Water Resources Data for Minnesota

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

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MN-79-1

WATER YEAR 1979

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 1979

1978

OCTOBER

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1979

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UNITED STATES DEPARTMENT OF THE INTERIOR

CECIL D. ANDRUS, Secretary

GEOLOGICAL SURVEY

H. William Menard, Director

For additional information write to
District Chief, Water Resources Division
U.S. Geological Survey
702 Post Office Building
St. Paul, Minnesota 55101

1980

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 R. H. Langford, 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

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16. Abstract (Limit: 200 words)

Water-resources data for the 1979 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 65 gaging stations; stage-only records for 1 gaging station; stage and contents for 5 lakes and reservoirs; water quality for 19 gaging stations, 1 partial-record station, and 13 lakes; and water levels for 39 observation wells. Also included are 48 crest-stage partial-record stations and 21 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.

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Letter after station name designates type of data: (d) discharge, (e) gage height, elevation, or contents, (c) chemical, (b) biological, (p) pesticides, (m) microbiological, (t) water temperature, (s) sediment

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

WATER RESOURCES DATA FOR MINNESOTA, 1979

INTRODUCTION

Water resources data for the 1979 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 65 gaging stations; stage only records for 1 gaging station; stage and contents for 5 lakes and reservoirs; water quality for 19 gaging stations, 1 partial-record station, and 13 lakes; and water levels for 39 observation wells. Also included are 48 crest-stage partial-record stations and 21 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 entitled "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 entitled "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 entitled "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-79-1." 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, James Harrington, commissioner.

Minnesota Department of Health, W. R. Lawson, M.D., 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 50 gaging stations and 14 water-quality stations published in this report.

Eleven gaging stations in the Hudson Bay and St. Lawrence River basins were maintained by funds appropriated to the United States Department of State.

On waters adjacent to the international boundary, certain gaging stations 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 the data in this report were: E. G. Giacomini, chief, hydrologic data section, assisted by H. W. Anderson, Alex Brietkrietz, C. E. Cornelius, D. W. Ericson, K. T. Gunard, M. R. Have, J. H. Hess, J. K. Hicks, J. A. Jannis, C. J. Smith, D. A. Wicklund, and J. L. Zirbel.

HYDROLOGIC CONDITIONS

Runoff in northern Minnesota during the 1979 water year was in the low to normal range through the winter, excessive in the spring, normal through the summer, and deficient in September. Runoff from snowmelt water and rain caused excessive runoff throughout northern Minnesota in the spring. About 25 percent of the gaging stations established record high flows during this period. One of the new maximums was 10,300 ft^3/s (292 m^3/s) at Clearwater River at Red Lake Falls, MN (05078500) where 52 years of record are available. Even though some streams did not reach record highs, they were close to it. For instance, St. Louis River at Scanlon, MN (04024000) had a peak discharge of 34,200 ft^3/s (969 m^3/s), not quite reaching the maximum discharge of 37,900 ft^3/s (1,073 m^3/s) for the 70 years of record. One of the more significant deficient flows near the end of the year occurred at Roseau River at Ross, MN (05107500) where runoff for September was the third lowest in 51 years of record and only 20 percent of normal.

Monthly and annual mean discharges are compared with median discharges for the period 1941-70 at three representative gaging stations in figure 1. Summary of flood stages and discharge at selected sites for the April-May floods are shown in table 1.

Ground-water levels in drift aquifers were relatively stable during 1979 following two years of recovery from the 1976 drought. At the end of the water year, levels were within 0.3 of a foot of 1978 levels, yet were 0.5 foot above the average for the past nine years. A hydrograph of water levels in a long-term representative network observation well, 1947-79, is shown in figure 2.

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 sensititve and rapid estimate of biomass. ATP is reported in micrograms per liter of the original water sample.

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

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

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

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

Bacteria are microscopic unicellular organisms, typically spherical, 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 when incubated at 44.5°C ± 0.2°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

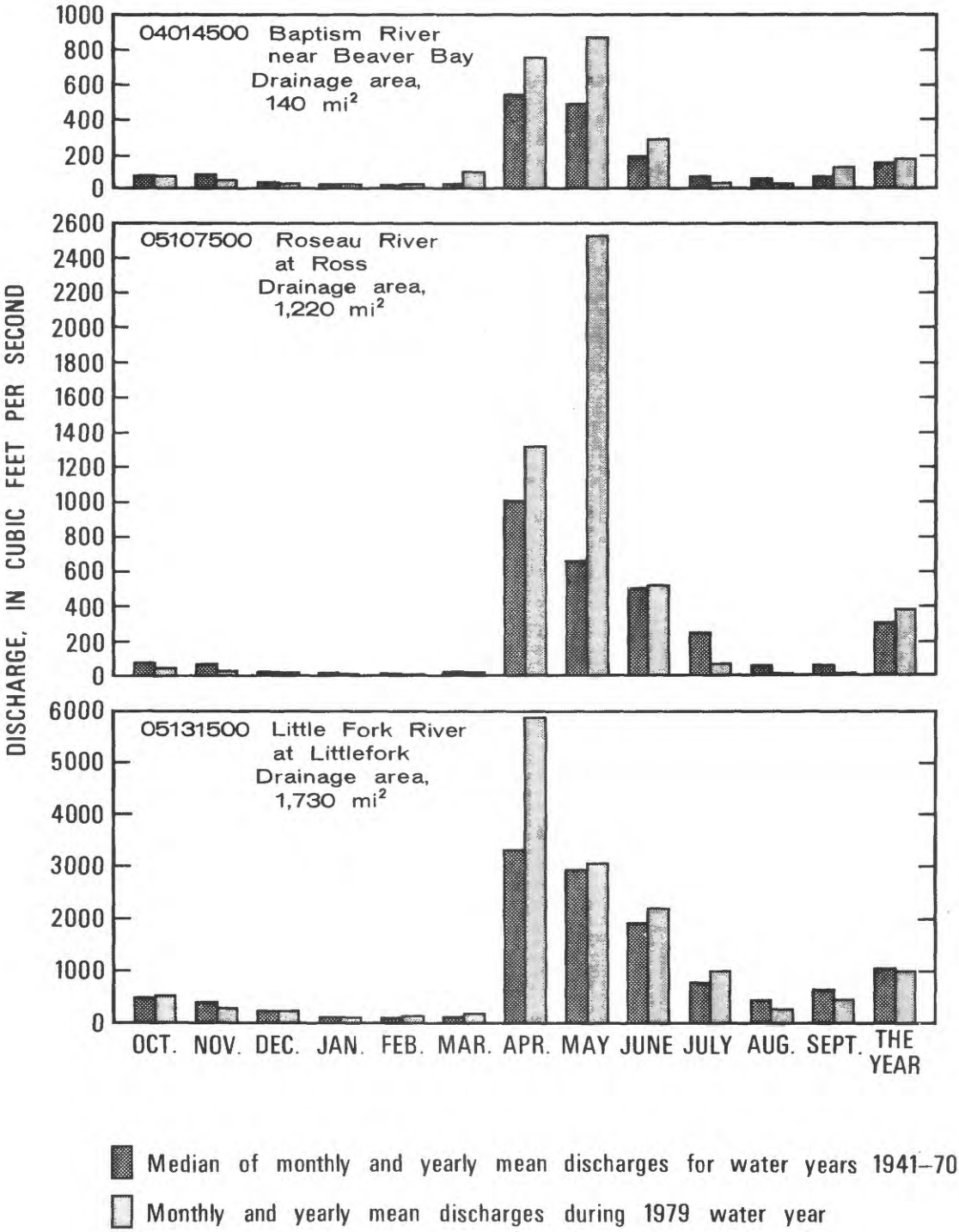


Figure 1.--Comparison of discharge at three long—term representative gaging stations for the current year with median discharge for water years 1941—70

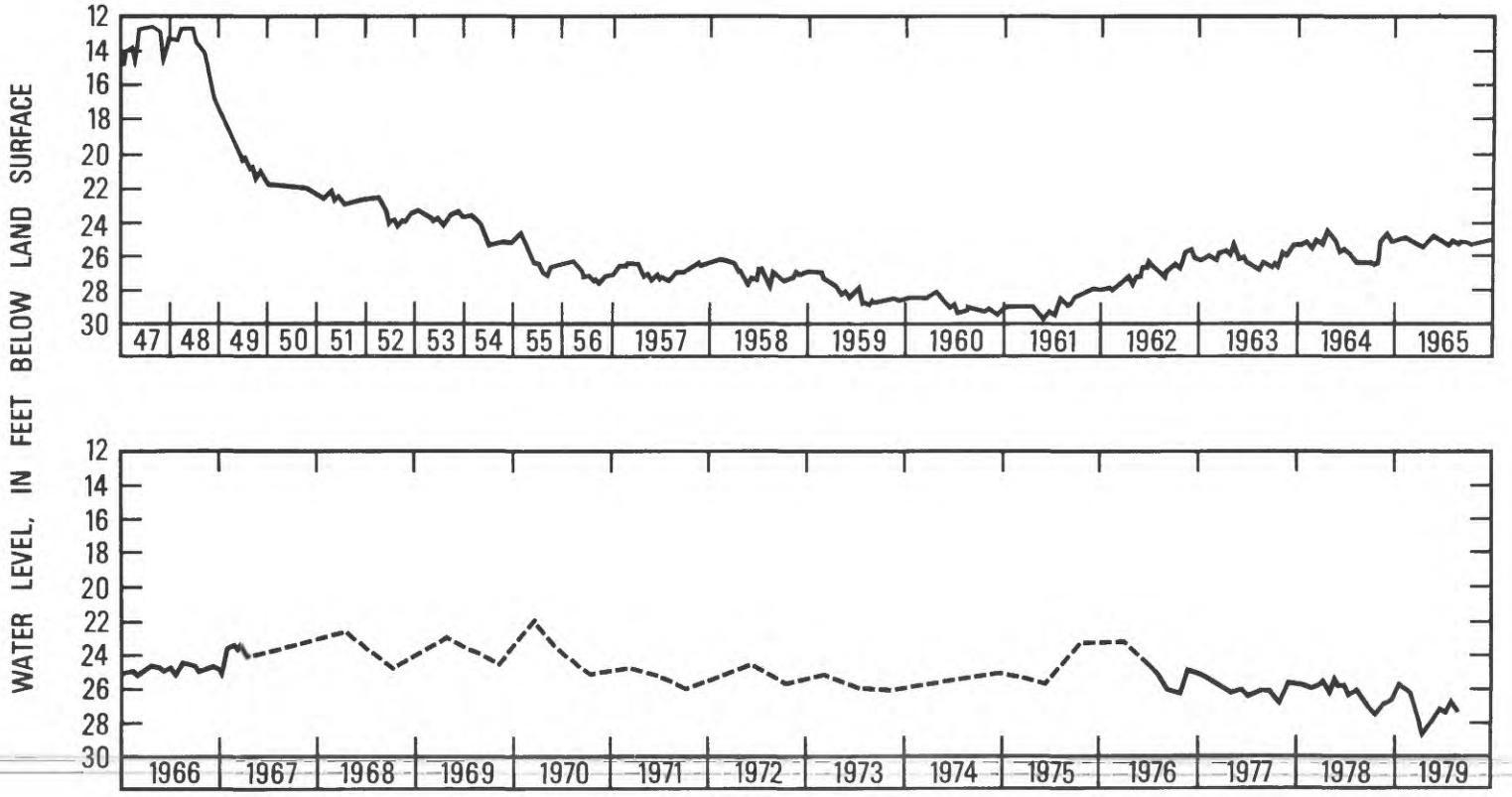


Figure 2.--Hydrograph showing long—term trends of water level for period of record in well 139.47.5cdc1, Clay County

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

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

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

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

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

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

Bottom material: See Bed Material.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Where n_i is the number of individuals per taxon, n is the total number of individuals, and 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 consitituents 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 milliters (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 expresssed 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 approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

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

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as 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 U.S.G.S. 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 immediatly 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 tributrary 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.

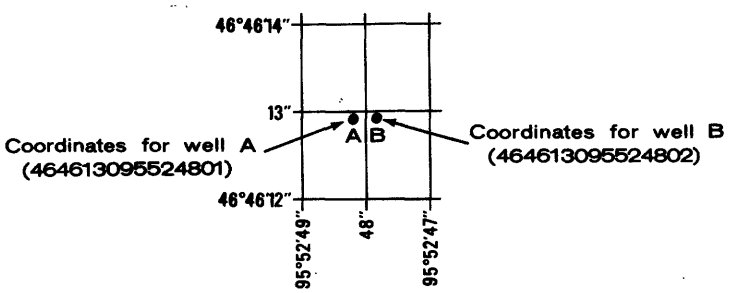


Figure 3.--Example of system for numbering wells and miscellaneous sites

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 radioisotopes. The streams that are sampled represent major drainage basins in the conterminous United States.

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

EXPLANATION OF 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 station, 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 discharge are computed from the daily figures. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is computed by the shifting-control method, in which correction factors based on individual discharge measurements and notes by hydrologists and observers are used in applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the control, the daily mean discharge is computed by what is basically the shifting-control method.

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

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

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

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

For some gaging stations there are periods when no gage-height record is obtained or the recorded gage height is so faulty that it cannot be used to compute daily discharge or contents. This happens when the recorder stops or otherwise fails to operate properly, intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods the daily discharges are estimated on the basis of recorded range in stage, prior and subsequent records, discharge measurements, weather records, and comparison with records for other stations in the same or nearby basins. Likewise daily contents may be estimated on the basis of operator's log prior and subsequent records, inflow-outflow studies, and other information.

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

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

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

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

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

The average discharge for the number of years indicated is given under "AVERAGE DISCHARGE"; it is not given for stations having fewer than 5 complete years of record or for stations where changes in water development during the period of record cause the figure to have little significance. In addition, the median of yearly mean discharges is given for stream-gaging stations having 10 or more complete years of record if the median differs from the average by more than 10 percent. Under "EXTREMES" are given first, the extremes for the period of record, second, information available outside the period of record, and last, those for the current year. Unless otherwise qualified, the maximum discharge (or contents) is the instantaneous maximum corresponding to the crest stage obtained by use of a water-stage recorder (graphic or digital), a crest-stage gage, or a nonrecording gage read at the time of crest. If the maximum gage height did not occur on the same day as the maximum discharge (or contents), it is given separately. Similarly, the minimum is the instantaneous minimum unless otherwise qualified. For some stations, peak discharges are listed with "EXTREMES FOR THE 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 indefinite 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 descripiton 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 concentration, samples may have been collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided day method. For periods when no samples were collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

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

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

EXPLANATION OF GROUND-WATER LEVEL RECORDS

Collection of the data

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

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

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.

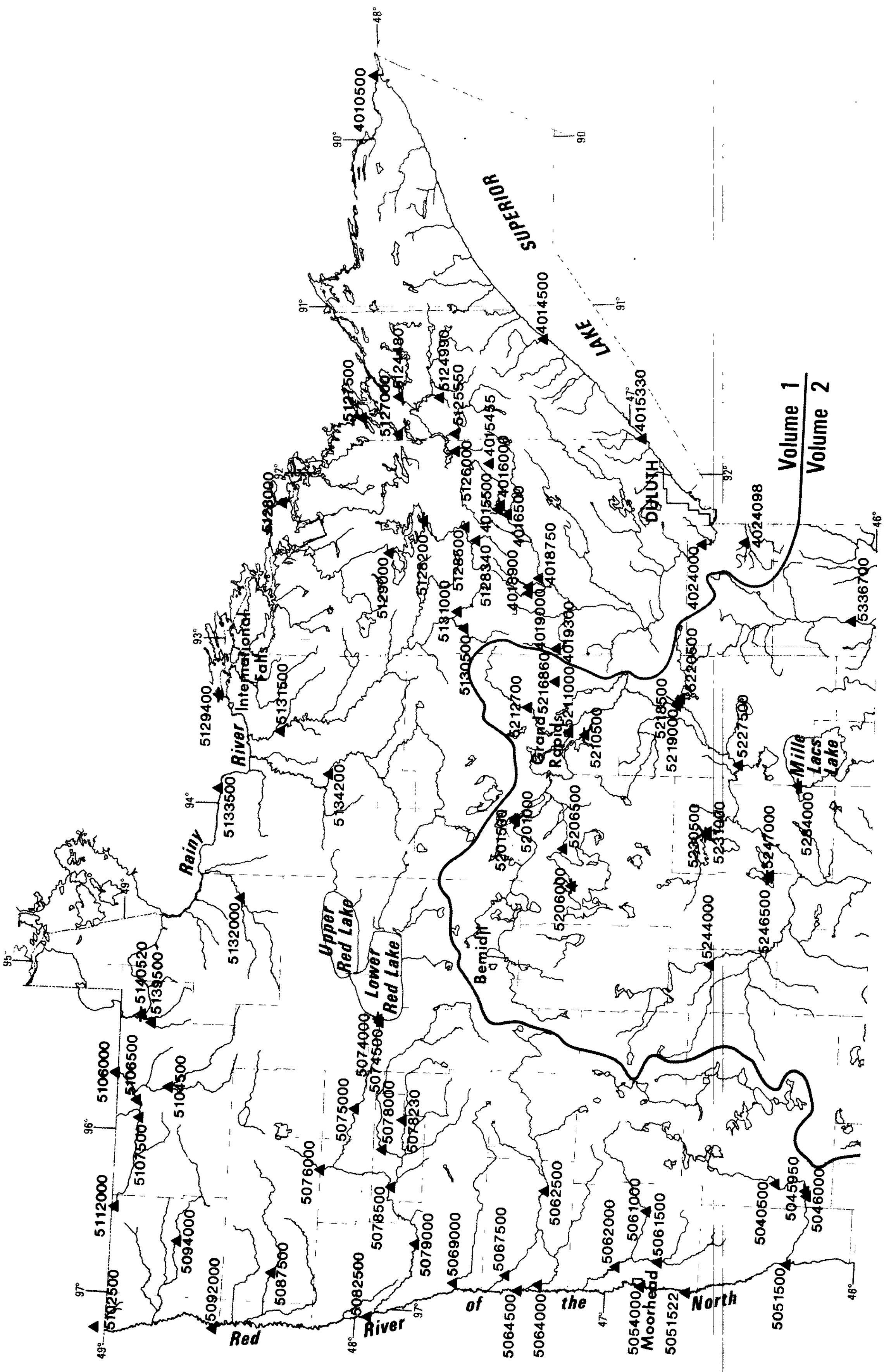
5-C1. *Laboratory theory and methods for sediment analysis,* by H. P. Guy: USGS--TWRI Book 5, Chapter C1. 1969. 58 pages.

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.



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Grand Rapids
Mille Lacs Lake
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Red River of the North
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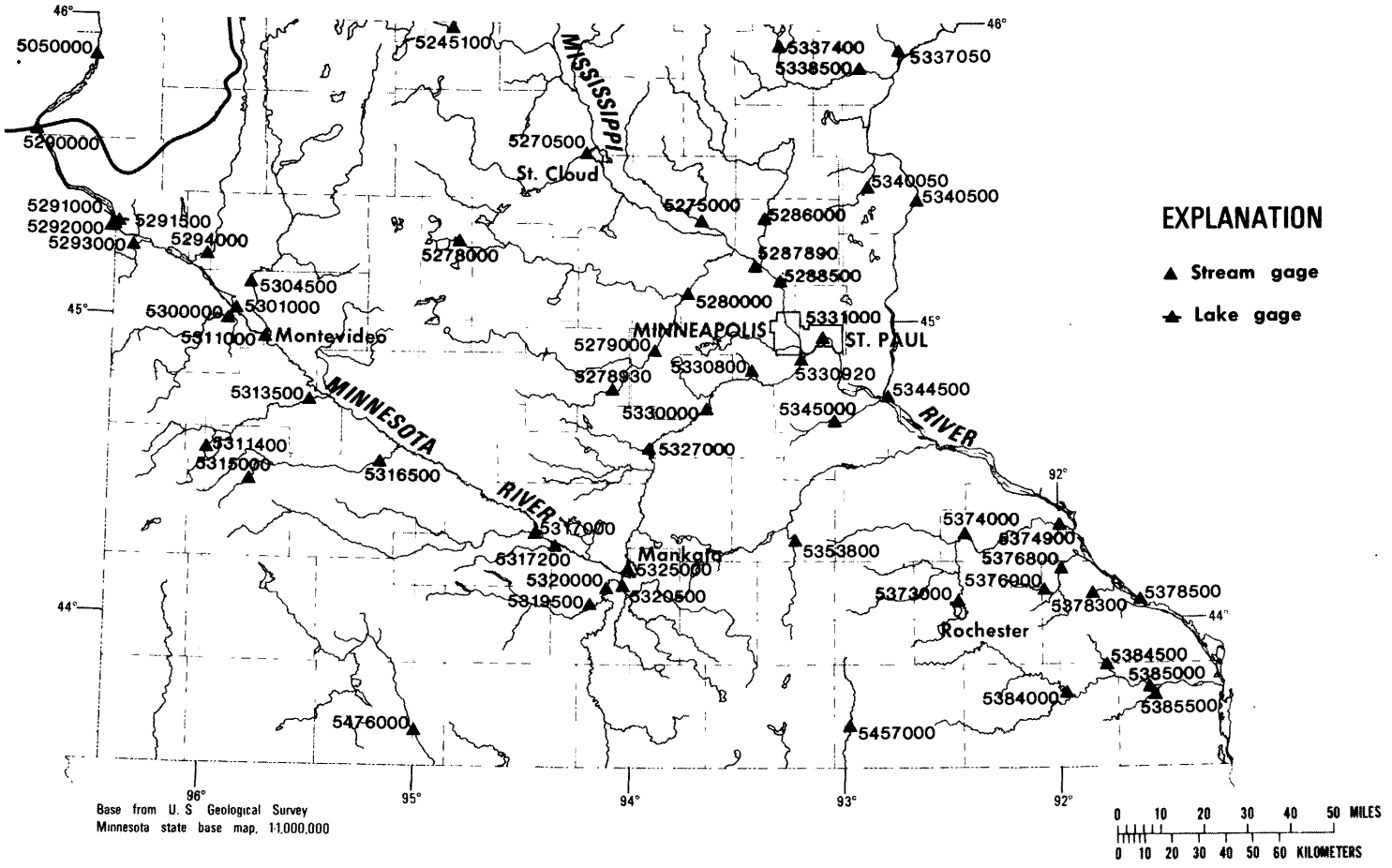
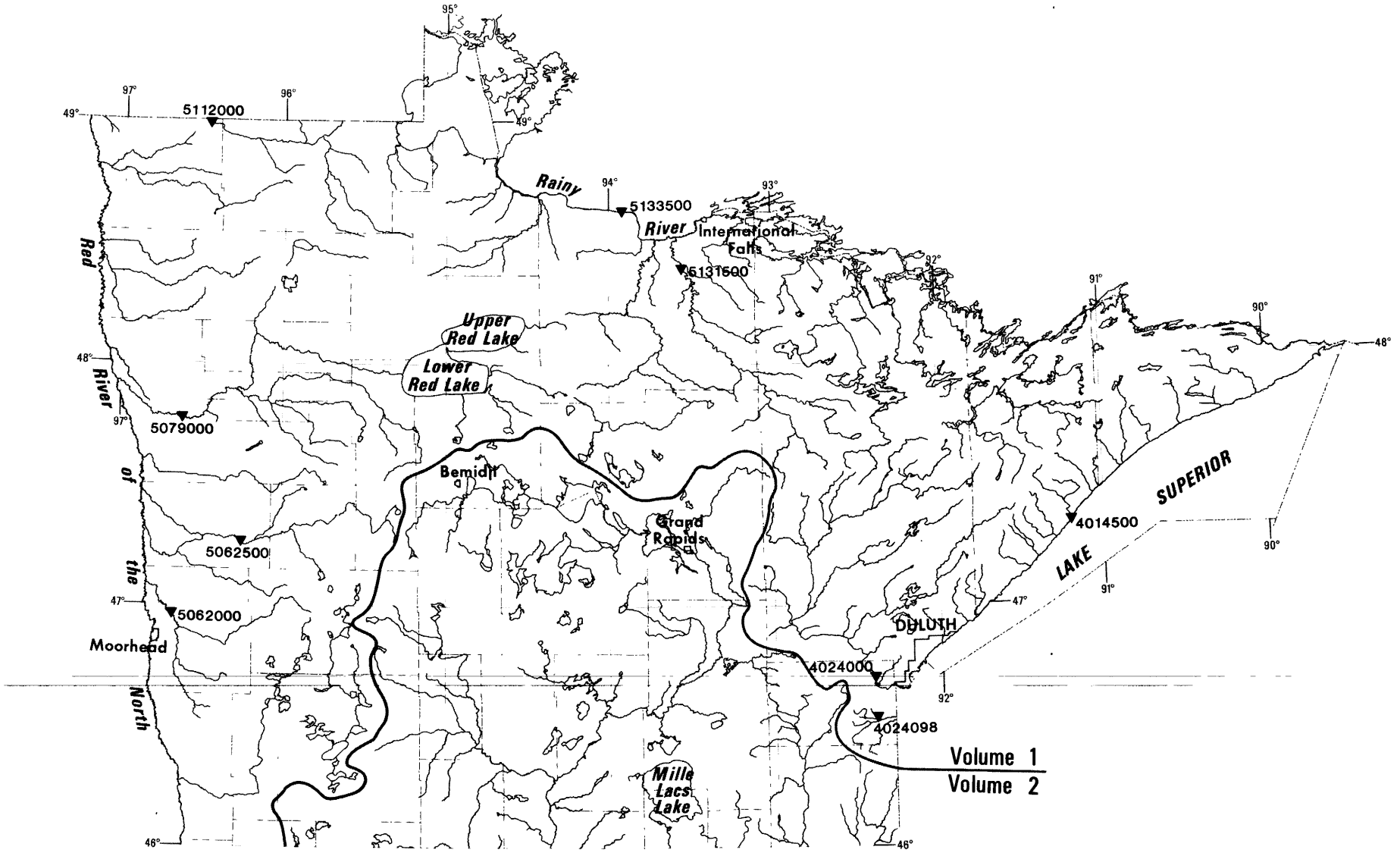


Figure 4.--Map showing location of water-discharge stations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Mille Lacs Lake
Volume 1
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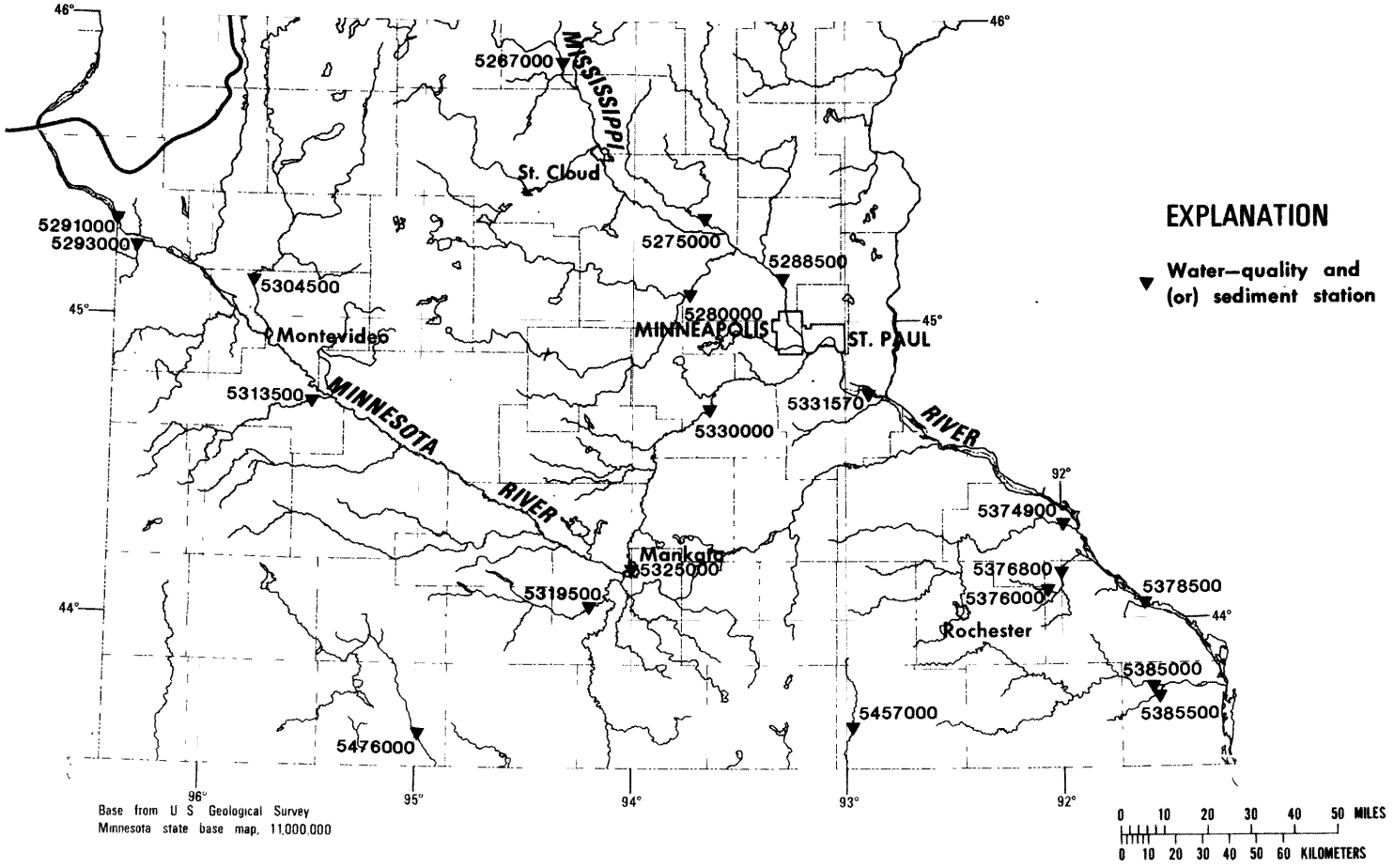
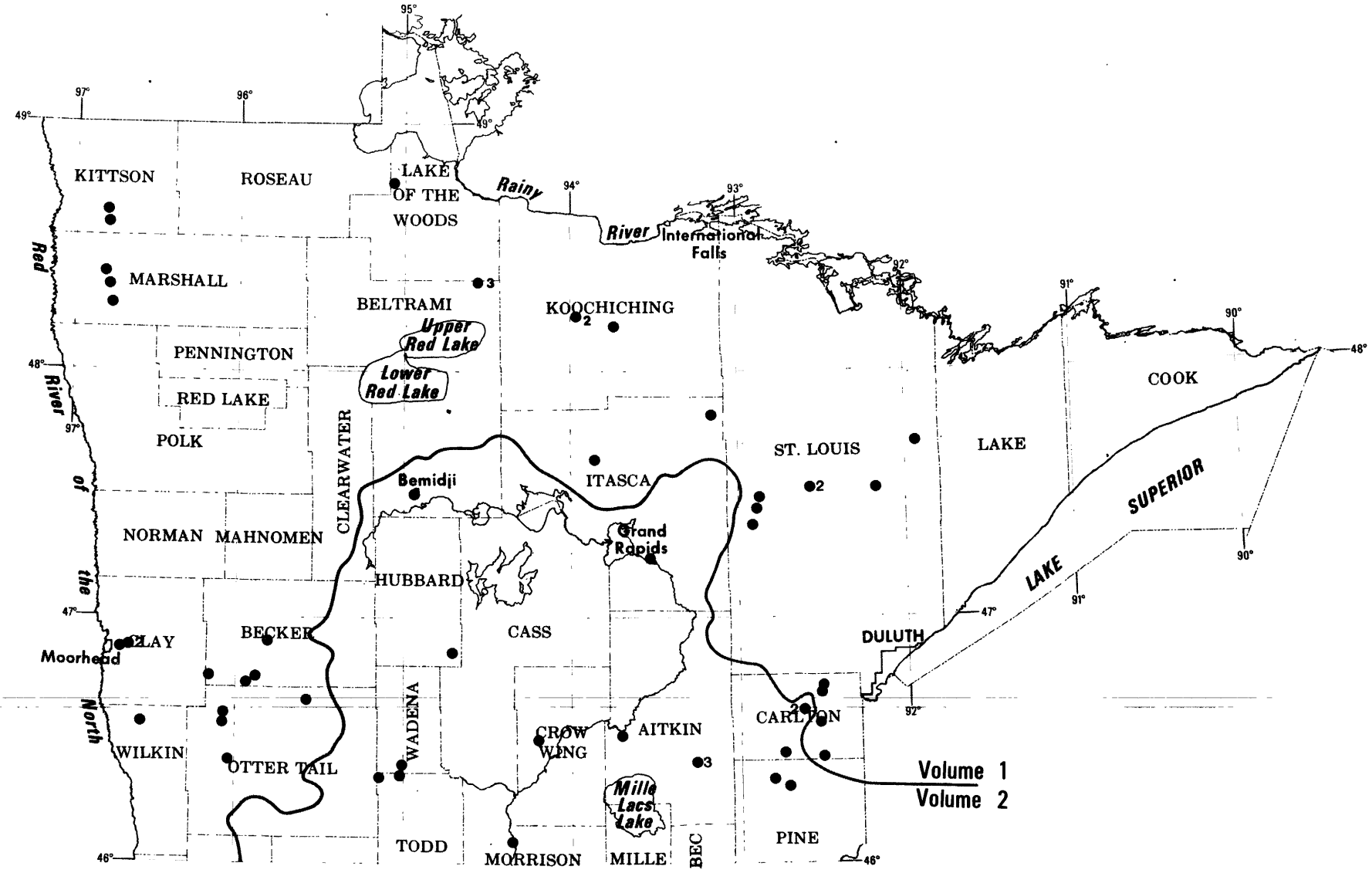


Figure 5.--Map showing location of water-quality stations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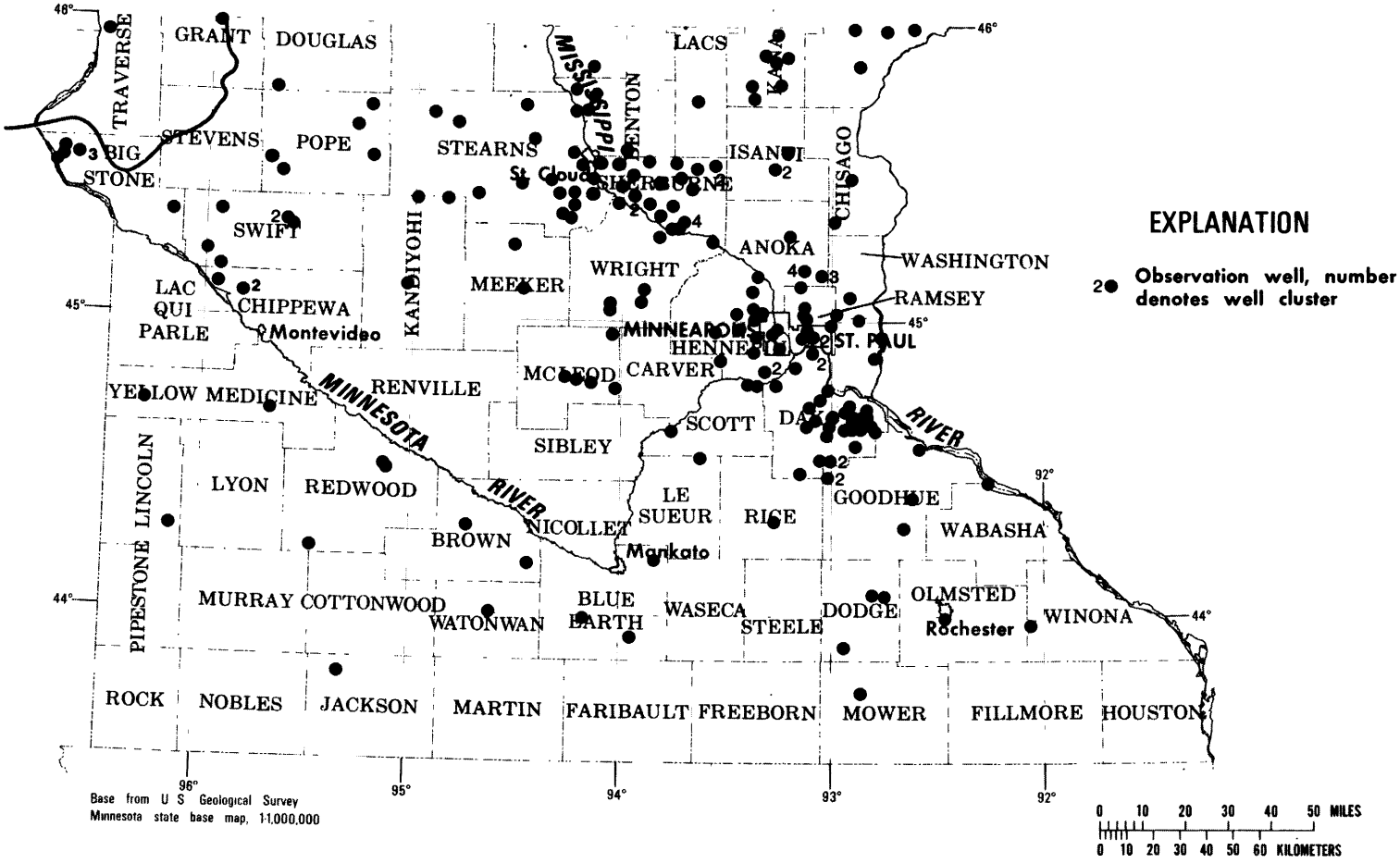
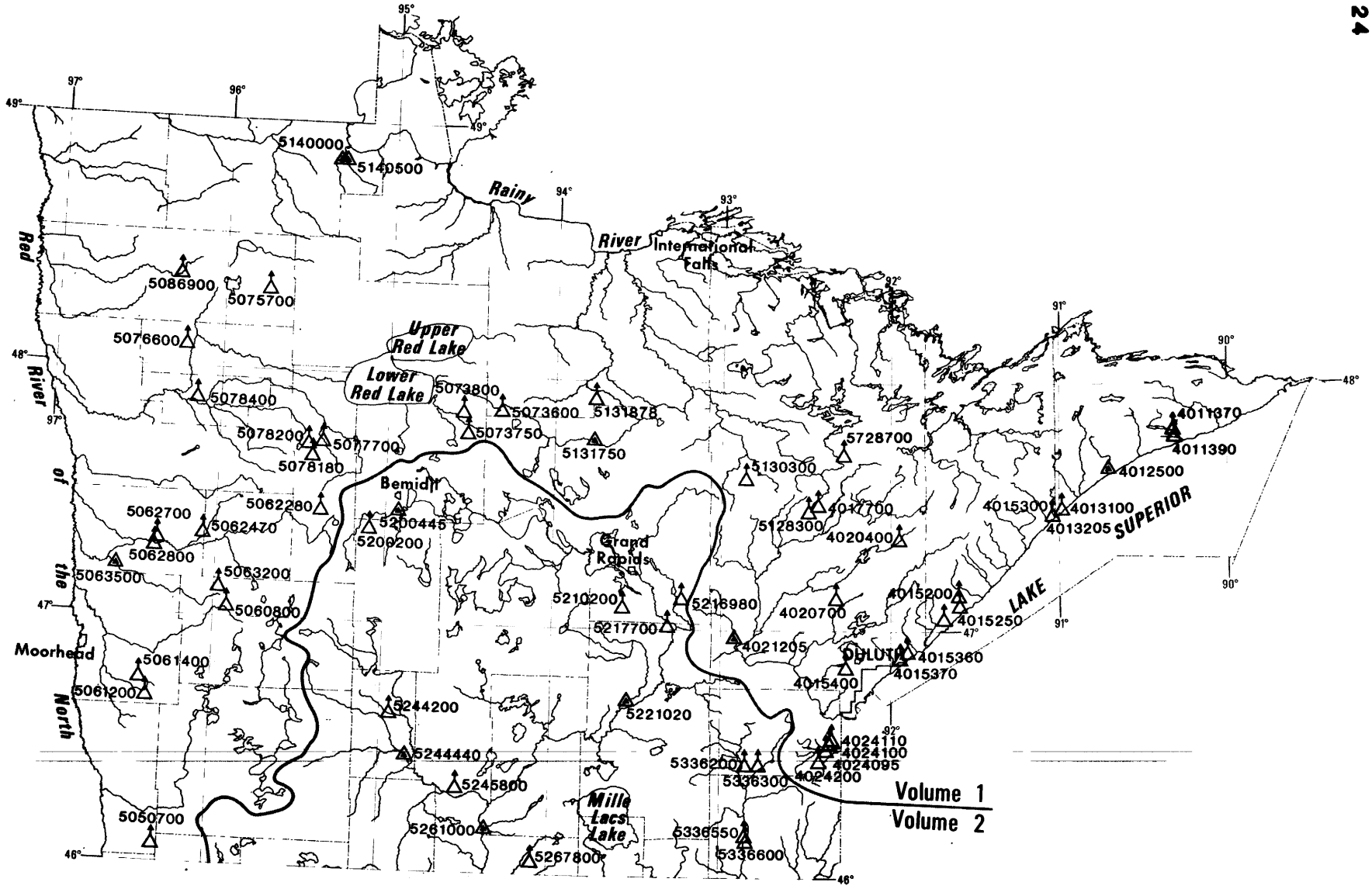


Figure 6.--Map showing location of ground-water wells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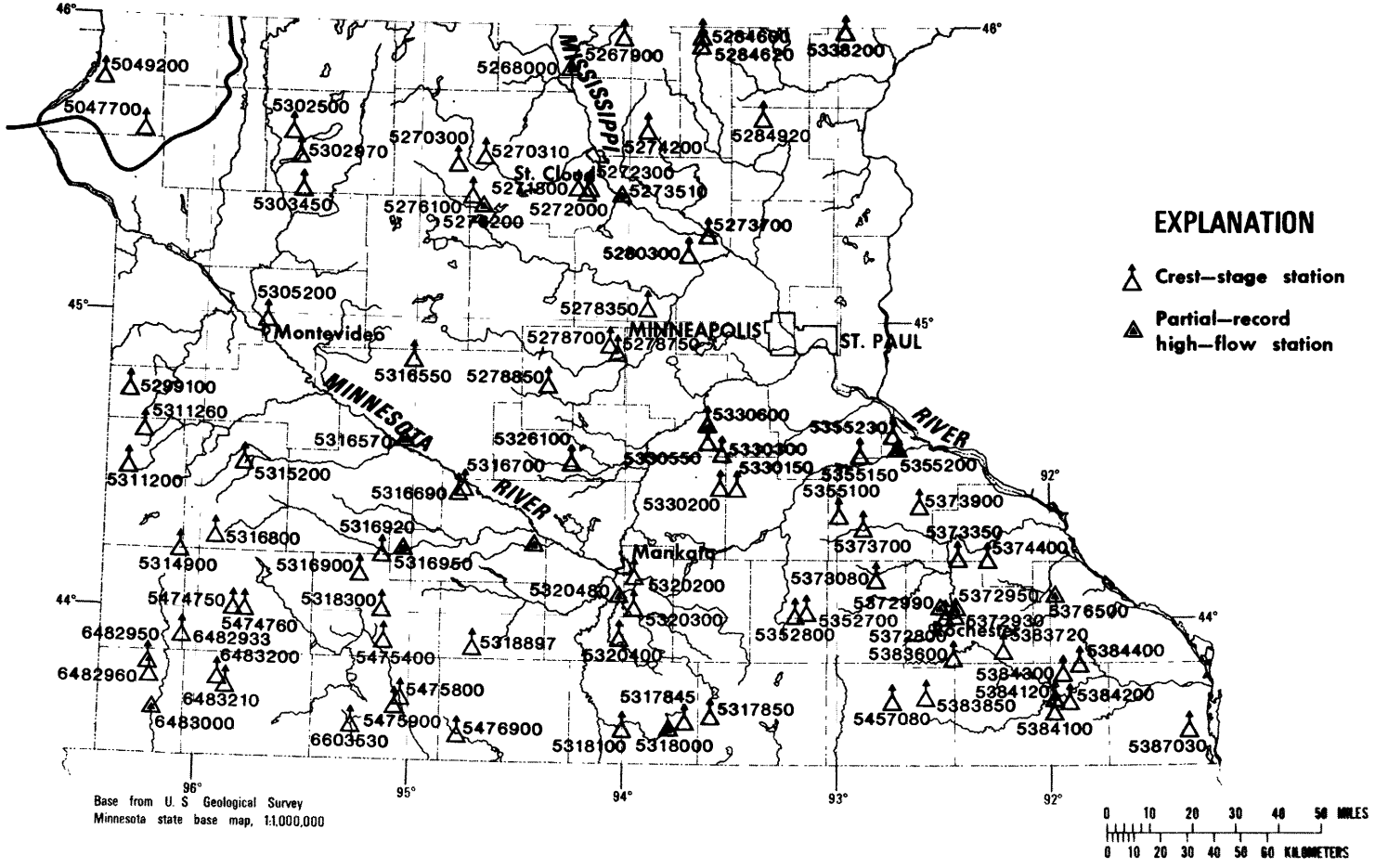

Figure 7--Map showing location of crest-stage partial-record stations

SUMMARY OF FLOOD STAGE AND DISCHARGE

Runoff from melting snow and rain in late April and early May caused record and near record peak flows at many sites in the northern half of the State. Peak discharges during the spring flood are listed for selected gaging stations and high-flow partial-record sites in the following table. At sites where 5 or more years of record are available, there are 21 recorded new peaks of record, and at 10 sites the peak discharge was within 10 percent of the peak of record.

Table 1.--Maximum discharges at selected sites during flood of April-May 1979

Station number	Stream name	Drainage area (mi^2)	Period of known floods	Maximum previously known			Maximum Apr-May 1979		
				Date	Stage (feet)	Discharge (ft^3/s)	Date	Stage (feet)	Discharge (ft^3/s)
	Streams tributary to Lake Superior								
04015330	Knife River near Two Harbors	85.6	1975-79	9-24-77	8.94	4320	5-10	11.16	7440
04015370	Talmadge River at Duluth	5.79	1964-79	9-20-72	20.54	1020	5- 9	21.76	1180
04015400	Miller Creek at Duluth	4.92	1960-79	9-20-72	19.24	481	5- 9	19.95	525
04015455	South Branch Partridge River near Babbitt	18.5	1978-79	5-31-78	3.25	108	4-22	5.31	456
04015475	Partridge River above Colby Lake at Hoyt Lakes	106	1979				4-22	10.89	2020
04016000	Partridge River near Aurora	161	1943-79	5-10-50	7.86	3230	4-24	6.78	2090
04016500	St. Louis River near Aurora	290	1943-79	5-14-50	8.37	5380	4-24	6.06	3170
04018750	St. Louis River at Forbes	713	1965-79	4-16-71	16.20	5610	4-25	17.71	6200
04019000	West Two Rivers near Iron Junction	65.3	1954-62, 1966-79	4-17-54	9.85	916	4-21	8.32	1120
04020400	North Branch Whiteface River near Fairbanks	17.1	1979				4-23	13.67	660
04020700	Bug Creek at Shaw	24.0	1979				4-23	15.12	590
04021205	Floodwood River above Floodwood		1972-79	5- 1-75	19.91	2030	4-23	22.87	2300
04024000	St. Louis River at Scanlon	3430	1908-79	5- 9-50	15.8	37,900	4-23	13.93	34,200
	Red River of the North basin								
05062280	Mosquito Creek near Bagley	3.98	1961-79	4-17-75	10.53	71	4-20	10.53	90
05062470	Marsh Creek tributary near Mahnomen	11.9	1961-79	4-11-69	13.76	436	4-19	14.00	460
05062500	Wild Rice River at Twin Valley	888	1910-17, 1931-79	7-22-09	20.0	9200	4-18	12.93	6010
05062800	Coon Creek near Twin Valley	50.8	1962-79	6-29-75	14.59	2700	4-16	12.70	1650
05063500	South Branch Wild Rice River near Borup	254	1944-49, 1972-79	7- 1-75	20.59	3700	4-17	19.52	3040
05064000	Wild Rice River at Hendrum	1600	1944-79	4-10-78	31.42	9350	4-21	32.30	8800
05067500	Marsh River near Shelly	151	1944-79	5-11-50	21.96	4660	4-19	23.36	4880
05069000	Sand Hill River at Climax	426	1943-79	4-14-65	17.81	4560	4-20	27.50	3400
05075000	Red Lake River at High Landing near Goodridge	2300	1930-79	7- 7-75	13.39	4060	4-25	12.30	3660
05075700	Mud River near Grygla	170	1979				4-26	18.49	1480
05076000	Thief River near Thief River Falls	959	1910-17, 1921, 1923-24, 1929-79	5-13-50	17.38	5610	4-24	14.11	3590
05076600	Red Lake River tributary near Thief River Falls	2.33	1962-79	4- 9-69	7.22	200	4-24	8.69	195
05078000	Clearwater River at Plummer	512	1939-79	6- 9-62	11.90	3640	4-25	12.31	3940
05078500	Clearwater River at Red Lake Falls	1370	1910-17, 1935-79	4- 9-78	11.56	9890	4-25	12.38	10,300
05079000	Red Lake River at Crookston	5280	1902-79	4-12-69	27.33	28,400	4-26	24.99	21,900
05086900	Middle River near Newfolden	91.1	1979				4-25	17.10	1000
05087500	Middle River at Argyle	265	1945, 1951-79	7- 3-75	16.59	4260	4-20	15.29	2140
05094000	South Branch Two Rivers at Lake Bronson	444	1929-37, 1941-47, 1954-79	4- 5-66	18.23	5410	4-22	13.17	3340
05104500	Roseau River below South Fork near Malung	573	1947-79	7-18-68	22.32	5750	4-25	21.78	5480
05107500	Roseau River at Ross	1220	1929-79	5-12-50	18.25	6560	4-29	17.31	4570
05112000	Roseau River below State ditch 51 near Caribou	1570	1917, 1920-79	5-19-50	11.81	4080	5- 8	10.11	2980
	Lake of the Woods basin								
05124480	Kawishiwi River near Ely	253	1967-79	4-24-76	5.92	1720	5-11	5.66	1340
05124990	Filson Creek near Ely	9.66	1975-79	4-25-75	6.99	129	4-22	7.72	283
05126000	Dunka River near Babbitt	53.4	1952-62, 1975-79	4-16-54	7.84	691	4-22	8.02	876
05128500	Pike River near Embarrass	115	1954-64, 1977-79	4-17-54	10.28	1750	4-23	10.18	1690
05128700	Pike River tributary near Wahlsten	1.93	1961-79	10-10-73	8.22	105	4-20	8.28	95

SUMMARY OF FLOOD STAGE AND DISCHARGE

Table 1.--Maximum discharges at selected sites during flood of April-May 1979--Continued

Station number	Stream name	Drainage area (mi^2)	Period of known floods	Maximum previously known			Maximum Apr-May 1979		
				Date	Stage (feet)	Discharge (ft^3/s)	Date	Stage (feet)	Discharge (ft^3/s)
	Lake of the Woods basin--Continued								
05129000	Vermilion River below Vermillion Lake near Tower	483	1912-17, 1929-79	5-23-50	7.68	2710	5-11, 13	6.43	1450
05130300	Boriin Creek near Chisholm	13.7	1959-79	4-13-69	13.40	700	4-20	13.37	560
05130500	Sturgeon River near Chisholm	187	1943-79	5- 7-50	7.41	3630	4-22	6.60	2460
05131500	Little Fork River at Littlefork	1730	1910-16, 1929-79	4-18-16, 5-11-50	37.00	25,000	4-25	32.59	20,600
05131750	Big Fork River near Big Fork	602	1973-79	4-29-75	13.97	2030	4-22	15.48	2830
05131878	Bowerman Brook near Craigville	25.0	1979				4-21	14.73	650
05132000	Big Fork River at Big Falls	1460	1929-79	5- 8-50	17.08	14,800	4-22	15.90	14,000
05133500	Rainy River at Manitou Rapids	19,400	1929-79	5-12-50	21.04	71,600	4-26	18.95	61,200
05134200	Rapid River near Baudette	543	1957-79	4-14-69	17.86	5500	4-26	21.13	7550
05139500	Warroad River near Warroad	162	1946-79	4-15-65	9.95	1780	4-25	9.66	2070
05140000	Bulldog Run near Warroad	11.1	1946-51, 1966-79	6-10-47	6.91	420	4-18	7.54	498
05140500	East Branch Warroad River near Warroad	45.8	1946-54, 1966-79	6-11-47	9.36	1340	4-25	9.38	1120
	Upper Mississippi River basin								
05200445	Mississippi River at Bemidji	400	1973-79	4-22-75	12.46	1170	4-23	13.04	1690
05212700	Prairie River near Taconite	360	1967-79	4-17-69	11.81	3250	4-24	11.64	3240
05220500	Mississippi River below Sandy River near Libby	5060	1930-79	5-17-50	20.02	16,000	5- 3	15.62	8230
05221020	Willow River below Palisade	445	1972-79	5- 1-75	17.21	3700	4-25	17.25	3730
05227500	Mississippi River at Aitkin	6140	1945-79	5-20-50	22.49	20,000	4-29	17.05	13,300
05244000	Crow Wing River at Nimrod	1010	1910-14, 1931-79	10-10-73	7.35	3700	4-18	7.24	3610
05244440	Leaf River near Aldrich	860	1972-79	10-13-73	15.83	4440	4-22	16.15	5170

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 SW 1/4 NE 1/4 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.--56 years (water years 1924-79), 508 ft^3/s (14.39 m^3/s), 11.50 in/yr (292 mm/yr).
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,000 ft^3/s (312 m^3/s) May 5, 1934, gage height, 7.6 ft (2.32 m), site and datum then in use, from rating curve extended above 7,000 ft^3/s (198 m^3/s); minimum daily, 1.0 ft^3/s (0.028 m^3/s) Jan. 15-21, 1977; minimum recorded gage height, 1.24 ft (0.378 m) Jan. 7, 8, 15, 1977, but may have been less during period of no gage-height record, Jan. 16 to Apr. 17, 1977.
EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 3,000 ft^3/s (85.0 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Apr. 26	1630	4,100	116	9.13	2.783
May 11	1900	*7,490	212	*11.30	3.444

Minimum discharge, 66 ft^3/s (1.87 m^3/s) Nov. 12, gage height, 2.49 ft (0.759 m) (result of freezeup).

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	146	133	96	89	89	95	245	2570	1710	628	182	184
2	154	132	96	89	89	96	242	2420	1670	594	177	231
3	167	129	96	89	89	97	240	2240	1570	549	172	233
4	194	126	95	89	89	98	240	2140	1460	514	182	226
5	218	123	95	89	89	99	240	2030	1350	483	179	209
6	224	122	95	89	89	100	238	1910	1300	457	172	189
7	223	119	94	89	89	102	238	1880	1440	433	165	176
8	218	123	94	89	89	105	236	2510	1410	407	157	166
9	206	121	93	88	89	108	234	2920	1280	387	151	155
10	193	118	93	88	89	110	232	5600	1630	375	144	150
11	187	121	92	88	89	114	234	7270	1960	357	135	157
12	186	95	92	88	89	118	236	6620	1650	339	131	196
13	183	143	92	88	90	124	238	5420	1380	320	135	207
14	182	160	92	88	90	130	240	4620	1240	304	131	194
15	187	128	91	88	90	136	248	4050	1140	287	133	181
16	201	107	91	88	90	142	255	3640	1070	278	130	168
17	202	98	91	88	90	150	270	3380	1010	261	119	154
18	202	95	90	88	90	160	300	3490	947	240	109	141
19	199	91	89	88	90	180	380	3430	884	230	103	130
20	193	90	89	88	90	210	620	3380	947	225	97	131
21	188	92	89	88	90	240	1100	3260	1870	215	93	124
22	179	97	89	88	91	250	2100	2970	1510	208	91	117
23	169	103	89	89	91	254	3000	2810	1200	202	99	112
24	167	106	89	89	91	254	3260	2670	1020	196	94	105
25	164	104	89	89	92	252	3560	2510	913	192	98	96
26	154	101	89	89	93	250	4020	2330	868	187	103	89
27	151	99	89	89	94	250	3990	2150	834	181	101	87
28	146	98	89	89	94	250	3770	2020	767	176	99	86
29	143	97	89	89	---	250	3280	1890	711	171	103	82
30	142	97	89	89	---	250	2830	1770	664	180	106	80
31	137	---	89	89	---	250	---	1690	---	186	123	---
TOTAL	5605	3368	2835	2745	2524	5224	36316	97590	37405	9762	4014	4556
MEAN	181	112	91.5	88.5	90.1	169	1211	3148	1247	315	129	152
MAX	224	160	96	89	94	254	4020	7270	1960	628	182	233
MIN	137	90	89	88	89	95	232	1690	664	171	91	80
CFSM	.30	.19	.15	.15	.15	.28	2.02	5.25	2.08	.53	.22	.25
IN.	.35	.21	.18	.17	.16	.32	2.25	6.05	2.32	.61	.25	.28

CAL YR 1978 TOTAL 180066 MEAN 493 MAX 3230 MIN 89 CFSM .82 IN 11.16
WTR YR 1979 TOTAL 211944 MEAN 581 MAX 7270 MIN 80 CFSM .97 IN 13.14

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN

LOCATION.--Lat 47°20'07", long 91°12'06", in SE 1/4 NE 1/4 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.--52 years, 168 ft^3/s (4.758 m^3/s), 16.30 in/yr (414 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,000 ft^3/s (283 m^3/s) Sept. 24, 1977, gage height, 8.33 ft (2,539 m) site and datum then in use, from highwater mark in well, from rating curve extended above 4,200 ft^3/s (119 m^3/s) on basis of slope-area measurement of peak flow; maximum gage height, 11.06 ft (3.371 m) Apr. 12, 1965, site and datum then in use, from floodmark (backwater from ice); no flow Jan. 14 to Mar. 2, 1977.

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

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Mar. 21	2030	ice jam		*12.99	3.959
Apr. 22	2030	2720	77.0	10.59	3.228
May 10	1830	*3120	88.4	10.90	3.322

Minimum discharge, 13 ft^3/s (0.36 m^3/s) Aug. 15-17, 19, 20-22, 28; minimum gage height, 5.48 ft (1.670 m) Aug. 21, 22.

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	73	49	39	33	26	29	120	949	520	81	69	422
2	77	46	38	32	26	29	110	834	455	70	49	562
3	73	45	38	32	26	31	105	730	404	66	39	410
4	69	44	39	31	26	32	100	678	387	59	37	292
5	79	45	40	30	26	31	95	644	313	50	35	203
6	94	44	40	30	26	30	95	600	297	42	33	142
7	89	41	37	29	26	30	95	684	396	35	29	105
8	80	47	34	29	24	30	90	1020	313	33	24	79
9	73	46	31	28	24	30	90	1030	245	37	20	64
10	69	47	29	27	24	29	90	2710	515	34	20	62
11	68	46	28	26	23	29	90	2370	495	29	18	158
12	68	48	29	25	23	29	90	1520	358	29	16	250
13	62	89	33	25	23	29	100	1090	276	49	17	189
14	59	100	33	25	24	29	130	882	221	37	15	147
15	77	87	33	25	26	29	191	738	200	26	14	116
16	94	80	33	25	26	29	262	627	188	21	13	89
17	92	77	32	25	26	30	404	566	206	19	13	70
18	90	65	31	25	26	32	556	1010	160	18	15	55
19	85	64	32	25	26	40	764	911	129	19	15	41
20	80	60	33	25	26	75	1050	810	228	20	13	37
21	79	56	34	26	27	100	1430	762	294	19	13	34
22	79	52	34	26	27	150	2190	800	276	18	14	30
23	68	51	34	26	32	200	2240	943	203	20	23	28
24	61	49	34	26	34	250	2040	831	158	67	22	27
25	60	47	34	26	30	220	2150	660	127	52	18	24
26	58	46	33	26	29	190	2130	525	225	41	16	22
27	56	45	32	26	29	170	1780	422	183	37	15	20
28	52	42	31	26	29	160	1400	351	136	30	17	21
29	51	41	32	26	---	150	1120	290	109	25	42	21
30	51	40	33	26	---	140	1020	262	94	94	40	21
31	50	---	33	26	---	130	---	535	---	106	55	---
TOTAL	2216	1639	1046	838	740	2512	22127	26784	8111	1283	779	3741
MEAN	71.5	54.6	33.7	27.0	26.4	81.0	738	864	270	41.4	25.1	125
MAX	94	100	40	33	34	250	2240	2710	520	106	69	562
MIN	50	40	28	25	23	29	90	262	94	18	13	20
CFSM	.51	.39	.24	.19	.19	.58	5.27	6.17	1.93	.30	.18	.89
IN.	.59	.44	.28	.22	.20	.67	5.88	7.12	2.16	.34	.21	.99

CAL YR 1978 TOTAL 62007 MEAN 170 MAX 1310 MIN 22 CFSM 1.21 IN 16.48
WTR YR 1979 TOTAL 71816 MEAN 197 MAX 2710 MIN 13 CFSM 1.41 IN 19.08

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 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
OCT										
03...	1300	73	89	7.3	15.0	11.0	1.0	10.7	100	K4
NOV										
14...	1230	104	88	7.5	.0	.5	3.0	14.0	101	K7
DEC										
19...	1330	30	80	7.2	8.0	.0	1.0	10.8	78	K1
FEB										
06...	1300	25	114	7.6	-15.0	.0	1.0	14.7	104	K4
MAR										
28...	1630	160	90	7.2	1.0	1.0	2.0	--	--	K10
MAY										
01...	1130	931	50	7.7	5.0	3.0	1.0	13.1	101	K6
JUN										
12...	1800	359	54	7.3	18.0	19.0	1.0	9.2	101	K11
JUL										
24...	1200	81	110	7.8	22.5	21.5	6.0	8.7	100	--
AUG										
28...	1315	14	115	7.0	21.0	17.0	--	9.0	97	46

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 PERCENT (00932)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY (MG/L AS CACO3) (00410)
OCT										
03...	K2	37	3	9.9	3.1	2.7	13	.2	.6	34
NOV										
14...	K7	39	8	10	3.3	3.1	15	.2	.5	31
DEC										
19...	K1	43	5	11	3.8	3.3	14	.2	.5	38
FEB										
06...	K2	46	7	12	3.8	3.4	14	.2	.4	39
MAR										
28...	K8	35	14	9.2	2.9	2.7	14	.2	.7	21
MAY										
01...	K1	19	7	4.8	1.6	1.3	13	.1	.5	12
JUN										
12...	K12	26	8	6.8	2.1	2.0	14	.2	.3	18
JUL										
24...	--	46	4	12	3.8	3.3	13	.2	.5	42
AUG										
28...	190	--	--	--	--	--	--	--	--	--

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
OCT										
03...	6.4	2.3	.2	10	84	56	.11	16.6	.03	.01
NOV										
14...	5.3	2.8	.1	12	80	56	.11	22.5	.30	.00
DEC										
19...	6.9	2.6	.2	14	83	65	.11	6.72	.31	.03
FEB										
06...	6.9	2.9	.2	14	86	67	.12	5.80	.48	.01
MAR										
28...	10	3.4	.1	12	78	54	.11	33.7	1.3	.06
MAY										
01...	6.4	1.3	.1	8.3	54	32	.07	136	.49	.05
JUN										
12...	6.0	1.5	.2	6.2	64	36	.09	62.0	.04	.00
JUL										
24...	5.2	2.9	.2	9.9	92	63	.13	20.1	.29	.02
AUG										
28...	--	--	--	--	--	--	--	--	--	--

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N) (00624)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN, TOTAL (MG/L AS N) (00600)	NITRO-GEN, TOTAL (MG/L AS NO3) (71887)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P) (00666)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT									
03...	.53	.54	.16	.38	.57	2.5	.01	.00	--
NOV									
14...	.40	.40	.05	.35	.70	3.1	.00	.00	10
DEC									
19...	.20	.23	.00	.23	.54	2.4	.00	.00	8.2
FEB									
06...	.26	.27	.06	.21	.75	3.3	.00	.00	--
MAR									
28...	.58	.64	.08	.56	1.9	8.6	.02	.02	--
MAY									
01...	.44	.49	.09	.40	.98	4.3	.01	.00	--
JUN									
12...	.46	.46	.02	.44	.50	2.2	.01	.01	11
JUL									
24...	.49	.51	.10	.41	.80	3.5	.03	.01	--
AUG									
28...	--	--	--	--	--	--	--	--	5.1

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPER-ATURE (DEG C) (00010)	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
NOV						
14...	1230	.5	104	10	2.8	96
DEC						
19...	1330	.0	30	8	.65	99
FEB						
06...	1310	.0	25	1	.07	80
MAR						
28...	1630	1.0	160	3	1.3	75
MAY						
01...	1130	3.0	931	4	10	61
JUN						
12...	1800	19.0	359	2	1.9	84
JUL						
24...	1200	21.5	81	17	3.7	100
AUG						
28...	1315	17.0	14	6	.23	--

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

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										
03...	1300	1	1	0	0	2	1	<10	1	1
FEB										
06...	1300	1	0	0	0	1	0	10	0	0
MAY										
01...	1130	1	1	0	0	0	0	20	10	1
JUL										
24...	1200	1	1	<100	10	0	0	10	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										
03...	0	6	5	320	280	7	7	10	10	<.5
FEB										
06...	0	3	3	270	230	2	0	1	1	<.5
MAY										
01...	0	4	3	360	160	31	3	10	5	<.5
JUL										
24...	0	4	1	740	230	1	0	20	10	<.5

DATE	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)
OCT									
03...	<.5	0	0	1	1	10	10	15	.5
FEB									
06...	<.5	0	0	0	0	20	0	7.4	.2
MAY									
01...	<.5	0	0	0	0	10	0	50	.8
JUL									
24...	<.5	0	0	0	0	20	20	13	--

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	OCT 3,78	DEC 19,78	MAR 28,79	MAY 1,79
TIME	1300	1330	1630	1130
TOTAL CELLS/ML	110	17000	240	57
DIVERSITY: DIVISION	1.7	0.1	0.7	1.5
.CLASS	1.7	0.1	0.7	1.5
..ORDER	2.0	0.2	0.8	2.0
...FAMILY	2.2	0.2	0.8	2.0
....GENUS	2.2	0.2	0.8	0.0

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	14#	25
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	*	0	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	7	7	--	-	10	4	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE	--	-	--	-	--	-	14#	25
....CHLAMYDOMONAS	5	5	--	-	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....COSMARIUM	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	5	5	--	-	--	-	14#	25
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	9	8	--	-	20	9	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	*	0	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	23#	21	*	0	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	4	3	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	--	-	5	2	--	-
....COCCOCHLORIS	--	-	140	1	--	-	--	-
..HORMOGONALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	53#	49	17000#	98	200#	85	--	-
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	*	0	--	-	14#	25
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	2	2	--	-	--	-	--	-

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 1978 TO AUGUST 1979

DATE	JUN 12,79		JUL 24,79		AUG 28,79	
TIME	1800		1200		1315	
TOTAL CELLS/ML	210		970		5200	
DIVERSITY: DIVISION	1.3		0.8		0.2	
.CLASS	1.3		0.8		0.2	
..ORDER	1.4		1.0		0.2	
...FAMILY	1.7		1.9		0.2	
....GENUS	1.8		1.9		0.3	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...HYDRODICTYACEAE						
....PEDIASTRUM	--	-	64	7	--	-
...OOCYSTACEAE						
....ANKISTRODESMUS	--	-	90	9	57	1
....DICTYOSPHAERIUM	--	-	--	-	29	1
....KIRCHNERIELLA	--	-	--	-	--	-
....SELENASTRUM	13	6	--	-	--	-
....TETRAEDRON	--	-	--	-	*	0
...SCENEDESMACEAE						
....SCENEDESMUS	--	-	570#	59	--	-
..VOLVOCALES						
...CHLAMYDOMONADACEAE	--	-	--	-	--	-
....CHLAMYDOMONAS	13	6	13	1	--	-
..ZYGNEMATALES						
...DESMIDIACEAE						
....COSMARIUM	--	-	13	1	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	--	-	--	-	--	-
..PENNALES						
...ACHNANTHACEAE						
....ACHNANTHES	26	13	--	-	*	0
...CYMBELLACEAE						
....CYMBELLA	--	-	13	1	--	-
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	--	-
....FRAGILARIA	13	6	--	-	--	-
....SYNEDRA	13	6	52	5	--	-
...NAVICULACEAE						
....NAVICULA	--	-	--	-	*	0
...NITZSCHIACEAE						
....NITZSCHIA	--	-	150#	16	*	0
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	130#	63	--	-	57	1
....COCCOCHLORIS	--	-	--	-	--	-
..HORMOGONALES						
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	--	-	--	-
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....GOMPHOSPHAERIA	--	-	--	-	5000#	96
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	--	-	--	-	--	-
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%

04015330 KNIFE RIVER NEAR TWO HARBORS, MN

LOCATION.--Lat 46°56'49", long 91°47'32", in SW 1/4 NW 1/4 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. 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. 25 to Feb. 7, Sept. 1-30, which are fair.

AVERAGE DISCHARGE.--5 years, 89.1 ft^3/s (2.523 m^3/s), 14.14 in/yr (359 mm/yr).

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

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

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Apr. 21	2030	2290	64.8	7.06	2.152	May 22	2015	1010	28.6	5.33	1.625
May 10	0215	*7440	211	*11.16	3.402	June 10	1315	874	24.8	5.16	1.573

Minimum discharge, 5.9 ft^3/s (0.17 m^3/s) July 23; minimum gage height, 2.62 ft (0.799 m) Aug. 21, 22.

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	18	17	19	11	9.1	9.0	115	226	196	28	34	100
2	20	17	18	11	9.0	9.0	110	199	144	27	21	70
3	21	17	18	11	9.0	9.0	100	168	112	40	16	50
4	22	17	17	11	9.0	9.0	95	153	145	57	29	34
5	24	17	16	10	8.9	9.0	90	134	115	37	34	24
6	44	17	16	10	8.9	9.0	85	176	90	25	25	20
7	41	17	15	10	8.9	9.0	80	380	121	20	19	17
8	34	16	15	10	8.9	9.0	75	783	99	17	13	15
9	31	16	14	10	8.9	9.0	70	923	77	15	11	13
10	28	21	14	10	8.9	9.0	70	4480	639	15	9.8	11
11	26	26	14	10	8.9	9.0	70	1120	341	14	9.0	50
12	24	21	13	10	9.0	9.0	75	498	155	12	8.2	35
13	23	55	13	10	9.0	9.0	100	326	95	12	8.2	24
14	22	128	13	10	9.0	9.0	200	242	67	11	8.6	21
15	31	73	13	9.9	9.0	9.0	395	188	55	10	7.4	18
16	38	52	12	9.9	9.0	9.0	678	148	56	8.2	6.4	16
17	36	43	12	9.8	9.0	9.6	1010	131	102	7.4	6.7	15
18	35	37	12	9.8	9.0	11	1150	149	73	7.3	7.2	14
19	32	35	12	9.7	9.0	30	1250	145	52	7.8	7.5	13
20	29	32	12	9.7	9.0	80	1640	136	47	9.7	6.4	13
21	25	30	12	9.6	9.0	200	1650	144	81	9.7	6.2	13
22	24	28	12	9.6	9.0	400	1830	454	85	8.4	6.8	12
23	21	26	12	9.5	9.0	365	1470	581	61	6.6	8.8	12
24	20	25	11	9.5	9.0	300	951	323	46	33	9.8	12
25	19	24	11	9.4	9.0	250	818	199	37	80	9.0	11
26	19	23	11	9.4	9.0	200	678	140	109	53	8.2	11
27	19	22	11	9.3	9.0	180	516	109	82	44	7.0	10
28	17	21	11	9.3	9.0	160	400	87	52	31	10	10
29	18	20	11	9.2	---	135	326	72	39	24	39	10
30	19	20	11	9.2	---	125	278	71	32	138	20	10
31	17	---	11	9.1	---	120	---	357	---	78	13	---
TOTAL	797	917	412	305.9	251.4	2709.6	16375	13242	3405	886.1	425.2	684
MEAN	25.7	30.6	13.3	9.87	8.98	87.4	546	427	114	28.6	13.7	22.8
MAX	44	128	19	11	9.1	400	1830	4480	639	138	39	100
MIN	17	17	11	9.1	8.9	9.0	70	71	32	6.6	6.2	10
CFSM	.30	.36	.16	.12	.11	1.02	6.38	4.99	1.33	.33	.16	.27
IN.	.35	.40	.18	.13	.11	1.18	7.12	5.75	1.48	.39	.18	.30

CAL YR 1978 TOTAL 39370.5 MEAN 108 MAX 2350 MIN 6.4 CFSM 1.26 IN 17.11
WTR YR 1979 TOTAL 40410.2 MEAN 111 MAX 4480 MIN 6.2 CFSM 1.30 IN 17.56

04015455 SOUTH BRANCH PARTRIDGE RIVER NEAR BABBITT, MN

LOCATION.--Lat 47°33'59", long 91°56'30", in SE 1/4 NW 1/4 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 Development 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 current year. 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 poor. The culverts 65 ft (20 m) downstream were frozen completely shut Jan. 11 to Mar. 19, 1979, resulting in streamflow going into storage. Streamflow was adjusted for change in storage.

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); 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, 456 ft^3/s (12.9 m^3/s) Apr. 22, gage height, 5.31 ft (1.618 m); maximum gage height, 6.67 ft (2.033 m) Mar. 20 (backwater from ice); minimum daily discharge, 0.02 ft^3/s (0.001 m^3/s) Mar. 1-15 (see remarks).

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	5.8	2.9	1.3	.20	.04	.02	1.1	68	33	20	27	17
2	6.3	2.8	1.2	.18	.04	.02	1.1	62	34	18	21	26
3	6.3	2.6	1.2	.16	.04	.02	1.0	56	35	16	15	24
4	5.6	2.4	1.1	.15	.04	.02	.95	52	34	15	11	19
5	5.6	2.5	1.1	.13	.04	.02	.87	48	32	13	7.3	25
6	6.3	2.5	1.0	.12	.04	.02	.76	45	31	11	4.6	29
7	6.0	2.2	1.0	.11	.04	.02	.65	47	54	9.7	2.9	24
8	5.6	2.2	.95	.10	.03	.02	.58	54	55	9.7	2.1	19
9	5.3	2.2	.90	.08	.03	.02	.50	56	46	12	1.6	16
10	5.1	2.2	.85	.06	.03	.02	1.0	104	54	10	1.5	17
11	4.9	2.2	.81	.04	.03	.02	1.5	171	60	8.1	1.3	16
12	6.0	2.0	.78	.04	.03	.02	2.0	132	51	5.6	1.2	16
13	4.6	2.3	.74	.04	.03	.02	2.5	92	42	4.6	1.2	15
14	4.2	2.8	.71	.04	.03	.02	3.5	71	36	3.8	1.2	13
15	4.7	2.6	.67	.04	.03	.02	4.4	60	38	3.1	1.1	11
16	6.5	2.6	.64	.04	.03	.05	5.7	50	33	2.2	.96	9.2
17	6.5	2.5	.61	.04	.03	.10	8.8	45	33	2.0	.94	7.3
18	6.0	2.4	.58	.04	.03	.20	13	52	29	1.5	.90	5.8
19	5.8	2.4	.55	.04	.03	.50	25	53	26	1.7	.84	4.6
20	5.8	2.2	.52	.04	.03	1.4	60	57	30	1.9	.80	4.3
21	5.6	2.1	.50	.04	.03	1.4	150	65	40	1.2	.80	6.5
22	6.0	2.0	.47	.04	.03	1.4	426	67	43	1.2	.80	9.4
23	5.8	1.9	.45	.04	.03	1.4	379	82	37	1.2	1.2	6.0
24	4.7	1.8	.42	.04	.03	1.3	262	76	31	1.2	1.4	4.6
25	3.7	1.8	.38	.04	.03	1.3	213	64	27	1.2	1.2	3.2
26	3.4	1.7	.34	.04	.03	1.3	185	53	36	1.1	1.0	2.8
27	3.1	1.6	.31	.04	.03	1.3	141	43	33	1.1	1.0	2.2
28	3.1	1.5	.28	.04	.03	1.2	110	38	29	1.0	1.4	2.1
29	3.1	1.4	.26	.04	---	1.2	90	33	27	.94	5.3	2.1
30	3.0	1.4	.24	.04	---	1.2	77	30	23	17	7.0	1.9
31	3.0	---	.22	.04	---	1.1	---	34	---	30	8.9	---
TOTAL	157.4	65.7	21.08	2.13	.91	16.65	2167.91	1960	1112	226.04	134.44	359.0
MEAN	5.08	2.19	.68	.069	.033	.54	72.3	63.2	37.1	7.29	4.34	12.0
MAX	6.5	2.9	1.3	.20	.04	1.4	426	171	60	30	27	29
MIN	3.0	1.4	.22	.04	.03	.02	.50	30	23	.94	.80	1.9
CFSM	.28	.12	.04	.004	.002	.03	3.91	3.42	2.01	.39	.24	.65
IN.	.32	.13	.04	.00	.00	.03	4.36	3.94	2.24	.45	.27	.72

CAL YR 1978 TOTAL 5676.78 MEAN 15.6 MAX 104 MIN .22 CFSM .84 IN 11.41
WTR YR 1979 TOTAL 6223.26 MEAN 17.1 MAX 426 MIN .02 CFSM .92 IN 12.51

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

LOCATION.--Lat 47°31'38", long 92°07'21", in SW 1/4 NE 1/4 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 September 1979.

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

REMARKS.--Records good except those for period of no gage-height record, Dec. 1 to Feb. 28, which are fair.

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, 2,020 ft^3/s (57.2 m^3/s) Apr. 22, 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.

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	49	23	25	5.4	1.4	1.3	21	543	189	114	193	44
2	48	23	25	4.8	1.4	1.3	20	475	194	97	183	86
3	47	23	25	4.4	1.4	1.3	20	423	197	88	144	115
4	46	22	25	4.0	1.4	1.3	20	382	195	80	111	115
5	45	20	24	3.5	1.4	1.3	20	349	185	70	87	115
6	43	21	24	3.2	1.4	1.3	20	324	173	63	67	116
7	42	21	23	2.8	1.4	1.4	19	314	198	56	54	117
8	41	21	23	2.5	1.4	1.4	18	314	236	54	44	104
9	40	20	22	2.3	1.4	1.4	17	326	250	59	35	88
10	39	20	22	2.0	1.3	1.4	16	399	252	62	32	79
11	38	19	21	1.8	1.3	1.4	15	510	262	58	30	80
12	37	19	21	1.7	1.3	1.5	16	637	272	50	24	85
13	36	20	20	1.6	1.3	1.5	19	702	242	41	20	87
14	36	22	19	1.5	1.3	1.6	22	653	199	34	17	86
15	35	23	19	1.5	1.3	1.6	26	558	200	28	14	81
16	37	25	18	1.4	1.3	1.7	35	449	212	25	12	70
17	39	26	17	1.4	1.3	2.0	58	380	212	21	11	60
18	40	27	16	1.4	1.3	4.0	109	355	196	18	11	51
19	40	27	16	1.4	1.3	12	268	351	165	17	9.7	43
20	40	27	15	1.4	1.3	14	555	359	146	15	9.1	38
21	39	26	14	1.4	1.3	17	996	367	162	13	8.7	34
22	36	26	13	1.4	1.3	18	1780	381	199	12	8.3	31
23	34	26	12	1.4	1.3	19	1960	402	217	11	7.9	29
24	31	26	12	1.4	1.3	19	1780	415	197	11	9.6	29
25	29	26	11	1.4	1.3	20	1450	413	163	12	11	28
26	29	25	10	1.4	1.3	20	1170	374	175	13	12	26
27	28	25	9.0	1.4	1.3	20	983	316	191	12	12	23
28	27	25	8.2	1.4	1.3	21	844	265	186	12	12	22
29	26	25	7.4	1.4	---	21	724	219	159	12	16	22
30	24	25	6.6	1.4	---	21	620	185	135	27	21	21
31	23	---	6.0	1.4	---	21	---	179	---	117	27	---
TOTAL	1144	704	529.2	65.4	37.3	271.7	13621	12319	5959	1302	1253.3	1925
MEAN	36.9	23.5	17.1	2.11	1.33	8.76	454	397	199	42.0	40.4	64.2
MAX	49	27	25	5.4	1.4	21	1960	702	272	117	193	117
MIN	23	19	6.0	1.4	1.3	1.3	15	179	135	11	7.9	21
CFSM	.35	.22	.16	.02	.01	.08	4.28	3.75	1.88	.40	.38	.61
IN.	.40	.25	.19	.02	.01	.10	4.78	4.32	2.09	.46	.44	.68

WTR YR 1979 TOTAL 39130.9 MEAN 107 MAX 1960 MIN 1.3 CFSM 1.01 IN 13.73

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.--The specific-conductance record has more than 20 percent in missing days. Extremes are those for water years with 80 percent or more days of record.

EXTREME FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES (water year 1979): Maximum daily, 27°C July 13, 1979; minimum, 0.0°C on many days during winter periods.

EXTREME FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum daily, 27°C July 13; minimum, 0.0°C on many days during winter period.

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	114	113	114	121	120	121	225	208	217	---	---	---
2	115	113	114	121	119	120	246	226	235	---	---	---
3	117	114	115	119	116	117	259	247	254	---	---	---
4	119	117	118	115	111	112	270	259	266	---	---	---
5	127	128	122	113	110	111	272	271	272	---	---	---
6	137	128	133	---	---	---	272	271	271	---	---	---
7	140	136	138	---	---	---	272	269	271	---	---	---
8	144	138	142	---	---	---	275	269	273	---	---	---
9	143	139	141	---	---	---	278	275	276	---	---	---
10	142	140	141	---	---	---	285	273	280	---	---	---
11	141	139	140	105	104	104	292	285	289	---	---	---
12	139	133	136	107	105	107	295	293	294	---	---	---
13	133	131	131	108	107	108	296	295	295	---	---	---
14	134	133	133	108	108	108	297	295	296	---	---	---
15	134	133	133	108	106	107	296	293	295	---	---	---
16	132	129	130	108	105	106	293	288	292	---	---	---
17	130	128	129	106	105	106	288	280	285	---	---	---
18	129	128	129	107	106	106	280	270	275	---	---	---
19	128	127	128	112	107	109	268	259	264	---	---	---
20	129	127	128	120	112	116	259	248	254	---	---	---
21	134	129	132	122	120	121	248	239	243	---	---	---
22	131	130	130	122	110	121	238	233	235	240	240	240
23	130	129	130	126	121	123	232	229	230	240	238	240
24	130	124	126	136	126	131	228	227	227	239	235	238
25	125	123	124	154	137	144	230	224	228	239	235	237
26	124	123	124	174	155	165	---	---	---	---	---	---
27	124	123	124	185	175	181	---	---	---	---	---	---
28	123	122	122	195	185	191	---	---	---	---	---	---
29	122	121	122	198	195	197	---	---	---	---	---	---
30	122	121	122	208	198	203	---	---	---	---	---	---
31	122	121	121	---	---	---	---	---	---	---	---	---
MONTH	144	113	128									

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1				227	227	227	258	253	256	38	35	36
2				227	227	227	253	236	245	41	38	39
3				228	227	228	236	212	224	43	41	42
4				227	226	226	211	199	204	48	44	45
5				227	226	226	199	198	198	52	48	50
6				228	227	227	208	199	203	53	52	53
7				228	227	228	227	209	218	55	54	54
8				229	227	228	248	229	238	55	53	54
9				229	229	229	262	249	256	53	50	52
10				231	228	229	265	262	264	50	46	49
11				232	231	232	263	257	260	46	38	41
12				233	232	233	262	257	260	38	35	36
13				234	233	233	260	251	257	36	34	35
14				234	232	233	251	238	243	40	36	37
15				233	231	232	238	229	235	43	40	41
16				232	230	231	232	210	222	48	43	45
17				230	228	229	210	176	195	54	48	51
18				228	225	227	175	122	150	58	54	56
19				225	209	217	119	64	86	58	57	57
20				217	207	212	62	42	48	57	54	55
21				215	205	209	42	28	36	54	51	52
22				215	209	213	---	---	---	51	48	50
23				222	215	218	---	---	---	48	46	47
24				222	208	217	---	---	---	47	45	46
25				207	198	202	---	---	---	47	45	46
26				198	191	194	---	---	---	50	44	46
27				191	190	191	---	---	---	48	45	46
28				200	192	196	---	---	---	54	47	49
29				219	201	208	---	---	---	55	50	51
30				241	219	231	35	31	32	53	52	53
31				256	242	250	---	---	---	53	51	52
	JUNE			JULY			AUGUST			SEPTEMBER		
1	51	50	51	75	70	72	132	101	120	155	130	141
2	51	50	50	80	75	78	103	78	87	190	157	176
3	52	51	51	84	80	82	75	72	73	176	121	149
4	52	51	51	88	84	86	72	71	72	119	101	107
5	53	51	52	93	88	90	74	71	72	100	87	93
6	52	51	52	98	93	95	80	74	76	87	79	83
7	54	52	53	100	98	99	85	80	83	79	77	78
8	54	50	53	100	97	99	90	85	88	77	72	74
9	49	43	46	97	95	96	95	90	93	72	69	70
10	43	41	42	100	95	97	98	95	97	70	69	69
11	41	39	40	114	100	106	103	98	101	68	68	68
12	42	39	40	126	115	122	106	102	105	68	67	68
13	45	41	43	130	126	128	109	106	108	72	68	69
14	47	43	45	130	129	130	110	109	109	83	73	78
15	49	46	47	129	129	129	113	110	111	97	83	89
16	49	47	48	129	129	129	115	113	114	108	97	103
17	48	47	48	130	129	129	117	114	116	113	108	111
18	48	46	47	131	129	130	125	117	120	115	113	114
19	51	47	49	129	129	129	125	121	122	116	115	115
20	55	51	53	129	129	129	129	124	127	117	116	116
21	58	55	57	129	129	129	133	128	130	117	115	116
22	62	58	60	129	127	128	130	124	127	117	117	117
23	67	62	64	128	126	127	126	125	126	118	117	117
24	65	64	65	126	125	126	130	126	128	119	117	118
25	68	64	66	126	121	124	130	128	129	120	119	119
26	70	67	69	122	120	121	130	127	129	121	117	119
27	72	68	70	122	120	121	127	124	125	118	118	118
28	71	70	71	122	120	121	124	116	121	118	117	117
29	71	69	70	121	120	120	118	116	117	117	115	116
30	70	68	69	121	106	112	120	118	119	115	115	115
31	---	---	---	105	94	98	129	120	123	---	---	---
MONTH	72	39	54	131	70	112	133	71	109	190	67	105

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

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

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

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

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

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

04015500 SECOND CREEK NEAR AURORA, MN

LOCATION.--Lat 47°31'25", long 92°11'35", in NW 1/4 SW 1/4 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 current year.

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, 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.--24 years, 22.8 ft^3/s (0.646 m^3/s); median of yearly mean discharges, 20.0 ft^3/s (0.566 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, 3.09 ft (0.942 m) Oct. 16, 17, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 174 ft^3/s (4.93 m^3/s) Apr. 22, gage height, 5.11 ft (1.558 m); maximum gage height, 5.19 ft (1.582 m) Apr. 17 (backwater from ice); minimum daily discharge, 3.2 ft^3/s (0.091 m^3/s) Jan. 10, 11; minimum gage height, 3.22 ft (0.981 m) Mar. 4, 5.

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	22	14	6.4	4.5	3.8	4.0	18	45	29	27	44	52
2	28	14	6.3	4.4	3.8	4.0	18	48	36	31	38	52
3	22	12	6.2	4.3	3.8	4.0	18	42	39	26	36	44
4	30	9.1	6.2	4.1	3.9	3.5	18	37	33	25	36	40
5	29	8.6	6.1	3.9	3.9	3.5	18	32	36	23	34	45
6	29	8.2	6.0	3.8	3.9	3.7	18	29	32	21	32	36
7	24	7.8	5.8	3.6	3.9	4.0	18	32	36	24	29	36
8	23	9.9	5.7	3.5	3.9	4.2	17	43	29	29	27	35
9	19	9.6	5.6	3.3	3.9	4.2	17	46	31	31	24	34
10	20	10	5.5	3.2	3.9	4.2	17	65	32	32	26	37
11	21	9.6	5.4	3.2	3.9	4.2	18	67	32	30	25	39
12	24	11	5.3	3.3	3.9	4.2	22	60	28	29	25	42
13	22	10	5.3	3.3	3.9	4.2	26	52	29	27	24	49
14	17	11	5.4	3.4	4.0	4.2	33	52	28	24	26	49
15	20	10	5.5	3.5	4.0	4.2	45	50	33	22	25	46
16	19	9.5	5.7	3.5	4.0	4.2	58	43	30	22	24	37
17	22	8.9	5.9	3.6	4.0	5.0	80	43	27	20	25	32
18	21	8.5	6.2	3.7	4.0	9.0	111	45	25	18	24	30
19	18	8.0	7.0	3.8	4.0	13	130	42	25	21	24	26
20	15	7.7	6.8	3.8	4.0	14	145	44	24	20	23	25
21	13	7.5	6.6	3.8	4.0	14	156	40	32	19	22	35
22	13	7.3	6.5	3.7	4.0	14	165	41	28	21	22	25
23	13	7.1	6.3	3.6	4.0	14	150	43	29	22	23	21
24	13	7.0	6.1	3.6	4.0	14	127	40	28	28	25	20
25	14	6.9	6.0	3.6	4.0	14	111	31	26	25	26	18
26	17	6.8	5.7	3.7	4.0	14	93	29	38	25	27	18
27	15	6.7	5.4	3.8	4.0	15	79	27	37	27	28	20
28	15	6.6	5.2	3.8	4.0	17	71	25	35	30	26	23
29	16	6.5	5.0	3.8	---	18	60	23	30	28	29	21
30	16	6.4	4.8	3.8	---	18	49	20	31	48	25	25
31	15	---	4.7	3.8	---	18	---	27	---	49	34	---
TOTAL	605	266.2	180.6	114.7	110.4	275.5	1906	1263	928	824	858	1012
MEAN	19.5	8.87	5.83	3.70	3.94	8.89	63.5	40.7	30.9	26.6	27.7	33.7
MAX	30	14	7.0	4.5	4.0	18	165	67	39	49	44	52
MIN	13	6.4	4.7	3.2	3.8	3.5	17	20	24	18	22	18

CAL YR 1978 TOTAL 10044.8 MEAN 27.5 MAX 89 MIN 4.7
WTR YR 1979 TOTAL 8343.4 MEAN 22.9 MAX 165 MIN 3.2

04016000 PARTRIDGE RIVER NEAR AURORA, MN

LOCATION.--Lat 47°31'02", long 92°11'24", in SE 1/4 SW 1/4 sec.12, T.58 N., R.15 W., St. Louis County, Hydrologic Unit 04010201, on right bank at upstream side of highway bridge, 1,000 ft (305 m) downstream from Second Creek, 2.5 mi (4.0 km) east of Aurora, and 2.8 mi (4.5 km) upstream from mouth.
DRAINAGE AREA.--161 mi^2 (417 km^2) of which 13.3 mi^2 (34.4 km^2) is noncontributing.
PERIOD OF RECORD.--August 1942 to current year.
REVISED RECORDS.--WSP 974: 1942. WSP 1307: 1943(M). WDR MN-77-1: Drainage area.
GAGE.--Water-stage recorder. Datum of gage is 1,402.30 ft (427.421 m) National Geodetic Vertical Datum of 1929. Aug. 5, 1942, to Aug. 25, 1944, nonrecording gage, and Aug. 26, 1944, to July 1, 1956, water-stage recorder at site 45 ft (14 m) downstream at same datum.
REMARKS.--Records good. Flow regulated at times by storage in off-channel Partridge Reservoir, formerly known as Whitewater Lake. Reservoir formed from lake by levees around marsh areas and natural outlet. Usable capacity, 20,000 acre-ft (24.7 hm^3) between elevations 1,410 ft (430 m), natural lake level, and 1,440 ft (439 m). Storage began Apr. 9, 1955. Storage in reservoir obtained from Colby Lake during periods of high flow; release from storage returned to Colby Lake to maintain lake elevation during diversion for iron-ore processing. Diversion began Feb. 7, 1956. Some seepage losses from reservoir bypass station. Flow also affected by mining activities in Second Creek (station 04015500) basin.
AVERAGE DISCHARGE (adjusted for storage and diversion).--37 years, 128 ft^3/s (3.625 m^3/s), 10.80 in/yr (274 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, 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, 2,090 ft^3/s (59.2 m^3/s) Apr. 24, gage height, 6.78 ft (2.067 m); minimum daily, 10 ft^3/s (0.28 m^3/s) Jan. 16.

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	57	29	35	13	12	13	36	695	219	168	148	76
2	62	29	34	12	13	13	35	618	226	152	185	76
3	54	27	31	13	13	14	35	546	232	112	190	68
4	62	25	28	12	13	13	36	482	227	90	174	61
5	60	24	21	12	13	13	35	432	226	87	130	66
6	54	23	19	12	14	13	35	401	214	82	106	58
7	48	23	18	12	13	14	35	379	222	80	79	74
8	47	25	19	12	13	14	34	354	228	88	54	94
9	44	24	18	12	13	14	32	372	256	93	44	87
10	44	25	16	11	13	14	32	474	278	92	44	96
11	44	24	14	11	13	14	33	582	285	89	42	93
12	45	23	13	11	12	13	37	670	289	85	42	102
13	43	25	14	11	12	13	47	740	286	77	40	111
14	38	26	17	11	12	14	52	745	288	64	40	118
15	43	24	21	11	12	15	63	680	282	53	37	118
16	42	24	24	10	12	16	80	582	262	48	31	108
17	45	23	27	12	12	17	100	482	263	43	31	96
18	44	24	29	11	12	19	130	428	249	38	31	74
19	40	24	32	12	12	25	200	401	224	40	31	64
20	32	22	29	13	12	27	350	401	204	37	31	60
21	31	20	26	13	12	29	482	401	201	34	31	66
22	31	18	23	12	13	29	928	402	206	34	35	52
23	33	19	21	12	15	31	1730	436	228	34	40	45
24	35	19	19	12	15	31	2070	448	233	41	42	42
25	35	20	19	12	14	30	1850	440	201	37	36	39
26	37	20	19	13	14	29	1540	416	209	38	34	37
27	35	21	18	13	13	30	1280	375	219	42	35	38
28	31	23	17	13	13	33	1090	328	230	45	35	39
29	32	28	17	13	---	35	940	279	213	42	40	36
30	31	31	15	12	---	36	802	237	195	77	35	38
31	29	---	14	11	---	35	---	225	---	99	47	---
TOTAL	1308	712	667	370	360	656	14149	14451	7095	2141	1920	2132
MEAN	42.2	23.7	21.5	11.9	12.9	21.2	472	466	237	69.1	61.9	71.1
MAX	62	31	35	13	15	36	2070	745	289	168	190	118
MIN	29	18	13	10	12	13	32	225	195	34	31	36
(†)	+22.9	+13.3	+10.4	-0.13	-0.07	+5.07	+78.5	+15.0	+15.2	+12.6	+16.0	+30.4
MEAN ‡	65.1	37.0	31.9	11.8	12.8	26.2	550	481	252	81.7	77.9	101
CFSM ‡	.40	.23	.20	.07	.08	.16	3.42	2.99	1.57	.51	.48	.63
IN ‡	.47	.26	.23	.08	.08	.19	3.81	3.45	1.74	.58	.56	.70

CAL YR 1978 TOTAL 42925 MEAN 118 MAX 705 MIN 13 MEAN ‡ 139 CFSM ‡ 0.86 IN ‡ 11.75
WTR YR 1979 TOTAL 45961 MEAN 126 MAX 2070 MIN 10 MEAN ‡ 144 CFSM ‡ 0.89 IN ‡ 12.16

† 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 NW 1/4 SW 1/4 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, 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).--37 years, 248 ft^3/s (7.023 m^3/s), 11.61 in/yr (295 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, 3,170 ft^3/s (89.8 m^3/s) Apr. 24, gage height, 6.06 ft (1.847 m); minimum daily, 32 ft^3/s (0.91 m^3/s) Feb. 16 to Mar. 14.

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	148	67	64	40	34	32	88	1780	565	366	191	239
2	150	68	66	40	34	32	88	1630	555	336	248	283
3	139	64	64	39	33	32	88	1460	550	290	256	298
4	139	61	60	39	33	32	86	1320	535	256	239	276
5	141	59	56	39	33	32	84	1210	520	233	188	227
6	133	58	52	39	33	32	82	1130	507	218	150	200
7	123	57	49	38	33	32	80	1100	550	203	127	190
8	115	57	46	38	33	32	79	1040	545	221	94	200
9	113	58	43	38	33	32	79	1040	545	245	77	210
10	110	59	42	38	33	32	80	1280	590	236	75	220
11	110	58	41	38	33	32	84	1440	610	209	70	230
12	108	56	40	37	33	32	90	1540	600	191	69	240
13	103	63	41	37	33	32	99	1580	575	169	67	260
14	96	67	43	37	33	32	110	1560	555	148	65	280
15	104	65	46	37	33	33	130	1460	565	129	61	270
16	104	63	50	37	32	35	180	1330	535	115	56	260
17	106	61	54	36	32	39	275	1190	540	103	52	250
18	104	58	56	36	32	45	405	1110	502	89	52	240
19	103	55	58	36	32	52	515	1060	462	89	50	230
20	89	52	59	36	32	61	1050	1050	435	85	49	200
21	85	50	57	36	32	69	1480	1040	444	76	48	210
22	83	50	55	35	32	74	2060	1060	444	73	55	200
23	83	50	53	35	32	78	2820	1090	458	72	65	188
24	85	50	51	35	32	80	3140	1090	453	83	63	155
25	83	50	49	35	32	82	2930	1040	417	75	58	144
26	83	51	47	35	32	84	2670	976	440	79	54	135
27	82	52	45	34	32	86	2460	886	440	76	54	129
28	75	54	43	34	32	88	2300	790	444	77	62	125
29	73	57	42	34	---	88	2120	702	426	76	75	115
30	73	60	41	34	---	88	1940	630	412	123	61	113
31	69	---	41	34	---	88	---	605	---	155	141	---
TOTAL	3212	1730	1554	1136	913	1618	27692	36219	15219	4896	2972	6317
MEAN	104	57.7	50.1	36.6	32.6	52.2	923	1168	507	158	95.9	211
MAX	150	68	66	40	34	88	3140	1780	610	366	256	298
MIN	69	50	40	34	32	32	79	605	412	72	48	113
(†)	+22.9	+13.3	+10.4	-0.13	-0.07	+5.07	+78.5	+15.0	+15.2	+12.6	+16.0	+30.4
MEAN ‡	127	71.0	60.5	36.5	32.5	57.3	1002	1183	522	171	112	241
CFSM ‡	.44	.24	.21	.13	.11	.20	3.46	4.08	1.80	.59	.39	.83
IN ‡	.50	.27	.24	.15	.12	.23	3.85	4.71	2.01	.68	.44	.93

CAL YR 1978 TOTAL 92672 MEAN 254 MAX 1150 MIN 36 MEAN ‡ 276 CFSM ‡ 0.95 IN ‡ 12.90
WTR YR 1979 TOTAL 103478 MEAN 284 MAX 3140 MIN 32 MEAN ‡ 302 CFSM ‡ 1.04 IN ‡ 14.13

† 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 NE 1/4 SE 1/4 sec.3, T.56 N., R.18 W., St. Louis County, Hydrologic Unit 04010201, on right bank at downstream side of highway bridge, 0.5 mi (0.8 km) downstream from Eveleth Taconite Company dam, 0.6 mi (1.0 km) south of Forbes, 1.8 mi (2.9 km) upstream from Elbow Creek.

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

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

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

REMARKS.--Records good except those for winter periods, which are fair. 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.--15 years, 562 ft^3/s (15.92 m^3/s), 10.70 in/yr (272 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, 6,200 ft^3/s (176 m^3/s) Apr. 25, gage height, 17.71 ft (5.398 m); minimum daily, 45 ft^3/s (1.27 m^3/s) Mar. 14; minimum gage height, 5.35 ft (1.631 m) Mar. 13, 14.

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	374	190	176	141	94	90	235	3960	1180	768	377	341
2	365	198	180	138	93	90	235	3560	1180	695	347	605
3	359	196	183	136	93	90	235	3190	1140	676	384	646
4	353	193	184	133	92	90	235	2850	1110	657	403	562
5	320	190	184	131	92	90	235	2560	1070	570	390	570
6	329	193	184	129	91	90	230	2350	1030	518	344	624
7	317	173	183	127	91	90	225	2240	1060	477	302	584
8	300	211	182	125	90	90	220	2090	1080	587	282	566
9	300	246	181	123	90	90	215	2100	1040	844	249	570
10	288	196	181	121	90	90	210	2320	1070	737	230	545
11	265	188	180	120	90	90	210	2580	1130	624	216	518
12	268	186	180	119	90	90	210	2650	1110	556	200	521
13	279	190	179	118	90	70	210	2690	1080	511	193	438
14	257	200	178	116	90	45	215	2680	1030	467	188	473
15	268	183	178	115	90	70	240	2600	1010	416	186	473
16	268	168	176	114	90	95	390	2470	1020	374	180	457
17	274	160	174	112	90	130	600	2300	1010	350	183	432
18	268	180	172	110	90	185	1200	2140	972	326	176	409
19	288	185	170	108	90	200	2300	1980	908	297	171	384
20	271	185	168	107	90	205	3300	1880	872	282	168	359
21	265	180	166	105	90	209	4400	1840	940	271	159	344
22	235	175	164	104	90	215	5130	1850	976	257	166	332
23	230	170	162	102	90	220	5350	1940	924	244	193	317
24	230	170	160	100	90	220	5670	1920	864	277	203	297
25	216	170	158	99	90	225	6080	1860	784	297	211	282
26	222	170	156	98	90	230	6130	1790	872	186	216	268
27	216	170	154	98	90	230	5780	1680	908	235	149	257
28	211	170	151	97	90	230	5320	1540	864	271	154	252
29	208	171	149	96	---	235	4840	1420	844	257	225	249
30	208	173	146	95	---	235	4380	1320	808	257	279	241
31	203	---	144	94	---	235	---	1310	---	326	279	---
TOTAL	8455	5530	5283	3531	2536	4564	64230	69660	29886	13610	7403	12916
MEAN	273	184	170	114	90.6	147	2141	2247	996	439	239	431
MAX	374	246	184	141	94	235	6130	3960	1180	844	403	646
MIN	203	160	144	94	90	45	210	1310	784	186	149	241
CFSM	.38	.26	.24	.16	.13	.21	3.00	3.15	1.40	.62	.34	.60
IN.	.44	.29	.28	.18	.13	.24	3.35	3.63	1.56	.71	.39	.67

CAL YR 1978 TOTAL 215296 MEAN 590 MAX 2340 MIN 100 CFSM .83 IN 11.23
WTR YR 1979 TOTAL 227604 MEAN 624 MAX 6130 MIN 45 CFSM .88 IN 11.87

04018900 EAST TWO RIVER NEAR IRON JUNCTION, MN

LOCATION.--Lat 47°24'04", long 92°39'52", in NW 1/4 NW 1/4 sec.29, T.57 N., R.18 W., St. Louis County, Hydrologic Unit 04010201, on right bank 30 ft (9 m) downstream from bridge on State Highway 37 and 2.2 mi (3.5 km) southwest of Iron Junction.

DRAINAGE AREA.--40.0 mi^2 (103.6 km^2).

PERIOD OF RECORD.--June 1966 to current year. Occasional low-flow measurements, water years 1957-62.

GAGE.--Water-stage recorder. Altitude of gage is 1,335 ft (407 m), from topographic map.

REMARKS.--Records poor. Natural flow of stream affected by continually changing iron-mining activities that include mine pit dewatering and some regulation of tailing ponds.

COOPERATION.--Records collected and computed by U.S. Steel Corporation; random discharge measurements made and records reviewed by Geological Survey.

AVERAGE DISCHARGE.--13 years, 31.6 ft^3/s (0.895 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 640 ft^3/s (18.1 m^3/s) Oct. 12, 1973, gage height, 10.01 ft (3.051 m); maximum gage height, 10.16 ft (3.097 m) Apr. 12, 1971 (backwater from ice); minimum daily discharge, 4.1 ft^3/s (0.12 m^3/s) Aug. 19, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 555 ft^3/s (15.7 m^3/s) Apr. 19, gage height, 9.47 ft (2.886 m); minimum daily, 4.5 ft^3/s (0.13 m^3/s) Dec. 10-13.

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	12	8.7	6.0	5.8	8.0	8.3	32	72	30	22	16	74
2	12	9.5	5.7	5.9	8.0	8.3	31	63	28	17	15	105
3	11	11	5.5	6.0	8.0	8.3	30	56	27	22	14	125
4	11	11	5.3	6.0	8.0	8.3	30	49	28	29	13	155
5	11	11	5.1	6.1	8.0	8.3	29	46	28	21	12	130
6	17	10	4.9	6.2	8.1	8.3	28	46	28	15	12	100
7	17	9.1	4.7	6.3	8.1	8.3	28	56	30	13	11	64
8	9.9	9.5	4.6	6.4	8.1	8.3	28	71	27	16	10	40
9	11	10	4.6	6.5	8.1	8.3	28	67	24	32	9.7	34
10	9.3	9.7	4.5	6.6	8.1	8.3	28	91	28	27	9.3	23
11	8.7	14	4.5	6.7	8.2	8.3	29	122	28	20	8.9	18
12	8.3	14	4.5	6.8	8.2	8.3	32	110	25	16	8.5	15
13	7.9	14	4.5	6.8	8.2	8.5	36	90	21	14	8.2	13
14	7.6	13	4.6	6.9	8.2	9.0	50	74	19	13	7.8	11
15	8.7	13	4.6	7.0	8.2	9.5	90	62	17	12	7.4	9.8
16	9.7	12	4.6	7.1	8.2	11	203	50	15	11	7.2	9.0
17	9.5	12	4.7	7.2	8.3	13	328	42	16	9.9	6.9	8.4
18	9.7	11	4.7	7.3	8.3	15	496	39	14	8.3	6.6	8.0
19	9.3	10	4.8	7.3	8.3	20	520	35	12	8.5	6.4	8.1
20	9.3	10	4.8	7.4	8.3	30	515	35	15	8.5	6.2	8.3
21	9.1	9.5	4.9	7.4	8.3	37	428	33	31	9.9	6.6	8.6
22	9.1	9.0	5.0	7.5	8.3	42	339	37	36	9.7	8.8	9.0
23	9.3	8.6	5.1	7.5	8.3	45	284	56	30	10	12	8.9
24	9.1	8.2	5.2	7.6	8.3	43	221	52	25	13	13	7.8
25	9.7	7.9	5.2	7.6	8.3	42	179	45	19	16	10	5.8
26	9.3	7.5	5.3	7.7	8.3	40	158	41	32	19	14	5.4
27	8.9	7.2	5.4	7.7	8.3	38	140	38	42	22	24	5.6
28	8.7	6.8	5.5	7.8	8.3	36	122	34	36	21	40	5.8
29	8.5	6.6	5.6	7.8	---	35	103	30	30	20	33	6.0
30	8.7	6.3	5.6	7.9	---	34	85	27	26	18	27	6.2
31	8.9	---	5.7	7.9	---	33	---	31	---	17	40	---
TOTAL	309.2	300.1	155.7	216.7	229.3	640.6	4650	1700	767	510.8	424.5	1027.7
MEAN	9.97	10.0	5.02	6.99	8.19	20.7	155	54.8	25.6	16.5	13.7	34.3
MAX	17	14	6.0	7.9	8.3	45	520	122	42	32	40	155
MIN	7.6	6.3	4.5	5.8	8.0	8.3	28	27	12	8.3	6.2	5.4

CAL YR 1978 TOTAL 9500.6 MEAN 26.0 MAX 177 MIN 4.5
WTR YR 1979 TOTAL 10931.6 MEAN 29.9 MAX 520 MIN 4.5

NOTE.--No gage-height record Dec. 1 to Feb. 27, July 24 to Sept. 30.

04019000 WEST TWO RIVER NEAR IRON JUNCTION, MN

LOCATION.--Lat 47°24'55", long 92°42'18", in NW 1/4 NW 1/4 sec.24, T.57 N., R.19 W., St. Louis County, Hydrologic Unit 04010201, on left bank 40 ft (12 m) upstream from bridge on County Highway 452, 4.8 mi (7.7 km) west of Iron Junction, and 11.0 mi (17.7 km) upstream from St. Louis River.

DRAINAGE AREA.--65.3 mi^2 (169.1 km^2).

PERIOD OF RECORD.--October 1953 to September 1962, October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,340 ft (408 m), from topographic map. Prior to May 14, 1976, at site 1.8 mi (2.9 km) downstream at datum 1,322.05 ft (402.96 m) National Geodetic Vertical Datum of 1929 (Minnesota Department of Transportation bench mark).

REMARKS.--Records fair except those for winter period, which are poor. Flow regulated at times by West Two River Reservoir, 8.3 mi (13.4 km) upstream, for taconite processing at U.S. Steel Mountain Iron Taconite Plant. The reservoir impounds water from the upper 27.9 mi^2 (72.3 km^2) of the drainage area and has an available capacity of 8,500 acre-ft (10.5 hm^3) between elevations 1,370 ft (418 m), natural inlet, and 1,395 ft (425 m), crest of spillway at outlet dam. Storage began July 28, 1966. Some seepage losses from reservoir enter above station.

COOPERATION.--Records for current year collected and computed by U.S. Steel Corporation; random discharge measurements made and records reviewed by Geological Survey.

AVERAGE DISCHARGE.--23 years, 45.0 ft^3/s (1.274 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,120 ft^3/s (31.7 m^3/s) Apr. 21, 1979, gage height, 8.32 ft (2.536 m); minimum daily, 3.0 ft^3/s (0.085 m^3/s) Jan. 22 to Feb. 6, 1957; minimum gage height, 1.73 ft (0.527 m) May 16, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,120 ft^3/s (31.7 m^3/s) Apr. 21, gage height, 8.32 ft (2.536 m); minimum daily, 7.0 ft^3/s (0.20 m^3/s) Sept. 26; minimum gage height, 1.76 ft (0.536 m) Sept. 26. Nov. 8.

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	23	15	13	12	11	13	22	106	50	35	21	94
2	23	15	13	12	12	13	21	88	49	32	19	143
3	22	13	13	12	12	13	21	75	46	41	18	194
4	22	12	13	12	12	13	20	66	44	49	16	220
5	22	13	13	12	12	13	20	60	39	41	16	174
6	21	14	13	12	12	13	20	58	36	35	15	120
7	20	12	13	12	12	13	20	82	37	30	15	79
8	19	12	13	12	12	13	20	101	34	43	14	56
9	19	12	13	12	12	13	20	91	30	62	12	43
10	18	13	13	12	12	13	20	113	37	60	12	36
11	18	13	13	12	12	13	22	140	34	55	12	30
12	18	12	13	12	12	13	25	138	30	46	10	24
13	18	13	13	12	12	13	28	124	28	39	10	18
14	17	14	13	12	12	14	33	107	25	33	10	14
15	18	14	13	11	13	14	45	88	23	28	9.8	13
16	18	14	13	11	13	14	70	74	21	24	9.8	12
17	17	14	13	11	13	15	110	62	21	22	9.5	11
18	18	14	13	11	13	15	210	56	19	18	9.2	11
19	18	14	13	11	13	16	500	52	18	15	8.3	11
20	18	14	13	11	13	17	968	50	22	13	8.3	11
21	18	14	13	11	13	20	1110	49	30	12	8.0	10
22	18	14	13	11	13	29	1040	52	32	12	9.2	9.8
23	17	14	13	11	13	32	870	68	32	12	18	14
24	16	14	12	11	13	32	635	69	31	29	18	10
25	17	14	12	11	13	30	464	62	28	25	15	7.5
26	16	14	12	11	13	29	369	56	37	30	12	7.0
27	16	14	12	11	13	27	288	51	37	30	41	8.0
28	16	14	12	11	13	26	221	46	36	25	56	8.3
29	15	14	12	11	---	25	170	40	37	20	49	7.8
30	15	14	12	11	---	24	133	40	38	24	41	8.0
31	15	---	12	11	---	23	---	53	---	25	33	---
TOTAL	566	407	395	355	349	571	7515	2317	981	965	555.1	1404.4
MEAN	18.3	13.6	12.7	11.5	12.5	18.4	251	74.7	32.7	31.1	17.9	46.8
MAX	23	15	13	12	13	32	1110	140	50	62	56	220
MIN	15	12	12	11	11	13	20	40	18	12	8.0	7.0

CAL YR 1978 TOTAL 18360.0 MEAN 50.3 MAX 465 MIN 11
WTR YR 1979 TOTAL 16380.5 MEAN 44.9 MAX 1110 MIN 7.0

04019300 WEST SWAN RIVER NEAR SILICA, MN

LOCATION.--Lat 47°17'36", long 93°02'30", in SW 1/4 NW 1/4 sec.32, T.56 N., R.21 W., St. Louis County, Hydrologic Unit 04010201, on right bank 10 ft (3 m) upstream from pilings of dismantled bridge and railroad bed of Great Northern Railroad, 2 mi (3 km) northwest of Silica, 9 mi (14 km) southwest of Hibbing and 20 mi (32 km) upstream from confluence of East Swan and West Swan.

DRAINAGE AREA.--16.3 mi^2 (42.2 km^2).

PERIOD OF RECORD.--April 1963 to May 1979 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 1,360 ft (415 m), from topographic map. Prior to Aug. 2, 1963, reference point at same site and datum.

REMARKS.--Records poor. Natural flow affected by extensive iron mining activities in headwaters of stream.

AVERAGE DISCHARGE.--15 years (water years 1964-78) 10.3 ft^3/s (0.292 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 573 ft^3/s (16.2 m^3/s) Oct. 10, 1973, gage height, 5.68 ft (1.731 m); no flow for several days in 1969, 1970, 1972, 1973, 1976, 1977, 1978.

EXTREMES FOR CURRENT YEAR.--Oct. 1978 to May 1979: Maximum discharge 462 ft^3/s (13.1 m^3/s) Apr. 20, gage height, 5.11 ft (1.558 m); minimum daily, 0.30 ft^3/s (0.008 m^3/s) Feb. 16 to Mar 13.

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	1.5	1.0	.70	.50	.31	.30	1.6	24				
2	1.7	1.0	.68	.49	.31	.30	1.6	18				
3	1.9	.89	.66	.48	.31	.30	1.5	14				
4	1.7	.99	.64	.47	.31	.30	1.5	11				
5	2.3	1.2	.63	.46	.31	.30	1.5	10				
6	2.3	1.2	.62	.45	.31	.30	1.5	10				
7	2.2	1.1	.61	.44	.31	.30	1.4	11				
8	2.3	1.1	.60	.43	.31	.30	1.4	11				
9	2.8	1.0	.60	.43	.31	.30	1.4	12				
10	2.0	1.0	.60	.42	.31	.30	1.4	12				
11	1.7	1.3	.60	.41	.31	.30	1.5	9.5				
12	1.3	1.5	.60	.40	.31	.30	1.6	7.1				
13	1.3	2.2	.61	.39	.31	.30	1.7	10				
14	.99	2.1	.61	.38	.31	.31	2.5	14				
15	1.2	1.8	.62	.38	.31	.32	5.0	16				
16	1.1	1.6	.62	.37	.30	.34	15	14				
17	.99	1.4	.62	.37	.30	.39	50	20				
18	1.5	1.3	.62	.36	.30	.45	180	31				
19	1.9	1.2	.63	.35	.30	.60	300	26				
20	2.1	1.2	.63	.35	.30	1.1	422	19				
21	2.0	1.1	.63	.34	.30	1.6	398	14				
22	1.7	1.0	.62	.34	.30	2.1	304	12				
23	1.5	.98	.61	.34	.30	2.3	240	9.7				
24	1.5	.94	.60	.33	.30	2.3	175	7.3				
25	1.5	.91	.58	.33	.30	2.2	135	7.1				
26	1.5	.85	.57	.33	.30	2.0	100	6.0				
27	1.5	.82	.56	.33	.30	1.9	76	5.9				
28	1.3	.80	.55	.32	.30	1.8	58	5.1				
29	1.2	.76	.54	.32	---	1.7	43	8.2				
30	1.2	.73	.53	.31	---	1.7	32	13				
31	1.0	---	.52	.31	---	1.6	---	12				
TOTAL	50.68	34.97	18.81	11.93	8.55	28.61	2555.1	399.9				
MEAN	1.63	1.17	.61	.38	.31	.92	85.2	12.9				
MAX	2.8	2.2	.70	.50	.31	2.3	422	31				
MIN	.99	.73	.52	.31	.30	.30	1.4	5.1				

CAL YR 1978 TOTAL 3469.45 MEAN 9.51 MAX 210 MIN .00

NOTE.--No gage-height record Dec. 12 to Mar. 18.

04024000 ST. LOUIS RIVER AT SCANLON, MN

LOCATION.--Lat 46°42'12", long 92°25'07", in NW 1/4 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. Water-quality sampling site is at cableway 0.75 mi (1.21 km) downstream.

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 and those for period of no gage-height record, May 3 to June 14, 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).--71 years, 2,301 ft^3/s (65.16 m^3/s), 9.11 in/yr (231 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, 63 ft^3/s (1.78 m^3/s) Aug. 22, 24, 25, 1977; minimum daily, 88 ft^3/s (2.49 m^3/s) Aug. 24, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 34,200 ft^3/s (969 m^3/s) Apr. 23, gage height, 13.93 ft (4.246 m); minimum, 222 ft^3/s (6.29 m^3/s) Sept. 27, gage height 2.22 ft (0.677 m); minimum daily, 328 ft^3/s (9.29 m^3/s) Sept. 27.

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	1520	1450	660	1150	1120	1370	1800	12400	4600	3030	2200	1330
2	1770	1410	1240	1110	1120	1410	1800	10700	4500	2690	2210	1630
3	1770	1560	1110	1200	1120	1420	1820	9600	4300	12700	2510	3070
4	1650	1600	1300	1240	1070	1420	1810	8700	4000	21400	2360	3150
5	1820	1550	1530	1140	1070	1500	1770	7800	3800	17500	2440	2910
6	1880	1590	1410	1100	1070	1480	1700	7000	3500	12300	2520	2900
7	2060	1540	970	1150	1120	1480	1750	6600	3400	8060	2270	2680
8	1840	1520	1400	1200	1080	1500	1500	6800	3800	5510	1870	2250
9	1820	1510	1380	1180	1230	1540	1400	7800	4500	4830	1660	1880
10	1720	1550	1200	1120	1210	1530	1250	12000	5300	5290	1210	1700
11	1740	1440	1320	1200	1140	1430	1280	14000	6200	4560	1170	1780
12	1600	1390	1690	1120	1130	1480	1330	14000	6000	3720	944	1680
13	1590	1410	1610	1090	1200	1510	1420	13000	5300	3080	1040	1570
14	1590	1540	1560	1120	1280	1550	1470	12000	4500	2650	1000	1560
15	1530	1370	1470	1100	1260	1470	1530	11500	4110	2240	840	1400
16	1580	1510	1460	1080	1150	1450	2440	11000	3980	1950	849	1400
17	1600	1390	1490	1100	1110	1500	4540	10500	4110	1660	863	1480
18	1600	1290	1440	1080	1220	1580	8680	8800	4200	1340	805	1590
19	1580	1300	1540	1060	1170	1630	14500	7800	3780	1220	808	1450
20	1460	1340	1430	1170	1100	2110	25400	7000	3430	1230	799	1410
21	1640	1130	1320	1100	1210	2100	29800	7200	3810	1200	878	1310
22	1650	827	1280	1050	1130	1780	32800	7600	4160	1180	877	915
23	1950	955	1370	1070	1170	1760	33700	8300	4270	1140	1080	834
24	1820	1480	1260	1090	1240	1610	32200	8600	3980	1400	979	637
25	1810	1430	1280	1130	1250	1330	29300	7800	3480	3000	961	1320
26	1760	1410	1200	1170	1250	1320	26100	7000	3150	3070	981	738
27	1770	1380	1150	1070	1320	1450	22000	6500	3820	2660	956	328
28	1710	1310	1290	1090	1350	1720	19000	6000	3720	2630	950	359
29	1650	1080	1270	1100	---	1770	17000	5600	3330	2350	1070	371
30	1480	1030	1260	1100	---	1890	14900	5200	3010	2460	1040	658
31	1360	---	1260	1120	---	1790	---	4800	---	2180	986	---
TOTAL	52320	41292	41150	34800	32890	48880	335990	273600	124040	140230	41126	46290
MEAN	1688	1376	1327	1123	1175	1577	11200	8826	4135	4524	1327	1543
MAX	2060	1600	1690	1240	1350	2110	33700	14000	6200	21400	2520	3150
MIN	1360	827	660	1050	1070	1320	1250	4800	3010	1140	799	328
(†)	-669	-714	-854	-677	-674	-627	+2593	+1743	+89	-20	-513	+255
MEAN ‡	1019	662	473	446	501	950	13790	10570	4224	4504	814	1798
CFSM ‡	.30	.19	.14	.13	.15	.28	4.02	3.08	1.23	1.31	.24	.52
IN ‡	.34	.22	.16	.15	.15	.32	4.49	3.55	1.37	1.51	.27	.58

CAL YR 1978	TOTAL 1162072	MEAN 3184	MAX 18000	MIN 660	MEAN ‡ 3026	CFSM ‡ .88	IN ‡ 11.98
WTR YR 1979	TOTAL 1212608	MEAN 3322	MAX 33700	MIN 328	MEAN ‡ 3316	CFSM ‡ .97	IN ‡ 13.13

† 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

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

REMARKS.--Periphyton was collected with plastic strips. Letter K indicates non-ideal colony count. Letters ND indicate not detected.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
OCT										
02...	1345	1900	180	7.7	18.0	15.0	4.0	8.0	80	--
NOV										
15...	0900	1400	165	7.4	--	1.0	4.0	12.6	92	6100
DEC										
18...	1530	1450	170	7.4	-8.0	.5	4.0	13.0	95	480
FEB										
05...	1630	1070	161	7.4	-15.0	.0	1.0	10.5	74	K5100
MAR										
29...	1630	1740	175	7.6	1.0	1.0	4.0	--	--	K960
APR										
30...	1420	14500	93	7.6	8.0	6.0	20	12.1	101	K40
JUN										
11...	1900	6440	100	7.2	19.0	17.0	4.0	9.5	98	K2400
JUL										
23...	1430	1130	146	7.6	24.0	25.0	3.0	6.0	74	24
AUG										
27...	1445	990	165	7.2	25.0	22.0	--	9.6	113	16

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 PERCENT (00932)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY (MG/L AS CACO3) (00410)
OCT										
02...	690	71	14	17	6.9	8.2	20	.4	1.1	57
NOV										
15...	160	68	16	16	6.8	11	26	.6	1.1	52
DEC										
18...	440	68	13	16	6.9	11	26	.6	1.0	55
FEB										
05...	K35	63	6	15	6.3	3.4	10	.2	1.0	57
MAR										
29...	620	80	17	19	8.0	8.4	18	.4	2.3	63
APR										
30...	K20	37	8	8.7	3.7	2.2	11	.2	1.3	29
JUN										
11...	K28	47	13	11	4.8	3.1	12	.2	.8	34
JUL										
23...	47	73	18	17	7.3	3.9	10	.2	.9	55
AUG										
27...	28	--	--	--	--	--	--	--	--	--

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
OCT										
02...	15	9.6	.2	9.3	158	103	.21	811	.08	.01
NOV										
15...	12	10	.1	7.3	140	96	.19	529	.09	.00
DEC										
18...	14	9.2	.1	8.6	137	100	.19	536	.19	.03
FEB										
05...	8.0	3.1	.1	9.8	116	82	.16	335	.31	.04
MAR										
29...	13	7.8	.1	11	139	107	.19	653	.59	.09
APR										
30...	8.9	2.8	.1	6.4	88	52	.12	3450	.20	.02
JUN										
11...	9.4	2.8	.1	5.0	94	57	.13	1630	.11	.01
JUL										
23...	8.9	3.7	.1	7.7	144	84	.20	385	.14	.01
AUG										
27...	--	--	--	--	--	--	--	--	--	--

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N) (00624)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOTAL (MG/L AS NO3) (71887)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT									
02...	.77	.78	.00	.78	.86	3.8	.05	.03	--
NOV									
15...	.64	.64	.00	.64	.73	3.2	.04	.02	22
DEC									
18...	.67	.70	.07	.63	.89	3.9	.03	.00	14
FEB									
05...	.67	.71	.11	.60	1.0	4.5	.03	.01	--
MAR									
29...	.82	.91	.16	.75	1.5	6.6	.06	.04	13
APR									
30...	.75	.77	.08	.69	.97	4.3	.07	.01	--
JUN									
11...	.93	.94	.05	.89	1.1	4.6	.03	.02	26
JUL									
23...	1.1	1.1	.13	.97	1.2	5.5	.06	.04	--
AUG									
27...	--	--	--	--	--	--	--	--	12

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA) (01007)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOVERABLE (UG/L AS CO) (01037)
OCT										
02...	1345	1	1	0	0	2	1	<10	2	0
FEB										
05...	1630	1	1	0	0	0	0	10	2	0
APR										
30...	1420	3	2	0	0	0	0	20	10	1
JUL										
23...	1430	3	2	<100	20	2	2	20	20	3

DATE	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)
OCT										
02...	0	6	3	1600	930	10	10	110	90	<.5
FEB										
05...	0	3	1	1200	660	4	0	50	40	<.5
APR										
30...	0	6	3	2100	470	15	4	90	40	<.5
JUL										
23...	3	4	2	1700	1400	3	2	110	30	<.5

DATE	MERCURY DISSOLVED (UG/L AS HG) (71890)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOVERABLE (UG/L AS AG) (01077)	SILVER, DISSOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C) (00689)
OCT									
02...	<.5	0	0	1	1	10	10	24	1.5
FEB									
05...	<.5	0	0	0	0	30	10	12	.5
APR									
30...	<.5	0	0	0	0	30	0	20	.9
JUL									
23...	<.5	0	0	0	0	30	30	30	.2

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

PESTICIDE ANALYSES, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	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)
NOV										
15...	0900	--	ND	--	ND	--	ND	--	ND	--
MAR										
30...	1030	ND	--	ND	--	ND	--	ND	--	ND
JUN										
11...	1900	ND	ND	ND	ND	ND	ND	ND	ND	ND
AUG										
27...	1445	ND	--	ND	--	ND	--	ND	--	ND

DATE	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG) (39373)	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)
NOV										
15...	ND	--	ND	--	ND	--	ND	--	ND	--
MAR										
30...	--	ND	--	ND	--	ND	--	ND	--	ND
JUN										
11...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AUG										
27...	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG) (39413)	HEPTACHLOR EPOXIDE TOTAL (UG/L) (39420)	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)
NOV										
15...	ND	--	ND	--	ND	--	ND	--	ND	--
MAR										
30...	--	ND	--	ND	--	ND	--	ND	--	ND
JUN										
11...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AUG										
27...	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	METHYL PARATHION, TOT. IN BOTTOM MATL. (UG/KG) (39601)	METHYL TRITHION, TOTAL (UG/L) (39790)	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)
NOV									
15...	ND	--	ND	--	ND	--	ND	--	ND
MAR									
30...	--	ND	--	ND	--	ND	--	ND	--
JUN									
11...	ND	ND	ND	ND	ND	ND	ND	ND	ND
AUG									
27...	--	ND	--	ND	--	ND	--	ND	--

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

DATE TIME	OCT 2,78 1345		NOV 15,78 0900		DEC 18,78 1530		MAR 29,79 1630	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	330	7	*	0	15	2
....FRAGILARIA	--	-	--	-	--	-	20	2
....SYNEDRA	--	-	--	-	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	5	1
...NAVICULACEAE								
....NAVICULA	--	-	44	1	*	0	40	4
...NITZSCHIACEAE								
....NITZSCHIA	*	0	44	1	*	0	20	2
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	34	1	--	-	--	-	660#	69
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	100	11
....APHANIZOMENON	--	-	380	8	--	-	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	2500#	76	3500#	75	6800#	99	--	-
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%

DATE	TIME	LENGTH OF EXPOSURE (DAYS) (00022)	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M (00575)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M (00572)	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2) (70957)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2) (70958)
OCT 02...	1345	42	7.32	4.50	.470	.060
NOV 14...	1330	43	32.9	19.7	2.03	.090
MAR 19...	1100	39	1.26	.870	.070	.000
AUG 27...	1445	35	.950	.710	9.49	3.23

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

PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	OCT 2,78	NOV 15,78	DEC 18,78	MAR 29,79
TIME	1345	0900	1530	1630
TOTAL CELLS/ML	3300	4600	6900	950
DIVERSITY: DIVISION	1.0	0.8	0.1	0.8
.CLASS	1.0	0.8	0.1	0.8
..ORDER	1.1	0.9	0.1	1.5
...FAMILY	1.2	1.5	0.1	1.7
....GENUS	1.4	1.5	0.1	1.8

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	--	-	--	-	--	-
...CHLOROCOCCACEAE								
....CHLOROCOCCUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	*	0	--	-	--	-	--	-
....DICTYOSPHAERIUM	120	4	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	5	1
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	*	0	44	1	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-
....WESTELLA	*	0	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	28	1	--	-	--	-	--	-
....SCENEDESMUS	150	5	89	2	--	-	--	-
..TETRASPORALES								
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	67	1	--	-	15	2
..ZYGNEMATALES								
...ZYGNEMATACEAE								
....MOUGEOTIA	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	41	1	89	2	--	-	60	6
....MELOSIRA	340	10	--	-	--	-	10	1
....STEPHANODISCUS	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	*	0	--	-	--	-
....COCCONEIS	--	-	--	-	*	0	5	1
...CYMBELLACEAE								
....CYMBELLA	--	-	44	1	--	-	--	-

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

PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	APR 30,79	JUN 11,79	JUL 23,79	AUG 27,79
TIME	1420	1900	1430	1445
TOTAL CELLS/ML	1200	920	610	13000
DIVERSITY: DIVISION	1.2	1.0	0.7	0.5
.CLASS	1.2	1.0	0.7	0.5
..ORDER	1.7	1.9	2.1	1.4
...FAMILY	1.7	2.3	2.8	1.4
....GENUS	1.8	2.8	3.1	2.0

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
...CHLOROCOCCACEAE								
....CHLORUCOCCUM	--	-	--	-	52	9	--	-
...MICRACTINIACEAE								
....GOLENKINIA	--	-	39	4	39	6	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	14	1	26	3	91	15	*	0
....DICTYOSPHAERIUM	--	-	150#	17	--	-	--	-
....KIRCHNERIELLA	520#	43	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	*	0
....SELENASTRUM	--	-	26	3	39	6	--	-
....TREUBARIA	--	-	--	-	--	-	*	0
....WESTELLA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	26	4	790	6
..TETRASPORALES								
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	100#	17	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	52	6	170#	28	--	-
..ZYGNEMATALES								
...ZYGNEMATACEAE								
....MOUGEOTIA	190#	15	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	29	2	52	6	26	4	260	2
....MELOSIRA	--	-	--	-	26	4	--	-
....STEPHANODISCUS	--	-	300#	32	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	*	0
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-

DATE TIME	APR 30,79 1420		JUN 11,79 1900		JUL 23,79 1430		AUG 27,79 1445	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	210#	23	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	13	1	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	14	1	13	1	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	14	1	26	3	26	4	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	430#	36	13	1	13	2	3800#	29
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	3500#	27
....APHANIZOMENON	--	-	--	-	--	-	4700#	35
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	*	0
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%

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
OCT						
02...	1345	15.0	1900	20	103	95
NOV						
15...	0920	1.0	1400	119	450	99
DEC						
18...	1530	.5	1450	19	74	92
MAR						
30...	1030	1.0	2060	7	39	77
APR						
21...	1330	3.0	30700	220	18200	77
30...	1450	6.0	14500	52	2040	91
JUN						
11...	1830	17.0	6440	12	209	90
JUL						
23...	1430	25.0	1130	7	21	96
AUG						
27...	1330	22.0	990	11	29	61

04024098 DEER CREEK NEAR HOLYOKE, MN

LOCATION.--Lat 46°31'30", long 92°23'20", in NE 1/4 SE 1/4 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, 383 ft^3/s (10.8 m^3/s) May 10, gage height, 17.11 ft (5.215 m) from rating curve extended above 104 ft^3/s (2.95 m^3/s); minimum, 0.71 ft^3/s (0.020 m^3/s) Jan. 8, gage height, 11.31 ft (3.447 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	1.9	2.2	2.0	1.1	.99	1.2	13	5.5	6.4	2.6	2.3	2.5
2	2.0	2.2	2.0	1.1	1.0	1.2	8.0	5.0	5.8	2.2	2.1	3.1
3	2.0	2.3	2.0	1.0	1.0	1.2	7.8	4.5	4.8	10	1.8	1.9
4	2.1	2.3	1.9	1.0	1.0	1.2	7.8	4.1	3.9	10	1.7	1.7
5	3.0	2.3	1.9	.97	1.0	1.2	7.8	5.0	3.6	4.6	1.8	1.6
6	3.0	2.3	1.9	.96	1.0	1.2	7.2	11	4.3	3.2	1.7	1.5
7	2.6	2.3	1.9	.94	1.0	1.2	6.6	24	14	2.3	1.8	1.3
8	2.3	2.3	1.9	.93	1.0	1.2	6.1	26	7.6	2.1	1.7	1.3
9	2.2	2.2	1.9	.94	1.0	1.2	5.6	51	7.4	2.0	1.7	1.4
10	2.2	3.1	1.9	.94	1.0	1.2	7.5	194	105	2.4	2.0	1.3
11	2.2	3.4	1.8	.94	1.1	1.2	11	39	22	2.0	2.1	15
12	2.2	2.5	1.8	.94	1.1	1.2	18	17	8.7	2.1	2.2	7.1
13	2.3	2.5	1.8	.94	1.1	1.2	24	12	5.6	9.6	2.4	4.1
14	2.2	2.4	1.8	.94	1.1	1.2	37	8.9	4.5	4.1	1.8	2.9
15	2.5	2.3	1.8	.95	1.1	1.2	85	7.2	4.1	2.5	1.8	2.3
16	2.4	2.3	1.8	.95	1.1	1.4	106	6.4	5.0	1.9	1.8	1.9
17	2.4	2.2	1.8	.95	1.1	2.9	120	5.9	10	1.7	1.7	1.7
18	2.4	2.1	1.8	.95	1.1	11	92	5.7	5.2	1.6	1.8	1.6
19	2.3	1.9	1.8	.95	1.1	43	100	5.3	4.0	1.6	1.6	1.5
20	2.3	1.7	1.8	.95	1.1	22	113	5.1	12	1.7	1.5	1.7
21	2.3	1.6	1.8	.96	1.1	13	101	5.4	17	1.5	1.4	1.9
22	2.3	1.6	1.7	.96	1.1	12	80	12	8.1	1.3	1.6	1.8
23	2.3	1.8	1.6	.96	1.1	11	38	16	5.0	1.4	2.8	2.0
24	2.2	1.9	1.6	.96	1.1	9.1	22	9.2	3.7	1.7	1.8	1.9
25	2.3	1.9	1.5	.96	1.1	7.2	16	6.7	3.2	2.2	1.3	1.8
26	2.3	2.0	1.4	.97	1.1	7.2	12	5.4	2.8	2.2	1.3	1.8
27	2.3	2.0	1.4	.98	1.1	6.4	10	4.8	2.6	2.5	1.5	1.9
28	2.3	2.0	1.3	.98	1.1	2.9	8.1	4.0	2.4	2.0	1.6	1.9
29	2.2	2.0	1.3	.98	---	1.5	7.0	3.9	2.5	1.6	3.2	1.9
30	2.2	2.0	1.2	.99	---	32	6.4	4.2	3.9	8.0	1.6	2.0
31	2.4	---	1.2	.99	---	25	---	9.2	---	3.4	1.4	---
TOTAL	71.6	65.6	53.3	30.03	29.79	225.6	1083.9	523.4	295.1	98.0	56.8	76.3
MEAN	2.31	2.19	1.72	.97	1.06	7.28	36.1	16.9	9.84	3.16	1.83	2.54
MAX	3.0	3.4	2.0	1.1	1.1	43	120	194	105	10	3.2	15
MIN	1.9	1.6	1.2	.93	.99	1.2	5.6	3.9	2.4	1.3	1.3	1.3
CFSM	.30	.28	.22	.13	.14	.94	4.65	2.18	1.27	.41	.24	.33
IN.	.34	.31	.26	.14	.14	1.08	5.19	2.51	1.41	.47	.27	.37

CAL YR 1978 TOTAL 2171.70 MEAN 5.95 MAX 142 MIN .94 CFSM .77 IN 10.40
WTR YR 1979 TOTAL 2609.42 MEAN 7.15 MAX 194 MIN .93 CFSM .92 IN 12.49

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, 1,840 mg/L May 10; minimum daily mean, 9 mg/L Sept. 30.
SEDIMENT LOADS: Maximum daily, 1,260 tons (1,140 tonnes) May 10; minimum daily, 0.04 ton (0.04 tonne) many days.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (JTU) (00070)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS, NONCAR-BONATE (MG/L CACO3) (00902)
OCT											
11...	1530	1.0	235	8.0	15.0	11.0	7	10.0	93	130	19

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 PERCENT (00932)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	CAR-BONATE (MG/L AS CO3) (00445)	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)
OCT											
11...	32	11	3.6	6	.1	2.0	0	110	13	3.4	.1

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, TOTAL (MG/L AS N) (00600)	NITRO-GEN, TOTAL (MG/L AS NO3) (71887)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT											
11...	15	167	144	.23	.45	.00	.70	.70	3.1	.03	12

04024098 DEER CREEK NEAR HOLYOKE, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

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	33	.17	12	.07	18	.10	19	.06	15	.04	13	.04
2	48	.26	21	.12	18	.10	19	.06	15	.04	13	.04
3	35	.19	28	.17	18	.10	19	.05	15	.04	13	.04
4	19	.11	16	.10	18	.09	19	.05	15	.04	13	.04
5	15	.12	12	.07	18	.09	19	.05	14	.04	13	.04
6	22	.18	12	.07	18	.09	19	.05	14	.04	13	.04
7	25	.18	11	.07	18	.09	19	.05	14	.04	13	.04
8	23	.14	14	.09	18	.09	18	.05	14	.04	13	.04
9	27	.16	40	.24	18	.09	18	.05	14	.04	13	.04
10	30	.18	12	.10	18	.09	18	.05	14	.04	13	.04
11	18	.11	12	.11	18	.09	18	.05	14	.04	13	.04
12	15	.09	13	.09	18	.09	18	.05	14	.04	13	.04
13	14	.09	18	.12	18	.09	18	.05	13	.04	13	.04
14	32	.19	18	.12	18	.09	18	.05	13	.04	13	.04
15	26	.18	18	.11	18	.09	17	.04	13	.04	13	.04
16	14	.09	18	.11	18	.09	17	.04	13	.04	23	.09
17	14	.09	18	.11	18	.09	17	.04	13	.04	33	.26
18	16	.10	18	.10	18	.09	17	.04	13	.04	226	6.7
19	27	.17	18	.09	18	.09	17	.04	13	.04	482	56
20	14	.09	18	.08	18	.09	17	.04	13	.04	313	19
21	14	.09	18	.08	19	.09	17	.04	13	.04	166	5.8
22	13	.08	18	.08	19	.09	16	.04	13	.04	67	2.2
23	18	.11	18	.09	19	.08	16	.04	13	.04	72	2.1
24	17	.10	18	.09	19	.08	16	.04	13	.04	63	1.5
25	14	.09	18	.09	19	.08	16	.04	13	.04	75	1.5
26	12	.07	18	.10	19	.07	16	.04	13	.04	78	1.5
27	14	.09	18	.10	19	.07	16	.04	13	.04	69	1.2
28	20	.12	18	.10	19	.07	16	.04	13	.04	63	.49
29	46	.27	18	.10	19	.07	15	.04	---	---	52	.21
30	39	.23	18	.10	19	.06	15	.04	---	---	330	29
31	12	.08	---	---	19	.06	15	.04	---	---	190	13
TOTAL	---	4.22	---	3.07	---	2.65	---	1.40	---	1.12	---	141.15
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	76	2.7	41	.61	24	.41	20	.14	25	.16	24	.19
2	44	.95	40	.54	23	.36	20	.12	19	.11	19	.16
3	32	.67	40	.49	23	.30	91	3.6	20	.10	15	.08
4	26	.55	39	.43	23	.24	74	2.2	23	.11	15	.07
5	25	.53	47	.67	18	.17	31	.39	21	.10	14	.06
6	25	.49	233	8.2	32	.54	25	.22	19	.09	14	.06
7	24	.43	558	40	80	3.1	26	.16	17	.08	14	.05
8	22	.36	433	32	34	.70	26	.15	16	.07	13	.05
9	20	.30	854	357	104	7.0	26	.14	15	.07	13	.05
10	24	.49	1840	1260	1160	375	25	.16	13	.07	12	.04
11	32	.95	335	38	188	12	20	.11	17	.10	132	6.5
12	35	1.7	145	6.7	62	1.5	21	.16	13	.08	109	2.0
13	45	2.9	93	3.0	47	.71	85	2.3	17	.11	61	.68
14	160	22	65	1.6	31	.38	36	.40	14	.07	44	.34
15	733	215	47	.91	22	.24	27	.18	18	.09	38	.24
16	856	270	42	.73	44	.87	19	.10	18	.09	32	.16
17	943	347	36	.57	66	1.9	15	.07	18	.08	26	.12
18	656	178	27	.42	25	.35	13	.06	18	.09	20	.09
19	740	245	23	.33	23	.25	12	.05	18	.08	17	.07
20	906	287	21	.29	84	3.2	15	.07	17	.07	14	.06
21	809	249	22	.32	92	4.5	20	.08	17	.06	24	.12
22	723	160	90	4.3	38	.83	13	.05	16	.07	28	.14
23	404	41	82	3.8	27	.36	12	.05	28	.22	20	.11
24	178	11	42	1.0	22	.22	15	.07	25	.12	18	.09
25	63	2.7	27	.49	18	.16	23	.14	17	.06	19	.09
26	53	1.7	23	.34	16	.12	18	.11	14	.05	20	.10
27	47	1.3	18	.23	16	.11	20	.14	12	.05	18	.09
28	44	.96	16	.17	16	.10	17	.09	13	.06	15	.08
29	42	.79	17	.18	22	.15	16	.07	28	.25	12	.06
30	42	.73	23	.27	30	.32	171	5.0	16	.07	9	.05
31	---	---	45	1.1	---	---	48	.46	14	.05	---	---
TOTAL	---	2046.20	---	1764.69	---	416.09	---	17.04	---	2.88	---	12.00

TOTAL LOAD FOR YEAR: 4412.51 .TONS.

04024098 DEER CREEK NEAR HOLYOKE, MN--Continued

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .002 MM (70337)	SED. SUSP. FALL DIAM. % FINER THAN .004 MM (70338)	SED. SUSP. FALL DIAM. % FINER THAN .016 MM (70340)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR									
17...	1800	2.0	208	1480	400	48	59	78	92
MAY									
09...	1840	--	33	1790	203	64	69	87	97
10...	0015	--	371	5470	5450	50	57	74	91

05040500 PELICAN RIVER NEAR FERGUS FALLS, MN

LOCATION.--Lat 46°20'10", long 96°07'10", in NE 1/4 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.--40 years (water years, 1910-12, 1943-79), 79.6 ft^3/s (2.254 m^3/s), 57,670 acre-ft/yr (71.1 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, 610 ft^3/s (17.3 m^3/s) Apr. 18, gage height, 5.08 ft (1.548 m); maximum gage height, 6.49 ft (1.978 m) Apr. 15 (backwater from ice); minimum daily discharge, 1.8 ft^3/s (0.051 m^3/s) Jan. 8-27.

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	21	7.0	6.7	2.8	2.8	5.1	55	238	233	192	173	114
2	19	6.8	6.7	2.5	3.1	5.1	58	235	233	198	166	108
3	19	6.8	6.8	2.2	3.6	5.2	61	233	233	224	161	105
4	19	6.8	6.8	2.1	4.0	5.2	64	232	233	226	154	105
5	18	6.8	6.8	2.1	4.2	5.2	65	236	233	222	150	106
6	17	6.8	6.8	2.0	4.3	5.2	65	245	224	235	146	104
7	15	6.8	6.9	1.9	4.5	5.2	68	257	220	246	142	104
8	15	6.5	6.9	1.8	4.5	5.2	68	261	220	247	137	101
9	14	6.5	6.9	1.8	4.6	5.2	70	260	220	232	135	99
10	14	7.6	7.0	1.8	4.6	5.2	82	261	224	215	133	99
11	13	5.6	7.0	1.8	4.7	5.2	105	263	220	202	128	101
12	13	5.4	7.0	1.8	4.7	5.3	186	265	215	196	126	99
13	13	6.2	7.0	1.8	4.7	5.3	340	264	207	192	125	99
14	12	6.2	7.1	1.8	4.7	5.4	420	264	196	185	124	97
15	12	6.3	7.1	1.8	4.8	5.5	455	253	180	178	122	95
16	11	6.3	7.1	1.8	4.8	5.8	380	246	182	178	120	94
17	11	6.3	7.1	1.8	4.8	6.6	450	246	178	175	120	94
18	11	6.4	7.1	1.8	4.8	11	560	246	172	173	117	95
19	10	6.4	7.1	1.8	4.9	20	450	246	198	170	114	92
20	9.7	6.4	7.1	1.8	4.9	36	385	251	251	166	110	90
21	9.0	6.4	7.1	1.8	4.9	40	348	251	233	163	115	88
22	8.6	6.5	7.1	1.8	5.0	42	313	246	221	157	114	86
23	8.6	6.5	7.0	1.8	5.0	43	286	246	216	155	111	85
24	9.7	6.5	7.0	1.8	5.0	44	267	246	212	167	111	84
25	9.3	6.5	6.7	1.8	5.1	45	271	242	204	166	108	84
26	10	6.6	6.2	1.8	5.1	46	260	242	211	169	111	82
27	12	6.6	5.6	1.6	5.1	47	255	242	203	167	116	82
28	9.3	6.6	4.9	1.9	5.1	48	244	238	197	166	124	81
29	8.2	6.6	4.3	2.0	---	49	242	233	194	165	126	81
30	7.9	6.7	3.7	2.2	---	51	240	238	188	196	122	80
31	7.3	---	3.2	2.4	---	53	---	233	---	181	118	---
TOTAL	386.6	195.4	201.8	60.1	128.3	665.9	7113	7659	6351	5904	3979	2834
MEAN	12.5	6.51	6.51	1.94	4.58	21.5	237	247	212	190	128	94.5
MAX	21	7.6	7.1	2.8	5.1	53	560	265	251	247	173	114
MIN	7.3	5.4	3.2	1.8	2.8	5.1	55	232	172	155	108	80
AC-FT	767	388	400	119	254	1320	14110	15190	12600	11710	7890	5620

CAL YR 1978 TOTAL 32794.8 MEAN 89.8 MAX 430 MIN 3.2 AC-FT 65050
WTR YR 1979 TOTAL 35478.1 MEAN 97.2 MAX 560 MIN 1.8 AC-FT 70370

05045950 ORWELL LAKE NEAR FERGUS FALLS, MN

LOCATION.--Lat 46°12'55", long 96°10'40", in SW 1/4 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, MN.

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, 14,170 acre-ft (17.5 hm^3) Apr. 19, elevation, 1,070.06 ft (326.154 m); minimum, 1,450 acre-ft (1.79 hm^3) Apr. 3, elevation, 1,049.99 ft (320.037 m).

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	1068.09	12090	
Oct. 31	1064.52	9020	-3070
Nov. 30	1063.08	7860	-1160
Dec. 31	1060.65	6170	-1690
CAL YR 1978			-1810
Jan. 31	1057.92	4560	-1610
Feb. 28	1055.69	3510	-1050
Mar. 31	1050.64	1640	-1870
Apr. 30	1065.52	9820	+8180
May 31	1063.05	7840	-1980
June 30	1064.44	8950	+1110
July 31	1062.17	7220	-1730
Aug. 31	1061.40	6680	-540
Sept. 30	1060.50	6080	-600
WTR YR 1979			-6010

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

LOCATION.--Lat 46°12'35", long 96°11'05", in NE 1/4 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.--49 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, 1,110 ft^3/s (31.4 m^3/s) Apr. 17, gage height, 4.11 ft (1.253 m); minimum, 16 ft^3/s (0.45 m^3/s) Oct. 18, gage height, 1.81 ft (0.552 m), result of regulation.

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	195	129	109	104	95	206	507	841	972	903	832	690
2	193	125	110	103	95	202	530	1000	957	903	825	680
3	194	118	110	103	94	201	444	985	959	903	820	677
4	191	116	108	103	94	199	154	980	957	897	816	645
5	191	117	106	103	93	193	50	968	963	915	810	623
6	150	107	107	100	94	201	174	965	963	922	760	618
7	113	100	107	100	94	210	355	959	955	915	737	601
8	114	97	107	100	94	210	465	961	941	908	709	587
9	113	94	104	100	103	210	284	963	929	900	693	582
10	113	92	101	100	114	205	51	959	910	699	695	581
11	113	93	101	97	114	195	62	965	902	912	696	582
12	113	92	102	97	114	200	64	964	898	906	696	576
13	113	91	103	97	114	200	62	968	879	895	697	576
14	113	92	103	97	114	195	64	949	888	888	695	576
15	114	104	102	97	114	181	191	977	896	872	666	567
16	115	121	103	97	114	182	450	972	899	772	645	565
17	141	120	102	97	125	243	831	969	892	686	645	537
18	103	120	100	97	135	300	1110	968	886	691	644	509
19	155	121	100	97	135	295	1100	960	881	691	645	511
20	153	117	103	97	154	312	1100	959	897	697	647	511
21	153	113	103	97	154	341	1090	952	909	700	656	511
22	152	113	103	97	162	405	1090	960	922	705	656	503
23	141	113	103	97	225	469	1090	965	915	710	615	502
24	140	112	102	95	207	469	1050	973	909	710	664	480
25	140	110	101	95	180	449	1070	979	909	703	663	460
26	134	110	103	98	175	435	1060	986	903	720	665	451
27	137	111	104	97	192	423	1050	998	903	722	687	457
28	137	110	103	95	210	418	1040	1000	915	725	704	457
29	137	107	103	97	---	416	1030	1020	909	726	688	457
30	130	107	103	95	---	488	1010	1040	909	791	692	457
31	126	---	105	95	---	519	---	1040	---	837	693	---
TOTAL	4327	3272	3221	3044	3708	9172	18628	30145	27527	24924	21756	16529
MEAN	140	109	104	98.2	132	296	621	972	918	804	702	551
MAX	195	129	110	104	225	519	1110	1040	972	922	832	690
MIN	103	91	100	95	93	181	50	841	879	686	615	451
AC-FT	8580	6490	6390	6040	7350	18190	36950	59790	54600	49440	43150	32790

CAL YR 1978 TOTAL 130005 MEAN 356 MAX 984 MIN 23 AC-FT 257900
WTR YR 1979 TOTAL 166253 MEAN 455 MAX 1110 MIN 50 AC-FT 329800

05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, SD

LOCATION.--Lat 45°51'45", long 96°34'25", in SW 1/4 SW 1/4 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.--38 years, 81.6 ft^3/s (2.311 m^3/s), 59,120 acre-ft/yr (72.9 hm^3/yr); median of yearly mean discharges, 54.0 ft^3/s (1.529 m^3/s), 39,120 acre-ft/yr (48.3 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, 1,030 ft^3/s (29.2 m^3/s) May 4, gage height, 10.15 ft (3.094 m); no flow for many days.

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	3.4	2.4	2.0	1.3	.09	.00	4.2	857	863	716	119	39
2	2.1	2.0	2.0	1.2	.02	.00	9.0	917	858	722	119	38
3	2.4	1.8	2.0	1.1	.00	.00	12	992	854	756	120	37
4	3.4	3.8	2.0	.94	.00	.00	15	1020	850	746	119	36
5	1.7	1.6	2.0	.87	.00	.00	18	1010	812	728	116	35
6	2.0	1.7	2.0	.80	.00	.00	20	1010	824	715	111	35
7	2.6	1.7	2.0	.76	.00	.00	23	1000	817	700	114	22
8	5.8	1.6	2.0	.70	.00	.00	26	997	808	679	113	.48
9	3.2	.92	2.0	.65	.00	.00	29	995	806	468	114	.00
10	4.2	.85	2.0	.64	.00	.00	33	990	801	150	114	.00
11	4.5	.96	2.0	.64	.00	.00	47	985	754	120	113	.00
12	3.4	1.4	2.0	.64	.00	.00	60	975	733	119	112	.05
13	3.4	2.6	2.0	.63	.00	.00	68	967	727	169	114	.00
14	3.9	2.1	2.0	.63	.00	.00	72	959	723	225	114	.00
15	2.8	2.1	2.0	.63	.00	.01	80	949	610	228	112	.00
16	4.8	2.1	2.0	.63	.00	.03	88	930	506	222	109	.00
17	4.1	2.1	2.1	.63	.00	.08	99	940	501	218	109	.00
18	2.7	2.1	2.1	.63	.00	.20	110	936	421	214	111	.00
19	3.7	2.1	2.1	.62	.00	.29	120	929	348	212	111	.00
20	4.1	2.1	2.1	.62	.00	.50	180	925	395	211	111	.00
21	3.2	2.0	2.1	.62	.00	.80	240	918	492	210	110	.00
22	2.0	2.0	2.1	.61	.00	1.5	260	917	590	209	112	.00
23	5.3	2.0	2.0	.58	.00	2.0	332	909	644	213	112	.00
24	4.8	2.0	1.9	.52	.00	2.2	485	902	694	216	110	.00
25	1.8	2.0	1.8	.47	.00	2.4	612	893	729	163	110	.00
26	2.7	2.0	1.7	.42	.00	2.6	746	890	754	121	111	.00
27	2.4	2.0	1.6	.37	.00	2.8	770	882	745	123	88	.00
28	2.9	2.0	1.6	.32	.00	3.0	757	874	742	126	50	.00
29	5.0	2.0	1.5	.27	---	3.1	758	871	736	137	42	.00
30	2.9	2.0	1.5	.22	---	3.3	773	873	729	139	40	.00
31	2.4	---	1.4	.18	---	3.7	---	864	---	128	38	---
TOTAL	103.6	58.03	59.6	19.84	.11	28.51	6846.2	29076	20866	10103	3198	242.53
MEAN	3.34	1.93	1.92	.64	.004	.92	228	938	696	326	103	8.08
MAX	5.8	3.8	2.1	1.3	.09	3.7	773	1020	863	756	120	39
MIN	1.7	.85	1.4	.18	.00	.00	4.2	857	348	119	38	.00
AC-FT	205	115	118	39	.2	57	13580	57670	41390	20040	6340	481

CAL YR 1978 TOTAL 73715.83 MEAN 202 MAX 923 MIN .00 AC-FT 146200
WTR YR 1979 TOTAL 70601.42 MEAN 193 MAX 1020 MIN .00 AC-FT 140000

05051500 RED RIVER OF THE NORTH AT WAHPETON, ND

LOCATION.--Lat 46°15'55", long 96°35'40", in NE¼ 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 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.--36 years (1943-79), 538 ft^3/s (15.24 m^3/s), 389,800 acre-ft/yr (481 hm^3/yr); median of yearly mean discharges, 500 ft^3/s (14.2 m^3/s), 362,000 acre-ft/yr (446 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, 7,050 ft^3/s (200 m^3/s) Apr. 14, gage height, 15.44 ft (4.706 m), backwater from ice; minimum, 85 ft^3/s (2.41 m^3/s) Oct. 11, gage height, 3.16 ft (0.963 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	213	136	120	105	100	160	620	1930	1900	1740	980	742
2	206	134	120	105	100	180	660	1880	1880	1700	980	742
3	205	134	120	105	100	230	800	1930	1840	1720	973	742
4	204	136	120	105	100	240	1000	2050	1820	1800	973	734
5	200	126	120	105	100	250	1500	2150	1810	1800	959	714
6	203	125	120	105	102	250	1450	2160	1790	1740	942	678
7	179	121	120	105	105	250	1360	2150	1760	1720	912	674
8	113	109	120	105	105	250	1380	2120	1740	1690	861	662
9	91	108	120	105	105	250	1500	2090	1720	1670	834	642
10	90	119	120	105	105	260	2000	2040	1700	1520	808	634
11	88	114	120	105	108	270	2800	2050	1680	1080	805	626
12	90	126	120	105	110	270	4140	2050	1600	985	799	622
13	94	114	120	105	112	250	6230	2040	1600	1060	813	614
14	97	103	120	105	105	250	7000	1980	1570	1100	807	610
15	100	102	120	105	100	240	6830	1950	1540	1120	804	610
16	103	100	120	105	100	240	6180	1940	1470	1120	796	602
17	99	100	120	105	100	260	5560	1940	1390	1080	769	594
18	126	100	120	105	100	270	5510	1930	1350	975	761	578
19	117	100	120	105	100	280	6640	1930	1330	940	758	546
20	134	100	105	105	100	270	5980	1920	1630	935	764	538
21	155	109	105	105	100	250	5250	1920	2380	935	772	542
22	158	120	105	105	100	360	4480	1920	2560	935	781	542
23	164	125	105	105	100	360	3580	1920	2290	980	782	538
24	157	125	105	105	100	400	2670	1920	1990	1010	746	514
25	148	125	105	103	100	450	2200	1920	1830	980	762	486
26	151	125	105	103	100	480	2040	1910	1750	980	774	502
27	145	125	105	102	100	520	2040	1910	1730	922	778	490
28	144	125	105	100	120	560	2010	1910	1720	898	790	498
29	145	125	105	100	---	580	1970	1910	1740	890	786	506
30	134	125	105	100	---	580	1960	1910	1780	935	754	506
31	140	---	105	100	---	600	---	1910	---	940	754	---
TOTAL	4393	3536	3540	3228	2877	10060	97340	61290	52890	37900	25577	18028
MEAN	142	118	114	104	103	325	3245	1977	1763	1223	825	601
MAX	213	136	120	105	120	600	7000	2160	2560	1800	980	742
MIN	88	100	105	100	100	160	620	1880	1330	890	746	486
AC-FT	8710	7010	7020	6400	5710	19950	193100	121600	104900	75170	50730	35760

CAL YR 1978 TOTAL 314959.6 MEAN 863 MAX 6190 MIN 9.6 AC-FT 624700
WTR YR 1979 TOTAL 320659.0 MEAN 879 MAX 7000 MIN 88 AC-FT 636000

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, MN, Hydrologic Unit 09020104, on right bank 60 ft (18 m) downstream from bridge on township road, and 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 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.

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 9,600 ft^3/s (272 m^3/s) Apr. 18, gage height, 33.03 ft (10.068 m); minimum daily, 97 ft^3/s (2.75 m^3/s) Oct. 12, 13.

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	222	130	125	105	100	120	580	2270	1870	1780	1110	760
2	220	128	122	105	100	160	590	2160	1860	1770	1060	752
3	208	128	120	105	100	230	610	2070	1850	1750	1060	744
4	204	128	120	105	100	230	730	1960	1830	1750	1040	748
5	200	125	120	105	100	220	1000	2040	1800	1770	1040	740
6	196	124	120	105	100	230	1250	2130	1790	1810	1030	732
7	192	124	120	105	100	240	1530	2210	1760	1790	988	696
8	200	124	120	105	102	240	1520	2230	1730	1750	964	684
9	188	124	120	105	105	250	1390	2220	1710	1720	916	684
10	136	124	120	105	105	250	1350	2180	1710	1690	888	660
11	108	124	120	105	105	250	1670	2130	1700	1600	852	652
12	97	120	120	105	105	260	2390	2080	1680	1360	845	632
13	97	120	120	105	108	270	3360	2060	1650	1240	840	620
14	100	115	120	105	110	250	4450	2040	1590	1110	832	616
15	100	110	120	105	110	250	5830	2010	1550	1120	832	616
16	108	105	120	105	105	255	7420	1980	1520	1140	824	616
17	104	102	120	105	100	260	9000	1960	1480	1140	818	620
18	108	100	120	105	100	260	9550	1950	1400	1130	796	600
19	120	100	120	105	100	270	9160	1940	1360	1030	772	584
20	124	100	120	105	100	280	8610	1940	1360	992	768	564
21	132	100	120	105	100	300	7980	1920	1430	980	764	544
22	128	110	105	105	100	320	7720	1910	1910	980	788	540
23	140	120	105	105	100	380	6380	1910	2380	980	868	540
24	144	122	105	105	100	420	5640	1910	2470	1030	900	540
25	144	125	105	105	100	440	4750	1900	2270	1080	832	540
26	144	125	105	105	100	450	4030	1890	2010	1080	780	496
27	140	125	105	104	100	460	3240	1880	1830	1060	784	496
28	136	125	105	103	100	500	2750	1870	1770	996	788	492
29	136	125	105	102	---	540	2540	1880	1760	1000	792	492
30	128	125	105	100	---	580	2380	1890	1760	1010	788	492
31	132	---	105	100	---	580	---	1880	---	1140	776	---
TOTAL	4536	3557	3577	3239	2855	9745	119400	62400	52790	40778	27135	18492
MEAN	146	119	115	104	102	314	3980	2013	1760	1315	875	616
MAX	222	130	125	105	110	580	9550	2270	2470	1810	1110	760
MIN	97	100	105	100	100	120	580	1870	1360	980	764	492
AC-FT	9000	7060	7090	6420	5660	19330	236800	123800	104700	80880	53820	36680

CAL YR 1978 TOTAL 331482 MEAN 908 MAX 8920 MIN 37 AC-FT 657500
WTR YR 1979 TOTAL 348504 MEAN 955 MAX 9550 MIN 97 AC-FT 691300

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

WATER-QUALITY RECORDS

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

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

REMARKS.--No record Sept. 1-30.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,900 micromhos Jan. 27, 1977; minimum daily, 190 micromhos Mar. 28, 1978.
WATER TEMPERATURES: Maximum daily, 30°C July 23, 1977; minimum daily, 0.0°C on many days during winter months.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 800 micromhos Feb. 26; minimum daily, 220 micromhos Apr. 12.
WATER TEMPERATURES: Maximum observed, 26.5°C July 12, 21, 24; minimum daily, 0.0°C on many days during winter months.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE (DEG C) (00010)	COLOR (PLATINUM-COBALT UNITS) (00080)	TURBIDITY (NTU) (00076)	OXYGEN, DISSOLVED (MG/L) (00300)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)
OCT											
26...	1230	143	541	8.3	7.5	20	7.0	9.1	270	--	51
DEC											
01...	1445	125	750	8.1	.0	6	2.0	6.8	300	43	57
19...	1200	121	620	8.0	.0	7	1.9	11.6	300	51	58
JAN											
25...	1600	107	690	7.8	.5	5	3.0	10.4	370	57	71
MAR											
09...	1245	250	610	7.7	.5	24	2.6	.6	290	23	58
23...	1030	580	520	8.0	.5	12	3.5	8.8	260	53	54
APR											
16...	1745	7840	350	--	1.0	--	--	--	--	--	--
20...	1400	8580	390	7.6	6.5	90	66	11.4	170	93	41
22...	2015	6890	445	--	10.0	--	--	--	--	--	--
26...	1340	3840	520	--	10.5	--	--	--	--	--	--
MAY											
02...	1745	2110	600	--	8.0	--	--	--	--	--	--
JUN											
07...	1030	1770	580	8.3	19.0	20	35	6.6	270	100	55
28...	1930	1770	--	--	22.5	--	--	--	--	--	--
29...	1930	1780	620	8.2	22.5	35	42	6.6	280	96	53
AUG											
01...	1015	1170	405	8.2	23.5	520	2.0	6.4	220	51	44
SEP											
05...	1240	741	413	8.4	22.5	20	56	7.6	<200	7	36

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	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)
OCT											
26...	35	14	10	.4	5.2	230	59	7.9	.2	5.0	332
DEC											
01...	39	16	10	.4	5.7	260	56	9.5	.2	6.0	366
19...	38	15	10	.4	5.2	270	58	9.2	.1	7.9	377
JAN											
25...	46	17	9	.4	5.5	310	54	12	.2	19	408
MAR											
09...	36	16	10	.4	6.0	270	46	9.7	.2	18	368
23...	31	16	11	.4	5.2	230	40	15	.2	16	313
APR											
16...	--	--	--	--	--	--	--	--	--	--	--
20...	16	7.6	9	.3	6.3	76	90	4.8	.2	14	249
22...	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--
MAY											
02...	--	--	--	--	--	--	--	--	--	--	--
JUN											
07...	33	19	13	.5	6.8	170	130	9.4	.2	5.1	396
28...	--	--	--	--	--	--	--	--	--	--	--
29...	35	21	14	.6	6.3	180	140	9.4	.2	14	415
AUG											
01...	27	11	17	.3	4.7	170	59	5.5	.2	17	287
SEP											
05...	26	9.0	9	.3	3.8	190	33	5.0	.2	9.0	251

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

DATE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	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, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, TOTAL (MG/L AS N) (00600)	NITRO-GEN, TOTAL (MG/L AS NO3) (71887)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)
OCT											
26...	--	.45	128	.01	.00	.01	.78	.79	.80	3.5	.10
DEC											
01...	--	.50	124	.02	.20	.01	.67	.68	.70	3.1	.05
19...	354	.51	123	.04	.04	.01	.70	.71	.75	3.3	.07
JAN											
25...	413	.55	118	.34	.34	.66	.74	1.4	1.7	7.7	.19
MAR											
09...	352	.50	248	.01	.02	.30	1.0	1.3	1.3	5.8	.15
23...	319	.43	321	.60	.64	.49	.71	1.2	1.8	8.0	.22
APR											
16...	--	--	--	--	--	--	--	--	--	--	--
20...	236	.34	5770	2.3	2.2	.27	1.1	1.4	3.7	16	.39
22...	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--
MAY											
02...	--	--	--	--	--	--	--	--	--	--	--
JUN											
07...	361	.54	1890	.47	.07	.05	1.2	1.2	1.7	7.4	.18
28...	--	--	--	--	--	--	--	--	--	--	--
29...	388	.56	1990	.25	.27	.03	1.2	1.2	1.5	6.4	.31
AUG											
01...	272	.39	907	.25	.24	.03	1.5	1.5	1.8	7.7	.16
SEP											
05...	237	.34	502	.03	.02	.02	.98	1.0	1.0	4.6	.14

DATE	PHOS-PHATE, TOTAL (MG/L AS PO4) (00650)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOS-PHORUS, HYDRO-LYZABLE TOTAL (MG/L AS P) (00669)	PHOS-PHORUS, ORGANIC TOTAL (MG/L AS P) (00670)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)
OCT										
26...	--	.05	.06	.01	.03	20	3	80	100	--
DEC										
01...	--	.11	.06	.00	.02	--	--	--	110	--
19...	--	.05	.03	.01	.03	--	--	--	120	--
JAN										
25...	--	.17	.17	.02	.00	--	--	--	90	--
MAR										
09...	--	.03	.04	--	--	--	--	--	110	--
23...	--	.19	.18	.02	.02	--	--	--	90	--
APR										
16...	--	--	--	--	--	--	--	--	--	--
20...	1.2	.28	.27	.09	.03	0	5	40	80	<1
22...	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--
MAY										
02...	--	--	--	--	--	--	--	--	--	--
JUN										
07...	.18	.08	.06	.04	.08	--	--	--	100	--
28...	--	--	--	--	--	--	--	--	--	--
29...	.37	.13	.12	.12	.07	--	--	--	100	--
AUG										
01...	.43	.15	.14	.01	.01	--	--	--	70	--
SEP										
05...	.18	.09	.06	.04	.04	0	3	80	70	<1

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

DATE	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
OCT											
26...	30	<1	2	20	--	20	6	.0	3	3	0
DEC											
01...	--	--	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--	--	--
JAN											
25...	--	--	--	--	--	--	--	--	--	--	--
MAR											
09...	--	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--	--
APR											
20...	0	<3	5	40	0	20	30	11	<10	11	1
JUN											
07...	--	--	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--	--	--
AUG											
01...	--	--	--	--	--	--	--	--	--	--	--
SEP											
05...	0	<3	2	<10	0	10	2	.1	<10	2	0

DATE	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	VANA-DIUM, DIS-SOLVED (UG/L AS V) (01085)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	CYANIDE TOTAL (MG/L AS CN) (00720)	PHENOLS (UG/L) (32730)	PCB, TOTAL (UG/L) (39516)	ALDRIN, TOTAL (UG/L) (39330)	CHLOR-DANE, TOTAL (UG/L) (39350)	DDD, TOTAL (UG/L) (39360)
OCT											
26...	190	.0	<3	8.9	.9	.00	0	.0	.00	.0	.00
DEC											
01...	--	--	--	9.8	--	--	7	--	--	--	--
19...	--	--	--	8.6	.6	--	1	--	--	--	--
JAN											
25...	--	--	--	8.3	--	--	1	--	--	--	--
MAR											
09...	--	--	--	8.8	2.0	--	6	--	--	--	--
23...	--	--	--	9.8	1.1	--	5	--	--	--	--
APR											
20...	170	4.0	10	11	3.1	.00	2	.0	.00	.0	.00
JUN											
07...	--	--	--	13	2.0	--	3	.0	.00	.0	.00
29...	--	--	--	14	--	--	1	--	--	--	--
AUG											
01...	--	--	--	14	5.4	--	0	--	--	--	--
SEP											
05...	<10	<1.0	140	8.1	1.6	.00	3	.0	.00	.0	.00

DATE	DDE, TOTAL (UG/L) (39365)	DDT, TOTAL (UG/L) (39370)	DI-AZINON, TOTAL (UG/L) (39570)	DI-ELDRIN TOTAL (UG/L) (39380)	ENDO-SULFAN, TOTAL (UG/L) (39388)	ENDRIN, TOTAL (UG/L) (39390)	ETHION, TOTAL (UG/L) (39398)	HEPTA-CHLOR, TOTAL (UG/L) (39410)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L) (39420)	LINDANE TOTAL (UG/L) (39340)	MALA-THION, TOTAL (UG/L) (39530)
OCT											
26...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
DEC											
01...	--	--	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--	--	--
JAN											
25...	--	--	--	--	--	--	--	--	--	--	--
MAR											
09...	--	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--	--
APR											
20...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
JUN											
07...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
29...	--	--	--	--	--	--	--	--	--	--	--
AUG											
01...	--	--	--	--	--	--	--	--	--	--	--
SEP											
05...	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

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

DATE	METHOXYCHLOR, TOTAL (UG/L) (39480)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOTAL (UG/L) (39790)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L) (39250)	MIREX, TOTAL (UG/L) (39755)	PARATHION, TOTAL (UG/L) (39540)	PERTHANE TOTAL (UG/L) (39034)	TOXAPHENE, TOTAL (UG/L) (39400)	TOTAL TRITHION (UG/L) (39786)	2,4-D, TOTAL (UG/L) (39730)	2,4,5-T TOTAL (UG/L) (39740)
OCT											
26...	--	.00	.00	.00	.00	.00	.00	0	.00	.02	.00
DEC											
01...	--	--	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--	--	--
JAN											
25...	--	--	--	--	--	--	--	--	--	--	--
MAR											
09...	--	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--	--
APR											
20...	--	.00	.00	--	.00	.00	.00	0	.00	.08	.00
26...	--	--	--	--	--	--	--	--	--	--	--
JUN											
07...	--	.00	.00	--	.00	.00	.00	0	.00	.06	.00
28...	--	--	--	--	--	--	--	--	--	--	--
AUG											
01...	--	--	--	--	--	--	--	--	--	.15	.00
SEP											
05...	.00	.00	.00	--	.00	.00	.00	0	.00	.00	.00

DATE	SILVEX, TOTAL (UG/L) (39760)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	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)	SED. SUSP. SIEVE DIAM. % FINER THAN 2.00 MM (70336)
OCT											
26...	.00	22	8.5	--	--	--	--	--	--	--	--
DEC											
01...	--	8	2.7	--	--	--	--	--	--	--	--
19...	--	6	2.0	--	--	--	--	--	--	--	--
JAN											
25...	--	3	.87	--	--	--	--	--	--	--	--
MAR											
09...	--	4	2.7	--	--	--	--	--	--	--	--
23...	--	4	4.1	--	--	--	--	--	--	--	--
APR											
20...	.00	108	2500	87	98	100	--	--	--	--	--
26...	--	105	1090	66	91	94	95	98	98	99	100
JUN											
07...	.00	124	593	--	--	--	--	--	--	--	--
28...	--	139	664	--	--	--	--	--	--	--	--
AUG											
01...	.00	271	856	--	--	--	--	--	--	--	--
SEP											
05...	.00	110	220	--	--	--	--	--	--	--	--

DATE	BED MAT. SIEVE DIAM. % FINER THAN .062 MM (80164)	BED MAT. SIEVE DIAM. % FINER THAN .125 MM (80165)	BED MAT. SIEVE DIAM. % FINER THAN .250 MM (80166)	BED MAT. SIEVE DIAM. % FINER THAN .500 MM (80167)	BED MAT. SIEVE DIAM. % FINER THAN 1.00 MM (80168)	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM (80169)	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM (80170)	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM (80171)	BED MAT. SIEVE DIAM. % FINER THAN 16.0 MM (80172)	BED MAT. SIEVE DIAM. % FINER THAN 32.0 MM (80173)
OCT										
26...	--	--	--	--	--	--	--	--	--	--
DEC										
01...	--	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--	--
JAN										
25...	--	--	--	--	--	--	--	--	--	--
MAR										
09...	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--
APR										
20...	68	69	72	74	74	80	84	89	93	100
26...	27	28	29	38	47	65	82	92	100	--
JUN										
07...	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--
AUG										
01...	--	--	--	--	--	--	--	--	--	--
SEP										
05...	--	--	--	--	--	--	--	--	--	--

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	540	600	610	640	710	---	520	530	---	440	
2	470	540	500	600	600	700	480	510	570	600	470	
3	470	560	---	650	690	660	500	500	---	600	470	
4	480	540	540	675	---	---	500	540	580	600	470	
5	450	---	580	650	650	650	560	500	590	590	---	
6	460	550	580	670	660	650	480	---	600	580	470	
7	500	560	625	---	620	650	430	480	590	600	470	
8	---	550	650	725	625	610	---	500	600	---	470	
9	500	540	650	700	650	610	445	520	590	600	470	
10	500	540	---	700	650	580	400	520	---	610	480	
11	500	480	625	650	---	---	460	490	625	600	470	
12	480	---	625	700	675	600	220	540	600	600	---	
13	490	550	650	700	700	590	340	---	560	550	480	
14	480	560	610	---	675	560	320	540	625	500	480	
15	---	590	650	685	700	570	---	530	625	---	470	
16	520	600	630	680	720	560	320	520	630	490	475	
17	560	560	---	650	675	520	320	520	---	500	460	
18	600	520	620	700	---	---	350	520	620	500	470	
19	600	---	625	700	700	550	360	520	600	500	---	
20	560	560	600	690	675	520	380	---	580	550	480	
21	550	580	600	---	600	540	390	520	570	530	460	
22	---	560	590	700	650	520	---	510	560	---	470	
23	550	650	590	700	650	520	450	520	420	510	455	
24	560	700	---	690	620	490	480	520	---	500	450	
25	550	650	580	690	---	---	490	510	540	500	450	
26	540	---	590	670	800	460	500	520	---	500	---	
27	540	625	610	660	790	500	540	---	600	500	480	
28	520	660	600	---	725	500	560	525	600	500	480	
29	---	650	600	650	---	500	---	540	620	---	480	
30	520	625	650	650	---	480	530	540	625	490	470	
31	540	---	---	650	---	500	---	550	---	470	460	

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	7.0	.5	.5	.5	.5	---	8.0	17.0	---	23.5	
2	14.5	7.0	.5	.5	.5	.5	.0	8.5	17.0	24.5	24.5	
3	13.0	7.5	---	.5	.0	.5	.0	9.5	---	24.0	24.5	
4	13.0	7.0	.5	.5	---	---	1.0	9.0	18.5	24.5	25.0	
5	12.0	---	.5	.5	.5	.5	.5	9.0	20.0	24.5	---	
6	11.5	6.0	.5	.5	.5	.5	.0	---	19.0	23.5	25.0	
7	11.5	6.0	.5	---	.5	.5	.5	11.0	18.0	22.5	25.0	
8	---	7.0	.5	1.0	.5	1.0	---	10.0	19.0	---	26.0	
9	12.0	6.0	.5	.5	.5	.0	3.0	9.0	17.5	23.5	25.5	
10	12.0	4.0	---	.5	.0	.0	1.0	8.5	---	25.5	24.5	
11	12.0	2.0	.5	.5	---	---	3.0	8.5	19.5	26.0	23.5	
12	11.0	---	.5	.5	.0	.5	3.0	8.5	20.5	26.5	---	
13	10.0	1.0	1.5	.5	.5	.0	1.0	---	21.5	26.0	21.0	
14	10.0	1.0	.5	---	.5	.5	2.5	11.5	23.5	25.5	20.5	
15	---	1.5	.5	.5	.5	.5	---	12.5	23.0	---	20.5	
16	9.0	.5	.5	.5	.5	.5	2.5	15.5	22.5	24.0	19.0	
17	8.5	.5	---	.5	.5	.0	6.0	15.5	---	24.0	20.5	
18	8.5	1.0	.5	.5	---	---	9.5	15.5	21.5	24.0	21.5	
19	9.5	---	.5	.5	.5	.5	5.5	14.5	20.0	25.0	---	
20	10.0	1.0	.5	.5	.5	1.0	8.0	---	20.0	26.0	22.0	
21	10.0	.5	.5	---	.5	1.0	9.0	14.5	19.0	26.5	22.0	
22	---	.0	.5	.5	.5	1.0	---	14.0	18.0	---	22.0	
23	8.0	.5	.5	.5	.5	.0	11.0	15.0	17.5	26.0	20.0	
24	9.0	1.0	---	.5	.5	.0	10.0	16.0	---	26.5	20.0	
25	8.0	.5	.5	.5	---	---	10.0	16.0	20.5	26.0	20.0	
26	8.0	---	.0	.5	.5	.0	9.0	16.5	---	25.0	---	
27	8.0	.5	.0	.5	.5	.0	8.5	---	22.5	24.5	20.5	
28	7.0	.5	.0	---	.5	.0	8.0	20.0	22.5	25.0	21.0	
29	---	.5	.5	.5	---	.5	---	19.5	23.0	---	21.0	
30	7.0	.5	.5	.5	---	.5	8.0	17.5	24.0	23.0	21.0	
31	7.0	---	---	.5	---	1.0	---	17.5	---	23.0	22.5	

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).--78 years, 559 ft^3/s (15.83 m^3/s), 405,000 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, 17,300 ft^3/s (490 m^3/s) Apr. 19, gage height, 34.93 ft (10.647 m); minimum daily, 75 ft^3/s (2.12 m^3/s) Nov. 18-22; minimum gage height, 13.54 ft (4.127 m) Nov. 17.

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	275	144	110	100	90	90	575	3520	2080	1920	1620	819
2	255	140	105	100	90	110	555	3290	2070	1940	1570	799
3	247	140	100	100	90	160	570	3180	2070	1910	1440	780
4	240	140	100	100	90	240	670	3140	2040	1890	1330	760
5	226	136	100	100	95	240	860	3140	2010	1900	1250	750
6	222	132	100	100	100	240	1200	3150	1990	1920	1210	738
7	217	132	100	100	100	230	1500	3150	1960	1910	1180	721
8	215	128	100	100	95	240	1600	3160	1930	1890	1140	688
9	207	118	100	100	95	240	1600	3090	1900	1850	1090	682
10	182	121	100	100	100	250	1610	2920	1910	1830	1030	677
11	136	121	100	100	105	250	1750	2780	1890	1790	973	679
12	108	121	100	100	105	250	2500	2660	1880	1640	948	653
13	101	114	100	100	100	260	3850	2570	1850	1320	913	639
14	97	108	100	100	90	250	5500	2500	1820	1180	901	627
15	94	101	100	100	90	250	7730	2440	1770	1200	892	623
16	97	85	100	100	90	250	10600	2390	1730	1220	877	621
17	94	76	100	100	90	250	13800	2350	1710	1240	881	618
18	94	75	100	100	90	240	16500	2300	1660	1240	862	613
19	91	75	100	100	90	240	17200	2270	1640	1190	833	604
20	94	75	100	100	90	140	16800	2240	1610	1100	801	595
21	108	75	100	100	90	140	15900	2200	1610	1040	808	578
22	114	75	100	100	90	175	14700	2180	1820	1020	820	561
23	118	90	100	100	90	205	13300	2170	2220	1100	862	562
24	136	95	100	100	90	275	12100	2160	2420	1090	979	552
25	140	100	100	95	90	340	10500	2160	2370	1130	987	555
26	148	110	100	90	90	360	8900	2150	2190	1200	900	543
27	148	110	100	90	90	360	6900	2140	2020	1280	839	515
28	148	110	100	90	90	390	5400	2110	2070	1390	852	497
29	152	110	100	90	---	450	4450	2120	1960	1320	863	497
30	144	110	100	90	---	550	3910	2140	1930	1260	865	500
31	144	---	100	90	---	580	---	2100	---	1370	857	---
TOTAL	4792	3267	3115	3035	2605	8245	203030	79870	58130	45280	31373	19046
MEAN	155	109	100	97.9	93.0	266	6768	2576	1938	1461	1012	635
MAX	275	144	110	100	105	580	17200	3520	2420	1940	1620	819
MIN	91	75	100	90	90	90	555	2100	1610	1020	801	497
AC-FT	9500	6480	6180	6020	5170	16350	402700	158400	115300	89810	62230	37780
(+)	964	959	1026	1028	1144	1124	1024	1060	1208	1220	1180	1260
MEAN*	171	125	117	115	114	284	6785	2593	1958	1481	1031	656
AC-FT*	10460	7440	7210	7050	6310	17470	403700	159500	116500	91030	63410	39040

		OBSERVED						ADJUSTED	
CAL YR 1978	TOTAL	435241	MEAN 1192	MAX 17000	MIN 27	AC-FT 863300		MEAN 1210	AC-FT 875660
WTR YR 1979	TOTAL	461788	MEAN 1265	MAX 17200	MIN 75	AC-FT 916000		MEAN 1283	AC-FT 929120

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

05054020 RED RIVER OF THE NORTH BELOW FARGO, ND
(National stream-quality accounting network station)
(Radiochemical Station)

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 mi² (17,660 km²), approximately.

PERIOD OF RECORD.--Water years 1969 to March 1978, July 1978 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. Interruptions in the record were due to malfunctions of the instrument. Water-quality monitor discontinued March 1978. Daily measurements of specific conductance and temperature resumed by observer July 1978 to current year.

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, 965 micromhos Oct. 1; minimum, 225 micromhos Apr. 15.
WATER TEMPERATURES: Maximum, 25.5°C July 13, 20-22, 25, 26; minimum, 0.0°C on many days during winter months.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE (DEG C) (00010)	COLOR (PLAT-INUM-COBALT UNITS) (00080)	OXYGEN, DIS-SOLVED (MG/L) (00300)	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)
OCT												
24...	1700	136	608	8.2	9.0	10	--	260	--	48	35	25
NOV												
30...	1115	110	687	8.0	.0	8	10.0	300	--	55	39	26
DEC												
21...	1130	99	705	7.8	.0	6	--	330	52	62	43	27
JAN												
25...	0730	90	835	8.1	.0	8	--	350	45	64	45	28
FEB												
20...	1440	90	720	7.9	.0	11	--	330	37	65	40	28
MAR												
08...	1710	236	800	7.6	.0	7	--	350	19	69	43	28
APR												
19...	1115	16900	290	7.8	5.5	120	--	120	58	30	11	6.8
27...	1315	7100	490	7.9	11.0	--	--	--	--	--	--	--
JUL												
02...	1430	1950	650	7.9	23.5	25	--	280	93	54	36	23
AUG												
01...	1745	1690	--	--	--	40	--	230	53	47	28	16
SEP												
06...	1130	723	430	8.2	21.0	20	--	210	16	58	27	11

DATE	SODIUM PERCENT (00932)	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)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)
OCT											
24...	15	.6	9.5	220	62	16	.2	4.7	360	--	.49
NOV											
30...	16	.7	6.8	260	89	15	.2	5.4	421	--	.57
DEC											
21...	15	.6	7.1	280	100	16	.3	6.5	441	433	.60
JAN											
25...	15	.7	8.4	300	92	21	.3	15	490	456	.67
FEB											
20...	15	.7	9.3	290	69	21	.3	19	440	429	.60
MAR											
08...	14	.7	12	330	67	15	.3	19	461	452	.63
APR											
19...	10	.5	6.2	62	53	4.4	.2	11	183	170	.25
27...	--	--	--	--	--	--	--	--	--	--	--
JUL											
02...	26	.6	7.1	190	170	15	.2	14	436	435	.59
AUG											
01...	13	.5	5.3	180	69	7.5	.2	18	318	301	.43
SEP											
06...	10	.5	4.3	190	44	5.7	.2	16	273	261	.37

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

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P) (00666)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)
OCT											
24...	132	.15	.23	10	3	100	120	<1	0	<1	4
NOV											
30...	125	.10	.30	--	--	--	140	--	--	--	--
DEC											
21...	118	.13	.29	--	--	--	130	--	--	--	--
JAN											
25...	119	.39	.39	--	--	--	370	--	--	--	--
FEB											
20...	107	.61	.45	--	--	--	140	--	--	--	--
MAR											
08...	296	.04	.08	--	--	--	160	--	--	--	--
APR											
19...	8350	2.3	.27	10	4	30	70	<1	0	<3	5
27...	--	--	--	0	4	80	--	2	0	<3	4
JUL											
02...	2300	.22	.16	--	--	--	100	--	--	--	--
AUG											
01...	1450	.41	.18	--	--	--	110	--	--	--	--
SEP											
06...	533	.06	.01	0	4	100	90	<1	0	<3	2

DATE	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	VANA-DIUM, DIS-SOLVED (UG/L AS V) (01085)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
OCT											
24...	<10	7	20	30	.0	1	4	0	190	.0	<3
NOV											
30...	--	--	--	--	--	--	--	--	--	--	--
DEC											
21...	--	--	--	--	--	--	--	--	--	--	--
JAN											
25...	--	--	--	--	--	--	--	--	--	--	--
FEB											
20...	--	--	--	--	--	--	--	--	--	--	--
MAR											
08...	--	--	--	--	--	--	--	--	--	--	--
APR											
19...	50	0	20	40	8.0	13	8	0	110	4.0	10
27...	50	1	20	30	.0	<10	6	0	230	--	10
JUL											
02...	--	--	--	--	--	--	--	--	--	--	--
AUG											
01...	--	--	--	--	--	--	--	--	--	--	--
SEP											
06...	<10	0	20	3	.0	<10	3	0	160	--	6

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	965	610	680	650	705	690	460	460	585	640	515	490
2	870	565	670	670	700	690	510	455	580	630	570	495
3	640	560	670	665	720	700	480	470	585	630	540	490
4	575	580	680	640	750	705	495	600	605	630	535	495
5	640	560	680	650	745	700	495	610	580	620	485	470
6	640	585	700	670	725	785	460	610	620	620	505	445
7	630	580	705	670	720	830	505	585	600	610	510	440
8	705	580	750	645	740	725	525	535	625	620	510	430
9	640	560	765	650	650	650	505	550	600	610	495	445
10	610	565	760	650	670	640	525	550	625	630	535	440
11	595	560	750	670	670	645	525	560	620	630	505	490
12	605	580	740	665	625	670	485	570	640	630	520	480
13	620	560	710	665	640	695	305	570	645	635	520	450
14	590	560	670	650	650	580	240	580	635	620	515	470
15	595	580	660	670	650	565	225	595	640	600	530	470
16	605	585	655	670	660	540	270	580	650	585	520	460
17	595	560	660	805	670	540	260	575	640	505	525	435
18	600	580	640	740	640	620	355	570	640	505	505	430
19	650	560	635	740	670	530	285	580	645	525	530	420
20	625	560	630	750	670	530	285	570	645	540	510	380
21	620	610	675	725	675	550	295	570	630	540	500	380
22	605	615	705	790	670	590	280	565	610	560	495	370
23	620	600	700	745	660	595	285	590	590	550	500	380
24	640	610	670	745	670	560	275	560	560	550	505	380
25	595	605	670	760	650	575	305	565	455	555	500	390
26	590	610	740	740	650	575	335	590	490	540	525	400
27	600	605	660	725	670	580	370	595	555	530	530	420
28	590	650	680	780	690	530	345	570	580	525	505	410
29	650	635	640	695	---	510	380	570	580	640	500	415
30	665	685	660	725	---	480	430	565	650	505	520	405
31	630	---	670	700	---	450	---	580	---	515	495	---
MEAN	639	589	686	700	679	614	383	564	604	581	515	436

WTR YR 1979 MEAN 583 MAX 965 MIN 225

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14.0	8.5	.5	.0	.0	1.0	.0	8.0	17.0	22.5	24.0	22.0
2	13.5	8.0	.5	.0	.0	1.0	.0	8.0	18.0	23.0	24.0	22.0
3	13.5	8.5	.5	.0	.0	1.0	.0	7.5	18.5	23.0	24.0	23.0
4	13.5	8.5	.0	.0	.0	1.0	.0	7.5	19.0	23.5	24.0	23.5
5	12.5	9.0	.0	.0	.0	1.0	.0	8.0	18.5	23.5	24.0	23.0
6	11.5	7.0	.0	.0	.0	.0	.0	8.0	18.5	24.5	24.0	22.0
7	11.5	7.5	.0	.0	.0	.0	.0	9.0	18.0	23.5	24.5	21.5
8	12.0	7.5	.0	.0	.0	.0	.0	10.0	18.0	24.5	24.0	21.0
9	12.0	7.0	.0	.0	.0	.0	.0	9.0	18.5	25.0	24.0	21.0
10	12.0	7.0	.0	.0	.0	.0	.0	8.0	19.0	25.0	23.5	20.5
11	12.0	5.0	.0	.0	.0	.0	.0	8.0	19.0	25.0	23.0	20.5
12	11.0	4.5	.0	.0	.0	.0	1.0	9.0	19.5	25.0	23.0	19.5
13	10.5	4.0	.0	.0	.0	.0	1.0	9.5	19.5	25.5	22.5	19.0
14	10.0	3.5	.0	.0	.0	.0	1.0	11.0	21.0	25.0	21.0	19.0
15	9.5	3.5	.0	.0	.0	.0	1.5	11.5	22.0	24.5	20.5	20.0
16	8.0	2.0	.0	.0	.0	.0	1.0	14.0	21.5	24.5	20.0	19.5
17	8.5	1.0	.0	.0	.0	.0	1.0	14.0	21.5	24.5	19.0	19.5
18	9.5	1.0	.0	.0	.0	.0	1.5	14.0	21.0	25.0	19.5	17.5
19	10.5	1.0	.0	.0	.0	.0	2.0	14.0	21.0	25.0	20.0	17.0
20	10.0	1.0	.0	.0	1.0	.0	2.5	14.5	20.0	25.5	21.0	16.5
21	10.5	1.0	.0	.0	1.0	.0	4.5	14.5	19.5	25.5	21.5	16.0
22	10.0	1.0	.0	.0	1.0	.0	7.5	14.5	19.0	25.5	21.5	16.5
23	10.0	1.0	.0	.0	1.0	.0	9.5	14.5	18.0	25.0	21.0	17.0
24	9.5	.5	.0	.0	1.0	.0	11.5	15.0	17.5	25.0	20.0	17.0
25	8.0	.5	.0	.0	1.0	.0	10.5	15.0	18.0	25.5	21.0	17.0
26	8.0	.5	.0	.0	1.0	.0	8.5	15.5	19.0	25.5	20.0	17.5
27	8.0	.5	.0	.0	1.0	.0	8.5	17.5	20.5	25.0	19.5	17.0
28	8.5	.5	.0	.0	1.0	1.0	8.5	16.0	21.5	25.0	20.0	16.5
29	8.5	.5	.0	.0	---	1.0	8.0	19.0	21.5	24.5	20.0	16.0
30	8.5	.5	.0	.0	---	1.0	8.0	17.0	22.5	24.0	21.0	16.5
31	9.0	---	.0	.0	---	1.0	---	17.5	---	23.5	21.5	---
MEAN	10.5	3.5	.0	.0	.5	.5	3.5	12.5	19.5	24.5	22.0	19.0

WTR YR 1979 MEAN 9.5 MAX 25.5 MIN .0

05061000 BUFFALO RIVER NEAR HAWLEY, MN

LOCATION.--Lat 46°51'00", long 96°19'45", in NW 1/4 SE 1/4 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.--34 years, 73.8 ft^3/s (2.090 m^3/s), 53,470 acre-ft/yr (65.9 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, 980 ft^3/s (27.8 m^3/s) Apr. 17, gage height, 8.67 ft (2.643 m); minimum, 9.5 ft^3/s (0.27 m^3/s) Sept. 29, gage height, 3.32 ft (1.012 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	11	12	14	13	14	14	21	296	91	124	45	18
2	11	12	14	13	14	14	20	276	86	136	41	18
3	11	17	14	13	14	14	20	256	82	193	38	19
4	11	16	14	13	14	14	20	238	80	236	36	19
5	11	15	14	14	14	14	19	231	78	232	37	17
6	11	13	14	14	14	14	19	233	74	199	45	17
7	12	13	14	14	14	14	20	239	71	180	44	15
8	11	14	14	14	14	14	22	236	68	164	44	12
9	11	14	14	14	14	14	25	226	66	156	42	15
10	11	13	14	14	14	14	33	217	64	148	43	16
11	10	13	13	14	14	14	61	211	61	131	40	15
12	10	13	13	14	14	14	109	205	60	122	42	15
13	11	14	13	14	14	14	188	197	56	113	45	15
14	11	13	13	14	14	14	238	186	52	107	42	15
15	11	14	13	14	14	14	355	180	49	102	40	14
16	12	13	13	14	14	14	772	169	50	97	38	13
17	11	13	13	14	14	15	962	159	45	90	36	12
18	11	13	13	14	14	18	918	154	43	83	32	11
19	11	14	13	14	14	31	890	149	51	76	32	11
20	11	15	13	14	14	28	939	145	63	71	32	11
21	11	15	13	14	14	27	952	141	85	67	30	11
22	10	15	13	14	14	25	882	134	88	63	30	11
23	12	15	13	14	14	26	815	128	81	64	30	11
24	14	15	13	14	14	28	740	123	73	64	30	11
25	14	15	13	14	14	25	646	116	67	67	32	10
26	14	15	13	14	14	23	559	112	62	65	30	9.8
27	14	15	13	14	14	21	485	109	60	61	28	10
28	13	15	13	14	14	20	412	105	83	58	27	10
29	13	14	13	14	---	19	358	98	170	53	25	9.8
30	13	14	13	14	---	25	316	97	134	54	23	9.9
31	12	---	13	14	---	22	---	96	---	50	21	---
TOTAL	360	422	413	430	392	577	11816	5462	2193	3426	1100	401.5
MEAN	11.6	14.1	13.3	13.9	14.0	18.6	394	176	73.1	111	35.5	13.4
MAX	14	17	14	14	14	31	962	296	170	236	45	19
MIN	10	12	13	13	14	14	19	96	43	50	21	9.8
AC-FT	714	837	819	853	778	1140	23440	10830	4350	6800	2180	796

CAL YR 1978 TOTAL 34917.4 MEAN 95.7 MAX 1930 MIN 9.3 AC-FT 69260
WTR YR 1979 TOTAL 26992.5 MEAN 74.0 MAX 962 MIN 9.8 AC-FT 53540

05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MN

LOCATION.--Lat 46°46'20", long 96°37'40", in SW 1/4 SW 1/4 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.--34 years, 56.8 ft^3/s (1.609 m^3/s), 41,150 acre-ft/yr (50.7 hm^3/yr); median of yearly mean discharges, 41.8 ft^3/s (1.184 m^3/s), 30,280 acre-ft/yr (37.3 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, 2,800 ft^3/s (79.3 m^3/s) Apr. 14, gage height, 15.33 ft (4.673 m) (backwater from ice); minimum daily, 0.18 ft^3/s (0.005 m^3/s) Feb. 20-28; minimum gage height observed, (2.20 ft (0.975 m) Feb. 27.

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	2.7	5.0	3.9	.80	.42	.19	58	154	27	43	31	5.5
2	2.3	5.3	3.4	.70	.40	.19	96	133	25	43	26	4.6
3	2.5	5.0	3.2	.64	.38	.20	257	121	24	75	24	3.7
4	3.1	4.7	2.9	.62	.37	.20	260	109	23	98	22	3.7
5	3.0	4.1	2.8	.60	.34	.20	281	100	20	122	21	3.7
6	2.3	3.7	2.5	.60	.30	.20	302	104	17	132	20	3.2
7	1.6	4.3	2.4	.60	.28	.20	281	109	13	134	18	2.8
8	1.1	4.7	2.2	.58	.24	.20	258	125	12	122	17	2.7
9	.88	4.4	2.1	.58	.23	.21	236	139	12	111	15	2.8
10	.74	4.6	2.0	.58	.22	.22	221	131	13	100	14	3.0
11	.96	4.7	2.0	.58	.21	.22	321	111	13	91	13	3.5
12	1.5	4.7	2.0	.58	.21	.24	568	100	16	85	12	4.1
13	2.8	4.8	2.0	.58	.20	.24	1340	89	14	73	10	5.2
14	2.9	4.8	1.9	.58	.20	.26	2700	78	10	62	8.6	5.0
15	2.9	4.8	1.9	.58	.20	.28	2440	69	7.0	51	6.5	5.3
16	2.9	4.8	1.8	.58	.20	.30	2100	64	6.0	40	4.6	4.1
17	2.9	4.8	1.8	.57	.20	.32	1630	56	5.0	31	4.3	2.9
18	3.0	4.8	1.8	.57	.19	.34	1080	52	3.6	26	3.0	2.2
19	3.2	4.9	1.8	.57	.19	.36	870	51	13	22	1.9	2.4
20	3.5	4.9	1.8	.57	.18	.37	784	54	45	18	.80	1.9
21	3.4	4.9	1.8	.57	.18	.39	722	58	51	14	3.0	1.4
22	3.6	4.9	1.7	.57	.18	.52	662	61	44	14	4.6	1.2
23	3.7	4.9	1.6	.57	.18	3.2	601	56	40	14	5.5	.91
24	3.8	4.9	1.6	.57	.18	8.6	506	52	35	18	5.0	.62
25	3.7	4.9	1.6	.57	.18	12	425	47	31	14	4.9	.74
26	4.3	4.9	1.6	.57	.18	16	349	43	23	24	4.8	.42
27	4.9	4.9	1.6	.57	.18	20	302	39	16	22	4.7	.38
28	4.2	4.8	1.6	.56	.18	19	261	35	20	23	7.4	.52
29	4.2	4.7	1.5	.52	---	21	220	31	73	23	8.8	.62
30	4.3	4.5	1.2	.48	---	21	180	32	44	24	7.7	.88
31	4.4	---	.88	.44	---	21	---	29	---	43	6.4	---
TOTAL	91.28	142.1	62.88	18.05	6.60	147.65	20311	2432	697.6	1712	335.50	79.99
MEAN	2.94	4.74	2.03	.58	.24	4.76	677	78.5	23.3	55.2	10.8	2.67
MAX	4.9	5.3	3.9	.80	.42	21	2700	154	73	134	31	5.5
MIN	.74	3.7	.88	.44	.18	.19	58	29	3.6	14	.80	.38
AC-FT	181	282	125	36	13	293	40290	4820	1380	3400	665	159

CAL YR 1978 TOTAL 36740.55 MEAN 101 MAX 3350 MIN .00 AC-FT 72870
WTR YR 1979 TOTAL 26036.65 MEAN 71.3 MAX 2700 MIN .18 AC-FT 51640

05062000 BUFFALO RIVER NEAR DILWORTH, MN

LOCATION.--Lat 46°57'40", long 96°39'40", in SW 1/4 SE 1/4 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.--48 years, 131 ft^3/s (3.710 m^3/s), 94,910 acre-ft/yr (117 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, 4,380 ft^3/s (124 m^3/s) Apr. 16, gage height, 21.60 ft (6.584 m); minimum, 5.4 ft^3/s (0.153 m^3/s) Oct 12; minimum gage height, 2.28 ft (0.695 m) Sept. 29.

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	8.0	17	19	17	13	13	29	666	155	313	111	30
2	8.1	17	19	16	13	13	31	595	146	245	95	30
3	9.2	18	19	16	13	13	40	531	138	220	81	26
4	9.8	18	19	16	13	13	50	484	130	259	72	23
5	10	18	19	16	13	13	70	453	122	297	66	24
6	10	18	19	16	13	13	140	442	116	318	63	24
7	8.5	18	19	16	13	13	160	444	110	312	65	21
8	8.3	18	19	16	13	13	175	440	103	302	64	19
9	9.7	19	19	15	13	13	185	425	96	287	61	18
10	10	19	19	15	13	13	216	413	91	274	59	18
11	9.6	20	19	15	13	13	260	396	88	267	57	17
12	9.4	20	19	15	13	13	330	372	81	240	57	19
13	10	20	18	15	13	13	620	346	77	222	55	19
14	8.8	20	18	14	13	13	920	327	77	209	62	18
15	9.5	20	18	14	13	14	2570	309	75	188	58	17
16	11	20	18	14	13	15	4350	287	69	168	53	17
17	13	20	18	14	13	16	4170	265	65	156	49	16
18	14	20	18	13	13	17	3840	244	62	141	49	15
19	16	20	18	13	13	19	3240	230	67	127	47	14
20	15	20	18	13	13	20	2690	226	91	116	40	14
21	16	20	18	13	13	22	2360	223	107	106	37	14
22	16	20	18	13	13	23	2150	218	138	98	39	13
23	15	20	18	13	13	24	2020	215	151	92	39	12
24	17	20	17	13	13	24	1870	208	142	95	38	11
25	18	20	17	13	13	24	1800	198	126	101	37	11
26	18	20	17	13	13	24	1600	188	113	109	37	10
27	19	20	17	13	13	25	1350	181	102	121	38	10
28	18	20	17	13	13	25	1120	176	109	109	37	8.6
29	18	20	17	13	---	26	921	171	311	105	35	8.1
30	17	19	17	13	---	28	771	177	399	110	33	8.8
31	17	---	17	13	---	28	---	162	---	118	32	---
TOTAL	396.9	579	562	442	364	556	40048	10012	3657	5825	1666	505.5
MEAN	12.8	19.3	18.1	14.3	13.0	17.9	1335	323	122	188	53.7	16.9
MAX	19	20	19	17	13	28	4350	666	399	318	111	30
MIN	8.0	17	17	13	13	13	29	162	62	92	32	8.1
AC-FT	787	1150	1110	877	722	1100	79440	19860	7250	11550	3300	1000

CAL YR 1978 TOTAL 85030.5 MEAN 233 MAX 5250 MIN 3.4 AC-FT 168700
WTR YR 1979 TOTAL 64613.4 MEAN 177 MAX 4350 MIN 8.0 AC-FT 128200

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 1978 TO SEPTEMBER 1979

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	---	---	---	---	---	---	---	---			---	---
20	132	5.3	---	---	185	9.0	---	---			---	---
21	---	---	176	9.5	---	---	---	---			22	1.3
22	---	---	---	---	---	---	---	---			---	---
23	---	---	---	---	---	---	---	---			---	---
24	---	---	---	---	---	---	150	5.3			---	---
25	---	---	---	---	---	---	---	---			---	---
26	---	---	---	---	---	---	---	---			---	---
27	---	---	---	---	---	---	---	---			---	---
28	---	---	---	---	---	---	---	---			---	---
29	---	---	---	---	---	---	---	---			---	---
30	---	---	---	---	---	---	---	---			---	---
31	---	---	---	---	---	---	---	---			---	---
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	---	---	85	153	105	44	163	138	188	56	---	---
2	---	---	80	129	102	40	101	67	171	44	---	---
3	---	---	80	115	89	33	109	65	---	---	---	---
4	---	---	82	107	106	37	132	92	---	---	---	---
5	---	---	77	94	105	35	145	116	---	---	---	---
6	---	---	78	93	115	36	129	111	---	---	---	---
7	---	---	95	114	104	31	105	88	---	---	---	---
8	---	---	89	106	107	30	95	77	---	---	---	---
9	---	---	99	114	108	28	96	74	---	---	---	---
10	15	8.7	94	105	---	---	152	112	---	---	---	---
11	21	15	77	82	---	---	168	121	---	---	---	---
12	28	25	67	67	---	---	171	111	---	---	---	---
13	40	67	67	63	---	---	177	106	---	---	---	---
14	69	171	79	70	---	---	174	98	---	---	---	---
15	114	791	90	75	---	---	149	76	94	15	---	---
16	80	940	82	64	---	---	157	71	---	---	---	---
17	66	743	88	63	---	---	235	99	---	---	---	---
18	70	726	74	49	---	---	223	85	---	---	---	---
19	58	507	54	34	---	---	196	67	---	---	---	---
20	76	552	65	40	---	---	222	70	---	---	---	---
21	72	459	83	50	67	19	244	70	---	---	---	---
22	241	1400	61	36	74	28	163	43	---	---	---	---
23	119	649	71	41	232	95	134	33	---	---	---	---
24	63	318	70	39	75	29	127	33	64	6.6	52	1.5
25	79	384	79	42	91	31	190	52	---	---	---	---
26	61	264	76	39	76	23	215	63	---	---	---	---
27	75	273	97	47	85	23	156	51	---	---	---	---
28	79	239	80	38	98	29	135	40	---	---	---	---
29	97	241	86	40	186	156	170	48	---	---	---	---
30	113	235	133	64	157	169	186	55	---	---	---	---
31	---	---	90	39	---	---	188	60	---	---	---	---

05062500 WILD RICE RIVER AT TWIN VALLEY, MN

LOCATION.--Lat 47°16'00", long 96°14'40", in NW 1/4 NE 1/4 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).

WATER-DISCHARGE RECORDS

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

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

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

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

AVERAGE DISCHARGE.--57 years, 176 ft^3/s (4.984 m^3/s), 127,500 acre-ft/yr (157 hm^3/yr); median of yearly mean discharges, 155 ft^3/s (4.390 m^3/s), 112,300 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, 6,010 ft^3/s (170 m^3/s) Apr. 18, gage height, 12.93 ft (3.941 m); minimum, 28 ft^3/s (0.79 m^3/s) Sept. 23, 24, 30; minimum gage height, 1.48 ft (0.451 m) Nov. 12.

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	58	40	38	36	37	42	175	1440	416	368	113	34
2	58	42	38	35	38	42	170	1390	404	626	106	40
3	57	50	38	35	38	42	170	1340	375	1010	101	44
4	54	42	38	35	39	42	160	1280	355	973	96	42
5	53	38	38	35	40	42	150	1220	324	841	90	36
6	56	42	38	35	40	42	145	1160	306	730	83	33
7	53	44	38	35	41	41	140	1130	284	637	71	31
8	54	43	38	35	41	41	135	1090	292	560	67	34
9	56	47	38	35	42	41	132	1060	283	494	62	33
10	53	47	38	35	42	40	130	1020	258	436	53	31
11	51	43	37	35	43	40	140	992	247	384	46	42
12	52	42	37	34	43	39	190	958	236	345	44	50
13	56	50	37	34	43	39	350	928	210	318	45	48
14	51	49	37	34	43	39	800	893	196	308	43	49
15	61	48	37	34	43	39	1500	843	188	296	58	46
16	54	46	37	34	43	40	2600	791	178	271	48	43
17	44	45	37	34	43	43	4330	746	159	248	44	40
18	41	43	37	34	43	45	5830	701	136	227	44	37
19	43	42	37	34	43	48	4580	677	138	206	40	34
20	40	41	37	34	43	52	3440	664	176	191	36	33
21	45	40	37	34	43	60	3020	636	282	180	35	33
22	46	40	37	34	43	88	2680	602	404	172	35	32
23	42	40	37	35	43	115	2390	568	443	161	39	29
24	41	39	37	35	43	145	2180	539	425	154	40	29
25	42	39	37	35	43	180	2170	505	408	146	43	32
26	42	39	36	35	43	190	2000	476	376	143	43	32
27	39	39	36	35	43	190	1830	452	311	142	45	32
28	44	39	36	35	42	190	1680	436	303	137	46	31
29	46	39	36	36	---	190	1570	419	497	134	42	30
30	41	39	36	36	---	190	1510	421	421	129	40	42
31	39	---	36	37	---	180	---	433	---	120	36	---
TOTAL	1512	1277	1151	1079	1171	2557	46297	25810	9031	11087	1734	1102
MEAN	48.8	42.6	37.1	34.8	41.8	82.5	1543	833	301	358	55.9	36.7
MAX	61	50	38	37	43	190	5830	1440	497	1010	113	50
MIN	39	38	36	34	37	39	130	419	136	120	35	29
AC-FT	3000	2530	2280	2140	2320	5070	91830	51190	17910	21990	3440	2190

CAL YR 1978 TOTAL 75905 MEAN 208 MAX 5900 MIN 31 AC-FT 150600
WTR YR 1979 TOTAL 103808 MEAN 284 MAX 5830 MIN 29 AC-FT 205900

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1971, 1973 to current year (discontinued).

PERIOD OF DAILY RECORD.--
SEDIMENT-SUSPENDED DISCHARGE: March 1976 to September 30, 1979.

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

EXTREMES FOR PERIOD OF DAILY RECORD.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 1,140 mg/L Apr. 2, 1976; minimum daily mean, 7 mg/L July 30, 1978, Aug. 6, 1979.
SEDIMENT LOADS: Maximum daily, 6,910 tons (6,270 tonnes) Apr. 7, 1978; minimum daily, 0.13 tons (0.12 tonnes) Oct. 3, 1976.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 724 mg/L July 2; minimum daily mean, 7 mg/L Aug. 6.
SEDIMENT LOADS: Maximum daily, 5,810 tons (5,270 tonnes) Apr. 17; minimum daily, 0.89 tons (0.81 tonnes) Sept. 29.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	COLOR (PLAT-INUM-COBALT UNITS) (00080)	TUR-BID-ITY (JTU) (00070)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)
OCT											
02...	1200	58	500	8.4	16.5	11.5	40	4	10.2	97	4.7
10...	1430	53	500	7.9	21.0	11.0	40	3	11.2	105	--
17...	1700	42	560	8.3	10.0	6.0	30	2	11.8	98	1.5
24...	1200	41	540	8.3	14.0	5.5	30	2	11.3	94	.8
NOV											
07...	1400	44	567	8.4	14.0	3.0	40	2	13.2	101	1.0
DEC											
20...	1025	37	700	7.7	--	.0	30	4	3.1	22	--
JAN											
16...	1330	34	670	7.7	2.0	.0	30	3	4.2	30	1.4
FEB											
13...	1400	43	670	7.6	-18.0	.0	20	3	7.8	55	--
MAR											
13...	1515	39	650	7.7	--	.0	20	4	11.0	80	2.2
APR											
04...	1015	127	565	7.8	-1.0	.5	40	3	11.9	86	--
10...	1315	112	592	8.0	4.0	.0	20	8	11.8	84	4.4
16...	1700	2600	--	--	--	--	--	--	--	--	--
17...	1815	4220	270	7.9	11.0	.5	40	65	--	--	--
18...	1000	5920	--	--	--	--	--	--	--	--	--
19...	0945	4680	320	--	--	6.0	--	--	--	--	--
22...	1815	2610	365	--	--	9.0	--	--	--	--	--
25...	1015	2160	370	8.2	4.0	8.0	70	50	10.4	90	--
MAY											
01...	1000	1550	360	8.7	4.0	6.0	40	30	11.2	93	--
09...	0930	1060	370	8.2	--	6.5	35	--	11.0	92	--
14...	1530	896	420	--	20.0	10.0	35	--	11.0	100	--
22...	1630	595	440	8.2	10.0	10.5	30	--	10.4	95	--
29...	1315	417	400	8.0	18.5	18.5	30	--	8.5	93	--
JUN											
05...	1000	331	445	8.3	21.0	K 16.0	40	--	8.3	86	--
12...	1230	236	460	8.8	28.0	17.5	20	--	8.4	90	--
19...	1300	139	420	8.3	16.0	18.5	30	--	9.7	107	--
25...	1425	409	520	8.2	26.5	19.0	50	--	8.5	94	--
JUL											
02...	1330	681	420	8.0	25.0	19.5	50	--	11.4	127	--
09...	1245	493	509	8.2	30.0	22.0	80	--	7.7	90	--
16...	1430	270	478	8.7	21.0	23.0	50	--	7.8	93	--
23...	1245	159	490	8.5	23.0	24.5	30	--	7.4	87	--
31...	1400	119	445	8.4	22.0	21.5	30	--	7.9	92	--

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

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 PERCENT (00932)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY (MG/L AS CACO3) (00410)
OCT											
02...	K10	K14	260	18	63	26	8.6	7	.2	2.2	250
10...	K2	K11	280	13	64	28	9.1	7	.2	2.6	260
17...	K3	K6	290	24	67	29	9.3	7	.2	2.6	260
24...	K1	K16	300	25	74	29	11	7	.3	2.8	280
NOV											
07...	--	--	290	5	69	29	11	8	.3	2.8	290
DEC											
20...	--	K8	330	0	79	32	13	8	.3	3.5	340
JAN											
16...	K4	K24	400	11	98	38	14	7	.3	3.7	390
FEB											
13...	K10	22	400	0	96	38	14	7	.3	3.7	410
MAR											
13...	K19	21	360	0	88	35	13	7	.3	3.9	370
APR											
04...	K5	110	320	39	75	32	11	7	.3	4.5	280
10...	K13	130	310	22	72	32	12	8	.3	5.2	290
16...	--	--	--	--	--	--	--	--	--	--	--
17...	120	K1800	130	49	32	12	3.5	5	.1	3.7	80
18...	--	--	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--	--
25...	96	K1600	190	57	47	17	3.9	4	.1	.9	130
MAY											
01...	K24	140	180	30	44	17	4.4	5	.1	4.0	150
09...	K10	K16	200	26	47	19	5.2	5	.2	3.6	170
14...	K5	33	210	31	50	21	6.1	6	.2	3.5	180
22...	45	40	220	16	52	21	5.7	5	.2	3.4	200
29...	42	32	230	18	55	22	6.3	6	.2	3.1	210
JUN											
05...	62	K12	250	32	58	26	8.9	7	.2	2.9	220
12...	29	50	240	9	56	24	7.5	6	.2	2.2	230
19...	120	200	220	12	51	23	9.4	8	.3	2.5	210
25...	150	70	260	52	62	26	7.1	6	.2	3.1	210
JUL											
02...	120	77	200	34	47	21	7.2	7	.2	2.7	170
09...	170	180	280	57	63	29	8.9	6	.2	3.0	220
16...	100	75	260	32	57	29	9.7	7	.3	2.5	230
23...	K44	76	250	19	55	27	9.4	8	.3	2.3	230
31...	35	49	250	27	56	26	7.4	6	.2	2.5	220

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

DATE	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2) (00405)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, TOTAL (MG/L AS F) (00951)	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 AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NITRATE TOTAL (MG/L AS N) (00620)
OCT											
02...	1.9	22	2.6	.1	.1	18	309	291	.42	48.4	.18
10...	6.4	21	2.3	.2	.1	17	315	302	.43	45.1	.00
17...	2.6	25	3.6	.1	.1	17	330	312	.45	37.4	.00
24...	2.7	30	2.7	.2	.1	16	339	333	.46	37.5	.01
NOV											
07...	2.2	27	2.8	.2	.2	14	349	329	.47	41.5	.01
DEC											
20...	13	23	3.7	.1	.1	23	392	386	.53	39.2	.17
JAN											
16...	--	23	4.1	.2	.2	27	464	443	.63	42.6	.06
FEB											
13...	--	23	4.5	.3	.2	29	479	456	.65	56.1	.16
MAR											
13...	--	25	4.0	.2	.2	28	450	422	.61	48.0	.32
APR											
04...	--	58	6.5	.1	.1	21	396	383	.54	136	1.2
10...	5.7	36	4.9	.1	.1	21	364	359	.50	110	.35
16...	--	--	--	--	--	--	--	--	--	--	2.4
17...	--	42	3.8	.1	.1	8.1	193	165	.26	2200	2.4
18...	--	--	--	--	--	--	--	--	--	--	2.6
19...	--	--	--	--	--	--	--	--	--	--	2.3
22...	--	--	--	--	--	--	--	--	--	--	1.4
25...	--	50	4.0	.2	.1	12	253	220	.34	1480	1.4
MAY											
01...	--	40	3.2	.1	.1	9.8	242	214	.33	1010	.19
09...	--	39	3.1	.1	.1	7.8	253	227	.34	724	.05
14...	--	40	3.0	.1	.1	7.5	270	240	.37	655	.01
22...	2.5	30	2.7	.1	.1	6.8	266	242	.36	427	.02
29...	--	29	2.5	--	.1	7.0	268	251	.36	302	--
JUN											
05...	2.2	39	2.8	.1	.1	8.6	305	279	.41	273	.00
12...	--	29	2.6	.3	.1	8.7	293	268	.40	187	.00
19...	--	27	4.5	.1	.1	9.3	280	253	.38	105	.27
25...	--	58	3.1	.3	.1	14	352	301	.48	388	.19
JUL											
02...	3.3	43	3.0	.7	.3	12	283	240	.38	520	.42
09...	2.7	54	3.2	.2	.2	17	356	311	.48	474	.01
16...	.9	37	3.5	.2	.2	16	331	294	.45	241	.11
23...	1.4	29	2.4	.1	.1	12	300	276	.41	129	.01
31...	1.7	30	2.5	.1	.1	14	294	271	.40	94.5	.00

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

DATE	NITROGEN, NITRATE DISSOLVED (MG/L AS N) (00618)	NITROGEN, NITRITE TOTAL (MG/L AS N) (00615)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N) (00607)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)
OCT											
02...	.00	.00	.00	.18	.00	.03	.03	.58	.58	.61	.61
10...	.00	.01	.01	.01	.01	.02	.00	.90	.62	.92	.62
17...	.00	.01	.00	.01	.00	.07	.02	.53	.53	.60	.55
24...	.01	.00	.00	.01	.01	.01	.00	.59	.57	.60	.57
NOV											
07...	.01	.00	.00	.01	.01	.01	.01	.68	.46	.69	.47
DEC											
20...	.16	.01	.01	.18	.17	.19	.19	.69	.64	.88	.83
JAN											
16...	.00	.01	.01	.07	.01	.19	.19	.73	.73	.92	.92
FEB											
13...	--	.01	--	.17	.15	.32	--	.68	--	1.0	--
MAR											
13...	.32	.01	.01	.33	.33	.34	.28	.59	.59	.93	.87
APR											
04...	1.2	.06	.06	1.3	1.3	.26	.26	.94	.84	1.2	1.1
10...	.35	.01	.01	.36	.36	.15	.14	.56	.56	.71	.70
16...	2.4	.12	.12	2.5	2.5	.40	.40	1.6	.80	2.0	1.2
17...	2.4	.12	.11	2.5	2.5	.36	.32	2.0	.68	2.3	1.0
18...	2.5	.12	.11	2.7	2.6	.39	.38	1.2	.92	1.6	1.3
19...	2.3	.10	.09	2.4	2.4	.30	.26	.80	.66	1.1	.92
22...	1.4	.06	.04	1.5	1.4	.12	.10	.98	.68	1.1	.78
25...	1.4	.03	.03	1.4	1.4	.10	.07	1.1	1.0	1.2	1.1
MAY											
01...	.19	.01	.01	.20	.20	.02	.02	.73	.60	.75	.62
09...	.05	.00	.00	.05	.05	.01	.01	.86	.83	.87	.84
14...	.01	.01	.01	.02	.02	.07	.07	.75	.67	.82	.74
22...	.01	.02	.01	.04	.02	.04	.00	1.3	.80	1.3	.80
29...	--	--	--	.01	--	--	--	--	--	.83	--
JUN											
05...	.00	.00	.00	.00	.00	.01	.00	.81	.73	.82	.73
12...	.00	.01	.00	.01	.00	.01	.01	.71	.67	.72	.68
19...	.06	.01	.00	.28	.06	.06	.01	.73	.65	.79	.66
25...	.19	.02	.01	.21	.20	.04	.00	1.4	.89	1.4	.89
JUL											
02...	.40	.02	.02	.44	.42	.06	.03	4.5	.81	4.6	.84
09...	.01	.01	.01	.02	.02	.05	.05	1.4	1.1	1.4	1.1
16...	.10	.01	.01	.12	.11	.06	.03	1.1	.90	1.2	.93
23...	.01	.01	.01	.02	.02	.08	.00	.87	.80	.95	.80
31...	.00	.00	.00	.00	.00	.03	.02	.67	.62	.70	.64

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

DATE	NITROGEN, TOTAL (MG/L AS N) (00600)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P) (00671)	PHOSPHORUS, ORGANIC TOTAL (MG/L AS P) (00670)	PHOSPHORUS, ORGANIC DISSOLVED (MG/L AS P) (00673)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	IRON, DISSOLVED (UG/L AS FE) (01046)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
OCT											
02...	.79	.04	.03	.01	.00	.01	.01	260	140	20	20
10...	.93	.03	.02	.01	.01	.01	.00	90	80	40	30
17...	.61	.03	.02	.01	.01	.02	.01	270	100	30	30
24...	.61	.03	.02	.01	.01	.02	.02	320	100	30	30
NOV											
07...	.70	.00	.00	.00	.00	.00	.00	290	70	30	30
DEC											
20...	1.1	.03	.03	.01	.01	.02	.02	560	60	140	90
JAN											
16...	.99	.03	.01	.01	.01	.01	.00	480	120	550	550
FEB											
13...	1.2	.03	.02	.02	--	.01	.01	400	50	290	270
MAR											
13...	1.3	.03	.01	.01	.00	.01	.00	380	40	190	190
APR											
04...	2.5	.07	.06	.04	.04	.02	.02	380	100	100	80
10...	1.1	.05	.02	.02	.01	.01	.01	540	--	90	70
16...	4.5	.29	.15	.14	.12	.00	.00	--	--	--	--
17...	4.8	.37	.12	.13	.09	.00	.00	7900	90	30	30
18...	4.3	.29	.12	.12	.09	.00	.00	--	--	--	--
19...	3.5	.27	.10	.11	.07	.01	.01	--	--	--	--
22...	2.6	.18	.07	.07	.05	.01	.01	--	--	--	--
25...	2.6	.18	.06	.05	.03	.06	.00	2900	70	130	10
MAY											
01...	.95	.04	.01	.02	.01	.00	.00	890	50	60	20
09...	.92	.07	.02	.01	.00	.07	.02	1200	30	60	20
14...	.84	.03	.01	.01	.01	.01	.00	670	30	50	20
22...	1.3	.04	.01	.03	.00	.01	.01	700	40	60	20
29...	.84	.05	--	--	--	--	--	910	--	80	--
JUN											
05...	.82	.07	.06	.00	.00	.05	.05	440	40	50	20
12...	.73	.04	.02	.00	.00	.02	.01	330	60	50	30
19...	1.1	.05	.03	.05	.02	.01	.01	380	30	70	30
25...	1.6	.12	.04	.03	.02	.06	.01	780	40	90	20
JUL											
02...	5.0	.55	.06	.06	.04	.01	.01	17000	70	760	10
09...	1.4	.10	.05	.04	.04	.02	.00	1200	50	110	20
16...	1.3	.10	.07	.05	.04	.02	.01	610	50	80	30
23...	.97	.06	.06	.02	.01	.02	.03	400	70	60	30
31...	.70	.05	.04	.02	.02	.01	.01	290	30	90	30

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	COLOR (PLATINUM-COBALT UNITS) (00080)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
AUG											
27...	1400	46	580	8.4	25.0	17.0	15	8.3	89	36	32

DATE	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)	SODIUM PERCENT (00932)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY (MG/L AS CACO3) (00410)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
AUG											
27...	280	22	65	29	15	16	.4	3.2	260	2.0	47

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, TOTAL (MG/L AS F) (00951)	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 AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRATE TOTAL (MG/L AS N) (00620)	NITROGEN, NITRATE DISSOLVED (MG/L AS N) (00618)	NITROGEN, NITRITE TOTAL (MG/L AS N) (00615)
AUG											
27...	7.1	.2	.2	13	355	336	.48	44.1	.01	.01	.00

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

DATE	NITROGEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	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, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, ORGANIC DIS-SOLVED (MG/L AS N) (00607)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, TOTAL (MG/L AS N) (00600)
AUG 27...	.00	.01	.01	.02	.00	.65	.65	.67	.65	.68

DATE	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DIS-SOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOSPHORUS, ORTHO, DIS-SOLVED (MG/L AS P) (00671)	PHOSPHORUS, ORGANIC TOTAL (MG/L AS P) (00670)	PHOSPHORUS, ORGANIC DIS-SOLVED (MG/L AS P) (00673)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DIS-SOLVED (UG/L AS MN) (01056)
AUG 27...	.04	.03	.00	.00	.02	.02	240	10	60	20

DATE	TIME	ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL) (01105)	ARSENIC TOTAL (UG/L AS AS) (01002)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA) (01007)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE) (01012)	BORON, TOTAL RECOVERABLE (UG/L AS B) (01022)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	COBALT, TOTAL RECOVERABLE (UG/L AS CO) (01037)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LITHIUM TOTAL RECOVERABLE (UG/L AS LI) (01132)
OCT 24...	1200	60	3	0	0	200	1	10	0	1	4	10
FEB 13...	1400	30	2	100	0	80	0	<10	0	2	0	20
MAY 09...	0930	380	3	0	0	70	0	10	1	2	3	10
JUL 16...	1430	--	--	--	--	--	--	--	--	--	--	--
AUG 27...	1400	130	6	100	0	70	1	30	3	3	7	20

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO) (01062)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SILVER, TOTAL RECOVERABLE (UG/L AS AG) (01077)	STRONTIUM, TOTAL RECOVERABLE (UG/L AS SR) (01082)	VANADIUM, DIS-SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C) (00689)	CYANIDE TOTAL (MG/L AS CN) (00720)
OCT 24...	<.5	2	14	0	0	210	2.0	10	11	.9	.00
FEB 13...	<.5	3	7	0	0	250	1.5	30	13	.4	.00
MAY 09...	<.5	3	7	0	0	190	.0	10	27	.9	.00
JUL 16...	--	--	--	--	--	--	--	--	14	--	.00
AUG 27...	<.5	5	2	0	1	190	.0	10	25	--	.00

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

DATE	TIME	TEMPERATURE (DEG C) (00010)	PH (UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)
OCT						
17...	1000	6.5	8.1	10.6	88	--
17...	1200	6.5	8.3	10.6	88	--
17...	1400	6.5	8.3	11.8	98	--
17...	1600	7.0	8.3	11.8	100	--
17...	1700	6.0	8.3	11.8	98	560
17...	1800	8.0	8.4	11.8	103	--
17...	2000	8.0	8.3	11.5	100	--
17...	2200	7.0	8.3	11.2	95	--
17...	2400	7.0	8.2	11.0	93	--
18...	0200	6.0	8.2	10.9	90	--
18...	0400	5.5	8.0	10.9	89	--
18...	0600	5.0	8.2	10.8	87	--
18...	0800	4.5	8.4	11.2	89	--
18...	1000	4.0	8.2	11.2	88	--

DATE	TIME	TEMPERATURE (DEG C) (00010)	PH (UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)
FEB						
12...	1400	.0	7.6	7.8	55	595
12...	1600	.0	7.6	7.8	51	500
12...	1800	.0	7.5	7.6	54	660
12...	2000	.0	7.7	7.3	51	650
12...	2200	.0	7.5	7.3	51	660
12...	2400	.0	7.5	7.3	51	660
13...	0200	.0	7.7	7.6	54	655
13...	0400	.0	7.5	7.0	49	640
13...	0600	.0	7.6	7.0	49	700
13...	0800	.0	7.5	7.4	52	695
13...	1000	.0	7.6	6.7	47	650
13...	1200	.0	7.5	7.2	51	670
13...	1400	.0	7.6	7.8	55	670

DATE	TIME	TEMPERATURE (DEG C) (00010)	PH (UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)
JUN						
05...	1000	16.0	8.3	8.3	86	445
05...	1200	17.0	8.3	8.8	93	440
05...	1400	17.5	8.3	8.7	93	460
05...	1600	17.5	8.3	9.0	96	460
05...	1800	19.0	8.3	9.0	99	465
05...	2000	19.0	8.3	8.9	98	455
05...	2200	18.5	8.3	8.3	90	460
05...	2400	18.0	8.4	8.1	87	460
06...	0200	18.0	8.3	7.6	82	465
06...	0400	18.0	--	8.2	88	445
06...	0600	17.5	8.3	8.1	86	440
06...	0800	17.0	8.2	7.9	83	465
06...	1000	18.0	8.3	8.4	90	455

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	PH (UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)
JUL						
17...	0900	19.0	8.2	7.8	--	490
17...	1100	19.5	8.2	8.2	--	500
17...	1300	21.0	8.3	8.9	--	485
17...	1500	22.0	8.2	9.0	--	475
17...	1700	23.0	8.3	8.5	--	460
17...	1900	22.5	8.4	8.5	--	480
17...	2100	22.0	8.3	8.0	--	490
17...	2300	22.0	8.3	7.8	--	485
18...	0100	21.0	8.4	8.0	--	475
18...	0300	21.0	8.3	7.8	--	465
18...	0500	20.5	8.3	7.5	--	480
18...	0700	20.0	8.3	7.6	--	475
18...	0900	20.0	8.3	8.3	--	490

PARTICLE-SIZE DISTRIBUTION OF SURFACE BED MATERIAL, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	NUMBER OF SAMPLING POINTS (00063)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	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)	BED MAT. FALL DIAM. % FINER THAN 1.00 MM (80162)	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)
FEB												
12...	1400	1	43	9	18	27	54	89	91	--	--	--
JUL												
16...	1430	1	270	0	1	24	97	99	100	--	--	--
AUG												
27...	1400	1	46	1	2	11	40	68	90	97	99	100

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

PHYTOPLANKTON ANALYSES, SEPTEMBER 1978 TO JULY 1979

DATE TIME	SEP 27,78 1200		OCT 2,78 1200		OCT 10,78 1430		OCT 17,78 1700		OCT 24,78 1200		NOV 7,78 0000	
TOTAL CELLS/ML	170		770		160		94		370		140	
DIVERSITY: DIVISION	1.6		1.5		1.2		1.6		1.1		1.0	
.CLASS	1.6		1.5		1.2		1.6		1.5		1.0	
..ORDER	1.8		2.2		1.6		1.7		1.8		1.0	
...FAMILY	2.4		3.2		2.2		2.1		2.9		2.3	
....GENUS	2.7		3.3		2.3		2.1		3.0		2.3	
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	--	-	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE												
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE												
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	*	0	--	-	--	-	--	-	14	10
....CHODATELLA	--	-	--	-	--	-	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	2	1	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	7	4	--	-	--	-	--	-	--	-	--	-
....TREUBARIA	2	1	--	-	2	1	--	-	--	-	--	-
...SCENEDESMACEAE												
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-	57#	40
....SCENEDESMUS	29#	16	64	8	--	-	4	4	55	15	--	-
....TETRASTRUM	7	4	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES												
...PALMELLACEAE												
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES												
...CHLAMYDOMONADACEAE	--	-	--	-	--	-	--	-	--	-	--	-
....CARTERIA	--	-	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	18	2	2	1	4	4	14	4	--	-
..ZYGNEMATALES												
...DESMIDIACEAE												
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	4	2	*	0	2	1	2	2	14	4	--	-
....MELOSIRA	4	2	14	2	4	2	--	-	--	-	--	-
....STEPHANODISCUS	2	1	--	-	--	-	--	-	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....COCCONEIS	--	-	36	5	7	4	--	-	14	4	--	-
...CYMBELLACEAE												
....AMPHORA	--	-	11	1	--	-	--	-	14	4	--	-
....CYMBELLA	--	-	21	3	2	1	--	-	41	11	14	10
....EPITHEMIA	--	-	7	1	--	-	--	-	--	-	--	-
...DIATOMACEAE												
....DIATOMA	--	-	25	3	--	-	--	-	--	-	--	-
...FRAGILARIACEAE												
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	25	3	--	-	--	-	--	-	29#	20
...GOMPHONEMATACEAE												
....GOMPHONEMA	--	-	--	-	--	-	--	-	--	-	14	10
...NAVICULACEAE												
....GYROSIGMA	--	-	--	-	2	1	--	-	--	-	--	-
....NAVICULA	36#	20	96	13	27#	16	11	11	55	15	--	-
...NITZSCHIACEAE												
....NITZSCHIA	37#	21	67	9	21	13	27#	28	110#	30	14	10
...SURIRELLACEAE												
....SURIRELLA	--	-	*	0	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...OCHROMONADACEAE												
....OCHROMONAS	--	-	--	-	--	-	--	-	28	7	--	-
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	11	1	--	-	5	6	--	-	--	-
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	--	-	4	2	--	-	14	4	--	-

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

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

DATE		SEP 27,78		OCT 2,78		OCT 10,78		OCT 17,78		OCT 24,78		NOV 7,78	
TIME		1200		1200		1430		1700		1200		0000	
ORGANISM		CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)													
.CYANOPHYCEAE													
..CHROOCOCCALES													
...CHROOCOCCACEAE													
....AGMENELLUM	--	-	--	-	85#	52	--	-	--	-	--	-		
....ANACYSTIS	--	-	140#	19	--	-	--	-	--	-	--	-		
..HORMOGONALES														
...NOSTOCACEAE														
....ANABAENA	--	-	--	-	--	-	--	-	--	-	--	-		
...OSCILLATORIACEAE														
....LYNGBYA	--	-	--	-	--	-	--	-	--	-	--	-		
....OSCILLATORIA	45#	26	210#	28	7	4	42#	45	--	-	--	-		
...RIVULARIACEAE														
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-	--	-		
EUGLENOPHYTA (EUGLENOIDS)														
.EUGLENOPHYCEAE														
..EUGLENALES														
...EUGLENACEAE														
....EUGLENA	--	-	*	0	--	-	--	-	--	-	--	-		
....PHACUS	--	-	--	-	--	-	--	-	--	-	--	-		
....TRACHELOMONAS	2	1	*	0	--	-	--	-	14	4	--	-		
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%

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.5	7.0	---	---	---	---	---	6.0	17.0	---	22.0	---
2	13.0	6.5	---	---	---	---	---	5.5	17.0	17.0	22.5	---
3	12.0	---	---	---	---	---	---	8.5	19.0	14.0	21.5	---
4	13.0	---	---	---	---	---	.5	6.0	20.0	15.0	20.5	---
5	10.5	---	---	---	---	---	---	7.0	18.0	14.5	20.5	---
6	10.0	---	---	---	---	---	---	---	19.0	---	22.5	---
7	13.5	4.0	---	---	---	---	---	8.0	17.0	14.0	23.0	---
8	13.5	---	---	---	---	---	---	7.0	16.5	18.0	23.5	---
9	17.5	---	---	---	---	---	---	6.0	16.5	20.0	---	---
10	17.0	---	---	---	---	---	.0	6.5	20.0	20.0	---	---
11	13.0	---	---	---	---	---	---	6.5	18.0	19.5	22.0	---
12	9.5	---	---	---	.0	---	---	7.0	18.0	20.0	18.5	---
13	7.5	---	---	---	---	.0	---	9.0	18.0	18.0	17.5	15.5
14	8.0	---	---	---	---	---	---	11.0	18.5	16.5	20.0	---
15	7.5	---	---	---	---	---	---	10.0	21.0	15.0	17.5	---
16	9.0	---	---	.0	---	---	---	14.5	---	22.5	18.0	---
17	7.0	---	---	---	---	---	1.0	15.0	19.5	17.0	21.0	---
18	10.0	---	---	---	---	---	3.0	15.0	23.0	18.0	---	---
19	11.5	---	---	---	---	---	7.5	10.0	18.5	18.5	---	---
20	13.0	---	.0	---	---	---	9.0	14.0	17.0	19.0	---	---
21	13.5	---	---	---	---	---	8.5	12.0	17.5	21.0	---	---
22	9.5	---	---	---	---	---	10.0	12.0	18.0	22.0	---	---
23	7.5	---	---	---	---	---	9.0	13.0	---	21.0	---	---
24	8.0	---	---	---	---	---	10.0	14.0	18.0	---	---	---
25	7.5	---	---	---	---	---	9.0	17.0	20.5	---	---	---
26	7.5	---	---	---	---	---	6.5	16.5	19.0	17.5	---	---
27	7.5	---	---	---	---	---	5.5	18.5	18.5	18.0	17.0	---
28	7.5	---	---	---	---	---	6.0	19.5	17.5	---	---	---
29	7.0	---	---	---	---	---	9.0	19.0	16.0	---	---	---
30	7.0	---	---	---	---	---	6.5	17.0	16.5	---	---	---
31	7.0	---	---	---	---	---	---	16.0	---	21.5	---	---

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

PHYTOPLANKTON ANALYSES, SEPTEMBER 1978 TO JULY 1979

DATE	DEC 20,78		JAN 16,79		MAR 13,79		APR 4,79		APR 10,79	
TIME	1025		1330		1515		1015		1315	
TOTAL CELLS/ML	170		1500		190		260		810	
DIVERSITY: DIVISION	1.3		0.9		0.4		1.1		1.5	
.CLASS	1.3		0.9		0.4		1.1		1.5	
..ORDER	1.3		1.2		1.0		1.4		1.7	
...FAMILY	1.9		1.3		1.0		2.0		2.7	
....GENUS	1.9		1.3		1.0		2.0		2.7	
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										
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	43#	25	15	1	14	8	13	5	130#	16
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	57#	33	77	5	--	-	--	-	--	-
....TETRASTRUM	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	110	7	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE	--	-	--	-	--	-	--	-	--	-
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	--	-	--	-	150#	60	43	5
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	8	1	--	-	--	-	--	-
....MELOSIRA	--	-	8	1	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....COCCONEIS	--	-	--	-	--	-	--	-	14	2
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	--	-	13	5	58	7
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	72	9
...FRAGILARIACEAE										
....FRAGILARIA	--	-	15	1	--	-	--	-	--	-
....SYNEDRA	--	-	8	1	--	-	--	-	43	5
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	26	10	--	-
...NAVICULACEAE										
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	--	-	8	1	--	-	26	10	58	7
...NITZSCHIACEAE										
....NITZSCHIA	--	-	31	2	--	-	13	5	72	9
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	14	8	15	1	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
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05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

PHYTOPLANKTON ANALYSES, SEPTEMBER 1978 TO JULY 1979

DATE	DEC 20,78		JAN 16,79		MAR 13,79		APR 4,79		APR 10,79	
TIME	1025		1330		1515		1015		1315	
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										
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	23	2	29#	15	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	320#	39
....OSCILLATORIA	57#	33	1200#	79	140#	77	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....PHACUS	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	13	5	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-

DATE	APR 17,79		APR 25,79		MAY 1,79		MAY 9,79		MAY 14,79	
TIME	1815		1015		1000		0930		1530	
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										
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	--	-	430#	38	58	8	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	72	4	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	220	11	--	-	--	-	--	-	--	-
....OSCILLATORIA	1200#	61	--	-	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	58	7
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....PHACUS	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	14	1	--	-	43	4	--	-	14	2
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	14	1	--	-	--	-

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05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

PHYTOPLANKTON ANALYSES, SEPTEMBER 1978 TO JULY 1979

DATE	APR 17,79		APR 25,79		MAY 1,79		MAY 9,79		MAY 14,79	
TIME	1815		1015		1000		0930		1530	
TOTAL CELLS/ML	1900		430		1100		750		840	
DIVERSITY: DIVISION	1.0		0.4		1.3		1.3		1.6	
.CLASS	1.0		0.4		1.3		1.3		1.6	
..ORDER	1.2		1.2		1.8		2.1		2.1	
...FAMILY	1.5		1.2		2.1		2.5		2.6	
....GENUS	0.0		0.0		0.0		0.0		3.6	
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										
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	58	3	--	-	43	4	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	220	11	140#	33	220#	19	120#	15	58	7
....CHODATELLA	--	-	14	3	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	14	1	14	2	--	-
....DICTYOSPHAERIUM	--	-	--	-	43	4	--	-	58	7
....KIRCHNERIELLA	14	1	--	-	100	9	120#	15	100	12
....OOCYSTIS	--	-	130#	30	--	-	--	-	140#	17
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	29	3	29	4	58	7
....TETRASTRUM	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE	72	4	110#	27	140	13	43	6	--	-
....CARTERIA	--	-	--	-	29	3	14	2	--	-
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-	14	2
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	29	1	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	14	3	--	-	220#	29	140#	17
....MELOSIRA	--	-	--	-	--	-	--	-	14	2
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	--	-	--	-	--	-
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	--	-	--	-	29	3
....SYNEDRA	14	1	--	-	--	-	43	6	43	5
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	--	-	14	2
...NAVICULACEAE										
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	--	-	--	-	14	1	14	2	--	-
...NITZSCHIACEAE										
....NITZSCHIA	43	2	14	3	--	-	86	12	43	5
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	14	2
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	29	3

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05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued
PHYTOPLANKTON ANALYSES, SEPTEMBER 1978 TO JULY 1979

DATE	MAY 22,79		MAY 29,79		JUN 5,79		JUN 12,79		JUN 19,79	
TIME	1630		1315		1000		1230		1300	
TOTAL CELLS/ML	490		2000		1200		1300		5200	
DIVERSITY: DIVISION	1.7		1.8		1.2		1.8		0.3	
.CLASS	1.7		1.8		1.2		1.8		0.3	
..ORDER	2.3		2.1		1.6		2.2		0.4	
...FAMILY	3.0		2.5		2.0		2.5		1.2	
....GENUS	3.2		2.6		2.0		2.5		1.2	
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										
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	870#	17
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	26	2	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	39	8	210	10	13	1	13	1	51	1
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	51	3	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	51	11	--	-	--	-	--	-	*	0
....SELENASTRUM	--	-	13	1	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	13	1	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	51	11	440#	22	310#	25	410#	31	4000#	77
....TETRASTRUM	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE	--	-	--	-	--	-	--	-	--	-
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	26	5	39	2	39	3	52	4	*	0
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	--	-	*	0
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	64	13	--	-	64	5	65	5	51	1
....MELOSIRA	--	-	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	77	4	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	--	-	--	-	--	-
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	39	3	--	-	--	-
....SYNEDRA	51	11	26	1	--	-	26	2	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	13	1	--	-
...NAVICULACEAE										
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	--	-	--	-	--	-	52	4	*	0
...NITZSCHIACEAE										
....NITZSCHIA	120#	24	680#	34	680#	55	90	7	*	0
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	26	5	--	-	39	3	65	5	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	26	5	140	7	26	2	--	-	*	0

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05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

PHYTOPLANKTON ANALYSES, SEPTEMBER 1978 TO JULY 1979

DATE	MAY 22,79		MAY 29,79		JUN 5,79		JUN 12,79		JUN 19,79	
TIME	1630		1315		1000		1230		1300	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-GENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	39	8	320#	16	--	-	26	2	*	0
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	520#	38	90	2
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....PHACUS	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	13	1	--	-	13	1	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-

DATE	JUN 25,79		JUL 2,79		JUL 9,79		JUL 23,79		JUL 31,79	
TIME	1425		1350		1245		1245		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										
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	1000#	87	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	13	1	--	-
....PHACUS	--	-	--	-	13	8	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-
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%

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

PHYTOPLANKTON ANALYSES, SEPTEMBER 1978 TO JULY 1979

DATE	JUN 25,79		JUL 2,79		JUL 9,79		JUL 23,79		JUL 31,79	
TIME	1425		1350		1245		1245		1400	
TOTAL CELLS/ML	330		0		170		1200		64	
DIVERSITY: DIVISION	1.1		0.0		1.7		0.8		1.4	
.CLASS	1.1		0.0		1.7		0.8		1.4	
..ORDER	1.8		0.0		1.7		0.8		1.4	
...FAMILY	2.2		0.0		2.2		0.9		1.4	
....GENUS	2.2		0.0		2.3		0.9		1.4	
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										
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	13	8	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....CLUSTERIOPSIS	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	13	8	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	150#	46	--	-	52#	31	51	4	--	-
....TETRASTRUM	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES										
..:PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE	--	-	--	-	--	-	--	-	--	-
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	64#	19	--	-	--	-	--	-	13#	20
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	13	4	--	-	52#	31	13	1	--	-
....MELOSIRA	--	-	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	--	-	--	-	--	-
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	13	4	--	-	--	-	13	1	--	-
...NITZSCHIACEAE										
....NITZSCHIA	64#	19	--	-	--	-	39	3	39#	60
...SURIRELLACEAE										
....SURIRELLA	13	4	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....UROGLENA	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	13	1	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	13	4	--	-	26#	15	13	1	13#	20

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

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

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	27	4.2	80	8.6	54	5.5	72	7.0	115	11	119	13
2	23	3.6	61	6.9	54	5.5	73	6.9	116	12	118	13
3	19	2.9	65	8.8	54	5.5	75	7.1	117	12	118	13
4	18	2.6	85	9.6	54	5.5	76	7.2	119	13	117	13
5	14	2.0	75	7.7	54	5.5	78	7.4	120	13	117	13
6	16	2.4	72	8.2	54	5.5	79	7.5	121	13	116	13
7	21	3.0	72	8.6	54	5.5	81	7.7	123	14	116	13
8	17	2.5	72	8.4	54	5.5	82	7.7	124	14	115	13
9	13	2.0	72	9.1	54	5.5	84	7.9	125	14	114	13
10	14	2.0	72	9.1	54	5.5	85	8.0	126	14	114	12
11	14	1.9	72	8.4	54	5.4	87	8.2	128	15	113	12
12	18	2.5	72	8.2	54	5.4	88	8.1	129	15	113	12
13	16	2.4	72	9.7	54	5.4	90	8.3	128	15	112	12
14	16	2.2	80	11	54	5.4	91	8.4	128	15	104	11
15	12	2.0	80	10	54	5.4	92	8.4	127	15	96	10
16	17	2.5	75	9.3	54	5.4	94	8.6	127	15	88	9.5
17	23	2.7	75	9.1	54	5.4	95	8.7	126	15	80	9.3
18	25	2.8	70	8.1	54	5.4	97	8.9	125	15	72	8.7
19	34	3.9	70	7.9	54	5.4	98	9.0	125	15	64	8.3
20	33	3.6	70	7.7	54	5.4	99	9.1	124	14	55	7.7
21	58	7.0	65	7.0	55	5.5	100	9.2	124	14	47	7.6
22	40	5.0	65	7.0	57	5.7	102	9.4	123	14	39	9.3
23	41	4.6	65	7.0	58	5.8	103	9.7	123	14	31	9.6
24	38	4.2	60	6.3	60	6.0	104	9.8	122	14	23	9.0
25	44	5.0	60	6.3	61	6.1	106	10	121	14	15	7.3
26	40	4.5	54	5.7	63	6.1	107	10	121	14	15	7.7
27	44	4.6	54	5.7	64	6.2	108	10	120	14	15	7.7
28	61	7.2	54	5.7	66	6.4	110	10	120	14	15	7.7
29	67	8.3	54	5.7	67	6.5	111	11	---	---	15	7.7
30	80	8.9	54	5.7	69	6.7	112	11	---	---	15	7.7
31	82	8.6	---	---	70	6.8	113	11	---	---	15	7.3
TOTAL	---	121.6	---	236.5	---	176.8	---	271.2	---	391	---	318.1
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	15	7.1	118	459	39	44	60	60	11	3.4	41	3.8
2	15	6.9	103	387	42	46	724	1220	12	3.4	29	3.1
3	15	6.9	103	373	48	49	491	1340	15	4.1	29	3.4
4	15	6.9	104	359	32	31	249	654	18	4.7	28	3.2
5	17	6.9	100	329	29	25	103	234	10	2.4	29	2.8
6	20	7.8	108	338	36	30	98	193	7	1.6	29	2.6
7	22	8.3	93	284	37	28	116	200	10	1.9	34	2.8
8	24	8.7	88	259	36	28	73	110	9	1.6	31	2.8
9	27	9.6	80	229	28	21	59	79	12	2.0	28	2.5
10	29	10	70	193	26	18	53	62	20	2.9	33	2.8
11	97	37	60	161	36	24	45	47	30	3.7	27	3.1
12	166	85	53	137	29	18	49	46	28	3.3	28	3.8
13	234	221	56	140	27	15	28	24	27	3.3	30	3.9
14	303	654	56	135	20	11	28	23	21	2.4	32	4.2
15	371	1500	58	132	31	16	38	30	22	3.4	32	4.0
16	542	3800	65	139	24	12	32	23	27	3.5	26	3.0
17	497	5810	58	117	15	6.4	21	14	21	2.5	38	4.1
18	336	5290	50	95	11	4.0	23	14	16	1.9	29	2.9
19	318	3930	50	91	18	6.7	17	9.5	13	1.4	21	1.9
20	292	2710	48	86	29	14	15	7.7	19	1.8	13	1.2
21	308	2510	45	77	64	49	18	8.7	24	2.3	11	.98
22	268	1940	45	73	74	81	18	8.4	19	1.8	18	1.6
23	187	1210	40	61	62	74	32	14	13	1.4	13	1.0
24	208	1220	41	60	48	55	42	17	18	1.9	18	1.4
25	226	1320	38	52	45	50	29	11	41	4.8	12	1.0
26	162	875	41	53	36	37	20	7.7	41	4.8	14	1.2
27	144	712	38	46	37	31	14	5.4	39	4.7	11	.95
28	128	581	39	46	207	169	13	4.8	40	5.0	15	1.3
29	122	517	47	53	224	301	12	4.3	30	3.4	11	.89
30	129	526	58	66	89	101	13	4.5	20	2.2	11	1.2
31	---	---	43	50	---	---	13	4.2	29	2.8	---	---
TOTAL	---	35526.7	---	5080	---	1395.1	---	4480.2	---	90.3	---	73.42

TOTAL LOAD FOR YEAR: 48160.92 TONS.

05064000 WILD RICE RIVER AT HENDRUM, MN

LOCATION.--Lat 47°16'05", long 96°47'50", in SE 1/4 SE 1/4 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.

WATER-DISCHARGE RECORDS

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 except those for winter period, which are poor. 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.--35 years, 266 ft^3/s (7.533 m^3/s), 192,700 acre-ft/yr (238 hm^3/yr); median of yearly mean discharges, 213 ft^3/s (6.032 m^3/s), 154,300 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, 8,800 ft^3/s (249 m^3/s) Apr. 21, gage height, 32.30 ft (9.845 m) (backwater from Red River of the North); minimum daily, 29 ft^3/s (0.82 m^3/s) Jan. 25-Feb. 22; minimum gage height, 2.28 ft (0.695 m) Sept. 27.

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	64	44	33	31	29	30	165	2450	628	820	136	54
2	61	42	33	31	29	30	160	2400	605	799	126	52
3	58	41	33	30	29	30	155	2300	580	1080	122	49
4	58	44	33	30	29	31	150	2150	540	1900	121	52
5	59	48	33	30	29	31	145	1950	502	2220	110	54
6	54	46	33	30	29	31	140	1750	472	1600	102	51
7	54	43	33	30	29	31	135	1600	427	1200	94	48
8	54	43	33	30	29	31	130	1450	384	1000	93	45
9	53	47	33	30	29	32	125	1300	374	853	90	45
10	53	48	33	30	29	32	115	1250	364	700	85	45
11	53	47	33	30	29	32	130	1150	337	650	80	45
12	51	45	33	30	29	32	175	1100	307	600	74	45
13	49	43	33	30	29	33	425	1050	293	550	75	47
14	48	41	33	30	29	33	1230	1020	259	500	69	56
15	48	39	32	30	29	33	2000	980	228	454	58	56
16	45	38	32	30	29	34	4470	940	215	433	63	57
17	48	37	32	30	29	35	5440	890	202	410	62	55
18	51	36	32	30	29	36	6650	820	192	367	60	52
19	47	35	32	30	29	38	7800	770	167	322	59	47
20	43	35	32	30	29	40	8500	740	170	276	58	47
21	42	35	32	30	29	45	8650	710	250	230	56	44
22	40	35	31	30	29	50	7600	690	429	214	49	42
23	43	34	31	30	30	55	6500	670	550	200	60	41
24	47	34	31	30	30	70	5850	660	594	190	72	42
25	46	34	31	29	30	90	5400	650	570	177	75	39
26	43	34	31	29	30	120	5100	628	552	173	74	35
27	43	34	31	29	30	140	4600	616	512	164	73	33
28	43	34	31	29	30	160	3950	608	447	161	72	34
29	43	34	31	29	---	170	3250	600	557	154	67	36
30	43	34	31	29	---	170	2650	614	839	150	67	39
31	47	---	31	29	---	170	---	640	---	145	61	---
TOTAL	1531	1184	996	925	818	1895	91790	35146	12546	18692	2463	1387
MEAN	49.4	39.5	32.1	29.8	29.2	61.1	3060	1134	418	603	79.5	46.2
MAX	64	48	33	31	30	170	8650	2450	839	2220	136	57
MIN	40	34	31	29	29	30	115	600	167	145	49	33
AC-FT	3040	2350	1980	1830	1620	3760	182100	69710	24880	37080	4890	2750

CAL YR 1978 TOTAL 134598 MEAN 369 MAX 9220 MIN 31 AC-FT 267000
WTR YR 1979 TOTAL 169373 MEAN 464 MAX 8650 MIN 29 AC-FT 336000

05064000 WILD RICE RIVER AT HENDRUM, MN--Continued

WATER-QUALITY RECORDS

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (JTU) (00070)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)
OCT										
02...	1400	61	525	8.3	20.0	12.0	15	9.4	90	4.8
11...	1000	52	525	8.4	13.0	10.0	15	9.5	87	--
17...	1415	48	520	8.2	6.0	6.5	4	10.5	88	3.1
24...	1510	47	580	8.2	24.0	6.0	6	10.3	85	1.3
NOV										
07...	1000	43	590	8.2	1.5	2.0	5	11.9	89	1.3
DEC										
19...	1330	32	700	7.8	--	.0	3	4.9	35	--
JAN										
15...	1730	30	750	7.3	-16.0	.0	3	2.3	16	1.3
FEB										
13...	1200	29	680	7.4	-21.0	.0	1	5.6	40	--
MAR										
13...	0920	33	650	7.4	--	.0	5	12.8	93	3.0
APR										
04...	1645	151	600	7.7	-2.0	.5	5	12.0	86	--
10...	1000	114	621	8.0	.0	.0	10	10.2	72	4.9
18...	1030	6690	245	8.0	12.0	4.0	50	--	--	--
24...	1600	5750	360	8.2	8.5	9.0	65	9.2	81	--
30...	1500	2580	346	8.4	5.0	7.0	30	4.6	39	--
MAY										
08...	1045	1460	415	8.3	7.0	9.0	--	10.1	90	--
15...	1000	988	470	9.3	7.5	10.5	--	10.2	94	--
23...	0945	674	470	8.1	15.5	12.0	--	9.6	92	--
30...	1045	595	450	7.6	15.0	16.0	--	8.0	83	--
JUN										
05...	1415	460	480	8.2	24.0	20.0	--	7.5	84	--
12...	1430	308	530	9.4	26.0	19.0	--	8.6	96	--
19...	1015	158	480	8.2	16.0	20.5	--	8.8	99	--
26...	1030	545	500	7.5	21.0	18.0	--	--	--	--
JUL										
03...	0800	866	390	7.9	23.5	21.0	--	7.8	87	--
09...	1430	853	540	8.1	36.0	22.0	--	6.6	78	--
17...	1100	450	540	7.5	26.0	23.0	--	7.4	85	--
24...	1030	203	570	8.7	20.0	24.5	--	6.8	80	--
31...	1100	147	505	8.3	21.0	21.0	--	7.2	83	--
AUG										
28...	1230	72	540	8.2	22.0	19.0	--	7.7	86	--

05064000 WILD RICE RIVER AT HENDRUM, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	NITROGEN, NITRATE TOTAL (MG/L AS N) (00620)	NITROGEN, NITRITE TOTAL (MG/L AS N) (00615)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	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)
OCT										
02...	3.0	.02	.00	.02	.01	.60	.61	.63	.06	.03
11...	2.9	.00	.00	.00	.02	.98	1.0	1.0	.05	.02
17...	3.7	.00	.00	.00	.09	.56	.65	.65	.04	.02
24...	3.5	.00	.00	.00	.01	.64	.65	.65	.04	.03
NOV										
07...	3.7	.00	.00	.00	.00	.68	.68	.68	.01	.00
DEC										
19...	5.8	.13	.00	.13	.11	.66	.77	.90	.01	.01
JAN										
15...	4.5	.13	.01	.14	.15	.62	.77	.91	.03	.01
FEB										
13...	4.8	.23	.01	.24	.19	.71	.90	1.1	.03	.01
MAR										
13...	5.1	.43	.01	.44	.18	.70	.88	1.3	.03	.01
APR										
04...	8.1	2.0	.07	2.1	.34	.76	1.1	3.2	.07	.05
10...	6.7	.93	.02	.95	.17	.79	.96	1.9	.05	.03
18...	3.2	2.4	.14	2.5	.27	1.5	1.8	4.3	.33	.19
24...	4.1	2.1	.13	2.2	.16	.78	.94	3.1	.25	.15
30...	4.8	.64	.02	.66	.02	.84	.86	1.5	.10	.05
MAY										
08...	4.0	.15	.01	.16	.03	1.1	1.1	1.3	.13	.03
15...	4.7	.06	.02	.08	.08	.83	.91	.99	.06	.02
23...	3.4	.25	.00	.25	.01	.75	.76	1.0	.08	.01
30...	3.4	.02	.01	.03	.01	.95	.96	.99	.08	.02
JUN										
05...	3.8	.00	.00	.00	.01	1.1	1.1	1.1	.09	.06
12...	3.3	.01	.01	.02	.03	.78	.81	.83	.05	.03
19...	3.5	.01	.01	.02	.05	.70	.75	.77	.06	.02
26...	4.2	.51	.03	.54	.04	1.2	1.2	1.7	.12	.04
JUL										
03...	4.1	.50	.04	.54	.07	1.7	1.8	2.3	.29	.07
09...	4.1	.15	.02	.17	.08	1.3	1.4	1.6	.13	.07
17...	3.7	.10	.02	.12	.01	.99	1.0	1.1	.14	.08
24...	3.3	.11	.01	.12	.05	.91	.96	1.1	.11	.05
31...	3.5	.10	.02	.12	.09	.71	.80	.92	.10	.05
AUG										
28...	4.0	.06	.01	.07	.04	.73	.77	.84	.16	.13

05064000 WILD RICE RIVER AT HENDRUM, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	PH (UNITS) (00400)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)
OCT						
17...	1100	6.0	8.2	10.4	86	--
17...	1300	6.5	8.2	10.5	88	--
17...	1415	6.5	8.2	10.5	88	520
17...	1500	6.0	8.2	10.5	87	--
17...	1700	6.0	8.3	10.7	88	--
17...	1900	6.0	8.2	10.4	86	--
17...	2100	6.0	8.3	10.2	84	--
17...	2300	6.0	8.2	10.5	87	--
18...	0100	5.5	8.2	10.6	86	--
18...	0300	5.0	8.2	10.7	86	--
18...	0500	5.0	8.2	10.6	85	--
18...	0700	4.0	8.4	10.8	84	--
18...	0900	4.0	8.2	10.8	84	--
18...	1100	5.0	8.2	10.6	85	--
FEB						
12...	1500	.0	7.4	5.6	40	670
12...	2100	.0	7.6	5.8	41	660
12...	2300	.0	7.4	5.7	40	680
13...	0100	.0	7.6	5.3	37	670
13...	0300	.0	7.8	5.3	37	660
13...	0500	.0	7.8	5.9	42	680
13...	0700	.0	7.5	5.5	39	700
13...	0900	.0	7.5	5.4	38	640
13...	1100	.0	7.4	5.6	39	680
13...	1200	.0	7.4	5.6	40	680
13...	1300	.0	7.5	5.4	38	680
JUN						
05...	1100	19.5	8.3	8.0	89	500
05...	1300	20.0	8.2	8.3	93	495
05...	1415	20.0	8.2	7.5	84	480
05...	1500	20.0	8.3	--	--	480
05...	1700	20.0	8.2	8.2	92	495
05...	1900	19.5	8.3	8.2	91	505
05...	2100	19.0	8.3	8.2	90	515
05...	2300	19.0	8.3	8.3	91	505
06...	0100	18.5	8.2	8.4	91	505
06...	0300	18.0	--	8.2	88	505
06...	0500	18.0	8.2	8.2	88	505
06...	0700	18.0	8.2	8.3	89	495
06...	0900	18.0	--	8.4	90	505
JUL						
17...	1000	21.0	8.0	7.4	--	540
17...	1100	23.0	7.5	7.4	85	540
17...	1200	23.0	8.2	7.4	--	530
17...	1400	22.0	8.1	--	--	535
17...	1600	22.5	8.2	7.4	--	550
17...	1800	23.0	8.2	7.3	--	560
17...	2000	23.0	8.2	6.9	--	555
17...	2200	22.0	8.1	7.0	--	550
17...	2400	22.0	8.2	7.0	--	550
18...	0200	22.0	8.2	6.9	--	550
18...	0400	21.0	8.1	7.1	--	560
18...	0600	21.0	8.2	7.3	--	555
18...	0800	21.0	8.2	7.3	--	560

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.--18 years (1961-79), 1,885 ft^3/s (53.38 m^3/s), 1,366,000 acre-ft/yr (1.68 km^3/yr); median of yearly mean discharges, 1,880 ft^3/s (53.2 m^3/s), 1,362,000 acre-ft/yr (1.7 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, 42,000 ft^3/s (1,190 m^3/s) Apr. 22, gage height, 39.00 ft (11.887 m); minimum daily, 160 ft^3/s (4.53 m^3/s) Jan. 21-28.

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	380	277	325	210	165	185	1300	24600	3040	3780	1980	1110
2	431	266	315	210	165	185	1350	21900	3010	3650	2100	1080
3	428	258	305	210	165	185	1410	19000	2970	3580	2170	1050
4	412	258	290	205	165	190	1420	16400	2930	3500	2070	1010
5	402	258	285	205	165	200	1430	14700	2900	3450	1920	996
6	399	255	282	200	165	225	1500	13700	2870	3400	1780	970
7	389	258	278	200	165	280	1620	13000	2860	3300	1660	947
8	376	252	275	195	170	340	1950	12100	2840	3200	1590	924
9	370	258	273	190	170	370	2200	11400	2750	3100	1530	905
10	367	297	271	185	170	380	2600	10600	2700	3080	1480	871
11	354	311	269	180	170	385	2800	10100	2650	3050	1420	867
12	335	283	267	180	170	385	3100	9500	2600	3000	1350	848
13	305	258	265	180	170	385	3900	8800	2570	2800	1300	841
14	280	260	263	175	175	390	5500	8400	2540	2600	1250	837
15	258	275	262	175	175	395	8500	8080	2500	2300	1220	834
16	247	280	260	175	175	400	13200	7880	2450	2000	1200	830
17	231	280	255	170	175	410	18200	7720	2390	2010	1190	823
18	229	280	255	170	175	420	24000	7220	2380	2020	1180	812
19	226	280	250	165	180	445	31000	6500	2330	2050	1150	808
20	226	280	250	165	180	470	35900	5750	2340	2060	1130	798
21	224	280	245	160	180	530	39100	5190	2380	1960	1090	790
22	229	300	240	160	180	630	41500	4720	2410	1570	1140	769
23	234	305	235	160	180	600	40300	4400	2610	1520	1180	754
24	242	310	230	160	180	530	38600	4100	3020	1540	1130	736
25	229	310	230	160	185	560	37200	3800	3420	1690	1150	730
26	242	310	230	160	185	600	35800	3500	3580	1590	1240	726
27	247	310	225	160	185	630	34400	3250	3480	1610	1230	719
28	252	315	225	160	185	700	32800	3190	3180	1720	1190	698
29	260	320	220	165	---	780	30300	3140	3110	1910	1140	674
30	266	325	220	165	---	960	27600	3100	3540	2040	1120	656
31	280	---	215	165	---	1160	---	3070	---	2030	1110	---
TOTAL	9350	8509	8010	5520	4870	14305	520480	278810	84350	77110	43390	25413
MEAN	302	284	258	178	174	461	17350	8994	2812	2487	1400	847
MAX	431	325	325	210	185	1160	41500	24600	3580	3780	2170	1110
MIN	224	252	215	160	165	185	1300	3070	2330	1520	1090	656
AC-FT	18550	16880	15890	10950	9660	28370	1032000	553000	167300	152900	86060	50410

CAL YR 1978 TOTAL 854911 MEAN 2342 MAX 28700 MIN 188 AC-FT 1696000
WTR YR 1979 TOTAL 1080117 MEAN 2959 MAX 41500 MIN 160 AC-FT 2142000

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 TEMPERATURE: February 1977 to current year.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,050 micromhos Oct. 4, 1978; minimum daily, 225 micromhos Apr. 5, 1978.
WATER TEMPERATURE: Maximum daily, 29.0°C Aug. 14, 1978; minimum observed, 0.0°C on many days during winter months.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,050 micromhos Oct. 4; minimum daily, 300 micromhos Apr. 18, 24.
WATER TEMPERATURE: Maximum daily, 26.5°C July 25; minimum observed, 0.0°C on many days during winter months.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML) (31501)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD-NESS (MG/L AS CACO3) (00900)
OCT												
24...	1315	240	719	8.4	--	6.5	15	11.6	--	K10	K23	290
NOV												
29...	1445	325	1190	8.0	10.0	.5	4.7	10.0	--	K20	100	380
DEC												
18...	1400	255	1000	7.5	--	.0	2.7	6.8	--	K640	1800	410
JAN												
23...	1340	160	1020	7.3	--	.0	2.2	3.4	--	K13	42	410
FEB												
27...	1350	205	910	7.8	--	.0	2.7	3.2	--	K13	1150	380
MAR												
20...	1240	468	780	8.2	--	.5	3.0	2.4	--	31	810	360
APR												
17...	1615	19100	255	--	--	1.5	--	--	--	--	--	--
21...	1325	39100	270	--	--	7.5	--	--	--	--	--	--
23...	1630	39700	295	--	--	9.0	--	--	--	--	--	--
MAY												
01...	1325	24600	440	--	--	8.0	--	--	--	--	--	--
03...	1115	19200	480	7.7	--	7.0	93	10.4	--	83	3200	210
09...	1200	11400	500	--	--	8.0	--	--	--	--	--	--
JUN												
08...	1135	2770	500	8.2	--	19.0	84	7.4	--	K90	K95	290
JUL												
03...	1435	3600	580	8.2	--	23.0	56	6.4	--	340	1100	260
04...	1435	3600	580	8.2	--	23.0	--	6.4	--	--	--	--
31...	1350	2020	655	8.2	--	24.0	180	6.2	470	--	380	300
SEP												
10...	1340	870	550	8.4	--	19.5	26	8.0	--	320	390	240

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	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 PERCENT (00932)	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)
OCT												
24...	73	63	33	44	24	1.1	8.8	220	120	29	.2	12
NOV												
29...	95	76	45	60	25	1.3	9.2	280	190	31	.4	12
DEC												
18...	110	85	48	67	26	1.4	9.6	300	190	35	.4	16
JAN												
23...	52	89	46	48	20	1.0	8.2	360	140	26	.3	19
FEB												
27...	46	83	41	50	22	1.1	8.3	330	120	30	.3	22
MAR												
20...	52	79	40	35	17	.8	8.0	310	100	18	.3	21
APR												
17...	--	--	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--	--	--
25...	--	--	--	--	--	--	--	--	--	--	--	--
MAY												
01...	--	--	--	--	--	--	--	--	--	--	--	--
03...	80	51	20	18	15	.5	7.6	130	97	9.8	.2	14
09...	--	--	--	--	--	--	--	--	--	--	--	--
JUN												
08...	100	63	33	27	16	.7	7.0	190	130	12	.2	6.9
JUL												
03...	83	54	31	21	14	.6	6.3	180	130	9.6	.2	14
04...	--	--	--	--	--	--	--	--	--	--	--	--
31...	86	64	33	31	29	.8	6.7	210	150	14	.2	19
SEP												
10...	27	47	29	22	16	.6	5.5	210	81	11	.2	16

DATE	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N) (00624)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, TOTAL (MG/L AS N) (00600)
OCT												
24...	461	442	.63	299	.42	--	.20	.80	1.0	.28	.72	1.4
NOV												
29...	577	592	.78	506	.23	--	.72	.78	1.5	.00	1.5	1.7
DEC												
18...	656	631	.89	452	.27	--	1.6	1.4	3.0	.10	2.9	3.3
JAN												
23...	611	593	.83	264	.52	--	.63	.77	1.4	.00	1.4	1.9
FEB												
27...	590	553	.80	327	.71	--	.81	.79	1.6	.10	1.5	2.3
MAR												
20...	470	488	.64	594	.36	--	.41	.79	1.2	.10	1.1	1.6
APR												
17...	--	--	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--	--	--
MAY												
01...	--	--	--	--	--	--	--	--	--	--	--	--
03...	302	296	.41	15700	1.3	--	.10	1.5	1.6	.78	.82	2.9
09...	--	--	--	--	--	--	--	--	--	--	--	--
JUN												
08...	435	393	.59	3250	.33	--	.06	1.1	1.2	.38	.82	1.5
JUL												
03...	383	374	.52	3720	.52	--	.04	1.3	1.3	.50	.80	1.8
04...	--	--	--	--	--	--	--	--	--	--	--	--
31...	451	444	.59	2350	.52	--	.01	1.2	1.2	.39	.81	1.7
SEP												
10...	331	340	.45	778	.28	.33	.04	1.2	1.2	.00	1.2	1.5

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	NITROGEN, DISSOLVED (MG/L AS N) (00602)	NITROGEN, TOTAL (MG/L AS NO3) (71887)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHATE, TOTAL (MG/L AS PO4) (00650)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC SUSPENDED TOTAL (UG/L AS AS) (01001)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA) (01007)	BARIUM, SUSPENDED RECOVERABLE (UG/L AS BA) (01006)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)
OCT												
24...	--	6.3	.29	--	.23	4	--	4	0	0	80	0
NOV												
29...	--	7.7	.64	--	.61	--	--	--	--	--	--	--
DEC												
18...	--	14	2.7	--	1.8	--	--	--	--	--	--	--
JAN												
23...	--	8.5	.26	--	.24	3	--	2	100	0	100	--
FEB												
27...	--	10	.30	--	.23	--	--	--	--	--	--	--
MAR												
20...	--	6.9	.13	--	.16	--	--	--	--	--	--	--
APR												
17...	--	--	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--	--	--
25...	--	--	--	--	--	--	--	--	--	--	--	--
MAY												
01...	--	--	--	--	--	--	--	--	--	--	--	--
03...	--	13	.33	1.0	.16	4	--	4	100	100	0	1
09...	--	--	--	--	--	--	--	--	--	--	--	--
JUN												
08...	--	6.8	.31	.95	.15	--	--	--	--	--	--	--
JUL												
03...	--	8.1	.29	.89	.11	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--	--	--	--
31...	--	7.6	.26	--	.16	7	--	6	100	0	100	1
SEP												
10...	1.5	6.6	.41	--	.04	5	0	5	200	100	90	1

DATE	CADMIUM SUSPENDED RECOVERABLE (UG/L AS CD) (01026)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, SUSPENDED RECOV. (UG/L AS CR) (01031)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOVERABLE (UG/L AS CO) (01037)	COBALT, SUSPENDED RECOVERABLE (UG/L AS CO) (01036)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, SUSPENDED RECOVERABLE (UG/L AS CU) (01041)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)
OCT												
24...	0	<1	0	0	0	0	0	<1	5	2	3	480
NOV												
29...	--	--	--	--	--	--	--	--	--	--	--	--
DEC												
18...	--	--	--	--	--	--	--	--	--	--	--	--
JAN												
25...	--	--	10	10	0	2	0	<3	3	2	1	150
FEB												
27...	--	--	--	--	--	--	--	--	--	--	--	--
MAR												
20...	--	--	--	--	--	--	--	--	--	--	--	--
APR												
17...	--	--	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--	--	--
25...	--	--	--	--	--	--	--	--	--	--	--	--
MAY												
01...	--	--	--	--	--	--	--	--	--	--	--	--
03...	1	0	10	10	0	2	0	4	5	4	1	5300
09...	--	--	--	--	--	--	--	--	--	--	--	--
JUN												
08...	--	--	--	--	--	--	--	--	--	--	--	--
JUL												
03...	--	--	--	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--	--	--	--
31...	0	4	10	10	0	3	0	<3	11	7	4	6500
SEP												
10...	0	<1	10	10	0	0	0	<3	6	4	2	1500

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, SUS-PENDED RECOV-ERABLE (UG/L AS PB) (01050)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN) (01054)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	MERCURY SUS-PENDED RECOV-ERABLE (UG/L AS HG) (71895)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)
OCT											
24...	20	10	10	0	90	80	6	.0	.0	.0	0
NOV											
29...	--	--	--	--	--	--	--	--	--	--	--
DEC											
18...	--	--	--	--	--	--	--	--	--	--	--
JAN											
23...	20	--	--	--	80	10	70	.0	.0	.0	0
FEB											
27...	--	--	--	--	--	--	--	--	--	--	--
MAR											
20...	--	--	--	--	--	--	--	--	--	--	--
MAY											
03...	20	19	19	0	380	350	30	29	22	6.9	1
JUN											
08...	--	--	--	--	--	--	--	--	--	--	--
JUL											
03...	--	--	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--	--	--
31...	70	10	9	1	500	480	20	.4	.1	.3	1
SEP											
10...	<10	7	7	0	160	150	10	.2	.1	.1	0

DATE	SELE-NIUM, SUS-PENDED TOTAL (UG/L AS SE) (01146)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, SUS-PENDED RECOV-ERABLE (UG/L AS AG) (01076)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, SUS-PENDED RECOV-ERABLE (UG/L AS ZN) (01091)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	GROSS ALPHA, DIS-SOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DIS-SOLVED (PCI/L AS CS-137) (03515)
OCT											
24...	0	1	1	1	0	50	50	<3	<4.1	.7	12
NOV											
29...	--	--	--	--	--	--	--	--	--	--	--
DEC											
18...	--	--	--	--	--	--	--	--	--	--	--
JAN											
23...	0	0	1	1	0	20	20	5	--	--	--
FEB											
27...	--	--	--	--	--	--	--	--	--	--	--
MAR											
20...	--	--	--	--	--	--	--	--	--	--	--
MAY											
03...	1	0	0	0	0	70	0	190	<4.8	5.7	10
JUN											
08...	--	--	--	--	--	--	--	--	--	--	--
JUL											
03...	--	--	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--	--	--
31...	1	0	0	0	0	40	10	30	--	--	--
SEP											
10...	0	0	0	0	0	0	0	20	--	--	--

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DIS-SOLVED (PCI/L AS SR/YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90) (80060)	RADIUM 226, DIS-SOLVED, RADON METHOD (PCI/L) (09511)	URANIUM DIS-SOLVED, EXTRAC-TION (UG/L) (80020)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	PHYTO-PLANK-TON, TOTAL (CELLS PER ML) (60050)	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M (00573)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M (00572)
OCT										
24...	1.4	11	1.4	.13	2.5	--	1.3	39000	.315	.157
NOV										
29...	--	--	--	--	--	9.1	1.0	--	--	--
DEC										
18...	--	--	--	--	--	10	.1	--	--	--
JAN										
23...	--	--	--	--	--	10	.4	--	.000	.000
FEB										
27...	--	--	--	--	--	10	.8	20000	--	--
MAR										
20...	--	--	--	--	--	9.8	--	--	--	--
MAY										
03...	4.1	9.4	4.0	.07	3.0	11	2.4	--	--	--
JUN										
08...	--	--	--	--	--	14	2.6	3600	--	--
JUL										
03...	--	--	--	--	--	18	1.0	--	--	--
04...	--	--	--	--	--	--	--	700	--	--
31...	--	--	--	--	--	9.8	3.6	1400	.550	.470
SEP										
10...	--	--	--	--	--	10	2.1	180000	--	--

DATE	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUORUM (MG/M2) (70957)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUORUM (MG/M2) (70958)	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					
24...	.130	.000	32	21	98
NOV					
29...	--	--	24	21	70
DEC					
18...	--	--	6	4.1	90
JAN					
23...	.090	.000	8	3.5	85
FEB					
27...	--	--	14	7.7	84
MAR					
20...	--	--	11	14	76
MAY					
03...	--	--	166	8610	99
JUN					
08...	--	--	136	1020	100
JUL					
03...	--	--	204	1980	100
31...	.000	.000	330	1800	99
SEP					
10...	--	--	89	209	99

05064500 RED RIVER OF THE NORTH AT HALSTAD, MN--Continued
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO SEPTEMBER 1979

DATE	OCT 24,78		FEB 27,79		JUN 8,79		JUL 4,79		JUL 31,79		SEP 10,79	
TIME	1315		1350		1135		1435		1350		1340	
TOTAL CELLS/ML	39000		20000		3600		700		1400		180000	
DIVERSITY: DIVISION	1.3		0.2		1.4		0.5		1.8		0.5	
.CLASS	1.4		0.2		1.4		0.5		1.8		0.5	
..ORDER	1.9		0.2		2.0		0.5		2.3		0.5	
...FAMILY	2.1		0.2		2.7		0.5		2.9		0.0	
....GENUS	2.5		0.2		3.4		0.5		3.3		0.0	
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	--	-	--	-	410	12	--	-	--	-	*	0
...HYDRODICTYACEAE												
....PEDIASTRUM	--	-	--	-	--	-	--	-	84	6	--	-
...MICRACTINIACEAE												
....GOLENKINIA	280	1	--	-	100	3	--	-	--	-	--	-
....MICRACTINIUM	550	1	--	-	--	-	620#	89	--	-	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	830	2	--	-	52	1	--	-	98	7	*	0
....CHODATELLA	830	2	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-	1600	1
....GLOEOACTINIUM	--	-	--	-	--	-	--	-	--	-	*	0
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-	*	0
....NEPHROCYTIUM	--	-	--	-	--	-	--	-	--	-	*	0
....OOCYSTIS	550	1	--	-	260	7	--	-	110	8	*	0
....POLYEDRIOPSIS	--	-	--	-	--	-	--	-	--	-	*	0
....QUADRIGULA	--	-	--	-	--	-	--	-	--	-	*	0
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-	*	0
....TREUBARIA	--	-	--	-	52	1	--	-	--	-	--	-
...SCENEDESMACEAE												
....ACTINASTRUM	1100	3	--	-	--	-	--	-	--	-	*	0
....SCENEDESMUS	3900	10	--	-	310	9	--	-	130	9	1100	1
....TETRASTRUM	--	-	--	-	--	-	--	-	56	4	*	0
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	1100	3	520	3	150	4	--	-	14	1	*	0
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	20000#	52	--	-	150	4	77	11	150	11	5300	3
....MELOSIRA	--	-	--	-	570#	16	--	-	70	5	*	0
....SKELETONEMA	1700	4	--	-	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	620#	17	--	-	--	-	--	-
..PENNALES												
...NAVICULACEAE												
....NAVICULA	--	-	--	-	52	1	--	-	--	-	--	-
...NITZSCHIACEAE												
....NITZSCHIA	2500	6	--	-	520	14	--	-	28	2	*	0
...SURIRELLACEAE												
....SURIRELLA	--	-	--	-	--	-	--	-	14	1	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...UCHROMONADACEAE												
....UCHROMONAS	830	2	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	--	-	52	1	--	-	--	-	--	-
...CRYPTOMONADACEAE												
....CRYPTOMONAS	280	1	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....ANACYSTIS	4400	11	--	-	260	7	--	-	390#	28	170000#	92
....COCCOCHLORIS	--	-	19000#	97	--	-	--	-	--	-	--	-
..HORMOGONALES												
...OSCILLATORIACEAE												
....OSCILLATORIA	--	-	--	-	--	-	--	-	140	10	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	--	-	--	-	--	-	14	1	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	110	8	*	0
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..PERIDINIALES	--	-	--	-	--	-	--	-	--	-	*	0

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

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	900	710	900	875	890	850	600	450	630	590	610	600
2	950	720	905	810	860	820	580	460	620	600	600	590
3	1030	700	925	800	870	800	575	480	620	580	600	590
4	1050	710	920	800	870	775	570	500	610	540	580	600
5	950	700	940	805	840	770	560	500	610	---	570	600
6	925	700	950	810	800	800	555	560	620	---	540	600
7	850	725	950	790	780	750	550	530	620	600	560	590
8	760	690	950	770	825	710	560	520	610	650	550	580
9	720	710	1000	740	850	700	550	500	625	640	560	580
10	800	720	1000	780	800	720	560	520	625	650	540	590
11	850	690	995	800	835	750	575	500	640	640	560	590
12	855	720	990	840	810	760	580	540	670	680	550	550
13	800	710	995	860	835	750	580	530	680	680	560	510
14	750	700	995	870	845	725	530	500	700	670	560	530
15	750	725	1000	850	850	710	460	520	695	---	570	540
16	730	735	1000	880	840	720	400	530	700	---	580	560
17	780	730	1010	890	800	700	360	530	720	650	600	560
18	775	700	990	900	820	675	300	550	700	640	590	550
19	790	750	990	910	810	640	320	560	700	610	600	520
20	800	760	980	950	810	700	360	540	680	600	600	500
21	790	775	975	950	800	745	350	560	690	600	600	480
22	750	790	975	940	810	690	340	580	680	620	590	500
23	720	840	940	930	840	630	320	580	640	600	580	470
24	725	850	860	950	850	650	300	600	620	600	560	460
25	710	860	820	930	870	635	320	600	600	600	560	480
26	710	850	810	900	890	600	340	600	580	600	550	470
27	720	875	810	880	900	600	340	620	560	590	570	480
28	720	880	830	870	910	610	370	620	570	600	565	470
29	710	900	830	880	---	590	410	600	570	585	580	450
30	720	920	875	900	---	590	420	620	590	610	575	500
31	720	---	875	910	---	620	---	610	---	750	580	---
MEAN	800	762	935	864	840	703	455	545	639	621	574	536

WTR YR 1979 MEAN 690 MAX 1050 MIN 300

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.5	6.5	1.0	1.0	1.0	1.0	1.5	9.0	19.5	23.0	24.5	20.5
2	13.5	6.5	1.0	1.0	1.0	1.0	1.5	9.0	20.0	23.0	24.5	20.5
3	13.0	6.5	1.0	1.0	1.0	1.0	2.0	9.0	20.0	23.0	25.0	20.0
4	13.5	6.5	1.0	1.0	1.0	1.0	2.0	9.0	20.0	22.0	23.5	24.5
5	11.5	6.0	1.0	1.0	1.0	1.0	2.0	8.5	19.0	---	24.5	22.0
6	11.5	5.5	1.0	1.0	1.0	1.0	2.0	9.0	19.5	---	25.0	21.5
7	11.0	5.5	1.0	1.0	1.0	1.0	2.5	9.0	19.5	23.0	25.5	21.0
8	9.5	7.0	1.0	1.0	1.0	1.5	2.5	9.0	19.0	23.0	26.0	21.0
9	11.0	5.5	1.0	1.0	1.0	1.5	3.0	9.0	19.0	24.0	26.0	20.5
10	11.0	5.5	1.0	1.0	1.0	1.5	3.0	9.0	19.5	24.0	25.5	21.0
11	10.5	4.0	1.0	1.0	1.0	1.5	3.0	10.0	20.0	25.0	25.0	21.0
12	11.0	2.0	1.0	1.0	1.0	1.5	2.5	10.0	21.5	25.0	22.0	20.0
13	11.0	1.5	1.0	1.0	1.0	1.0	2.5	11.0	22.0	26.0	21.0	19.0
14	10.0	1.5	1.0	1.0	1.0	1.0	3.0	11.0	23.0	25.5	20.5	21.0
15	10.0	1.0	1.0	1.0	1.0	1.0	4.0	11.5	21.5	---	20.5	22.0
16	10.0	1.5	1.0	1.0	1.0	1.0	3.0	12.0	22.0	---	20.5	21.0
17	9.0	1.5	1.0	1.0	1.0	1.0	3.0	13.5	21.5	24.0	22.0	20.0
18	9.0	2.0	1.0	1.0	1.0	1.5	3.0	14.5	21.0	23.0	23.0	19.0
19	9.5	3.0	1.0	1.0	1.0	1.5	4.0	14.5	21.0	24.0	22.5	18.5
20	11.0	1.5	1.0	1.0	1.0	1.5	5.0	15.0	20.0	26.0	22.5	18.0
21	10.5	1.5	1.0	1.0	1.0	1.5	6.0	14.5	19.5	26.0	23.0	17.0
22	9.5	1.0	1.0	1.0	1.0	2.0	7.0	15.0	19.0	26.0	23.0	17.0
23	8.5	1.0	1.0	1.0	1.0	2.0	8.0	15.0	20.0	26.0	21.0	17.5
24	9.5	1.0	1.0	1.0	1.0	1.5	8.0	15.5	21.0	26.0	21.0	17.5
25	9.5	1.0	1.0	1.0	1.0	1.0	9.0	15.5	21.0	26.5	22.0	18.5
26	8.5	1.0	1.0	1.0	1.0	1.5	9.0	16.0	23.0	26.0	21.0	18.5
27	8.5	1.0	1.0	1.0	1.0	1.5	9.0	17.0	23.0	25.0	22.5	17.5
28	6.5	1.0	1.0	1.0	1.0	1.5	9.0	19.0	23.0	24.0	22.0	17.5
29	7.0	1.0	1.0	1.0	---	1.5	9.0	19.0	23.0	24.0	22.5	16.0
30	7.5	1.0	1.0	1.0	---	2.0	9.0	18.5	23.0	24.5	22.5	15.0
31	6.5	---	1.0	1.0	---	1.5	---	19.0	---	24.5	23.5	---
MEAN	10.0	3.0	1.0	1.0	1.0	1.5	4.5	13.0	21.0	24.5	23.0	19.5

WTR YR 1979 MEAN 10.0 MAX 26.5 MIN 1.0

05067500 MARSH RIVER NEAR SHELLY, MN

LOCATION.--Lat 47°24'45", long 96°45'50", in NE 1/4 NW 1/4 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.--35 years, 69.6 ft^3/s (1.971 m^3/s), 50,420 acre-ft/yr (62.2 hm^3/yr); median of yearly mean discharges, 45.9 ft^3/s (1.30 m^3/s), 33,300 acre-ft/yr (41.1 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, 4,880 ft^3/s (138 m^3/s) Apr. 19, gage height, 23.36 ft (7.120 m), from floodmarks; no flow on many days.

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	.00	.00	.00	.00	.00	.00	.00	230	63	41	4.3	.58
2	.00	.00	.00	.00	.00	.00	.00	155	55	73	4.0	.42
3	.00	.00	.00	.00	.00	.00	.00	110	44	126	3.1	.42
4	.00	.00	.00	.00	.00	.00	.00	80	32	262	3.9	.42
5	.00	.00	.00	.00	.00	.00	.00	52	26	274	4.2	.34
6	.00	.00	.00	.00	.00	.00	.00	45	17	213	4.5	.28
7	.00	.00	.00	.00	.00	.00	.00	42	15	139	3.1	.10
8	.00	.00	.00	.00	.00	.00	.00	44	12	88	1.6	.04
9	.00	.00	.00	.00	.00	.00	.00	52	9.8	66	1.4	.00
10	.00	.00	.00	.00	.00	.00	.00	48	8.4	55	.74	.00
11	.00	.00	.00	.00	.00	.00	.00	41	8.2	44	.66	.00
12	.00	.00	.00	.00	.00	.00	1.0	36	6.4	38	.78	.00
13	.00	.00	.00	.00	.00	.00	10	31	5.8	33	.90	.00
14	.00	.00	.00	.00	.00	.00	40	30	4.9	33	.58	.00
15	.00	.00	.00	.00	.00	.00	150	25	3.7	27	.50	.00
16	.00	.00	.00	.00	.00	.00	870	26	3.3	22	.42	.00
17	.00	.00	.00	.00	.00	.00	1700	23	2.5	18	.50	.00
18	.00	.00	.00	.00	.00	.00	3790	19	2.5	14	.50	.00
19	.00	.00	.00	.00	.00	.00	4740	18	1.6	13	.50	.00
20	.00	.00	.00	.00	.00	.00	4100	18	3.1	11	.28	.00
21	.00	.00	.00	.00	.00	.00	3000	18	3.0	8.4	.50	.00
22	.00	.00	.00	.00	.00	.00	2200	16	2.2	8.3	.74	.00
23	.00	.00	.00	.00	.00	.00	1600	17	6.7	8.0	.74	.00
24	.00	.00	.00	.00	.00	.00	1150	18	11	7.4	.66	.00
25	.00	.00	.00	.00	.00	.00	860	17	11	6.4	.58	.00
26	.00	.00	.00	.00	.00	.00	700	18	10	6.2	.58	.00
27	.00	.00	.00	.00	.00	.00	613	14	9.0	4.5	.58	.00
28	.00	.00	.00	.00	.00	.00	530	13	7.4	4.5	1.1	.00
29	.00	.00	.00	.00	---	.00	435	12	6.4	3.9	1.0	.00
30	.00	.00	.00	.00	---	.00	355	20	11	4.3	.66	.00
31	.00	---	.00	.00	---	.00	---	66	---	3.5	.58	---
TOTAL	.00	.00	.00	.00	.00	.00	26844.00	1354	401.9	1655.4	44.18	2.60
MEAN	.000	.000	.000	.000	.000	.000	895	43.7	13.4	53.4	1.43	.087
MAX	.00	.00	.00	.00	.00	.00	4740	230	63	274	4.5	.58
MIN	.00	.00	.00	.00	.00	.00	.00	12	1.6	3.5	.28	.00
AC-FT	.00	.00	.00	.00	.00	.00	53250	2690	797	3280	88	5.2

CAL YR 1978 TOTAL 21112.11 MEAN 57.8 MAX 2220 MIN .00 AC-FT 41880
WTR YR 1979 TOTAL 30302.08 MEAN 83.0 MAX 4740 MIN .00 AC-FT 60100

05069000 SAND HILL RIVER AT CLIMAX, MN

LOCATION.--Lat 47°36'43", long 96°48'52", in NE 1/4 NE 1/4 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 good except those for period of backwater from the Red River of the North, Apr. 13 to May 8, which are poor.

AVERAGE DISCHARGE.--33 years (water years 1947-79), 71.9 ft^3/s (2.036 m^3/s), 52,090 acre-ft/yr (64.2 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, 3,400 ft^3/s (96.3 m^3/s) Apr. 20, maximum gage height, 32.79 ft (9.994 m) Apr. 23 (backwater from Red River of the North); minimum daily discharge, 9.0 ft^3/s (0.26 m^3/s) Mar. 6; minimum gage height, 4.75 ft (1.448 m) Oct. 1, 2.

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	12	15	14	12	13	9.8	26	500	87	350	79	29
2	12	15	14	12	13	9.6	25	430	84	619	86	27
3	12	15	14	12	13	9.4	24	370	80	536	86	24
4	12	15	14	12	13	9.2	24	320	78	400	81	22
5	12	16	14	12	13	9.1	24	270	75	276	76	22
6	12	16	14	12	13	9.0	23	230	69	230	70	21
7	13	15	14	12	14	9.1	23	200	65	198	64	20
8	14	15	14	12	14	9.1	23	185	61	179	58	18
9	14	15	14	12	14	9.2	23	170	55	160	55	18
10	14	15	14	12	14	9.3	23	158	50	147	50	18
11	15	17	14	12	14	9.4	24	150	47	132	46	18
12	13	19	14	12	14	9.6	26	144	43	125	42	18
13	12	17	13	12	14	9.8	36	139	50	153	40	17
14	12	15	13	12	14	10	84	132	44	158	36	17
15	12	15	13	12	14	10	185	126	39	150	33	16
16	15	14	13	12	14	11	560	119	34	130	31	16
17	12	14	13	12	14	12	1300	106	34	109	29	15
18	14	14	13	12	13	14	2240	102	33	102	30	15
19	13	14	13	12	13	17	3040	93	31	101	28	17
20	13	14	13	12	13	22	3360	95	41	95	27	16
21	14	14	13	12	12	27	3230	88	56	91	27	16
22	15	14	13	12	12	29	2660	91	52	84	32	16
23	15	14	13	12	12	30	2050	93	56	78	31	17
24	16	14	13	12	11	31	1600	93	64	74	33	20
25	14	14	13	12	11	31	1320	93	69	72	35	21
26	15	14	13	12	11	30	1100	87	70	68	34	16
27	15	14	13	12	10	29	925	84	88	66	32	12
28	15	14	13	12	10	28	800	77	232	64	34	10
29	15	14	12	12	---	28	690	74	190	59	32	11
30	14	14	12	13	---	27	600	72	156	64	32	12
31	15	---	12	13	---	26	---	84	---	75	31	---
TOTAL	421	445	412	374	360	533.6	26068	4975	2133	5145	1400	535
MEAN	13.6	14.8	13.3	12.1	12.9	17.2	869	160	71.1	166	45.2	17.8
MAX	16	19	14	13	14	31	3360	500	232	619	86	29
MIN	12	14	12	12	10	9.0	23	72	31	59	27	10
AC-FT	835	883	817	742	714	1060	51710	9870	4230	10210	2780	1060

CAL YR 1978 TOTAL 36974.6 MEAN 101 MAX 3050 MIN 7.1 AC-FT 73340
WTR YR 1979 TOTAL 42801.6 MEAN 117 MAX 3360 MIN 9.0 AC-FT 84900

05074000 LOWER RED LAKE NEAR RED LAKE, MN

LOCATION.--Lat 47°57'27", long 95°16'34", in SW 1/4 NW 1/4 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, 7.20 ft (2.195 m) July 3; maximum daily, 6.70 ft (2.042 m) July 3; minimum, 3.82 ft (1.164 m) Nov. 5; minimum daily, 4.58 ft (1.396 m) Nov. 5.

MONTHEND GAGE HEIGHT, IN FEET, OCTOBER 1978 TO SEPTEMBER 1979

Oct. 31 ..... 4.98	Feb. 28 ..... 5.12	June 30 ..... 6.50
Nov. 30 ..... 5.06	Mar. 31 ..... 5.20	July 31 ..... 6.45
Dec. 31 ..... 5.03	Apr. 30 ..... 6.19	Aug. 31 ..... 6.08
Jan. 18 ..... 5.06	May 31 ..... 6.50	Sept.30 ..... 5.63

NOTE.--Mean daily gage heights are available. No record Jan. 19 to Feb. 19.

05074500 RED LAKE RIVER NEAR RED LAKE, MN

LOCATION.--Lat 47°57'27", long 95°16'35", in SW 1/4 NW 1/4 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.--46 years, 490 ft^3/s (13.88 m^3/s), 355,000 acre-ft/yr (438 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, 1,260 ft^3/s (35.7 m^3/s) July 3, gage height, 5.21 ft (1.588 m); maximum gage height, 5.76 ft (1.756 m) Sept. 10, affected by seiches and backwater from aquatic vegetation; maximum daily discharge, 1,220 ft^3/s (34.6 m^3/s) May 30; minimum daily, 110 ft^3/s (3.12 m^3/s) Apr. 18-21, 26-29.

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	320	387	400	400	395	390	395	600	1160	1200	1040	1080
2	328	394	400	400	395	390	395	630	1140	1200	1040	1090
3	328	397	400	400	395	390	395	637	1140	1180	1040	1080
4	328	384	400	400	395	390	395	651	1160	1080	1040	1080
5	331	406	400	400	395	390	395	637	1160	1050	1040	1080
6	331	378	400	400	395	390	395	626	1150	1030	1040	1080
7	328	372	400	400	395	390	400	620	1150	1020	1030	1070
8	325	378	400	400	395	390	400	610	1140	1020	1030	1070
9	325	381	400	400	395	390	400	600	1130	1010	1040	1070
10	328	394	400	400	395	390	400	600	1120	1000	1050	1090
11	334	378	400	400	390	390	400	600	1110	996	1040	1080
12	328	363	400	400	390	390	400	650	1100	999	1030	1070
13	328	378	400	400	390	390	400	800	1100	999	1050	1060
14	331	428	400	400	390	390	400	1000	1100	1010	1040	1060
15	334	390	400	395	390	390	400	1070	1100	999	1040	1040
16	328	395	400	395	390	390	400	1100	1110	992	1030	1040
17	328	395	400	395	390	390	130	1090	1100	984	1040	1040
18	334	395	400	395	390	390	110	1080	1100	984	1040	1030
19	331	400	400	395	390	390	110	1080	1130	984	1050	1020
20	360	400	400	395	390	390	110	1080	1160	988	1050	1020
21	419	400	400	395	390	390	110	1100	1160	988	1060	1020
22	409	400	400	395	390	390	140	1140	1150	996	1070	1020
23	397	400	400	395	390	395	500	1160	1140	1010	1080	1020
24	400	400	400	395	390	395	500	1150	1120	1040	1070	1010
25	394	400	400	395	390	395	140	1160	1110	1030	1070	988
26	397	400	400	395	390	395	110	1170	1090	1040	1070	984
27	397	400	400	395	390	395	110	1170	1080	1040	1070	980
28	394	400	400	395	390	395	110	1180	1080	1030	1070	980
29	387	400	400	395	---	395	110	1180	1110	1030	1070	968
30	394	400	400	395	---	395	140	1220	1180	1040	1070	961
31	384	---	400	395	---	395	---	1200	---	1050	1070	---
TOTAL	10980	11793	12400	12315	10970	12135	8800	28591	33780	32019	32570	31181
MEAN	354	393	400	397	392	391	293	922	1126	1033	1051	1039
MAX	419	428	400	400	395	395	500	1220	1180	1200	1080	1090
MIN	320	363	400	395	390	390	110	600	1080	984	1030	961
AC-FT	21780	23390	24600	24430	21760	24070	17450	56710	67000	63510	64600	61850

CAL YR 1978 TOTAL 180332 MEAN 494 MAX 885 MIN 146 AC-FT 357700
WTR YR 1979 TOTAL 237534 MEAN 651 MAX 1220 MIN 110 AC-FT 471100

NOTE.--No gage-height record Mar. 3 to Apr. 5.

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

LOCATION.--Lat 48°02'34", long 95°48'28", in NW 1/4 NW 1/4 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.--50 years, 543 ft^3/s (15.38 m^3/s), 393,400 acre-ft/yr (485 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, 3,660 ft^3/s (104 m^3/s) Apr. 25, gage height, 12.30 ft (3.749 m); maximum gage height, 12.48 ft (3.804 m) Apr. 18 (backwater from ice); minimum daily discharge, 349 ft^3/s (9.88 m^3/s) Oct. 12.

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	360	435	410	410	415	420	435	1620	1420	1270	1180	1090
2	357	441	410	410	415	420	435	1380	1380	1330	1170	1090
3	356	448	410	410	415	420	435	1360	1340	1430	1160	1090
4	359	448	410	410	415	420	435	1480	1330	1490	1170	1090
5	362	437	410	410	415	420	435	1530	1310	1400	1160	1090
6	362	434	410	410	415	425	440	1510	1300	1320	1160	1080
7	361	444	410	410	415	425	440	1440	1290	1270	1150	1080
8	363	434	410	410	415	425	440	1370	1270	1250	1140	1080
9	359	435	410	410	415	425	440	1300	1250	1220	1140	1080
10	358	444	410	410	415	425	440	1240	1240	1210	1150	1080
11	357	452	410	410	415	425	445	1190	1230	1200	1140	1080
12	349	445	410	410	415	425	450	1160	1220	1180	1130	1070
13	356	456	410	410	415	425	460	1130	1210	1180	1130	1060
14	359	411	410	410	415	425	470	1100	1190	1180	1120	1040
15	364	419	410	410	415	425	500	1060	1180	1150	1110	1020
16	365	430	410	410	415	425	700	1200	1160	1150	1110	1010
17	362	435	410	410	415	425	1500	1340	1160	1150	1100	1000
18	357	440	410	410	415	425	2900	1360	1170	1150	1090	990
19	356	440	410	410	415	425	2420	1370	1190	1150	1080	980
20	356	435	410	410	414	430	1950	1360	1310	1150	1080	980
21	381	435	410	410	415	430	1470	1340	1390	1140	1080	970
22	430	430	410	410	415	430	1160	1370	1360	1140	1090	982
23	449	430	410	410	415	430	1100	1430	1330	1170	1100	1010
24	443	425	410	410	415	430	2520	1420	1290	1270	1090	1010
25	433	425	410	410	415	430	3620	1400	1260	1250	1080	991
26	442	425	410	410	415	430	3460	1380	1220	1220	1080	983
27	438	420	410	410	415	430	3210	1370	1210	1200	1080	982
28	439	415	410	410	420	430	2890	1350	1210	1190	1080	976
29	443	415	410	410	---	430	2470	1340	1200	1180	1090	978
30	438	410	410	410	---	430	1990	1380	1210	1180	1090	970
31	438	---	410	410	---	430	---	1430	---	1180	1090	---
TOTAL	11952	12993	12710	12710	11624	13210	40060	41710	37830	37950	34620	30932
MEAN	386	433	410	410	415	426	1335	1345	1261	1224	1117	1031
MAX	449	456	410	410	420	430	3620	1620	1420	1490	1180	1090
MIN	349	410	410	410	414	420	435	1060	1160	1140	1080	970
AC-FT	23710	25770	25210	25210	23060	26200	79460	82730	75040	75270	68670	61350

CAL YR 1978 TOTAL 228397 MEAN 626 MAX 2280 MIN 349 AC-FT 453000
WTR YR 1979 TOTAL 298301 MEAN 817 MAX 3620 MIN 349 AC-FT 591700

05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN

LOCATION.--Lat 48°11'08", long 96°10'11", in NW 1/4 SW 1/4 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 Wild Life 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.--62 years, 161 ft^3/s (4.560 m^3/s), 116,600 acre-ft/yr (144 hm^3/yr); median of yearly mean discharges, 110 ft^3/s (3.115 m^3/s), 79,700 acre-ft/yr (98 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, 3,590 ft^3/s (102 m^3/s) Apr. 24, gage height, 14.11 ft (4.301 m); maximum gage height, 15.35 ft (4.679 m) Apr. 19 (backwater from ice); minimum daily discharge, 2.6 ft^3/s (0.074 m^3/s) Jan. 14-16.

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	109	91	13	5.5	11	8.8	9.9	2690	1380	392	19	15
2	109	48	9.7	5.1	11	8.8	9.5	2600	1330	398	18	12
3	109	47	7.0	4.7	11	8.8	9.1	2500	1290	450	18	12
4	109	47	5.6	4.5	11	8.8	8.9	2380	1240	546	19	11
5	109	33	5.0	4.1	11	8.8	8.7	2300	1150	462	18	9.1
6	104	21	4.8	3.6	11	8.8	8.3	2240	1100	374	19	8.6
7	104	20	5.0	3.3	11	8.8	7.8	2180	961	183	19	9.1
8	106	16	5.8	3.1	11	8.8	7.4	2110	933	165	17	8.6
9	104	20	6.8	3.0	11	8.8	7.1	2040	947	153	16	8.6
10	104	19	5.7	2.9	11	8.8	6.8	1980	937	143	15	11
11	102	14	4.0	2.8	11	8.8	6.9	1930	906	134	11	11
12	104	23	3.4	2.7	10	8.8	9.0	1880	818	89	9.1	9.7
13	104	23	3.2	2.7	10	8.8	20	1840	674	56	10	7.4
14	168	30	3.1	2.6	10	8.8	45	1800	490	47	9.7	7.8
15	214	34	3.3	2.6	9.8	8.9	80	1760	481	42	8.6	9.1
16	211	35	3.6	2.6	9.4	9.0	150	1710	475	40	8.2	9.1
17	197	35	4.0	2.7	9.3	9.1	560	1660	472	36	9.1	9.1
18	220	34	4.4	2.7	9.2	9.2	1250	1620	441	31	8.2	9.7
19	220	32	4.8	2.7	9.2	9.4	3160	1570	150	28	8.6	9.7
20	111	26	5.2	2.8	9.1	9.7	3030	1530	120	25	9.1	11
21	243	17	5.6	2.9	9.0	9.9	2830	1490	138	23	8.6	10
22	217	11	5.8	3.0	9.0	10	2640	1480	228	21	15	12
23	206	8.8	6.0	3.4	8.9	11	2520	1460	314	20	11	15
24	206	7.2	6.2	4.7	8.8	11	3100	1450	401	20	12	13
25	203	7.2	6.2	5.6	8.8	11	3230	1410	395	19	11	12
26	203	9.0	6.2	6.8	8.8	12	2970	1330	380	19	9.7	13
27	203	16	6.2	7.7	8.8	12	2880	1290	377	20	9.7	15
28	200	26	6.2	8.6	8.8	11	2830	1260	398	21	9.7	15
29	197	24	6.1	9.4	---	11	2800	1230	365	21	9.7	19
30	194	19	6.0	10	---	11	2740	1300	380	23	9.7	17
31	186	---	5.8	11	---	11	---	1420	---	21	18	---
TOTAL	4976	793.2	173.7	139.8	277.9	299.4	36934.4	55440	19671	4022	393.7	339.6
MEAN	161	26.4	5.60	4.51	9.93	9.66	1231	1788	656	130	12.7	11.3
MAX	243	91	13	11	11	12	3230	2690	1380	546	19	19
MIN	102	7.2	3.1	2.6	8.8	8.8	6.8	1230	120	19	8.2	7.4
AC-FT	9870	1570	345	277	551	594	73260	110000	39020	7980	781	674

CAL YR 1978 TOTAL 87750.0 MEAN 240 MAX 2730 MIN 3.1 AC-FT 174100
WTR YR 1979 TOTAL 123460.7 MEAN 338 MAX 3230 MIN 2.6 AC-FT 244900

05078000 CLEARWATER RIVER AT PLUMMER, MN

LOCATION.--Lat 47°55'24", long 96°02'46", in SE 1/4 SW 1/4 sec.4, T.151 N., R.42 W., Red Lake County, Hydrologic Unit 09020305, on right bank 200 ft (61 m) downstream from Soo Line Railroad bridge, 300 ft (91 m) downstream from bridge on U.S. Highway 59, 0.9 mi (1.4 km) northwest of railroad depot in Plummer, and 8 mi (13 km) upstream from Hill River.

DRAINAGE AREA.--512 mi^2 (1,326 km^2).

PERIOD OF RECORD.--April 1939 to September 1979 (discontinued as a continuous-record station; converted to a crest-stage partial-record station).

GAGE.--Water-stage recorder. Datum of gage is 1,099.12 ft (335.012 m), adjustment of 1912 (levels by Corps of Engineers). Prior to Nov. 10, 1939, nonrecording gage at site 100 ft (30 m) upstream at same datum.

REMARKS.--Records good except those for winter period, which are poor. Since 1968, undetermined amounts of water diverted for the flooding of wild rice paddies upstream.

AVERAGE DISCHARGE.--40 years, 179 ft^3/s (5.069 m^3/s), 129,700 acre-ft/yr (160 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,940 ft^3/s (112 m^3/s) Apr. 25, 1979, gage height, 12.31 ft (3.752 m); maximum gage height, 12.37 ft (3.770 m) Apr. 18, 1979 (backwater from ice); minimum discharge 2.5 ft^3/s (0.071 m^3/s) May 16, 17, 1977, gage height, 1.71 ft (0.521 m).

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 500 ft^3/s (14.2 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Apr. 18	1200	ice jam		*12.37	3.770	July 4	1000	797	22.6	6.41	1.954
Apr. 19	1230	2840	80.4	10.76	3.280	Aug. 1	0630	780	22.1	6.19	1.887
Apr. 25	1630	*3940	112	12.31	3.752						

Minimum daily discharge, 14 ft^3/s (0.40 m^3/s) Apr. 8.

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	58	47	45	43	73	73	19	1470	246	115	758	121
2	55	47	45	43	72	70	18	1250	265	141	609	111
3	52	38	45	43	71	68	17	1050	263	417	468	109
4	51	39	45	42	70	66	16	864	256	779	393	104
5	56	39	45	42	70	62	16	751	229	639	350	89
6	65	37	45	42	69	58	15	670	198	469	308	81
7	60	50	45	42	68	55	15	628	174	400	294	80
8	55	51	45	41	68	52	14	579	167	330	304	81
9	52	47	45	41	67	49	15	445	167	278	265	73
10	52	49	44	41	67	46	16	302	155	231	252	69
11	51	40	44	41	66	43	20	260	144	202	239	65
12	53	47	44	41	66	41	25	267	126	196	203	71
13	56	54	44	41	66	39	30	267	122	184	183	76
14	54	54	44	41	66	36	37	256	128	183	167	70
15	53	53	44	42	66	34	46	248	130	172	169	65
16	58	51	44	42	66	34	200	239	91	155	150	61
17	65	50	44	43	66	34	700	222	81	151	157	57
18	69	49	44	45	66	34	2300	192	75	145	142	52
19	71	48	44	46	66	35	2700	179	71	131	135	50
20	73	48	44	47	66	37	2330	160	140	141	123	48
21	69	47	44	49	66	38	2150	160	333	146	117	46
22	69	47	44	50	67	39	1890	161	327	150	115	50
23	63	47	43	52	68	38	1840	184	295	140	115	54
24	56	47	43	54	69	35	2420	198	260	162	155	65
25	52	47	43	56	70	32	3840	161	206	240	154	73
26	63	47	43	59	72	28	3600	143	175	257	135	68
27	55	46	43	62	73	26	2920	144	156	278	117	62
28	43	46	43	66	73	24	2400	156	153	278	127	58
29	47	46	43	70	---	22	2000	167	134	252	137	59
30	45	46	43	72	---	21	1700	182	120	301	143	55
31	43	---	43	73	---	20	---	222	---	657	136	---
TOTAL	1764	1404	1364	1512	1913	1289	33309	12177	5387	8320	7120	2123
MEAN	56.9	46.8	44.0	48.8	68.3	41.6	1110	393	180	268	230	70.8
MAX	73	54	45	73	73	73	3840	1470	333	779	758	121
MIN	43	37	43	41	66	20	14	143	71	115	115	46
AC-FT	3500	2780	2710	3000	3790	2560	66070	24150	10690	16500	14120	4210

CAL YR 1978 TOTAL 62761 MEAN 172 MAX 3070 MIN 34 AC-FT 124500
WTR YR 1979 TOTAL 77682 MEAN 213 MAX 3840 MIN 14 AC-FT 154100

05078230 LOST RIVER AT OKLEE, MN

LOCATION.--Lat 47°50'35", long 95°51'30", in SE 1/4 NE 1/4 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.--19 years, 80.5 ft^3/s (2.280 m^3/s), 58,320 acre-ft/yr (71.9 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, 2,140 ft^3/s (60.6 m^3/s) Apr. 20, gage height, 14.63 ft (4.459 m); minimum daily, 1.9 ft^3/s (0.054 m^3/s) Jan. 14-19.

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	9.4	5.6	6.5	2.5	2.3	3.5	44	316	185	90	500	18
2	8.8	5.8	6.4	2.4	2.3	3.5	47	274	200	220	320	15
3	8.3	4.2	6.2	2.3	2.4	3.6	50	233	155	540	230	14
4	7.9	4.6	5.9	2.3	2.4	3.7	52	208	110	350	160	12
5	7.4	5.4	5.7	2.2	2.4	3.8	54	200	81	240	120	11
6	7.0	4.8	5.4	2.2	2.5	3.9	50	193	71	160	108	10
7	8.4	8.0	5.2	2.2	2.6	4.0	47	187	66	115	86	9.8
8	8.3	7.8	5.0	2.1	2.6	4.2	45	169	57	93	66	9.4
9	8.0	7.1	4.8	2.1	2.7	4.4	44	155	54	76	54	9.0
10	7.8	5.0	4.7	2.1	2.7	4.5	45	142	50	64	45	8.4
11	7.8	6.9	4.5	2.0	2.8	4.7	46	145	46	54	42	11
12	7.8	5.6	4.4	2.0	2.8	4.9	53	138	43	48	38	12
13	7.8	5.2	4.3	2.0	2.9	5.2	66	124	40	60	35	8.0
14	7.8	3.6	4.2	1.9	2.9	5.5	120	112	38	79	33	7.0
15	7.8	4.9	4.1	1.9	2.9	5.8	240	99	35	70	31	6.4
16	7.8	6.2	3.9	1.9	3.0	6.7	730	93	33	56	29	6.0
17	8.1	6.8	3.8	1.9	3.0	10	1710	81	31	48	27	5.6
18	8.5	7.2	3.7	1.9	3.0	52	2000	80	30	45	26	5.1
19	8.6	7.4	3.6	1.9	3.1	61	2040	76	110	42	24	4.4
20	8.6	7.6	3.5	2.0	3.1	50	2090	70	400	40	23	3.3
21	8.6	7.6	3.3	2.0	3.1	38	1850	64	290	38	22	3.0
22	8.5	7.6	3.2	2.0	3.2	29	1300	76	190	38	21	4.0
23	8.1	7.6	3.1	2.0	3.2	26	925	98	130	58	20	8.3
24	7.7	7.5	3.0	2.0	3.2	26	1190	92	92	76	34	12
25	7.1	7.4	2.9	2.1	3.2	27	1730	74	68	76	25	9.6
26	6.9	7.2	2.9	2.1	3.3	29	1370	70	54	74	18	6.7
27	6.2	7.1	2.8	2.1	3.3	32	880	66	48	72	20	2.0
28	6.7	6.9	2.7	2.1	3.4	34	630	65	42	130	22	3.5
29	6.2	6.8	2.6	2.2	---	37	494	112	37	240	25	9.6
30	5.8	6.7	2.6	2.2	---	40	394	137	33	600	23	12
31	5.4	---	2.5	2.2	---	42	---	160	---	700	20	---
TOTAL	239.1	192.1	127.4	64.8	80.3	604.9	20336	4109	2819	4592	2247	256.1
MEAN	7.71	6.40	4.11	2.09	2.87	19.5	678	133	94.0	148	72.5	8.54
MAX	9.4	8.0	6.5	2.5	3.4	61	2090	316	400	700	500	18
MIN	5.4	3.6	2.5	1.9	2.3	3.5	44	64	30	38	18	2.0
AC-FT	474	381	253	129	159	1200	40340	8150	5590	9110	4460	508

CAL YR 1978	TOTAL	28031.9	MEAN 76.8	MAX	2940	MIN 2.5	AC-FT	55600
WTR YR 1979	TOTAL	35667.7	MEAN 97.7	MAX	2090	MIN 1.9	AC-FT	70750

NOTE.--No gage-height record June 9 to Sept. 16.

05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN

LOCATION.--Lat 47°53'15", long 96°16'25", in NW 1/4 NE 1/4 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.--53 years, 320 ft^3/s (9.062 m^3/s), 231,800 acre-ft/yr (286 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, 10,300 ft^3/s (292 m^3/s) Apr. 25, gage height, 12.38 ft (3.773 m); minimum, 30 ft^3/s (0.85 m^3/s) Nov. 11, gage height, 1.82 ft (0.555 m), result of freezeup.

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	74	53	60	49	67	91	97	2410	711	269	1870	207
2	69	54	59	49	68	90	98	2030	684	904	1460	191
3	65	59	59	49	70	89	98	1720	655	2090	1040	171
4	63	51	58	49	71	87	98	1480	606	3090	833	164
5	59	48	58	49	73	86	98	1330	559	2390	721	157
6	59	48	57	49	75	85	99	1260	505	1520	630	129
7	71	47	57	49	76	85	100	1190	451	1060	532	119
8	69	53	57	49	78	84	102	1140	403	827	486	117
9	65	61	57	48	80	84	104	1020	385	665	438	114
10	62	58	57	48	82	83	106	823	356	545	384	109
11	60	49	56	48	83	82	110	748	329	447	368	110
12	57	55	56	48	84	81	130	743	299	389	355	102
13	58	54	55	48	86	80	200	732	265	374	349	105
14	59	54	55	48	88	80	500	707	251	347	267	108
15	60	44	54	48	89	79	900	673	250	327	242	106
16	59	50	54	48	90	79	2000	654	230	294	231	97
17	62	58	54	48	91	79	4200	620	193	260	208	88
18	71	60	53	49	92	79	6700	557	182	244	213	81
19	74	61	53	50	93	79	8860	524	196	233	196	75
20	75	62	53	51	94	80	7480	502	269	233	184	70
21	77	62	52	52	95	82	6040	478	970	240	169	68
22	76	62	52	53	96	84	4510	509	1100	241	175	69
23	76	61	52	54	96	86	3680	514	891	239	174	76
24	72	61	51	56	95	88	5470	560	745	285	186	76
25	66	61	51	57	94	90	9930	517	609	454	236	84
26	61	61	51	58	94	92	8380	456	509	593	234	101
27	68	61	51	60	93	94	6240	436	437	581	207	97
28	66	60	50	62	92	94	4450	424	387	580	197	87
29	56	60	50	63	---	95	3480	430	343	499	259	81
30	54	60	50	64	---	96	2880	454	290	1810	239	76
31	56	---	50	66	---	96	---	567	---	2090	223	---
TOTAL	2019	1688	1682	1619	2385	2659	87140	26208	14060	24120	13306	3235
MEAN	65.1	56.3	54.3	52.2	85.2	85.8	2905	845	469	778	429	108
MAX	77	62	60	66	96	96	9930	2410	1100	3090	1870	207
MIN	54	44	50	48	67	79	97	424	182	233	169	68
AC-FT	4000	3350	3340	3210	4730	5270	172800	51980	27890	47840	26390	6420

CAL YR 1978 TOTAL 147399 MEAN 404 MAX 9400 MIN 44 AC-FT 292400
WTR YR 1979 TOTAL 180121 MEAN 493 MAX 9930 MIN 44 AC-FT 357300

NOTE.--No gage-height record Nov. 19 to Jan. 15 and Feb. 25 to Apr. 3.

05079000 RED LAKE RIVER AT CROOKSTON, MN

LOCATION.--Lat 47°46'32", long 96°36'33", in SW 1/4 SW 1/4 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.--78 years, 1,124 ft^3/s (31.83 m^3/s), 814,300 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, 21,900 ft^3/s (620 m^3/s) Apr. 26, gage height, 24.99 ft (7.617 m); minimum, 279 ft^3/s (7.90 m^3/s) Nov. 15, gage height, 3.27 ft (0.997 m), result of freezeup.

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	546	724	515	490	490	530	580	8680	3790	1930	3300	1370
2	541	703	515	490	490	530	580	7700	3770	2510	2910	1290
3	541	509	515	490	490	530	580	6890	3630	4280	2430	1260
4	537	546	515	490	490	535	580	6270	3500	5610	2080	1210
5	537	555	515	490	490	535	580	5910	3320	5720	1880	1220
6	532	541	515	490	490	540	580	5710	3190	4430	1760	1210
7	523	532	515	490	490	540	590	5490	3070	3420	1670	1140
8	546	481	510	490	490	545	590	5310	2890	2750	1570	1150
9	541	523	510	490	490	545	600	5050	2780	2440	1530	1140
10	537	523	510	490	490	550	610	4740	2790	2210	1470	1150
11	527	495	510	490	490	550	700	4430	2700	2030	1400	1160
12	518	432	510	490	500	550	900	4260	2650	1910	1410	1170
13	532	481	510	490	500	555	1500	4170	2470	1800	1440	1210
14	509	436	505	490	505	555	2500	4070	2360	1720	1330	1190
15	514	387	505	490	510	560	3500	3930	2080	1630	1280	1160
16	659	500	505	490	510	560	6000	3780	2080	1580	1270	1160
17	649	510	505	490	510	560	9000	3690	2040	1510	1240	1140
18	644	520	505	490	515	560	14000	3780	1980	1460	1230	1100
19	664	520	505	490	515	560	20000	3710	2000	1440	1220	1100
20	674	520	505	490	520	565	20500	3660	1860	1410	1190	1100
21	654	520	500	490	520	565	19400	3570	2010	1370	1180	1070
22	532	520	500	490	520	565	15100	3580	2690	1340	1610	1130
23	718	520	495	490	520	565	11200	3550	2750	1370	1620	1150
24	713	520	495	490	525	570	10300	3590	2620	1370	1350	1170
25	739	515	490	490	525	570	16300	3580	2550	1460	1370	1150
26	744	515	490	490	530	570	21200	3480	2360	1750	1370	1170
27	729	515	490	490	530	575	17800	3320	2200	1820	1320	1170
28	734	515	490	490	530	580	13700	3270	2120	1750	1240	1100
29	729	515	490	490	---	580	11100	3220	2100	1700	1400	1120
30	718	515	490	490	---	580	9760	3300	2040	2320	1340	1120
31	724	---	490	490	---	580	---	3460	---	3940	1300	---
TOTAL	19005	15608	15620	15190	14175	17255	230330	139150	78390	71980	48710	34980
MEAN	613	520	504	490	506	557	7678	4489	2613	2322	1571	1166
MAX	744	724	515	490	530	580	21200	8680	3790	5720	3300	1370
MIN	509	387	490	490	490	530	580	3220	1860	1340	1180	1070
AC-FT	37700	30960	30980	30130	28120	34230	456900	276000	155500	142800	96620	69380

CAL YR 1978 TOTAL 514428 MEAN 1409 MAX 15300 MIN 387 AC-FT 1020000
WTR YR 1979 TOTAL 700393 MEAN 1919 MAX 21200 MIN 387 AC-FT 1389000

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, October 1978 to September 1979.

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
NOV										
27...	1530	515	390	7.9	-18.0	.0	5.0	12.5	89	K1900
JAN										
08...	1630	357	400	7.7	--	.0	4.0	13.5	98	K2500
FEB										
12...	1545	499	435	7.6	-19.0	.0	3.0	12.2	86	3400
APR										
02...	1600	579	400	7.8	3.0	.5	3.0	11.1	79	1700
MAY										
15...	1400	3920	380	8.2	23.0	11.7	15	12.7	122	420
JUN										
18...	1530	1900	350	8.4	27.0	22.5	15	9.1	107	K1000
AUG										
07...	1030	1680	330	8.2	24.5	22.0	20	8.3	96	--
SEP										
18...	1200	1100	320	8.2	20.0	17.0	7.0	9.7	104	1800

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 PERCENT (00932)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY (MG/L AS CACO3) (00410)
NOV										
27...	K850	230	31	58	21	5.1	5	.1	2.8	200
JAN										
08...	1400	220	22	56	20	9.5	8	.3	2.9	200
FEB										
12...	1900	210	6	53	18	4.6	5	.1	2.5	200
APR										
02...	671	210	21	53	19	6.2	6	.2	3.7	190
MAY										
15...	320	200	70	52	17	4.0	4	.1	3.7	130
JUN										
18...	308	190	38	49	16	4.1	4	.1	3.0	150
AUG										
07...	--	180	29	47	15	3.3	4	.1	2.2	150
SEP										
18...	430	170	15	43	14	4.0	5	.1	2.0	150

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
NOV										
27...	29	2.9	.1	5.8	278	245	.38	387	.06	.07
JAN										
08...	13	4.0	.1	7.8	262	234	.36	253	.10	.35
FEB										
12...	14	2.4	.1	7.8	253	223	.34	341	.09	.18
APR										
02...	21	5.7	.1	8.2	260	231	.35	406	.51	.15
MAY										
15...	69	3.3	.1	5.6	267	233	.36	2830	.16	.03
JUN										
18...	36	2.7	.1	2.7	242	204	.33	1240	.05	.08
AUG										
07...	24	2.5	.1	8.4	228	193	.31	1030	.08	.06
SEP										
18...	10	1.9	.1	7.3	198	173	.27	588	.02	.04

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N) (00624)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOTAL (MG/L AS NO3) (71887)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
NOV									
27...	1.0	1.1	.29	.81	1.2	5.1	.05	.02	--
JAN									
08...	1.2	1.5	.10	1.4	1.6	7.1	.03	.03	--
FEB									
12...	.92	1.1	.13	.97	1.2	5.3	.03	.01	--
APR									
02...	.84	.99	.01	.98	1.5	6.6	.06	.04	12
MAY									
15...	1.2	1.2	.20	1.0	1.4	6.0	.05	.02	--
JUN									
18...	.86	.94	.18	.76	.99	4.4	.07	.01	15
AUG									
07...	.78	.84	.09	.75	.92	4.1	.11	.06	12
SEP									
18...	.73	.77	.25	.52	.79	3.5	.04	.02	9.4

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA) (01007)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOVERABLE (UG/L AS CO) (01037)
NOV										
27...	1530	2	1	0	0	--	0	10	0	1
FEB										
12...	1545	2	1	0	0	0	0	10	1	1
MAY										
15...	1400	4	2	0	0	1	0	60	<10	2
AUG										
07...	1030	4	4	100	50	2	1	20	10	3

DATE	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)
NOV										
27...	0	2	0	170	30	--	0	20	10	.5
FEB										
12...	0	2	1	250	50	1	1	40	30	<.5
MAY										
15...	2	4	2	780	30	3	1	60	6	<.5
AUG										
07...	0	6	2	860	20	8	0	70	7	<.5

DATE	MERCURY DISSOLVED (UG/L AS HG) (71890)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOVERABLE (UG/L AS AG) (01077)	SILVER, DISSOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C) (00689)
NOV									
27...	<.5	0	0	0	0	20	0	3.4	1.1
FEB									
12...	<.5	0	0	0	0	50	10	29	--
MAY									
15...	<.5	0	0	0	0	20	0	12	--
AUG									
07...	<.5	0	0	0	0	30	3	--	--

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO SEPTEMBER 1979

DATE	NOV 27,78		APR 2,79		MAY 15,79		JUN 18,79		AUG 7,79		SEP 18,79	
TIME	1530		1600		0000		1530		1030		1200	
TOTAL CELLS/ML	3900		750		21000		47000		8000		40000	
DIVERSITY: DIVISION	1.0		1.6		1.6		0.8		1.1		0.3	
.CLASS	1.0		1.6		1.6		0.8		1.1		0.3	
..ORDER	1.9		2.1		1.7		1.2		1.1		0.7	
...FAMILY	2.1		2.2		2.4		1.4		1.5		0.8	
....GENUS	2.2		2.3		0.0		1.7		2.0		1.0	
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												
...OOCYSTACEAE												
....DICHOTOMOCOCCUS	--	-	--	-	1700	9	--	-	--	-	--	-
...CHARACIACEAE												
....SCHROEDERIA	--	-	--	-	--	-	--	-	*	0	*	0
...COELASTRACEAE												
....COELASTRUM	--	-	--	-	--	-	860	2	--	-	--	-
...HYDRODICTYACEAE												
....PEDIASTRUM	--	-	--	-	--	-	940	2	--	-	200	1
...MICRACTINIACEAE												
....GOLENKINIA	22	1	--	-	*	0	*	0	--	-	--	-
....MICRACTINIUM	--	-	--	-	2800	13	--	-	84	1	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	87	2	26	3	830	4	*	0	290	4	*	0
....DICTYOSPHAERIUM	--	-	--	-	1100	5	--	-	--	-	230	1
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	210	3	*	0
....OOCYSTIS	44	1	100	14	--	-	320	1	220	3	*	0
....SELENASTRUM	130	3	--	-	--	-	*	0	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	*	0	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	*	0	--	-
...SCENEDESMACEAE												
....CRUCIGENIA	--	-	--	-	370	2	430	1	1400#	17	--	-
....SCENEDESMUS	260	7	--	-	1800	9	1800	4	710	9	890	2
....TETRASTRUM	--	-	--	-	--	-	320	1	110	1	*	0
..TETRASPORALES												
...COCCOMYXACEAE												
....ELAKATOTHRIX	44	1	--	-	--	-	*	0	--	-	*	0
...PALMELLACEAE												
....SPHAEROCYSTIS	--	-	--	-	--	-	*	0	--	-	--	-
..VOLVOCALES												
...CHLAMYDOMONADACEAE	--	-	--	-	*	0	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	64	9	--	-	--	-	--	-	*	0
..ZYGNEMATALES												
...DESMIDIACEAE												
....COSMARIUM	--	-	--	-	--	-	*	0	--	-	--	-
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	110	3	170#	22	6300#	30	--	-	*	0	--	-
....MELOSIRA	--	-	--	-	*	0	1100	2	--	-	*	0
....STEPHANODISCUS	--	-	--	-	--	-	*	0	--	-	--	-
..PENNALES												
...CYMBELLACEAE												
....CYMBELLA	--	-	26	3	--	-	--	-	--	-	--	-
....EPITHEMIA	--	-	13	2	--	-	--	-	--	-	--	-
...FRAGILARIACEAE												
....ASTERIONELLA	110	3	--	-	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	*	0	960	2	--	-	--	-
....SYNEDRA	22	1	--	-	--	-	*	0	*	0	--	-
...GOMPHONEMATACEAE												
....GOMPHONEMA	22	1	--	-	--	-	*	0	--	-	--	-
...NAVICULACEAE												
....NAVICULA	--	-	13	2	--	-	*	0	--	-	--	-
...NITZSCHIACEAE												
....NITZSCHIA	--	-	--	-	370	2	320	1	110	1	*	0
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...OCHROMONADACEAE												
....OCHROMONAS	44	1	--	-	--	-	--	-	--	-	--	-
.XANTHOPHYCEAE												
..HETEROCOCCALES												
...CENTRITRACTACEAE												
....CENTRITRACTUS	--	-	--	-	--	-	--	-	*	0	--	-
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	--	-	*	0	--	-	--	-	--	-
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	--	-	--	-	--	-	*	0	--	-

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

05079000 RED LAKE RIVER AT CROOKSTON, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO SEPTEMBER 1979

DATE	NOV 27,78		APR 2,79		MAY 15,79		JUN 18,79		AUG 7,79		SEP 18,79	
TIME	1530		1600		0000		1530		1030		1200	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....AGMENELLUM	--	-	--	-	--	-	1700	4	--	-	--	-
....ANACYSTIS	1000#	27	320#	43	4800#	23	35000#	75	4800#	59	35000#	87
....COCCOCHLORIS	--	-	--	-	--	-	--	-	--	-	230	1
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	--	-	--	-	--	-	--	-	950	2
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-	570	1
...OSCILLATORIACEAE												
....LYNGBYA	1900#	50	--	-	--	-	--	-	--	-	830	2
....OSCILLATORIA	--	-	--	-	--	-	2400	5	--	-	900	2
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..PERIDINIALES												
...GLENODINIACEAE												
....GLENODINIUM	--	-	13	2	--	-	--	-	--	-	--	-

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

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)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS) (70950)
SEP							
18...	1200	42	.080	.080	.070	.000	.00

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
JAN						
08...	1645	.0	490	13	17	88
FEB						
12...	1600	.0	499	10	13	94
APR						
02...	1600	.5	579	87	136	98
19...	0950	2.0	20200	695	37900	93
22...	1655	8.5	14800	261	10400	94
MAY						
15...	1400	11.5	3840	47	487	95
JUN						
18...	1530	22.5	1900	38	195	92
AUG						
07...	1100	20.0	1680	48	218	99
SEP						
18...	1200	17.0	1140	18	55	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.--97 years, 2,557 ft^3/s (72.41 m^3/s), 1,853,000 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, 82,000 ft^3/s (2,320 m^3/s) Apr. 23, gage height, 48.63 ft (14.822 m); maximum gage height, 48.81 ft (14.877 m) Apr. 26; minimum, 552 ft^3/s (15.6 m^3/s) Nov. 16, gage height, 4.02 ft (1.225 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	866	962	830	740	660	700	1410	51900	7650	5970	5660	2520
2	854	968	820	735	660	715	1590	46800	7750	6980	5740	2500
3	884	962	820	735	660	735	1710	42100	7700	9300	5450	2450
4	923	920	860	730	660	750	1840	38400	7450	10700	5130	2400
5	932	851	855	730	665	760	1910	35000	7250	11300	4700	2350
6	932	836	830	725	665	780	1930	31200	7100	11600	4300	2300
7	920	830	810	725	670	805	1940	27700	6800	10800	3990	2200
8	905	818	800	720	675	820	1990	24500	6600	9200	3750	2100
9	890	812	790	720	680	830	2110	21700	6400	7720	3520	2000
10	893	797	750	710	680	855	2320	19500	6200	7000	3370	1900
11	867	815	730	700	685	880	2780	17500	6100	6500	3220	1850
12	864	830	720	690	690	900	3470	16200	5940	6120	3090	1820
13	875	821	720	680	690	920	4000	15000	5740	5780	3000	1820
14	860	765	725	670	690	940	5000	14200	5530	5470	2920	1810
15	842	655	728	660	685	935	7600	13500	5310	5100	2800	1830
16	812	562	730	650	685	935	12500	13000	5010	4640	2670	1830
17	812	575	730	650	680	935	19600	12400	4810	4280	2610	1810
18	851	735	725	650	680	940	30100	12000	4660	4020	2570	1830
19	860	890	735	655	680	985	42500	11600	4570	3850	2540	1780
20	860	911	740	658	690	1020	55500	11000	4600	3720	2500	1770
21	863	899	740	658	700	1040	68000	10400	4490	3610	2450	1770
22	857	803	740	658	715	1050	76800	9800	4470	3480	2460	1760
23	815	698	745	660	720	1120	80900	9400	5020	3310	2650	1760
24	794	640	745	660	700	1180	80500	8900	5400	3210	2890	1780
25	851	670	740	660	690	1220	79700	8610	5720	3140	2700	1770
26	950	740	740	660	690	1190	78400	8320	6080	3250	2600	1730
27	1010	800	740	660	690	1130	80100	8000	6200	3500	2630	1700
28	839	840	740	660	690	1140	74000	7700	6120	3650	2640	1740
29	860	850	740	660	---	1160	65500	7400	6140	3650	2580	1680
30	932	850	740	660	---	1200	58800	7300	5920	3790	2570	1660
31	959	---	740	660	---	1260	---	7250	---	4330	2610	---
TOTAL	27272	24105	23598	21189	19125	29830	944500	568280	178730	178970	102310	58220
MEAN	880	804	761	684	683	962	31480	18330	5958	5773	3300	1941
MAX	1010	968	860	740	720	1260	80900	51900	7750	11600	5740	2520
MIN	794	562	720	650	660	700	1410	7250	4470	3140	2450	1660
AC-FT	54090	47810	46810	42030	37930	59170	1873000	1127000	354500	355000	202900	115500

CAL YR 1978 TOTAL 1545525 MEAN 4234 MAX 54100 MIN 562 AC-FT 3066000
WTR YR 1979 TOTAL 2176129 MEAN 5962 MAX 80900 MIN 562 AC-FT 4316000

05087500 MIDDLE RIVER AT ARGYLE, MN

LOCATION.--Lat 48°20'27", long 96°49'02", in SE 1/4 SW 1/4 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 good except those for winter period, which are fair.

AVERAGE DISCHARGE.--29 years (water years 1951-79), 43.6 ft^3/s (1.235 m^3/s), 31,590 acre-ft/yr (39.0 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, 2,140 ft^3/s (60.6 m^3/s) Apr. 20, gage height, 15.29 ft (4.660 m); minimum, 0.02 ft^3/s (0.001 m^3/s) Sept. 27, gage height, 1.18 ft (0.360 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	.66	1.2	1.5	1.0	.69	.58	2.2	479	55	11	3.6	1.8
2	.22	1.2	1.4	1.0	.68	.58	2.1	401	126	11	3.6	2.1
3	.11	1.2	1.4	1.0	.67	.58	2.1	332	176	11	3.3	1.8
4	.13	1.4	1.4	1.0	.66	.58	2.0	269	167	10	2.8	1.7
5	.28	1.4	1.4	1.0	.66	.58	2.0	223	134	11	2.5	1.4
6	.44	1.6	1.4	.99	.65	.58	1.9	194	108	19	1.7	1.7
7	.44	1.5	1.4	.98	.64	.58	1.9	174	87	30	2.4	1.4
8	.22	1.5	1.4	.98	.64	.59	1.9	159	70	40	1.4	.83
9	.18	1.6	1.3	.97	.63	.59	1.9	146	58	34	1.5	.76
10	.22	1.6	1.3	.96	.63	.60	2.0	130	49	27	.79	.87
11	.18	1.6	1.3	.95	.62	.61	2.5	118	42	21	1.2	.88
12	.11	1.6	1.3	.93	.62	.62	4.5	110	35	17	1.6	.77
13	.11	1.6	1.3	.92	.61	.63	9.0	104	30	17	1.5	.61
14	.11	1.7	1.2	.90	.61	.64	18	100	27	13	1.3	.58
15	.15	1.7	1.2	.89	.60	.65	35	95	24	11	1.1	.57
16	.15	1.7	1.2	.88	.60	.70	70	89	23	9.7	1.1	.32
17	.18	1.7	1.2	.86	.59	.78	135	87	20	8.8	1.2	.18
18	.18	1.7	1.2	.85	.59	1.0	550	72	18	8.2	.70	.16
19	.22	1.7	1.2	.84	.59	1.5	1600	63	16	7.7	.36	.40
20	.53	1.7	1.2	.82	.59	2.0	1980	53	18	7.1	.67	.20
21	.53	1.7	1.2	.81	.58	2.6	1960	49	17	6.8	.91	.08
22	.33	1.7	1.2	.80	.58	3.0	1580	48	17	6.3	2.2	.13
23	.33	1.7	1.1	.79	.58	3.0	1230	45	19	6.1	2.5	.22
24	.28	1.7	1.1	.77	.58	2.9	1040	45	18	5.9	2.5	.15
25	.44	1.7	1.1	.76	.58	2.8	1480	51	15	5.7	2.0	.13
26	.66	1.6	1.1	.75	.58	2.7	1970	53	14	5.4	1.3	.11
27	.75	1.6	1.1	.74	.58	2.6	1720	53	13	5.0	.98	.03
28	.75	1.6	1.1	.73	.58	2.5	1340	50	12	4.6	.50	.04
29	.87	1.5	1.1	.72	---	2.4	961	46	12	4.2	.37	.04
30	1.3	1.5	1.1	.71	---	2.3	630	47	11	4.1	.75	.04
31	1.2	---	1.1	.70	---	2.3	---	47	---	3.7	1.5	---
TOTAL	12.26	47.2	38.5	27.00	17.21	44.07	18335.0	3932	1431	382.3	49.83	20.00
MEAN	.40	1.57	1.24	.87	.61	1.42	611	127	47.7	12.3	1.61	.67
MAX	1.3	1.7	1.5	1.0	.69	3.0	1980	479	176	40	3.6	2.1
MIN	.11	1.2	1.1	.70	.58	.58	1.9	45	11	3.7	.36	.03
AC-FT	24	94	76	54	34	87	36370	7800	2840	758	99	40

CAL YR 1978 TOTAL 22185.99 MEAN 60.8 MAX 1300 MIN .11 AC-FT 44010
WTR YR 1979 TOTAL 24336.37 MEAN 66.7 MAX 1980 MIN .03 AC-FT 48270

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 highway 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.--30 years (1949-79), 3,900 ft^3/s (110.4 m^3/s), 2,826,000 acre-ft/yr (3.48 km^3/yr); median of yearly mean discharges, 2,770 ft^3/s (78.4 m^3/s), 2,010,000 acre-ft/yr (2.5 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.--Maximum discharge known since 1860, that of Apr. 28, 1979. 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, 92,900 ft^3/s (2,630 m^3/s) Apr. 28; gage height, 43.66 ft (13.308 m); minimum, 516 ft^3/s (14.6 m^3/s) Nov. 19, gage height, 9.58 ft (2.920 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	1060	940	830	765	710	730	1140	75400	10200	6100	3900	2720
2	1030	970	840	760	710	740	1170	73200	9800	6000	4700	2670
3	980	970	850	760	715	760	1210	66500	9500	7000	5500	2630
4	980	980	850	755	715	770	1300	61200	9300	8100	5400	2550
5	1000	940	850	750	715	780	1350	55100	9100	10300	5000	2450
6	1030	940	850	745	715	790	1500	51000	8700	12000	4600	2350
7	1040	910	850	740	715	795	1520	47800	8400	13000	4200	2310
8	1050	880	850	740	715	800	1720	44000	8000	13300	3900	2260
9	1040	870	860	735	715	805	1750	42500	7600	11400	3750	2210
10	1060	860	860	730	715	810	1800	40000	7200	9750	3600	2160
11	1020	860	850	730	715	815	1850	37200	6800	8450	3400	2150
12	1040	840	830	730	715	820	2000	35000	6500	7600	3250	2140
13	1040	840	810	725	720	825	2200	32800	6200	6800	3150	2100
14	1030	820	770	725	720	830	2700	30700	6000	6300	3080	2090
15	1010	780	760	720	720	840	4500	29000	5800	5900	3000	2080
16	1000	752	760	715	720	890	5200	27100	5600	5500	2920	2040
17	950	656	760	715	725	870	8900	25200	5400	5100	2840	2000
18	940	593	760	715	725	830	15300	23700	5200	4700	2730	1980
19	920	523	760	715	725	830	24200	21800	5000	4500	2670	1960
20	930	565	760	715	725	830	32800	20300	4800	4000	2630	1900
21	940	698	760	710	730	840	42600	18700	4800	3850	2580	1870
22	960	840	760	710	730	860	55500	17500	4750	3700	2560	1850
23	960	850	760	710	740	890	67000	16400	4650	3600	2510	1850
24	920	820	760	710	750	920	75900	15300	4600	3500	2580	1840
25	910	800	760	710	750	960	83100	14300	5200	3400	2770	1830
26	900	770	765	705	740	1000	89000	13600	5600	3300	2840	1830
27	910	750	765	705	730	1100	90000	12900	6000	3200	2730	1780
28	1010	760	770	705	730	1130	91000	12300	6200	3300	2700	1780
29	1040	810	770	710	---	1130	89000	11800	6250	3500	2680	1770
30	940	820	765	710	---	1140	80600	11500	6250	3650	2680	1760
31	930	---	765	710	---	1140	---	10900	---	3700	2720	---
TOTAL	30570	24407	24710	22480	20250	27270	877810	994700	199600	194300	103570	62910
MEAN	986	814	797	725	723	880	29260	32090	6653	6268	3341	2097
MAX	1060	980	860	765	750	1140	91000	75400	10200	13300	5500	2720
MIN	900	523	760	705	710	730	1140	10900	4650	3200	2510	1760
AC-FT	60640	48410	49010	44590	40170	54090	1741000	1973000	395900	385400	205400	124800

CAL YR 1978 TOTAL 1861448 MEAN 5100 MAX 56200 MIN 523 AC-FT 3692000
WTR YR 1979 TOTAL 2582577 MEAN 7076 MAX 91000 MIN 523 AC-FT 5123000

05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN

LOCATION.--Lat 48°43'50", long 96°39'50", in SW 1/4 SW 1/4 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 poor. Flow partly regulated since 1937 by Bronson Lake, usable capacity, 3,700 acre-ft (4.56 hm^3).

AVERAGE DISCHARGE.--38 years (water years 1929-36, 1942, 1943, 1946, 1947, 1954-79), 91.0 ft^3/s (2.577 m^3/s), 65,930 acre-ft/yr (81.3 hm^3/yr); median of yearly mean discharges, 58 ft^3/s (1.64 m^3/s), 42,000 acre-ft/yr (52 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, 3,340 ft^3/s (94.6 m^3/s) Apr. 22, gage height, 13.17 ft (4.014 m); minimum, 0.47 ft^3/s (0.013 m^3/s) Oct. 8; minimum gage height, 3.26 ft (0.994 m) Apr. 11, 12.

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	.70	1.7	.88	1.7	2.2	2.4	27	1240	555	51	6.5	4.0
2	1.0	2.4	.92	1.7	2.2	2.4	25	1070	513	49	6.0	4.0
3	1.1	4.4	.95	1.7	2.2	2.4	22	952	482	52	5.6	2.4
4	1.2	4.8	.98	1.7	2.2	2.4	20	796	458	184	5.2	2.4
5	1.5	3.2	1.0	1.8	2.2	2.4	18	686	427	327	4.8	2.7
6	1.7	3.6	1.0	1.8	2.2	2.5	15	624	394	294	4.4	2.1
7	1.4	3.6	1.0	1.8	2.2	2.5	12	446	223	155	4.0	2.1
8	.58	3.6	1.1	1.8	2.2	2.5	10	423	310	91	3.2	2.1
9	.64	2.7	1.1	1.8	2.2	2.5	9.0	421	240	71	3.2	2.7
10	.90	2.7	1.1	1.8	2.2	2.5	4.3	347	184	31	2.7	3.6
11	1.0	2.5	1.2	1.9	2.3	2.5	.90	369	247	9.4	2.7	3.2
12	1.1	2.2	1.2	1.9	2.3	2.5	1.2	405	274	19	2.7	2.7
13	1.2	2.0	1.2	1.9	2.3	2.5	1.9	423	262	25	2.7	2.7
14	1.5	1.9	1.3	1.9	2.3	2.6	7.4	417	157	22	3.2	2.4
15	1.7	1.8	1.3	1.9	2.3	2.6	14	415	115	21	2.7	2.4
16	2.1	1.6	1.3	1.9	2.3	2.7	20	415	200	29	2.7	2.4
17	1.7	1.5	1.3	2.0	2.3	2.8	13	376	193	28	2.7	2.1
18	2.4	1.4	1.4	2.0	2.3	2.9	482	380	117	24	2.7	2.4
19	2.4	1.3	1.4	2.0	2.3	4.2	2100	394	28	23	2.4	2.7
20	2.4	1.2	1.4	2.0	2.3	15	2470	332	135	18	1.9	2.4
21	1.9	1.2	1.4	2.0	2.4	34	2800	364	131	15	3.2	2.7
22	1.5	1.1	1.5	2.0	2.4	38	3120	414	52	12	4.0	3.2
23	1.4	1.0	1.5	2.1	2.4	39	2870	402	24	12	2.4	2.1
24	1.5	1.0	1.5	2.1	2.4	39	2390	402	52	12	2.7	2.1
25	66	.92	1.5	2.1	2.4	39	2340	402	121	12	2.4	3.2
26	11	.88	1.6	2.1	2.4	38	2460	380	117	10	2.1	3.2
27	1.5	.86	1.6	2.1	2.4	36	2600	377	38	8.9	2.1	3.2
28	1.9	.84	1.6	2.1	2.4	35	2460	360	6.5	7.9	2.4	2.4
29	1.9	.84	1.6	2.2	---	33	1950	320	7.9	8.4	2.4	2.7
30	2.7	.86	1.6	2.2	---	31	1500	374	34	8.4	2.1	3.6
31	2.1	---	1.7	2.2	---	29	---	458	---	7.4	2.7	---
TOTAL	121.62	59.60	40.13	60.2	64.2	455.8	29762.70	15184	6097.4	1637.4	100.5	81.9
MEAN	3.92	1.99	1.29	1.94	2.29	14.7	992	490	203	52.8	3.24	2.73
MAX	66	4.8	1.7	2.2	2.4	39	3120	1240	555	327	6.5	4.0
MIN	.58	.84	.88	1.7	2.2	2.4	.90	320	6.5	7.4	1.9	2.1
AC-FT	241	118	80	119	127	904	59030	30120	12090	3250	199	162

CAL YR 1978 TOTAL 31180.12 MEAN 85.4 MAX 2620 MIN .30 AC-FT 61850
WTR YR 1979 TOTAL 53665.45 MEAN 147 MAX 3120 MIN .58 AC-FT 106400

05102500 RED RIVER OF THE NORTH AT EMERSON, MAN
(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.--67 years (water years 1913-79) 3,328 ft^3/s (94.25 m^3/s), 2,411,000 acre-ft/yr (2.97 km^3/yr); median of yearly mean discharges, 2,660 ft^3/s (75.3 m^3/s), 1,996,000 acre-ft/yr (2.5 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, 92,700 ft^3/s (2,630 m^3/s) May 1, gage height, 91.19 ft (27.795 m); minimum daily, 532 ft^3/s (15.1 m^3/s) Feb. 7.

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	1070	968	708	579	565	612	1290	92400	14300	6350	3680	2700
2	1060	948	715	576	558	606	1300	86300	13100	6240	3930	2710
3	1020	960	726	571	552	597	1320	83700	12400	6350	4530	2700
4	988	993	728	563	544	593	1340	83300	11800	7090	4950	2700
5	961	1000	724	557	538	584	1390	81400	11300	8600	5040	2690
6	950	1000	716	552	533	574	1460	78000	10900	10000	4910	2620
7	981	1000	721	546	532	563	1560	74200	10400	11100	4660	2550
8	1000	988	753	549	535	559	1680	70800	9930	11700	4390	2480
9	1010	930	787	552	543	556	1800	66700	9420	11800	4110	2400
10	1010	879	790	554	548	559	1910	62800	8950	11300	3870	2350
11	1020	856	753	561	554	569	2010	59700	8510	10400	3650	2300
12	999	846	698	565	562	579	2100	56500	8100	9270	3460	2260
13	993	845	655	565	574	596	2210	53500	7760	8170	3310	2230
14	996	882	646	562	583	617	2390	50200	7450	7240	3190	2200
15	983	886	623	558	590	645	2830	46900	7190	6530	3090	2180
16	966	870	602	551	595	677	3320	44100	6910	6010	3010	2160
17	950	905	586	549	603	753	4480	41700	6590	5580	2930	2130
18	921	907	577	544	609	819	9270	39400	6300	5170	2840	2100
19	896	878	570	548	610	834	19700	37800	6030	4800	2760	2080
20	878	811	570	556	605	849	27100	36300	5890	4510	2690	2050
21	878	720	573	562	600	859	32300	34500	5760	4260	2660	2010
22	878	672	577	566	601	876	39500	33100	5730	4060	2680	1980
23	904	714	579	569	604	889	50500	31600	5650	3930	2650	1960
24	917	806	585	574	608	915	65700	29900	5590	3810	2630	1940
25	907	879	589	575	613	947	74300	28000	5660	3710	2620	1930
26	883	906	588	574	616	985	79900	25900	5840	3680	2690	1910
27	876	872	584	575	617	1030	82300	23600	6110	3620	2750	1900
28	873	805	583	570	617	1100	86400	21300	6350	3510	2740	1880
29	911	740	583	570	---	1170	89900	19100	6440	3480	2710	1870
30	1000	705	582	571	---	1230	91100	17300	6430	3530	2680	1850
31	1010	---	581	567	---	1270	---	15800	---	3600	2680	---
TOTAL	29689	26171	20052	17431	16209	24012	782360	1525800	242790	199400	104490	66820
MEAN	958	872	647	562	579	775	26080	49220	8093	6432	3371	2227
MAX	1070	1000	790	579	617	1270	91100	92400	14300	11800	5040	2710
MIN	873	672	570	544	532	556	1290	15800	5590	3480	2620	1850
AC-FT	58890	51910	39770	34570	32150	47630	1552000	3026000	481600	395500	207300	132500

CAL YR 1978 TOTAL 1908971 MEAN 5230 MAX 50300 MIN 570 AC-FT 3786000
WTR YR 1979 TOTAL 3055224 MEAN 8370 MAX 92400 MIN 532 AC-FT 6060000

05102500 RED RIVER OF THE NORTH AT EMERSON, MAN.--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.

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

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily mean, 1,110 micromhos Jan. 2, 3; minimum daily mean, 345 micromhos Apr. 22.
WATER TEMPERATURES: Maximum daily mean, 25°C July 22-25; minimum daily mean, 0.0°C on many days during winter months.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE (DEG C) (00010)	TURBIDITY (NTU) (00076)	OXYGEN, DISSOLVED (MG/L) (00300)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)
OCT												
25...	1200	907	800	8.4	7.0	21	10.4	K10	66	310	130	71
NOV												
30...	1000	705	790	8.1	.0	3.8	13.4	K3	48	270	53	63
DEC												
21...	1300	573	890	8.0	.0	3.7	11.0	--	--	300	64	69
JAN												
30...	1415	515	750	7.7	.0	5.6	8.6	62	86	290	38	69
FEB												
22...	1130	569	813	7.5	.0	5.6	10.3	K40	126	330	67	75
MAR												
20...	1230	846	631	7.5	.0	5.5	9.5	97	430	280	51	68
MAY												
10...	1030	62800	410	8.0	5.5	80	11.0	K10	3100	190	76	48
JUN												
01...	1225	14300	598	8.1	15.5	90	7.2	K270	220	270	99	65
28...	1100	6350	645	8.3	22.0	51	7.8	K40	82	260	70	58
JUL												
26...	1125	3690	640	8.2	23.0	150	5.4	K31	37	250	41	51
AUG												
30...	1120	2580	519	8.5	20.0	52	8.2	K47	54	220	45	52
SEP												
27...	1030	1900	494	8.5	15.5	40	9.4	K10	48	220	57	49

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

DATE	MAGNESIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD-SORP-TION RATIO (00931)	POTASSIUM, DIS-SOLVED (MG/L AS K) (00935)	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 CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)
OCT												
25...	33	48	24	1.2	10	180	140	48	.2	9.5	504	468
NOV												
30...	28	61	32	1.6	6.6	220	74	85	.2	3.2	457	453
DEC												
21...	32	59	29	1.5	6.6	240	95	70	.2	9.1	520	485
JAN												
30...	28	50	27	1.3	4.9	250	60	62	.2	11	460	436
FEB												
22...	34	52	25	1.3	5.2	260	72	65	.2	13	500	473
MAR												
20...	27	24	15	.6	4.5	250	47	21	.2	13	352	355
MAY												
10...	16	14	14	.4	6.0	110	86	9.8	.2	18	272	264
JUN												
01...	26	28	18	.7	6.5	170	100	44	.2	8.6	394	381
28...	28	32	21	.9	5.8	190	120	25	.2	9.0	419	390
JUL												
26...	30	30	33	.8	5.5	210	99	36	.2	16	410	394
AUG												
30...	23	21	17	.6	4.0	180	65	25	.2	12	325	310
SEP												
27...	23	21	26	.6	3.8	180	55	20	.2	10	316	290

DATE	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	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, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N) (00624)	NITRO-GEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN, TOTAL (MG/L AS N) (00600)	NITRO-GEN, DIS-SOLVED (MG/L AS N) (00602)
OCT											
25...	.69	1230	.02	--	.01	1.4	1.4	.10	1.3	1.4	--
NOV											
30...	.62	870	.04	--	.05	.86	.91	.20	.71	.95	--
DEC											
21...	.71	804	.20	--	.25	.95	1.2	.20	1.0	1.4	--
JAN											
30...	.63	640	.39	--	.40	.90	1.3	.20	1.1	1.7	--
FEB											
22...	.68	768	.55	--	.49	1.0	1.5	.20	1.3	2.1	--
MAR											
20...	.48	804	.50	--	.32	.78	1.1	.12	.98	1.6	--
MAY											
10...	.37	46100	1.8	--	.15	1.2	1.3	.56	.74	3.1	--
JUN											
01...	.54	15200	.24	--	.15	1.3	1.4	.43	.97	1.6	--
28...	.57	7180	.30	--	.03	1.1	1.1	.47	.63	1.4	--
JUL											
26...	.56	4090	.35	--	.01	1.3	1.3	.58	.72	1.7	--
AUG											
30...	.44	2400	.16	--	.03	1.7	1.7	.93	.77	1.9	--
SEP											
27...	.43	1620	.11	.04	.11	.88	.99	.96	.03	1.1	.07

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

DATE	NITROGEN, TOTAL (MG/L AS NO3) (71887)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHATE, TOTAL (MG/L AS PO4) (00650)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA) (01007)	BARIUM, SUSPENDED RECOVERABLE (UG/L AS BA) (01006)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM SUSPENDED RECOVERABLE (UG/L AS CD) (01026)
OCT											
25...	6.3	.22	--	.14	3	11	100	0	100	--	--
NOV											
30...	4.2	.11	--	.06	--	--	--	--	--	--	--
DEC											
21...	6.2	.21	--	.19	--	--	--	--	--	--	--
JAN											
30...	7.5	.21	--	.17	2	1	0	0	0	1	0
FEB											
22...	9.1	.22	--	.17	--	--	--	--	--	--	--
MAR											
20...	7.1	.17	--	.14	--	--	--	--	--	--	--
MAY											
10...	14	.30	.92	.18	5	4	100	0	100	2	2
JUN											
01...	7.3	.23	.71	.10	--	--	--	--	--	--	--
28...	6.2	.31	.95	.09	--	--	--	--	--	--	--
JUL											
26...	7.3	.02	--	.17	6	4	100	0	100	1	0
AUG											
30...	8.2	.18	--	.12	--	--	--	--	--	--	--
SEP											
27...	4.9	.18	--	.05	--	--	--	--	--	--	--

DATE	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, SUSPENDED RECOV. (UG/L AS CR) (01031)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOVERABLE (UG/L AS CO) (01037)	COBALT, SUSPENDED RECOVERABLE (UG/L AS CO) (01036)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, SUSPENDED RECOVERABLE (UG/L AS CU) (01041)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)
OCT											
25...	0	0	0	0	1	1	0	12	9	3	980
NOV											
30...	--	--	--	--	--	--	--	--	--	--	--
DEC											
21...	--	--	--	--	--	--	--	--	--	--	--
JAN											
30...	1	10	10	0	1	0	1	12	10	2	340
FEB											
22...	--	--	--	--	--	--	--	--	--	--	--
MAR											
20...	--	--	--	--	--	--	--	--	--	--	--
MAY											
10...	0	10	10	0	3	3	0	310	300	8	5200
JUN											
01...	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--
JUL											
26...	<1	10	10	0	3	0	<3	10	8	2	4700
AUG											
30...	--	--	--	--	--	--	--	--	--	--	--
SEP											
27...	--	--	--	--	--	--	--	--	--	--	--

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

DATE	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, SUS-PENDED RECOV-ERABLE (UG/L AS PB) (01050)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN) (01054)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	MERCURY SUS-PENDED RECOV-ERABLE (UG/L AS HG) (71895)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)
OCT											
25...	20	--	--	0	70	50	20	.0	.0	.0	0
NOV											
30...	--	--	--	--	--	--	--	--	--	--	--
DEC											
21...	--	--	--	--	--	--	--	--	--	--	--
JAN											
30...	10	--	--	--	80	20	60	.0	.0	.0	0
FEB											
22...	--	--	--	--	--	--	--	--	--	--	--
MAY											
10...	70	66	66	0	740	730	10	.2	.1	.1	1
JUN											
01...	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--
JUL											
26...	10	8	7	1	320	320	4	.4	.1	.3	1
AUG											
30...	--	--	--	--	--	--	--	--	--	--	--
SEP											
27...	--	--	--	--	--	--	--	--	--	--	--

DATE	SELE-NIUM, SUS-PENDED TOTAL (UG/L AS SE) (01146)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, SUS-PENDED RECOV-ERABLE (UG/L AS AG) (01076)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, SUS-PENDED RECOV-ERABLE (UG/L AS ZN) (01091)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	PCB, TOTAL (UG/L) (39516)
OCT											
25...	0	0	0	0	0	20	10	10	12	1.4	--
NOV											
30...	--	--	--	--	--	--	--	--	11	1.4	--
DEC											
21...	--	--	--	--	--	--	--	--	12	1.3	ND
JAN											
30...	0	0	1	0	1	20	10	10	16	1.0	ND
FEB											
22...	--	--	--	--	--	--	--	--	15	--	--
MAY											
10...	0	1	0	0	0	110	90	20	11	--	ND
JUN											
01...	--	--	--	--	--	--	--	--	13	2.8	--
28...	--	--	--	--	--	--	--	--	11	.9	--
JUL											
26...	0	1	0	0	0	50	40	7	16	.7	ND
AUG											
30...	--	--	--	--	--	--	--	--	29	1.1	--
SEP											
27...	--	--	--	--	--	--	--	--	9.4	1.3	--

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

DATE	PCB, TOTAL IN BOTTOM MATERIAL (UG/KG) (39519)	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)
OCT											
25...	--	--	--	--	--	--	--	--	--	--	--
NOV											
30...	--	--	--	--	--	--	--	--	--	--	--
DEC											
21...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAN											
30...	--	ND	--	ND	--	ND	--	ND	--	ND	--
FEB											
22...	--	--	--	--	--	--	--	--	--	--	--
MAY											
10...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JUN											
01...	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--
JUL											
26...	--	ND	--	ND	--	ND	--	ND	--	ND	--
AUG											
30...	--	--	--	--	--	--	--	--	--	--	--
SEP											
27...	--	--	--	--	--	--	--	--	--	--	--

DATE	DI-AZINON, TOTAL (UG/L) (39570)	DI-AZINON, TOTAL IN BOTTOM MATERIAL (UG/KG) (39571)	DI-ELDRIN TOTAL (UG/L) (39380)	DI-ELDRIN, 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)
OCT											
25...	--	--	--	--	--	--	--	--	--	--	--
NOV											
30...	--	--	--	--	--	--	--	--	--	--	--
DEC											
21...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAN											
30...	ND	--	ND	--	ND	--	ND	--	ND	--	ND
FEB											
22...	--	--	--	--	--	--	--	--	--	--	--
MAY											
10...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JUN											
01...	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--
JUL											
26...	ND	--	ND	--	ND	--	ND	--	ND	--	ND
AUG											
30...	--	--	--	--	--	--	--	--	--	--	--
SEP											
27...	--	--	--	--	--	--	--	--	--	--	--

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

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)
OCT										
25...	--	--	--	--	--	--	--	--	--	--
NOV										
30...	--	--	--	--	--	--	--	--	--	--
DEC										
21...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAN										
30...	--	ND	--	ND	--	ND	--	ND	--	ND
FEB										
22...	--	--	--	--	--	--	--	--	--	--
MAY										
10...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JUN										
01...	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--
JUL										
26...	--	ND	--	ND	--	ND	--	ND	--	ND
AUG										
30...	--	--	--	--	--	--	--	--	--	--
SEP										
27...	--	--	--	--	--	--	--	--	--	--

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)	PHYTOPLANKTON, TOTAL (CELLS PER ML) (60050)	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M (00573)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M (00572)
OCT										
25...	--	--	--	--	--	--	--	71000	--	--
NOV										
30...	--	--	--	--	--	--	--	--	--	--
DEC										
21...	ND	ND	ND	ND	ND	ND	ND	--	--	--
JAN										
30...	--	ND	--	ND	--	ND	--	--	.240	.160
FEB										
22...	--	--	--	--	--	--	--	470	--	--
MAY										
10...	ND	ND	ND	ND	ND	ND	ND	1000	--	--
JUN										
01...	--	--	--	--	--	--	--	3000	--	--
28...	--	--	--	--	--	--	--	2300	--	--
JUL										
26...	--	ND	--	ND	--	ND	--	1400	.630	.550
AUG										
30...	--	--	--	--	--	--	--	5200	--	--
SEP										
27...	--	--	--	--	--	--	--	--	--	--

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUORUM (MG/M2) (70957)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUORUM (MG/M2) (70958)	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					
25...	--	--	42	103	98
NOV					
30...	--	--	14	27	87
DEC					
21...	--	--	9	14	88
JAN					
30...	.190	.000	8	11	77
FEB					
22...	--	--	8	12	90
MAR					
20...	--	--	18	41	90
MAY					
10...	--	--	183	31000	98
JUN					
01...	--	--	212	8190	98
28...	--	--	220	3770	98
JUL					
26...	.000	.000	237	2360	100
AUG					
30...	--	--	122	903	98
SEP					
27...	--	--	97	498	99

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	865	700	910	1100	805	740	700	---	700	---	650	635
2	850	735	990	1110	810	710	690	---	720	---	645	650
3	830	700	950	1110	810	700	690	---	730	---	650	670
4	815	670	965	1080	820	695	690	---	720	---	640	680
5	790	690	965	1050	830	690	690	---	740	---	580	680
6	805	720	935	1020	840	685	685	---	730	---	550	680
7	840	680	915	1000	850	685	670	---	700	---	560	680
8	805	670	900	990	880	685	655	---	730	---	590	680
9	730	690	895	980	890	685	655	---	740	---	610	680
10	725	700	895	980	880	685	660	---	750	---	600	690
11	710	720	885	970	860	685	665	---	740	---	600	690
12	720	740	860	950	850	680	660	---	740	---	600	690
13	730	780	840	935	830	680	670	---	750	---	620	700
14	735	740	835	925	810	680	660	---	760	---	610	710
15	750	740	830	920	800	680	640	---	740	---	595	720
16	775	760	880	910	795	670	620	---	750	---	600	730
17	790	760	890	900	790	660	615	---	760	---	610	730
18	765	755	860	890	790	650	555	---	765	735	610	730
19	805	830	850	885	790	645	440	---	755	730	610	690
20	790	880	875	885	800	650	370	---	740	730	600	690
21	795	875	900	875	800	670	355	---	750	740	600	720
22	815	910	915	860	790	690	345	---	760	735	590	730
23	850	880	930	840	785	705	360	---	760	725	610	720
24	850	865	960	830	790	710	---	---	775	725	625	660
25	840	905	1000	825	780	710	---	---	770	725	640	620
26	815	955	1030	820	770	700	---	---	750	715	650	600
27	790	1000	1050	815	760	695	---	---	730	710	660	580
28	750	990	1060	810	750	695	---	---	---	700	670	560
29	780	890	1080	810	---	710	---	---	---	685	640	560
30	750	820	1080	805	---	705	---	660	---	675	630	560
31	700	---	1090	805	---	705	---	670	---	670	620	---
MEAN	786	792	936	925	813	688					615	671

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.5	5.5	.5	.5	.5	.5	.5	---	13.5	---	23.0	19.5
2	13.5	5.0	.5	.5	.5	.5	.5	---	14.0	---	23.0	19.0
3	13.0	5.5	.5	.5	.5	.5	.5	---	14.5	---	23.0	18.5
4	12.0	5.0	.5	.5	.5	.5	.5	---	15.5	---	23.0	19.0
5	11.5	4.5	.5	.5	.5	.5	.5	---	15.0	---	23.0	19.5
6	11.0	4.0	.5	.5	.5	.5	.5	---	15.5	---	22.0	19.0
7	10.5	3.5	.5	.5	.5	.5	.5	---	15.5	---	21.5	18.0
8	10.0	4.0	.5	.5	.5	.5	.5	---	15.0	---	22.0	18.0
9	10.5	4.5	.5	.5	.5	.5	.5	---	15.5	---	21.5	18.0
10	10.5	3.5	.5	.5	.5	.5	.5	---	16.0	---	21.0	17.5
11	11.0	2.0	.5	.5	.5	.5	.5	---	16.0	---	21.5	17.0
12	11.0	1.0	.5	.5	.5	.5	.5	---	17.0	---	23.0	17.0
13	10.0	1.0	.5	.5	.5	.5	.5	---	17.0	---	22.0	16.0
14	9.0	.5	.5	.5	.5	.5	.5	---	18.0	---	20.0	15.0
15	8.5	1.0	.5	.5	.5	.5	.5	---	18.5	---	20.5	15.0
16	8.0	.5	.5	.5	.5	.5	.5	---	18.0	---	21.0	16.0
17	8.0	.5	.5	.5	.5	.5	.5	---	18.5	---	20.5	16.5
18	7.5	.5	.5	.5	.5	.5	1.0	---	18.0	23.5	19.5	16.0
19	8.0	.5	.5	.5	.5	.5	1.0	---	18.5	23.0	20.0	15.5
20	8.5	.5	.5	.5	.5	.5	2.0	---	18.0	24.0	20.5	15.0
21	9.0	.5	.5	.5	.5	.5	2.5	---	17.0	24.5	20.5	14.5
22	9.0	.5	.5	.5	.5	.5	3.0	---	16.0	25.0	20.0	14.0
23	7.5	.5	.5	.5	.5	.5	4.0	---	16.5	25.0	19.0	13.5
24	7.0	.5	.5	.5	.5	.5	---	---	17.0	25.0	18.0	14.0
25	7.0	.5	.5	.5	.5	.5	---	---	17.5	25.0	18.5	14.0
26	7.0	.5	.5	.5	.5	.5	---	---	16.0	24.5	18.5	14.5
27	6.5	.5	.5	.5	.5	.5	---	---	18.5	24.0	19.0	14.5
28	6.0	.5	.5	.5	.5	.5	---	---	---	24.0	19.5	14.0
29	5.5	.5	.5	.5	---	.5	---	---	---	24.0	19.5	13.0
30	6.0	.5	.5	.5	---	.5	---	14.0	---	24.0	19.0	13.0
31	5.5	---	.5	.5	---	.5	---	14.0	---	23.0	19.0	---
MEAN	9.0	2.0	.5	.5	.5	.5	1.0	14.0	16.5	24.0	20.5	16.0

05104500 ROSEAU RIVER BELOW SOUTH FORK NEAR MALUNG, MN

LOCATION.--Lat 48°47'30", long 95°44'40", in NW 1/4 SW 1/4 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 good except those for winter period, which are fair. Some flow bypasses the gaging station through a natural overflow channel 0.8 mi (1.3 km) upstream and returns to river 0.5 mi (0.8 km) downstream. Overflow begins at stage of about 13.0 ft (4.0 m), discharge, 1,800 ft^3/s (51.0 m^3/s). These records include any flow in the overflow channel.

AVERAGE DISCHARGE.--33 years, 152 ft^3/s (4.305 m^3/s), 110,100 acre-ft/yr (136 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 and Dec. 22 to Mar. 10, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,480 ft^3/s (155 m^3/s) Apr. 25, gage height, 21.78 ft (6.639 m); minimum daily, 1.1 ft^3/s (0.031 m^3/s) Sept. 24.

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	53	22	16	11	5.2	5.2	35	1700	155	35	9.8	5.5
2	51	22	16	10	5.0	5.4	32	1420	192	36	9.8	6.3
3	48	22	15	10	4.9	5.6	30	1220	199	40	9.2	5.1
4	42	22	15	10	4.8	6.0	28	1040	196	61	7.9	4.6
5	40	21	15	10	4.7	6.3	26	899	189	159	6.7	4.6
6	39	21	14	10	4.6	6.6	25	781	196	248	6.1	4.0
7	38	21	14	10	4.5	6.9	24	689	182	201	5.5	3.8
8	37	20	14	10	4.4	7.2	23	627	167	141	5.7	2.0
9	37	20	14	9.9	4.4	7.4	22	562	144	108	4.0	2.4
10	41	20	14	9.8	4.4	7.7	22	490	128	88	3.8	2.7
11	38	18	14	9.5	4.4	8.2	22	454	112	76	4.2	1.9
12	34	19	14	9.2	4.4	8.6	23	428	101	68	3.6	1.5
13	30	20	14	9.0	4.4	9.2	24	404	89	60	2.3	1.6
14	28	20	13	8.8	4.4	9.9	25	364	79	59	2.3	1.6
15	28	20	13	8.6	4.4	11	40	315	71	46	2.3	1.6
16	28	20	12	8.4	4.4	18	120	264	70	38	2.8	1.6
17	29	20	12	8.2	4.4	30	1000	232	63	36	2.8	1.4
18	27	20	12	8.0	4.4	40	3000	204	56	33	2.7	1.2
19	28	18	11	7.7	4.4	52	4820	185	51	29	2.3	1.3
20	28	15	11	7.5	4.4	54	4730	164	51	25	2.0	1.3
21	27	14	11	7.3	4.5	54	4830	150	56	22	1.9	1.3
22	26	13	11	7.1	4.5	54	4160	145	69	18	2.8	1.3
23	26	16	11	6.9	4.5	54	3380	152	88	18	4.2	1.2
24	36	16	11	6.8	4.6	53	3400	158	94	16	4.6	1.1
25	35	18	11	6.6	4.6	53	5010	172	85	15	5.1	1.2
26	31	18	11	6.4	4.7	52	5300	162	73	13	5.3	1.2
27	27	18	11	6.2	4.8	52	4560	154	63	11	5.9	1.2
28	25	17	11	6.0	5.0	52	3680	141	55	11	4.6	1.2
29	23	17	11	5.8	---	47	2870	134	48	12	5.5	1.2
30	22	17	11	5.6	---	42	2150	125	42	18	3.7	1.2
31	22	---	11	5.4	---	38	---	129	---	13	3.8	---
TOTAL	1024	565	394	255.7	128.1	856.2	53411	14064	3164	1754	143.2	68.1
MEAN	33.0	18.8	12.7	8.25	4.58	27.6	1780	454	105	56.6	4.62	2.27
MAX	53	22	16	11	5.2	54	5300	1700	199	248	9.8	6.3
MIN	22	13	11	5.4	4.4	5.2	22	125	42	11	1.9	1.1
AC-FT	2030	1120	781	507	254	1700	105900	27900	6280	3480	284	135

CAL YR 1978 TOTAL 65412.3 MEAN 179 MAX 2500 MIN 4.4 AC-FT 129700
WTR YR 1979 TOTAL 75827.3 MEAN 208 MAX 5300 MIN 1.1 AC-FT 150400

05105300 ROSEAU RIVER BELOW ROSEAU, MN

LOCATION.--Lat 48°53'28", long 95°43'50", in SW 1/4 SE 1/4 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 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	COLOR (PLAT-INUM-COBALT UNITS) (00080)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
OCT										
10...	1400	44	375	8.0	19.0	10.0	60	4.0	9.6	88
NOV										
27...	1700	18	477	8.7	--	.0	45	4.0	9.5	67
JAN										
10...	1430	9.8	515	--	-27.0	.0	30	3.0	5.5	39
FEB										
14...	1100	8.2	500	7.4	--	.0	25	5.0	8.2	58
MAR										
26...	1515	34	450	7.8	-3.0	.0	50	4.0	7.3	52
MAY										
07...	1800	727	290	8.0	11.0	6.0	55	15	11.4	95
JUN										
18...	1500	82	460	8.2	23.0	21.0	40	--	8.1	91
JUL										
31...	0930	22	419	8.0	18.0	19.5	25	9.0	6.2	80
SEP										
10...	1600	4.9	990	8.2	14.5	14.5	35	15	7.1	72

DATE	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L) (00310)	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML) (31501)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD-NESS (MG/L AS CACO3) (00900)	HARD-NESS, NONCAR-BONATE (MG/L 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 PERCENT (00932)
OCT										
10...	2.7	K9100	66	200	220	16	57	19	4.7	4
NOV										
27...	3.3	820	250	290	280	19	73	24	8.0	6
JAN										
10...	2.7	1200	210	280	300	14	74	29	11	7
FEB										
14...	--	--	>6000	710	280	0	68	26	13	9
MAR										
26...	--	K86	K10	27	230	12	55	23	9.9	8
MAY										
07...	--	K110	K50	K100	140	10	33	14	3.0	4
JUN										
18...	--	300	110	130	200	0	51	17	11	11
JUL										
31...	--	360	280	550	240	12	59	23	9.5	8
SEP										
10...	--	290	90	630	320	6	64	38	98	40

05105300 ROSEAU RIVER BELOW ROSEAU, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	CAR-BONATE (MG/L AS CO3) (00445)	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									
10...	.1	1.3	0	210	8.2	2.1	.1	14	261
NOV									
27...	.2	1.7	0	260	13	3.1	.1	15	325
JAN									
10...	.3	1.8	--	290	8.5	3.8	.1	20	349
FEB									
14...	.3	2.6	--	280	20	6.1	.1	20	358
MAR									
26...	.3	5.7	--	220	19	7.1	.1	17	298
MAY									
07...	.1	2.4	--	130	11	2.9	.2	9.8	192
JUN									
18...	.3	1.2	--	200	11	11	.1	5.5	273
JUL									
31...	.3	1.5	--	230	15	5.7	.1	7.8	292
SEP									
10...	2.4	6.2	--	310	68	130	.4	15	645

DATE	SOLIDS, VOLA-TILE, DIS-SOLVED (MG/L) (00520)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, TOTAL (MG/L AS N) (00600)	NITRO-GEN, TOTAL (MG/L AS NO3) (71887)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)
OCT									
10...	69	.00	1.0	1.0	4.4	.05	90	130	30
NOV									
27...	77	.00	.64	.64	2.8	.02	80	350	30
JAN									
10...	74	.12	.84	.96	4.3	.04	90	400	100
FEB									
14...	75	.35	1.3	1.7	7.3	.04	80	510	80
MAR									
26...	72	1.2	2.1	3.3	15	.32	80	480	100
MAY									
07...	53	.04	1.3	1.3	5.9	.07	90	620	20
JUN									
18...	73	.18	.87	1.1	4.6	.19	80	300	40
JUL									
31...	55	.07	.83	.90	4.0	.09	60	--	--
SEP									
10...	33	.03	1.6	1.6	7.2	1.1	180	520	50

05106000 SPRAGUE CREEK NEAR SPRAGUE, MANITOBA

(International gaging station)

LOCATION.--Lat 48°59'33", long 95°39'43", in NE 1/4 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 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.--40 years (water years 1929, 1941-79), 59.1 ft^3/s (1.674 m^3/s), 42,820 acre-ft/yr (52.8 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, 963 ft^3/s (27.3 m^3/s) Apr. 20, gage height, 11.88 ft (3.621 m); minimum, 0.63 ft^3/s (0.018 m^3/s) Sept. 21; gage height, 1.85 ft (0.564 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	4.4	3.4	2.5	1.5	1.0	.98	6.1	424	160	12	3.0	3.8
2	4.3	3.4	2.5	1.5	1.0	.98	5.6	441	171	10	2.9	6.6
3	4.2	3.7	2.4	1.5	1.0	.98	5.2	435	157	9.0	3.7	5.2
4	4.2	4.0	2.4	1.5	1.0	.98	4.8	399	147	8.8	3.8	4.8
5	4.4	3.7	2.5	1.5	1.0	.98	4.5	379	136	8.3	3.1	3.5
6	4.5	3.6	2.4	1.4	1.0	.99	4.4	364	141	8.0	2.9	3.8
7	4.7	3.8	2.1	1.4	1.0	1.0	4.1	365	169	7.5	2.4	4.0
8	4.5	3.8	1.9	1.4	1.0	1.0	3.8	376	142	7.1	3.6	2.6
9	4.4	3.8	1.9	1.4	.99	1.0	3.5	357	118	6.7	2.5	2.3
10	4.2	3.8	1.9	1.4	.99	1.0	3.4	324	103	6.3	2.2	1.9
11	3.9	3.8	1.9	1.4	.98	1.1	3.5	324	93	6.0	2.0	1.6
12	3.8	3.5	1.9	1.4	.97	1.1	3.8	317	83	5.8	1.9	1.4
13	3.7	3.8	1.9	1.4	.97	1.1	4.8	309	76	5.6	2.0	1.2
14	3.7	4.1	1.9	1.4	.97	1.1	7.0	292	66	5.3	2.0	1.0
15	3.8	3.7	1.9	1.4	.97	1.2	12	263	58	5.0	2.2	1.1
16	4.1	3.5	1.9	1.3	.97	1.3	50	238	48	4.8	1.9	1.0
17	4.1	3.3	1.9	1.3	.97	1.6	136	218	41	4.6	1.9	1.0
18	4.5	3.0	1.8	1.3	.97	2.1	556	191	35	4.4	1.7	1.0
19	5.2	2.8	1.8	1.3	.97	5.8	710	169	33	4.2	1.6	.81
20	4.5	2.2	1.8	1.3	.97	9.0	898	157	39	4.1	1.6	.74
21	3.9	2.3	1.8	1.3	.97	11	919	146	47	4.0	1.9	.70
22	4.0	2.4	1.8	1.2	.97	11	937	161	40	3.9	2.2	.71
23	4.0	2.5	1.7	1.2	.97	11	826	182	32	3.8	2.7	.76
24	3.9	2.8	1.7	1.2	.97	10	766	169	28	3.6	3.6	.77
25	3.6	2.9	1.7	1.2	.97	10	910	152	24	3.5	3.5	.69
26	3.7	2.9	1.7	1.2	.98	9.5	881	141	21	3.4	3.3	.76
27	4.0	2.9	1.6	1.1	.98	9.0	770	133	18	3.3	2.6	.86
28	4.6	2.8	1.6	1.1	.98	8.5	638	127	17	3.7	2.3	.83
29	4.5	2.7	1.6	1.1	---	7.9	532	116	14	4.0	2.1	.80
30	4.4	2.7	1.6	1.1	---	6.8	462	118	14	3.7	2.0	.78
31	3.6	---	1.6	1.1	---	6.4	---	157	---	3.4	3.0	---
TOTAL	129.3	97.6	59.6	40.8	27.48	136.39	10067.5	7944	2271	173.8	78.1	57.01
MEAN	4.17	3.25	1.92	1.32	.98	4.40	336	256	75.7	5.61	2.52	1.90
MAX	5.2	4.1	2.5	1.5	1.0	11	937	441	171	12	3.8	6.6
MIN	3.6	2.2	1.6	1.1	.97	.98	3.4	116	14	3.3	1.6	.69
AC-FT	256	194	118	81	55	271	19970	15760	4500	345	155	113

CAL YR 1978 TOTAL 16105.80 MEAN 44.1 MAX 631 MIN 1.3 AC-FT 31950
WTR YR 1979 TOTAL 21082.58 MEAN 57.8 MAX 937 MIN .69 AC-FT 41820

NOTE.--No gage-height record Jan. 11 to Mar. 27.

05106500 ROSEAU RIVER AT ROSEAU LAKE, MN

LOCATION.--Lat 48°54'22", long 95°49'55", in SW 1/4 SW 1/4 sec.28, T.163 N., R.40 W., Roseau County, Hydrologic Unit 09020314, at downstream side of bridge on County Road 123 at Roseau Lake, 3.5 mi (5.6 km) upstream from Pine Creek, 3.8 mi (6.1 km) downstream from Sprague Creek, and 7 mi (11 km) northwest of Roseau.

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

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

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

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

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,036.44 ft (315.907 m) Apr. 29; minimum recorded, 1,020.80 ft (311.140 m) Sept. 11.

GAGE HEIGHT, IN FEET, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22.46						---	36.32	29.91	22.37	21.71	21.06
2	22.56						---	36.29	29.70	22.37	21.64	21.22
3	22.62						---	36.17	29.49	22.36	21.57	21.19
4	22.64						---	36.00	29.27	22.33	21.49	21.03
5	22.63						---	35.85	29.02	22.53	21.45	20.93
6	22.60						---	35.67	28.79	23.30	21.38	20.85
7	22.55						---	35.50	28.59	23.66	21.34	20.83
8	22.56						---	35.34	28.33	23.45	21.29	20.83
9	22.60						---	35.15	28.01	23.03	21.27	20.85
10	22.64						---	34.99	---	22.67	21.27	20.84
11	---						---	34.84	---	22.45	21.26	20.82
12	---						---	34.62	---	22.32	21.24	20.89
13	---						---	34.47	---	22.23	21.19	21.02
14	---						---	34.31	---	22.17	21.14	21.17
15	---						---	34.09	---	22.17	21.07	21.27
16	---						24.85	33.87	---	22.09	21.00	21.37
17	---						29.61	33.67	---	22.03	20.98	21.44
18	---						31.37	33.45	---	22.06	20.98	21.49
19	---						32.27	33.20	---	22.08	20.97	21.53
20	---						33.19	32.97	---	22.03	20.99	21.55
21	---						33.72	32.71	23.54	21.96	21.03	21.57
22	---						34.20	32.51	23.24	21.92	21.12	21.60
23	---						34.57	32.27	23.14	21.94	21.17	21.62
24	---						34.92	32.03	23.11	22.06	21.25	21.64
25	---						35.29	31.76	23.04	22.01	21.26	21.66
26	---						35.64	31.51	22.94	21.94	21.12	21.68
27	---						36.03	31.23	22.76	21.87	21.11	21.69
28	---						36.29	30.93	22.64	21.79	20.98	21.70
29	---						36.39	30.61	22.52	21.67	20.96	21.76
30	---						36.40	30.39	22.39	21.69	21.01	21.80
31	---						---	30.16	---	21.79	20.97	---
MEAN	---	---	---	---	---	---	---	33.64	---	22.27	21.20	21.30
MAX	---	---	---	---	---	---	---	36.32	---	23.66	21.71	21.80
MIN	---	---	---	---	---	---	---	30.16	---	21.67	20.96	20.82

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 NE 1/4 SE 1/4 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 good except those for winter period, which are fair. High flow affected by natural storage in Roseau Lake.

AVERAGE DISCHARGE.--51 years, 270 ft^3/s (7.646 m^3/s), 195,600 acre-ft/yr (241 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 and Aug. 23-25, 1977.

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, 4,570 ft^3/s (129 m^3/s) Apr. 29, gage height, 17.31 ft (5.276 m); minimum, 0.35 ft^3/s (0.010 m^3/s) Sept. 23, gage height, 1.02 ft (0.311 m), minimum gage height, 0.94 ft (0.287 m) Aug. 22.

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	69	35	28	14	7.3	6.1	61	4440	1280	68	24	3.3
2	61	32	28	13	7.2	6.1	60	4170	1220	66	21	7.0
3	59	31	27	13	7.0	6.1	59	4000	1170	68	19	14
4	60	38	26	13	6.9	6.1	58	3880	1120	65	17	14
5	58	42	25	12	6.8	6.1	57	3740	1070	77	16	11
6	55	39	25	12	6.7	6.1	56	3640	1020	149	15	8.1
7	51	36	24	12	6.6	6.1	55	3400	975	202	14	7.0
8	49	35	24	12	6.6	6.1	55	3180	925	187	12	7.4
9	46	35	23	11	6.5	6.1	54	3090	865	148	12	8.1
10	45	34	22	11	6.4	6.1	54	2990	798	113	12	8.4
11	48	31	22	11	6.3	6.1	54	2820	722	92	11	7.7
12	53	31	21	11	6.2	6.1	55	2750	640	82	10	4.9
13	52	31	20	10	6.1	6.1	56	2700	557	75	8.5	2.2
14	46	32	20	10	6.1	6.2	59	2610	482	66	7.4	2.0
15	44	33	20	10	6.1	6.3	65	2540	418	62	7.4	2.0
16	42	32	19	9.8	6.1	6.6	150	2460	359	56	8.1	1.8
17	40	31	19	9.7	6.1	7.0	350	2360	309	46	4.8	1.5
18	39	31	18	9.5	6.1	7.5	900	2280	263	43	3.8	1.2
19	42	30	18	9.3	6.1	8.4	1200	2230	226	43	3.3	.86
20	43	28	18	9.1	6.1	9.8	1480	2150	208	39	2.4	.69
21	43	26	17	8.9	6.1	12	2150	2070	194	32	1.8	.52
22	43	24	17	8.8	6.1	15	2510	2010	164	30	1.3	.49
23	41	22	16	8.6	6.1	18	2800	1930	147	31	1.8	.42
24	39	22	16	8.4	6.1	22	3040	1870	145	34	2.4	.51
25	50	22	16	8.3	6.1	26	3240	1780	139	33	7.0	.50
26	59	23	16	8.1	6.1	33	3640	1730	129	30	13	.48
27	52	25	15	8.0	6.1	40	4180	1650	110	28	10	.61
28	46	27	15	7.8	6.1	47	4460	1570	96	26	7.0	.69
29	42	28	14	7.7	---	53	4520	1490	86	23	4.0	.69
30	41	28	14	7.5	---	60	4500	1420	75	24	3.1	1.2
31	37	---	14	7.4	---	62	---	1350	---	25	3.3	---
TOTAL	1495	914	617	311.9	178.1	519.1	39978	80300	15912	2063	283.4	119.26
MEAN	48.2	30.5	19.9	10.1	6.36	16.7	1333	2590	530	66.5	9.14	3.98
MAX	69	42	28	14	7.3	62	4520	4440	1280	202	24	14
MIN	37	22	14	7.4	6.1	6.1	54	1350	75	23	1.3	.42
AC-FT	2970	1810	1220	619	353	1030	79300	159300	31560	4090	562	237

CAL YR 1978 TOTAL 108226.80 MEAN 297 MAX 2540 MIN 8.0 AC-FT 214700
WTR YR 1979 TOTAL 142690.76 MEAN 391 MAX 4520 MIN .42 AC-FT 283000

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

LOCATION.--Lat 48°58'54", long 96°27'46", in SE 1/4 SW 1/4 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 good except those for winter period, which are 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.--22 years (water years 1921-30, 1933, 1937, 1941-43, 1973-79), 298 ft^3/s (8.439 m^3/s), 215,900 acre-ft/yr (266 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, 2,980 ft^3/s (84.4 m^3/s) May 8, gage height, 10.11 ft (3.082 m); minimum, 3.7 ft^3/s (0.10 m^3/s) Aug. 28, gage height, 1.51 ft (0.460 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	103	42	31	20	14	11	62	2430	2110	154	76	11
2	91	40	30	20	14	11	64	2530	2040	150	57	11
3	79	38	30	20	13	11	65	2590	1980	167	45	9.2
4	74	36	29	20	13	11	64	2680	1920	160	37	9.7
5	72	37	28	20	13	11	64	2780	1860	147	30	12
6	73	39	27	20	13	11	62	2860	1820	147	25	15
7	69	44	26	19	13	11	61	2940	1770	220	23	15
8	67	41	26	19	13	11	60	2970	1720	299	19	14
9	64	39	25	19	13	11	58	2970	1670	306	18	12
10	61	39	25	19	12	11	56	2950	1620	269	16	11
11	61	28	24	19	12	11	55	2960	1570	220	15	12
12	56	39	24	18	12	11	55	2930	1510	182	14	12
13	60	34	23	18	12	11	55	2920	1440	162	13	11
14	62	26	23	16	12	12	60	2880	1370	131	12	10
15	60	35	23	18	12	12	70	2840	1270	88	12	9.2
16	55	38	22	17	12	13	110	2800	1150	73	10	8.4
17	52	37	22	17	12	13	180	2750	1000	64	9.7	7.7
18	48	36	22	17	12	14	450	2700	861	54	8.8	6.4
19	45	36	22	17	12	15	900	2650	733	47	8.1	6.1
20	46	35	22	16	12	16	1100	2600	670	42	7.1	6.4
21	48	35	22	16	12	18	1200	2560	610	38	6.7	5.8
22	46	34	22	16	12	20	1300	2550	549	34	7.1	5.8
23	48	33	22	16	12	22	1380	2520	453	36	7.1	5.8
24	46	32	21	15	12	26	1500	2470	375	36	6.7	6.4
25	45	32	21	15	12	27	1660	2410	324	34	5.5	5.8
26	46	31	21	15	11	28	1770	2380	297	31	4.7	5.0
27	57	31	21	15	11	29	1900	2330	267	28	4.2	5.0
28	59	31	21	14	11	34	2040	2280	233	25	3.9	4.7
29	53	31	21	14	---	40	2190	2220	202	24	5.2	4.4
30	49	31	20	14	---	48	2320	2220	179	140	8.4	4.2
31	44	---	20	14	---	55	---	2180	---	133	9.7	---
TOTAL	1839	1060	736	535	344	585	20911	81650	33573	3641	524.9	262.0
MEAN	59.3	35.3	23.7	17.3	12.3	18.9	697	2640	1119	117	16.9	8.73
MAX	103	44	31	20	14	55	2320	2970	2110	306	76	15
MIN	44	26	20	14	11	11	55	2180	179	24	3.9	4.2
AC-FT	3650	2100	1460	1060	682	1160	41480	162300	66590	7220	1040	520

CAL YR 1978 TOTAL 114260.2 MEAN 313 MAX 2220 MIN 5.8 AC-FT 226600
WTR YR 1979 TOTAL 145860.9 MEAN 400 MAX 2970 MIN 3.9 AC-FT 289300

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.--Periphyton was collected with plastic strips. 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 not detected.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	COLOR (PLATINUM-COBALT UNITS) (00080)	TURBIDITY (NTU) (00076)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	OXYGEN DEMAND, BIOCHEMICAL, 5 DAY (MG/L) (00310)
OCT											
11...	1300	60	370	8.2	13.0	11.0	60	5.0	10.2	96	2.4
NOV											
28...	1630	32	462	7.8	--	.0	55	3.0	8.7	62	.8
JAN											
09...	1330	19	570	--	-24.0	.0	70	6.0	2.6	18	4.1
FEB											
15...	1530	12	606	7.4	--	.0	45	3.0	9.5	67	--
MAR											
27...	1215	29	530	7.6	-6.0	.0	40	4.0	.6	4	--
MAY											
08...	1000	3000	265	8.0	11.0	6.5	70	4.0	10.8	90	--
JUN											
19...	1100	797	410	7.7	14.5	19.0	80	--	5.6	62	--
AUG											
01...	1330	75	350	7.9	23.0	21.5	50	20	7.8	91	--
SEP											
11...	1200	11	411	8.5	15.5	15.0	35	5.0	8.7	89	--

DATE	COLIFORM, TOTAL, IMMED. (COLS. PER 100 ML) (31501)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARDNESS (MG/L AS CACO3) (00900)	HARDNESS, NONCARBONATE (MG/L CACO3) (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM ADSORPTION RATIO (00931)
OCT										
11...	K4400	58	K24	220	20	57	20	4.5	4	.1
NOV										
28...	50	K1	K1	280	23	68	26	7.4	5	.2
JAN										
09...	96	K15	K13	360	1	85	36	10	6	.2
FEB										
15...	--	34	K1	380	0	91	36	13	7	.3
MAR										
27...	100	K3	25	290	3	68	30	12	8	.3
MAY										
08...	K300	K4	31	130	18	33	11	2.3	4	.1
JUN										
19...	210	K12	190	200	11	51	18	4.8	5	.1
AUG										
01...	300	120	1800	190	40	48	17	3.7	6	.1
SEP										
11...	560	58	K150	220	11	49	24	8.9	8	.3

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

DATE	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CARBONATE (MG/L AS CO3) (00445)	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, VOLATILE, DISSOLVED (MG/L) (00520)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)
OCT										
11...	1.5	0	210	9.6	1.6	.1	9.9	263	73	.00
NOV										
28...	1.8	0	250	12	2.7	.1	11	312	80	.01
JAN										
09...	2.2	--	360	9.7	3.3	.1	23	431	80	.00
FEB										
15...	2.5	--	400	17	5.1	.1	24	470	94	.04
MAR										
27...	3.7	--	290	25	4.4	.1	19	367	83	.17
MAY										
08...	3.6	--	110	22	2.8	.1	7.3	176	51	.06
JUN										
19...	2.4	--	190	14	3.0	.1	9.7	287	84	.45
AUG										
01...	1.4	--	150	31	.1	.1	6.1	--	263	.23
SEP										
11...	1.9	--	210	15	3.9	.1	.6	272	34	.01

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOTAL (MG/L AS NO3) (71887)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C) (00689)
OCT										
11...	1.1	1.1	4.9	.04	70	70	10	--	18	--
NOV										
28...	.79	.80	3.5	.02	70	210	10	3.6	--	--
JAN										
09...	1.5	1.5	6.6	.10	80	2200	1400	--	21	.7
FEB										
15...	1.7	1.7	7.7	.09	90	1700	670	--	--	--
MAR										
27...	1.3	1.5	6.5	.05	80	370	360	15	--	--
MAY										
08...	1.1	1.2	5.1	.04	90	160	0	--	17	.6
JUN										
19...	1.4	1.9	8.2	.14	110	480	130	23	--	--
AUG										
01...	1.6	1.8	8.1	.15	50	100	20	--	--	--
SEP										
11...	.86	.87	3.9	.04	50	240	20	--	--	--

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA) (01007)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, TOTAL RECOVERABLE (UG/L AS CO) (01037)
OCT										
11...	1300	4	3	0	0	1	1	10	1	0
JAN										
09...	1330	3	3	100	100	0	0	10	2	1
MAY										
08...	1000	3	3	0	0	0	0	20	20	1
AUG										
01...	1330	4	4	<100	50	0	0	20	10	3

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

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										
11...	0	5	3	70	50	11	11	10	10	<.5
JAN										
09...	1	2	1	2200	1600	0	0	1400	1400	<.5
MAY										
08...	0	3	3	160	50	2	0	0	0	<.5
AUG										
01...	3	5	5	100	70	5	0	20	20	<.5

DATE	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)
OCT									
11...	<.5	0	0	0	0	100	10	18	--
JAN									
09...	<.5	0	0	0	0	30	10	21	.7
MAY									
08...	<.5	0	0	0	0	20	0	17	.6
AUG									
01...	<.5	0	0	0	0	30	20	--	--

PESTICIDE ANALYSES, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	ALDRIN, TOTAL (UG/L) (39330)	ALDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39333)	CHLOR-DANE, TOTAL (UG/L) (39350)	CHLOR-DANE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39351)	DDD, TOTAL (UG/L) (39360)	DDD, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39363)	DDE, TOTAL (UG/L) (39365)	DDE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39368)	DDT, TOTAL (UG/L) (39370)
NOV										
28...	1630	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB										
15...	1530	ND	--	ND	--	ND	--	ND	--	ND
MAY										
08...	1530	ND	--	ND	--	ND	--	ND	--	ND
AUG										
02...	1130	ND	--	ND	--	ND	--	ND	--	ND

DATE	DDT, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39373)	DI-AZINON, TOTAL (UG/L) (39570)	DI-AZINON, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39571)	DI-ELDRIN TOTAL (UG/L) (39380)	DI-ELDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39383)	ENDRIN, TOTAL (UG/L) (39390)	ENDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39393)	ETHION, TOTAL (UG/L) (39398)	ETHION, TOTAL IN BOT-TOM MA-TERIAL (UG/KG) (39399)	HEPTA-CHLOR, TOTAL (UG/L) (39410)
NOV										
28...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB										
15...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY										
08...	--	ND	--	ND	--	ND	--	ND	--	ND
AUG										
02...	--	ND	--	ND	--	ND	--	ND	--	ND

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

PESTICIDE ANALYSES, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG) (39413)	HEPTACHLOR EPOXIDE TOTAL (UG/L) (39420)	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)
NOV										
28...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB										
15...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY										
08...	--	ND	--	ND	--	ND	--	ND	--	ND
AUG										
02...	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	METHYL PARATHION, TOT. IN BOTTOM MATL. (UG/KG) (39601)	METHYL TRITHION, TOTAL (UG/L) (39790)	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)
NOV									
28...	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB									
15...	--	ND	--	ND	--	ND	--	ND	--
MAY									
08...	--	ND	--	ND	--	ND	--	ND	--
AUG									
02...	--	ND	--	ND	--	ND	--	ND	--

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)
NOV						
28...	1630	48	.000	.000	.200	.000
MAR						
27...	1215	40	.080	.000	.000	.000

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
OCT						
11...	1300	11.0	60	26	4.2	99
NOV						
28...	1430	.0	32	39	3.3	99
MAR						
27...	1235	.0	29	36	2.9	69
APR						
24...	1020	4.0	1520	29	119	88
MAY						
01...	1550	7.5	2440	17	112	70
08...	1515	6.5	3000	4	38	46
JUN						
19...	1100	19.0	797	15	32	98
AUG						
01...	1230	21.5	75	9	1.8	--
SEP						
11...	1115	14.5	11	8	.23	100

05112000 ROSEAU RIVER BELOW STATE DITCH 51, NEAR CARIBOU, MN--Continued
PHYTOPLANKTON ANALYSES, AUGUST 1978 TO AUGUST 1979

DATE	AUG 29,78		OCT 11,78		NOV 28,78		FEB 15,79	
TIME	1300		1300		1630		1530	
TOTAL CELLS/ML	470		97		57		120	
DIVERSITY: DIVISION	1.4		1.1		1.0		2.1	
.CLASS	1.4		1.1		1.0		2.4	
..ORDER	2.0		1.9		1.5		2.8	
...FAMILY	2.7		2.2		1.5		2.8	
....GENUS	3.2		2.6		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								
...HYDRODICTYACEAE								
....PEDIASTRUM	19	4	--	-	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	9	2	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	3	1	2	2	--	-	10	8
....SELENASTRUM	--	-	4	4	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	50	11	--	-	--	-	--	-
....SCENEDESMUS	110#	24	18#	18	--	-	--	-
....TETRASTRUM	12	3	--	-	--	-	--	-
..TETRASPORALES								
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	78#	17	11	11	--	-	5	4
...PHACOTACEAE								
....PTEROMONAS	--	-	2	2	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....CLOSTERIUM	--	-	2	2	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	3	1	42#	44	14#	25	25#	21
....MELOSIRA	--	-	7	7	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	3	1	--	-	--	-	--	-
....COCCONEIS	100#	21	4	4	--	-	--	-
....RHOICOSPHENIA	3	1	--	-	--	-	--	-
...FRAGILARIACEAE								
....SYNEDRA	6	1	--	-	14#	25	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	22	5	--	-	--	-	5	4
...NITZSCHIACEAE								
....NITZSCHIA	6	1	5	5	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	10	8
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	12	3	--	-	29#	50	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	19	4	--	-	--	-	5	4
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	--	-	--	-
....SPIRULINA	--	-	--	-	--	-	20#	17
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	3	1	--	-	--	-	--	-
....TRACHELOMONAS	--	-	2	2	--	-	35#	29
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..GYMNODINIALES								
...GYMNODINIACEAE								
....GYMNODINIUM	9	2	--	-	--	-	5	4
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	--	-	--	-

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

PHYTOPLANKTON ANALYSES, AUGUST 1978 TO SEPTEMBER 1979

DATE	MAR 27,79	JUN 19,79	AUG 2,79	SEP 11,79
TIME	1215	1100	1030	1200
TOTAL CELLS/ML	480	2900	160	1600
DIVERSITY: DIVISION	1.9	1.6	1.6	0.7
.CLASS	1.9	1.6	1.9	0.7
..ORDER	2.3	2.0	1.9	1.6
...FAMILY	2.3	2.1	2.3	1.9
....GENUS	2.5	2.3	2.3	0.0

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	15	3	64	2	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	490#	31
....OOCYSTIS	--	-	--	-	--	-	72	5
....SELENASTRUM	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	58	4
....SCENEDESMUS	--	-	310	10	--	-	29	2
....TETRASTRUM	--	-	310	10	--	-	--	-
..TETRASPORALES								
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	460#	16	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	210#	44	26	1	--	-	740#	46
....PLATYMONAS	--	-	--	-	--	-	14	1
...PHACOTACEAE								
....PTEROMONAS	--	-	--	-	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....CLOSTERIUM	--	-	--	-	57#	36	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	45	9	400	14	--	-	43	3
....MELOSIRA	20	4	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	14	9	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....SYNEDRA	--	-	*	0	--	-	--	-
...GOMPHONEMATACEAE								

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

DATE	MAR 27,79		JUN 19,79		AUG 2,79		SEP 11,79	
TIME	1215		1100		1030		1200	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
....GOMPHONEMA	--	-	--	-	14	9	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	14	9	--	-
...NITZSCHIACEAE								
....NITZSCHIA	20	4	--	-	--	-	87	5
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	14	9	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	64	2	--	-	29	2
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	1300#	44	--	-	--	-
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	43#	27	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	100#	21	--	-	--	-	--	-
....SPIRULINA	10	2	--	-	--	-	--	-

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

PHYTOPLANKTON ANALYSES, AUGUST 1978 TO SEPTEMBER 1979

DATE	MAR 27,79		JUN 19,79		AUG 2,79		SEP 11,79	
TIME	1215		1100		1030		1200	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE	--	-	--	-	--	-	29	2
....EUGLENA	5	1	--	-	--	-	--	-
....TRACHELOMONAS	20	4	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..GYMNODINIALES								
...GYMNODINIACEAE								
....GYMNODINIUM	20	4	--	-	--	-	--	-
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	10	2	--	-	--	-	--	-

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

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	370	370	425	420								
2	370	370	425	420								
3	370	370	420	420								
4	375	370	420	420								
5	375	375	420	420								
6	375	375	420	420								
7	370	370	420	420								
8	370	370	420	420								
9	370	370	420	405								
10	370	370	405	390								
11	370	370	---	---								
12	370	370	---	---								
13	370	370	---	---								
14	370	370	---	---								
15	375	370	---	---								
16	375	375	---	---								
17	375	370	---	---								
18	375	375	---	---								
19	375	375	---	---								
20	390	375	---	---								
21	395	390	---	---								
22	400	395	---	---								
23	405	400	---	---								
24	415	405	---	---								
25	415	415	---	---								
26	415	415	---	---								
27	415	410	---	---								
28	420	415	---	---								
29	420	420	---	---								
30	425	420	---	---								
31	425	425	---	---								
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	---	---	---	---								
2	---	---	---	---								
3	---	---	---	---								
4	---	---	---	---								
5	---	---	---	---								
6	---	---	---	---								
7	---	---	---	---								
8	---	---	---	---								
9	---	---	260	260								
10	---	---	260	260								
11	---	---	260	255								
12	---	---	255	250								
13	---	---	250	250								
14	---	---	250	250								
15	---	---	250	245								
16	---	---	250	250								
17	360	325	255	250								
18	325	170	255	255								
19	220	180	255	255								
20	180	155	255	255								
21	170	160	275	255								
22	185	170	280	275								
23	195	185	305	280								
24	200	195	305	290								
25	200	195	290	290								
26	200	195	300	280								
27	205	200	320	300								
28	210	205	---	---								
29	---	---	---	---								
30	---	---	---	---								
31	---	---	---	---								

05124480 KAWISHIWI RIVER NEAR ELY, MN

(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'22", long 91°32'06", in SE 1/4 SE 1/4 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 periods of no gage-height record, June 28 to Aug. 13, Aug. 23 to Sept. 23, which are fair.

AVERAGE DISCHARGE.--13 years, 226 ft^3/s (6.400 m^3/s), 12.13 in/yr (308 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,720 ft^3/s (48.7 m^3/s) Apr. 24, 1976, gage height, 5.92 ft (1.804 m); minimum 4.5 ft^3/s (0.13 m^3/s) Jan. 30 to Feb. 2, 1977, gage height, 2.14 ft (0.652 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,340 ft^3/s (37.9 m^3/s) May 11, gage height, 5.66 ft (1.725 m); minimum daily, 23 ft^3/s (0.65 m^3/s) Feb. 4-6; minimum gage height, 2.58 ft (0.786 m) Feb. 4-6.

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	59	32	27	24	24	30	51	1080	748	258	110	51
2	58	32	27	24	24	30	51	1140	722	248	108	54
3	58	31	27	24	24	32	51	1200	696	240	106	58
4	58	30	27	24	23	32	50	1230	670	230	102	60
5	58	29	27	24	23	32	50	1260	639	222	98	63
6	58	28	27	24	23	32	50	1260	614	217	94	65
7	57	28	27	24	24	32	50	1280	602	210	90	67
8	56	28	27	24	24	32	51	1270	571	202	87	69
9	57	28	27	24	24	32	52	1240	548	197	81	72
10	56	28	26	24	24	32	53	1270	542	190	78	75
11	54	28	26	24	24	32	54	1310	536	182	74	78
12	52	28	25	24	24	32	54	1320	513	178	72	79
13	51	28	25	24	24	32	57	1310	502	170	70	80
14	50	29	25	24	24	32	58	1300	480	165	68	80
15	48	28	25	24	25	32	59	1260	475	160	65	80
16	48	28	25	24	26	32	62	1230	448	155	62	80
17	47	27	25	24	26	32	64	1220	438	150	60	79
18	45	27	24	24	26	33	74	1210	412	145	58	77
19	43	27	24	24	26	42	88	1170	397	140	57	75
20	43	27	24	24	27	42	122	1150	383	135	56	73
21	43	26	24	24	27	42	154	1120	378	130	54	72
22	42	26	24	24	29	43	210	1100	354	125	53	71
23	39	26	25	24	31	43	300	1080	340	120	52	70
24	38	26	25	24	32	43	392	1020	322	118	51	68
25	38	26	24	24	32	42	475	981	308	112	50	66
26	36	26	24	24	31	42	626	974	304	110	49	65
27	35	26	24	24	30	40	742	897	291	106	48	64
28	34	26	24	24	30	46	835	842	285	103	47	64
29	33	27	24	24	---	48	925	829	275	100	47	63
30	32	27	24	24	---	51	996	788	268	105	47	60
31	32	---	24	24	---	51	---	775	---	108	49	---
TOTAL	1458	833	783	744	731	1148	6856	35116	14061	5031	2143	2078
MEAN	47.0	27.8	25.3	24.0	26.1	37.0	229	1133	469	162	69.1	69.3
MAX	59	32	27	24	32	51	996	1320	748	258	110	80
MIN	32	26	24	24	23	30	50	775	268	100	47	51
CFSM	.19	.11	.10	.10	.10	.15	.91	4.48	1.85	.64	.27	.27
IN.	.21	.12	.12	.11	.11	.17	1.01	5.16	2.07	.74	.32	.31

CAL YR 1978 TOTAL 62427 MEAN 171 MAX 822 MIN 24 CFSM .68 IN 9.18
WTR YR 1979 TOTAL 70982 MEAN 194 MAX 1320 MIN 23 CFSM .77 IN 10.44

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. Less than 80 percent of the daily water temperature record was obtained because of instrument malfunction. Extremes are those 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): Maximum, 24.5°C July 9, 10, 11, 12, 13, 1974; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (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)
JAN										
17...	1150	24	40	7.1	-18.0	.5	--	--	30	K1
MAY										
22...	1200	1100	22	7.3	15.0	10.0	9.8	90	K1	K1
AUG										
14...	1530	66	29	7.2	15.5	20.0	8.2	92	25	K3
SEP										
24...	1330	68	31	7.3	23.0	14.0	8.7	84	20	K2

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 PERCENT (00932)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY (MG/L AS CACO3) (00410)
JAN										
17...	<1	18	5	4.3	1.7	1.2	13	.1	.4	13
MAY										
22...	K2	13	2	2.9	1.3	1.0	14	.1	.4	11
AUG										
14...	43	13	5	3.0	1.3	1.0	14	.1	.4	8
SEP										
24...	K12	13	5	2.9	1.3	.9	13	.1	.4	8

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)
JAN										
17...	4.1	3.6	.1	2.9	44	26	.06	2.85	.04	.00
MAY										
22...	5.0	1.2	.0	4.1	40	23	.05	119	.09	.00
AUG										
14...	6.6	.7	.0	2.9	40	21	.05	7.13	.01	.01
SEP										
24...	4.1	.4	.0	2.8	49	18	.07	9.00	.00	.01

05124480 KAWISHIWI RIVER NEAR ELY, MN--Continued

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

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

05124480 KAWISHIWI RIVER NEAR ELY, MN--Continued

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

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

05124990 FILSON CREEK NEAR ELY, MN

LOCATION.--Lat 47°50'05", long 91°40'27", in SE 1/4 SW 1/4 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.
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.--5 years, 7.32 ft^3/s (0.207 m^3/s), 10.29 in/yr (261 mm/yr).
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 283 ft^3/s (8.01 m^3/s) Apr. 22, 1979, gage height, 7.72 ft (2.353 m); maximum gage height, 8.67 ft (2.643 m) Apr. 21, 1979 (backwater from ice); no flow at times most years.
EXTREMES FOR CURRENT YEAR.--Maximum discharge 283 ft^3/s (8.01 m^3/s) Apr. 22, gage height, 7.72 ft (2.353 m), maximum gage height, 8.67 ft (2.643 m) Apr. 21, backwater from ice; minimum discharge, 0.19 ft^3/s (0.005 m^3/s) Aug. 20-22, gage height, 4.75 ft (1.448 m).
REVISIONS.--Revised maximum discharges for water years 1975, 1976, and 1978 and revised daily discharges, in cubic feet per second, for high-water periods in these years, are given below. These figures supercede those published in the reports for 1975, 1976, and 1978.

Maximum discharge:			
Water year	Date	Discharge (ft^3/s)	(m^3/s)
1975	Apr. 25	152	4.30
1976	Apr. 9	127	3.60
1978	May 29	139	3.94

Daily discharge:	
Apr. 24, 1975....	84
25.....	132
26.....	129
27.....	107
Apr. 9, 1976....	116
10.....	125
11.....	113
May 30, 1978....	121

Month	Total	Mean	Max
Apr. 1975	871.61	29.1	132
Wtr. Yr. 1975	2140.47	5.86	132
Apr. 1976	1452	48.4	125
Wtr. Yr. 1976	2522.82	6.91	125
May 1978	698.5	22.5	121
Wtr. Yr. 1978	3905.63	10.7	121

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	.99	1.3	1.3	.64	.60	.75	1.7	35	18	1.3	1.8	5.3
2	2.1	1.3	1.3	.63	.60	.74	1.7	30	18	1.2	1.2	3.2
3	3.3	1.2	1.3	.62	.61	.73	1.6	27	17	.92	.96	1.5
4	3.8	1.2	1.3	.61	.61	.72	1.6	25	16	.69	.78	1.5
5	3.4	1.1	1.3	.60	.62	.71	1.6	23	14	.58	.78	3.0
6	3.4	.90	1.1	.59	.63	.70	1.6	21	13	.48	.52	2.5
7	3.2	.87	1.1	.58	.63	.70	1.5	21	14	.49	.55	2.4
8	2.4	.87	1.1	.57	.64	.70	1.5	23	13	.48	.42	2.3
9	2.1	.87	1.1	.56	.64	.70	1.4	23	12	.38	.36	2.0
10	2.1	.87	1.1	.55	.65	.70	1.4	41	15	.38	.36	6.4
11	2.1	.87	1.1	.54	.65	.70	1.3	55	17	.36	.42	6.3
12	2.1	.87	1.1	.53	.66	.70	1.4	52	15	.28	.40	5.7
13	1.9	.90	1.1	.52	.67	.70	1.5	44	13	.53	.69	5.6
14	1.8	.96	.96	.52	.68	.70	1.7	36	12	1.5	.67	4.8
15	1.7	.96	.87	.51	.68	.70	2.0	30	13	.73	.57	4.4
16	1.7	.98	.87	.51	.69	.80	3.0	25	13	.70	.49	3.2
17	1.7	.96	.87	.51	.70	1.3	4.0	22	12	.70	.46	2.3
18	1.7	.96	.85	.51	.70	2.0	8.0	21	10	.63	.34	2.3
19	1.7	.96	.83	.52	.71	4.0	25	19	8.8	.92	.24	1.9
20	1.7	.96	.82	.52	.71	3.5	60	18	8.5	.85	.19	2.5
21	1.7	.96	.80	.53	.72	3.0	115	18	8.8	.81	.19	2.0
22	1.7	.96	.78	.54	.73	2.7	235	18	8.9	1.5	.19	1.4
23	1.7	.96	.77	.54	.73	2.4	210	21	8.1	1.2	.33	1.2
24	1.4	1.1	.76	.55	.74	2.3	138	22	6.8	1.6	.25	.97
25	1.4	1.2	.74	.55	.74	2.2	116	20	5.1	1.3	.22	.72
26	1.3	1.1	.72	.56	.75	2.1	92	18	5.3	1.4	.22	.78
27	1.3	1.1	.71	.56	.76	2.0	72	16	5.2	1.0	.22	.87
28	1.2	1.1	.70	.57	.76	1.9	60	14	4.4	.96	.31	.78
29	1.2	1.1	.68	.57	---	1.9	51	12	2.8	.91	.47	.87
30	1.2	1.2	.67	.58	---	1.8	43	12	1.8	2.3	.32	.87
31	1.2	---	.66	.59	---	1.8	---	17	---	3.3	2.1	---
TOTAL	60.19	30.64	29.36	17.28	19.01	46.35	1255.5	779	329.5	30.38	17.02	79.56
MEAN	1.94	1.02	.95	.56	.68	1.50	41.9	25.1	11.0	.98	.55	2.65
MAX	3.8	1.3	1.3	.64	.76	4.0	235	55	18	3.3	2.1	6.4
MIN	.99	.87	.66	.51	.60	.70	1.3	12	1.8	.28	.19	.72
CFSM	.20	.11	.10	.06	.07	.16	4.34	2.60	1.14	.10	.06	.27
IN.	.23	.12	.11	.07	.07	.18	4.83	3.00	1.27	.12	.07	.31

CAL YR 1978 TOTAL 2784.52 MEAN 7.63 MAX 111 MIN .50 CFSM .79 IN 10.72
WTR YR 1979 TOTAL 2693.79 MEAN 7.38 MAX 235 MIN .19 CFSM .76 IN 10.37

05125550 STONY RIVER NEAR BABBITT, MN

LOCATION.--Lat 47°41'39", long 91°45'38", in SW 1/4 SW 1/4 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 current year.

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 good except those for periods of no gage-height record, Dec. 13 to Apr. 9 and May 22 to June 25, which are poor.

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, 1,630 ft^3/s (46.2 m 3/s) Apr. 28, gage height, 7.28 ft (2.219 m); minimum daily, 26 ft^3/s (0.74 m^3/s) Feb. 24 to Mar. 6.

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	143	109	40	38	34	26	48	1440	440	247	124	72
2	140	94	40	39	34	26	47	1320	470	228	134	106
3	135	82	39	39	33	26	47	1180	500	214	130	149
4	128	68	39	39	33	26	47	1060	470	199	125	207
5	122	59	38	39	32	26	46	880	440	187	120	312
6	117	51	38	39	32	26	46	820	410	172	112	376
7	111	49	38	39	32	27	46	800	380	159	103	388
8	106	48	38	40	31	28	46	760	350	150	91	370
9	104	47	37	40	31	29	46	740	325	145	84	340
10	112	46	37	40	30	29	46	820	330	140	76	330
11	112	47	37	40	30	29	46	950	350	136	68	309
12	107	47	37	40	30	29	46	1130	365	148	61	298
13	101	50	37	40	29	28	47	1280	370	141	57	301
14	94	51	37	40	29	28	48	1340	370	142	53	290
15	90	51	37	40	28	28	49	1310	365	126	48	281
16	90	50	37	40	28	28	51	1210	345	117	46	266
17	85	49	37	40	28	28	54	1130	325	105	43	252
18	84	48	37	40	27	30	63	1040	310	95	41	232
19	84	48	37	40	27	32	86	940	295	94	39	212
20	83	47	37	39	27	36	135	893	290	89	36	193
21	85	46	37	39	27	41	225	875	300	84	35	174
22	81	46	37	39	27	48	390	950	320	81	33	159
23	73	45	37	38	27	52	690	980	330	84	34	150
24	71	45	38	38	26	53	900	1000	335	86	34	140
25	68	44	38	37	26	52	1110	990	330	87	33	129
26	67	44	38	37	26	51	1330	900	317	87	33	121
27	67	43	38	36	26	50	1500	800	307	84	33	115
28	66	42	38	36	26	49	1580	720	290	77	34	107
29	65	42	38	35	---	49	1570	620	278	73	38	100
30	64	41	38	35	---	48	1550	540	263	77	40	93
31	70	---	38	35	---	48	---	460	---	99	47	---
TOTAL	2925	1579	1169	1196	816	1106	11935	29878	10570	3953	1985	6572
MEAN	94.4	52.6	37.7	38.6	29.1	35.7	398	964	352	128	64.0	219
MAX	143	109	40	40	34	53	1580	1440	500	247	134	388
MIN	64	41	37	35	26	26	46	460	263	73	33	72
CFSM	.43	.24	.17	.18	.13	.16	1.82	4.40	1.61	.58	.29	1.00
IN.	.50	.27	.20	.20	.14	.19	2.03	5.08	1.80	.67	.34	1.12

CAL YR 1978 TOTAL 74888 MEAN 205 MAX 1120 MIN 30 CFSM .94 IN 12.72
WTR YR 1979 TOTAL 73684 MEAN 202 MAX 1580 MIN 26 CFSM .92 IN 12.52

05126000 DUNKA RIVER NEAR BABBITT, MN

LOCATION.--Lat 47°41'55", long 91°52'05", in NW 1/4 NE 1/4 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 current year.

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 winter period and periods of no gage-height record, Oct. 27 to Dec. 6 and Dec. 11 to Jan. 15, 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.--15 years, 39.2 ft^3/s (1.110 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, 876 ft^3/s (24.8 m^3/s) Apr. 22, gage height, 8.02 ft (2.444 m); no flow, Jan. 16-19, Feb. 18, 19.

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	37	12	7.3	.82	.78	1.0	36	198	101	60	50	31
2	39	12	7.0	.66	.96	1.0	35	171	105	53	47	46
3	49	11	6.8	.55	1.1	1.0	34	154	110	49	40	52
4	40	11	6.4	.46	1.2	1.0	33	140	107	46	42	49
5	33	11	6.2	.38	1.1	1.0	30	129	99	43	38	47
6	41	10	6.1	.30	1.0	1.0	25	123	93	39	34	46
7	38	10	5.9	.24	.92	1.0	15	124	107	35	30	40
8	31	10	5.5	.20	.84	1.0	13	134	122	32	27	34
9	33	9.8	5.2	.16	.76	1.0	15	139	117	31	24	28
10	34	9.6	4.9	.13	.66	1.0	18	180	120	31	22	32
11	35	9.4	4.6	.10	.54	1.0	22	264	135	29	21	36
12	33	9.6	4.4	.08	.40	1.0	30	299	132	26	19	42
13	32	10	4.1	.06	.29	1.0	35	269	116	24	17	59
14	24	11	3.9	.04	.20	1.0	40	224	106	23	7.8	57
15	23	13	3.6	.02	.15	1.0	45	184	100	21	5.0	41
16	26	13	3.4	.00	.10	1.1	50	157	100	20	3.4	34
17	28	13	3.2	.00	.03	1.3	60	137	98	19	2.3	30
18	27	12	3.0	.00	.00	1.7	80	132	87	17	3.0	31
19	25	12	2.8	.00	.00	2.4	150	150	74	16	4.0	29
20	27	11	2.7	.02	.12	10	366	153	76	8.5	2.1	26
21	24	11	2.5	.10	.90	65	596	165	95	7.3	1.7	24
22	21	10	2.4	.19	.98	55	820	172	128	6.8	1.4	13
23	18	10	2.2	.44	1.0	52	828	182	142	6.3	2.0	8.0
24	17	9.7	2.1	.43	1.0	50	690	187	123	6.9	9.1	7.3
25	15	9.3	2.0	.41	1.0	48	559	167	98	6.7	24	6.8
26	14	9.0	1.9	.40	1.0	45	469	139	91	6.5	8.2	6.8
27	14	8.6	1.7	.40	1.0	43	398	118	96	6.2	3.3	6.9
28	14	8.2	1.5	.41	1.0	41	331	101	89	5.6	2.8	6.4
29	13	8.0	1.4	.43	---	39	276	89	78	5.3	5.0	5.4
30	12	7.8	1.2	.48	---	38	236	87	68	7.3	4.8	4.4
31	12	---	1.0	.62	---	37	---	94	---	23	9.5	---
TOTAL	829	312.0	116.9	8.53	19.03	544.5	6335	4962	3113	710.4	510.4	879.0
MEAN	26.7	10.4	3.77	.28	.68	17.6	211	160	104	22.9	16.5	29.3
MAX	49	13	7.3	.82	1.2	65	828	299	142	60	50	59
MIN	12	7.8	1.0	.00	.00	1.0	13	87	68	5.3	1.4	4.4

CAL YR 1978 TOTAL 17415.59 MEAN 47.7 MAX 310 MIN .99
WTR YR 1979 TOTAL 18339.76 MEAN 50.2 MAX 828 MIN .00

05126000 DUNKA RIVER NEAR BABBITT, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--September 1955. September 1957 to April 1963. March 1976 to current year.

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 those 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, 26.0°C June 29, July 6, Aug. 14, and Sept. 6, 1978; minimum, 0.0°C Nov. 21, Dec. 11, 16, 17, 1977, Jan. 17 and Feb. 2, 3, 1978.

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	183	164	176	155	119	136						
2	182	161	177	156	136	150						
3	162	152	155	133	124	127						
4	206	165	191	130	121	125						
5	176	133	152	128	111	116						
6	151	126	133	150	113	133						
7	167	152	161	164	151	159						
8	154	146	151	172	164	169						
9	167	143	158	169	161	164						
10	169	165	166	161	153	156						
11	167	164	166	187	158	175						
12	177	165	173	205	188	197						
13	178	147	171	206	189	200						
14	145	127	132	222	189	211						
15	144	127	137	243	239	241						
16	137	112	124	263	243	256						
17	128	112	122	267	263	265						
18	133	121	126	263	253	258						
19	139	133	136	261	253	257						
20	136	128	132	265	261	263						
21	144	128	135	---	---	---						
22	144	134	141	---	---	---						
23	132	116	121	---	---	---						
24	122	117	120	---	---	---						
25	123	114	121	---	---	---						
26	114	103	109	---	---	---						
27	114	111	113	---	---	---						
28	112	105	110	---	---	---						
29	111	102	105	---	---	---						
30	134	111	126	---	---	---						
31	128	119	122	---	---	---						
MONTH	206	102	141									

05126000 DUNKA RIVER NEAR BABBITT, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	276	270	273	288	279	283	59	58	58
2	---	---	---	271	267	269	286	280	282	61	59	60
3	---	---	---	267	264	266	288	279	283	64	61	63
4	---	---	---	265	259	263	287	280	284	67	64	65
5	---	---	---	265	259	262	294	286	288	70	67	69
6	---	---	---	265	260	262	304	272	295	74	70	72
7	---	---	---	259	256	258	269	254	263	80	74	77
8	---	---	---	259	257	258	254	251	253	82	80	81
9	---	---	---	260	258	259	286	250	259	82	76	79
10	---	---	---	264	261	262	301	287	293	76	69	71
11	---	---	---	268	263	265	299	290	295	69	62	66
12	---	---	---	268	265	266	299	295	297	62	58	60
13	---	---	---	268	265	266	295	289	293	60	59	60
14	---	---	---	266	264	265	293	287	291	62	61	61
15	---	---	---	285	263	273	289	268	279	64	62	63
16	---	---	---	270	265	267	270	225	251	66	65	65
17	---	---	---	268	267	268	224	186	207	69	66	67
18	---	---	---	267	263	266	187	139	165	74	62	65
19	---	---	---	261	222	237	137	90	113	78	75	77
20	---	---	---	344	214	262	89	63	76	78	75	76
21	---	---	---	342	327	336	63	54	57	79	74	76
22	---	---	---	347	327	336	55	50	52	79	72	76
23	---	---	---	368	350	362	50	48	49	73	72	73
24	---	---	---	365	341	355	48	44	46	72	70	71
25	---	---	---	349	335	342	51	48	49	70	64	67
26	288	279	282	345	336	340	52	51	52	66	65	65
27	283	279	282	345	335	340	53	52	52	67	64	66
28	281	275	279	335	316	325	55	53	54	65	63	64
29	---	---	---	314	300	307	57	55	56	72	64	66
30	---	---	---	300	289	296	58	56	57	83	73	80
31	---	---	---	292	281	287	---	---	---	83	80	81
MONTH				368	214	287	304	44	186	83	58	69
		JUNE			JULY			AUGUST			SEPTEMBER	
1	87	83	86	123	117	119	226	171	207	255	225	247
2	84	81	83	127	119	124	167	130	144	245	229	240
3	81	80	80	127	122	124	128	105	113	223	189	205
4	82	80	81	135	128	132	154	122	143	189	172	180
5	84	82	83	138	134	136	170	154	164	183	169	176
6	103	83	86	150	134	144	186	169	178	171	152	167
7	83	81	82	155	149	152	204	186	195	148	118	130
8	82	77	79	155	148	152	214	203	207	131	105	114
9	78	76	77	154	150	151	233	214	224	105	99	103
10	78	75	76	151	147	149	247	233	241	104	98	100
11	76	74	75	163	149	156	257	246	251	110	93	103
12	75	73	74	170	163	167	259	254	256	165	102	112
13	88	74	79	171	170	170	265	257	261	190	171	187
14	97	89	93	179	171	176	261	236	251	191	147	182
15	99	97	98	184	172	180	233	201	221	144	112	122
16	100	97	99	194	181	187	199	180	189	112	108	110
17	102	99	100	211	195	204	187	179	182	140	103	111
18	100	90	96	220	210	215	220	175	185	187	144	173
19	95	89	92	222	202	216	286	225	263	202	187	194
20	96	92	95	200	157	176	275	256	267	215	202	210
21	94	90	91	169	145	153	255	227	240	216	210	213
22	93	88	90	144	138	139	227	212	220	208	153	176
23	92	90	91	140	132	137	268	206	215	153	141	147
24	96	92	94	146	135	141	347	289	319	139	135	136
25	98	90	95	149	145	147	350	339	345	136	116	124
26	90	88	89	148	143	147	347	292	317	115	107	110
27	97	89	94	166	149	159	291	252	275	112	107	109
28	101	97	99	183	166	173	265	217	246	115	111	113
29	111	101	106	193	183	187	225	193	208	123	115	119
30	118	111	115	191	183	189	190	175	181	131	122	126
31	---	---	---	196	178	191	220	150	182	---	---	---
MONTH	118	73	89	222	117	161	350	105	222	255	93	151

05126000 DUNKA RIVER NEAR BABBITT, MN--Continued

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

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

05126000 DUNKA RIVER NEAR BABBITT, MN--Continued

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	14.0	11.5	13.0	23.0	19.5	21.5	23.0	20.0	21.5	21.5	19.5	20.5
2	13.0	11.5	12.5	21.5	19.5	20.5	23.0	20.5	22.0	20.5	18.5	19.5
3	14.0	11.5	12.5	20.0	18.5	19.0	23.0	21.0	22.0	18.5	17.5	17.5
4	16.5	12.5	14.0	21.5	17.0	19.0	23.5	20.5	22.0	21.0	16.5	18.5
5	17.0	12.5	15.0	23.0	17.5	20.5	24.0	21.0	22.5	22.0	20.0	21.0
6	16.0	14.5	15.0	23.5	19.0	21.5	22.0	20.0	21.5	20.5	17.5	19.0
7	16.5	14.0	15.0	24.0	20.0	22.0	24.5	21.0	22.5	17.5	16.0	16.5
8	17.5	13.5	15.5	22.0	21.0	21.5	24.0	21.0	22.5	16.5	15.0	16.0
9	16.0	14.0	15.0	24.5	20.0	22.0	23.0	20.5	22.0	18.0	15.0	16.5
10	16.5	13.5	15.0	26.0	21.5	24.0	22.5	20.0	21.0	17.5	16.0	17.0
11	18.5	13.5	16.0	26.5	22.0	24.5	22.0	17.5	20.0	15.5	14.0	14.5
12	19.5	14.5	17.0	26.5	23.0	24.5	19.5	18.0	19.0	14.5	13.0	14.0
13	19.5	15.5	17.5	26.0	23.5	25.0	19.0	17.0	18.5	14.5	13.0	14.0
14	21.5	17.5	19.5	26.5	23.0	24.5	19.0	14.0	16.5	14.5	13.0	13.5
15	22.5	20.0	21.0	24.5	22.0	23.0	20.5	14.0	17.0	15.5	12.5	14.0
16	20.5	18.0	19.5	24.0	20.0	22.0	19.0	14.5	16.5	16.5	13.5	15.0
17	20.5	17.0	18.5	24.0	19.5	22.0	21.5	15.0	17.5	18.0	15.0	16.5
18	20.5	16.5	18.5	24.5	20.0	22.5	24.0	17.5	20.0	17.0	14.5	16.0
19	18.5	17.0	17.5	24.5	21.5	23.0	24.0	17.5	20.0	15.5	13.0	14.0
20	19.0	16.5	18.0	26.0	21.0	23.5	23.0	18.5	21.0	15.0	14.0	14.5
21	17.5	15.5	17.0	28.0	22.5	25.0	23.5	19.5	21.5	14.5	12.5	13.5
22	16.0	14.0	15.0	25.5	22.0	23.5	22.0	20.0	20.5	13.5	12.0	13.0
23	18.0	13.0	15.5	25.5	20.5	23.5	19.5	18.0	19.5	14.5	12.0	13.0
24	19.0	14.0	16.5	26.5	23.0	24.5	18.5	17.0	17.5	16.5	12.0	13.5
25	20.0	15.5	17.5	25.5	22.0	24.0	20.0	17.0	18.5	16.0	12.0	13.5
26	21.5	17.5	19.5	23.5	21.5	22.5	19.0	16.5	17.5	16.5	11.5	13.5
27	22.0	18.0	20.0	23.5	19.0	21.5	21.0	14.5	17.5	17.0	13.0	15.0
28	20.0	18.5	19.5	24.5	19.0	22.0	17.5	15.5	16.5	16.0	15.0	15.5
29	21.5	17.5	19.5	25.0	20.5	23.0	21.5	16.5	18.5	16.0	13.5	14.5
30	23.0	18.5	20.5	22.5	21.0	22.0	22.5	16.5	19.0	16.0	12.0	13.5
31	---	---	---	23.5	20.5	21.5	20.0	16.5	18.5	---	---	---
MONTH	23.0	11.5	17.0	28.0	17.0	22.5	24.5	14.0	19.5	22.0	11.5	15.5

05127000 KAWISHIWI RIVER NEAR WINTON, MN

LOCATION.--Lat 47°56'05", long 91°45'50", in NE 1/4 NW 1/4 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).--60 years (water years 1906, 1916-17, 1919, 1924-79), 1,029 ft^3/s (29.14 m^3/s), 11.37 in/yr (289 mm/yr); median of yearly mean discharges, 962 ft^3/s (27.2 m^3/s) 10.63 in/yr (270 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 16,000 ft^3/s (453 m^3/s) May 18, 1950; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 6,530 ft^3/s (185 m^3/s) May 1; minimum daily, 102 ft^3/s (2.89 m^3/s) Jan. 13.

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	960	330	399	265	199	444	448	6530	3290	1460	397	362
2	960	362	334	265	199	514	448	6360	3590	1570	397	297
3	960	241	333	265	199	547	480	6390	3460	1360	398	297
4	960	330	398	265	199	482	448	6030	3320	1220	398	214
5	960	330	398	233	199	482	415	5970	3180	1040	398	380
6	863	265	301	200	199	482	560	5910	3010	960	398	333
7	895	265	398	265	199	450	728	5900	3090	960	333	366
8	863	330	349	265	199	450	825	5230	2840	895	366	398
9	863	362	297	265	199	417	727	5120	2780	960	366	430
10	627	261	265	233	199	417	724	5060	2940	895	333	608
11	480	265	297	233	199	482	637	4990	2840	960	398	547
12	415	330	265	265	199	353	765	5180	2910	895	366	547
13	480	380	265	102	199	450	604	5540	2880	928	333	740
14	480	431	265	230	199	417	542	5380	2910	895	366	708
15	480	399	265	199	199	385	574	5940	2750	928	398	950
16	480	399	265	199	199	415	478	6220	2640	831	398	1200
17	480	367	265	264	199	415	543	6060	2480	777	333	1180
18	415	367	265	264	199	319	662	6220	2560	727	333	988
19	415	367	297	199	264	577	857	5720	2320	662	366	1060
20	545	399	233	199	134	480	1150	5890	2170	580	366	924
21	448	399	233	199	199	383	1370	5610	1950	626	366	990
22	448	399	265	199	199	480	2090	5130	2020	529	366	827
23	415	399	265	199	264	512	2660	4970	1950	529	398	746
24	480	399	265	231	199	480	2860	4980	1950	594	333	570
25	448	334	265	199	199	480	3960	4810	1720	546	366	432
26	480	367	265	199	199	415	4340	4810	1520	662	333	482
27	415	399	233	199	297	448	4520	4810	1460	501	381	482
28	480	367	233	199	391	448	5460	4730	1420	501	265	482
29	480	399	265	199	---	512	5940	4590	1490	533	362	482
30	412	399	265	199	---	480	6330	4140	1460	727	301	482
31	265	---	265	264	---	480	---	3690	---	426	394	---
TOTAL	18352	10641	8973	6961	5927	14096	52145	167910	74900	25677	11306	18504
MEAN	592	355	289	225	212	455	1738	5416	2497	828	365	617
MAX	960	431	399	265	391	577	6330	6530	3590	1570	398	1200
MIN	265	241	233	102	134	319	415	3690	1420	426	265	214

CAL YR 1978 TOTAL 398521 MEAN 1092 MAX 4880 MIN 201
WTR YR 1979 TOTAL 415392 MEAN 1138 MAX 6530 MIN 102

(†)	-109	-70	-60	-59	-22	-125	+532	-39	+30	-161	-19	+170
MEAN ‡	483	285	229	166	190	330	2270	5377	2527	667	346	787
CFSM ‡	.39	.23	.19	.14	.15	.27	1.85	4.38	2.06	.54	.28	.64
IN ‡	.45	.26	.22	.16	.16	.31	2.06	5.06	2.29	.63	.32	.71

CAL YR 1978 TOTAL 398521 MEAN 1092 MAX 4880 MIN 201 MEAN (‡) 1070 CFSM (‡) .87 IN (‡) 11.82
WTR YR 1979 TOTAL 415392 MEAN 1138 MAX 6530 MIN 102 MEAN (‡) 1142 CFSM (‡) .93 IN (‡) 12.62

† Change in contents, equivalent in cubic feet per second, in Camp Six, Bald Eagle, Gabbro, Little Gabbro, Birch, White Iron, Farm, South Farm, and Garden Lakes.
‡ Adjusted for change in reservoir contents.

05127500 BASSWOOD RIVER NEAR WINTON, MN

(International gaging station)

LOCATION.--Lat 48°04'55", long 91°39'10", in SE 1/4 SE 1/4 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.--51 years (water years 1926, 1927, 1931-79), 1,395 ft^3/s (39.51 m^3/s), 10.89 in/yr (277 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, 7,290 ft^3/s (206 m^3/s) May 20, gage height, 6.99 ft (2.131 m); minimum, 338 ft^3/s (9.57 m^3/s) Feb. 12, 13, gage height, 2.57 ft (0.783 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	1310	660	521	436	354	399	747	4980	5860	2390	1060	597
2	1340	644	520	436	354	405	741	5360	5630	2320	1010	580
3	1330	629	517	436	354	430	741	5730	5420	2240	1000	565
4	1300	613	521	430	349	442	738	6030	5220	2160	1040	558
5	1310	581	518	430	349	448	727	6290	5040	2080	1000	551
6	1290	568	518	420	354	455	722	6470	4860	2000	970	529
7	1270	559	518	415	354	455	723	6620	4700	1920	900	514
8	1260	540	515	414	349	463	748	6710	4540	1840	870	507
9	1240	527	513	411	349	468	771	6730	4410	1770	840	500
10	1220	524	510	410	349	468	795	6840	4370	1710	790	544
11	1200	516	506	407	344	460	816	6870	4260	1650	770	536
12	1140	508	500	405	344	460	852	6870	4150	1600	732	536
13	1100	510	495	401	344	460	870	6870	4050	1570	712	522
14	1060	505	494	398	349	460	872	6890	3960	1540	694	522
15	1040	503	488	395	354	460	868	6940	3940	1480	674	522
16	1010	499	482	391	360	460	864	7010	3860	1450	665	522
17	978	492	478	391	365	510	869	7050	3740	1400	648	529
18	942	493	473	388	370	540	881	7140	3630	1340	631	536
19	908	490	469	385	375	580	915	7170	3540	1320	622	558
20	890	487	468	380	380	592	1010	7260	3480	1270	614	565
21	865	482	467	381	385	600	1160	7240	3360	1220	597	573
22	836	483	464	380	386	622	1330	7190	3290	1200	588	580
23	822	496	461	386	392	659	1560	7120	3160	1160	597	597
24	803	501	457	375	392	665	1880	7010	3060	1140	580	588
25	766	501	453	370	392	665	2300	6870	2960	1100	573	588
26	756	505	449	364	392	665	2770	6710	2870	1080	565	588
27	735	507	446	370	392	665	3230	6550	2770	1050	558	588
28	723	512	443	364	392	691	3680	6420	2670	1020	558	580
29	717	519	445	364	---	715	4150	6290	2570	1000	551	573
30	691	522	442	359	---	741	4560	6160	2490	1050	536	558
31	678	---	442	359	---	750	---	6050	---	1080	573	---
TOTAL	31530	15876	14993	12251	10223	16853	42890	205440	117860	47150	22518	16606
MEAN	1017	529	484	395	365	544	1430	6627	3929	1521	726	554
MAX	1340	660	521	436	392	750	4560	7260	5860	2390	1060	597
MIN	678	482	442	359	344	399	722	4980	2490	1000	536	500
CFSM	.58	.30	.28	.23	.21	.31	.82	3.81	2.26	.87	.42	.32
IN.	.67	.34	.32	.26	.22	.36	.92	4.39	2.52	1.01	.48	.36

CAL YR 1978 TOTAL 539201 MEAN 1477 MAX 5320 MIN 442 CFSM .85 IN 11.53
WTR YR 1979 TOTAL 554190 MEAN 1518 MAX 7260 MIN 344 CFSM .87 IN 11.85

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 except those for period of no gage-height record, Nov. 4 to Dec. 12 and Dec. 14 to Jan. 22, which are good.

COOPERATION.--This station is maintained by Canada under agreement with the United States.

AVERAGE DISCHARGE.--57 years (water years 1923-79), 3,832 ft^3/s (108.5 m^3/s), 10.07 in/yr (256 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, 15,300 ft^3/s (433 m^3/s) May 25, elevation, 1,189.25 ft (362.483 m); minimum, 1,270 ft^3/s (36.0 m^3/s) Apr. 5, elevation, 1,182.47 ft (360.417 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	4210	2880	2090	1560	1380	1340	1620	7660	14700	8860	4090	2430
2	4190	2860	2070	1550	1380	1350	1630	8180	14600	8650	3980	2390
3	4100	2830	2040	1530	1370	1370	1640	8700	14500	8480	3880	2380
4	4080	2800	2020	1530	1360	1370	1660	9230	14300	8300	3890	2350
5	4070	2770	1990	1520	1360	1370	1670	9780	14200	8120	3800	2280
6	4050	2740	1970	1520	1360	1370	1690	10400	14000	7900	3730	2220
7	4020	2720	1940	1510	1360	1370	1710	10900	13700	7720	3570	2200
8	3980	2690	1920	1510	1350	1370	1720	11400	13500	7510	3510	2170
9	3960	2660	1900	1510	1340	1360	1740	11900	13200	7320	3430	2120
10	3880	2640	1870	1500	1330	1360	1760	12400	13000	7150	3340	2120
11	3850	2610	1850	1500	1330	1360	1760	12900	12800	6980	3280	2080
12	3740	2590	1820	1490	1320	1360	1780	13300	12600	6780	3210	2040
13	3780	2560	1800	1490	1320	1360	1820	13600	12300	6610	3120	2010
14	3740	2530	1790	1490	1330	1350	1850	13900	12100	6450	3070	1980
15	3720	2510	1780	1480	1320	1360	1870	14100	12100	6250	3040	1960
16	3680	2480	1770	1480	1330	1350	1890	14300	11900	6120	2980	1940
17	3620	2460	1760	1470	1320	1360	1910	14500	11700	5940	2920	1900
18	3560	2430	1730	1470	1310	1370	1960	14500	11400	5730	2850	1840
19	3500	2400	1720	1460	1310	1440	2030	14700	11200	5620	2820	1830
20	3490	2380	1710	1460	1300	1460	2190	14800	11000	5430	2780	1790
21	3430	2350	1700	1450	1300	1470	2430	14900	10800	5240	2740	1770
22	3340	2330	1690	1450	1310	1490	2730	15000	10600	5130	2690	1760
23	3280	2300	1670	1440	1350	1500	3150	15100	10400	4950	2700	1750
24	3240	2270	1660	1430	1340	1510	3710	15200	10200	4890	2660	1700
25	3210	2250	1650	1430	1340	1520	4300	15200	9990	4760	2620	1670
26	3160	2220	1640	1430	1340	1530	4890	15200	9820	4680	2580	1680
27	3100	2200	1620	1430	1330	1490	5480	15200	9610	4570	2550	1660
28	3090	2170	1600	1420	1330	1530	6040	15100	9430	4460	2510	1640
29	3060	2140	1590	1410	---	1550	6600	15100	9220	4340	2450	1620
30	2950	2120	1580	1400	---	1580	7130	14900	9040	4280	2420	1590
31	2940	---	1570	1390	---	1610	---	14800	---	4200	2440	---
TOTAL	112020	74890	55510	45710	37420	44180	82360	406850	357910	193420	95650	58870
MEAN	3614	2496	1791	1475	1336	1425	2745	13120	11930	6239	3085	1962
MAX	4210	2880	2090	1560	1380	1610	7130	15200	14700	8860	4090	2430
MIN	2940	2120	1570	1390	1300	1340	1620	7660	9040	4200	2420	1590
CFSM	.70	.48	.35	.29	.26	.28	.53	2.54	2.31	1.21	.60	.38
IN.	.81	.54	.40	.33	.27	.32	.59	2.93	2.58	1.39	.69	.42

CAL YR 1978 TOTAL 1665920 MEAN 4564 MAX 12600 MIN 1570 CFSM .88 IN 11.99
WTR YR 1979 TOTAL 1564790 MEAN 4287 MAX 15200 MIN 1300 CFSM .83 IN 11.26

05128200 VERMILION LAKE NEAR SOUDAN, MN

LOCATION.--Lat 47°49'52", long 92°16'20", in SW 1/4 SE 1/4 sec.20, T.62 N., R.15 W., St. Louis County, Hydrologic Unit 09030002, on south shore of Vermilion Lake, 2 mi (3.2 km) northwest of Soudan.

PERIOD OF RECORD.--October 1913 to July 1915, July 1941 to November 1942, June 1946 to current year (fragmentary during 1947).

GAGE.--Water-stage recorder. Datum of gage is 1,355.10 ft (413.034 m) National Geodetic Vertical Datum of 1929. October 1913 to July 1915, nonrecording gage at Tower, 2 mi (3.2 km) southwest of present gage, at datum about 1,354.60 ft (412.882 m). July 1941 to November 1942, and June 1946 to June 1951, nonrecording gage approximately 13 mi (20.9 km) northwest at Vermilion Dam near Tower, at same datum. All gage readings have been reduced to elevations NGVD.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation observed, 1,359.52 ft (414.382 m) May 16, 1950; minimum observed, 1,356.02 ft (413.315 m) Jan. 29, 1942; minimum 1,355.96 ft (413.297 m) Dec. 14, 1976, result of wind action.

EXTREMES OUTSIDE PERIOD OF RECORD.--Elevation on June 6, 1913, was 1,359.94 ft (414.510 m), determined from reference point set by local observers.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,358.95 ft (414.208 m) May 11, result of wind action; maximum daily, 1,358.92 ft (414.199 m) May 11; minimum, 1,357.02 ft (413.620 m) Sept. 30; minimum daily, 1,357.07 ft (413.635 m) Feb. 5, 9.

MONTHEND ELEVATION, IN FEET NGVD, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

Oct. 31 ..... 1357.46	Feb. 28 ..... 1357.12	June 30 ..... 1358.05
Nov. 30 ..... 1357.28	Mar. 31 ..... 1357.30	July 31 ..... 1357.66
Dec. 31 ..... 1357.18	Apr. 30 ..... 1358.85	Aug. 31 ..... 1357.17
Jan. 31 ..... 1357.09	May 31 ..... 1358.66	Sept.30 ..... 1357.08

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

05128340 PIKE RIVER NEAR BIWABIK, MN

LOCATION.--Lat 47°36'32", long 92°23'29", in NW 1/4 SW 1/4 sec.9, T.59 N., R.16 W., St. Louis County, Hydrologic Unit 09030002, in Superior National Forest, on right bank 3.5 mi (5.6 km) above mouth and 5.7 mi (9.2 km) northwest of Biwabik.

PERIOD OF RECORD.--January 1977 to February 1979 (discontinued).

GAGE.--Nonrecording gage and crest-stage gage. Altitude of gage is 1,460 ft (445 m) from topographic map.

REMARKS.--Records fair.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 168 ft^3/s (4.76 m^3/s) July 18, 1978, gage height 7.17 ft (2.185 m); no flow Jan. 1 to Mar. 8, 1977.

EXTREMES FOR CURRENT YEAR.--October 1978 to February 1979: Maximum daily discharge, 12 ft^3/s (0.34 m^3/s) Oct. 1, 2; minimum daily, 1.6 ft^3/s (0.045 m^3/s) Feb. 9-28.

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	12	5.6	5.7	2.3	1.7							
2	12	5.1	5.6	2.2	1.7							
3	11	4.9	5.6	2.2	1.7							
4	10	4.9	5.5	2.1	1.7							
5	9.8	4.8	5.4	2.1	1.7							
6	9.5	4.7	5.2	2.1	1.7							
7	9.2	4.6	5.0	2.0	1.7							
8	8.8	4.6	4.7	2.0	1.7							
9	8.5	4.8	4.5	2.0	1.6							
10	8.2	4.9	4.3	2.0	1.6							
11	7.9	5.1	4.1	1.9	1.6							
12	7.9	5.3	4.0	1.9	1.6							
13	7.9	5.5	3.8	1.9	1.6							
14	7.9	5.7	3.7	1.9	1.6							
15	7.8	5.8	3.6	1.8	1.6							
16	7.7	5.9	3.5	1.8	1.6							
17	7.8	6.0	3.4	1.8	1.6							
18	7.9	6.0	3.2	1.8	1.6							
19	7.7	6.0	3.1	1.7	1.6							
20	7.5	6.0	3.0	1.7	1.6							
21	7.3	6.0	2.9	1.7	1.6							
22	7.1	6.0	2.9	1.7	1.6							
23	7.0	6.0	2.8	1.7	1.6							
24	6.9	6.0	2.7	1.7	1.6							
25	6.8	6.0	2.7	1.7	1.6							
26	6.8	5.9	2.6	1.7	1.6							
27	6.7	5.9	2.5	1.7	1.6							
28	6.7	5.8	2.5	1.7	1.6							
29	6.6	5.8	2.4	1.7	---							
30	6.6	5.7	2.4	1.7	---							
31	6.1	---	2.3	1.7	---							
TOTAL	251.6	165.3	115.6	57.9	45.6							
MEAN	8.12	5.51	3.73	1.87	1.63							
MAX	12	6.0	5.7	2.3	1.7							
MIN	6.1	4.6	2.3	1.7	1.6							

CAL YR 1978 TOTAL 11484.6 MEAN 31.5 MAX 164 MIN 1.2

05128500 PIKE RIVER NEAR EMBARRASS, MN

LOCATION.--Lat 47°39'36", long 91°18'54", in NE 1/4 NW 1/4 sec.25, T.60 N., R.16 W., St. Louis County, Hydrologic Unit 09030002, on left bank 75 ft (23 m) downstream from bridge on County Road 373, 5.4 mi (8.7 km) west of Embarrass, and 8.5 mi (13.7 km) downstream from Sandy River.

DRAINAGE AREA.--115 mi^2 (298 km^2).

PERIOD OF RECORD.--October 1953 to December 1964, December 1976 to May 1979 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 1,410.27 ft (429.850 m) National Geodetic Vertical Datum of 1929.

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

AVERAGE DISCHARGE.--12 years (water years 1954-64, 1978), 79.6 ft^3/s (2.254 m^3/s), 9.40 in/yr (239 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge 1,750 ft^3/s (49.6 m^3/s) April 17, 1954, gage height, 10.28 ft (3.133 m); minimum daily, 0.40 ft^3/s (0.011 m^3/s) Jan. 29 to Feb. 3, 1963; minimum gage height, 3.08 ft (0.939 m) Aug. 25-28, 1961.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in May 1950 reached a stage of approximately 11.3 ft (3.444 m) from information by local residents, discharge about 2,400 ft^3/s (68.0 m^3/s).

EXTREMES FOR CURRENT YEAR.--October 1978 to May 1979; Maximum discharge, 1,690 ft^3/s (47.9 m^3/s) Apr. 23, gage height, 10.18 ft (3.103 m); minimum daily, 7.0 ft^3/s (0.20 m^3/s) Jan. 20-29.

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	60	45	20	9.3	7.1	8.5	28	562				
2	58	45	19	9.2	7.2	8.5	27	488				
3	58	45	19	9.0	7.2	8.5	27	433				
4	58	45	18	8.8	7.2	8.5	27	391				
5	56	45	17	8.6	7.3	8.5	27	360				
6	56	45	17	8.5	7.3	8.5	27	339				
7	55	42	16	8.3	7.4	8.5	27	328				
8	54	39	16	8.2	7.4	8.5	27	335				
9	54	34	15	8.0	7.5	8.5	27	338				
10	53	30	15	7.9	7.5	9.0	27	354				
11	51	29	15	7.8	7.6	9.0	28	385				
12	52	27	14	7.7	7.6	9.0	29	403				
13	46	27	14	7.6	7.7	9.5	31	398				
14	41	28	13	7.5	7.7	9.5	34	381				
15	43	29	13	7.4	7.8	10	40	358				
16	47	30	13	7.3	7.8	11	50	332				
17	45	30	12	7.2	7.9	12	70	307				
18	43	30	12	7.1	7.9	13	140	283				
19	43	29	12	7.1	8.0	15	300	261				
20	47	29	11	7.0	8.0	18	784	246				
21	52	28	11	7.0	8.1	22	1200	240				
22	54	27	11	7.0	8.1	27	1540	230				
23	51	27	10	7.0	8.2	32	1680	250				
24	51	26	10	7.0	8.2	33	1570	270				
25	51	25	10	7.0	8.2	33	1380	270				
26	50	24	9.9	7.0	8.3	32	1170	260				
27	50	23	9.8	7.0	8.3	32	1000	240				
28	49	22	9.7	7.0	8.3	30	873	230				
29	48	21	9.6	7.0	---	30	758	220				
30	48	20	9.5	7.1	---	29	652	210				
31	47	---	9.4	7.1	---	28	---	200				
TOTAL	1571	946	410.9	236.7	216.8	529.5	13600	9902				
MEAN	50.7	31.5	13.3	7.64	7.74	17.1	453	319				
MAX	60	45	20	9.3	8.3	33	1680	562				
MIN	41	20	9.4	7.0	7.1	8.5	27	200				
CFSM	.44	.27	.12	.07	.07	.15	3.94	2.77				
IN.	.51	.31	.13	.08	.07	.17	4.40	3.20				

CAL YR 1978 TOTAL 40275.6 MEAN 110 MAX 497 MIN 8.8 CFSM .96 IN 13.03

05129000 VERMILION RIVER BELOW VERMILION LAKE, NEAR TOWER, MN

LOCATION.--Lat 47°57'41", long 92°28'33", in SE 1/4 SW 1/4 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.--57 years, 321 ft^3/s (9.091 m^3/s), 9.03 in/yr (229 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,710 ft^3/s (76.7 m^3/s) May 23, 1950, gage height, 7.68 ft (2.341 m) present datum; no flow Oct. 25-29, 1955, caused by temporary storage behind new concrete dam at outlet of Vermilion Lake.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,450 ft^3/s (41.1 m^3/s) May 11, 13, gage height, 6.43 ft (1.960 m); minimum, 0.85 ft^3/s (2.41 m^3/s) Sept. 9, gage height, 3.54 ft (1.079 m), affected by wind action; minimum daily, 113 ft^3/s (3.20 m^3/s) Feb. 6.

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	640	280	194	155	120	129	200	1410	1090	674	412	180
2	635	275	190	153	119	132	198	1410	1070	659	399	180
3	625	272	188	151	117	136	198	1400	1060	644	378	170
4	610	270	190	149	115	140	196	1390	1020	619	372	170
5	585	268	188	149	114	144	195	1390	1020	599	352	170
6	560	260	186	146	113	144	194	1380	1000	579	355	170
7	535	242	184	144	115	144	194	1390	960	564	303	167
8	495	227	180	144	115	140	194	1390	916	579	294	172
9	480	217	178	142	114	142	193	1380	898	569	291	164
10	465	212	176	140	114	142	193	1400	892	544	255	184
11	460	212	176	138	114	140	191	1410	880	534	251	191
12	450	222	172	136	115	135	193	1410	874	519	251	189
13	435	227	170	133	115	134	200	1410	862	504	210	188
14	415	205	168	131	115	134	203	1400	838	504	200	184
15	410	219	166	131	116	132	202	1390	794	466	203	185
16	405	214	165	127	117	128	203	1400	778	457	202	192
17	400	205	161	127	118	128	207	1380	762	444	187	180
18	395	203	159	127	118	130	217	1340	756	426	176	164
19	385	198	161	125	119	140	240	1320	762	416	177	174
20	375	198	163	125	120	150	316	1340	778	412	176	159
21	375	196	165	127	121	157	434	1340	745	398	177	155
22	370	194	163	127	122	166	595	1340	745	394	170	155
23	345	196	161	125	123	177	741	1330	745	385	176	162
24	330	198	159	122	124	175	883	1320	734	377	170	141
25	325	196	157	120	124	174	1030	1290	734	368	167	134
26	320	194	155	120	124	173	1150	1260	709	355	162	141
27	315	194	153	122	125	172	1260	1220	704	345	160	143
28	315	196	153	122	126	177	1330	1200	699	335	164	129
29	310	198	161	122	---	189	1370	1190	684	325	150	134
30	305	196	159	122	---	197	1400	1160	674	384	149	124
31	295	---	157	120	---	202	---	1100	---	417	172	---
TOTAL	13365	6584	5258	4122	3312	4703	14320	41490	25183	14795	7261	4951
MEAN	431	219	170	133	118	152	477	1338	839	477	234	165
MAX	640	280	194	155	126	202	1400	1410	1090	674	412	192
MIN	295	194	153	120	113	128	191	1100	674	325	149	124
CFSM	.89	.45	.35	.28	.24	.32	.99	2.77	1.74	.99	.48	.34
IN.	1.03	.51	.40	.32	.26	.36	1.10	3.20	1.94	1.14	.56	.38

CAL YR 1978 TOTAL 164889 MEAN 452 MAX 1040 MIN 141 CFSM .94 IN 12.70
WTR YR 1979 TOTAL 145344 MEAN 398 MAX 1410 MIN 113 CFSM .82 IN 11.19

NOTE.--No gage-height record Oct. 1 to Nov. 6 and Feb. 10 to Mar. 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, 1,108.00 ft (337.719 m) June 6, maximum daily elevation, 1,107.94 ft (337.700 m) June 6; minimum daily, 1,104.63 ft (336.691 m) Apr. 15.

MONTHEND ELEVATION, IN FEET NGVD, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

Oct. 31 ..... 1107.33	Feb. 28 ..... 1105.49	June 30 ..... 1107.50
Nov. 30 ..... 1107.28	Mar. 31 ..... 1104.97	July 31 ..... 1107.69
Dec. 31 ..... 1106.52	Apr. 30 ..... 1107.03	Aug. 31 ..... 1107.34
Jan. 31 ..... 1105.95	May 31 ..... 1107.77	Sept.30 ..... 1107.10

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

05130500 STURGEON RIVER NEAR CHISHOLM, MN

LOCATION.--Lat 47°40'25", long 92°54'00", in NE 1/4 NW 1/4 sec.20, T.60 N., R.20 W., St. Louis County, Hydrologic Unit 09030005, on left bank 1,000 ft (305 m) upstream from highway bridge, 0.6 mi (1.0 km) downstream from East Branch Sturgeon River, and 11.5 mi (18.5 km) north of Chisholm.

DRAINAGE AREA.--187 mi^2 (484 km^2).

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

REVISED RECORDS.--WSP 1438: 1946.

GAGE.--Water-stage recorder. Datum of gage is 1,305.7 ft (397.977 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 24, 1944, nonrecording gage at site 1,000 ft (305 m) downstream at different datum. Aug. 25, 1944, to Sept. 30, 1975, at present site at datum 1.00 ft (0.305 m) higher.

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

AVERAGE DISCHARGE.--37 years, 126 ft^3/s (3.568 m^3/s), 9.15 in/yr (232 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,630 ft^3/s (103 m^3/s) May 7, 1950, gage height, 7.41 ft (2.259 m), present datum, from rating curve extended above 1,600 ft^3/s (45.3 m^3/s) on basis of slope-area measurement of peak flow; minimum daily, 3.8 ft^3/s (0.11 m^3/s) Jan. 31 to Feb. 3, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 500 ft^3/s (14.2 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Apr. 22	0200	2460	69.7	6.60	2.012

Minimum discharge, 21 ft^3/s (.59 m^3/s) Aug. 21, 22, gage height, 1.54 ft (0.469 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	107	78	40	27	25	23	50	511	240	230	52	63
2	107	76	39	27	25	23	50	465	240	195	49	86
3	106	76	38	26	25	23	50	438	240	180	45	117
4	103	76	37	26	25	23	50	412	230	185	43	126
5	104	80	36	26	25	23	50	369	220	176	41	119
6	104	78	35	26	25	23	50	355	200	158	40	97
7	103	76	35	26	25	23	50	376	190	140	41	78
8	100	79	34	26	25	23	50	412	180	172	38	62
9	97	75	34	26	25	23	50	415	170	224	37	51
10	95	75	33	26	25	24	50	412	170	235	36	55
11	95	76	32	26	25	24	53	446	160	210	33	54
12	92	76	32	26	25	25	55	473	150	172	31	51
13	92	80	32	26	25	25	65	461	148	146	29	48
14	92	84	31	25	25	26	75	427	140	127	28	49
15	94	85	31	25	25	27	95	387	135	108	26	47
16	94	84	30	25	25	28	145	348	125	96	25	41
17	92	82	30	25	24	29	235	314	120	86	24	38
18	92	80	30	25	24	30	372	294	115	77	24	35
19	91	67	29	25	24	33	793	274	110	74	23	32
20	88	64	29	25	24	38	1640	263	115	67	22	31
21	86	60	29	25	24	52	2270	263	150	62	22	31
22	91	57	29	25	24	62	2370	254	200	59	23	31
23	92	54	28	25	24	68	2040	283	230	56	43	31
24	86	52	28	25	24	67	1570	307	260	68	55	32
25	82	49	28	25	23	64	1290	304	280	65	54	30
26	81	47	28	25	23	61	1070	283	277	64	47	28
27	84	45	28	25	23	58	903	263	259	61	42	27
28	82	44	27	25	23	55	774	243	234	55	38	28
29	80	43	27	25	---	53	668	233	211	51	38	29
30	79	41	27	25	---	52	579	230	238	51	36	31
31	78	---	27	25	---	50	---	230	---	53	36	---
TOTAL	2869	2039	973	790	684	1158	17562	10745	5737	3703	1121	1578
MEAN	92.5	68.0	31.4	25.5	24.4	37.4	585	347	191	119	36.2	52.6
MAX	107	85	40	27	25	68	2370	511	280	235	55	126
MIN	78	41	27	25	23	23	50	230	110	51	22	27
CFSM	.50	.36	.17	.14	.13	.20	3.13	1.86	1.02	.64	.19	.28
IN.	.57	.41	.19	.16	.14	.23	3.49	2.14	1.14	.74	.22	.31

CAL YR 1978 TOTAL 51801 MEAN 142 MAX 744 MIN 27 CFSM .76 IN 10.30
WTR YR 1979 TOTAL 48959 MEAN 134 MAX 2370 MIN 22 CFSM .72 IN 9.74

05131000 DARK RIVER NEAR CHISHOLM, MN

LOCATION.--Lat 47°41'27", long 92°49'15", in SW 1/4 SW 1/4 sec.12, T.60 N., R.20 W., St. Louis County, Hydrologic Unit 09030005, in Superior National Forest, on right bank 50 ft (15 m) downstream from snowmobile bridge, 3.5 mi (5.6 km) upstream from mouth, and 12.2 mi (19.6 km) northeast of Chisholm.

DRAINAGE AREA.--50.6 mi^2 (131.1 km^2) of which 13.5 mi^2 (35.0 km^2), since October 1972, has been contained in tailing ponds and probably is noncontributing.

PERIOD OF RECORD.--August 1942 to September 1961, October 1965 to current year.

REVISED RECORDS.--WSP 1508: 1943(M), 1947-48(M), 1950.

GAGE.--Water-stage recorder. Datum of gage is 1,316.8 ft (401.361 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 24, 1944, nonrecording gage at site 59 ft (15 m) upstream at same datum.

REMARKS.--Records good except those for winter period, which are poor. Natural flow of stream affected by continually changing iron-mining activities that include diversions for iron-ore processing, and storage in tailing ponds.

COOPERATION.--Records for current water year collected and computed by U.S. Steel Corporation; random discharge measurements made and records reviewed by Geological Survey.

AVERAGE DISCHARGE.--33 years, 36.5 ft^3/s (1.034 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,170 ft^3/s (33.1 m^3/s) May 7, 1950, gage height, 7.10 ft (2.164 m); minimum, 0.3 ft^3/s (0.008 m^3/s) Aug. 3, 1956; minimum gage height, 0.87 ft (0.265 m) Mar. 22, 23, 1949, Aug. 16, 17, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 490 ft^3/s (13.9 m^3/s) Apr. 20, gage height, 5.22 ft (1.591 m); minimum, 6.0 ft^3/s (0.17 m^3/s) Aug. 21, gage height, 1.27 ft (0.387 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	18	14	13	11	9.9	9.1	20	93	48	42	17	59
2	18	14	13	11	9.8	9.2	20	83	53	36	16	50
3	17	14	13	11	9.7	9.3	19	74	54	35	15	51
4	18	14	13	11	9.6	9.4	19	70	52	33	15	51
5	18	14	12	11	9.5	9.6	19	64	48	29	14	51
6	17	14	12	11	9.4	9.7	19	63	45	27	13	45
7	17	14	12	11	9.2	9.8	18	68	42	24	12	37
8	16	14	12	11	9.0	9.9	18	68	36	52	11	31
9	16	14	12	11	8.8	10	18	66	35	54	11	28
10	16	14	12	11	8.8	10	18	78	43	56	11	32
11	16	14	12	11	8.7	11	18	83	38	53	10	28
12	16	14	12	11	8.7	11	18	84	34	52	9.8	27
13	15	15	12	11	8.6	11	18	82	30	47	9.5	28
14	17	16	12	11	8.6	12	20	78	28	40	8.7	23
15	17	16	12	11	8.5	12	23	71	26	34	7.8	21
16	17	16	12	11	8.5	13	30	64	23	29	7.8	19
17	17	16	11	11	8.4	14	48	59	22	25	7.8	19
18	17	15	11	11	8.3	15	79	55	20	23	7.3	16
19	17	15	11	11	8.4	16	186	53	22	21	6.8	16
20	17	15	11	11	8.4	18	379	57	34	19	6.3	15
21	17	14	11	11	8.5	20	468	54	47	18	7.3	14
22	17	14	11	11	8.5	26	402	61	45	17	9.8	13
23	17	14	11	11	8.6	27	323	64	43	17	20	13
24	16	14	11	11	8.6	36	269	61	41	20	18	12
25	16	14	11	11	8.7	32	241	57	36	18	18	11
26	16	13	11	11	8.8	29	207	53	77	18	19	11
27	16	13	11	11	8.9	25	178	48	59	18	20	11
28	15	13	11	10	9.0	23	152	45	56	17	20	10
29	15	13	11	10	---	22	129	38	51	15	19	10
30	16	13	11	10	---	21	108	38	48	17	18	9.5
31	15	---	11	10	---	21	---	44	---	18	23	---
TOTAL	513	427	361	337	248.4	511.0	3484	1976	1236	924	408.9	761.5
MEAN	16.5	14.2	11.6	10.9	8.87	16.5	116	63.7	41.2	29.8	13.2	25.4
MAX	18	16	13	11	9.9	36	468	93	77	56	23	59
MIN	15	13	11	10	8.3	9.1	18	38	20	15	6.3	9.5

CAL YR 1978 TOTAL 11795.0 MEAN 32.3 MAX 172 MIN 8.5
WTR YR 1979 TOTAL 11187.8 MEAN 30.7 MAX 468 MIN 6.3

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN

LOCATION.--Lat 48°23'55", long 93°33'56", in SE 1/4 NW 1/4 sec.9, T.68 N., R.25 W., Koochiching County, Hydrologic Unit 09030005, on left bank at town of Littlefork, 0.3 mi (0.5 km) downstream from bridge on State Highway 217, 1.5 mi (2.4 km) upstream from Beaver Creek, and 18 mi (29 km) upstream from mouth.

DRAINAGE AREA.--1,730 mi^2 (4,481 km^2), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June to November 1909, April to November 1910, April 1911 to June 1917, September 1917, October 1917 to March 1919 (gage heights only), June 1928 to current year.

REVISED RECORDS.--WSP 955: Drainage area. WSP 1508: 1913, 1916, 1928-32, 1934. WRD MN-74: 1963.

GAGE.--Water-stage recorder. Datum of gage is 1,073.06 ft (327.069 m) National Geodetic Vertical Datum of 1929. June 23, 1909, to Mar. 4, 1917, nonrecording gage at same site and datum. Mar. 5 to Sept. 30, 1917, and June 22, 1928, to July 20, 1937, nonrecording gage, at site 100 ft (30 m) upstream at same datum. Nonrecording gage 1.2 mi (1.9 km) upstream at datum 9.0 ft (2.7 m) higher (used as supplementary gage during periods of backwater from Rainy River).

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

AVERAGE DISCHARGE.--56 years (water years 1912-16, 1929-79), 1,056 ft^3/s (29.91 m^3/s), 8.29 in/yr (211 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, 20,600 ft^3/s (583 m^3/s) Apr. 25, gage height, 32.59 ft (9.933 m); minimum daily, 105 ft^3/s (2.97 m^3/s) Jan. 25-30; minimum gage height, 5.65 ft (1.722 m) Sept. 30.

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	819	407	275	160	106	110	290	5760	1990	2470	460	283
2	765	401	270	158	106	110	280	5110	2080	2070	430	404
3	740	401	265	154	106	111	270	4860	2100	1850	400	469
4	712	396	260	150	107	111	260	4500	2060	1680	380	531
5	696	393	255	148	107	111	250	4200	1920	1550	370	597
6	684	396	255	145	107	111	245	3900	1890	1430	360	582
7	669	364	250	142	107	112	235	3700	1750	1300	350	570
8	647	356	245	140	107	112	230	3500	1630	1170	330	531
9	634	364	240	138	107	113	225	3400	1510	1090	310	484
10	613	377	235	135	107	114	220	3300	1430	1140	300	449
11	600	412	230	132	108	114	225	3300	1390	1270	280	475
12	588	349	230	130	108	115	230	3300	1360	1320	270	588
13	564	345	225	128	108	115	245	3300	1330	1270	250	647
14	540	340	220	125	108	116	270	3200	1280	1150	240	634
15	537	335	215	122	108	116	310	3100	1240	989	230	625
16	540	330	210	120	108	117	450	3000	1160	874	230	594
17	556	325	208	118	108	117	900	2800	1090	790	214	534
18	564	320	203	116	109	117	2000	2700	1020	738	205	466
19	558	320	200	114	109	120	4000	2500	958	685	203	407
20	555	315	198	112	109	130	8000	2400	894	622	187	364
21	546	310	192	110	109	150	15100	2300	1630	573	173	310
22	534	305	190	108	109	180	17200	2250	3230	531	168	272
23	510	300	188	107	110	210	18400	2200	3740	520	178	244
24	495	300	184	106	110	250	20100	2300	3400	520	192	216
25	486	295	180	105	110	290	20500	2400	2940	540	218	196
26	481	295	178	105	110	310	19100	2400	3500	560	244	184
27	472	290	174	105	110	330	15900	2300	5220	540	288	182
28	454	290	170	105	110	325	11600	2150	4900	500	298	172
29	437	285	168	105	---	320	8480	2000	3960	480	287	165
30	437	280	164	105	---	310	6840	1820	3100	470	252	162
31	426	---	160	106	---	300	---	1860	---	480	250	---
TOTAL	17861	10196	6637	3854	3028	5267	172355	95810	65702	31172	8547	12337
MEAN	576	340	214	124	108	170	5745	3091	2190	1006	276	411
MAX	819	412	275	160	110	330	20500	5760	5220	2470	460	647
MIN	426	280	160	105	106	110	220	1820	894	470	168	162
CFSM	.33	.20	.12	.07	.06	.10	3.32	1.79	1.27	.58	.16	.24
IN.	.38	.22	.14	.08	.07	.11	3.71	2.06	1.41	.67	.18	.27

CAL YR 1978 TOTAL 540130 MEAN 1480 MAX 11300 MIN 133 CFSM .86 IN 11.61
WTR YR 1979 TOTAL 432766 MEAN 1186 MAX 20500 MIN 105 CFSM .69 IN 9.31

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.--Periphyton was collected with plastic strips. Letter K indicates non-ideal colony count.

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
NOV										
07...	1000	364	155	7.5	4.0	2.0	6.0	13.3	100	K4
DEC										
13...	1300	230	180	7.2	-5.0	.5	6.0	15.1	107	K2
JAN										
22...	1330	108	250	7.3	<-5.0	.5	8.0	10.8	77	<1
MAR										
05...	1600	111	260	7.7	2.0	.0	6.0	8.2	58	K1
APR										
24...	1515	20000	90	8.0	15.5	2.5	70	11.1	84	K46
MAY										
29...	1400	1990	98	8.0	18.5	18.5	10	8.0	89	--
JUL										
10...	1230	1120	115	7.8	26.0	22.5	6.0	7.0	82	--
AUG										
20...	1300	187	200	7.9	25.0	22.5	15	8.2	96	17

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 PERCENT (00932)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY (MG/L AS CACO3) (00410)
NOV										
07...	K5	78	12	20	6.7	2.8	7	.1	1.4	66
DEC										
13...	84	95	13	24	8.4	3.6	8	.2	1.7	82
JAN										
22...	<1	120	13	31	11	4.8	8	.2	2.0	110
MAR										
05...	K2	130	10	34	11	5.2	8	.2	2.1	120
APR										
24...	630	44	8	13	2.9	1.0	4	.1	2.2	36
MAY										
29...	--	49	9	13	4.0	1.7	7	.1	1.0	40
JUL										
10...	--	63	16	17	5.0	1.8	6	.1	.7	47
AUG										
20...	38	93	4	26	6.8	2.3	5	.1	1.3	89

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
NOV										
07...	6.2	1.9	.1	7.3	133	87	.18	131	.07	.00
DEC										
13...	7.4	2.4	.1	10	158	107	.21	98.1	.14	.06
JAN										
22...	11	2.6	.1	14	187	143	.25	54.5	.24	.06
MAR										
05...	14	2.5	.1	15	185	156	.25	55.4	.33	.11
APR										
24...	4.1	1.6	.0	5.4	88	52	.12	4750	.16	.10
MAY										
29...	5.5	1.8	.1	2.9	99	54	.13	532	.01	.02
JUL										
10...	5.4	1.7	.1	4.6	145	65	.20	438	.07	.01
AUG										
20...	11	2.0	.1	5.3	149	109	.20	75.2	.01	.05

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N) (00624)	NITRO-GEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN, TOTAL (MG/L AS N) (00600)	NITRO-GEN, TOTAL (MG/L AS NO3) (71887)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P) (00666)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
NOV									
07...	.81	.81	.05	.76	.88	3.9	.02	.01	--
DEC									
13...	.91	.97	.06	.97	1.1	4.9	.04	.01	25
JAN									
22...	.48	.54	.05	.49	.78	3.5	.03	.02	16
MAR									
05...	.61	.72	.00	.72	1.1	4.6	.04	.03	--
APR									
24...	1.1	1.2	.56	.64	1.4	6.0	.18	.02	17
MAY									
29...	.95	.97	.22	.75	.98	4.3	.01	.01	--
JUL									
10...	.95	.96	.03	.93	1.0	4.6	.05	.02	27
AUG									
20...	.77	.82	.02	.80	.83	3.7	.04	.02	--

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

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)
NOV										
07...	1000	1	1	0	0	1	1	<10	1	0
MAR										
05...	1600	1	1	0	0	1	1	10	1	1
MAY										
29...	1400	2	1	<100	20	0	0	20	20	0
AUG										
20...	1300	3	3	<100	20	0	0	30	20	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)
NOV										
07...	0	3	1	890	530	6	6	40	40	<.5
MAR										
05...	1	3	3	1300	360	3	2	50	30	<.5
MAY										
29...	0	3	1	950	180	4	0	40	10	<.5
AUG										
20...	0	2	2	970	370	3	0	70	40	<.5

DATE	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)
NOV									
07...	<.5	0	0	0	0	40	10	21	.5
MAR									
05...	<.5	0	0	0	0	20	20	18	.2
MAY									
29...	<.5	0	0	0	0	30	4	22	1.1
AUG									
20...	<.5	0	0	0	0	80	5	28	.6

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

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)
NOV						
07...	1000	49	.079	.000	.000	.000

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
NOV						
07...	1000	2.0	364	19	19	98
DEC						
13...	1300	.5	230	27	17	70
JAN						
22...	1330	.5	108	14	4.1	86
MAR						
05...	1600	.0	111	9	2.7	93
APR						
24...	1530	2.5	20000	227	12300	91
MAY						
29...	1620	18.5	1990	23	124	93
JUL						
10...	1300	23.0	1120	20	60	90
AUG						
20...	1300	22.5	187	18	9.1	--

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

PHYTOPLANKTON ANALYSES, AUGUST 1978 TO AUGUST 1979

DATE	AUG 8,78		SEP 19,78		NOV 7,78		DEC 13,78		MAR 5,79	
TIME	1045		1100		1000		1300		1600	
TOTAL CELLS/ML	650		6900		4900		230		110	
DIVERSITY: DIVISION	1.0		0.4		1.1		1.6		1.0	
.CLASS	1.0		0.4		1.1		1.6		1.0	
..ORDER	1.2		0.6		1.6		1.6		1.0	
...FAMILY	1.4		0.6		1.8		1.9		1.0	
....GENUS	1.8		0.6		1.9		1.9		1.0	
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	--	-	--	-	--	-	14	6	--	-
...CUELASTRACEAE										
....CUELASTRUM	--	-	--	-	110	2	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	*	0	--	-	44#	40
....CHODATELLA	--	-	--	-	*	0	--	-	--	-
....OOCYSTIS	11	2	--	-	*	0	--	-	--	-
....TETRAEDRON	*	0	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	350#	54	--	-	280	6	--	-	--	-
....SCENEDESMUS	65	10	290	4	220	5	110#	50	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	5	1	--	-	--	-	--	-	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	22	3	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	*	0	*	0	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....SPONDYLOSIUM	--	-	--	-	28	1	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	*	0	--	-	240	5	--	-	--	-
....MELOSIRA	--	-	55	1	--	-	--	-	--	-
..PENNALES										
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	350	7	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	57#	25	--	-
...NAVICULACEAE										
....NAVICULA	*	0	*	0	*	0	--	-	--	-
...NITZSCHIACEAE										
....HANTZSCHIA	--	-	*	0	--	-	--	-	--	-
....NITZSCHIA	12	2	--	-	97	2	--	-	66#	60
...SURIRELLACEAE										
....SURIRELLA	--	-	*	0	--	-	--	-	--	-
...TABELLARIACEAE										
....TABELLARIA	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	29	13	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	180#	28	6200#	91	3300#	67	--	-	--	-
..HORMOGONALES										
...NOSTOCALEAE										
....ANABAENA	--	-	--	-	220	5	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	210	3	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	--	-	--	-	--	-	14	6	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...PERIDINIALEAE										
....PERIDINIUM	--	-	*	0	--	-	--	-	--	-

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
PHYTOPLANKTON ANALYSES, AUGUST 1978 TO AUGUST 1979

DATE	APR 24,79		MAY 29,79		JUL 10,79		AUG 20,79	
TIME	1515		1400		1230		1300	
TOTAL CELLS/ML	14		1100		770		1400	
DIVERSITY: DIVISION	0.0		1.6		1.2		1.2	
.CLASS	0.0		1.6		1.2		1.2	
..ORDER	0.0		1.8		1.3		1.2	
...FAMILY	0.0		2.2		2.0		1.3	
....GENUS	0.0		2.2		2.0		1.4	
ORGANISM	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	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	100	13	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	13	1
....CHODATELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	100	13	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	470#	33
....SCENEDESMUS	--	-	180#	16	150#	20	26	2
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	26	2	13	2	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....SPONDYLOSIUM	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	13	1	--	-	13	1
....MELOSIRA	--	-	--	-	--	-	--	-
..PENNALES								
...FRAGILARIACEAE								
....FRAGILARIA	--	-	51	5	--	-	--	-
....SYNEDRA	--	-	26	2	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	13	2	--	-
...NITZSCHIACEAE								
....HANTZSCHIA	--	-	--	-	--	-	--	-
....NITZSCHIA	14#	100	39	3	13	2	--	-
...SURIRELLACEAE								
....SURIRELLA	--	-	13	1	--	-	13	1
...TABELLARIACEAE								
....TABELLARIA	--	-	150	11	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	51	5	--	-	39	3
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	--	-	370#	48	830#	59
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....LYNGBYA	--	-	590#	53	--	-	--	-
...RIVULARIACEAE								
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...PERIDINIACEAE								
....PERIDINIUM	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	--	-

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

05132000 BIG FORK RIVER AT BIG FALLS, MN

LOCATION.--Lat 48°11'45", long 93°48'25", in SW 1/4 SE 1/4 sec.35, T.155 N., R.25 W., Koochiching County, Hydrologic Unit 09030006, on left bank at village of Big Falls, 700 ft (213 m) downstream from falls, 0.3 mi (0.5 km) downstream from bridge on U.S. Highway 71, and 4.8 mi (7.7 km) upstream from Sturgeon River.

DRAINAGE AREA.--1,460 mi^2 (3,780 km^2), approximately.

PERIOD OF RECORD.--August to November 1909, April to November 1910, April 1911 to September 1912 (gage heights and discharge measurements only), June 1928 to September 1979 (discontinued as a continuous-record station; converted to a crest-stage partial-record station).

REVISED RECORDS.--WSP 1308: 1935(M).

GAGE.--Water-stage recorder. Datum of gage is 1,144.71 ft (348.908 m) National Geodetic Vertical Datum of 1929. Prior to June 10, 1911, nonrecording gage at railroad bridge about 0.4 mi (0.6 km) upstream at different datum. June 10, 1911, to Sept. 30, 1912, and June 22, 1928, to Dec. 17, 1937, nonrecording gage at site 200 ft (61 m) upstream at same datum.

REMARKS.--Records good except those for winter period and period of no gage-height record, Oct. 1 to Nov. 5, which are fair. Prior to 1971, a powerplant, located 0.3 mi (0.5 km) upstream, caused some diurnal fluctuation at low flows.

AVERAGE DISCHARGE.--51 years (water years 1929-79), 713 ft^3/s (20.19 m^3/s), 6.63 in/yr (168 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,800 ft^3/s (419 m^3/s) May 8, 9, 1950; maximum gage height, 17.08 ft (5.206 m) May 8, 1950; minimum discharge recorded, 7 ft^3/s (0.20 m^3/s) Aug. 7, 1939.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 14,000 ft^3/s (396 m^3/s) Apr. 22, gage height, 15.90 ft (4.846 m); minimum daily, 165 ft^3/s (4.67 m^3/s) Mar. 6-15; minimum gage height, 3.15 ft (0.960 m) Sept. 8.

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	1300	870	430	250	172	167	425	4750	2040	1360	660	369
2	1250	840	420	248	172	167	410	4350	2080	1230	640	376
3	1220	820	400	244	172	166	400	4030	2060	1260	600	356
4	1180	810	400	240	171	166	390	3750	1980	1450	570	334
5	1160	800	390	238	171	166	380	3540	1890	1750	550	323
6	1130	777	380	234	171	165	370	3380	1780	1980	525	316
7	1100	763	370	230	170	165	365	3250	1660	1970	505	301
8	1080	765	365	228	170	165	360	3160	1560	1840	495	256
9	1070	756	355	224	170	165	355	3060	1480	1690	480	283
10	1060	741	350	220	170	165	350	2950	1440	1880	460	309
11	1050	743	340	218	170	165	350	2940	1390	2390	450	369
12	1040	726	335	214	170	165	350	2890	1320	1940	425	415
13	1030	712	325	210	170	165	360	2820	1230	1650	395	412
14	1020	652	320	208	170	165	425	2720	1160	1480	375	395
15	1040	627	315	204	170	165	520	2590	1100	1310	350	369
16	1060	576	310	200	170	170	666	2470	1030	1150	335	351
17	1080	452	305	198	170	178	1260	2370	977	1030	320	329
18	1100	469	300	196	169	187	2200	2340	928	939	305	311
19	1120	570	300	194	169	205	3500	2240	893	853	295	299
20	1110	550	295	192	169	230	6500	2230	970	800	285	291
21	1100	540	290	190	169	265	11500	2240	1310	767	280	290
22	1080	520	285	188	168	375	13700	2230	2000	705	279	288
23	1060	510	280	186	168	475	13400	2330	2380	680	291	287
24	1040	500	280	182	168	510	12400	2380	2470	721	304	284
25	1020	490	275	180	168	520	11200	2340	2390	776	313	283
26	990	480	270	180	168	515	9890	2250	2660	810	306	282
27	970	460	268	178	167	500	8510	2170	2090	806	302	283
28	960	450	264	176	167	490	7170	2060	1890	767	298	287
29	940	440	260	174	---	475	6110	1950	1680	720	294	288
30	920	430	257	172	---	460	5340	1870	1510	680	291	289
31	900	---	254	172	---	445	---	1970	---	660	324	---
TOTAL	33180	18839	9988	6368	4749	8482	119156	85620	49348	38044	12302	9625
MEAN	1070	628	322	205	170	274	3972	2762	1645	1227	397	321
MAX	1300	870	430	250	172	520	13700	4750	2660	2390	660	415
MIN	900	430	254	172	167	165	350	1870	893	660	279	256
CFSM	.73	.43	.22	.14	.12	.19	2.72	1.89	1.13	.84	.27	.22
IN.	.85	.48	.25	.16	.12	.22	3.04	2.18	1.26	.97	.31	.25

CAL YR 1978 TOTAL 446763 MEAN 1224 MAX 6300 MIN 160 CFSM .84 IN 11.38
WTR YR 1979 TOTAL 395701 MEAN 1084 MAX 13700 MIN 165 CFSM .74 IN 10.08

05133500 RAINY RIVER AT MANITOU RAPIDS, MN

(International gaging station)

LOCATION.--Lat 48°38'04", long 93°54'47", in NW 1/4 SE 1/4 sec.36, T.160 N., R.26 W., Koochiching County, Hydrologic Unit 09030004, on left bank at Manitou Rapids, 4 mi (6 km) west of Indus.

DRAINAGE AREA.--19,400 mi^2 (50,200 km^2), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1928 to current year. Monthly discharge only for some periods, published in WSP 1308. October 1911 to October 1924 (gage heights only) at site near Birchdale in files of Corps of Engineers. Published as "near Birchdale" 1932-34.

GAGE.--Water-stage recorder. Datum of gage is 1,062.48 ft (323.844 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 10, 1934, nonrecording gage at site near Birchdale 7 mi (11 km) downstream at different datum.

REMARKS.--Records good. Diurnal fluctuation caused by powerplant at International Falls. Some regulation at low and medium flows by Rainy and Namakan Lakes.

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

AVERAGE DISCHARGE.--51 years, 12,940 ft^3/s (366.5 m^3/s), 9.06 in/yr (230 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, 61,200 ft^3/s (1,730 m^3/s) Apr. 26, gage height, 18.95 ft (5.776 m), from floodmarks; minimum, 5,080 ft^3/s (144 m^3/s) Sept. 6, gage height, 2.66 ft (0.811 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	13900	7810	10600	8200	8000	8300	11200	37400	31600	26100	11400	6440
2	13800	7770	10600	8200	7600	8600	11100	36600	32000	20300	11500	6260
3	13700	7710	10600	8200	8000	8800	10700	35700	32200	16800	11400	5930
4	13600	7760	10600	8200	7500	9000	10600	36100	31900	20700	11200	5390
5	13500	7650	10600	7900	7400	8000	10400	35600	29600	22700	10900	5160
6	13500	7890	10600	8600	8200	9200	10700	34900	31100	20000	10800	5150
7	13100	7740	10500	8500	7000	9400	10500	34300	31400	16400	10500	7130
8	13200	7600	10500	8100	8000	8800	10100	33900	31100	14600	10400	8680
9	13200	7620	10500	8200	8000	8700	10000	33700	30800	14000	10200	6210
10	13200	7590	10500	8500	7800	8800	9670	33600	30400	13600	10100	5310
11	13100	7590	10500	7700	7800	8800	9570	33500	30200	13600	10100	5150
12	13100	7480	10500	7700	7000	9000	9550	34000	30000	14200	10000	5190
13	13000	7230	10500	8500	7800	9400	9600	34400	29800	15200	9980	5490
14	12400	7390	10500	8500	8300	9500	9810	34300	29400	14700	9570	5640
15	12400	7600	10500	8500	7800	9500	9890	33900	29500	13900	8170	5590
16	12400	7900	10400	8500	8000	9500	8930	33300	29200	13500	7700	5720
17	12100	7980	10400	8500	7200	9900	12100	32600	28900	12700	7550	5760
18	12200	8350	10400	8500	6800	10200	14900	32200	28600	12000	6880	5740
19	11900	9010	10400	8500	6100	9800	19200	32000	28000	11600	6330	6070
20	11400	9510	10400	8400	6200	9800	27300	31700	24600	11400	6180	5900
21	9320	9500	10400	8000	7200	9900	39300	31400	29000	11200	6070	6120
22	8410	9500	10800	7800	7300	9900	45200	31300	32800	11100	6110	6020
23	8240	9400	10400	8100	7500	10400	48400	31400	35000	10900	6110	6180
24	8030	9500	10200	7700	8000	10900	53800	31600	35200	10900	6120	6090
25	7980	10500	10300	7500	7300	11300	58500	29000	34400	10900	6430	5970
26	8040	10800	10300	8300	6400	11400	60800	22500	35000	11000	6320	5600
27	7980	10800	8700	8200	5600	11500	59200	28900	36500	11000	6190	5650
28	7980	10800	9000	7700	7200	11500	53500	30800	36400	11000	6210	5820
29	7900	10800	9200	7600	---	11400	46500	30900	34700	10900	6260	6330
30	7800	10700	8600	8600	---	11300	41000	30700	29400	10800	6200	5770
31	7840	---	7800	8400	---	11300	---	31100	---	10900	6320	---
TOTAL	348220	259480	315800	253800	207000	303800	742020	1013300	938700	438600	259200	177460
MEAN	11230	8649	10190	8187	7393	9800	24730	32690	31290	14150	8361	5915
MAX	13900	10800	10800	8600	8300	11500	60800	37400	36500	26100	11500	8680
MIN	7800	7230	7800	7500	5600	8000	8930	22500	24600	10800	6070	5150
CFSM	.58	.45	.53	.42	.38	.51	1.28	1.69	1.61	.73	.43	.31
IN.	.67	.50	.61	.49	.40	.58	1.42	1.94	1.80	.84	.50	.34

CAL YR 1978 TOTAL 5902800 MEAN 16170 MAX 42500 MIN 7230 CFSM .83 IN 11.32
WTR YR 1979 TOTAL 5257380 MEAN 14400 MAX 60800 MIN 5150 CFSM .74 IN 10.08

NOTE.--No gage-height record Apr. 24-26.

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1968-70, October 1977 to current year.

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
NOV										
14...	1400	7420	105	8.3	3.0	.5	2.0	13.5	97	--
DEC										
13...	1000	10500	73	7.3	10.0	.5	1.0	11.0	78	>240
JAN										
23...	1130	8100	80	7.4	<-5.0	.5	3.0	11.5	83	K2200
MAR										
06...	1200	9200	92	7.5	-3.0	.0	2.0	7.6	54	E470
APR										
18...	1830	15700	100	7.9	9.0	1.0	10	10.0	72	>6000
MAY										
30...	1130	31700	77	8.1	13.0	13.5	3.0	10.3	102	3200
JUL										
11...	1300	14600	80	7.4	31.0	23.0	4.0	6.8	--	--
AUG										
21...	1200	6240	108	7.4	19.0	20.0	3.0	6.0	67	K9

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 PERCENT (00932)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY (MG/L AS CACO3) (00410)
NOV										
14...	K2	36	8	9.7	2.8	2.2	12	.2	.8	28
DEC										
13...	38	29	0	7.5	2.4	3.1	18	.3	.9	29
JAN										
23...	26	29	8	7.5	2.5	3.5	20	.3	.9	21
MAR										
06...	K15	37	4	10	2.9	3.1	15	.2	.9	33
APR										
18...	44	51	9	13	4.4	3.0	11	.2	1.6	42
MAY										
30...	55	29	2	8.0	2.3	1.7	11	.1	.6	27
JUL										
11...	--	32	5	8.7	2.6	2.9	16	.2	.6	27
AUG										
21...	K15	32	2	9.2	2.3	3.3	18	.3	.8	30

DATE	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
NOV										
14...	5.0	2.2	.1	2.5	58	42	.08	1160	.02	.00
DEC										
13...	4.9	3.0	.1	2.5	60	42	.08	1700	.10	.01
JAN										
23...	5.7	4.4	.1	3.1	66	40	.09	1440	.07	.01
MAR										
06...	5.1	3.4	.0	3.9	68	49	.09	1690	.11	.02
APR										
18...	5.5	2.7	.1	5.0	84	61	.11	3560	.15	.00
MAY										
30...	3.7	1.9	.0	2.8	60	37	.08	5140	.03	.01
JUL										
11...	5.1	3.4	.0	2.6	--	42	.06	1660	.01	.02
AUG										
21...	6.5	6.1	.0	2.1	81	48	.11	1370	.00	.03

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, NH4 + ORG. SUSP. TOTAL (MG/L AS N) (00624)	NITRO-GEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITRO-GEN, TOTAL (MG/L AS N) (00600)	NITRO-GEN, TOTAL (MG/L AS NO3) (71887)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P) (00666)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
NOV 14...	.34	.34	.03	.31	.36	1.6	.01	.01	--
DEC 13...	.55	.56	.30	.26	.66	2.9	.02	.00	13
JAN 23...	.26	.27	.07	.20	.34	1.5	.01	.01	11
MAR 06...	.52	.54	.18	.36	.65	2.9	.02	.01	--
APR 18...	.62	.62	.06	.56	.77	3.4	.04	.02	6.1
MAY 30...	.53	.54	.18	.36	.57	2.5	.03	.01	--
JUL 11...	.60	.62	.14	.48	.63	2.8	.03	.00	24
AUG 21...	.53	.56	.21	.35	.56	2.5	.03	.01	--

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)
NOV 14...	1400	1	0	0	0	1	0	<10	3	0
MAR 06...	1200	1	0	0	0	1	1	<10	0	1
MAY 30...	1130	2	1	<100	30	0	0	20	20	0
AUG 21...	1200	2	2	100	20	0	0	30	20	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)
NOV 14...	0	5	1	220	90	8	2	10	10	<.5
MAR 06...	1	2	2	200	100	5	5	20	10	<.5
MAY 30...	0	3	1	330	80	4	0	20	5	<.5
AUG 21...	0	3	3	260	70	3	0	20	6	<.5

DATE	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG) (01077)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)
NOV 14...	<.5	0	0	0	0	10	0	19	--
MAR 06...	<.5	0	0	0	0	20	10	11	.3
MAY 30...	<.5	0	0	0	0	50	6	8.7	1.1
AUG 21...	<.5	0	0	0	0	20	10	15	2.0

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

DATE	AUG 8,78		SEP 20,78		NOV 14,78		DEC 13,78	
TIME	1520		1130		1400		1000	
TOTAL CELLS/ML	2500		5300		3000		4400	
DIVERSITY: DIVISION	1.0		1.2		1.4		0.7	
.CLASS	1.0		1.2		1.4		0.7	
..ORDER	1.9		2.1		2.2		0.9	
...FAMILY	2.1		2.2		2.2		0.9	
....GENUS	2.7		2.8		2.9		1.6	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...COELASTRACEAE								
....COELASTRUM	--	-	320	6	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	*	0	--	-	67	2	*	0
....CHODATELLA	--	-	--	-	22	1	--	-
....CLOSTERIOPSIS	--	-	28	1	--	-	--	-
....DICTYOSPHAERIUM	73	3	--	-	760#	25	--	-
....OOCYSTIS	*	0	55	1	--	-	--	-
....SELENASTRUM	--	-	42	1	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	18	1	--	-	--	-	--	-
....SCENEDESMUS	37	1	--	-	--	-	--	-
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	28	1	--	-	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	18	1	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	*	0	28	1	22	1	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	*	0	69	1	22	1	29	1
....MELOSIRA	250	10	910#	17	240	8	820#	19
....STEPHANODISCUS	*	0	--	-	--	-	--	-
..PENNALES								
...FRAGILARIACEAE								
....ASTERIONELLA	110	4	55	1	240	8	29	1
....FRAGILARIA	*	0	--	-	--	-	--	-
....SYNEDRA	*	0	--	-	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	*	0	*	0	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	14	1	83	2	22	1	--	-

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

DATE	AUG 8,78		SEP 20,78		NOV 14,78		DEC 13,78	
TIME	1520		1130		1400		1000	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
...TABELLARIACEAE								
....TABELLARIA	--	-	42	1	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	830#	16	180	6	--	-
....ANACYSTIS	1000#	40	950#	18	490#	16	72	2
....COCCOCHLORIS	*	0	--	-	--	-	--	-
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	520#	20	--	-	--	-	--	-
....APHANIZOMENON	64	3	--	-	--	-	--	-
...OSCILLATORIACEAE								
....LYNGBYA	--	-	120	2	560#	18	2600#	60
....OSCILLATORIA	55	2	1700#	32	420	14	820#	19
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....GOMPHOSPHAERIA	320	13	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	*	0	--	-	--	-	--	-

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

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)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS) (70950)
MAR							
06...	1200	42	.790	.630	.000	.000	--
JUL							
11...	1300	42	.790	.630	.970	.020	165

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

PHYTOPLANKTON ANALYSES, AUGUST 1978 TO AUGUST 1979

DATE	MAR 6,79	MAY 30,79	JUL 11,79	AUG 21,79
TIME	1200	1130	1300	1200
TOTAL CELLS/ML	630	820	4600	11000
DIVERSITY: DIVISION	0.5	0.7	1.0	0.4
.CLASS	0.5	0.7	1.0	0.4
..ORDER	0.5	1.6	1.1	1.3
...FAMILY	0.5	2.0	2.1	1.7
....GENUS	0.5	2.6	2.1	1.7

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...COELASTRACEAE								
....COELASTRUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	43	7	39	5	39	1	*	0
....CHODATELLA	--	-	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	160	1
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	13	2	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	180	4	130	1
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	26	3	--	-	*	0
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...CUSCINODISCACEAE								
....CYCLOTELLA	--	-	64	8	*	0	--	-
....MELOSIRA	--	-	120	14	150	3	220	2
....STEPHANODISCUS	--	-	100	13	--	-	*	0
..PENNALES								
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	330#	41	540	12	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	14	2	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	--	-	90	11	*	0	*	0

05133500 RAINY RIVER AT MANITOU RAPIDS, MN--Continued

DATE TIME	MAR 6,79 1200		MAY 30,79 1130		JUL 11,79 1300		AUG 21,79 1200	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
...TABELLARIACEAE								
....TABELLARIA	--	-	--	-	210	4	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	39	5	--	-	6000#	53
....COCCOCHLORIS	--	-	--	-	--	-	--	-
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	1500#	33	1000	9
....APHANIZOMENON	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....LYNGBYA	580#	91	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	1900#	42	3700#	33
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	--	-

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

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
NOV						
14...	1215	.5	7400	4	74	--
DEC						
13...	1000	.5	10500	3	85	--
JAN						
23...	1130	.5	8100	5	109	64
MAR						
06...	1200	.0	9200	9	224	38
MAY						
30...	1415	13.5	31700	7	599	89
JUL						
11...	1400	23.0	14600	10	382	90
AUG						
21...	1200	20.0	6240	8	135	--

05134200 RAPID RIVER NEAR BAUDETTE, MN

LOCATION.--Lat 48°32'10", long 94°33'45", in SE 1/4 NE 1/4 sec.1, T.158 N., R.31 W., Lake of the Woods County, Hydrologic Unit 09030007, on left bank 20 ft (6 m) upstream from bridge on State Highway 72, 1.2 mi (1.9 km) downstream from North Branch Rapid River, and 12 mi (19 km) south of Baudette.

DRAINAGE AREA.--543 mi^2 (1,406 km^2).

PERIOD OF RECORD.--October 1956 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,093.92 ft (333.427 m) National Geodetic Vertical Datum of 1929 (Minnesota Department of Transportation bench mark).

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

AVERAGE DISCHARGE.--23 years, 324 ft^3/s (9.176 m^3/s), 8.10 in/yr (206 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) (revised).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,550 ft^3/s (214 m^3/s) Apr. 26, gage height, 21.13 ft (6.440 m); minimum, 5.6 ft^3/s (0.16 m^3/s) Aug. 22, Sept. 30; minimum gage height, 1.78 ft (0.543 m) Aug. 22.

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	86	40	38	24	16	15	72	4190	771	194	32	93
2	85	39	38	23	16	15	70	3620	747	174	34	134
3	83	38	37	23	16	15	69	3170	714	218	30	129
4	74	41	36	23	16	15	68	2770	672	301	30	118
5	71	38	35	23	16	15	66	2460	624	298	28	97
6	72	37	35	23	16	15	65	2260	575	255	24	83
7	70	36	35	22	16	15	64	2120	550	217	24	66
8	71	38	34	22	16	15	62	2020	510	192	19	56
9	65	44	33	22	15	15	61	1900	458	178	17	47
10	58	40	32	22	15	15	59	1760	410	165	14	43
11	60	42	32	21	15	15	59	1710	370	158	11	42
12	54	35	31	21	15	15	60	1660	332	144	9.6	47
13	50	40	31	20	15	15	62	1550	298	118	8.5	47
14	47	43	30	20	15	15	66	1450	283	107	8.1	45
15	53	45	30	20	15	15	74	1330	269	124	7.5	39
16	53	44	29	19	15	15	170	1220	236	110	7.0	32
17	53	44	29	19	15	16	350	1130	202	90	7.4	23
18	54	43	29	19	15	16	1000	1100	180	72	7.1	16
19	53	43	28	19	15	17	2500	1050	176	57	6.2	14
20	54	42	28	18	15	18	4380	937	269	50	6.3	14
21	52	42	27	18	15	19	4690	863	490	38	6.0	10
22	48	41	27	18	15	25	4140	838	550	38	10	8.9
23	47	41	26	18	15	32	3870	878	508	32	32	8.4
24	45	41	26	18	15	43	4950	863	428	28	19	7.6
25	48	40	26	18	15	57	6520	822	355	29	15	7.6
26	47	40	25	17	15	80	7430	762	375	38	14	9.5
27	42	40	25	17	15	80	7270	765	342	33	16	7.0
28	40	39	25	17	15	79	6610	717	289	31	15	6.3
29	42	39	25	17	---	78	5810	664	249	25	15	6.3
30	43	39	24	17	---	75	4970	637	218	32	16	5.8
31	41	---	24	17	---	74	---	735	---	34	39	---
TOTAL	1761	1214	930	615	428	949	65637	47931	12450	3580	527.7	1262.4
MEAN	56.8	40.5	30.0	19.8	15.3	30.6	2188	1546	415	115	17.0	42.1
MAX	86	45	38	24	16	80	7430	4190	771	301	39	134
MIN	40	35	24	17	15	15	59	637	176	25	6.0	5.8
CFSM	.11	.08	.06	.04	.03	.06	4.03	2.85	.76	.21	.03	.08
IN.	.12	.08	.06	.04	.03	.07	4.50	3.28	.85	.25	.04	.09

CAL YR 1978 TOTAL 106062.0 MEAN 291 MAX 4470 MIN 11 CFSM .54 IN 7.27
WTR YR 1979 TOTAL 137285.1 MEAN 376 MAX 7430 MIN 5.8 CFSM .69 IN 9.41

05139500 WARROAD RIVER NEAR WARROAD, MN

LOCATION.--Lat 48°51'57", long 95°21'07", in SW 1/4 NW 1/4 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 current year. 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 poor.

AVERAGE DISCHARGE.--33 years, 44.3 ft^3/s (1.255 m^3/s), 3.71 in/yr (94 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, 2,070 ft^3/s (58.6 m^3/s) Apr. 25, gage height, 9.66 ft (2.944 m); minimum daily, 0.22 ft^3/s (0.006 m^3/s) Sept. 22.

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	16	8.0	5.3	4.9	3.6	3.0	16	602	108	12	2.4	.76
2	16	7.3	5.3	4.9	3.6	3.0	15	528	105	11	2.4	.94
3	15	6.9	5.3	4.9	3.5	3.0	14	464	94	11	2.0	1.2
4	14	7.3	5.3	4.9	3.5	3.0	13	402	90	11	1.8	1.1
5	13	7.4	5.3	4.9	3.4	3.0	12	327	89	9.9	1.8	.94
6	14	8.6	5.3	4.9	3.4	3.0	11	282	84	9.3	1.8	.88
7	13	7.8	5.3	4.9	3.3	3.0	11	236	74	8.6	1.5	.70
8	12	8.0	5.2	4.9	3.3	3.0	10	212	68	7.1	.82	.70
9	12	7.6	5.2	4.9	3.2	3.0	10	205	59	5.7	.70	.70
10	11	7.5	5.2	4.9	3.2	3.0	9.6	173	50	4.8	.64	.70
11	9.7	7.3	5.2	4.9	3.2	3.0	9.4	160	49	7.4	.52	.64
12	11	7.2	5.2	4.9	3.1	3.0	9.3	158	43	7.4	.64	.64
13	9.9	7.0	5.2	4.9	3.1	3.0	9.3	160	39	7.1	.40	.58
14	9.5	6.9	5.2	4.8	3.1	3.0	9.8	148	41	7.4	.58	.52
15	11	6.8	5.2	4.8	3.1	3.1	12	132	37	6.0	.70	.64
16	12	6.7	5.1	4.8	3.1	3.2	21	115	34	4.8	.64	.46
17	11	6.6	5.1	4.7	3.0	3.3	46	103	28	3.8	.52	.46
18	11	6.4	5.1	4.7	3.0	3.4	380	95	24	3.3	.64	.38
19	9.9	6.0	5.0	4.6	3.0	3.5	1300	86	20	3.0	.58	.36
20	9.7	5.9	5.0	4.5	3.0	3.7	1860	76	22	2.8	.52	.28
21	9.5	5.8	4.9	4.4	3.0	3.9	1420	68	26	2.6	.40	.28
22	9.1	5.7	4.9	4.4	3.0	4.1	1040	72	35	3.5	.76	.22
23	8.8	5.6	4.9	4.3	3.0	4.5	915	83	32	3.1	.76	.26
24	9.1	5.6	4.9	4.2	3.0	4.9	1280	84	27	3.2	.94	.34
25	9.5	5.5	4.9	4.1	3.0	5.2	1940	78	22	3.7	1.7	.38
26	9.1	5.5	4.9	4.0	3.0	6.0	1510	68	20	5.7	1.1	.46
27	9.7	5.4	4.9	3.9	3.0	7.0	1040	67	20	4.2	.64	.58
28	8.2	5.4	4.9	3.9	3.0	8.8	885	63	17	3.1	.64	.58
29	8.0	5.3	4.9	3.8	---	11	770	61	16	3.0	.52	.64
30	8.2	5.3	4.9	3.8	---	15	671	73	14	3.1	.38	.64
31	8.2	---	4.9	3.7	---	18	---	90	---	2.7	.58	---
TOTAL	338.1	198.3	157.9	141.1	88.7	150.6	15249.4	5471	1387	181.3	30.02	17.96
MEAN	10.9	6.61	5.09	4.55	3.17	4.86	508	176	46.2	5.85	.97	.60
MAX	16	8.6	5.3	4.9	3.6	18	1940	602	108	12	2.4	1.2
MIN	8.0	5.3	4.9	3.7	3.0	3.0	9.3	61	14	2.6	.38	.22
CFSM	.07	.04	.03	.03	.02	.03	3.14	1.09	.29	.04	.006	.004
IN.	.08	.05	.04	.03	.02	.03	3.50	1.26	.32	.04	.01	.00

CAL YR 1978 TOTAL 21338.70 MEAN 58.5 MAX 968 MIN 1.9 CFSM .36 IN 4.90
WTR YR 1979 TOTAL 23411.38 MEAN 64.1 MAX 1940 MIN .22 CFSM .40 IN 5.38

05140520 LAKE OF THE WOODS AT WARROAD, MN

(International gaging station)

LOCATION.--Lat 48°54'15", long 95°18'57", revised, in SW 1/4 SE 1/4 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 ft (304.80 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 CURRENT YEAR.--Maximum elevation, 1,061.32 ft (323.490 m) June 29; maximum daily, 1,060.72 ft (323.307 m) July 1; minimum elevation, 1,057.61 ft (322.360 m) Apr. 11; minimum daily, 1057.71 ft (322.390 m) Apr. 15.

ELEVATION, IN FEET, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1060.45	1059.66	1059.30	1058.97	1058.48	1058.09	1057.80	1059.72	1060.29	1060.72	1060.10	1059.60
2	1060.46	1059.83	1059.31	1058.94	1058.45	1058.07	1057.79	1059.75	1060.28	1060.69	1060.12	1059.70
3	1060.40	1059.74	1059.30	1058.91	1058.44	1058.06	1057.78	1059.81	1060.37	1060.69	1060.27	1059.69
4	1060.42	1059.80	1059.26	1058.90	1058.40	1058.04	1057.79	1059.88	1060.47	1060.57	1060.26	1059.62
5	1060.45	1058.76	1059.24	1058.91	1058.45	1058.03	1057.74	1059.94	1060.43	1060.58	1060.26	1059.51
6	1060.47	1059.58	1059.24	1058.87	1058.40	1057.99	1057.76	1060.02	1060.33	1060.48	1060.14	1059.62
7	1060.46	1059.45	1059.24	1058.87	1058.38	1058.00	1057.80	1060.02	1060.38	1060.45	1060.07	1059.57
8	1060.26	1059.56	1059.22	1058.81	1058.36	1058.00	1057.76	1059.97	1060.41	1060.49	1060.18	1059.45
9	1060.30	1059.76	1059.20	1058.82	1058.33	1057.94	1057.75	1060.11	1060.41	1060.44	1060.13	1059.68
10	1060.36	1060.09	1059.21	1058.81	1058.36	1057.92	1057.76	1060.26	1060.41	1060.43	1060.12	1059.80
11	1060.15	1059.67	1059.19	1058.82	1058.31	1057.90	1057.76	1060.00	1060.42	1060.42	1059.96	1059.41
12	1060.12	1059.64	1059.16	1058.79	1058.30	1057.94	1057.78	1060.07	1060.41	1060.38	1059.78	1059.30
13	1060.30	1059.62	1059.15	1058.75	1058.31	1057.91	1057.77	1060.21	1060.31	1060.39	1059.89	1059.28
14	1060.18	1059.37	1059.16	1058.73	1058.30	1057.87	1057.72	1060.26	1060.37	1060.12	1060.00	1059.20
15	1060.41	1059.33	1059.12	1058.73	1058.25	1057.88	1057.71	1060.28	1060.35	1060.39	1059.90	1059.29
16	1060.16	1059.49	1059.10	1058.74	1058.25	1057.89	1057.72	1060.20	1060.47	1060.37	1059.73	1059.15
17	1060.15	1059.51	1059.12	1058.71	1058.27	1057.88	1057.76	1060.17	1060.40	1060.23	1059.82	1059.12
18	1060.02	1059.63	1059.13	1058.72	1058.24	1057.87	1058.09	1060.20	1060.37	1060.13	1059.87	1059.33
19	1060.07	1059.43	1059.15	1058.70	1058.21	1057.90	1058.80	1060.39	1060.46	1060.33	1059.88	1059.15
20	1060.09	1059.37	1059.10	1058.67	1058.17	1057.88	1058.17	1060.37	1060.50	1060.29	1059.90	1059.17
21	1060.00	1059.36	1059.11	1058.64	1058.17	1057.87	1058.21	1060.36	1060.42	1060.26	1059.83	1059.14
22	1060.12	1059.36	1059.08	1058.64	1058.18	1057.86	1058.28	1060.40	1060.60	1060.45	1059.80	1059.21
23	1059.84	1059.36	1059.08	1058.62	1058.16	1057.84	1058.43	1060.37	1060.50	1060.28	1059.89	1059.19
24	1059.97	1059.36	1059.08	1058.61	1058.16	1057.85	1058.74	1060.40	1060.41	1060.34	1059.81	1059.03
25	1060.01	1059.36	1059.07	1058.60	1058.16	1057.86	1059.03	1060.28	1060.34	1060.30	1059.79	1059.02
26	1059.89	1059.36	1059.03	1058.56	1058.13	1057.83	1059.19	1060.35	1060.46	1060.39	1059.65	1059.09
27	1059.97	1059.34	1059.03	1058.54	1058.10	1057.82	1059.31	1060.36	1060.55	1060.24	1059.67	1059.09
28	1059.98	1059.36	1059.08	1058.53	1058.10	1057.85	1059.45	1060.39	1060.61	1060.12	1059.64	1059.13
29	1059.88	1059.31	1059.03	1058.52	---	1057.86	1059.57	1060.38	1060.59	1060.18	1059.66	1058.78
30	1059.77	1059.32	1059.01	1058.49	---	1057.82	1059.62	1060.35	1060.67	1060.38	1059.76	1059.02
31	1059.65	---	1058.99	1058.48	---	1057.82	---	1060.41	---	1060.27	1059.78	---
MEAN	1060.15	1059.49	1059.14	1058.72	1058.28	1057.91	1058.23	1060.18	1060.43	1060.38	1059.92	1059.31
MAX	1060.47	1060.09	1059.31	1058.97	1058.48	1058.09	1059.62	1060.41	1060.67	1060.72	1060.27	1059.80
MIN	1059.65	1058.76	1058.99	1058.48	1058.10	1057.82	1057.71	1059.72	1060.28	1060.12	1059.64	1058.78

WTR YR 1979 MEAN 1059.36 MAX 1060.72 MIN 1057.71

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 crest-stage 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 1979

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements	
					Date	Discharge (ft^3/s)
		Streams tributary to Lake Superior				
*04012500	Poplar River at Lutsen, MN	Lat 47°38'23", long 90°42'31", in SW 1/4 NE 1/4 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	-	-	-
b04017000	Embarrass River at Embarrass, MN	Lat 47°39'24", long 92°11'51", in NW 1/4 sec.25, T.60 N., R.15 W., St. Louis County, Hydrologic Unit 04010201, at bridge on County Highway 362 in Embarrass.	93.8	1942-65‡, 1971, 1974-79	10-27-78	29.5
*04024095	Nemadji River near Holyoke, MN	Lat 46°31'04", long 92°23'22", in NE 1/4 NE 1/4 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	-	-	-
		Red River of the North basin				
b05040000	Pelican River near Detroit Lakes, MN	Lat 46°43'26", long 95°54'56", in NE 1/4 SW 1/4 sec.31, T.138 N., R.41 W., Becker County, at highway crossing at Buck's Mill, 200 ft downstream from concrete mill pond dam on Buck Lake, and 6.5 miles southwest of city of Detroit Lakes.	123	1942-53‡, 1968-71, 1976-77, 1979	12-19-78 1-24-79 2-26-79 9-25-79	5.51 18.4 21.2 11.2
b05062900	Wild Rice River above Ada, MN	Lat 47°17'29", long 96°26'09", on line between sec.13, T.144 N., R. 46 W., and sec.18, T.144 N., R.45 W., Norman County, Hydrologic Unit 09020108, at bridge on County Highway 24, 3.2 miles southeast of Ada.	-	-	-	-
b05063400	South Branch Wild Rice River near Felton, MN	Lat 47°07'23", long 96°24'25", on line between secs.8 and 9, T.142 N., R.45 W., Clay County, Hydrologic Unit 09020108, at bridge on County Highway 40, 5.5 miles northeast of Felton.	a180	-	-	-

"See footnotes at end of the table."

Discharge measurements made at low-flow partial-record stations during water year 1979--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				
*05063500	South Branch Wild Rice River near Borup, MN	Lat 47°11'40", long 96°34'40", in NW 1/4 NW 1/4 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	-	-	-
b05063800	State Ditch No. 45 near Felton, MN	Lat 47°02'00", long 96°29'58", on line between secs.15 and 16, T.141 N., R.46 W., Clay County, Hydrologic Unit 09020108, at culvert on State Highway 9, 3 miles south of Felton.	29.4	-	-	-
*05075700	Mud River near Grygla, MN	Lat 48°19'31", long 95°44'35", in SE 1/4 SE 1/4, 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	1937, 1957, 1966, 1970-73, 1975, 1979	6-25-79 8- 8-79 9-20-79	0.24 0.62 0.51
b05085500	Snake River at Warren, MN	Lat 48°11'50", long 96°46'45", in SE 1/4 sec.36, T.155N., R.48 W., Marshall County, Hydrologic Unit 09020309, at bridge on Minnesota Street in Warren.	a175	-	-	-
b05086000	Snake River at Alvarado, MN	Lat 48°11'50", long 97°00'20", in SW 1/4 SE 1/4 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	-	-	-
b05095000	Two Rivers at Hallock, MN	Lat 48°46'30", long 96°55'52", in SE 1/4 SE 1/4 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.	625	-	-	-
05102900	Roseau River near Skime, MN	Lat 48°38'30", long 95°35'47", in SE 1/4 SW 1/4 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, 1976, 1979	8- 2-79 9-13-79	4.6 0.84
b05105000	Roseau River at Roseau, MN	Lat 48°51'53", long 95°45'37", in SW 1/4 sec.13, T.162 N., R .40 W., Roseau County, Hydrologic Unit 09020314, at bridge on State Highway 11 at Roseau.	-	-	-	-
05105200	Hay Creek near Salol, MN	Lat 48°51'39", long 95°35'39", in SE 1/4 SE 1/4 sec.7, T.162 N., R.38 W., Roseau County, Hydrologic Unit 09020314, at 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	8- 2-79 9-13-79	0.51 0.08
b05105300	Roseau River below Roseau, MN	Lat 48°53'28",long 95°43'50", in SW 1/4 SE 1/4 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.	-	1973-79	10-10-78 11-27-78 1-10-79 2-14-79 3-26-79 7-31-79 9-10-79	44 18 9.8 8.2 34 22 4.9

"See footnotes at end of the table."

Discharge measurements made at low-flow partial-record stations during water year 1979--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				
b05125500	Stony River near Isabella, MN	Lat 47°41'10", long 91°38'20", in NW 1/4 NW 1/4 sec.17, T.60 N., R.10 W., Lake County, Hydrologic Unit 09030001, at bridge on State Highway 1 at Slate Lake outlet, 11 miles upstream from Birch Lake, and 12.8 miles northwest of Isabella.	180	1953-65‡, 1967-68, 1972-73, 1975-79	10-24-78	57
*05129650	Little Fork River at Cook, MN	Lat 47°51'15", long 92°41'55", in SE 1/4 NE 1/4 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	-	-	-
*05131750	Big Fork River near Bigfork, MN	Lat 47°44'56", long 93°46'31", in SW 1/4 NE 1/4 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	-	-	-
*05140000	Bulldog Run near Warroad, MN	Lat 48°51'30", long 95°20'18", in SW 1/4 SE 1/4 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‡, 1978-79	8- 2-79 9-13-79	0 0
*05140500	East Branch Warroad River Near Warroad, MN	Lat 48°51'29", long 95°18'40", in NE 1/4 NE 1/4 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‡, 1978-79	8- 2-79 9-13-79	2.0 0

* Also a crest-stage partial-record station.
‡ Operated as a continuous-record gaging station.
a Approximately.
b Also published under measurements made at miscellaneous sites.

Crest-stage partial-record stations

The following table contains annual maximum discharge for crest-stage stations. A crest-stage gage is 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 crest-stage partial-record stations during water year 1979

Station No.	Station name	Location	Drainage area (mi^2)	Period of Record	Annual maximum: Date	Annual maximum: Gage height (feet)	Annual maximum: Discharge (ft^3/s)
		Streams tributary to Lake Superior					
04011370	Little Devil Track River near Grand Marais, MN	Lat 47°47'09", long 90°19'44", in NE 1/4 NW 1/4 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	1961-79	5-10-79	17.05	162
04011390	Little Devil Track River tributary near Grand Marais, MN	Lat 47°47'17", long 90°19'20", in SE 1/4 SE 1/4 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	1966-79	5-10-79	16.37	37
*04012500	Poplar River at Lutsen, MN	Lat 47°38'23", long 90°42'31", in SW 1/4 NE 1/4 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‡, 1972-79	5-10-79	5.95	1,160
04013100	Lake Superior tributary near Taconite Harbor, MN	Lat 47°29'14", long 90°59'19", in SW 1/4 SE 1/4 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 of Taconite Harbor.	1.56	1964-79	4-21-79	8.65	74
04013200	Caribou River near Little Marais, MN	Lat 47°27'51", long 91°01'50", in NW 1/4 SE 1/4 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	1961-79	5-10-79	13.70	610
04015200	Encampment River tributary at Silver Creek, MN	Lat 47°07'01", long 91°36'04", in NE 1/4 SE 1/4 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	1960-79	5-10-79	10.14	112
04015250	Silver Creek tributary near Two Harbors, MN	Lat 47°04'40", long 91°36'49", in SW 1/4 NE 1/4 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	1965-79	5-10-79	10.30	(†)
04015300	Little Stewart River near Two Harbors, MN	Lat 47°03'52", long 91°40'03", in SE 1/4 NE 1/4 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	1960-79	5-10-79	14.34	500
04015360	Lake Superior tributary No. 2 at French River, MN	Lat 46°53'43", long 91°54'31", in SW 1/4 SE 1/4 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	1964-79	5- 9-79	30.23	550

"See footnotes at end of the table."

Annual maximum discharge at crest-stage partial-record stations during water year 1979--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of Record	Annual maximum Date	Gage height (feet)	Annual maximum Discharge (ft^3/s)
		Streams tributary to Lake Superior--Continued					
04015370	Talmadge River at Duluth, MN	Lat 46°53'20", long 91°55'21", in SE 1/4 NE 1/4 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	1964-79	5- 9-79	21.76	1,180
04015400	Miller Creek at Duluth, MN	Lat 46°49'01", long 92°10'42", in SE 1/4 NE 1/4 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	1960-79	5- 9-79	19.95	525
04017700	McKinley Lake tributary at McKinley, MN	Lat 47°30'41", long 92°25'11", in SW 1/4 NE 1/4 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	1960-79	4-24-79	9.64	10
04020400	North Branch Whiteface River near Fairbanks, MN	Lat 47°22'20", long 91°56"28", at common corner of sections 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	4-23-79	13.67	660
04020700	Bug Creek at Shaw, MN	Lat 47°06'40", long 92°21'03", in SW 1/4 SE 1/4 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, 7.5 miles upstream from mouth.	24.0	1979	4-23-79	15.12	590
04021205	Floodwood River above Floodwood, MN	Lat 46°17'15", long 92°53'40", in NE 1/4 NW 1/4 sec.32, T.52 N., R.20 W., St. Louis County, Hydrologic Unit 04010201, at bridge on County Highway 835, 500 ft west of State Highway 73, and 2 miles north of Floodwood.	-	1972-79	4-23-79	22.87	2,300
*04024095	Nemadji River near Holyoke, MN	Lat 46°31'04", long 92°23'22", in NE 1/4 NE 1/4 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	1972-79	5-10-79	13.31	2,340
04024100	Rock Creek near Blackhoof, MN	Lat 46°32'10", long 92°22'12", in SW 1/4 SE 1/4 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, 1967-79	5- 9-79	16.72	420
04024110	Rock Creek tributary near Blackhoof, MN	Lat 46°32'14", long 92°22'05", in NE 1/4 SE 1/4 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	1961-79	5-10-79	9.81	14
04024200	South Fork Nemadji River near Holyoke, MN	Lat 46°29'38", long 92°24'36", in SE 1/4 SE 1/4 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	1961-79	5-10-79	13.85	990

"See footnotes at end of the table."

Annual maximum discharge at crest-stage partial-record stations during water year 1979--Continued

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					
05047700	West Branch Mustinka River tributary near Graceville, MN	Lat 45°36'53", long 96°19'47", in NE 1/4 NW 1/4 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	1964-79	6-20-79	7.65	40
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, Hydrologic 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, 1970-79	4-12-79	a12.10	1,460
05050700	Rabbit River near Nashua, MN	Lat 46°04'30", long 96°18'24", in SE 1/4 NE 1/4 sec.15, T.130 N., R.45 W., Wilkin County, Hydrologic Unit 09020101, at right donwstream 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	4-12-79	13.43	(†)
05060800	Buffalo River near Callaway, MN	Lat 47°01'17", long 95°54'43", in SW 1/4 SW 1/4 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	1960-79	4-18-79	a15.57	340
05061200	Whisky Creek at Barnesville, MN	Lat 46°39'35", long 96°23'54", in SE 1/4 SW 1/4 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‡, 1967-79	4-20-79	b5.11	161
05061400	Hay Creek above Downer, MN	Lat 46°44'37", long 96°25'12", in NW 1/4 NW 1/4 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	1961-79	6-30-79	b7.39	(†)
05062280	Mosquito Creek near Bagley, MN	Lat 47°27'02", long 95°22'55", in SW 1/4 NW 1/4 sec.21, T.146 N., R.37 W., Clearwater County, Hydrologic Unit 0902018, at culvert on State Highway 92, 5.0 miles south of Bagley.	3.98	1961-79	4-20-79	10.53	90
05062470	Marsh Creek tributary near Mahnomen, MN	Lat 47°19'31", long 96°04'41", in SE 1/4 SW 1/4 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	1961-79	4-19-79	14.00	460
05062700	Wild Rice River tributary near Twin Valley, MN	Lat 47°17'47", long 96°19'42", in SW 1/4 SE 1/4 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	1961-79	4-16-79	14.37	290
05062800	Coon Creek near Twin Valley, MN	Lat 47°15'51", long 96°20'34", in NE 1/4 NE 1/4 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	1962-79	4-16-79	12.70	1,650

"See footnotes at end of the table."

Annual maximum discharge at crest-stage partial-record stations during water year 1979--Continued

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					
05063200	Spring Creek tributary near Ogema, MN	Lat 47°07'22", long 95°57'35", in SE 1/4 SE 1/4 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	1963-79	4-18-79	7.70	85
*05063500	South Branch Wild Rice River near Borup, MN	Lat 47°11'40", long 96°34'40", in NW 1/4 NW 1/4 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‡, 1972-79	4-17-79	19.52	3,040
05073600	South Branch Battle River at Northome, MN	Lat 47°52'17", long 94°17'45", in NW 1/4 NE 1/4 sec.25, T.151 N., R.29 W., Koochiching County, Hydrologic Unit 09020302, at culvert on U.S. Highway 71, 0.7 mile west of Northome, and 3.1 miles upstream from Battle Lake.	2.80	1960-79	4-21-79	a16.50	60
05073750	Spring Creek near Blackduck, MN	Lat 47°46'23", long 94°31'22", in NW 1/4 NW 1/4 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	1960-79	4-20-79	14.02	92
05073800	Perry Creek tributary near Shooks, MN	Lat 47°52'00", long 94°32'52", in NW 1/4 SW 1/4 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	1960-79	4-20-79	a8.32	60
05075700	Mud River near Grygla, MN	Lat 48°19'31", long 95°44'35", at common corner of sections 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	4-26-79	18.49	1,480
05076600	Red Lake River tributary near Thief River Falls, MN	Lat 48°04'44", long 96°12'15", in SW 1/4 SE 1/4 sec.8, T.153 N., R.43 W., Pennington County, Hydrologic Unit 09020303, at culvert on County Highway 7, 0.5 mile upstream from mouth, and 3.1 miles south of Thief River Falls.	2.33	1962-79	4-24-79	9.77	195
05077700	Ruffy Brook near Gonvick, MN	Lat 47°44'50", long 95°24'45", in SE 1/4 SE 1/4 sec.5, T.149 N., R.37 W., Clearwater County, Hydrologic Unit 09020305, on downstream side of bridge on County Highway 17, 4 miles upstream from mouth, and 4.8 miles east of Gonvick.	45.2	1960-78‡, 1979	4-20-79	4.94	284
05078180	Silver Creek near Clearbrook, MN	Lat 47°38'43", long 95°26'33", in NW 1/4 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	1960-79	4-20-79	8.68	77
05078200	Silver Creek tributary at Clearbrook, MN	Lat 47°41'49", long 95°25'50", in SW 1/4 NW 1/4 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	1960-79	4-19-79	12.57	91

"See footnotes at end of the table."

Annual maximum discharge at crest-stage partial-record stations during water year 1979--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of Record	Annual maximum Date	Gage height (feet)	Annual maximum Discharge (ft^3/s)
		Red River of the North basin--Continued					
*05078400	Clearwater River tributary near Plummer, MN	Lat 47°52'34", long 96°08'35", in SE 1/4 SE 1/4 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	1961-79	4-18-79	a14.01	(†)
05086900	Middle River near Newfolden, MN	Lat 48°22'04", long 96°16'47", in NE 1/4 NE 1/4, 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	4-25-79	17.10	1,000
		Lake of the Woods basin					
05128300	Pike River near Gilbert, MN	Lat 47°29'34", long 92°29'15", in NE 1/4 SW 1/4 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	1966-79	4-23-79	8.03	36
05128700	Pike River tributary near Wahlsten, MN	Lat 47°43'04", long 92°17'12", in SW 1/4 SW 1/4 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 miles upstream from mouth.	1.93	1961-79	4-20-79	a8.28	95
05129650	Little Fork River at Cook, MN	Lat 47°51'15", long 92°41'55", in SE 1/4 NE 1/4 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	1968-79	4-21-79	18.24	992
05130300	Boriin Creek near Chisholm, MN	Lat 47°36'14", long 92°51'58", in SE 1/4 SE 1/4 sec.9, T.59 N., R.20 W., St. Louis County, Hydrologic Unit 09030005, at culvert on State Highway 73, 1.2 miles upstream from mouth, and 7.8 miles north of Chisholm.	13.7	1959-79	4-20-79	13.37	560
*05131750	Big Fork River near Bigfork, MN	Lat 47°44'56", long 93°46'31", in SW 1/4 NE 1/4 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	1973-79	4-22-79	15.48	2,830
05131878	Bowerman Brook near Craigville, MN	Lat 47°55'29", long 93°45'34", in NE 1/4 NW 1/4 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	4-21-79	14.73	650
*05140000	Bulldog Run near Warroad, MN	Lat 48°51'30", long 95°20'18", in SW 1/4 SE 1/4 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‡, 1978-79	4-18-79	7.54	498
*05140500	East Branch Warroad River near Warroad, MN	Lat 48°51'29", long 95°18'40", in NE 1/4 NE 1/4 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‡, 1978-79	4-25-79	9.38	1,120

* 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.

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 1979

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
Streams tributary to Lake Superior						
Embarrass River	St. Louis River	Lat 47°40'33", long 92°03'15", in SE 1/4 SE 1/4 sec.13, T.60 N., R.14 W., St. Louis County, Hydrologic Unit 04010201, at bridge on County Highway 620, 0.1 mile upstream from Spring Mine Creek, and 5.9 miles southwest of Babbitt, MN (04016900).	-	1971, 1976-78	10-27-78	*2.7
Red River of the North basin						
bPelican River	Otter Tail River	Lat 46°43'26", long 95°54'56", in NE 1/4 SW 1/4 sec.31, T.138 N., R.41 W., Becker County, Hydrologic Unit 09020103, at highway crossing at Buck's Mill, 200 ft downstream from concrete mill pond dam on Buck Lake, and 6.5 miles southwest of Detroit Lakes, (05040000).	123	1942-53‡, 1968-71, 1976-77,	3-22-79 4-11-79 4-23-79 5-14-79 6-20-79 7-23-79	30 55.5 113 *162 84.8 82.8
Wild Rice River	Red River of the North	Lat 47°17'29", long 96°26'09", on line between sec.13, T.144 N., R.46 W., and sec.18, T.144 N., R.45 W., Norman County, Hydrologic Unit 09020108, at bridge on County Highway 24, 3.2 miles southeast of Ada, MN (05062900).	-	1945-51, 1965-73, 1975-76, 1978	4-17-79	5,330
Wild Rice River	Red River of the North	Lat 47°13'16", long 96°37'39", in NE 1/4 NE 1/4 sec.9, T.143 N., R.47 W., Norman County, Hydrologic Unit 09020108, at bridge on County Highway 33, 6 miles west of Wheatville, and 6.7 miles northwest of Borup, MN.	-	1976, 1978	4-20-79	4,080
bSouth Branch Wild Rice River	Wild Rice River	Lat 47°07'23", long 96°24'25", on line between secs.8 and 9, T.142 N., R.45 W., Clay County, Hydrologic Unit 09020108, at bridge on County Highway 40, 5.5 miles northeast of Felton, MN (05063400).	a180	1959-73, 1975-76, 1978	4-17-79	1,940
bState ditch No. 45	Wild Rice River	Lat 47°02'00", long 96°29'58", on line between secs.15 and 16, T.141 N., R.46 W., Clay County, Hydrologic Unit 09020108, at culvert on State Highway 9, 3 miles south of Felton, MN (05063800).	29.4	1959-76, 1978	4-17-79	47
Wild Rice River	Red River of the North	Lat 47°11'58", long 96°43'55", in NE 1/4 SE 1/4 sec.15, T.143 N., R.48 W., Norman County, Hydrologic Unit 09020108, at bridge on County Highway 6, 3.5 miles northeast of Perley, and 11 miles west of Borup, MN.	-	1976, 1978	4-21-79	8,090
Marsh River Ditch	Marsh River	Lat 47°17'29", long 96°26'09", in NE 1/4 NE 1/4 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	4-17-79 4-19-79 4-21-79	1,040 1,280 376
bSnake River	Red River of the North	Lat 48°11'50", long 96°46'45", in SE 1/4 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	4-18-79 4-20-79	2,160 1,980

"See footnotes at end of the table."

Discharge measurements made at miscellaneous sites during water year 1979--Continued

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Red River of the North basin--Continued				
bSnake River	Red River of the North	Lat 48°11'50", long 97°00'20", in SW 1/4 SE 1/4 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	4-18-79 4-20-79 4-26-79	540 3,410 1,110
Tamarac River	Red River of the North	Lat 48°27'23", long 96°53'25", in NE 1/4 NE 1/4 sec.6, T.157 N., R.48 W., Marshall County, Hydrologic Unit 09020211, at bridge on County Highway 5, 1.3 miles northwest of Stephen, MN.	-		4-26-79	2,170
bTwo Rivers	Red River of the North	Lat 48°46'30", long 96°55'52", in SE 1/4 SE 1/4 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 0.2 mile downstream from South Branch Two Rivers (05095000).	625	1911-14‡, 1929-30‡, 1941-43‡, 1967-71‡, 1974, 1976, 1978	4-19-79 4-21-79 4-24-79	2,220 2,950 3,230
bRoseau River	Red River of the North	Lat 48°51'53", long 95°45'37", in SW 1/4 sec.13, T.163 N., R.40 W., Roseau County, Hydrologic Unit 09020314, at bridge on State Highway 11 at Roseau, MN (05105000).	-	1911-14, 1943, 1967-71, 1974-75, 1978	4-20-79	5,000
bRoseau River	Red River of the North	Lat 48°53'28", long 95°43'50", in SW 1/4 SE 1/4 sec.31, T.163 N., R.39 W., Roseau County, Hydrologic Unit 9020314, at bridge on County Highway 28, 900 ft downstream from Hay Creek, and 3.2 miles northeast of Roseau, MN (05105300).	-	1973-78	10-10-78 11-27-78 1-10-79 2-14-79 3-26-79 5- 7-79 6-18-79 7-31-79 9-10-79	*44 *18 *9.8 *8.2 34 727 82 *22 *4.9
		Lake of the Woods basin				
bStony River	South Kawishiwi River	Lat 47°41'10", long 91°38'20", in NW 1/4 NW 1/4 sec.17, T.60 N., R.10 W., Lake County, Hydrologic Unit 09030001, at bridge on State Highway 1, 11 miles upstream from Birch Lake, and 12.8 miles northwest of Isabella, MN (05125500).	180	1953-65‡, 1967-68, 1972-73, 1975-78,	10-24-78	*57
Vermilion River	Namakan River	Lat 48°07'24", long 92°31'22", in SE 1/4 SE 1/4 sec.9 T.65 N., R.17 W., St. Louis County, Hydrologic Unit 09030002, at bridge on County Highway 23 at Buyck, 20 miles northeast of Cook, MN.	-	1977	4-26-79	2,170

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

Water-quality partial-record stations are particular sites where chemical-quality, biological and(or) sediment data are collected systematically over a period of years for use in hydrologic analyses.

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	MERCURY RECOV. FM BOTTOM MATERIAL (UG/G AS HG) (71921)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	NICKEL, RECOV. FM BOTTOM MATERIAL (UG/G AS NI) (01068)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	ZINC, RECOV. FM BOTTOM MATERIAL (UG/G AS ZN) (01093)
AUG 13...	.00	4	1	20	0	0	10	7	40

DATE	IRON, RECOV. FM BOTTOM MATERIAL (UG/G AS FE) (01170)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LEAD, RECOV. FM BOTTOM MATERIAL (UG/G AS PB) (01052)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MANGANESE, RECOV. FM BOTTOM MATERIAL (UG/G) (01053)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	MERCURY DISSOLVED (UG/L AS HG) (71890)
AUG 13...	11000	3	0	20	40	4	350	<.5	<.5

DATE	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	CHROMIUM, RECOV. FM BOTTOM MATERIAL (UG/G) (01029)	COBALT, RECOV. FM BOTTOM MATERIAL (UG/G AS CO) (01038)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	COPPER, RECOV. FM BOTTOM MATERIAL (UG/G AS CU) (01043)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	IRON, DISSOLVED (UG/L AS FE) (01046)
AUG 13...	10	10	20	20	5	0	10	210	50

DATE	TIME	SAMPLING DEPTH (FT) (00003)	SULFIDE TOTAL (MG/L AS S) (00745)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	ARSENIC TOTAL IN BOTTOM MATERIAL (UG/G AS AS) (01003)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CADMIUM RECOV. FM BOTTOM MATERIAL (UG/G AS CD) (01028)
AUG 13...	1545	3.0	.0	2.3	4	2	1	0	0	<10

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
NOV 06...	1530	6.0	16	235	7.7	6.5	4.0	.51	12.3
MAY 30...	1415	6.0	9.5	166	7.7	--	16.4	1.40	7.9
AUG 13...	1545	3.0	7.0	181	8.8	13.0	20.0	.90	8.7

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV 06...	97	136	4.3	.00	.00	1.9	--	.77	52000
MAY 30...	84	99	3.2	.00	.00	11	--	.57	9500
AUG 13...	99	110	.3	.01	.01	4.7	72	.80	8000

482451092471001 ASH RIVER AT ENTRANCE TO SULLIVAN BAY NR RAY, MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	NOV 6,78	MAY 30,79	AUG 13,79
TIME	1530	1415	1545
TOTAL CELLS/ML	7400	800	72000
DIVERSITY: DIVISION	0.9	1.9	0.2
.CLASS	1.4	1.9	0.2
..ORDER	2.0	2.4	0.5
...FAMILY	2.3	2.5	0.8
....GENUS	2.7	2.7	1.7

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHARACIACEAE						
....SCHROEDERIA	--	-	--	-	*	0
...OOCYSTACEAE						
....ANKISTRODESMUS	380	5	51	6	--	-
....DICTYOSPHAERIUM	--	-	39	5	920	1
....ECHINOSPHAERELLA	--	-	--	-	*	0
....TETRAEDRON	42	1	--	-	--	-
....TREUBARIA	--	-	--	-	*	0
...SCENEDESMACEAE						
....SCENEDESMUS	--	-	--	-	*	0
..VOLVOCALES						
...VOLVOCACEAE						
....PANDORINA	--	-	210#	26	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	800	11	13	2	--	-
....MELOSIRA	2900#	39	100	13	--	-
..PENNALES						
...ACHNANTHACEAE						
....COCCONEIS	630	9	--	-	--	-
...DIATOMACEAE						
....DIATOMA	42	1	--	-	--	-
...EUNOTIACEAE						
....EUNOTIA	42	1	--	-	--	-
...FRAGILARIACEAE						
....ASTERIONELLA	340	5	--	-	--	-
....SYNEDRA	--	-	13	2	--	-
...GOMPHONEMATACEAE						
....GOMPHONEMA	250	3	--	-	--	-
...NAVICULACEAE						
....NAVICULA	84	1	--	-	--	-
...NITZSCHIACEAE						
....NITZSCHIA	--	-	39	5	--	-
.CHRYSOPHYCEAE						
..CHRYSOMONADALES						
...OCHROMONADACEAE						
....DINOBRYON	970	13	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	13	2	*	0
...CRYPTOMONADACEAE						
....CRYPTOMONAS	--	-	13	2	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	--	-	280#	35	2700	4
....COCCOCHLORIS	--	-	--	-	1800	3
..HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	27000#	37
....APHANIZOMENON	--	-	--	-	36000#	49
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	--	-	3500	5
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....EUGLENA	--	-	13	2	--	-
....TRACHELOMONAS	970	13	13	2	*	0

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 NR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	NITRO-GEN, TOTAL (MG/L AS N) (00600)	NITRO-GEN, TOT IN BOT-TOM MA-TERIAL (MG/KG AS N) (00603)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INOR-GANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV									
06...	.77	--	.04	.00	530	10	--	--	--
MAY									
30...	.57	9510	.02	.00	450	10	--	31	.6
AUG									
13...	.81	8000	.05	.01	450	4	14	21	6.7

04015455 - SOUTH BRANCH PARTRIDGE RIVER NEAR BABBITT, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPER-ATURE (DEG C) (00010)	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	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)
APR						
23...	1015	1.5	280	5	3.8	65

04015475 - PARTRIDGE RIVER ABV COLBY LAKE AT HOYT LAKES, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPER-ATURE (DEG C) (00010)	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	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)
APR						
24...	1215	1.5	1770	4	19	97

04016000 - PARTRIDGE RIVER NEAR AURORA, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPER-ATURE (DEG C) (00010)	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	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)
APR						
24...	1450	2.0	2070	4	22	78

04016500 - ST. LOUIS RIVER NEAR AURORA, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPER-ATURE (DEG C) (00010)	STREAM-FLOW, INSTAN-TANEOUS (CFS) (00061)	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)
APR						
24...	1725	1.5	3120	6	50	74

04018750 - ST. LOUIS RIVER AT FORBES, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR 22...	1550	3.0	5170	318	4440	68

04024093 - SKUNK CREEK BELOW ELIM CREEK NEAR HOLYOKE, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARDNESS (MG/L AS CACO3) (00900)
OCT 11...	1530	1.0	235	8.0	15.0	11.0	7	10.0	93	K8	62	130

04024093 - SKUNK CREEK BELOW ELIM CREEK NEAR HOLYOKE, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	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 PERCENT (00932)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	CARBONATE (MG/L AS CO3) (00445)	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)
OCT 11...	19	32	11	3.6	6	.1	2.0	0	110	13	3.4	.1

04024093 - SKUNK CREEK BELOW ELIM CREEK NEAR HOLYOKE, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	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 AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOTAL (MG/L AS NO3) (71887)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT 11...	15	167	144	.23	.45	.00	.70	.70	3.1	.03	12

05062900 - WILD RICE RIVER NR ADA MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR 17...	1910	1.0	5330	1280	18400	46

05063100 - WILD RICE RIVER ABOVE SO. BR. NR BORUP MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)
APR 20...	1930	8.0	4080	421	4640

05063400 - SOUTH BRANCH WILD RICE RIVER NEAR FELTON, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR 17...	1015	2.5	1940	1700	8900	28

05063500 - SOUTH BRANCH WILD RICE RIVER NEAR BORUP, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR 17...	1600	6.5	2350	535	3400	100

05063800 - STATE DITCH #45 NEAR FELTON, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR 17...	1245	6.5	47	37	4.7	82

05063900 - WILD RICE RIVER NR PERLEY MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR 21...	1550	8.0	8090	146	3190	99

05064000 - WILD RICE RIVER AT HENDRUM, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
20...	1145	8.0	8460	234	5350	99
MAY						
09...	1630	7.0	1300	147	516	98
30...	1045	16.0	595	121	194	--
JUL						
17...	1100	23.0	450	112	136	--

05067050 - MARSH DITCH NR ADA MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
19...	1150	6.0	1280	1520	5250	44

05067500 - MARSH RIVER NEAR SHELLY, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
21...	1200	8.0	3060	87	719	99

05069000 - SAND HILL RIVER AT CLIMAX, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
22...	1245	9.0	2690	153	1110	99

05075000 - RED LAKE RIVER AT HIGH LANDING NR GOODRICH, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
19...	1830	10.0	2130	21	121	76
25...	1530	6.0	3640	43	423	80

05076000 - THIEF RIVER NEAR THIEF RIVER FALLS, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
20...	1015	6.0	2920	73	576	87

05077700 - RUFFY BROOK NEAR GONVICK, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
18...	1615	1.0	238	72	46	80

05078000 - CLEARWATER RIVER AT PLUMMER, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
19...	1615	5.5	2760	41	306	64

05078230 - LOST RIVER AT OKLEE, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
18...	1845	5.5	1990	56	301	86
20...	1530	8.0	2140	36	208	69

05078500 - CLEARWATER RIVER AT RED LAKE FALLS, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
19...	1345	4.5	7430	361	7240	70
25...	1700	6.5	10100	307	8370	69

05085500 - SNAKE RIVER AT WARREN, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
20...	1045	5.5	1980	289	1540	91

05086000 - SNAKE RIVER AT ALVARADO, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
20...	1300	6.0	3410	211	1940	99

05087500 - MIDDLE RIVER AT ARGYLE, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
19...	0930	1.0	1640	347	1540	78

05094000 - SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
19...	1545	2.0	2500	93	628	63

05095000 - TWO RIVERS AT HALLOCK, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
19...	1300	2.0	2220	615	3690	78
21...	1220	5.0	2950	246	1960	74

05104500 - RUSEAU RIVER BELOW SOUTH FORK NEAR MALUNG, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
23...	1020	8.0	3330	31	279	61

05105300 - ROSEAU RIVER BELOW ROSEAU, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)
JUN					
18...	1500	21.0	82	9	2.0
JUL					
31...	1000	19.5	22	18	1.1
SEP					
10...	1515	15.0	4.9	24	.32

05106000 - SPRAGUE CREEK NEAR SPRAGUE, MANITOBA, CANADA

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
MAY						
01...	1045	6.5	424	23	26	84

05107500 - ROSEAU RIVER AT ROSS, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
22...	1550	7.0	2640	55	392	94
27...	1400	8.0	4250	24	275	89

05130500 - STURGEON RIVER NEAR CHISHOLM, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
21...	1815	2.5	2390	44	284	63

05134206 - RAPID RIVER NEAR BAUDETTE, MN

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	TEMPERATURE (DEG C) (00010)	STREAMFLOW, INSTANTANEOUS (CFS) (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)
APR						
22...	1115	4.5	4180	31	350	72
27...	1205	5.0	7270	16	314	58

483538093100001 - RAINY LK AT BLACK BAY NARROWS NR ISLAND VIEW, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
NOV									
08...	1500	6.0	8.0	85	7.1	8.5	6.0	1.20	11.0
MAY									
31...	1400	3.0	9.0	71	7.3	--	14.6	1.00	7.8
AUG									
15...	1530	3.0	8.0	97	8.9	21.0	19.0	.90	--

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV									
08...	92	41	5.2	.06	.06	3.1	--	.43	24000
MAY									
31...	79	37	3.0	.01	.01	3.2	--	.63	21000
AUG									
15...	--	55	.1	.01	.01	5.6	62	1.0	33000

DATE	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOT IN BOTTOM MATERIAL (MG/KG AS N) (00603)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INORGANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV								
08...	.49	--	.01	.01	550	0	--	--
MAY								
31...	.64	21000	.02	.00	500	0	72	.0
AUG								
15...	1.0	33000	.04	.01	590	0	--	--

483538093100001 RAINY LK AT BLACK BAY NARROWS NR ISLAND VIEW, MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	NOV 8,78	MAY 31,79	AUG 15,79
TIME	1500	1400	1530
TOTAL CELLS/ML	5000	2000	430000
DIVERSITY: DIVISION	1.0	1.2	0.2
.CLASS	1.0	1.3	0.2
..ORDER	1.4	1.9	0.3
...FAMILY	1.4	2.2	0.6
....GENUS	1.6	2.4	0.6

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...OOCYSTACEAE						
....GLOEOACTINIUM	--	-	--	-	*	0
...MICRACTINIACEAE						
....MICRACTINIUM	--	-	--	-	*	0
...OOCYSTACEAE						
....ANKISTRODESMUS	44	1	51	3	*	0
....CHODATELLA	--	-	--	-	*	0
....DICTYOSPHAERIUM	--	-	26	1	--	-
....SELENASTRUM	--	-	--	-	*	0
....TREUBARIA	--	-	13	1	*	0
...SCENEDESMACEAE						
....CRUCIGENIA	--	-	--	-	2600	1
....SCENEDESMUS	--	-	51	3	*	0
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	--	-	26	1	--	-
....CHLOROGONIUM	--	-	--	-	*	0
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	66	1	--	-	*	0
....MELOSIRA	2500#	49	900#	45	3800	1
....STEPHANODISCUS	110	2	--	-	*	0
..PENNALES						
...FRAGILARIACEAE						
....ASTERIONELLA	350	7	210	10	--	-
....FRAGILARIA	--	-	39	2	--	-
....SYNEDRA	--	-	26	1	*	0
...NAVICULACEAE						
....NAVICULA	*	0	13	1	--	-
...NITZSCHIACEAE						
....NITZSCHIA	--	-	100	5	*	0
.XANTHOPHYCEAE						
..HETEROCOCCALES						
...CHLOROTHECIACEAE						
....OPHIOCYTIUM	--	-	13	1	*	0
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	--	-	*	0
...CRYPTOMONADACEAE						
....CRYPTOMONAS	--	-	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	1900#	39	--	-	4500	1
..HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	21000	5
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	510#	26	390000#	91

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

483511093092801 - RAINY LAKE, AT BLACK BAY, NEAR ISLAND VIEW, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
NOV 08...	1530	4.0	8.0	57	6.8	8.0	4.5	.60	11.6
MAY 31...	1415	3.0	8.5	73	7.3	--	15.1	1.00	7.6
AUG 15...	1500	3.0	7.5	90	8.7	21.0	18.5	1.00	--

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV 08...	93	24	6.1	.03	.01	1.8	--	.67	29000
MAY 31...	.78	37	3.0	.01	.01	1.2	--	.69	37000
AUG 15...	--	49	.2	.02	.01	12	78	.57	31000

DATE	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOT IN BOTTOM MATERIAL (MG/KG AS N) (00603)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INORGANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV 08...	.70	--	.02	.02	450	0	--	--	--
MAY 31...	.70	37000	.02	.00	500	10	--	124	.1
AUG 15...	.59	31000	.03	.00	450	1	13	98	.2

DATE	TIME	SAMPLING DEPTH (FT) (00003)	SULFIDE TOTAL (MG/L AS S) (00745)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	ARSENIC TOTAL IN BOTTOM MATERIAL (UG/G AS AS) (01003)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CADMIUM RECOV. FM BOTTOM MATERIAL (UG/G AS CD) (01028)
AUG 15...	1500	3.0	.0	5.2	4	1	4	0	0	<10

DATE	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	CHROMIUM, RECOV. FM BOTTOM MATERIAL (UG/G) (01029)	COBALT, RECOV. FM BOTTOM MATERIAL (UG/G AS CO) (01038)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	COPPER, RECOV. FM BOTTOM MATERIAL (UG/G AS CU) (01043)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	IRON, DISSOLVED (UG/L AS FE) (01046)
AUG 15...	10	10	50	<10	3	0	30	160	40

483511093092801 - RAINY LAKE, AT BLACK BAY, NEAR ISLAND VIEW, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	MERCURY RECOV. FM BOT-TOM MA-TERIAL (UG/G AS HG) (71921)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	NICKEL, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS NI) (01068)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	ZINC, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS ZN) (01093)
AUG 15...	.00	3	1	<10	0	0	10	8	100

DATE	IRON, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS FE) (01170)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LEAD, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS PB) (01052)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MANGA-NESE, RECOV. FM BOT-TOM MA-TERIAL (UG/G) (01053)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)
AUG 15...	17000	2	0	<10	10	1	350	<.5	<.5

483511093092801 RAINY LAKE, AT BLACK BAY, NEAR ISLAND VIEW, MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	NOV 8,78	MAY 31,79	AUG 15,79
TIME	1530	1415	1500
TOTAL CELLS/ML	9400	3400	220000
DIVERSITY: DIVISION	0.3	1.3	0.2
.CLASS	0.3	1.3	0.2
..ORDER	0.4	1.6	0.2
...FAMILY	0.4	2.2	0.3
....GENUS	0.5	2.3	0.3

483511093092801 RAINY LAKE, AT BLACK BAY, NEAR ISLAND VIEW, MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHARACIACEAE						
....SCHROEDERIA	--	-	--	-	*	0
...COELASTRACEAE						
....COELASTRUM	--	-	--	-	*	0
...OOCYSTACEAE						
....ANKISTRODESMUS	*	0	26	1	*	0
....CHODATELLA	--	-	--	-	*	0
....SELENASTRUM	--	-	--	-	*	0
....TETRAEDRON	--	-	--	-	*	0
...SCENEDESMACEAE						
....CRUCIGENIA	--	-	52	2	--	-
....SCENEDESMUS	--	-	52	2	*	0
....TETRASTRUM	--	-	52	2	--	-
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	--	-	--	-	*	0
..ZYGNEMATALES						
...DESMIDIACEAE						
....COSMARIUM	*	0	--	-	--	-
....SPONDYLOSIUM	*	0	--	-	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	--	-	26	1	--	-
....MELOSIRA	8800#	94	930#	28	2500	1
....STEPHANODISCUS	*	0	--	-	*	0
..PENNALES						
...FRAGILARIACEAE						
....ASTERIONELLA	170	2	340	10	*	0
....FRAGILARIA	--	-	*	0	--	-
....SYNEDRA	--	-	--	-	*	0
...NAVICULACEAE						
....PINNULARIA	*	0	--	-	--	-
...NITZSCHIACEAE						
....NITZSCHIA	--	-	65	2	*	0
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOMONADACEAE						
....CRYPTOMONAS	--	-	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	--	-	--	-	*	0
..HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	520#	15	3700	2
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	1300#	38	210000#	96
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....GOMPHOSPHAERIA	290	3	--	-	--	-
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%

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

483622092560701 - RAINY LK AT BRULE NARROWS NR INTERNTNL FALLS, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMP-LING DEPTH (FT) (00003)	RESER-VOIR DEPTH (FEET) (72025)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	TEMPER-ATURE, AIR (DEG C) (00020)	TEMPER-ATURE (DEG C) (00010)	TRANS-PAR-ENCY (SECCHI DISK) (M) (00078)	OXYGEN, DIS-SOLVED (MG/L) (00300)
NOV 08...	1400	6.0	14	46	6.9	8.5	7.5	2.30	10.9
MAY 31...	1300	6.0	25	43	7.1	--	9.7	2.30	8.6
AUG 15...	1330	6.0	18	44	7.4	20.0	18.0	3.0	--

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	BICAR-BONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2) (00405)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITRO-GEN,NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN,NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV 08...	91	17	3.4	.08	.08	--	--	.45	--
MAY 31...	75	18	2.3	.06	.06	--	--	.39	--
AUG 15...	--	19	1.2	.07	.07	3.8	17	.10	6500

DATE	NITRO-GEN, TOTAL (MG/L AS N) (00600)	NITRO-GEN,TOT IN BOT-TOM MA-TERIAL (MG/KG AS N) (00603)	PHOS-PHORUS, TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INOR-GANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV 08...	.53	--	.01	.00	--	10	--	--	--
MAY 31...	.45	--	.01	.00	--	10	--	--	--
AUG 15...	.17	6500	.01	.01	290	1	9.1	20	.0

DATE	TIME	SAMP-LING DEPTH (FT) (00003)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	ARSENIC TOTAL IN BOT-TOM MA-TERIAL (UG/G AS AS) (01003)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CADMIUM RECOV. FM BOT-TOM MA-TERIAL (UG/G AS CD) (01028)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	CHRO-MIUM, RECOV. FM BOT-TOM MA-TERIAL (UG/G) (01029)
AUG 15...	1330	6.0	4.3	2	1	1	0	0	<10	10	10	10

DATE	COBALT, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS CO) (01038)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	COPPER, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS CU) (01043)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	IRON, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS FE) (01170)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LEAD, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS PB) (01052)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
AUG 15...	<10	3	1	10	90	40	6000	2	0	20	1	1

DATE	MANGA-NESE, RECOV. FM BOT-TOM MA-TERIAL (UG/G) (01053)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	MERCURY RECOV. FM BOT-TOM MA-TERIAL (UG/G AS HG) (71921)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	NICKEL, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS NI) (01068)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	ZINC, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS ZN) (01093)
AUG 15...	180	<.5	<.5	.00	3	0	<10	0	0	10	9	30

483622092560701 RAINY LK AT BRULE NARROWS NR INTERNTNL FALLS, MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	NOV 8,78	MAY 31,79	AUG 15,79
TIME	1400	1300	1330
TOTAL CELLS/ML	130	320	970
DIVERSITY: DIVISION	0.5	1.6	0.7
.CLASS	0.5	1.6	0.7
..ORDER	1.2	1.8	0.8
...FAMILY	1.4	2.4	0.8
....GENUS	1.9	2.6	1.7

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHARACIACEAE						
....SCHROEDERIA	--	-	--	-	13	1
...OOCYSTACEAE						
....ANKISTRODESMUS	--	-	51#	16	--	-
....OOCYSTIS	--	-	--	-	26	3
...SCENEDESMACEAE						
....SCENEDESMUS	--	-	51#	16	--	-
..TETRASPORALES						
...COCCOMYXACEAE						
....ELAKATOTHRIX	--	-	--	-	26	3
..ZYGNEMATALES						
...DESMIDIACEAE						
....SPONDYLOSIUM	14	11	--	-	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	--	-	13	4	52	5
....MELOSIRA	72#	56	--	-	--	-
....STEPHANODISCUS	14	11	--	-	--	-
..PENNALES						
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	120#	36	--	-
....SYNEDRA	--	-	13	4	13	1
...GOMPHONEMATACEAE						
....GOMPHONEMA	14	11	--	-	--	-
...NITZSCHIACEAE						
....NITZSCHIA	14	11	26	8	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM	--	-	--	-	310#	32
....ANACYSTIS	--	-	13	4	530#	55
PYRRHOPHYTA (FIRE ALGAE)						
.DINOPHYCEAE						
..PERIDINIALES						
...GLENODINIACEAE						
....GLENODINIUM	--	-	39	12	--	-

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

483015092380101 - RAINY LK IN KETTLE CHANNEL NR INTL FALLS MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
NOV 08...	0930	4.0	8.0	45	6.7	8.0	6.5	2.60	11.2
MAY 31...	1230	6.0	8.0	41	7.0	--	11.3	2.40	8.0
AUG 15...	1045	3.0	7.0	41	7.6	12.5	19.0	2.50	--

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN,NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN,NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV 08...	94	16	5.1	.07	--	1.1	--	.30	28000
MAY 31...	76	16	2.6	.08	.08	3.8	--	.41	7900
AUG 15...	--	17	.7	.04	.04	2.4	20	.23	5200

DATE	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN,TOT IN BOTTOM MATERIAL (MG/KG AS N) (00603)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INORGANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV 08...	.37	--	.00	--	410	0	--	--
MAY 31...	.49	7900	.00	.00	340	10	27	.2
AUG 15...	.27	5200	.01	.00	370	0	18	.0

483015092380101 RAINY LK IN KETTLE CHANNEL NR INTL FALLS MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	NOV 8,78		MAY 31,79		AUG 15,79	
TIME	0930		1230		1045	
TOTAL CELLS/ML	1300		270		1400	
DIVERSITY: DIVISION	1.0		1.4		1.1	
.CLASS	1.0		1.4		1.1	
..ORDER	1.0		1.6		2.0	
...FAMILY	1.0		1.9		2.2	
....GENUS	1.4		2.0		2.4	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHARACIACEAE						
....SCHROEDERIA	--	-	--	-	13	1
...OOCYSTACEAE						
....ANKISTRODESMUS	86	7	13	5	13	1
....DICTYOSPHAERIUM	290#	23	26	10	--	-
....OOCYSTIS	--	-	--	-	51	4
...SCENEDESMACEAE						
....CRUCIGENIA	--	-	--	-	51	4
....SCENEDESMUS	--	-	--	-	100	7
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	29	2	13	5	--	-
....MELOSIRA	--	-	--	-	51	4
....STEPHANODISCUS	--	-	--	-	26	2
..PENNALES						
...FRAGILARIACEAE						
....FRAGILARIA	--	-	13	5	26	2
...NITZSCHIACEAE						
....NITZSCHIA	--	-	13	5	--	-
...TABELLARIACEAE						
....TABELLARIA	--	-	39	14	64	5
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM	--	-	--	-	510#	36
....ANACYSTIS	830#	66	--	-	--	-
....CUCCOCHLORIS	29	2	--	-	--	-
..HORMOGONALES						
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	150#	57	510#	36

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

483003092380301 - RAINY LK BELOW KETTLE FALLS NR INTL FALLS MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
NOV									
08...	0900	6.0	14	44	6.7	8.0	7.5	2.60	10.6
MAY									
31...	1130	6.0	40	41	6.8	--	11.6	2.30	9.3
AUG									
15...	1130	6.0	36	42	7.4	19.0	19.5	3.0	--

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV									
08...	88	16	5.1	.08	.08	.7	--	.40	1900
MAY									
31...	86	16	4.1	.08	.08	2.9	--	.37	33000
AUG									
15...	--	17	1.1	.05	.05	1.7	35	.46	2200

DATE	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOT IN BOTTOM MATERIAL (MG/KG AS N) (00603)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INORGANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV								
08...	.48	--	.01	.01	410	0	--	--
MAY								
31...	.45	33000	.01	.00	510	10	211	.0
AUG								
15...	.51	2200	.01	.00	340	10	6.9	.0

483003092380301 RAINY LK BELOW KETTLE FALLS NR INTL FALLS MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	NOV 8,78	MAY 31,79	AUG 15,79
TIME	0900	1130	1130
TOTAL CELLS/ML	720	140	4000
DIVERSITY: DIVISION	0.5	0.8	0.9
.CLASS	0.5	0.8	0.9
..ORDER	0.6	0.8	1.0
...FAMILY	0.6	1.9	1.1
....GENUS	0.0	1.9	1.8

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...OOCYSTACEAE						
....ANKISTRODESMUS	22	3	26#	18	--	-
...SCENEDESMACEAE						
....SCENEDESMUS	--	-	77#	55	130	3
..VOLVOCALES						
...CHLAMYDOMONADACEAE	66	9	--	-	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	44	6	--	-	39	1
....MELOSIRA	590#	82	--	-	--	-
..PENNALES						
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	--	-	190	5
....SYNEDRA	--	-	13	9	--	-
...NAVICULACEAE						
....NAVICULA	--	-	13	9	--	-
...NITZSCHIACEAE						
....NITZSCHIA	--	-	13	9	--	-
...TABELLARIACEAE						
....TABELLARIA	--	-	--	-	240	6
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	--	-	100	3
...CRYPTOMONADACEAE						
....CRYPTOMONAS	--	-	--	-	39	1
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM	--	-	--	-	820#	21
....ANACYSTIS	--	-	--	-	2400#	61

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

482545092495401 - KABETOGAMA LK AT SULLIVAN BAY OUTLET NR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
NOV									
06...	1630	6.0	15	180	7.8	6.5	4.5	1.20	12.0
MAY									
30...	1430	6.0	26	146	7.8	--	17.5	1.90	8.7
AUG									
13...	1700	6.0	24	153	9.4	13.0	20.5	.80	9.2

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV									
06...	96	112	2.8	.00	.00	--	--	.70	--
MAY									
30...	94	89	2.3	.00	.00	2.6	--	.70	23000
AUG									
13...	106	77	.1	.01	.01	7.5	104	1.3	21000

DATE	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOT IN BOTTOM MATERIAL (MG/KG AS N) (00603)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INORGANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV								
06...	.70	--	.02	.00	--	0	--	--
MAY								
30...	.70	23000	.01	.00	680	10	85	1.0
AUG								
13...	1.3	21000	.08	.01	580	10	59	1.3

482545092495401 KABETOGAMA LK AT SULLIVAN BAY OUTLET NR RAY, MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	NOV 6,78	MAY 30,79	AUG 13,79
TIME	1630	1430	1700
TOTAL CELLS/ML	8900	3100	180000
DIVERSITY: DIVISION	0.5	0.7	0.2
.CLASS	0.5	0.7	0.2
..ORDER	0.9	0.9	0.4
...FAMILY	1.1	1.6	1.1
....GENUS	1.3	1.6	1.8

482545092495401 KABETOGAMA LK AT SULLIVAN BAY OUTLET NR RAY, MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHARACIACEAE						
....SCHROEDERIA	*	0	--	-	*	0
...HYDRODICTYACEAE						
....PEDIASTRUM	--	-	--	-	1600	1
...OOCYSTACEAE						
....ANKISTRODESMUS	120	1	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	2500	1
....KIRCHNERIELLA	--	-	--	-	*	0
....SELENASTRUM	160	2	--	-	--	-
...SCENEDESMACEAE						
....SCENEDESMUS	320	4	--	-	*	0
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	--	-	--	-	*	0
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	360	4	--	-	--	-
....MELOSIRA	7000#	79	310	10	1400	1
..PENNALES						
...FRAGILARIACEAE						
....ASTERIONELLA	650	7	--	-	--	-
....SYNEDRA	--	-	*	0	--	-
...GOMPHONEMATACEAE						
....GOMPHONEMA	*	0	--	-	--	-
...NAVICULACEAE						
....NAVICULA	*	0	*	0	--	-
...NITZSCHIACEAE						
....NITZSCHIA	*	0	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	26	1	--	-
...CRYPTOMONADACEAE						
....CRYPTOMONAS	--	-	26	1	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	--	-	100	3	5100	3
..HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	640#	21	37000#	20
....APHANIZOMENON	--	-	--	-	100000#	56
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	1900#	63	31000#	17
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....EUGLENA	--	-	*	0	--	-
....TRACHELOMONAS	120	1	--	-	*	0

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

482603092511401 - KABETOGAMA LAKE, IN MEADWOOD BAY, NEAR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
NOV 07...	1400	6.0	12	95	7.3	7.0	7.0	2.80	10.8
MAY 30...	1155	6.0	12	74	7.2	--	8.7	2.40	10.2
AUG 14...	1100	3.0	12	76	7.9	11.0	20.0	1.60	8.0

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN,NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN,NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV 07...	92	49	3.9	.01	.01	.4	--	.43	2600
MAY 30...	90	39	3.9	.05	.05	9.1	--	.54	2700
AUG 14...	91	41	.8	.01	.01	2.9	31	.26	2700

DATE	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN,TOT IN BOTTOM MATERIAL (MG/KG AS N) (00603)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INORGANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV 07...	.44	--	.01	.00	480	10	--	--
MAY 30...	.59	2710	.01	.00	470	10	8.3	.0
AUG 14...	.27	2700	.02	.00	400	10	9.4	.0

482603092511401 KABETOGAMA LAKE, IN MEADWOOD BAY, NEAR RAY, MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	NOV 7,78	MAY 30,79	AUG 14,79
TIME	1400	1155	1100
TOTAL CELLS/ML	950	850	72000
DIVERSITY: DIVISION	0.1	1.2	0.1
.CLASS	0.1	1.2	0.1
..ORDER	0.6	1.5	1.0
...FAMILY	0.6	1.6	1.1
....GENUS	1.6	1.7	1.7

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHARACIACEAE						
....SCHROEDERIA	--	-	--	-	*	0
...COELASTRACEAE						
....COELASTRUM	--	-	--	-	*	0
...OOCYSTACEAE						
....ANKISTRODESMUS	--	-	26	3	--	-
....OOCYSTIS	--	-	--	-	*	0
....SELENASTRUM	--	-	13	2	--	-
...SCENEDESMACEAE						
....SCENEDESMUS	--	-	26	3	*	0
..TETRASPORALES						
...PALMELLACEAE						
....SPHAEROCYSTIS	--	-	--	-	*	0
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	--	-	13	2	*	0
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	43	5	--	-	--	-
....MELOSIRA	580#	61	120	14	--	-
....STEPHANODISCUS	200#	21	--	-	--	-
..PENNALES						
...FRAGILARIACEAE						
....ASTERIONELLA	120	12	26	3	--	-
...NITZSCHIACEAE						
....NITZSCHIA	--	-	52	6	--	-
.CHRYSOPHYCEAE						
..CHRYSOMONADALES						
...MALLOMONADACEAE						
....MALLOMONAS	--	-	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	--	-	--	-	40000#	55
..HORMOGUNALES						
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	2700	4
....APHANIZOMENON	--	-	--	-	20000#	28
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	580#	68	790	1
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....GOMPHOSPHAERIA	--	-	--	-	7700	11
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	14	2	--	-	--	-

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

482607092511701 - KABETOGAMA LK AT MOUTH OF MEADWOOD BAY NR RAY MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
NOV 07...	1430	6.0	40	97	7.3	7.0	7.0	2.40	10.4
MAY 30...	1225	6.0	38	73	7.3	--	10.0	2.10	9.4
AUG 14...	1030	6.0	39	80	7.7	13.0	20.0	1.70	7.6

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN,NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN,NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV 07...	89	51	4.1	.02	.02	.0	--	.39	24000
MAY 30...	86	39	3.1	.05	.05	3.2	--	.45	32000
AUG 14...	86	42	1.3	.03	.02	14	98	.30	40000

DATE	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOT IN BOTTOM MATERIAL (MG/KG AS N) (00603)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INORGANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV 07...	.41	--	.03	.03	53	0	--	--
MAY 30...	.50	32000	.01	.00	820	10	82	.1
AUG 14...	.33	40000	.03	.00	950	10	74	.1

482630093011701 - KABETOGAMA LAKE, AT GAPPAS LANDING, NEAR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
NOV									
07...	1530	6.0	14	90	7.7	7.0	6.5	2.40	10.8
MAY									
30...	1045	6.0	9.5	91	7.4	--	10.0	2.40	10.2
AUG									
14...	1330	3.0	10	88	8.2	18.0	19.0	1.60	7.9

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV									
07...	89	47	1.5	.02	.02	.3	--	.45	4200
MAY									
30...	94	49	3.1	.00	.00	2.1	--	.46	2700
AUG									
14...	89	49	.5	.02	.02	1.6	34	.43	2100

DATE	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOT IN BOTTOM MATERIAL (MG/KG AS N) (00603)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INORGANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV								
07...	.47	--	.01	.01	530	0	--	--
MAY								
30...	.46	2700	.01	.00	440	10	14	4.3
AUG								
14...	.45	2100	.03	.01	440	0	16	4.4

482607092511701 KABETOGAMA LK AT MOUTH OF MEADWOOD BAY NR RAY MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	NOV 7,78	MAY 30,79	AUG 14,79
TIME	1430	1225	1030
TOTAL CELLS/ML	1300	370	59000
DIVERSITY: DIVISION	1.0	0.8	0.0
.CLASS	1.0	0.8	0.0
..ORDER	1.0	0.8	0.3
...FAMILY	1.0	0.8	0.9
....GENUS	1.6	1.0	0.9

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	22	2	--	-	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	22	2	--	-	*	0
....MELOSIRA	690#	53	64#	17	--	-
....STEPHANODISCUS	160	12	26	7	--	-
..PENNALES						
...FRAGILARIACEAE						
....SYNEDRA	--	-	--	-	*	0
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	400#	31	280#	76	3400	6
..HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	7800	13
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	--	-	48000#	81
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	--	-	--	-	*	0

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

482630093011701 KABETOGAMA LAKE, AT GAPPAS LANDING, NEAR RAY, MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	NOV 7,78	MAY 30,79	AUG 14,79
TIME	1530	1045	1330
TOTAL CELLS/ML	1500	660	1200
DIVERSITY: DIVISION	1.2	0.6	0.9
.CLASS	1.2	0.6	0.9
..ORDER	1.2	0.7	0.9
...FAMILY	1.2	0.8	1.0
....GENUS	1.5	0.8	1.5

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHARACIACEAE						
....SCHROEDERIA	--	-	--	-	13	1
...OOCYSTACEAE						
....ANKISTRODESMUS	29	2	13	2	--	-
....OOCYSTIS	110	8	--	-	--	-
....SELENASTRUM	57	4	--	-	--	-
...SCENEDESMACEAE						
....SCENEDESMUS	--	-	26	4	--	-
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	--	-	13	2	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	29	2	13	2	--	-
....STEPHANODISCUS	240#	16	--	-	--	-
..PENNALES						
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	13	2	180#	15
...TABELLARIACEAE						
....TABELLARIA	--	-	--	-	26	2
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	--	-	39	3
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM	--	-	--	-	820#	69
....ANACYSTIS	1000#	69	--	-	120	10
..HORMOGONALES						
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	580#	88	--	-

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

482642093011901 - KABETOGAMA LAKE, NR GAPPAS LANDING, NEAR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
NOV 07...	1600	6.0	28	91	7.4	7.0	6.5	2.60	10.7
MAY 30...	1115	6.0	26	91	7.4	--	11.5	2.50	9.3
AUG 14...	1230	6.0	25	90	8.1	--	19.5	1.70	8.1

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV 07...	90	45	2.9	.00	.00	6.4	--	.49	25000
MAY 30...	88	49	3.1	.00	.00	5.0	--	.46	2300
AUG 14...	91	49	.6	.01	.01	5.0	13	.49	2100

DATE	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOT IN BOTTOM MATERIAL (MG/KG AS N) (00603)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INORGANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV 07...	.49	--	.01	.00	660	0	--	--	--
MAY 30...	.46	2310	.01	.00	380	0	--	7.3	.0
AUG 14...	.50	2110	.03	.00	130	1	8.1	6.9	.0

DATE	TIME	SAMPLING DEPTH (FT) (00003)	SULFIDE TOTAL (MG/L AS S) (00745)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	ARSENIC TOTAL IN BOTTOM MATERIAL (UG/G AS AS) (01003)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CADMIUM RECOV. FM BOTTOM MATERIAL (UG/G AS CD) (01028)
AUG 14...	1230	6.0	.0	3.6	4	1	0	0	0	<10

DATE	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	CHROMIUM, RECOV. FM BOTTOM MATERIAL (UG/G) (01029)	COBALT, RECOV. FM BOTTOM MATERIAL (UG/G AS CO) (01038)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	COPPER, RECOV. FM BOTTOM MATERIAL (UG/G AS CU) (01043)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	IRON, DISSOLVED (UG/L AS FE) (01046)
AUG 14...	10	10	<10	<10	3	1	<10	120	20

482642093011901 - KABETOGAMA LAKE, NR GAPPAS LANDING, NEAR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	IRON, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS FE) (01170)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LEAD, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS PB) (01052)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MANGA-NESE, RECOV. FM BOT-TOM MA-TERIAL (UG/G) (01053)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)
AUG 14...	2500	1	0	<10	50	1	240	<.5	<.5

DATE	MERCURY RECOV. FM BOT-TOM MA-TERIAL (UG/G AS HG) (71921)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	NICKEL, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS NI) (01068)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	ZINC, RECOV. FM BOT-TOM MA-TERIAL (UG/G AS ZN) (01093)
AUG 14...	.00	4	0	<10	0	0	10	6	<10

PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

	NOV 7,78		MAY 30,79		AUG 14,79	
DATE						
TIME	1600		1115		1230	
TOTAL CELLS/ML	490		90		51000	
DIVERSITY: DIVISION	1.2		1.4		0.1	
.CLASS	1.2		1.4		0.1	
..ORDER	1.2		2.2		0.9	
...FAMILY	1.4		2.2		0.9	
....GENUS	2.0		2.2		1.6	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHARACIACEAE						
....SCHROEDERIA	--	-	--	-	*	0
...OOCYSTACEAE						
....ANKISTRODESMUS	43	9	13	14	--	-
....CLOSTERIOPSIS	14	3	--	-	--	-
....OOCYSTIS	58	12	--	-	*	0
...SCENEDESMACEAE						
....SCENEDESMUS	29	6	--	-	--	-
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	--	-	13	14	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	29	6	26#	29	--	-
....MELOSIRA	--	-	--	-	290	1
....STEPHANODISCUS	290#	59	--	-	--	-
..PENNALES						
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	26#	29	--	-
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	29	6	13	14	12000#	24
..HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	13000#	27
....APHANIZOMENON	--	-	--	-	25000#	48

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 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
NOV									
07...	1230	6.0	--	44	6.6	7.0	8.0	2.50	9.9
MAY									
29...	1500	6.0	--	40	7.3	--	14.0	2.70	10.0
AUG									
14...	1730	6.0	91	41	7.0	20.0	20.5	2.90	8.3
14...	1800	84	91	42	6.9	20.0	9.0	2.90	7.3

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV									
07...	87	16	6.4	.07	.07	.6	--	.39	1200
MAY									
29...	100	16	1.3	.06	.06	--	--	.47	--
AUG									
14...	95	17	2.7	.05	.05	8.1	138	.50	24000
14...	66	18	3.6	.15	.15	--	--	.33	--

DATE	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOT IN BOTTOM MATERIAL (MG/KG AS N) (00603)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INORGANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV									
07...	.46	--	.00	.00	260	0	--	--	--
MAY									
29...	.53	--	.01	.00	--	10	--	--	--
AUG									
14...	.55	24000	.01	.00	2100	1	8.5	73	.6
14...	.48	--	.01	.01	--	6	10	--	--

482616092372201 - NAMAKAN LAKE NEAR RAY, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	SULFIDE TOTAL (MG/L AS S) (00745)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	ARSENIC TOTAL IN BOTTOM MATERIAL (UG/G AS AS) (01003)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CADMIUM RECOV. FM BOTTOM MATERIAL (UG/G AS CD) (01028)
AUG										
14...	1730	6.0	.0	6.9	3	1	15	0	0	<10
14...	1800	84	.0	5.8	3	1	--	0	0	--

DATE	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	CHROMIUM, RECOV. FM BOTTOM MATERIAL (UG/G) (01029)	COBALT, RECOV. FM BOTTOM MATERIAL (UG/G AS CO) (01038)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	COPPER, RECOV. FM BOTTOM MATERIAL (UG/G AS CU) (01043)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	IRON, DISSOLVED (UG/L AS FE) (01046)
AUG									
14...	10	10	40	50	3	0	30	100	40
14...	10	10	--	--	2	1	--	240	70

DATE	IRON, RECOV. FM BOTTOM MATERIAL (UG/G AS FE) (01170)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LEAD, RECOV. FM BOTTOM MATERIAL (UG/G AS PB) (01052)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MANGANESE, RECOV. FM BOTTOM MATERIAL (UG/G) (01053)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	MERCURY DISSOLVED (UG/L AS HG) (71890)
AUG									
14...	51000	2	0	50	10	1	7000	<.5	<.5
14...	--	3	0	--	20	6	--	<.5	<.5

DATE	MERCURY RECOV. FM BOTTOM MATERIAL (UG/G AS HG) (71921)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	NICKEL, RECOV. FM BOTTOM MATERIAL (UG/G AS NI) (01068)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	ZINC, RECOV. FM BOTTOM MATERIAL (UG/G AS ZN) (01093)
AUG									
14...	.00	5	1	50	0	0	10	7	120
14...	--	3	2	--	0	0	10	5	--

482616092372201 NAMAKAN LAKE NEAR RAY, MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	NOV 7,78	MAY 29,79	AUG 14,79
TIME	1230	1500	1730
TOTAL CELLS/ML	2100	680	94000
DIVERSITY: DIVISION	1.1	1.5	0.2
.CLASS	1.1	1.5	0.2
..ORDER	1.2	1.6	0.9
...FAMILY	1.4	1.8	1.3
....GENUS	1.5	1.8	1.3

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...OOCYSTACEAE						
....ANKISTRODESMUS	22	1	77	11	--	-
....CHODATELLA	--	-	13	2	--	-
....DICTYOSPHAERIUM	1100#	51	--	-	--	-
...SCENEDESMACEAE						
....CRUCIGENIA	89	4	--	-	--	-
....SCENEDESMUS	--	-	26	4	*	0
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	22	1	13	2	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....MELOSIRA	44	2	--	-	*	0
....STEPHANODISCUS	--	-	--	-	*	0
..PENNALES						
...FRAGILARIACEAE						
....ASTERIONELLA	--	-	100#	15	--	-
....FRAGILARIA	--	-	--	-	2400	3
...NAVICULACEAE						
....NAVICULA	--	-	--	-	*	0
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	--	-	*	0
...CRYPTOMONADACEAE						
....CRYPTOMONAS	--	-	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	840#	40	410#	60	16000#	18
..HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	7200	8
...OSCILLATORIACEAE						
....OSCILLATORIA	--	-	--	-	67000#	72
PYRRHOPHYTA (FIRE ALGAE)						
.DINOPHYCEAE						
..PERIDINIALES						
...PERIDINIACEAE						
....PERIDINIUM	--	-	39	6	--	-

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

482226092283301 - SANDPOINT LK BL HARRISON NARROWS NR CRANE LK, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
NOV									
07...	1130	6.0	31	52	6.7	7.0	7.0	2.00	8.8
MAY									
29...	1630	6.0	--	46	7.3	--	14.8	1.90	10.4
AUG									
16...	1030	6.0	22	53	7.7	19.5	19.0	2.50	8.4

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN,NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN,AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN,NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV									
07...	75	20	6.4	.14	.14	--	--	.45	--
MAY									
29...	106	18	1.4	.05	.03	--	--	.56	--
AUG									
16...	94	24	.8	.02	.02	2.1	10	.50	2800

DATE	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN,TOT IN BOTTOM MATERIAL (MG/KG AS N) (00603)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INORGANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV								
07...	.59	--	.02	.02	--	10	--	--
MAY								
29...	.61	--	.01	.00	--	10	--	--
AUG								
16...	.52	2800	.01	.00	190	10	5.1	.0

482226092283301 SANDPOINT LK BL HARRISON NARROWS NR CRANE LK, MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	NOV 7,78	MAY 29,79	AUG 16,79
TIME	1130	1630	1030
TOTAL CELLS/ML	730	360	2600
DIVERSITY: DIVISION	1.6	1.6	0.6
.CLASS	1.6	1.6	0.6
..ORDER	2.3	1.6	0.6
...FAMILY	2.6	2.2	0.6
....GENUS	2.6	2.2	1.4

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHARACIACEAE						
....SCHROEDERIA	--	-	--	-	*	0
...OOCYSTACEAE						
....ANKISTRODESMUS	86	12	39	11	--	-
....CHODATELLA	14	2	--	-	--	-
...SCENEDESMACEAE						
....CRUCIGENIA	--	-	--	-	26	1
....SCENEDESMUS	120#	16	77#	21	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	43	6	--	-	--	-
..PENNALES						
...FRAGILARIACEAE						
....ASTERIONELLA	120#	16	--	-	90	3
....FRAGILARIA	--	-	64#	18	--	-
...TABELLARIACEAE						
....TABELLARIA	--	-	51	14	--	-
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	--	-	--	-	100	4
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM	--	-	--	-	670#	25
....ANACYSTIS	170#	24	130#	36	1700#	66
..HORMOGONALES						
...OSCILLATORIACEAE						
....OSCILLATORIA	170#	24	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	14	2	--	-	--	-

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

482056092282001 - SANDPOINT LK AB HARRISON NARROWS NR CRANE LK, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	RESERVOIR DEPTH (FEET) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE, AIR (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TRANSPARENCY (SECCHI DISK) (M) (00078)	OXYGEN, DISSOLVED (MG/L) (00300)
NOV									
07...	1100	6.0	62	54	6.7	7.0	7.0	1.60	9.6
MAY									
29...	1645	6.0	--	52	7.4	--	16.7	1.80	9.3
AUG									
16...	1130	6.0	58	56	7.4	19.0	19.5	2.50	8.4
16...	1215	54	58	47	6.0	19.0	9.0	2.50	3.3

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE (MG/L AS HCO3) (00440)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2) (00405)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, NO2+NO3 TOT. IN BOT MAT (MG/KG AS N) (00633)	NITROGEN, NH4 TOTAL IN BOT. MAT. (MG/KG AS N) (00611)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, NH4 + ORG. TOT IN BOT MAT (MG/KG AS N) (00626)
NOV									
07...	82	18	5.7	.10	.07	2.4	--	.55	21000
MAY									
29...	98	19	1.2	.02	.02	1.2	--	.46	21000
AUG									
16...	94	26	1.7	.02	.02	7.3	156	.36	27000
16...	30	20	32	.22	.21	--	--	.30	--

DATE	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOT IN BOTTOM MATERIAL (MG/KG AS N) (00603)	PHOSPHORUS, TOTAL (MG/L AS P) (00665)	PHOSPHORUS, DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, TOTAL IN BOT. MAT. (MG/KG AS P) (00668)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, ORGANIC TOT. IN BOTTOM MAT. (G/KG AS C) (00687)	CARBON, INORGANIC, TOT IN BOT MAT (G/KG AS C) (00686)
NOV									
07...	.65	--	.02	.02	970	10	--	--	--
MAY									
29...	.48	21000	.01	.00	960	10	--	80	.0
AUG									
16...	.38	27000	.01	.00	570	2	19	82	.2
16...	.52	--	.03	.02	--	160	10	--	--

482056092282001 - SANDPOINT LK AB HARRISON NARROWS NR CRANE LK, MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	TIME	SAMPLING DEPTH (FT) (00003)	SULFIDE TOTAL (MG/L AS S) (00745)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	ARSENIC TOTAL IN BOTTOM MATERIAL (UG/G AS AS) (01003)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CADMIUM RECOV. FM BOTTOM MATERIAL (UG/G AS CD) (01028)
AUG										
16...	1130	6.0	.0	6.1	3	1	7	0	0	<10
16...	1215	54	.0	5.8	2	1	--	0	0	--

DATE	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	CHROMIUM, RECOV. FM BOTTOM MATERIAL (UG/G) (01029)	COBALT, RECOV. FM BOTTOM MATERIAL (UG/G AS CO) (01038)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	COPPER, RECOV. FM BOTTOM MATERIAL (UG/G AS CU) (01043)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	IRON, DISSOLVED (UG/L AS FE) (01046)
AUG									
16...	10	10	40	50	2	0	30	130	60
16...	10	10	--	--	4	1	--	510	290

DATE	IRON, RECOV. FM BOTTOM MATERIAL (UG/G AS FE) (01170)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LEAD, RECOV. FM BOTTOM MATERIAL (UG/G AS PB) (01052)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MANGANESE, RECOV. FM BOTTOM MATERIAL (UG/G) (01053)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	MERCURY DISSOLVED (UG/L AS HG) (71890)
AUG									
16...	27000	1	1	50	20	2	900	<.5	<.5
16...	--	3	0	--	160	160	--	<.5	<.5

DATE	MERCURY RECOV. FM BOTTOM MATERIAL (UG/G AS HG) (71921)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	NICKEL, RECOV. FM BOTTOM MATERIAL (UG/G AS NI) (01068)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	ZINC, RECOV. FM BOTTOM MATERIAL (UG/G AS ZN) (01093)
AUG									
16...	.00	2	0	<10	0	0	10	9	170
16...	--	2	0	--	0	0	10	7	--

482056092282001 SANDPOINT LK AB HARRISON NARROWS NR CRANE LK, MN
PHYTOPLANKTON ANALYSES, OCTOBER 1978 TO AUGUST 1979

DATE	NOV 7,78	MAY 29,79	AUG 16,79
TIME	1100	1645	1130
TOTAL CELLS/ML	2800	190	3300
DIVERSITY: DIVISION	1.6	1.3	0.7
.CLASS	1.6	1.3	0.7
..ORDER	1.8	1.5	1.4
...FAMILY	2.1	1.9	1.4
....GENUS	0.0	2.3	1.6

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHARACIACEAE						
....SCHROEDERIA	--	-	--	-	64	2
...OOCYSTACEAE						
....ANKISTRODESMUS	130	5	26	13	--	-
....CHODATELLA	14	1	--	-	--	-
....DICTYOSPHAERIUM	460#	16	--	-	--	-
....OOCYSTIS	14	1	--	-	--	-
....SELENASTRUM	--	-	77#	40	--	-
...SCENEDESMACEAE						
....SCENEDESMUS	390	14	--	-	26	1
....TETRASTRUM	57	2	--	-	--	-
..VOLVOCALES						
...CHLAMYDOMONADACEAE	29	1	--	-	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	43	2	13	7	*	0
....MELOSIRA	630#	22	--	-	330	10
....STEPHANODISCUS	14	1	--	-	--	-
..PENNALES						
...FRAGILARIACEAE						
....FRAGILARIA	--	-	39#	20	--	-
...NITZSCHIACEAE						
....NITZSCHIA	--	-	26	13	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....AGMENELLUM	--	-	--	-	100	3
....ANACYSTIS	990#	35	13	7	1900#	58
..HORMOGONALES						
...NOSTOCACEAE						
....ANABAENA	--	-	--	-	850#	26
...RIVULARIACEAE						
....RAPHIDIOPSIS	29	1	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	29	1	--	-	--	-

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 1978 TO SEPTEMBER 1979

04010500 PIGEON RIVER AT MIDDLE FALLS NEAR GRAND PORTAGE, MN

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
OCT. 04, 1978...	201	12.0	98
OCT. 17.....	203	4.0	---
NOV. 15.....	128	.5	103
NOV. 22.....	144	.5	---
DEC. 20.....	89	.0	---
FEB. 07, 1979...	89	.5	---
FEB. 07.....	89	.0	129
MAR. 20.....	206	.0	---
APR. 06.....	238	.5	---
MAY 02.....	2490	3.5	50
MAY 11.....	7580	2.0	---
JUNE 13.....	1420	18.5	60
JUNE 14.....	1260	21.0	---
JULY 25.....	196	22.5	80
AUG. 29.....	113	---	---
SEPT. 06.....	181	14.0	---

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
OCT. 03, 1978...	73	11.0	86
NOV. 14.....	104	.5	88
DEC. 19.....	32	.0	80
FEB. 06, 1979...	25	.0	114
MAR. 28.....	160	1.0	90
APR. 17.....	388	3.0	75
APR. 23.....	3060	2.0	---
MAY 01.....	998	3.0	<50
MAY 11.....	3110	3.0	<50
JUNE 12.....	359	19.0	<50
JULY 24.....	88	21.5	110
AUG. 28.....	14	17.0	75

04015330 KNIFE RIVER NEAR TWO HARBORS, MN

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
OCT. 05, 1978...	21	12.0	160
OCT. 19.....	32	5.0	145
NOV. 13.....	47	1.0	160
DEC. 21.....	12	.0	160
FEB. 08, 1979...	8.9	.0	256
MAR. 23.....	363	1.0	---
APR. 29.....	137	1.0	130
APR. 17.....	803	1.5	53
MAY 03.....	169	2.5	65
MAY 10.....	3200	35.0	60
JUNE 14.....	68	22.5	100
JULY 31.....	96	18.5	120
AUG. 30.....	20	18.0	75

04015447 SOUTH BRANCH PARTRIDGE RIVER NEAR BABBITT, MN

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
OCT. 24, 1978...	4.7	7.0	665
DEC. 07.....	1.0	.5	80
JAN. 16, 1979...	.0	---	---
MAR. 01.....	.0	---	---
APR. 03.....	1.0	.5	105
APR. 09.....	.5	---	---
APR. 12.....	2.0	.5	125
APR. 18.....	13	.5	<50
APR. 22.....	414	1.5	<50
APR. 23.....	280	1.5	<50
APR. 26.....	175	1.5	<50
APR. 30.....	80	4.5	<50
MAY 22.....	67	9.0	43
JUNE 27.....	36	16.5	55
AUG. 23.....	1.3	18.0	80

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
04015475 PARTRIDGE RIVER ABOVE COLBY LAKE NEAR HOYT LAKES, MN							
OCT. 24, 1978...	31	6.0	130	APR. 24.....	1770	1.5	<50
DEC. 04.....	25	.5	280	APR. 27.....	1040	1.5	<50
JAN. 22, 1979...	1.4	.5	240	APR. 30.....	594	4.5	50
MAR. 01.....	1.3	.02	212	MAY 22.....	382	10.5	58
APR. 12.....	16	.5	255	JUNE 27.....	189	19.0	75
APR. 18.....	96	.5	155	AUG. 23.....	8.4	19.5	---
APR. 23.....	1910	1.5	<50	SEPT. 26.....	26	13.0	130
04015500 SECOND CREEK NEAR AURORA, MN							
OCT. 23, 1978...	14	6.5	990	APR. 23.....	141	---	---
DEC. 04.....	6.2	.5	950	MAY 22.....	40	10.0	900
JAN. 19, 1979...	3.8	.5	750	JUNE 27.....	39	20.0	880
MAR. 01.....	4.1	.0	650	AUG. 21.....	24	22.0	910
APR. 12.....	22	.5	820	SEPT. 26.....	18	11.0	890
APR. 18.....	111	1.0	540				
04016000 PARTRIDGE RIVER NEAR AURORA, MN							
OCT. 23, 1978...	34	2.0	560	APR. 24.....	2070	2.0	<50
DEC. 11.....	28	.5	410	MAY 24.....	442	13.0	285
JAN. 19, 1979...	12	.5	530	JUNE 27.....	227	22.0	350
MAR. 02.....	13	.0	440	AUG. 21.....	30	21.0	780
APR. 12.....	37	1.5	630	SEPT. 26.....	48	13.0	520
04016500 ST. LOUIS RIVER NEAR AURORA, MN							
OCT. 23, 1978...	84	7.0	149	APR. 24.....	3120	1.5	50
DEC. 05.....	56	.5	180	MAY 24.....	1090	13.0	70
JAN. 22, 1979...	34	.5	190	JUNE 28.....	447	20.0	105
MAR. 02.....	32	---	142	AUG. 21.....	48	20.0	620
APR. 13.....	99	.5	460	SEPT. 27.....	128	14.0	260
04018750 ST. LOUIS RIVER AT FORBES, MN							
NOV. 08, 1978...	200	4.5	275	APR. 25.....	1860	4.0	---
DEC. 05.....	184	.5	260	MAY 02.....	3650	6.0	100
FEB. 08, 1979...	90	.5	280	JUNE 12.....	1080	17.0	100
MAR. 21.....	209	.0	200	JULY 31.....	302	22.0	260
APR. 22.....	5170	3.0	90	SEPT. 05.....	571	20.0	---
APR. 24.....	5720	3.5	90				
04018900 EAST TWO RIVER NEAR IRON JUNCTION, MN							
FEB. 21, 1979...	8.3	.0	100	APR. 24.....	214	6.5	210
APR. 19.....	567	2.5	155				

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
04019000 WEST TWO RIVER NEAR IRON JUNCTION, MN							
FEB. 22, 1979...	13	.0	150	APR. 24.....	630	6.0	160
APR. 20.....	973	1.0	50				
04019300 WEST SWAN RIVER NEAR SILICA, MN							
OCT. 03, 1978...	2.0	12.5	153	FEB. 18, 1979....	.31	.5	340
NOV. 14.....	2.2	1.0	240	MAR. 22.....	2.1	.5	---
DEC. 18.....	.63	.5	---	JUNE 14.....	2.6	17.0	<50
04024000 ST. LOUIS RIVER AT SCANLON, MN							
OCT. 02, 1978...	1900	15.0	180	APR. 22.....	33800	3.0	110
NOV. 14.....	1500	1.0	165	APR. 30.....	14500	6.0	93
DEC. 18.....	1450	.5	170	JUNE 11.....	6440	17.0	100
FEB. 05, 1979...	1070	.0	161	JULY 23.....	1130	25.0	146
APR. 21.....	30700	3.0	110	AUG. 27.....	991	22.0	165
04024098 DEER CREEK NEAR HOLYOKE, MN							
OCT. 10, 1978...	2.2	12.5	310	APR. 20.....	104	1.5	85
NOV. 29.....	2.0	.0	90	MAY 10.....	126	4.0	103
JAN. 05, 1979...	.97	.0	100	MAY 30.....	3.6	10.5	280
FEB. 16.....	1.1	.0	230	JULY 10.....	2.6	24.0	355
MAR. 22.....	11.5	.0	170	AUG. 14.....	1.8	16.0	275
APR. 17.....	100	2.0	118	SEPT. 20.....	1.6	13.0	265
APR. 17.....	281	2.0	---				
05040500 PELICAN RIVER NEAR FERGUS FALLS, MN							
OCT. 19, 1978...	10	6.0	600	APR. 11.....	105	.5	420
NOV. 30.....	6.7	.0	800	APR. 16.....	382	---	---
DEC. 21.....	7.1	.0	---	APR. 19.....	439	8.0	380
JAN. 18, 1979...	1.8	.0	650	MAY 14.....	256	12.0	410
FEB. 07.....	4.5	.0	590	JUNE 13.....	198	22.0	420
FEB. 28.....	5.1	.0	700	JULY 23.....	153	24.0	470
MAR. 21.....	42	.5	540	AUG. 28.....	125	18.0	400
APR. 04.....	64	.0	480	SEPT. 25.....	83	15.0	460
05046000 OTTER TAIL RIVER BELOW ORWELL DAM NEAR FERGUS FALLS, MN							
OCT. 05, 1978...	192	13.0	450	MAY 15.....	979	11.0	340
NOV. 16.....	120	3.0	480	JUNE 13.....	890	19.0	380
DEC. 21.....	104	---	---	JULY 03.....	941	23.0	400
JAN. 25, 1979...	97	1.0	560	JULY 31.....	839	23.5	375
FEB. 21.....	162	---	530	AUG. 28.....	710	20.0	390
MAR. 23.....	418	2.0	---	SEPT. 26.....	466	15.5	380
APR. 17.....	948	3.0	330				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, SOUTH DAKOTA							
OCT. 10, 1978...	4.4	13.0	1400	APR. 26.....	765	7.0	800
NOV. 09.....	.83	6.0	---	MAY 11.....	989	---	---
DEC. 12.....	2.0	1.5	2700	JUNE 12.....	735	19.0	850
JAN 17, 1979...	.63	.5	4000	JULY 05.....	725	---	---
FEB. 27.....	.0	---	---	JULY 10.....	128	---	1000
MAR. 23.....	2.0	---	---	AUG. 01.....	119	23.0	950
APR. 04.....	15	.5	550	SEPT. 07.....	32	17.0	1050
APR. 17.....	99	---	---				
05061000 BUFFALO RIVER NEAR HAWLEY, MN							
OCT. 19, 1978...	10	9.0	675	APR. 16.....	771	2.0	270
NOV. 21.....	15	.5	950	APR. 23.....	809	10.0	420
DEC. 19.....	13	.5	900	MAY 14.....	187	12.0	600
JAN. 24, 1979...	14	.0	900	JUNE 20.....	59	16.0	700
FEB. 26.....	14	.0	770	JULY 26.....	67	23.0	720
MAR. 21.....	27	1.0	---	AUG. 30.....	23	---	---
APR. 11.....	56	.5	650	SEPT. 24.....	11	14.0	800
05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MN							
OCT. 19, 1978...	3.2	9.5	925	APR. 17.....	1740	4.0	330
NOV. 22.....	4.9	.5	700	APR. 24.....	500	11.0	530
DEC. 19.....	1.8	.0	1500	MAY 02.....	130	8.0	680
JAN. 25, 1979...	.57	.0	---	MAY 14.....	76	14.0	875
FEB. 27.....	.18	.0	1800	JUNE 21.....	52	16.0	650
MAR. 22.....	.40	.5	---	JULY 26.....	24	22.0	800
APR. 10.....	221	.5	570	AUG. 30.....	7.5	21.0	900
APR. 13.....	1780	1.0	280	SEPT. 24.....	.60	18.0	800
05062000 BUFFALO RIVER NEAR DILWORTH, MN							
OCT. 20, 1978...	14	7.5	800	APR. 23.....	1990	10.0	400
NOV. 21.....	20	.0	650	MAY 02.....	597	7.0	560
DEC. 20.....	18	.0	590	MAY 15.....	311	11.0	690
JAN. 24, 1979...	13	.0	590	MAY 23.....	215	16.0	780
FEB. 27.....	13	.0	800	JUNE 21.....	101	16.0	600
MAR. 21.....	22	.0	650	JULY 24.....	96	24.0	700
APR. 10.....	216	.5	510	AUG. 24.....	38	17.0	650
APR. 16.....	4270	7.0	180	SEPT. 24.....	11	14.0	875

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05062500 WILD RICE RIVER AT TWIN VALLEY, MN							
OCT. 10, 1978	53	11.0	500	MAY 01	1550	6.0	360
OCT. 17	42	6.0	560	MAY 08	1060	8.5	372
OCT. 24	41	5.5	540	MAY 14	896	10.0	420
NOV. 07	44	3.0	550	MAY 22	595	10.5	440
DEC. 20	37	.0	700	MAY 29	417	18.5	400
JAN. 16, 1979	34	.0	670	JUNE 05	331	17.0	445
FEB. 12	43	.0	660	JUNE 12	236	17.5	460
MAR. 13	39	.0	650	JUNE 19	139	18.5	420
APR. 04	127	.5	565	JUNE 25	409	19.0	520
APR. 10	112	.5	---	JULY 16	270	23.0	478
APR. 17	4120	.5	270	JULY 23	157	24.5	490
APR. 18	5850	1.5	267	JULY 31	119	21.5	445
APR. 19	4790	6.0	320	AUG. 27	46	17.0	580
APR. 25	2160	8.0	370				
05064000 WILD RICE RIVER AT HENDRUM, MN							
OCT. 11, 1978	52	11.0	525	APR. 30	2580	7.0	280
OCT. 17	48	6.5	520	MAY 03	2330	6.0	400
OCT. 24	47	6.0	580	MAY 08	1460	9.0	415
NOV. 07	43	2.0	580	MAY 10	1240	7.0	420
DEC. 19	32	.0	700	MAY 15	988	10.5	470
JAN. 15, 1979	30	.0	750	MAY 23	674	12.0	470
FEB. 13	29	.0	680	MAY 30	595	16.0	450
MAR. 13	33	.0	650	JUNE 05	460	20.0	480
APR. 04	151	.5	600	JUNE 13	322	18.0	540
APR. 10	114	.0	---	JUNE 19	157	20.5	480
APR. 18	6660	4.0	245	JUNE 26	545	18.0	500
APR. 20	8460	8.0	280	JULY 17	450	21.0	540
APR. 22	7300	7.5	380	JULY 24	203	24.5	570
APR. 24	5750	9.0	360	JULY 31	147	21.0	505
APR. 27	4690	8.5	400	AUG. 28	72	19.0	540
05067500 MARSH RIVER NEAR SHELLY, MN							
APR. 16, 1979	1000	.5	175	MAY 07	41	8.5	750
APR. 19	4820	4.0	270	MAY 16	26	12.0	810
APR. 21	3060	8.0	275	JUNE 06	16	17.0	960
APR. 25	812	8.0	340	JULY 16	23	23.5	605
APR. 27	613	7.5	255	AUG. 28	1.1	19.0	680
MAY 02	162	6.5	490				

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05069000 SANDHILL RIVER AT CLIMAX, MN							
OCT. 17, 1978...	13	6.0	700	MAY 01.....	491	7.0	480
NOV. 28.....	14	.0	710	MAY 07.....	200	8.0	535
JAN. 15, 1979...	12	.0	730	MAY 10.....	167	6.0	555
FEB. 13.....	14	.0	---	MAY 16.....	125	13.0	620
MAR. 12.....	9.6	.0	700	MAY 30.....	71	17.0	---
APR. 16.....	606	.5	365	JUNE 06.....	69	18.0	530
APR. 18.....	2400	5.0	240	JULY 16.....	131	23.0	500
APR. 20.....	3350	5.5	250	AUG. 28.....	34	20.0	580
APR. 22.....	2690	9.0	280				
05074500 RED LAKE RIVER NEAR RED LAKE, MN							
OCT. 20, 1978...	335	9.5	275	MAY 18.....	1080	9.5	270
NOV. 30.....	398	.0	280	JUNE 22.....	1160	17.0	200
MAR. 01, 1979...	388	1.0	260	AUG. 08.....	1030	22.5	285
APR. 06.....	396	1.0	300	SEPT. 21.....	1020	16.0	---
MAY 03.....	611	4.0	260				
05075000 RED LAKE RIVER AT HIGH LANDING NEAR GOODRIDGE, MN							
OCT. 19, 1978...	356	8.0	280	APR. 25.....	3640	6.0	260
NOV. 30.....	410	.0	255	MAY 02.....	1290	7.0	275
JAN. 17, 1979...	512	.0	250	MAY 18.....	1330	13.5	385
FEB. 20.....	414	.0	300	JUNE 27.....	1260	20.5	270
APR. 05.....	451	.0	250	AUG. 08.....	1140	23.0	285
APR. 19.....	2130	10.0	225	SEPT. 21.....	973	14.0	280
05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN							
OCT. 19, 1978...	221	23.0	445	APR. 20.....	2920	6.0	255
NOV. 29.....	24	.0	670	APR. 22.....	2710	6.5	280
JAN. 17, 1979...	2.7	.0	400	MAY 16.....	1760	14.0	---
FEB. 06.....	9.0	.0	790	JUNE 26.....	379	21.5	450
APR. 04.....	8.8	.5	860	AUG. 09.....	16	21.5	405
APR. 18.....	1330	.5	275	SEPT. 19.....	10	16.0	520
05078000 CLEARWATER RIVER AT PLUMMER, MN							
OCT. 16, 1978...	60	7.0	500	APR. 25.....	3090	6.0	290
NOV. 29.....	46	.0	395	APR. 26.....	3620	6.0	330
JAN. 16, 1979...	42	.0	430	MAY 16.....	236	15.0	515
FEB. 22.....	67	.0	510	JUNE 21.....	360	17.0	---
APR. 04.....	17	.5	520	AUG. 09.....	396	22.0	500
APR. 17.....	485	3.0	240	SEPT. 19.....	50	14.5	510
APR. 19.....	2760	5.5	250				

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05078230 LOST RIVER AT OKLEE, MN							
OCT. 16, 1978...	7.9	6.0	710	APR. 22.....	1290	8.0	440
NOV. 30.....	6.8	6.0	760	APR. 26.....	1560	5.5	---
JAN. 15, 1979...	1.9	.0	600	MAY 02.....	282	6.0	430
FEB. 22.....	3.2	1.0	640	MAY 14.....	117	13.0	630
APR. 05.....	54	.5	680	JUNE 21.....	47	24.0	660
APR. 16.....	724	3.0	260	JULY 30.....	600	---	---
APR. 18.....	1990	5.5	370	AUG. 10.....	46	18.0	700
APR. 20.....	2140	8.0	347	SEPT. 17.....	5.7	19.0	680
05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN							
OCT. 17, 1978...	61	6.0	570	APR. 22.....	4300	8.0	390
NOV. 29.....	61	.0	475	APR. 25.....	10100	6.5	---
JAN. 16, 1979...	48	.0	520	MAY 16.....	662	14.0	550
FEB. 22.....	96	.0	470	JUNE 21.....	993	17.0	535
APR. 04.....	98	.5	660	AUG. 09.....	440	22.0	500
APR. 17.....	3740	1.5	250	SEPT. 19.....	77	14.0	565
APR. 19.....	9430	4.5	270				
05079000 RED LAKE RIVER AT CROOKSTON, MN							
OCT. 01, 1978...	591	7.0	375	APR. 22.....	14800	8.5	335
NOV. 27.....	515	.0	391	MAY 02.....	7860	7.0	380
JAN. 08, 1979...	357	.0	400	MAY 15.....	3840	11.5	380
FEB. 12.....	499	.0	435	JUNE 18.....	1900	22.5	350
APR. 02.....	579	.5	400	AUG. 07.....	1680	22.0	330
APR. 19.....	20200	2.0	230	SEPT. 18.....	1140	17.0	320
05087500 MIDDLE RIVER AT ARGYLE, MN							
OCT. 19, 1978...	.19	6.0	670	APR. 19.....	1640	1.0	200
NOV. 28.....	1.6	.0	690	APR. 20.....	2100	3.5	250
JAN. 09, 1979...	.97	.0	400	MAY 17.....	88	15.5	560
FEB. 21.....	.58	---	---	JUNE 19.....	16	20.0	620
APR. 03.....	2.1	.5	660	AUG. 07.....	1.9	23.5	625
APR. 17.....	278	1.0	180	SEPT. 20.....	.20	13.5	600
05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN							
OCT. 11, 1978...	1.0	11.0	455	APR. 21.....	2780	5.5	230
NOV. 28.....	.84	2.0	220	APR. 24.....	2410	7.5	270
JAN. 09, 1979...	1.8	1.0	300	MAY 17.....	338	14.0	405
FEB. 21.....	2.4	---	---	JUNE 20.....	99	20.0	412
APR. 03.....	22	1.0	530	AUG. 07.....	3.6	23.0	460
APR. 19.....	2500	2.0	240	SEPT. 20.....	2.1	15.5	460

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05104500 ROSEAU RIVER BELOW SOUTH FORK NEAR MALUNG, MN							
OCT. 12, 1978...	33	8.5	360	APR. 23.....	3330	8.0	260
NOV. 29.....	17	.0	390	APR. 26.....	5280	6.5	280
JAN. 11, 1979...	9.6	.0	495	MAY 10.....	494	5.0	280
FEB. 12.....	4.4	.0	450	JUNE 26.....	73	19.0	340
MAR. 28.....	51	.0	---	JULY 30.....	18	20.0	300
APR. 19.....	4610	1.0	220	SEPT. 12.....	1.5	15.0	390
05106000 SPRAGUE CREEK NEAR SPRAGUE, MANITOBA							
OCT. 12, 1978...	4.0	7.5	355	MAY 01.....	424	6.5	180
OCT. 16.....	4.2	5.5	---	MAY 09.....	378	5.0	185
NOV. 29.....	2.7	.0	450	JUNE 20.....	36	16.0	280
JAN. 11, 1979...	1.4	.0	575	JUNE 21.....	40	16.0	---
FEB. 13.....	.97	.0	400	JULY 31.....	3.5	23.0	410
MAR. 28.....	8.2	.0	245	SEPT. 12.....	1.5	12.0	400
APR. 20.....	895	3.0	125	SEPT. 12.....	1.4	13.0	---
05107500 ROSEAU RIVER AT ROSS, MN							
OCT. 11, 1978...	47	9.5	380	APR. 27.....	4250	8.0	240
NOV. 29.....	28	.0	440	APR. 30.....	4340	---	---
JAN. 11, 1979...	11	.0	---	MAY 09.....	3010	6.0	275
FEB. 13.....	6.1	.5	460	JUNE 20.....	206	17.5	400
MAR. 29.....	53	.0	470	AUG. 01.....	24	21.5	490
APR. 20.....	1440	5.0	185	SEPT. 12.....	48	15.0	425
APR. 22.....	2640	7.0	220				
05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MN							
OCT. 11, 1978...	60	11.0	370	MAY 01.....	2440	7.5	255
OCT. 16.....	57	5.0	---	MAY 08.....	3000	6.5	265
NOV. 28.....	32	.0	430	JUNE 19.....	797	19.0	410
JAN. 09, 1979...	19	.0	570	JUNE 20.....	639	---	---
FEB. 15.....	12	---	500	AUG. 01.....	75	21.5	---
MAR. 27.....	29	.0	530	SEPT. 11.....	11	15.0	360
APR. 24.....	1520	4.0	200	SEPT. 12.....	11	5.5	---
APR. 27.....	1760	7.0	280				
05124480 KAWISHIWI RIVER NEAR ELY, MN							
OCT. 25, 1978...	38	9.0	31	MAY 22.....	1170	10.0	22
JAN. 17, 1979...	24	.5	40	JUNE 26.....	306	18.0	<50
FEB. 27.....	30	.0	39	AUG. 14.....	66	20.0	29
APR. 11.....	54	.5	32	SEPT. 24.....	68	17.0	31

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05124990 FILSON CREEK NEAR ELY, MN							
OCT. 25, 1978...	1.3	6.5	32	APR. 21.....	114	1.0	<50
DEC. 06.....	1.1	.5	<50	APR. 23.....	199	1.5	<50
JAN. 15, 1979...	.51	.0	55	APR. 25.....	109	1.0	<50
FEB. 28.....	.76	.0	64	MAY 21.....	17	12.0	---
APR. 11.....	1.3	.5	60	JUNE 25.....	5.0	---	<50
APR. 11.....	3.3	.5	<50	AUG. 17.....	.44	15.0	35
APR. 18.....	6.5	.5	<50	SEPT. 25.....	.74	12.5	---
05125550 STONY RIVER NEAR BABBITT, MN							
OCT. 24, 1978...	73	8.5	70	MAY 21.....	913	13.0	39
DEC. 07.....	38	.5	80	JUNE 26.....	316	20.0	<50
JAN. 18, 1979...	54	.5	---	AUG. 24.....	34	18.0	90
FEB. 28.....	26	.0	126	SEPT. 25.....	129	14.0	60
APR. 10.....	46	.5	105				
05126000 DUNKA RIVER NEAR BABBITT, MN							
OCT. 26, 1978...	14	5.5	125	APR. 25.....	812	2.0	<50
DEC. 07.....	5.9	.5	170	MAY 21.....	166	9.5	80
JAN. 16, 1979...	0	.5	225	JUNE 27.....	96	16.5	98
FEB. 26.....	1.0	.0	315	AUG. 23.....	1.9	19.5	212
APR. 10.....	18	.5	305	SEPT. 25.....	6.5	12.0	130
05127000 KAWISHIWI RIVER NEAR WINTON, MN							
OCT. 26, 1978...	462	10.0	57	SEPT. 25.....	442	16.0	55
MAY 21, 1979...	5240	9.0	45				
05127500 BASSWOOD RIVER NEAR WINTON, MN							
OCT. 24, 1978...	798	11.0	54	AUG. 15.....	688	21.5	52
MAY 23, 1979...	8030	10.5	52				
05128000 NAMAKAN RIVER AT OUTLET OF LAC LA CROIX, ONTARIO							
JUNE 14, 1979...	11800	15.5	<50				
05128340 PIKE RIVER NEAR BIWABIK, MN							
NOV. 08, 1978...	4.5	4.0	120	JAN. 19, 1979....	1.7	.5	310
DEC. 05.....	5.4	1.0	230	MAR. 02.....	1.6	.0	340
05128500 PIKE RIVER NEAR EMBARRASS, MN							
NOV. 08, 1978...	39	3.0	155	JAN. 18, 1979....	7.1	.5	385
DEC. 05.....	17	.5	225	FEB. 26.....	8.3	.0	365

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05129000 VERMILION RIVER BELOW VERMILION LAKE NEAR TOWER, MN							
NOV. 07, 1978...	243	6.0	70	MAY 01.....	1360	5.0	75
DEC. 06.....	197	1.0	70	JUNE 13.....	904	19.0	75
FEB. 07, 1979...	111	1.0	86	AUG. 01.....	412	25.0	70
MAR. 21.....	156	1.0	75	SEPT. 06.....	164	---	---
05130500 STURGEON RIVER NEAR CHISHOLM, MN							
NOV. 07, 1978...	71	3.0	90	APR. 24.....	1540	3.5	60
DEC. 08.....	34	.5	120	MAY 02.....	451	5.0	50
FEB. 07, 1979...	25	.0	150	JUNE 13.....	144	16.0	---
MAR. 26.....	61	.5	140	JULY 26.....	64	22.5	95
APR. 20.....	1920	1.0	75	SEPT. 06.....	92	---	---
APR. 21.....	2420	2.5	<50				
05131000 DARK RIVER NEAR CHISHOLM, MN							
FEB. 07, 1979...	9.1	.0	235	JULY 30.....	20	20.5	150
JUNE 13.....	30	17.0	70				
05131500 LITTLE FORK RIVER AT LITTLE FORK, MN							
NOV. 07, 1978...	364	2.0	155	APR. 24.....	20000	2.5	90
DEC. 12.....	230	.5	180	MAY 29.....	1990	18.5	98
JAN. 22, 1979...	108	.5	250	JULY 10.....	1120	23.0	116
MAR. 05.....	111	.0	260	AUG. 20.....	187	22.5	200
APR. 22.....	16800	2.0	85				
05132000 BIG FORK RIVER AT BIG FALLS, MN							
NOV. 06, 1978...	780	3.5	220	APR. 22.....	13800	2.0	100
DEC. 12.....	333	.5	275	APR. 25.....	11400	4.0	92
JAN. 24, 1979...	181	.5	185	MAY 31.....	1970	16.0	175
MAR. 06.....	166	.0	305	JULY 09.....	1670	22.0	115
APR. 16.....	666	1.0	95	AUG. 22.....	283	21.0	235
05133500 RAINY RIVER AT MANITOU RAPIDS, MN							
NOV. 08, 1978...	7570	4.0	140	MAY 30.....	31700	13.5	77
APR. 18, 1979...	14900	1.0	100	JULY 11.....	14600	23.0	80
APR. 27.....	59300	4.0	85	AUG. 21.....	6240	20.0	120
05134200 RAPID RIVER NEAR BAUDETTE, MN							
OCT. 13, 1978...	51	6.0	225	APR. 22.....	4180	4.5	110
NOV. 30.....	39	.0	220	APR. 27.....	7270	5.0	88
JAN. 08, 1979...	22	.0	283	MAY 11.....	1710	5.0	190
FEB. 20.....	15	.0	300	JULY 22.....	558	14.0	184
MAR. 30.....	75	.0	280	AUG. 03.....	29	20.0	150
APR. 21.....	4690	4.0	110	SEPT. 13.....	48	14.0	230

WATER QUALTIY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (ft^3/s)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05139500 WARROAD RIVER NEAR WARROAD, MN							
OCT. 12, 1978...	11	10.0	400	APR. 21.....	1460	5.0	180
NOV. 30.....	5.3	.0	470	APR. 23.....	894	6.0	190
JAN. 12, 1979...	4.9	.0	215	MAY 10.....	241	5.0	200
FEB. 14.....	1.0	.0	490	JUNE 21.....	26	15.5	400
MAR. 29.....	11	.0	465	AUG. 02.....	2.3	22.0	250
APR. 18.....	216	.5	205	SEPT. 13.....	.58	12.0	410
APR. 20.....	1780	7.0	160				

BECKER COUNTY

464613095524801. Local number, 138.41.17adal.
LOCATION.--Lat 46°46'13", long 95°52'48", in NE 1/4 SE 1/4 NE 1/4 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 1978 TO SEPTEMBER 1979
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	.....	+2.10	+2.60	+2.80	+2.90	+3.00	+3.00	.....	+0.70	.....	+2.50	+2.00
10	.....	+2.20	+2.60	+2.80	+2.80	+2.90	+3.10	.....	+1.80	.....	+0.70	+0.20
15	+1.80	+2.30	+2.70	+2.90	+2.80	+2.80	+3.10	+3.20	+0.80	.....	+2.10	+0.45
20	0.90	+2.20	+2.80	+2.90	+2.90	+2.90	+3.20	+3.25	+3.10	+2.50	+2.70	0.90
25	+1.90	+2.40	+2.80	+2.80	+2.80	+3.00	+3.35	.....	+1.90	+3.30	+2.90	1.10
EOM	+1.90	+2.50	+2.70	+2.80	+3.00	+3.00	.....	+3.50	+3.30	+3.50	+1.80	0.40

WTR YEAR 1979 HIGHEST +3.56 MAY 26, 1979 LOWEST 1.35 SEPT 26, 1979

464401095571301. Local number, 138.42.26cda1
LOCATION.--Lat 46°44'01", long 95°57'13", in NE 1/4 SE 1/ 4 SW 1/4 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 1-1/4 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.--July 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 52.68 ft (16.06 m) below land-surface datum, May 8, 1978; 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 1978 to SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 11	53.77	JAN 22	53.99	APR 21	53.76	MAY 18	53.54	JUL 1	53.27	SEP 1	52.77
DEC 12	53.07	APR 7	53.43	MAY 4	53.62	JUN 1	53.40	AUG 1	53.03		

464550096095901. Local number, 138.43.18cdal.
LOCATION.--Lat 46°45'50", long 96°09'59", in NE 1/4 SE 1/4 SW 1/4 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 1-1/4 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.--July 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 58.67 ft (17.88 m) below land-surface datum, July 21, 1978; lowest, 59.83 ft (18.24 m) below land-surface datum, Dec. 19, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 11	58.92	JAN 22	59.35	APR 1	59.52	MAY 3	59.11	JUN 1	58.97	AUG 1	58.81
DEC 12	59.15	MAR 20	59.54	17	59.44	MAY 16	58.91	JUL 2	58.93	SEP 2	58.77

BECKER COUNTY--Continued

465422095495001. Local number 140.41.26ccd1.
LOCATION.--Lat 46°54'22", long 95°49'50", in SE 1/4 SW 1/4 SW 1/4 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 1-1/4 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.--July 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 28.27 ft (8.62 m) below land-surface datum, July 20, 1977; lowest, 32.12 ft (9.79 m) below land-surface datum, Sept. 1, 1979.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 11	31.18	JAN 22	31.62	APR 21	31.39	MAY 18	31.12	JUL 1	31.12	SEP 1	32.12
DEC 12	31.35	APR 7	31.96	MAY 4	31.08	JUN 1	31.14	AUG 1	30.99		

BELTRAMI COUNTY

482154094334201. Local number, 156.31.1aba1.
LOCATION.--Lat 48°21'54", long 94°33'42", in NE 1/4 NW 1/4 NE 1/4 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 1-1/4 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 OR ABOVE (+) LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 13	0.71	JAN 8	1.13	MAR 30	1.30	JUN 22	0.38	AUG 3	2.25	SEP 14	1.47
NOV 30	0.88	FEB 16	1.43	MAY 11	+0.09						

482154094334202. Local number, 156.31.1aba2.
LOCATION.--Lat 48°21'54", long 94°33'42", in NE 1/4 NW 1/4 NE 1/4 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, 0.37 ft (0.11 m) below land-surface datum, Oct. 19, 1973; lowest, dry below land-surface datum, Dec. 14, 1973; Feb. 7, 1975; Aug. 6, 1976 to Mar. 3, 1977, Aug. 15, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 13	0.98	JAN 8	1.91	MAY 11	0.70	JUN 22	0.62	AUG 3	0.95	SEP 14	1.49
NOV 30	1.45	FEB 16	1.75								

BELTRAMI COUNTY--Continued

482154094334203. Local number, 156.31.laba3.
LOCATION.--Lat 48°21'54", long 94°33'42", in NE 1/4 NW 1/4 NE 1/4 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.--September 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.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	0.84	.....	.....	.....	.....	.....	.....	.....	.....	0.88	1.78	.....
10	0.84	.....	.....	.....	.....	.....	.....	0.27	.....	0.92	1.86	.....
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.10	1.94	1.46
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.42	1.94	1.50
25	.....	.....	.....	.....	.....	.....	.....	.....	0.94	1.60	.....	1.56
EOM	.....	Frozen	.....	.....	.....	.....	.....	.....	0.88	1.70	.....	1.62

WTR YEAR 1979 HIGHEST 0.27 MAY 10, 1979 LOWEST 1.94 AUG. 15, 20, 1979

CARLTON COUNTY

462614092305801. Local number, 46.17.29dbd1.
LOCATION.--Lat 46°26'14", long 92°30'58", in SE 1/4 NW 1/4 SE 1/4 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 1-1/2 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, 19.04 ft (5.79 m) below land-surface datum, Mar. 22, 1978.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 6	19.01	JUL 26	17.16	SEP 25	17.66

463437092313301. Local number, 47.17.7aab1.
LOCATION.--Lat 46°34'37", long 92°31'33", in NW 1/4 NE 1/4 NE 1/4 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 1-1/2 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 6	11.39	JUL 26	9.28	SEP 25	9.73

CARLTON COUNTY--Continued

464346092304901. Local number, 49.17.17add1.
LOCATION.--Lat 46°43'46", long 92°30'49", in SE 1/4 SE 1/4 NE 1/4 sec.17, T.49 N., R.17 W., Hydrologic Unit 04010201, 1.5 mi (2.4 km) west of Cloquet.
Owner: City of Cloquet, well 7.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 48 in (1.22 m), depth 49 ft (14.9 m), screened 39 to 49 ft (11.9 to 14.9 m).
DATUM.--Land-surface datum is 1,263.8 ft (385.2 m) National Geodetic Vertical Datum of 1929. Measuring point: Hole in steel cover, 2.30 ft (0.70 m) above land-surface datum.
REMARKS.--Well measured by Vernon Gohl.
PERIOD OF RECORD.--March 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 6.92 ft (2.11 m) below land-surface datum, July 20, 1978; lowest, 9.05 ft (2.76 m) below land-surface datum, March 7, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 9	7.40	JUL 26	7.34	SEP 14	6.95

464217092312501. Local number, 49.17.29bad1.
LOCATION.--Lat 46°42'17", long 92°31'25", in SE 1/4 NE 1/4 NW 1/4 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 1-1/2 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, 18.13 ft (5.53 m) below land-surface datum, July 26, 1979; lowest, 19.52 ft (5.95 m) below land-surface datum, Mar. 6, 1979.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 6	19.52	JUL 26	18.13	SEP 25	18.75

CLAY COUNTY

465237096383901. Local number, 139.47.5cdc1.
LOCATION.--Lat 46°52'37", long 96°38'39", in SW 1/4 SE 1/4 SW 1/4 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 outwash 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, 30.11 ft (9.18 m) below land-surface datum, June 6, 7, 1961.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 20	27.26	JAN 24	25.93	MAR 22	28.59	JUN 20	27.60	JUL 23	27.47	AUG 30	27.02
NOV 21	26.81	FEB 26	26.53	APR 24	28.10	28	27.26	AUG 15	26.72	SEP 24	27.58
DEC 20	26.61										

CLAY COUNTY--Continued

465327096390801. Local number, 139.47.6aaal.
LOCATION.--Lat 46°53'27", long 96°39'08", in NE 1/4 NE 1/4 NE 1/4 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, 1.88 ft (0.57 m) below land-surface datum, May 21, 1956; lowest, 27.58 ft (8.41 m) below land-surface datum, July 18, Sept. 12, Oct. 10, 1961.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 24	25.54	JUN 20	25.84	JUN 28	25.61	JUL 23	25.61	AUG 15	25.37	SEP 24	25.88
APR 24	25.91										

465231096415801. Local number, 139.48.11abal.
LOCATION.--Lat 46°52'31", long 96°41'58", in NE 1/4 NW 1/4 NE 1/4 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, 170.1 ft (51.82 m) below land-surface datum, Apr. 27, 1976.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 20	119.5	DEC 20	119.0	FEB 26	119.4	APR 24	122.0	JUL 23	123.1	SEP 24	123.2
NOV 21	119.8	JAN 24	118.8	MAR 22	122.4	JUN 20	122.7	AUG 30	121.6		

GRANT COUNTY

455932095582601. Local number, 129.42.9cccl.
LOCATION.--Lat 45°59'32", long 95°58'26", in SW 1/4 SW 1/4 SW 1/4 sec.9, T.129 N., R.42 W., Hydrologic Unit 09020102, in Elbow Lake.
Owner: City of Elbow Lake, old well 2.
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 12 in (0.30 m), depth 214 ft (65.2 m), screened 200 to 220 ft (61.0 to 67.1 m).
DATUM.--Altitude of land-surface datum is 1,222 ft (372 m). Measuring point: Top of platform, 1.40 ft (0.43 m) above land-surface datum.
REMARKS.--Water level affected by pumping.
PERIOD OF RECORD.--February 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	76.29	DEC 29	76.50	Mar 1	75.60	APR 30	75.60	JUN 30	75.20	SEP 4	75.80
NOV 30	73.80	JAN 31	75.60	30	75.60	MAY 31	75.10	JUL 31	75.00		

ITASCA COUNTY

474917093144601. Local number, 62.23.35bab.
LOCATION.--Lat 47°49'17", long 93°14'46", in NW 1/4 NE 1/4 NW 1/4 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 1-1/4 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	18.10	FEB 14	18.50	MAR 21	18.75	APR 18	18.90	JUL 11	17.76	AUG 29	17.80
NOV 1	18.10	MAR 6	18.70	28	18.75	MAY 23	18.50	18	18.12	SEP 5	17.87
DEC 6	18.10	14	18.70	APR 11	18.90	JUN 14	18.29	AUG 8	17.84	25	18.00
JAN 3	18.10										

473840093515101. Local number, 148.25.8ddd1.
LOCATION.--Lat 47°38'40", long 93°51'51", in SE 1/4 SE 1/4 SE 1/4 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 1-1/4 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 6	5.25	JAN 24	5.31	APR 16	5.93	MAY 31	4.73	JUL 13	4.40	AUG 20	5.00
DEC 12	5.26	MAR 5	5.31								

KITTSON COUNTY

483557096480601. Local number, 159.48.14aadl.
LOCATION.--Lat 48°35'57", long 96°48'06", in SE 1/4 NE 1/4 NE 1/4 sec.14, T.159 N., R.48 W., Hydrologic Unit 09020311, at Davis Township sandpit, SE 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, 12.73 ft (3.88 m) below land-surface datum, Apr. 3, 1979.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	12.26	APR 3	12.73	JUN 19	11.04

KITTSON COUNTY--Continued

483843096493001. Local number 160.48.27dcd1.
LOCATION.--Lat 48°38'43", long 96°49'30", in SE 1/4 SW 1/4 SE 1/4 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	a12.00	APR 3	a12.44	JUN 19	a8.72

a Nearby well being pumped.

KOOCHICHING COUNTY

481148093445601. Local number, 66.27.24daa1.
LOCATION.--Lat 48°11'48", long 93°44'56", in NE 1/4 NE 1/4 SE 1/4 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 1-1/4 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, 15.11 ft (4.61 m) below land-surface datum, May 8, 1972; 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 6	15.97	JAN 27	16.50	APR 16	17.04	MAY 31	16.10	JUL 12	15.63	AUG 20	15.35
DEC 12	16.18	MAR 7	16.76								

481345093582801. Local number, 155.26.21daa1
LOCATION.--Lat 48°13'45", long 93°58'28", in NE 1/4 NE 1/4 SE 1/4 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, 1-1/4 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 6	0.98	JAN 24	1.52	APR 16	1.60	MAY 31	0.18	JUL 12	0.36	AUG 20	0.65
DEC 12	1.28	MAR 7	1.40								

KOOCHICHING COUNTY--Continued

481345093582802. Local number, 155.26.21daa2.
LOCATION.--Lat 48°13'45", long 93°58'28", in NE 1/4 NE 1/4 SE 1/4 sec.21, T.155 N., R.26 W., Hydrologic Unit 09030006, in Pine Island State Forest.
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.

WATER LEVEL, IN FEET BELOW OR ABOVE (+) LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 6	1.16	JAN 24	1.00	MAR 7	1.08	MAY 31	+0.31	JUL 12	+0.21	AUG 20	+0.05
DEC 12	1.40										

LAKE OF THE WOODS COUNTY

484552095052401. Local number, 161.34.18bcc1.
LOCATION.--Lat 48°45'52", long 95°05'24", in SW 1/4 SW 1/4 NW 1/4 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 1-1/4 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 12	6.47	JAN 12	6.98	MAR 29	6.40	JUN 22	4.66	AUG 2	5.98	SEP 13	7.18
NOV 30	6.68	FEB 14	7.09	MAY 10	4.68						

MARSHALL COUNTY

481604096391501. Local number, 155.47.11aaa3.
LOCATION.--Lat 48°16'04", long 96°39'15", in NE 1/4 NE 1/4 NE 1/4 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 (2.53 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, 32.77 ft (9.99 m) below land-surface datum, June 19, 1979.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	25.02	APR 3	a31.90	JUN 19	a32.77

a Nearby well being pumped.

MARSHALL COUNTY--Continued

482048096481901. Local number, 156.48.10daa2.
LOCATION.--Lat 48°20'48", long 96°48'19", in NE 1/4 NE 1/4 SE 1/4 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 1-1/4 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	7.65	APR 3	6.78	JUN 19	3.55

482354096501001. Local number, 157.48.27baa1.
LOCATION.--Lat 48°23'54", long 96°50'10", in NE 1/4 NW 1/4 NW 1/4 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.--Glacial Lake Agassiz beach deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation artesian well, diameter 1-1/4 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	3.79	JAN 9	4.19	MAY 17	4.35	JUN 19	4.00	AUG 7	3.80	SEP 20	4.32
NOV 28	4.06	APR 3	4.45								

OTTER TAIL COUNTY

462522096031901. Local number, 134.43.14adb1.
LOCATION.--Lat 46°25'22", long 96°03'19", in NW 1/4 SE 1/4 NE 1/4 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 1-1/4 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.--July 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 24.51 ft (7.47 m) below land-surface datum, May 16, 1979; 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 11	25.87	JAN 22	25.31	APR 2	25.96	MAY 3	24.57	JUN 2	24.67	AUG 2	24.97
DEC 13	26.13	MAR 20	26.19	17	26.27	16	24.51	JUL 2	24.66	SEP 3	25.31

OTTER TAIL COUNTY--Continued

463650096042801. Local number, 136.43.10aaa1.
LOCATION.--Lat 46°36'50", long 96°04'28", in NE 1/4 NE 1/4 NE 1/4 sec.10, T.136 N., R.43 W., Hydrologic Unit 09020103, on Oliver Haugrud farm.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1-1/4 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 (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, 7.22 ft (2.20 m) below land-surface datum, May 8, 1978; 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 11	8.48	JAN 22	8.58	APR 1	8.36	MAY 3	7.39	JUN 2	7.55	AUG 1	7.84
DEC 13	8.61	MAR 20	8.40	17	7.72	16	7.37	JUL 2	7.53	SEP 3	8.01

463430096050201. Local number, 136.43.22cda2.
LOCATION.--Lat 46°34'30", long 96°05'02", in NE 1/4 SE 1/4 SW 1/4 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 1,354.4 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	49.10	DEC 19	48.58	FEB 26	48.62	MAR 23	48.61	APR 23	48.00	JUN 20	46.97
NOV 21	48.68	JAN 24	48.62								

463956095352601. Local number, 137.39.22acd1.
LOCATION.--Lat 46°39'56", long 95°35'26", in SE 1/4 SW 1/4 NE 1/4 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 outwash 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	9.27	NOV 8	9.50	FEB 15	10.09	JUL 5	7.38	AUG 5	7.56	SEP 5	7.98
10	9.30	DEC 21	9.72	APR 30	8.38	10	7.36	10	7.64	10	8.04
15	9.34	JAN 20	9.93	JUN 12	8.11	15	7.36	15	7.69	15	8.10
20	9.37	25	9.97	15	8.15	20	7.36	20	7.74	20	8.17
25	9.40	31	9.99	20	7.90	25	7.40	25	7.79	25	8.23
31	9.44	FEB 5	10.01	25	7.80	31	7.47	31	7.88	30	8.27
NOV 5	9.48	10	10.05	30	7.62						

WTR YEAR 1979 HIGHEST 7.36 JUL 10-20, 1979 LOWEST 10.09 Feb. 15, 1979

ST. LOUIS COUNTY

472638092533601. Local number, 57.20.5dad1.
LOCATION.--Lat 47°26'38", long 92°53'36", in SE 1/4 NE 1/4 SE 1/4 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 wood 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. 16, 1965.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 7	60.07	FEB 8	62.55	APR 13	58.92	MAY 25	59.21	JUN 25	59.12	SEP 27	58.59
DEC 8	57.94	MAR 2	58.99								

472230092561001. Local number, 57.20.31dbc1.
LOCATION.--Lat 47°22'30", long 92°56'10", in SW 1/4 NW 1/4 SE 1/4 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 September 1979.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.85 ft (1.78 m) below land-surface datum, May 23, 1962; lowest, 11.67 ft (3.56 m) below land-surface datum, Feb. 25, 1958.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL
JUL 25	9.03	SEP 27	9.10

473125092113501. Local number, 58.15.12cba1.
LOCATION.--Lat 47°31'25", long 92°11'35", in NE 1/4 NW 1/4 SW 1/4 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 outwash 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, April 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	9.77	JUL 24	9.79	SEP 26	9.90

ST. LOUIS COUNTY--Continued

473102092345001. Local number, 58.18.12ccc1.
LOCATION.--Lat 47°31'02", long 92°34'50", in SW 1/4 SW 1/4 SW 1/4 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 and 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 September 1979.
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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL
JUL 25	12.39	SEP 26	12.88

473100092340101. Local number, 58.18.13aba1.
LOCATION.--Lat 47°31'00", long 92°34'01", in NE 1/4 NW 1/4 NE 1/4 sec.13, T58 N., R.18 W., Hydrologic Unit 04010201, in West Virginia.
Owner: Charles Dahl
AQUIFER.--Buried sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled unused artesian well, diameter 6 in (0.15 m), depth 62 ft (18.9 m).
DATUM.--Land-surface datum is 1,432.0 (436.5 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 6.90 ft (2.10 m) below land-surface datum.
PERIOD OF RECORD.--July 1954 to May 1965, July 1979 to September 1979.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.06 ft (5.50 m) below land-surface datum, July 6, 1954; lowest, 24.90 ft (7.59 m) below land-surface datum, Apr. 9, 1964.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL
JUL 25	18.35	SEP 26	18.53

473011092524301. Local number, 58.20.16dbc1.
LOCATION.--Lat 47°30'11", long 92°52'43", in SW 1/4 NW 1/4 SE 1/4 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 7	6.64	MAR 21	4.05	MAY 2	1.60	JUN 13	1.94	JUL 30	3.02	SEP 6	3.58
DEC 8	4.84										

ST. LOUIS COUNTY--Continued

474253091574101. Local number, 60.13.1bba1.
LOCATION.--Lat 47°42'53", long 91°57'41", in NE 1/4 NW 1/4 NW 1/4 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 September 1979.
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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL
JUL 25	21.64	SEP 26	20.94

TRAVERSE COUNTY

455700096314001. Local number, 129.47.25cdc1.
LOCATION.--Lat 45°57'00", long 96°31'40", in SW 1/4 SE 1/4 SW 1/4 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 1-1/4 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	9.18	DEC 21	9.60	FEB 21	10.39	APR 19	7.99	JUL 31	8.03	SEP 24	9.34
NOV 16	9.30	JAN 18	10.07	MAR 23	10.02	JUL 5	7.91	AUG 28	8.72		

WILKIN COUNTY

463422096341701. Local number, 136.47.23ccc1.
LOCATION.--Lat 46°34'22", long 96°34'17", in SW 1/4 SW 1/4 SW 1/4 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 1-1/4 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 1978 TO SEPTEMBER 1979

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 20	6.62	DEC 20	7.46	FEB 27	8.40	APR 24	3.86	JUN 28	3.86	AUG 30	4.19
NOV 22	6.99	JAN 25	8.05	MAR 22	7.57	JUN 21	3.90	JUL 25	4.73	SEP 24	5.64

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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 to the International System of Units (SI). This report contains both the inch-pound and SI unit equivalents in the station manuscript descriptions.

Multiply inch-pound units	By	To obtain SI units
	Length	
inches (in)	2.54×10^{1}	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet (ft)	3.048×10^{-1}	meters (m)
miles (mi)	1.609×10^{0}	kilometers (km)
	Area	
acres	4.047×10^{3}	square meters (m^2)
	4.047×10^{-1}	square hectometers (hm^2)
	4.047×10^{-3}	square kilometers (km^2)
square miles (mi^2)	2.590×10^{0}	square kilometers (km^2)
	Volume	
gallons (gal)	3.785×10^{0}	liters (L)
	3.785×10^{0}	cubic decimeters (dm^3)
	3.785×10^{-3}	cubic meters (m^3)
million gallons	3.785×10^{3}	cubic meters (m^3)
	3.785×10^{-3}	cubic hectometers (hm^3)
cubic feet (ft^3)	2.832×10^{1}	cubic decimeters (dm^3)
	2.832×10^{-2}	cubic meters (m^3)
cfs-days	2.447×10^{3}	cubic meters (m^3)
	2.447×10^{-3}	cubic hectometers (hm^3)
acre-feet (acre-ft)	1.233×10^{3}	cubic meters (m^3)
	1.233×10^{-3}	cubic hectometers (hm^3)
	1.233×10^{-6}	cubic kilometers (km^3)
	Flow	
cubic feet per second (ft^3/s)	2.832×10^{1}	liters per second (L/s)
	2.832×10^{1}	cubic decimeters per second (dm^3/s)
	2.832×10^{-2}	cubic meters per second (m^3/s)
gallons per minute (gal/min)	6.309×10^{-2}	liters per second (L/s)
	6.309×10^{-2}	cubic decimeters per second (dm^3/s)
	6.309×10^{-5}	cubic meters per second (m^3/s)
million gallons per day	4.381×10^{1}	cubic decimeters per second (dm^3/s)
	4.381×10^{-2}	cubic meters per second (m^3/s)
	Mass	
tons (short)	9.072×10^{-1}	megagrams (Mg) or metric tons

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