOTAL (UG/L)	ENDO-SULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTA-CHLOR, TOTAL (UG/L)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA-THION, TOTAL (UG/L)	METH-OXY-CHLOR, TOTAL (UG/L)	METHYL PARA-THION, TOTAL (UG/L)	METHYL TRI-THION, TOTAL (UG/L)
AUG 07...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	MIREX, TOTAL (UG/L)	PARA-THION, TOTAL (UG/L)	PER-THANE TOTAL (UG/L)	PROME-TONE TOTAL (UG/L)	PROME-TRYNE TOTAL (UG/L)	SIMA-ZINE TOTAL (UG/L)	TOX-APHENE, TOTAL (UG/L)	TOTAL TRI-THION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
AUG 07...	.00	.00	.00	.0	.0	.0	0	.00	.00	.00	.00

482226092283301 SANDPOINT LAKE BELOW HARRISON NARROWS NEAR CRANE LAKE, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1980 TO AUGUST 1980

DATE	MAY 12,80	AUG 7,80
TIME	1230	1300
TOTAL CELLS/ML	1100	4900
DIVERSITY: DIVISION	1.5	0.4
.CLASS	1.5	0.4
..ORDER	1.9	0.8
...FAMILY	2.4	0.8
....GENUS	2.5	0.8

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...CHARACIACEAE				
....SCHROEDERIA	--	-	*	0
...MICRACTINIACEAE				
....MICRACTINIUM	58	5	--	-
...OOCYSTACEAE				
....ANKISTRODESMUS	230#	21	*	0
....OOCYSTIS	--	-	26	1
...SCENEDESMACEAE				
....SCENEDESMUS	58	5	--	-
..TETRASPORALES				
...PALMELLACEAE				
....GLOEOCYSTIS	58	5	--	-
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	14	1	*	0
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	43	4	*	0
....STEPHANODISCUS	14	1	--	-
..PENNALES				
...ACHNANTHACEAE				
....ACHNANTHES	14	1	--	-
...FRAGILARIACEAE				
....ASTERIONELLA	--	-	77	2
....SYNEDRA	29	3	--	-
...NITZSCHIACEAE				
....NITZSCHIA	29	3	--	-
.CHRYSOPHYCEAE				
..CHRYSOMONADALES				
...MALLOMONADACEAE				
....MALLOMONAS	--	-	*	0
CRYPTOPHYTA (CRYPTOMONADS)				
.CRYPTOPHYCEAE				
..CRYPTOMONADALES				
...CRYPTOCHRYSIDACEAE				
....CHROOMONAS	--	-	100	2
...CRYPTOMONADACEAE				
....CRYPTOMONAS	--	-	26	1
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	520#	48	4300#	87
..HORMOGONALES				
...NOSTOCACEAE				
....APHANIZOMENON	--	-	330	7
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....TRACHELOMONAS	14	1	--	-

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 1979 TO SEPTEMBER 1980

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPERATURE, WATER (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)
MAY 15...	0900	2.8	8.0	205	7.6	11.0	.85	9.7	91	91
AUG 04...	1400	2.0	12	158	8.9	22.7	.70	8.3	99	77

DATE	CARBONATE (MG/L AS CO3) (00445)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, TOTAL (MG/L AS N) (00600)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
MAY 15...	0	124	.00	.00	.66	.66	.028	.019	8.62	.000
AUG 04...	24	125	.00	.00	1.3	1.3	.105	.037	97.8	.000

DATE	TIME	COLOR (PLATINUM COBALT UNITS)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	SULFIDE TOTAL (MG/L AS S)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, TOTAL (MG/L AS F)	SOLIDS, RESIDUE AT 105 DEG. C, SUSPENDED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)
AUG 04...	1400	35	<1	<1	.2	2.9	1.6	.1	7	.00	.000	.390

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
AUG 04...	3	100	0	10	0	40	1	10	<.1	0	0	50

DATE	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)	METHYLENE BLUE ACTIVE SUBSTANCE (MG/L)	OIL AND GREASE, TOTAL RECOV. GRAVIMETRIC (MG/L)	PCB TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	ATRAZINE, TOTAL (UG/L)	CHLORDANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)
AUG 04...	.00	5	.00	1	.00	.00	.00	.10	.0	.00	.00	.00

DATE	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	ENDOSULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)
AUG 04...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	MIREX, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	PERTHANE TOTAL (UG/L)	PROMETONE TOTAL (UG/L)	PROMETRYNE TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
AUG 04...	.00	.00	.00	.0	.0	.0	0	.00	.00	.00	.00

482451092471001 ASH RIVER AT ENTRANCE TO SULLIVAN BAY NEAR RAY, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1980 TO AUGUST 1980

DATE	MAY 15,80	AUG 4,80
TIME	0900	1400
TOTAL CELLS/ML	4100	200000
DIVERSITY: DIVISION	1.1	0.6
.CLASS	1.1	0.6
..ORDER	1.3	1.3
...FAMILY	1.5	1.5
....GENUS	1.6	1.7

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...OOCYSTACEAE				
....ANKISTRODESMUS	160	4	*	0
....DICTYOSPHAERIUM	--	-	*	0
....OOCYSTIS	--	-	*	0
....SELENASTRUM	--	-	9600	5
....TETRAEDRON	--	-	*	0
...SCENEDESMACEAE				
....ACTINASTRUM	--	-	1900	1
....SCENEDESMUS	--	-	2900	1
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CARTERIA	41	1	--	-
....CHLAMYDOMONAS	240	6	1200	1
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	82	2	*	0
....MELOSIRA	41	1	--	-
..PENNALES				
...NAVICULACEAE				
....NAVICULA	41	1	--	-
...NITZSCHIACEAE				
....NITZSCHIA	490	12	*	0
CRYPTOPHYTA (CRYPTOMONADS)				
.CRYPTOPHYCEAE				
..CRYPTOMONADALES				
...CRYPTOCHRYSIDACEAE				
....CHROOMONAS	2900#	71	--	-
...CRYPTOMONADACEAE				
....CRYPTOMONAS	82	2	1700	1
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	--	-	35000#	18
....COCCOCHLORIS	--	-	1200	1
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	130000#	67
....APHANIZOMENON	--	-	4300	2
...OSCILLATORIACEAE				
....OSCILLATORIA	--	-	3900	2

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 1979 TO SEPTEMBER 1980

DATE	TIME	SAMP-LING DEPTH (FT) (00003)	RESER-VOIR DEPTH (FEET) (72025)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE, WATER (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 (MG/L AS HCO3) (00440)
MAY										
15...	0815	5.6	9.8	179	7.6	11.0	1.7	9.5	89	80
AUG										
04...	1630	3.0	22	132	9.2	22.8	.65	10.6	127	57

DATE	CAR-BONATE (MG/L AS CO3) (00445)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, TOTAL (MG/L AS N) (00600)	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										
15...	0	117	.00	.00	.60	.61	.032	.015	6.59	.160
AUG										
04...	20	103	.00	.00	.92	.92	.082	.032	107	.000

482545092495401 KABETOGAMA LAKE AT SULLIVAN BAY OUTLET NEAR RAY, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1980 TO AUGUST 1980

DATE	MAY 15,80		AUG 4,80	
TIME	0815		1630	
TOTAL CELLS/ML	4000		120000	
DIVERSITY: DIVISION	1.8		0.3	
.CLASS	1.8		0.3	
..ORDER	2.1		0.7	
...FAMILY	2.6		0.9	
....GENUS	3.6		1.3	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...CHARACIACEAE				
....SCHROEDERIA	22	1	--	-
...MICRACTINIACEAE				
....MICRACTINIUM	22	1	--	-
...OOCYSTACEAE				
....ANKISTRODESMUS	870#	22	*	0
....DICTYOSPHAERIUM	540	13	--	-
....KIRCHNERIELLA	45	1	--	-
....NEPHROCYTIUM	90	2	--	-
....OOCYSTIS	90	2	--	-
....SELENASTRUM	--	-	*	0
....TETRAEDRON	--	-	*	0
....TREUBARIA	22	1	--	-
...SCENEDESMACEAE				
....CRUCIGENIA	90	2	--	-
....SCENEDESMUS	250	6	*	0
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	180	4	*	0
....CHLOROGONIUM	--	-	*	0
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	200	5	*	0
....MELOSIRA	360	9	--	-
..PENNALES				
...FRAGILARIACEAE				
....SYNEDRA	67	2	*	0
...NITZSCHIACEAE				
....NITZSCHIA	160	4	1500	1
CRYPTOPHYTA (CRYPTOMONADS)				
.CRYPTOPHYCEAE				
..CRYPTOMONADALES				
...CRYPTOCHRYSIDACEAE				
....CHROOMONAS	160	4	--	-
...CRYPTOMONADACEAE				
....CRYPTOMONAS	45	1	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	720#	18	6600	5
....COCCOCHLORIS	--	-	2000	2
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	94000#	78
....APHANIZOMENON	--	-	9200	8
...OSCILLATORIACEAE				
....OSCILLATORIA	--	-	3900	3
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....EUGLENA	22	1	*	0
....TRACHELOMONAS	67	2	*	0
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..PERIDINIALES				
...GLENODINIACEAE				
....GLENODINIUM	22	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 1979 TO SEPTEMBER 1980

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPERATURE, WATER (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)
MAY										
14...	1430	8.5	33	107	7.1	10.5	2.6	9.6	90	42
AUG										
04...	1500	6.0	39	70	7.9	22.7	1.7	8.0	96	88

DATE	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, TOTAL (MG/L AS N) (00600)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
MAY									
14...	64	.01	.01	.58	.59	.020	.015	3.73	.340
AUG									
04...	80	.00	.00	.58	.58	.023	.013	10.9	.000

482607092511701 KABETOGAMA LAKE AT MOUTH OF MEADWOOD BAY NEAR RAY, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1980 TO AUGUST 1980

DATE	MAY 14,80		AUG 4,80	
TIME	1430		1500	
TOTAL CELLS/ML	5800		25000	
DIVERSITY: DIVISION	1.6		0.1	
.CLASS	1.6		0.1	
..ORDER	2.1		1.1	
...FAMILY	2.3		1.2	
....GENUS	2.4		1.4	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...CHARACIACEAE				
....SCHROEDERIA	71	1	--	-
...OOCYSTACEAE				
....ANKISTRODESMUS	140	2	--	-
....SELENASTRUM	--	-	*	0
...SCENEDESMACEAE				
....SCENEDESMUS	--	-	*	0
..TETRASPORALES				
...PALMELLACEAE				
....SPHAEROCYSTIS	280	5	--	-
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	2400#	42	*	0
..PENNALES				
...ACHNANTHACEAE				
....ACHNANTHES	35	1	--	-
...DIATOMACEAE				
....DIATOMA	35	1	--	-
...FRAGILARIACEAE				
....ASTERIONELLA	180	3	--	-
....SYNEDRA	180	3	--	-
...NITZSCHIACEAE				
....NITZSCHIA	280	5	*	0
...TABELLARIACEAE				
....TABELLARIA	--	-	160	1
CRYPTOPHYTA (CRYPTOMONADS)				
.CRYPTOPHYCEAE				
..CRYPTOMONADALES				
...CRYPTOCHRYSIDACEAE				
....CHROOMONAS	320	5	--	-
...CRYPTOMONADACEAE				
....CRYPTOMONAS	35	1	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	1800#	30	13000#	53
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	10000#	40
....APHANIZOMENON	--	-	1000	4
...OSCILLATORIACEAE				
....OSCILLATORIA	--	-	360	1
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..PERIDINIALES				
...GLENODINIACEAE				
....GLENODINIUM	35	1	--	-

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 1979 TO SEPTEMBER 1980

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPERATURE, WATER (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)
MAY 14...	0900	11.8	72	68	7.1	10.5	3.6	6.5	91	21
AUG 07...	1030	11.0	>60	42	6.4	20.2	3.4	7.8	89	20

DATE	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, TOTAL (MG/L AS N) (00600)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
MAY 14...	52	.08	.08	.84	.93	.020	.018	3.58	.000
AUG 07...	50	.01	.01	.43	.44	.018	.000	2.88	.000

DATE	TIME	COLOR (PLATINUM COBALT UNITS)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	SULFIDE TOTAL (MG/L AS S)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, TOTAL (MG/L AS F)	SOLIDS, RESIDUE AT 105 DEG. C, SUSPENDED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)
AUG 07...	1030	20	K1	<1	.0	4.8	.8	.0	1	.01	.000	.020

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
AUG 07...	1	<50	0	10	0	20	0	10	<.1	0	0	10

DATE	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)	METHYLENE BLUE ACTIVE SUBSTANCE (MG/L)	OIL AND GREASE, TOTAL RECOV. GRAVIMETRIC (MG/L)	PCB TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	ATRAZINE, TOTAL (UG/L)	CHLORDANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)
AUG 07...	.00	0	.00	4	.00	.00	.00	.00	.0	.00	.00	.00

DATE	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	ENDOSULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)
AUG 07...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	MIREX, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	PERTHANE TOTAL (UG/L)	PROMETONE TOTAL (UG/L)	PROMETRYNE TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
AUG 07...	.00	.00	.00	.0	.0	.0	0	.00	.00	.00	.00

482616092372201 NAMAKAN LAKE NEAR RAY, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1980 TO AUGUST 1980

DATE	MAY 14,80		AUG 7,80	
TIME	0900		1030	
TOTAL CELLS/ML	1100		6800	
DIVERSITY: DIVISION	1.4		0.1	
.CLASS	1.4		0.1	
..ORDER	1.9		0.9	
...FAMILY	1.9		1.1	
....GENUS	1.9		1.3	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...OOCYSTACEAE				
....ANKISTRODESMUS	72	6	--	-
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	160	14	--	-
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	660#	59	*	0
..PENNALES				
...FRAGILARIACEAE				
....FRAGILARIA	--	-	64	1
...NITZSCHIACEAE				
....NITZSCHIA	57	5	--	-
CRYPTOPHYTA (CRYPTOMONADS)				
.CRYPTOPHYCEAE				
..CRYPTOMONADALES				
...CRYPTOCHRYSIDACEAE				
....CHROOMONAS	--	-	*	0
...CRYPTOMONADACEAE				
....CRYPTOMONAS	14	1	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	140	13	5000#	73
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	980	14
....APHANIZOMENON	--	-	450	7
...OSCILLATORIACEAE				
....LYNGBYA	--	-	310	5
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..GYMNODINIALES				
...GYMNODINIACEAE				
....GYMNODINIUM	14	1	--	-

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 1979 TO SEPTEMBER 1980

DATE	TIME	COLOR (PLATINUM COBALT UNITS)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	SULFIDE TOTAL (MG/L AS S)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, TOTAL (MG/L AS F)	SOLIDS, RESIDUE AT 105 DEG. C, SUSPENDED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)
AUG 06...	1000	25	K1	<1	.0	3.3	1.0	.1	5	.00	.000	.080

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
AUG 06...	1	<50	0	11	0	10	0	10	<.1	0	0	10

DATE	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)	METHYLENE BLUE ACTIVE SUBSTANCE (MG/L)	OIL AND GREASE, TOTAL RECOV. GRAVIMETRIC (MG/L)	PCB TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	ATRAZINE, TOTAL (UG/L)	CHLORDANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)
AUG 06...	.00	6	.00	3	.00	.00	.00	.10	.0	.00	.00	.00

DATE	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	ENDOSULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)
AUG 06...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	MIREX, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	PERTHANE TOTAL (UG/L)	PROMETONE TOTAL (UG/L)	PROMETRYNE TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
AUG 06...	.00	.00	.00	.0	.0	.0	0	.00	.00	.00	.00

482721093003901 - KABETOGAMA LAKE NEAR RAY MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPERATURE, WATER (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)
MAY 14...	1300	9.0	30	105	7.2	8.5	2.8	10.2	93	41
AUG 06...	0900	5.0	34	85	7.4	20.8	1.6	7.2	84	49

DATE	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, TOTAL (MG/L AS N) (00600)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
MAY 14...	67	.00	.00	.67	.67	.029	.011	2.60	.870
AUG 06...	78	.00	.00	.65	.65	.044	.000	18.4	.000

DATE	TIME	COLOR (PLATINUM COBALT UNITS)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	SULFIDE TOTAL (MG/L AS S)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, TOTAL (MG/L AS F)	SOLIDS, RESIDUE AT 105 DEG. C, SUSPENDED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)
AUG 06...	0900	30	<1	<1	.0	3.9	1.0	.0	4	.00	.000	.070

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
AUG 06...	1	100	0	10	0	10	0	0	<.1	0	0	10

DATE	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)	METHYLENE BLUE ACTIVE SUBSTANCE (MG/L)	OIL AND GREASE, TOTAL RECOV. GRAVIMETRIC (MG/L)	PCB TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	ATRAZINE, TOTAL (UG/L)	CHLORDANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)
AUG 06...	.00	3	.00	3	.00	.00	.00	.10	.0	.00	.00	.00

DATE	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	ENDOSULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)
AUG 06...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	MIREX, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	PERTHANE TOTAL (UG/L)	PROMETONE TOTAL (UG/L)	PROMETRYNE TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
AUG 06...	.00	.00	.00	.0	.0	.0	0	.00	.00	.00	.00

482721093003901 KABETOGAMA LAKE NEAR RAY, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1980 TO AUGUST 1980

DATE	MAY 14,80		AUG 6,80	
TIME	1300		0900	
TOTAL CELLS/ML	13000		72000	
DIVERSITY: DIVISION	1.4		0.2	
.CLASS	1.4		0.2	
..ORDER	1.7		1.2	
...FAMILY	1.8		1.2	
....GENUS	1.8		1.8	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...CHARACIACEAE				
....SCHROEDERIA	*	0	*	0
...OOCYSTACEAE				
....ANKISTRODESMUS	*	0	--	-
....SELENASTRUM	--	-	*	0
...SCENEDESMACEAE				
....SCENEDESMUS	--	-	*	0
..TETRASPORALES				
...PALMELLACEAE				
....GLOEOCYSTIS	260	2	--	-
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	390	3	--	-
...VOLVOCACEAE				
....PANDORINA	--	-	540	1
..ZYGNEMATALES				
...DESMIDIACEAE				
....COSMARIUM	--	-	*	0
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	4600#	35	*	0
....STEPHANODISCUS	--	-	*	0
..PENNALES				
...NAVICULACEAE				
....NAVICULA	*	0	--	-
...NITZSCHIACEAE				
....NITZSCHIA	650	5	*	0
...SURIRELLACEAE				
....SURIRELLA	*	0	--	-
...TABELLARIACEAE				
....TABELLARIA	--	-	540	1
CRYPTOPHYTA (CRYPTOMONADS)				
.CRYPTOPHYCEAE				
..CRYPTOMONADALES				
...CRYPTOCHRYSIDACEAE				
....CHROOMONAS	200	1	*	0
...CRYPTOMONADACEAE				
....CRYPTOMONAS	*	0	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	6600#	51	9000	13
....GOMPHOSPHAERIA	--	-	27000#	38
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	30000#	42
....APHANIZOMENON	--	-	3500	5
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..GYMNODINIALES				
...GYMNODINIACEAE				
....GYMNODINIUM	*	0	--	-

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 1979 TO SEPTEMBER 1980

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPERATURE, WATER (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)
MAY 14...	1330	9.0	29	107	7.3	11.0	2.7	9.6	92	41
AUG 06...	1200	6.0	36	82	8.0	21.9	2.0	7.1	84	49

DATE	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, TOTAL (MG/L AS N) (00600)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
MAY 14...	60	.01	.01	.67	.68	.026	.019	1.31	.000
AUG 06...	98	.00	.00	.34	.34	.029	.000	12.2	.000

482747092503001 KABETOGAMA LAKE IN LOST BAY NEAR RAY, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1980 TO AUGUST 1980

DATE	MAY 14,80		AUG 6,80	
TIME	1330		1200	
TOTAL CELLS/ML	5600		22000	
DIVERSITY: DIVISION	1.3		0.3	
.CLASS	1.3		0.3	
..ORDER	2.0		1.0	
...FAMILY	2.3		1.2	
....GENUS	2.5		1.9	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...CHARACIACEAE				
....SCHROEDERIA	96	2	--	-
...MICRACTINIACEAE				
....MICRACTINIUM	--	-	210	1
...OOCYSTACEAE				
....ANKISTRODESMUS	64	1	--	-
....OOCYSTIS	--	-	*	0
...SCENEDESMACEAE				
....SCENEDESMUS	--	-	*	0
..TETRASPORALES				
...COCCOMYXACEAE				
....ELAKATOTHRIX	190	3	--	-
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	64	1	*	0
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	2100#	38	--	-
....MELOSIRA	160	3	360	2
....STEPHANODISCUS	32	1	--	-
..PENNALES				
...FRAGILARIACEAE				
....ASTERIONELLA	580	10	--	-
....SYNEDRA	64	1	--	-
...NITZSCHIACEAE				
....NITZSCHIA	510	9	*	0
CRYPTOPHYTA (CRYPTOMONADS)				
.CRYPTOPHYCEAE				
..CRYPTOMONADALES				
...CRYPTOCHRYSIDACEAE				
....CHROOMONAS	64	1	--	-
...CRYPTOMONADACEAE				
....CRYPTOMONAS	32	1	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	1600#	29	2300	11
....GOMPHOSPHAERIA	--	-	2100	10
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	14000#	62
....APHANIZOMENON	--	-	2200	10
...OSCILLATORIACEAE				
....OSCILLATORIA	--	-	770	4
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....TRACHELOMONAS	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..PERIDINIALES				
...GLENODINIACEAE				
....GLENODINIUM	--	-	*	0

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 1979 TO SEPTEMBER 1980

DATE	TIME	COLOR (PLATINUM COBALT UNITS)	SULFIDE TOTAL (MG/L AS S)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, TOTAL (MG/L AS F)	SOLIDS, RESIDUE AT 105 DEG. C, SUSPENDED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)
AUG 06...	1045	10	.0	3.7	.9	.0	7	.00	.000	.130	1	<50

DATE	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
AUG 06...	0	10	0	10	0	0	<.1	0	0	10	.00	4

DATE	METHYLENE BLUE ACTIVE SUBSTANCE (MG/L)	OIL AND GREASE, TOTAL RECOV. GRAVIMETRIC (MG/L)	PCB TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	ATRAZINE, TOTAL (UG/L)	CHLORDANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DIAZINON, TOTAL (UG/L)
AUG 06...	.00	4	.10	.00	.00	.00	.0	.00	.00	.00	.00

DATE	DIELDRIN TOTAL (UG/L)	ENDOSULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)
AUG 06...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	MIREX, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	PERTHANE TOTAL (UG/L)	PROMETONE TOTAL (UG/L)	PROMETRYNE TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
AUG 06...	.00	.00	.00	.0	.0	.0	0	.00	.00	.00	.00

483000092392601 - NAMAKAN LAKE ABOVE KETTLE FALLS NEAR INTERNATIONAL FALLS MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPERATURE, WATER (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)
MAY										
14...	1100	10.5	76	62	7.0	7.0	3.2	11.1	86	19
AUG										
07...	1545	10.0	60	46	6.7	21.2	3.2	7.7	86	22

DATE	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, TOTAL (MG/L AS N) (00600)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
MAY									
14...	38	.06	.06	.44	.51	.015	.016	2.99	.000
AUG									
07...	64	.00	.00	.24	.24	.009	.000	1.71	.000

483000092392601 NAMAKAN LAKE ABOVE KETTLE FALLS NEAR INTERNATIONAL FALLS, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1980 TO AUGUST 1980

DATE	MAY 14,80		AUG 7,80	
TIME	1100		1545	
TOTAL CELLS/ML	1100		4200	
DIVERSITY: DIVISION	0.9		0.5	
.CLASS	0.9		0.5	
..ORDER	1.8		1.3	
...FAMILY	2.1		1.5	
....GENUS	2.3		2.6	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...CHARACIACEAE				
....SCHROEDERIA	--	-	39	1
...MICRACTINIACEAE				
....MICRACTINIUM	43	4	--	-
...OOCYSTACEAE				
....ANKISTRODESMUS	43	4	--	-
....OOCYSTIS	--	-	51	1
...SCENEDESMACEAE				
....SCENEDESMUS	--	-	51	1
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	130	12	--	-
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	560#	51	26	1
....MELOSIRA	57	5	--	-
..PENNALES				
...FRAGILARIACEAE				
....ASTERIONELLA	57	5	64	2
...NAVICULACEAE				
....NAVICULA	14	1	--	-
...NITZSCHIACEAE				
....NITZSCHIA	170#	16	--	-
CRYPTOPHYTA (CRYPTOMONADS)				
.CRYPTOPHYCEAE				
..CRYPTOMONADALES				
...CRYPTOCHRYSIDACEAE				
....CHROOMONAS	14	1	100	2
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....AGMENELLUM	--	-	210	5
....ANACYSTIS	--	-	1600#	38
....GOMPHOSPHAERIA	--	-	1200#	27
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	260	6
....APHANIZOMENON	--	-	350	8
...OSCILLATORIACEAE				
....LYNGBYA	--	-	320	8
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..GYMNODINIALES				
...GYMNODINIACEAE				
....GYMNODINIUM	14	1	--	-

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 1979 TO SEPTEMBER 1980

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPERATURE, WATER (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)
MAY 13...	1130	1.6	5.0	100	7.4	10.5	.50	9.2	85	38
AUG 05...	0930	2.0	5.0	98	7.5	18.0	.30	8.2	90	53

DATE	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, TOTAL (MG/L AS N) (00600)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
MAY 13...	77	.00	.00	1.1	1.1	.042	.029	5.62	.000
AUG 05...	92	.01	.01	.23	.24	.071	.014	22.8	.720

DATE	TIME	COLOR (PLATINUM COBALT UNITS)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	SULFIDE TOTAL (MG/L AS S)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, TOTAL (MG/L AS F)	SOLIDS, RESIDUE AT 105 DEG. C, SUSPENDED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)
AUG 05...	0930	15	30	K30	.2	5.3	1.2	.1	87	.01	.000	.090

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
AUG 05...	1	<50	0	13	0	30	2	10	<.1	2	0	10

DATE	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)	METHYLENE BLUE ACTIVE SUBSTANCE (MG/L)	OIL AND GREASE, TOTAL RECOV. GRAVIMETRIC (MG/L)	PCB TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	ATRAZINE, TOTAL (UG/L)	CHLORDANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)
AUG 05...	.00	4	.00	0	.00	.00	.00	.10	.0	.00	.00	.00

DATE	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	ENDOSULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)
AUG 05...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	MIREX, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	PERTHANE TOTAL (UG/L)	PROMETONE TOTAL (UG/L)	PROMETRYNE TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
AUG 05...	.00	.00	.00	.0	.0	.0	0	.00	.00	.00	.00

483304093062701 RAINY LAKE AT BLACK BAY NEAR INTERNATIONAL FALLS, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1980 TO AUGUST 1980--Continued

DATE TIME	MAY 13,80 1130		AUG 5,80 0930	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
..TETRASPORALES				
...PALMELLACEAE				
....GLOEOCYSTIS	--	-	*	0
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CARTERIA	*	0	--	-
....CHLAMYDOMONAS	150	1	*	0
..ZYGNEMATALES				
...DESMIDIACEAE				
....COSMARIUM	--	-	*	0
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	320	2	--	-
....MELOSIRA	4500#	32	1200	1
....STEPHANODISCUS	--	-	*	0
..PENNALES				
...ACHNANTHACEAE				
....ACHNANTHES	--	-	*	0
...CYMBELLACEAE				
....AMPHORA	--	-	*	0
...FRAGILARIACEAE				
....ASTERIONELLA	180	1	*	0
....SYNEDRA	210	1	*	0
...NAVICULACEAE				
....ENTOMONEIS	--	-	*	0
....NAVICULA	*	0	*	0
...NITZSCHIACEAE				
....NITZSCHIA	260	2	2100	1
.CHRYSOPHYCEAE				
..CHRYSOMONADALES				
...OCHROMONADACEAE				
....KEPHYRIOPSIS	*	0	--	-
...SYNURACEAE				
....SYNURA	940	7	--	-
CRYPTOPHYTA (CRYPTOMONADS)				
.CRYPTOPHYCEAE				
..CRYPTOMONADALES				
...CRYPTOCHRYSIDACEAE				
....CHROOMONAS	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	760	5	110000#	75
....GOMPHOSPHAERIA	--	-	6100	4
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	9500	7
....APHANIZOMENON	--	-	1200	1
...OSCILLATORIACEAE				
....LYNGBYA	--	-	3700	3
....OSCILLATORIA	3500#	25	3600	2
....PHORMIDIUM	--	-	3200	2
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....EUGLENA	*	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 1979 TO SEPTEMBER 1980

DATE	TIME	COLOR (PLATINUM COBALT UNITS)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	SULFIDE TOTAL (MG/L AS S)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, TOTAL (MG/L AS F)	SOLIDS, RESIDUE AT 105 DEG. C, SUSPENDED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)
AUG 05...	1300	30	36	K10	.3	5.6	1.2	.1	12	.01	.000	.060

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
AUG 05...	1	100	0	12	0	50	1	10	<.1	0	0	10

DATE	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)	METHYLENE BLUE ACTIVE SUBSTANCE (MG/L)	OIL AND GREASE, TOTAL RECOV. GRAVIMETRIC (MG/L)	PCB TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	ATRAZINE, TOTAL (UG/L)	CHLORDANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)
AUG 05...	.00	1	.00	0	.00	.00	.00	.10	.0	.00	.00	.00

DATE	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	ENDOSULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)
AUG 05...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	MIREX, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	PERTHANE TOTAL (UG/L)	PROMETONE TOTAL (UG/L)	PROMETRYNE TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
AUG 05...	.00	.00	.00	.0	.0	.0	0	.00	.00	.00	.00

483622092560701 - RAINY LAKE AT BRULE NARROWS NEAR INTERNATIONAL FALLS, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPERATURE, WATER (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)
MAY 13...	1030	8.5	19	58	7.1	6.5	2.6	11.4	97	18
AUG 05...	1100	6.0	12	49	7.4	20.0	2.0	8.2	93	20

DATE	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, TOTAL (MG/L AS N) (00600)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
MAY 13...	48	.05	.05	.61	.67	.013	.011	1.55	.000
AUG 05...	55	.01	--	.33	.34	.007	--	2.84	.000

DATE	TIME	COLOR (PLATINUM COBALT UNITS)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	SULFIDE TOTAL (MG/L AS S)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, TOTAL (MG/L AS F)	SOLIDS, RESIDUE AT 105 DEG. C, SUSPENDED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)
AUG 05...	1100	30	K2	<1	.0	4.9	1.0	.1	4	.01	.000	.020

DATE	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)
AUG 05...	1	<50	0	10	0	30	2	10	<.1	1	0	270

DATE	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)	METHYLENE BLUE ACTIVE SUBSTANCE (MG/L)	OIL AND GREASE, TOTAL RECOV. GRAVIMETRIC (MG/L)	PCB TOTAL (UG/L)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	ATRAZINE, TOTAL (UG/L)	CHLORDANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)
AUG 05...	.00	6	.00	0	.00	.00	.00	.10	.0	.00	.00	.00

DATE	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	ENDOSULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)
AUG 05...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	MIREX, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	PERTHANE TOTAL (UG/L)	PROMETONE TOTAL (UG/L)	PROMETRYNE TOTAL (UG/L)	SIMAZINE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
AUG 05...	.00	.00	.00	.0	.0	.0	0	.00	.00	.00	.00

483622092560701 RAINY LAKE AT BRULE NARROWS NEAR INTERNATIONAL FALLS, MN--Continued

PHYTOPLANKTON ANALYSES, MAY 1980 TO AUGUST 1980

DATE	MAY 13,80		AUG 5,80	
TIME	1030		1100	
TOTAL CELLS/ML	860		1000	
DIVERSITY: DIVISION	0.8		1.6	
.CLASS	0.8		1.7	
..ORDER	1.4		2.5	
...FAMILY	1.7		2.9	
....GENUS	2.2		3.1	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...CHARACIACEAE				
....SCHROEDERIA	--	-	26	2
...OOCYSTACEAE				
....ANKISTRODESMUS	29	3	--	-
...SCENEDESMACEAE				
....SCENEDESMUS	--	-	51	5
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	--	-	39	4
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	160#	18	100	10
....MELOSIRA	450#	52	77	7
..PENNALES				
...FRAGILARIACEAE				
....ASTERIONELLA	72	8	190#	19
...NAVICULACEAE				
....NAVICULA	14	2	--	-
...NITZSCHIACEAE				
....NITZSCHIA	57	7	26	2
...TABELLARIACEAE				
....TABELLARIA	--	-	77	7
.CHRYSOPHYCEAE				
..CHRYSOMONADALES				
...SYNURACEAE				
....SYNURA	--	-	13	1
CRYPTOPHYTA (CRYPTOMONADS)				
.CRYPTOPHYCEAE				
..CRYPTOMONADALES				
...CRYPTOCHRYSIDACEAE				
....CHROOMONAS	43	5	--	-
...CRYPTOMONADACEAE				
....CRYPTOMONAS	14	2	13	1
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROOCOCCALES				
...CHROOCOCCACEAE				
....ANACYSTIS	--	-	90	9
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	300#	29
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....EUGLENA	--	-	13	1
....TRACHELOMONAS	--	-	13	1
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..GYMNODINIALES				
...GYMNODINIACEAE				
....GYMNODINIUM	29	3	--	-

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

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 1979 TO SEPTEMBER 1980

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. 17, 1979...	69	5.0	99	APR. 14.....	230	.5	---
OCT. 25.....	226	2.0	---	APR 23.....	1930	4.5	56
NOV. 28.....	158	.0	---	JUNE 04.....	231	16.0	82
JAN. 03, 1980...	82	.5	---	JULY 02.....	130	18.0	80
JAN. 10.....	102	.0	80	AUG. 06.....	56	18.0	82
FEB. 20.....	90	.5	---	AUG. 20.....	92	18.0	---
FEB. 21.....	96	.0	110	SEPT. 04.....	803	17.5	76
APR. 02.....	126	.0	127	SEPT. 30.....	626	10.0	58
04014500 BAPTISM RIVER NEAR BEAVER BAY, MN							
OCT. 16, 1979...	23	6.0	98	JUNE 03.....	236	13.0	69
NOV. 27.....	50	.0	90	JULY 01.....	30	19.0	100
JAN. 09, 1980....	24	.0	110	AUG. 05.....	13	20.5	103
FEB. 20.....	15	3.0	125	SEPT. 03.....	260	16.0	72
APR. 01.....	31	.0	139	SEPT. 30.....	168	10.5	55
MAY 15.....	96	8.0	---				
04015330 KNIFE RIVER NEAR TWO HARBORS, MN							
OCT. 18, 1979...	10	6.0	195	APR. 24.....	127	6.5	89
NOV. 28.....	19	.0	168	JUNE 06.....	28	19.0	138
JAN. 08, 1980...	4.7	.0	150	JULY 02.....	4.8	26.0	210
FEB. 22.....	5.8	.0	235	AUG. 06.....	4.0	23.0	220
APR. 03.....	219	.0	94	SEPT. 05.....	428	17.5	88
APR. 08.....	544	.5	75				
04015455 SOUTH BRANCH PARTRIDGE RIVER NEAR BABBITT, MN							
OCT. 29, 1979...	5.6	5.0	69	APR. 22.....	49	10.5	51
DEC. 19.....	2.7	.5	60	JULY 02.....	1.6	21	87
JAN. 30, 1980...	0.53	.0	98	AUG. 04.....	.07	22	115
MAR. 13.....	0.50	.0	90	SEPT. 03.....	28	15	61
APR. 09.....	40	.5	55				
04015475 PARTRIDGE RIVER ABOVE COLBY LAKE NEAR HOYT LAKES, MN							
OCT. 31, 1979...	64	6.0	108	APR. 22.....	266	11.0	70
DEC. 20.....	11	.0	120	JULY 01.....	11	20.5	101
JAN. 30, 1980...	3.6	.0	183	AUG. 06.....	3.2	22.0	220
MAR. 12.....	1.6	.0	195	SEPT. 03.....	209	16.0	111
APR. 10.....	175	.5	78				

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (^oC)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (^oC)	SPECIFIC CONDUCTANCE (MICROMHOS)
04015500 SECOND CREEK NEAR AURORA, MN							
NOV. 01, 1979...	48	6.5	680	APR. 22.....	25	12.5	500
DEC. 20.....	7.1	.5	690	JUNE 30.....	9.1	19.0	740
JAN. 31, 1980...	6.8	.0	990	AUG. 06.....	5.8	19.0	950
MAR. 13.....	4.9	.0	910	SEPT. 03.....	22	18.0	750
04016000 PARTRIDGE RIVER NEAR AURORA, MN							
NOV. 01, 1979...	78	7.0	460	APR. 22.....	99	14.0	320
DEC. 20.....	23	1.5	100	JUNE 30.....	32	20.0	382
JAN. 30, 1980...	21	.5	570	AUG. 06.....	10	18.0	560
MAR. 12.....	10	.0	600	SEPT. 03.....	49	18.5	490
04016500 ST. LOUIS RIVER NEAR AURORA, MN							
OCT. 31, 1979...	186	7.5	78	APR. 21.....	256	13.5	24
DEC. 21.....	65	.5	100	JULY 01.....	67	19.0	235
JAN. 31, 1980...	45	.0	189	AUG. 07.....	28	21.0	310
MAR. 12.....	26	.0	320	SEPT. 03.....	201	18.0	310
04018750 ST. LOUIS RIVER AT FORBES, MN							
OCT. 16, 1979...	190	7.0	290	APR. 17.....	527	4.0	165
NOV. 26.....	397	.5	200	MAY 21.....	332	19.0	170
JAN. 11, 1980...	125	.0	---	JULY 23.....	127	24.0	200
FEB. 22.....	97	.0	115	AUG. 25.....	155	21.5	335
APR. 01.....	222	.0	260	SEPT. 23.....	1130	13.0	185
04024000 ST. LOUIS RIVER AT SCANLON, MN							
OCT. 15, 1979...	974	7.0	160	JUNE 30.....	383	20.5	220
NOV. 26.....	1600	.0	135	AUG. 04.....	248	24.0	280
FEB. 19, 1980...	1520	.5	150	SEPT. 02.....	917	21.0	218
MAR. 31.....	1550	.0	159	SEPT. 29.....	1790	12.0	160
JUNE 02.....	1010	19.5	190				
04024098 DEER CREEK NEAR HOLYOKE, MN							
OCT. 25, 1979...	4.2	1.0	270	MAY 21.....	1.8	14.5	310
NOV. 27.....	2.4	.0	300	JULY 09.....	1.6	20.0	285
JAN. 08, 1980...	1.4	.0	290	AUG. 19.....	2.0	---	300
FEB. 20.....	2.0	.0	320	SEPT. 12.....	3.2	13.5	315
APR. 03.....	16.2	1.0	135				

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05040500 PELICAN RIVER NEAR FERGUS FALLS, MN							
OCT. 22, 1979...	65	6.0	480	APR. 02.....	174	---	---
NOV. 19.....	77	2.0	450	APR. 23.....	154	14.0	480
DEC. 18.....	54	.0	550	JULY 01.....	32	21.0	490
FEB. 01, 1980...	82	.0	440	AUG. 14.....	9.4	22.0	540
MAR. 03.....	87	.0	600				
05046000 OTTER TAIL RIVER BELOW ORWELL DAM NEAR FERGUS FALLS, MN							
OCT. 24, 1979...	304	8.0	390	APR. 02.....	56	8.0	440
NOV. 21.....	367	3.0	415	APR. 29.....	666	16.0	390
DEC. 20.....	310	2.0	430	JULY 01.....	206	23.0	410
FEB. 01, 1980...	398	0.5	400	JULY 22.....	178	22.0	370
MAR. 03.....	413	1.0	480	AUG. 22.....	46	22.0	410
05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, SOUTH DAKOTA							
OCT. 12, 1979...	56	6.0	1300	MAY 09.....	32	12.0	920
NOV. 13.....	7.4	2.0	675	JUNE 25.....	54	26.0	950
DEC. 26.....	8.9	2.0	1640	AUG. 07.....	2.8	23.5	1300
FEB. 07, 1980...	12	---	---	SEPT. 11.....	.05	17.0	1300
MAR. 18.....	28	1.0	670				
05061000 BUFFALO RIVER NEAR HAWLEY, MN							
OCT. 23, 1979...	18	5.0	810	APR. 01.....	381	1.5	360
NOV. 20.....	31	1.0	750	APR. 22.....	94	16.0	660
DEC. 19.....	18	.0	780	JUNE 17.....	26	21.0	590
JAN. 23, 1980...	18	.0	580	JULY 22.....	12	21.0	720
FEB. 21.....	22	.5	770	AUG. 21.....	16	22.0	640
MAR. 25.....	51	1.0	600	SEPT. 25.....	15	9.0	750
05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MN							
OCT. 23, 1979...	30	5.0	920	APR. 23.....	53	14.0	---
NOV. 20.....	22	1.0	1110	MAY 23.....	2.1	22.0	880
DEC. 19.....	4.6	.0	1340	JUNE 19.....	6.1	16.5	840
JAN. 24, 1980...	1.4	.0	1480	JULY 23.....	.0	---	---
FEB. 21.....	2.8	.0	1200	AUG. 21.....	3.3	20.0	790
MAR. 24.....	7.2	.5	690	SEPT. 24.....	7.6	12.0	520
APR. 01.....	1010	3.0	310				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

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, 1979...	28	6.0	760	APR. 23.....	194	14.0	710
NOV. 20.....	59	.5	810	MAY 23.....	38	20.0	740
DEC. 19.....	26	.0	1020	JUNE 18.....	42	18.5	700
JAN. 24, 1980...	20	.0	850	JULY 23.....	15	21.0	640
FEB. 21.....	25	.0	650	AUG. 21.....	15	22.0	640
MAR. 24.....	39	1.0	480	SEPT. 24.....	29	11.0	610
APR. 01.....	602	1.0	310				
05062500 WILD RICE RIVER AT TWIN VALLEY, MN							
OCT. 09, 1979...	18	8.0	510	APR. 04.....	846	1.0	365
NOV. 27.....	101	.2	520	MAY 05.....	212	18.5	425
JAN. 09, 1980...	46	.0	690	JULY 10.....	11	28.0	520
FEB. 12.....	47	.0	510	AUG. 12.....	5.1	21.5	540
MAR. 26.....	74	1.0	650	SEPT. 09.....	8.2	19.5	408
05064000 WILD RICE RIVER AT HENDRUM, MN							
OCT. 10, 1979...	33	7.0	530	APR. 08.....	1110	5.5	192
NOV. 27.....	110	.5	500	APR. 15.....	485	3.0	530
JAN. 09, 1980...	46	.0	590	MAY 06.....	243	14.0	445
FEB. 12.....	48	.0	590	JULY 08.....	16	23.0	560
MAR. 26.....	67	.5	725	AUG. 12.....	.89	21.0	600
APR. 04.....	1680	1.0	350	SEPT. 09.....	9.1	19.5	510
05067500 MARSH RIVER NEAR SHELLY, MN							
OCT. 10, 1979...	0	---	---	APR. 07.....	185	6.0	390
NOV. 27.....	0.52	.5	1080	MAY 06.....	0.59	12.5	725
JAN. 09, 1980.....	0.03	.0	---	JULY 08.....	0	---	---
FEB. 13.....	0.005	---	---	AUG. 12.....	0	---	---
MAR. 26.....	0.10	---	---	SEPT. 09.....	0	---	---
APR. 03.....	611	1.0	330				
05069000 SANDHILL RIVER AT CLIMAX, MN							
OCT. 10, 1979...	14	6.0	670	MAY 06.....	41	12.5	625
NOV. 28.....	26	.5	660	JULY 07.....	6.3	23.5	615
JAN. 10, 1980...	8.0	.0	275	JULY 15.....	10	25.0	600
FEB. 13.....	18	.0	550	AUG. 13.....	7.0	18.5	600
MAR. 26.....	41	.5	395	SEPT. 09.....	6.7	18.0	570
APR. 07.....	708	3.0	325				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (^oC)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (^oC)	SPECIFIC CONDUCTANCE (MICROMHOS)
05074500 RED LAKE RIVER NEAR RED LAKE, MN							
NOV. 01, 1979...	907	4.0	255	JUNE 19.....	632	---	---
DEC. 13.....	832	.5	260	JULY 17.....	115	25.5	260
JAN. 25, 1980...	834	1.0	---	AUG. 21.....	116	20.0	280
MAR. 07.....	829	.5	---	SEPT. 19.....	83	10.0	310
APR. 17.....	658	5.0	210				
05075000 RED LAKE RIVER AT HIGH LANDING NEAR GOODRIDGE, MN							
OCT. 31, 1979...	1070	5.5	265	APR. 17.....	675	6.0	500
DEC. 12.....	786	.5	325	JUNE 20.....	665	18.5	280
JAN. 24, 1980...	826	.5	270	JULY 17.....	172	23.5	247
MAR. 06.....	859	.0	215	AUG. 20.....	132	23.0	220
APR. 08.....	1030	3.0	300	SEPT. 18.....	91	11.0	325
05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN							
NOV. 01, 1979...	16	.5	465	APR. 17.....	822	5.0	575
DEC. 11.....	1.7	.5	1200	JUNE 18.....	0	---	---
JAN. 24, 1980...	0	---	---	JULY 16.....	0	---	---
MAR. 06.....	0	---	---	AUG. 20.....	0	---	---
APR. 03.....	204	1.0	600	SEPT. 18.....	5.0	10.0	590
APR. 08.....	1550	.5	355				
05078230 LOST RIVER AT OKLEE, MN							
OCT. 31, 1979...	29	5.0	508	APR. 16.....	110	6.0	550
DEC. 12.....	14	.5	640	JUNE 16.....	12	20.5	595
JAN. 21, 1980...	11	.5	650	JULY 16.....	3.4	29.5	430
MAR. 05.....	10	1.0	680	AUG. 20.....	5.1	27.5	600
APR. 07.....	502	5.0	370	SEPT. 16.....	9.7	11.0	---
05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN							
OCT. 30, 1979...	77	6.0	505	APR. 16.....	613	4.0	600
DEC. 12.....	119	.5	295	JUNE 17.....	24	19.5	460
JAN. 21, 1980...	93	.0	560	JULY 16.....	72	25.5	445
MAR. 05.....	110	.0	580	AUG. 20.....	82	22.0	700
APR. 07.....	1660	3.0	360	SEPT. 16.....	103	13.5	---
05079000 RED LAKE RIVER AT CROOKSTON, MN							
OCT. 29, 1979...	1000	5.5	315	APR. 14.....	2500	5.0	410
DEC. 10.....	1270	.5	350	JUNE 09.....	639	19.5	305
JAN. 22, 1980...	1050	.0	400	JULY 14.....	279	27.0	335
MAR. 03.....	1030	.0	340	AUG. 18.....	246	18.0	420
APR. 09.....	6010	2.0	330	SEPT. 16.....	154	15.0	580

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (^oC)	SPECIFIC CONDUCTANCE (MICROMHOS)
05087500 MIDDLE RIVER AT ARGYLE, MN			
OCT. 30, 1979...	.36	5.5	585
DEC. 11.....	1.5	.5	400
JAN. 23, 1980...	1.3	.5	780
MAR. 04.....	.90	.0	660
APR. 03.....	122	1.0	420
APR. 09.....	351	1.0	260
JUNE 11.....	.16	19.5	620
JULY 15.....	0	---	---
AUG. 19.....	.01	---	---
SEPT. 17.....	.16	11.0	610
05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN			
OCT. 30, 1979...	.64	6.5	468
DEC. 11.....	2.6	1.0	310
JAN. 23, 1980...	2.0	2.0	560
MAR. 04.....	1.7	0.5	580
APR. 09.....	791	2.0	250
JUNE 12.....	1.3	21.5	385
JULY 15.....	.78	22.0	360
AUG. 19.....	.92	21.0	---
SEPT. 17.....	1.0	13.5	440
05104500 ROSEAU RIVER BELOW SOUTH FORK NEAR MALUNG, MN			
OCT. 24, 1979...	2.3	5.0	425
DEC. 05.....	12	.0	475
JAN. 17, 1980...	6.2	.0	570
FEB. 27.....	5.1	.0	510
APR. 09.....	932	.5	235
APR. 15.....	314	3.0	285
JUNE 11.....	3.8	18.5	430
JULY 09.....	.05	---	---
AUG. 14.....	.07	23.0	425
SEPT. 10.....	.08	15.0	---
05106000 SPRAGUE CREEK NEAR SPRAGUE, MANITOBA			
OCT. 24, 1979...	1.8	3.0	590
NOV. 19.....	2.0	1.0	---
DEC. 05.....	1.8	.0	655
JAN. 16, 1980...	.63	.0	600
FEB. 27.....	1.4	.0	605
APR. 09.....	81	.5	220
APR. 15.....	25	.5	305
MAY 28.....	.19	.2	---
JUNE 11.....	.12	16.5	550
JULY 09.....	.02	---	---
AUG. 19.....	5.7	21.0	385
SEPT. 10.....	1.1	14.0	420
SEPT. 11.....	.78	18.0	---
05107500 ROSEAU RIVER AT ROSS, MN			
OCT. 23, 1979...	3.5	5.0	600
DEC. 05.....	15	.0	560
JAN. 16, 1980...	7.6	.0	700
FEB. 26.....	6.2	.0	655
APR. 09.....	1010	.5	235
JUNE 11.....	4.2	23.0	430
JULY 08.....	.18	25.0	380
AUG. 14.....	.55	19.5	390
SEPT. 09.....	1.1	17.0	590
05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MN			
OCT. 23, 1979...	3.4	6.0	460
NOV. 19.....	28	1.0	---
DEC. 04.....	17	.0	660
JAN. 15, 1980...	15	.0	100
FEB. 26.....	13	.0	755
APR. 08.....	358	.5	400
APR. 14.....	1050	4.5	290
MAY 28.....	30	21.0	---
JUNE 10.....	7.7	19.0	410
JULY 08.....	.87	22.0	330
AUG. 12.....	2.2	21.0	310
SEPT. 09.....	3.3	15.0	330
SEPT. 11.....	4.4	19.0	---

MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (^oC)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (^oC)	SPECIFIC CONDUCTANCE (MICROMHOS)
05124480 KAWISHIWI RIVER NEAR ELY, MN							
OCT. 30, 1979...	41	5.5	30	JULY 08.....	81	23.0	35
DEC. 18.....	72	1.5	38	AUG. 05.....	49	22.0	<50
JAN. 29, 1980...	63	.0	43	SEPT. 04.....	173	20.0	32
MAR. 11.....	38	.0	37	SEPT. 30.....	708	15.0	---
APR. 23.....	82	6.0	32				
05124990 FILSON CREEK NEAR ELY, MN							
OCT. 31, 1979...	3.6	6.0	39	APR. 24.....	19	5.0	29
DEC. 17.....	2.2	.5	38	JULY 10.....	2.0	20.0	48
JAN. 29, 1980...	.59	.0	70	AUG. 05.....	.42	20.0	50
MAR. 11.....	.40	.0	58	SEPT. 02.....	63	16.0	32
APR. 09.....	5.5	.0	<50	SEPT. 30.....	17	11.0	<50
05125550 STONY RIVER NEAR BABBITT, MN							
OCT. 29, 1979...	123	4.5	78	APR. 24.....	415	8.5	61
DEC. 19.....	55	1.0	175	JULY 07.....	46	23.0	86
JAN. 28, 1980...	30	.0	---	AUG. 04.....	27	21.0	90
MAR. 10.....	20	.0	122	SEPT. 02.....	629	18.5	60
05126000 DUNKA RIVER NEAR BABBITT, MN							
OCT. 29, 1979...	21	5.5	135	APR. 09.....	101	.5	126
DEC. 19.....	5.5	.0	194	JULY 03.....	12	20.5	336
JAN. 28, 1980...	2.3	.0	248	AUG. 04.....	.61	20.5	280
MAR. 10.....	.63	.0	300	SEPT. 02.....	60	16.0	106
05127000 KAWISHIWI RIVER NEAR WINTON, MN							
JULY 10, 1980...	350	---	---	SEPT. 29.....	3610	16.0	55
05127500 BASSWOOD RIVER NEAR WINTON, MN							
OCT. 25, 1979...	434	9.5	55	AUG. 12, 1980....	324	---	---
05128000 NAMAKAN RIVER AT OUTLET OF LAC LA CROIX, ONTARIO							
JUNE 26, 1980...	1500	21.0	<50				
05129000 VERMILION RIVER BELOW VERMILION LAKE NEAR TOWER, MN							
OCT. 17, 1979...	72	7.5	70	JULY 02.....	126	23.0	65
NOV. 27.....	174	3.0	70	JULY 30.....	49	26.0	66
JAN. 10, 1980...	135	.5	72	AUG. 27.....	58	24.0	70
FEB. 26.....	126	1.0	95	SEPT. 24.....	448	14.0	63
APR. 02.....	107	1.0	80				

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	MEASURED DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05129115 VERMILLION RIVER NEAR CRANE LAKE, MN							
OCT. 17, 1979...	150	7.5	80	APR. 22.....	1580	9.0	55
NOV. 27.....	386	.5	70	JULY 02.....	138	21.0	65
JAN. 10, 1980...	222	.0	84	JULY 30.....	76	25.5	65
FEB. 26.....	192	.0	55	AUG. 27.....	61	22.0	65
APR. 02.....	255	.0	80	SEPT. 24.....	1020	12.0	53
05130500 STURGEON RIVER NEAR CHISHOLM, MN							
OCT. 18, 1979...	37	6.0	110	JUNE 30.....	46	18.0	120
NOV. 26.....	78	.5	80	JULY 31.....	15	22.0	142
JAN. 14, 1980...	28	.0	135	AUG. 28.....	42	18.0	160
FEB. 25.....	26	.0	55	SEPT. 25.....	136	10.5	84
APR. 03.....	66	.5	150				
05131500 LITTLE FORK RIVER AT LITTLEFORK, MN							
OCT. 01, 1979...	156	15.0	155	APR. 22.....	4680	8.0	110
DEC. 21.....	422	.5	175	JUNE 24.....	206	24.0	200
FEB. 04, 1980...	164	.0	230	JULY 28.....	119	24.0	200
MAR. 20.....	124	.5	265	AUG. 25.....	278	22.5	240
APR. 21.....	5270	7.0	100	SEPT. 23.....	2110	10.5	95
05133500 RAINY RIVER AT MANITOU RAPIDS, MN							
OCT. 02, 1979...	4620	14.0	95	JULY 29.....	3410	23.0	122
APR. 22, 1980...	16440	8.0	120	AUG. 26.....	3360	18.0	130
JUNE 25.....	3400	23.0	130				
05134200 RAPID RIVER NEAR BAUDETTE, MN							
OCT. 25, 1979...	5.9	1.0	475	APR. 15.....	772	2.0	140
DEC. 06.....	41	.0	255	JUNE 13.....	21	22.0	340
JAN. 18, 1980...	18	.0	175	JULY 10.....	2.9	23.0	400
FEB. 29.....	10	.5	395	AUG. 15.....	1.7	22.0	375
APR. 10.....	970	.5	145	SEPT. 11.....	74	15.0	---
05139500 WARROAD RIVER NEAR WARROAD, MN							
OCT. 24, 1979...	1.1	5.0	300	APR. 09.....	125	1.0	260
DEC. 06.....	3.0	.0	555	JUNE 12.....	1.1	19.5	460
JAN. 17, 1980...	1.8	.0	200	JULY 19.....	0.08	---	---
FEB. 29.....	1.5	.0	465	AUG. 20.....	.30	21.0	395
APR. 07.....	245	2.0	170	SEPT. 10.....	.56	15.0	420

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, 4.44 ft (1.35 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, 1975; lowest, 2.47 ft (0.75 m) below land-surface datum, July 25, 1977.

WATER LEVEL, IN FEET BELOW OR ABOVE (+) LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	+0.40	+2.80	+3.30	+3.30	+3.40	+3.35	+3.40	.....	+1.90	0.45	+0.65	+0.60
10	+1.25	+3.00	+3.20	+3.35	+3.40	+3.30	+3.40	.....	+0.20	0.65	+1.30	+2.00
15	+0.50	+3.00	+3.10	+3.40	+3.30	+3.40	.....	+2.15	+1.90	+0.20	+1.70	+2.40
20	+2.65	+3.00	+3.25	+3.30	+3.40	+3.30	.....	0.65	+0.35	+1.30	+2.30	+2.50
25	+2.80	+3.20	+3.20	+3.30	+3.25	+3.30	.....	1.35	1.20	+0.70	+2.30	+2.50
EOM	+3.25	+3.15	+3.25	+3.30	+3.20	+3.35	.....	1.00	+0.25	+0.40	+2.45	+2.30

WTR YEAR 1980 HIGHEST +3.53 JAN 6, 1980 LOWEST 1.84 MAY 28, 1980

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; 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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	53.28	FEB 2	52.79	MAR 29	52.64	MAY 14	52.86	JUN 28	52.63	AUG 28	53.22
NOV 3	53.52	MAR 1	53.30	APR 12	52.96	31	52.89	JUL 12	53.01	SEP 13	53.18
DEC 1	53.41	15	53.02	26	52.92	JUN 13	52.62	30	52.89	26	53.14
29	53.11										

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, 59.99 ft (18.28 m) below land-surface datum, July 25, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	58.87	JAN 2	59.07	APR 1	59.24	MAY 2	58 73	JUN 1	58.47	AUG 1	59.13
NOV 2	58.73	FEB 2	58.94	16	58.83	17	58.76	JUL 1	59.07	SEP 2	59.28
DEC 1	58.98	MAR 2	59.08								

BECKER COUNTY--Continued

465422095495001. Local number, 140N41W26CCD01.
LOCATION.--Lat 46°54'22", long 95°49'50", 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, 32.16 ft (9.80 m) below land-surface datum, July 12, 1980.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	30.83	FEB 2	31.33	APR 1	31.58	MAY 14	31.38	JUN 28	31.64	AUG 28	31.92
NOV 2	30.83	MAR 1	31.47	12	31.10	31	31.49	JUL 12	32.16	SEP 13	31.91
DEC 1	31.02	15	31.49	26	31.24	JUN 13	31.60	30	31.77	26	32.06
JAN 1	31.16										

BELTRAMI COUNTY

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 25	1.90	DEC 6	1.65	AUG 21	3.00	SEP 11	2.91

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 25	0.95	DEC 6	1.40	AUG 21	DRY	SEP 11	1.95

BELTRAMI COUNTY--Continued

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 1979 TO SEPTEMBER 1980
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	1.68	1.25	.....	.....	.....	.....	.....	1.08	1.82	2.83	DRY	2.28
10	1.74	1.02	.....	.....	.....	.....	0.89	1.12	2.00	DRY	DRY	1.80
15	1.80	0.99	.....	.....	.....	.....	0.68	1.13	2.56	DRY	DRY	1.40
20	1.84	.....	.....	.....	.....	.....	0.76	1.26	2.82	DRY	DRY	1.25
25	1.88	.....	.....	.....	.....	.....	0.82	1.47	2.92	DRY	DRY	1.02
EOM	1.90	.....	.....	.....	.....	.....	0.94	1.66	2.93	DRY	2.86	0.98

WTR YEAR 1980 HIGHEST 0.68 APR 11, 1980 LOWEST DRY JULY 10 to AUG. 25, 1980

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	18.02	APR 30	18.92	JUL 9	19.40	AUG 1	19.44	AUG 30	19.54	SEP 21	20.13
MAR 12	18.90	JUN 12	20.23								

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, 11.39 ft (3.47 m) below land-surface datum, Mar. 6, 1979.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	10.03	MAY 11	11.01	JUL 9	10.81	JUL 22	10.92	AUG 28	11.03	SEP 19	10.30
MAR 12	11.05	JUN 11	10.80								

CARLTON COUNTY--Continued

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) bove land-surface datum.
REMARKS.--Well measured by Vernon Gohl.
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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 25	6.95	FEB 28	7.45	APR 25	6.90	MAY 29	6.90	JUN 27	6.90	JUL 31	7.90
JAN 31	7.45										

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, 19.58 ft (5.97 m) below land-surface datum, Aug. 28, 1980.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	18.93	APR 29	17.80	JUL 9	19.45	JUL 22	19.52	AUG 28	19.58	SEP 19	19.12
MAR 12	19.38	JUN 11	16.14								

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAY 19	9.15	JUN 16	9.42	JUL 14	10.10	AUG 3	10.21	AUG 25	10.00	SEP 12	9.90
24	9.35	23	9.52	25	10.10	14	10.21	SEP 2	9.95	22	9.74
JUN 9	9.53	30	9.57	AUG 1	10.15	18	10.09	8	9.90	29	9.70

CLAY COUNTY--Continued

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	28.50	DEC 20	27.60	FEB 22	27.79	APR 22	28.97	JUL 23	30.59	SEP 24	30.09
NOV 20	27.71	JAN 24	27.56	MAR 24	27.95	JUN 18	29.10	AUG 21	30.36		

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, 28.30 ft (8.63 m) below land-surface datum, Aug. 21, 1980.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	26.02	DEC 20	26.22	FEB 21	25.97	APR 22	26.62	JUL 23	28.00	SEP 24	28.24
NOV 20	26.15	JAN 24	26.28	MAR 24	26.09	JUN 18	27.36	AUG 21	28.30		

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	121.4	DEC 20	119.6	FEB 22	120.1	APR 22	123.9	JUL 23	129.1	SEP 24	124.8
NOV 20	120.4	JAN 24	120.0	MAR 24	120.6	JUN 18	126.2	AUG 21	128.6		

GRANT COUNTY

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 Elblow 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, 73.20 ft (22.31 m) below land-surface datum, Apr. 30, 1976; 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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 7	75.62	JAN 31	75.00	MAR 31	74.90	JUN 2	75.60	AUG 29	75.00	SEP 30	75.30
DEC 28	75.20	MAR 7	74.70	APR 30	74.80	JUL 31	75.10				

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 10	18.00	JAN 16	18.50	MAR 19	18.80	MAY 7	19.10	JUN 4	19.20	AUG 20	18.40
24	18.25	30	18.55	26	18.90	14	19.10	18	19.30	SEP 4	18.10
NOV 20	17.85	FEB 13	18.60	APR 16	19.00	21	19.15	JUL 15	19.20	26	19.69
29	18.30	20	18.70	30	19.05	28	19.20	AUG 6	19.40		

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	5.00	FEB 6	6.10	JUN 23	5.64	JUL 28	6.15	AUG 25	5.68	SEP 22	5.39
NOV 14	4.82	APR 21	4.73								

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, 13.41 ft (4.09 m) below land-surface datum, Sept. 17, 1980.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 4	12.58	JUN 11	12.84	JUL 15	13.23	AUG 19	13.37	SEP 17	13.41

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 30	s10.88	MAR 4	s10.95	JUN 11	s12.03	JUL 15	s12.41	AUG 19	s12.66	SEP 17	s12.67

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	14.85	DEC 21	16.28	MAR 19	16.66	JUN 23	16.81	AUG 25	17.05	SEP 22	17.20
NOV 14	16.17	FEB 6	16.49	APR 21	16.82	JUL 28	16.95				

KOOCHICHING COUNTY--Continued

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	0.37	DEC 21	0.96	MAR 19	1.56	JUN 23	1.43	AUG 25	1.62	SEP 22	0.47
NOV 14	0.45	FEB 6	1.46	APR 21	0.44	JUL 28	2.10				

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, 0.31 ft (0.09 m) above land-surface datum, May 31, 1979; 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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	0.41	MAR 19	0.62	APR 21	0.38	JUN 23	0.36	AUG 25	DRY	SEP 22	+0.37
NOV 14	0.45										

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	7.40	FEB 29	6.60	JUN 13	6.68	JUL 9	7.41	AUG 15	7.90	SEP 10	7.84
DEC 6	7.29										

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, 47.69 ft (14.54 m) below land-surface datum, Sept. 8, 1969.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAY 5	46.12	JUL 10	46.86	AUG 12	47.29	SEP 8	47.16

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.
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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 30	24.83	MAR 4	s24.62	JUN 11	s33.19	JUL 15	s33.66	AUG 19	28.29	SEP 17	s31.12

s Nearby well being pumped.

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, 29.02 ft (8.85 m) below land-surface datum, July 15, 1980.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JUN 11	28.23	JUL 15	29.02	AUG 19	28.61	SEP 17	24.35

MARSHALL COUNTY--Continued

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 4	6.82	JUN 11	6.01	JUL 15	6.80	AUG 19	7.00	SEP 17	6.80

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JUN 11	5.33	JUL 15	5.72	AUG 19	6.08	SEP 17	6.18

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, 5.13 ft (1.56 m) below land-surface datum, May 2, 1978.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 30	4.57	JAN 23	4.83	JUN 11	4.89	JUL 15	4.91	AUG 19	5.01	SEP 17	5.03
DEC 11	4.72	MAR 4	4.84								

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, 26.51 ft (8.08 m) below land-surface datum, Nov. 16, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	25.97	FEB 2	25.96	APR 1	25.71	MAY 2	24.04	JUN 1	25.36	AUG 2	26.12
NOV 2	25.55	MAR 2	25.97	17	25.04	19	25.19	JUL 2	25.83	SEP 3	26.37
JAN 3	25.84										

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 Sevey.
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 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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAY 7	13.76	JUL 11	14.45	AUG 11	14.92	SEP 9	14.93

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 Sevey.
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, 8.61 ft (2.62 m) below land-surface datum, Dec. 13, 1978.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	8.18	FEB 2	8.16	APR 1	7.84	MAY 2	7.69	JUN 1	7.70	AUG 2	8.58
NOV 2	7.97	MAR 3	8.08	16	6.89	17	7.88	JUL 2	8.37	SEP 2	8.54
JAN 2	7.68										

OTTER TAIL COUNTY--Continued

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 1979 TO SEPTEMBER 1980

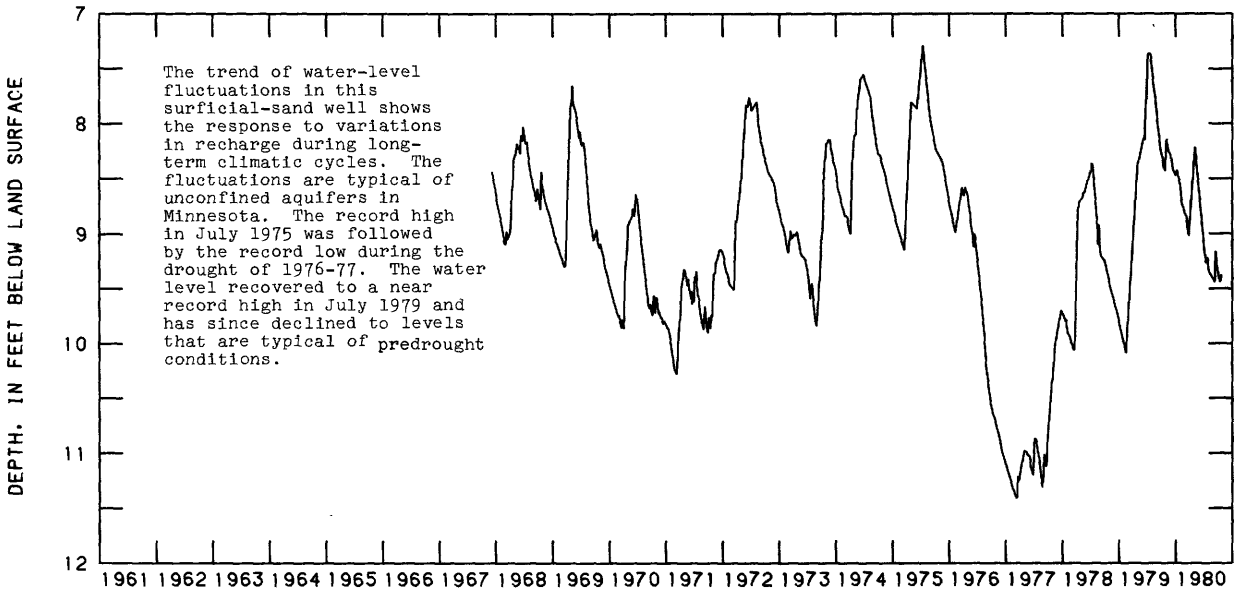
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 22	47.90	DEC 18	47.87	FEB 22	48.02	APR 22	47.71	JUL 22	48.24	AUG 22	48.52
NOV 19	47.87	JAN 23	47.93	MAR 25	48.13	JUN 17	47.82				

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 BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	8.30	8.14	8.31	.....	8.66	8.83	.....	8.21	.....	9.17	9.35	.....
10	8.31	8.20	8.36	8.42	8.72	8.84	.....	.....	.....	9.21	.....	9.44
15	8.40	8.25	8.42	8.47	8.75	8.92	.....	.....	8.85	9.27	.....	9.16
20	8.40	8.26	8.43	8.49	8.76	8.97	.....	.....	8.90	9.22	.....	9.24
25	8.43	8.27	8.45	8.52	8.80	9.02	.....	.....	9.00	9.22	.....	9.31
EOM	8.24	8.32	8.47	8.56	8.82	.....	.....	.....	9.08	9.32	.....	9.35

WTR YEAR 1980 HIGHEST 8.00 NOV 1, 1979 LOWEST 9.44 SEP 10, 1980



137N39W22ACD01

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, 39.07 ft (11.91 m) below land-surface datum, Sept. 18, 1980.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

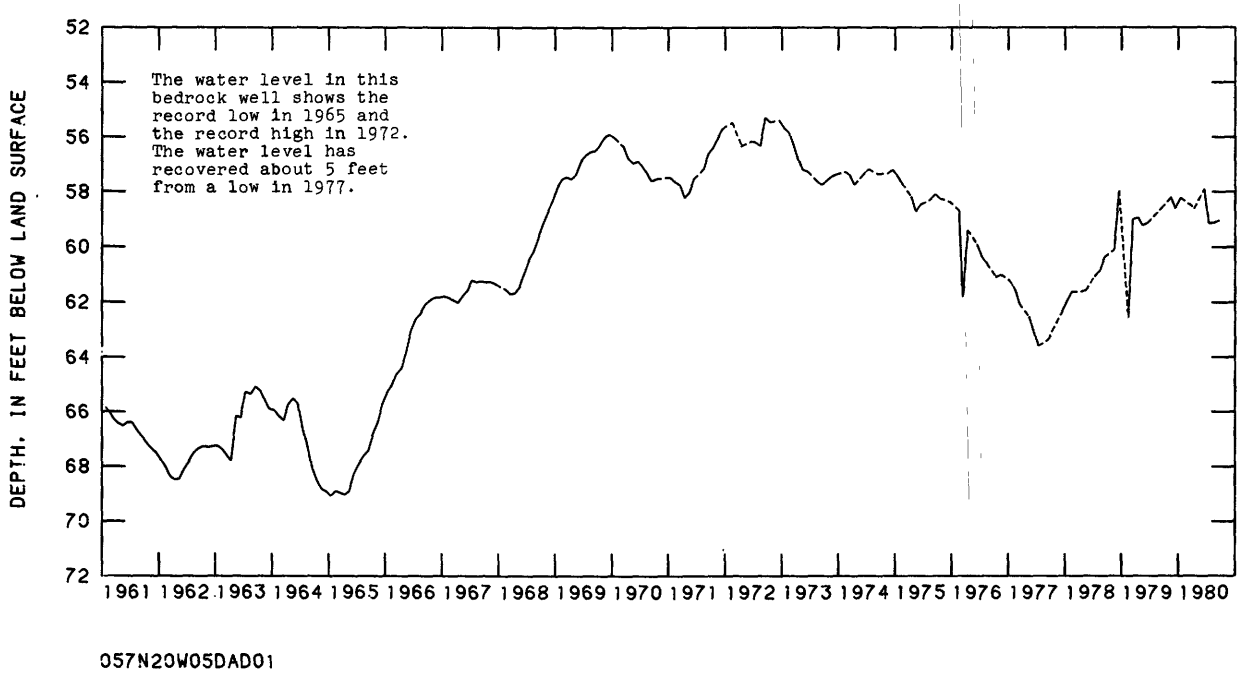
DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JUN 19	38.23	JUL 16	38.90	AUG 20	38.87	SEP 18	39.07

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 1	58.20	JAN 31	58.22	JUN 30	57.90	JUL 31	59.15	AUG 28	59.13	SEP 25	59.05
DEC 21	58.60	APR 21	58.59								



ST. LOUIS COUNTY--Continued

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	10.63	JUN 30	15.05	AUG 28	14.44	SEP 25	12.81

473125092113501. Local number,058N15W12CBA01.
LOCATION.--Lat 47°31'25", long 92°11'35", in NE¼NW¼SW¼ sec.12, T.58 N., R.15 W., Hydrologic Unit 04010201, 1.2 mi (1.9 km) east of Aurora.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial gravel and sand of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 2 in (0.05 m), depth 17 ft (5.2 m), screened 14 to 17 ft (4.3 to 5.2 m).
DATUM.--Altitude of land-surface datum is 1,410 ft (430 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 current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.90 ft (2.71 m) below land-surface datum, Apr. 12, 1978; lowest, 10.10 ft (3.08 m) below land-surface datum, June 13, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	9.80	APR 22	9.66	JUN 30	10.01	AUG 6	10.23	SEP 3	9.70

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	17.06	JUL 1	14.45	AUG 6	14.89	SEP 5	14.22

ST. LOUIS COUNTY--Continued

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	4.19	JAN 14	4.47	JUN 30	3.53	JUL 31	4.25	AUG 28	3.65	SEP 25	2.13
NOV 26	3.48	APR 2	4.45								

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	21.43	DEC 31	21.67	MAR 11	22.50	JUN 1	23.46	AUG 6	23.58	SEP 1	23.00
DEC 2	21.25	FEB 1	21.75	MAR 31	22.75						

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. 2, 1976.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	3.96	JUL 9	3.95	AUG 5	5.25	SEP 3	3.41	SEP 29	2.90		

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	9.47	DEC 20	9.53	APR 23	9.51	JUN 19	9.62	JUL 24	10.49	SEP 25	10.99
NOV 21	9.23	JAN 24	9.69								

WILKIN COUNTY

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 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	5.92	DEC 19	5.96	FEB 21	6.92	APR 23	4.34	JUL 24	6.16	SEP 24	6.60
NOV 21	5.06	JAN 24	6.42	MAR 24	6.92	JUN 18	5.23	AUG 21	6.49		

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	DATE OF SAMPLE	TIME	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPERATURE, WATER (DEG C) (00010)	HARDNESS (MG/L AS CACO3) (00900)
				COOK COUNTY					
474527090190601	61N01E22BBD	400NRSR	80-08-13	0800	22.0	400	6.8	8.0	160

HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	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 (MG/L AS CACO3) (00410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)
				COOK COUNTY					
40	51	8.0	17	.6	.5	120	5.7	53	1.1

SILICA, DISSOLVED (MG/L AS SIO2) (00955)	NITROGEN NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHORUS, ORTHOPHOSPHATE DISSOL. (MG/L AS P) (00671)	ARSENIC TOTAL (UG/L AS AS) (01002)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA) (01007)	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)
				COOK COUNTY					
20	.46	.000	1	<50	90	1	10	120	2000

IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY, TOTAL RECOVERABLE (UG/L AS HG) (71900)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SILVER, TOTAL RECOVERABLE (UG/L AS AG) (01077)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	CYANIDE TOTAL (MG/L AS CN) (00720)
			COOK COUNTY					
180	7	240	210	.1	0	0	670	.00

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STATION NUMBER	LOCAL IDENTIFIER	GEO-LOGIC UNIT	DATE OF SAMPLE	TIME	SAMP-LING DEPTH (FEET) (00003)	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	HARD-NESS (MG/L AS CACO3) (00900)
				LAKE COUNTY						
470826091281801	54N09W27BBB	400BSLT	80-08-13	1100	46.0	--	710	7.8	8.5	110
475638091434401	63N11W16ADA	400PCMB	80-08-11	1400	35.0	--	510	7.9	7.5	220
				OTTER TAIL COUNTY						
464100096051500	137N43W15ACB	112DSMO	79-11-23	1300	352	360	940	10.2	7.0	20
				ST LOUIS COUNTY						
473200092140001	58N15W03CCA	400BBKF	80-08-11	1100	20.0	--	775	7.2	8.5	380

HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)	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 (MG/L AS CACO3) (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
					LAKE COUNTY					
0	26	11	120	5.0	.5	330	23	3.2	.3	25
0	63	16	15	.4	2.8	230	15	12	.2	20
					OTTER TAIL COUNTY					
0	5.5	1.5	200	20	6.0	170	120	120	.6	.9
					ST LOUIS COUNTY					
160	80	43	9.7	.2	3.4	220	110	7.7	.5	26

SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P) (00671)	ARSENIC TOTAL (UG/L AS ASO (01002)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA) (01007)	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)
					LAKE COUNTY					
--	.03	--	--	.000	-- 1	<50	270	0	20	7
--	.11	--	--	.000	-- 3	<50	60	0	10	2
					OTTER TAIL COUNTY					
563	.08	2.2	.080	--	--	--	450	--	--	--
					ST LOUIS COUNTY					
--	.07	--	--	.000	-- 1	100	70	0	20	0

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)	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)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	CYANIDE TOTAL (MG/L AS CN) (00720)
				LAKE COUNTY					
280	10	4	10	0	<.1	0	0	290	0
580	330	2	300	290	<.1	0	0	140	0
				OTTER TAIL COUNTY					
--	30	--	--	2	--	--	--	--	--
				ST LOUIS COUNTY					
380	60	8	110	70	<.1	0	0	10	0

INDEX

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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 t › 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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