Water Resources Data for Minnesota

Water Year 1977

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

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MN-77-1

Prepared in cooperation with the Minnesota Department of Natural Resources, Division of Waters; the Minnesota Department of Transportation; and with other State, municipal, and Federal Agencies

CALENDAR FOR WATER YEAR 1977

1976

OCTOBER

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1977

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SEPTEMBER

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UNITED STATES DEPARTMENT OF THE INTERIOR

CECIL D. ANDRUS, Secretary

GEOLOGICAL SURVEY

H. W. Menard, Director

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

1978

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 J. S. Cragwall, Jr., Chief Hydrologist, U.S. Geological Survey, and G. W. Whetstone, 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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6.

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15. Supplementary Notes

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Water resources data for the 1977 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 report contains discharge records for 79 gaging stations; stage only records for 1 gaging station; stage and contents for 4 lakes and reservoirs; water quality for 21 gaging stations, 2 partial-record flow station, 4 lakes, and 65 wells; and water levels for 18 observation wells. Also included are 39 crest-stage partial-record stations and 35 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 represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Minnesota.

17. Key Words and Document Analysis. 17a. Descriptors

*Minnesota, *Hydrologic data, *Surface water, *Ground water, *Water quality, Flow rate, Gaging stations, Lakes, Reservoirs, Chemical analyses, Sediments, Water temperatures, Sampling sites, Water levels, Water analyses

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group

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

WATER RESOURCES DATA FOR MINNESOTA, 1977

INTRODUCTION

Water resources data for the 1977 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 report, in two volumes, contains discharge records for 79 gaging stations; stage only records for 1 gaging station; stage and contents for 4 lakes and reservoirs; water quality for 21 gaging stations, 1 partial-record station, 4 lakes, and 65 wells; and water levels for 18 observation wells. Also included are 39 crest-stage partial-record stations and 35 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 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, ~~604 South Pickett Street~~, ~~Alexandria~~, ~~Virginia~~ ~~22304~~. 1200 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-77-1." Water-Data reports are for sale by the National Technical Information Service, U.S. Department of Commerce, Springfield, ~~Virginia~~ VA 22161.

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, by G. D. Seinwill, director.
Through the Division of Waters
- AMAX Incorporated
- Buffalo Creek Watershed District
- City of Austin
- City of Rochester
- Morrison County Soil Conservation District
- Oglebay Norton Company
- Pickands Mather and Company
- Hanna Mining Company
- United States Steel Corporation
- Jones and Laughlin Steel Corporation

Minnesota Department of Transportation, F. D. Marzitelli, succeeded by James Harrington, commissioner.

Minnesota State Planning Agency, Peter Vanderpoel, director.

Minnesota Department of Health, W. R. Lawson, M.D., commissioner

Minnesota Pollution Control Agency, Sandra Gardebring, director.

Metropolitan Waste Control Commission of the Twin Cities Area, J. D. Strauss, chairman.

Douglas County, Wisconsin, Soil and Water Conservation District, Paul Brown, chairman.

City of Apple Valley, W. E. Branning, mayor.

City of Eagan, H. H. Polzin, mayor.

City of Lakeville, E. J. Mako, mayor.

Assistance in the form of funds or services was given by the Corps of Engineers, U.S. Army, in collecting records for 45 gaging stations and 14 water-quality stations published in this report.

Several 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."

Assistance in the form of funds or services was given by the U.S. Environmental Protection Agency, in collecting records for 7 gaging stations in this report.

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 C. E. Cornelius, D. W. Ericson, J. H. Hess, J. L. Zirbel, M. R. Have, and Alex Brietkrietz.

HYDROLOGIC CONDITIONS

Annual runoff was below normal during the 1977 water year. Monthly mean discharges for October through February were record low. An earlier than usual snowmelt caused near normal flows for March but then near record low discharges persisted through August. Flow during September continued low for stations in the Red River of the North basin and the annual runoff was near record low. Throughout the remainder of the area, monthly flows for September were considerably above normal. At many of these stations the runoff during September exceeded the total runoff for the first eleven months of the water year. Annual runoff at these streams was deficient but not at record low. There was record high monthly discharges for September for streams along the north shore of Lake Superior.

Ground-water levels were generally below average throughout the year. Water-levels rose in March and July but remained below average.

Precipitation for October-December was about 2.5 inches below normal and near normal for the rest of the year. Monthly and annual mean discharge is compared with median discharge for the period 1941-70 at three representative gaging stations 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 English 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 warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory they are defined as all organisms which produce blue colonies within 24 hours when incubated at 44.5°C ± 0.2°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal streptococcal bacteria are bacteria 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 (coloidal) 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 s is the total number of taxa in the sample of the community. Diversity index values range from zero, when all the organisms in the sample are the same, to some positive number, when some or all of the organisms in the sample are different.

Drainage area of a stream at a specified location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the river above the specified point. Figures of drainage area given herein include all closed basins, or noncontributing areas, within the area unless otherwise noted.

Drainage basin is a part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Gage height (G.H.) is the water-surface elevation referred to some arbitrary gage datum. Gage height is often used interchangeably with the more general term "stage," although gage height is more appropriate when used with a reading on a gage.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is attributable to the presence of alkaline earths (principally calcium and magnesium) and is expressed as equivalent calcium carbonate ($CaCO_3$).

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as delineated by the Office of Water Data Coordination on the State Hydrologic Unit Maps; each hydrologic unit is identified by an 8-digit number.

Metamorphic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with many intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Methylene blue active substance (MBAS) is a measure of apparent detergents. This determination depends on the formation of a blue color when methylene blue dye reacts with synthetic detergent compounds.

Micrograms per gram (ug/g) is a unit expressing the concentration of a chemical element as the mass (micrograms) of the element sorbed per unit mass (gram) of sediment.

Micrograms per liter (UG/L, ug/L) is a unit expressing the concentration of chemical 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.

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.

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 either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling).

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. Chemical dispersion is not used for native-water analysis.

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.

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.

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 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.

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharge. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

WRD is used as an abbreviation for "Water-Resources Data" in the REVISED RECORDS paragraph to refer to State annual basic-data reports published before 1975.

WSP is used as an abbreviation for "Water-Supply Paper" in references to previously published reports.

DOWNSTREAM ORDER AND STATION NUMBER

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

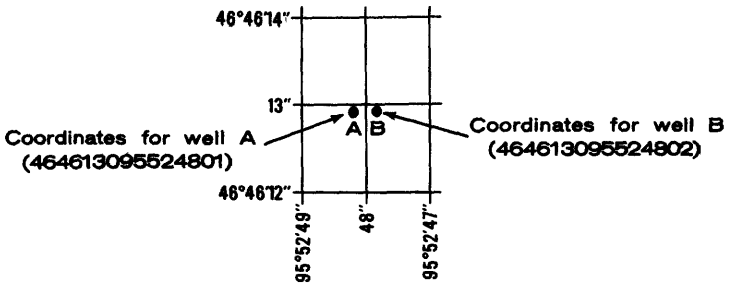


Figure 1. System for numbering wells and miscellaneous sites (latitude and longitude)

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 ~~engineers~~ 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 above mean sea level, and a condensed history of the types, locations, and datums of previous gages used during the period of record are given under "GAGE." In references to datum of gage, the phrase "mean sea level" denotes "Sea Level Datum of 1929" as used by the Topographic Division of the Geological Survey unless otherwise qualified.

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 the 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.

Skeleton rating tables are published, immediately following EXTREMES, for stream-gaging stations where they serve a useful purpose and the dates of applicability can be easily identified.

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-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 cfs; to tenths between 1.0 and 10 cfs; to whole numbers between 10 and 1,000 cfs; and to 3 significant figures above 1,000 cfs. 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.

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 1.

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 mean sea level (msl) or land-surface datum (lsd). Mean sea level 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 above mean sea level 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. Prices are effective January 1978 but are subject to change.

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. $1.60.

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. $0.85

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. $1.90.

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. $1.75.

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. $1.00.

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. $0.35.

3-A3. *Measurement of peak discharge at culverts by indirect methods,* by G. L. Bodhaine: USGS--TWRI Book 3, Chapter A3. 1968. 60 pages. $0.40.

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. $1.00.

3-A5. *Measurement of peak discharge at dams by indirect methods,* by Harry Hulsing: USGS--TWRI Book 3, Chapter A5. 1967. 29 pages. $0.35.

3-A6. *General procedure for gaging streams,* by R. W. Carter and Jacob Davidian: USGS--TWRI Book 3, Chapter A6, 1968, 13 pages. $1.00.

3-A7. *Stage measurements at gaging stations,* by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A7. 1968. 28 pages. $1.40.

3-A8. *Discharge measurements at gaging stations,* by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A8. 1969. 65 pages. $1.25.

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. $1.20.

3-A12. *Fluorometric procedures for dye tracing,* by J. F. Wilson Jr.: USGS--TWRI Book 3, Chapter A12. 1968. 31 pages. $0.35. Not currently available.

3-B1. *Aquifer-test design, observation, and data analysis,* by R. W. Stallman: USGS--TWRI Book 3, Chapter B1. 1971. 26 pages. $0.70.

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. $2.50.

3-C1. *Fluvial sediment concepts,* by H. P. Guy: USGS--TWRI Book 3, Chapter C1. 1970. 55 pages. $0.65.

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. $2.50.

3-C3. *Computation of fluvial-sediment discharge,* by George Porterfield: USGS--TWRI Book 3, Chapter C3. 1972. 66 pages. $2.10.

4-A1. *Some statistical tools in hydrology,* by H. C. Riggs: USGS--TWRI Book 4 Chapter A1. 1968. 39 pages. $1.60.

4-A2. *Frequency curves,* by H. C. Riggs: USGS--TWRI Book 4, Chapter A2. 1968. 15 pages. $0.35.

4-B1. *Low-flow investigations,* by H. C. Riggs: USGS--TWRI Book 4, Chapter B1. 1972, 18 pages. $0.65.

4-B2. *Storage analyses for water supply,* by H. C. Riggs and C. H. Hardison: USGS--TWRI Book 4, Chapter B2. 1973. 20 pages. $0.75.

4-B3. *Regional analyses of streamflow characteristics,* by H. C. Riggs: USGS--TWRI Book 4, Chapter B3. 1973. 15 pages. $0.65.

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. $1.10.

5-A1. *Methods for collection and analysis of water samples for dissolved minerals and gases,* by Eugene Brown, M. W. Skougstad, and M. J. Fishman: USGS--TWRI Book 5, Chapter A1. 1970. 160 pages. $2.40.

5-A2. *Determination of minor elments in water by emission spectroscopy,* by P. R. Barnett and E. C. Mallory, Jr.: USGS--TWRI Book 5, Chapter A2. 1971. 31 pages. $0.80.

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. $0.90.

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. $20.00.

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. $16.00.

5-C1. *Laboratory theory and methods for sediment analysis,* by H. P. Guy: USGS--TWRI Book 5, Chapter C1. 1969. 58 pages. $2.10.

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. $2.30.

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. $0.70.

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. $1.10.

*These publications are available ONLY from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. They are in looseleaf format and are subscription items. Additional supplements will be issued to subscribers at no extra cost. Checks should be made payable to Superintendent of Documents. Requester should emphasize to Superintendent of Documents that this is a subscription item.

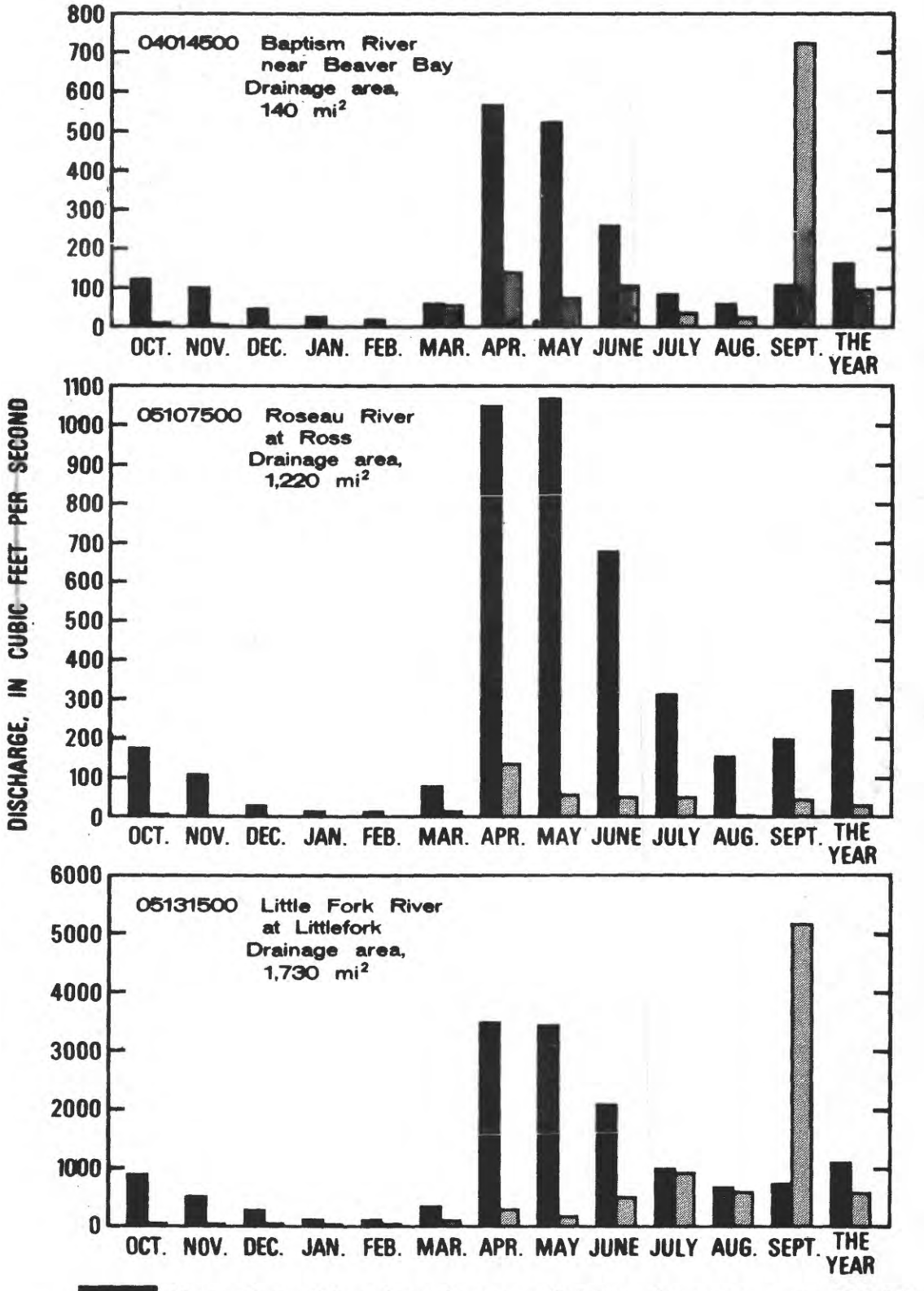


Figure 2.--Discharges during 1977 water year compared with median discharge for period 1941-70 for three representative stations.

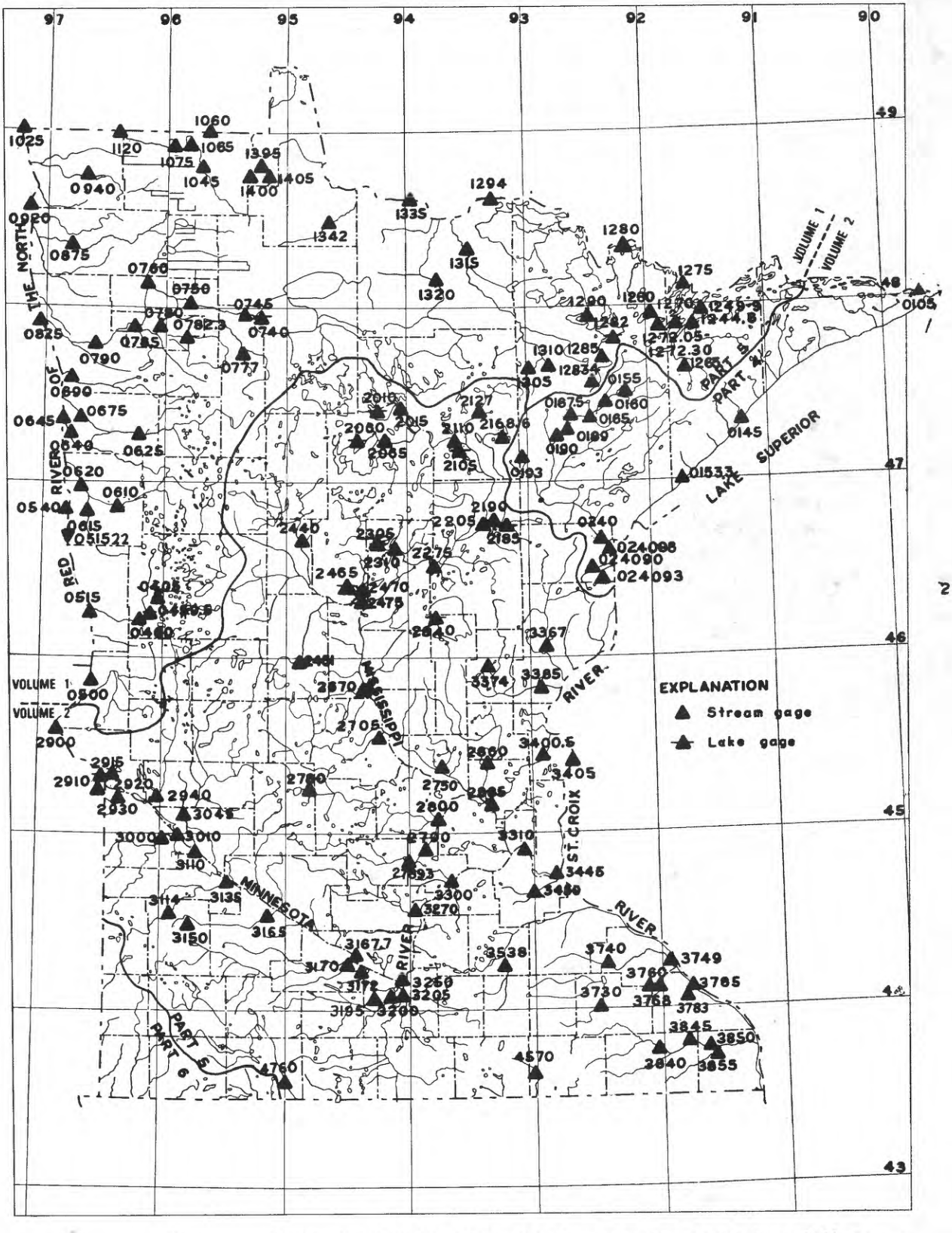


Figure 3.---Map showing location of lake and stream gaging stations.

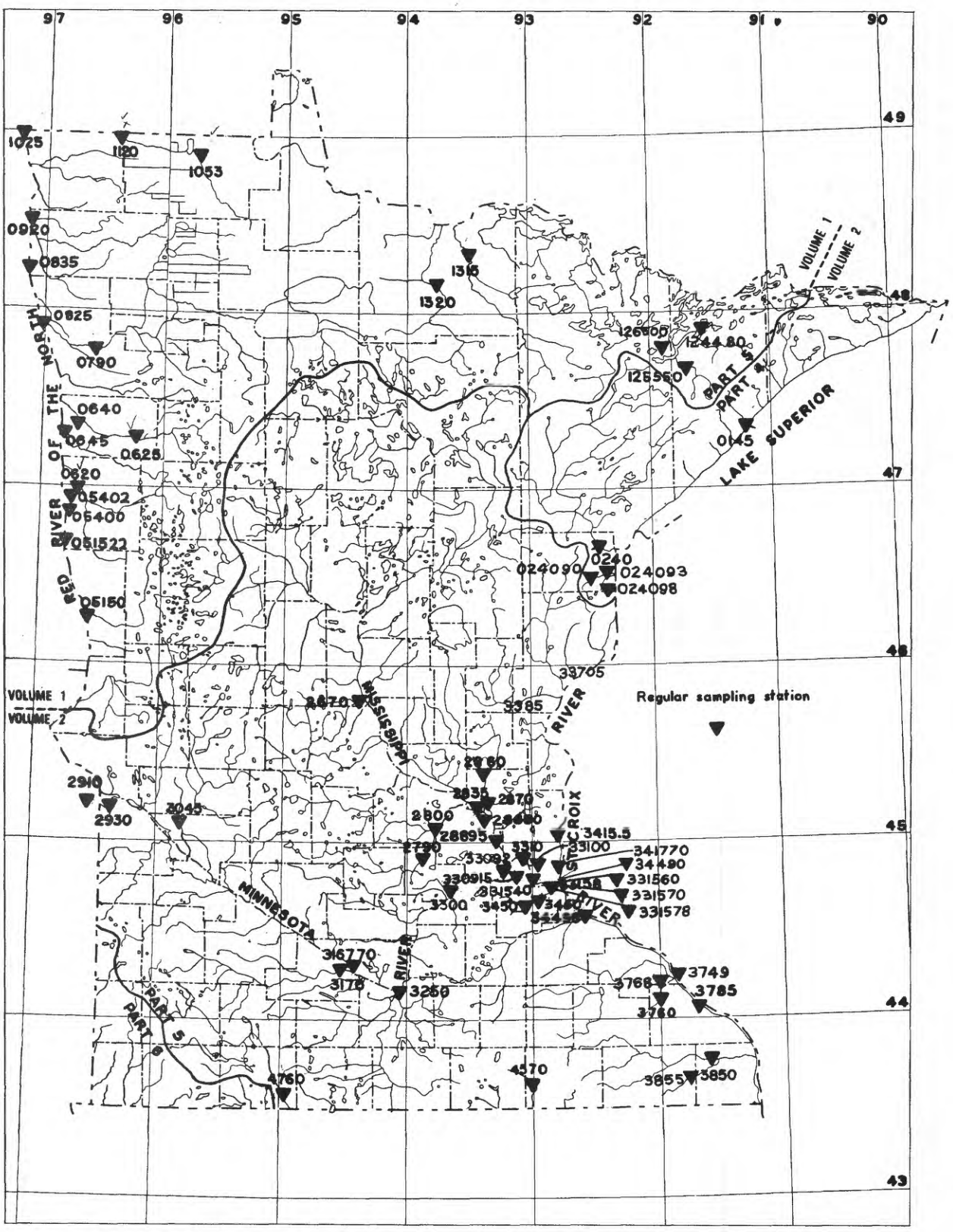
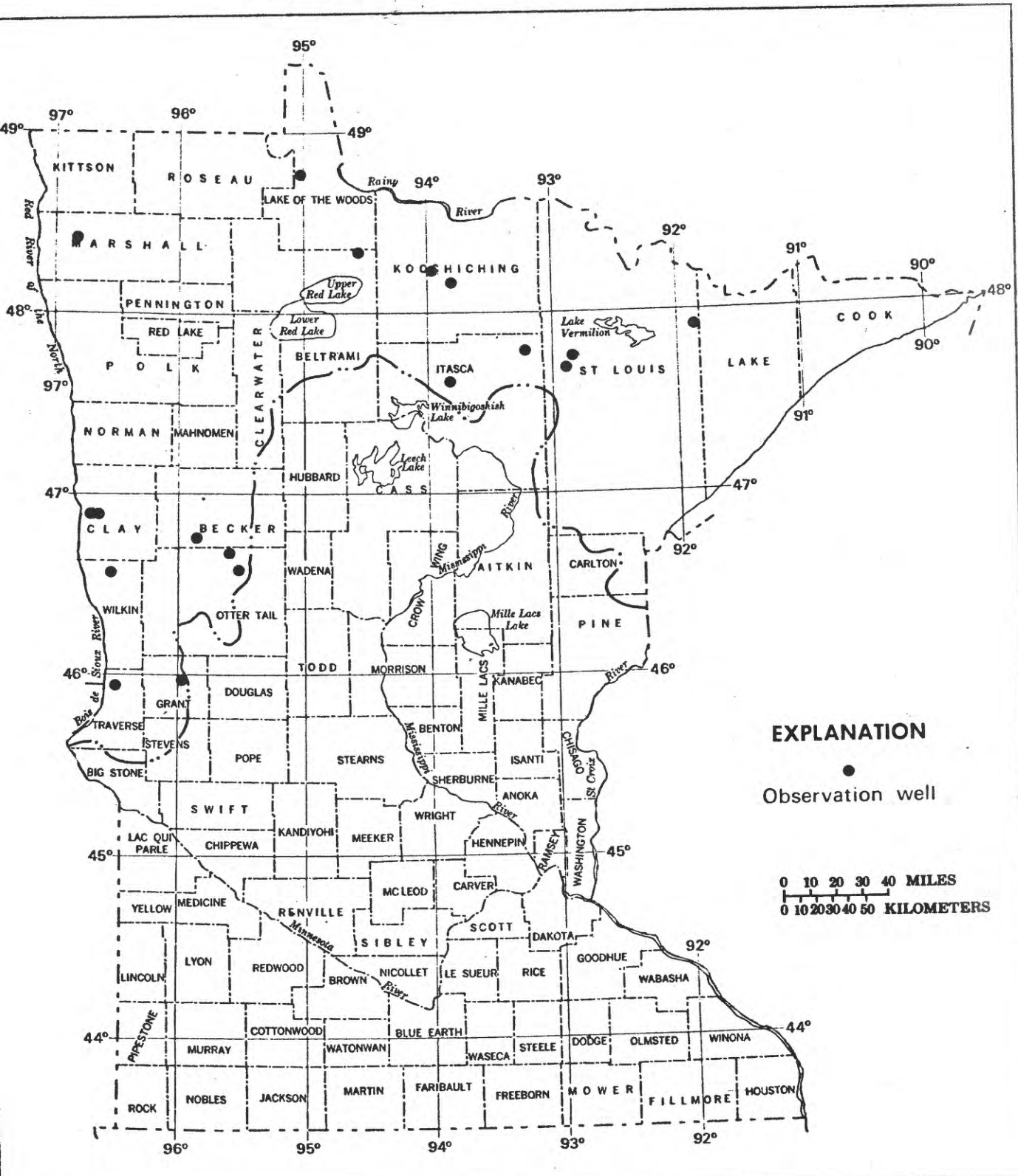


Figure 4 -- Map showing location of water-quality stations.



Location of observation wells in Great Lakes and Souris-Red-Rainy River Basins.

Figure 5.

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 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) above mean sea level. 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 periods, which are poor.
COOPERATION.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.
AVERAGE DISCHARGE.--54 years (water years 1924-77), 501 ft^3/s (14.19 m^3/s), 11.34 in/yr (288 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)
Sept. 9	1000	8,170	231	11.53	3.514
Sept. 20	0100	4,950	140	9.71	2.960
Sept. 24	1800	*10,500	297	*12.37	3.770

Minimum daily discharge, 1.0 ft^3/s (0.028 m^3/s) Jan. 15-21; minimum recorded gage height, 1.24 ft (0.378 m) Jan. 7, 8, 15, but may have been less during period of no gage-height record, Jan. 16 to Apr. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	14	3.8	2.0	4.6	7.9	180	210	98	103	67	650
2	18	15	3.7	1.8	5.4	8.0	165	193	109	97	62	563
3	17	15	3.6	1.7	6.2	8.1	150	182	122	108	59	448
4	18	15	3.5	1.6	6.8	8.3	135	168	114	107	55	383
5	19	14	3.4	1.5	7.6	8.6	125	161	105	110	51	344
6	19	14	3.3	1.4	8.0	8.9	115	171	108	124	46	305
7	18	7.1	3.2	1.3	8.4	9.3	105	178	117	140	41	275
8	17	9.3	3.1	1.3	8.8	9.6	100	176	123	144	36	490
9	18	16	3.0	4.4	9.0	10	115	161	127	132	31	7620
10	18	14	2.9	6.2	9.2	12	135	150	126	122	28	7300
11	18	13	2.8	6.0	9.3	19	170	139	116	130	28	4800
12	18	13	2.8	5.4	9.4	32	215	133	103	148	29	3250
13	17	12	2.7	3.7	9.2	40	280	124	94	134	29	2500
14	17	12	2.6	2.1	8.9	80	450	120	90	132	28	2070
15	18	11	2.6	1.0	8.8	130	500	118	89	128	27	1800
16	17	11	2.5	1.0	8.6	155	400	116	94	114	32	1620
17	17	11	2.4	1.0	8.4	145	284	111	100	108	31	1490
18	17	11	2.4	1.0	8.2	130	279	99	118	107	32	1400
19	19	12	2.6	1.0	8.1	115	290	86	196	101	32	3330
20	18	13	2.8	1.0	8.0	96	315	84	239	94	35	4740
21	19	12	3.0	1.0	8.0	86	560	85	208	87	38	4010
22	18	12	3.0	1.1	8.0	75	770	96	173	84	39	3220
23	14	12	2.9	1.2	8.0	68	627	127	151	82	37	2750
24	19	11	2.8	1.3	8.0	63	483	178	141	84	35	5200
25	18	11	2.7	1.4	7.9	62	394	175	131	84	36	7300
26	15	10	2.6	1.6	7.9	64	339	159	122	78	40	6120
27	15	7.5	2.5	1.8	7.9	72	291	142	115	73	74	4970
28	17	5.5	2.4	2.2	7.9	92	264	125	110	76	281	4040
29	16	4.5	2.3	2.6	---	130	238	110	105	73	430	3470
30	16	4.0	2.2	3.1	---	180	219	101	103	74	406	3090
31	16	---	2.1	3.8	---	195	---	94	---	78	524	---
TOTAL	540	341.9	88.2	67.5	224.5	2119.7	8693	4272	3747	3256	2719	89548
MEAN	17.4	11.4	2.85	2.18	8.02	68.4	290	138	125	105	87.7	2985
MAX	19	16	3.8	6.2	9.4	195	770	210	239	148	524	7620
MIN	14	4.0	2.1	1.0	4.6	7.9	100	84	89	73	27	275
CFSM	.03	.02	.005	.004	.01	.11	.48	.23	.21	.18	.15	4.98
IN.	.03	.02	.01	.00	.01	.13	.54	.26	.23	.20	.17	5.55

CAL YR 1976 TOTAL 161647.1 MEAN 442 MAX 6070 MIN 2.1 CFSM .74 IN 10.02
WTR YR 1977 TOTAL 115616.8 MEAN 317 MAX 7620 MIN 1.0 CFSM .53 IN 7.17

NOTE.--No gage-height record Jan. 16 to Apr. 17.

Publications Manual - p. 37 - When only one peak use format on page 37. Insert here

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN

LOCATION.--Lat 47°20'15", long 91°12'00", in SE 1/4 NE 1/4 sec.15, T.56 N., R.7 W., Lake County, Hydrologic Unit 04010101, on right bank 30 ft (9 m) upstream from bridge on U.S. Highway 61, 0.2 mi (0.3 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 609.97 ft (185.919 m) above mean sea level (Corps of Engineers bench mark). Prior to Oct. 5, 1934, nonrecording gage at same site and datum.

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

AVERAGE DISCHARGE.--50 years, 166 ft^3/s (4.701 m^3/s), 16.10 in/yr (409 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), 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, 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)
Sept. 24	2230	a10,000	283	b8.33	2.539

No flow Jan. 14 to Mar. 2.

a From rating curve extended above 4,200 (ft^3/s) (119 m^3/s) on basis of slope-area measurement of peak flow.
b From highwater mark in well.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.7	9.0	1.3	.14	.00	.00	95	80	265	74	16	458
2	4.7	9.0	1.2	.14	.00	.00	80	73	340	73	16	354
3	4.5	6.7	1.1	.13	.00	.04	70	66	270	85	16	270
4	5.4	8.7	1.0	.12	.00	.08	60	59	210	116	16	382
5	7.2	7.2	.90	.12	.00	.10	44	87	160	121	16	368
6	6.9	7.4	.84	.11	.00	.20	50	142	150	106	15	292
7	6.9	7.4	.78	.10	.00	.50	52	132	134	84	14	240
8	7.2	7.2	.72	.10	.00	1.0	52	114	116	62	12	184
9	7.4	6.8	.66	.08	.00	3.0	52	98	96	46	11	286
10	7.5	6.6	.62	.05	.00	8.0	80	82	74	36	9.8	322
11	7.7	6.4	.58	.02	.00	20	94	76	61	33	8.2	286
12	7.6	6.2	.54	.01	.00	50	93	68	48	34	7.2	286
13	7.1	5.9	.50	.01	.00	120	90	64	39	32	6.7	245
14	6.2	5.6	.46	.00	.00	300	87	82	33	28	6.2	202
15	5.9	5.3	.43	.00	.00	230	92	74	29	24	5.8	163
16	5.9	5.1	.40	.00	.00	170	90	65	28	24	6.5	134
17	5.9	4.9	.37	.00	.00	70	100	59	28	28	6.2	112
18	6.2	4.8	.35	.00	.00	45	125	62	37	24	5.8	110
19	6.4	4.6	.33	.00	.00	35	214	60	56	21	5.4	275
20	6.5	4.4	.30	.00	.00	30	230	58	72	19	6.0	286
21	7.4	4.2	.28	.00	.00	28	442	51	82	16	8.7	245
22	6.7	3.8	.26	.00	.00	26	442	76	61	15	8.2	218
23	6.9	3.4	.25	.00	.00	26	322	130	94	13	7.9	275
24	10	3.1	.23	.00	.00	26	255	125	178	11	6.9	4820
25	9.5	2.8	.22	.00	.00	25	202	104	152	9.8	6.5	5070
26	9.8	2.4	.21	.00	.00	25	163	82	114	8.5	14	2110
27	8.5	2.1	.20	.00	.00	27	139	64	80	7.4	20	1440
28	7.9	1.8	.18	.00	.00	60	121	51	62	9.5	47	1000
29	7.9	1.6	.17	.00	---	90	102	41	51	9.2	42	902
30	7.7	1.5	.16	.00	---	150	90	35	61	11	57	720
31	7.2	---	.15	.00	---	120	---	46	---	19	368	---
TOTAL	217.3	155.9	15.69	1.13	.00	1685.92	4128	2406	3181	1199.4	792.0	22055
MEAN	7.01	5.20	.51	.036	.000	54.4	138	77.6	106	38.7	25.5	735
MAX	10	9.0	1.3	.14	.00	300	442	142	340	121	368	5070
MIN	4.5	1.5	.15	.00	.00	.00	44	35	28	7.4	5.4	110
CFSM	.05	.04	.004	.000	.000	.39	.99	.55	.76	.28	.18	5.25
IN.	.06	.04	.00	.00	.00	.45	1.10	.64	.85	.32	.21	5.86

CAL YR 1976 TOTAL 48347.29 MEAN 132 MAX 2800 MIN .15 CFSM .94 IN 12.85
WTR YR 1977 TOTAL 35837.34 MEAN 98.2 MAX 5070 MIN .00 CFSM .70 IN 9.52

NOTE.--No gage-height record Dec. 20 to Apr. 12.

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 B indicates non-ideal colony count.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	FECAL COLIFORM .7UM-MF (COL./100 ML) (31625)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML) (31673)	HARDNESS (CA,MG) (MG/L) (00900)
OCT										
20...	1300	6.6	134	8.1	3.0	1.0	1	--	--	57
NOV										
30...	1215	1.4	195	7.9	.0	.0	1	B1	2	77
APR										
05...	1130	27	112	7.4	-2.5	.5	3	<1	250	47
MAY										
17...	1045	57	115	7.4	13.0	16.0	1	1	46	49
JUN										
28...	1500	61	98	8.2	20.0	21.0	1	6	27	46
AUG										
09...	1145	11	115	8.2	20.0	18.0	1	B13	49	49
SEP										
20...	1145	288	77	8.1	10.5	12.0	2	47	69	41

DATE	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)
OCT									
20...	5	15	4.8	4.8	15	.3	.4	53	8.9
NOV									
30...	10	20	6.6	6.8	16	.3	.5	67	12
APR									
05...	30	12	4.1	3.2	13	.2	1.0	16	26
MAY									
17...	25	13	4.0	3.3	13	.2	.5	24	26
JUN									
28...	24	12	3.9	2.8	12	.2	.4	22	15
AUG									
09...	11	13	4.0	4.0	15	.2	.5	38	9.5
SEP									
20...	21	11	3.3	2.5	12	.2	.4	21	13

DATE	DISSOLVED CHLORIDE (CL) (MG/L) (00940)	DISSOLVED FLUORIDE (F) (MG/L) (00950)	DISSOLVED SILICA (SIO2) (MG/L) (00955)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DISSOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	TOTAL PHOSPHORUS (P) (MG/L) (00665)
OCT									
20...	4.5	.3	7.9	80	78	1.43	.00	.12	.01
NOV									
30...	6.5	.3	9.7	138	103	.54	.26	.17	.00
APR									
05...	3.7	.1	8.8	105	69	7.68	1.3	1.1	.02
MAY									
17...	3.1	.3	3.1	85	68	13.1	.14	.45	.00
JUN									
28...	2.0	.2	6.3	85	56	14.1	.06	.79	.01
AUG									
09...	3.3	.3	4.3	73	62	2.17	.00	.37	.01
SEP									
20...	2.7	1.5	17	98	64	76.2	.12	--	.01

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	TOTAL ARSENIC (AS) (UG/L) (01002)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	TOTAL CAD-MIUM (CD) (UG/L) (01027)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	TOTAL CHRO-MIUM (CR) (UG/L) (01034)	DIS-SOLVED CHRO-MIUM (CR) (UG/L) (01030)	TOTAL COBALT (CO) (UG/L) (01037)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	TOTAL COPPER (CU) (UG/L) (01042)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	TOTAL IRON (FE) (UG/L) (01045)
OCT 20...	1300	0	0	<10	1	0	0	<50	1	<10	3	80
AUG 09...	1145	0	0	20	1	0	0	<50	0	10	10	60

DATE	DIS-SOLVED IRON (FE) (UG/L) (01046)	TOTAL LEAD (PB) (UG/L) (01051)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	TOTAL MAN-GANESE (MN) (UG/L) (01055)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	TOTAL MERCURY (HG) (UG/L) (71900)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	TOTAL SELE-NIUM (SE) (UG/L) (01147)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	TOTAL ZINC (ZN) (UG/L) (01092)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	TOTAL ORGANIC CARBON (C) (MG/L) (00680)
OCT 20...	50	<100	5	10	10	--	.0	0	0	0	0	4.0
AUG 09...	50	100	3	10	10	.0	.0	0	0	20	20	12

DATE	TIME	LENGTH OF EXPO-SURE (DAYS) (00022)	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M (00573)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M (00572)	CHLOR-A PERI-PHYTON CHROMO-SPECT-METRIC (MG/M2) (70955)	CHLOR-B PERI-PHYTON CHROMO-SPECT-METRIC (MG/M2) (70956)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS) (70950)	SAMPLING METHOD
OCT 20...	1300	41	110	97.6	.150	.009	82050	POLYETHYLENE STRIP

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	OCT 20,76	NOV 30,76	MAY 17,77	JUN 28,77	AUG 9,77	SEP 20,77
TIME	1300	1215	1045	1500	1145	1145
TOTAL CELLS/ML	35000	55	1800	230	240	630
DIVERSITY: DIVISION	0.9	0.0	1.1	1.0	1.5	1.6
.CLASS	0.9	0.0	1.1	1.0	1.5	1.6
..ORDER	0.9	0.0	1.1	1.0	1.9	2.4
...FAMILY	0.9	1.3	2.5	2.4	3.0	3.3
....GENUS	0.9	1.3	2.5	2.9	3.1	3.3

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												
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	--	-	35	2	--	-	11	4	14	2
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-	14	2
....OOCYSTIS	1300	4	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	11	4	--	-
...SCENEDESMACEAE												
....SCENEDESMUS	--	-	--	-	18	1	--	-	53#	22	100#	16
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CARTERIA	--	-	--	-	--	-	--	-	--	-	14	2
..ZYGNEMATALES												
...DESMIDIACEAE												
....BAMBUSINA	--	-	--	-	--	-	--	-	--	-	14	2
....COSMARIUM	--	-	--	-	--	-	27	11	16	7	--	-
...ZYGNEMATACEAE												
....MOUGEOTIA	--	-	--	-	18	1	--	-	--	-	86	14
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	5500#	16	--	-	--	-	--	-	5	2	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	23#	41	480#	26	87#	37	5	2	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	20	9	--	-	--	-
...CYMBELLACEAE												
....CYMBELLA	--	-	--	-	--	-	3	1	21	9	29	5
...DIATOMACEAE												
....DIATOMA	--	-	3	6	530#	29	27	11	--	-	--	-
...FRAGILARIACEAE												
....FRAGILARIA	--	-	--	-	18	1	7	3	--	-	--	-
....SYNEDRA	--	-	29#	53	190	11	23	10	48#	20	57	9
...GOMPHONEMATACEAE												
....GOMPHONEMA	--	-	--	-	18	1	17	7	5	2	29	5
...NAVICULACEAE												
....NAVICULA	--	-	--	-	53	3	--	-	11	4	57	9
...NITZSCHIACEAE												
....NITZSCHIA	--	-	--	-	--	-	3	1	5	2	14	2
...SURIRELLACEAE												
....SURIRELLA	--	-	--	-	18	1	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROCOCCALES												
...CHROCOCCACEAE												
....ANACYSTIS	--	-	--	-	420#	23	--	-	53#	22	86	14
..HORMOGONALES												
...OSCILLATORIACEAE												
....OSCILLATORIA	28000#	80	--	-	--	-	--	-	--	-	110#	18
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	--	-	18	1	--	-	--	-	--	-
....TRACHELOMONAS	*	0	--	-	--	-	10	4	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..PERIDINIALES												
...PERIDINIACEAE												
....PERIDINIUM	--	-	--	-	--	-	10	4	--	-	--	-

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

04014500 BAPTISM RIVER NEAR BEAVER BAY, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

SUSPENDED-SEDIMENT DISCHARGE

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)	SUS. SED. FALL DIAM. % FINER THAN .062 MM
NOV						
30...	1215	1.4	.0	1	.00	--
APR						
05...	1115	27	.5	14	1.0	88
MAY						
17...	1045	57	16.0	16	2.5	77
JUN						
28...	1545	62	21.0	1	.17	--
AUG						
09...	1145	11	18.0	6	.18	--
SEP						
20...	1120	288	12.0	4	3.1	80

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, which are fair.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,320 ft^3/s (122 m^3/s) Sept. 24, 1977, gage height, 8.94 ft (2.725 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)
Sept. 24	1030	4,320	122	8.94	2.725

Minimum discharge, no flow Dec. 2 to Mar. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.0	3.5	.01	.00	.00	.00	78	34	78	18	31	49
2	1.9	3.4	.00	.00	.00	.00	68	29	76	11	21	32
3	1.9	3.2	.00	.00	.00	.00	60	24	44	12	15	23
4	2.3	2.9	.00	.00	.00	.00	54	21	36	18	14	375
5	2.3	2.7	.00	.00	.00	.10	46	42	28	17	12	236
6	3.8	2.6	.00	.00	.00	.25	38	75	21	13	8.2	342
7	3.8	2.4	.00	.00	.00	.60	30	51	17	9.1	5.9	225
8	3.2	2.3	.00	.00	.00	1.4	21	38	15	5.8	4.8	124
9	3.2	2.2	.00	.00	.00	4.0	28	28	14	4.3	3.8	83
10	3.2	2.0	.00	.00	.00	9.0	37	23	13	2.4	3.2	71
11	3.4	1.9	.00	.00	.00	21	52	25	11	2.4	3.3	48
12	3.4	1.8	.00	.00	.00	55	58	28	8.8	3.2	1.7	33
13	3.2	1.7	.00	.00	.00	150	60	23	6.9	3.9	1.4	25
14	2.7	1.6	.00	.00	.00	378	53	20	5.5	2.7	1.2	20
15	2.5	1.6	.00	.00	.00	270	51	19	5.2	2.1	1.2	17
16	2.7	1.5	.00	.00	.00	160	46	26	4.7	4.9	1.7	15
17	2.5	1.4	.00	.00	.00	87	58	27	5.8	35	2.2	13
18	2.5	1.3	.00	.00	.00	78	69	93	7.3	25	3.0	12
19	2.9	1.2	.00	.00	.00	70	143	69	7.0	13	1.8	131
20	2.9	1.2	.00	.00	.00	63	119	48	8.1	8.4	1.7	183
21	3.6	1.1	.00	.00	.00	58	284	34	6.3	5.4	1.8	116
22	3.6	1.0	.00	.00	.00	55	225	39	4.6	3.5	7.9	79
23	3.4	.97	.00	.00	.00	51	142	72	46	2.3	5.2	128
24	3.4	.88	.00	.00	.00	48	100	62	62	2.2	4.2	3150
25	3.4	.54	.00	.00	.00	45	74	38	29	1.9	2.9	1920
26	3.5	.20	.00	.00	.00	44	58	25	14	1.5	4.2	839
27	3.5	.13	.00	.00	.00	46	49	18	8.9	1.3	19	426
28	3.5	.11	.00	.00	.00	60	40	13	7.0	1.6	71	278
29	3.6	.09	.00	.00	---	90	33	9.7	5.1	2.1	48	240
30	3.6	.03	.00	.00	---	112	35	8.3	11	5.1	27	189
31	3.6	---	.00	.00	---	94	---	13	---	42	37	---
TOTAL	95.0	47.45	.01	.00	.00	2030.35	2209	1075.0	606.2	280.1	366.3	9422
MEAN	3.06	1.58	.000	.000	.000	65.5	73.6	34.7	20.2	9.04	11.8	314
MAX	3.8	3.5	.01	.00	.00	378	284	93	78	42	71	3150
MIN	1.9	.03	.00	.00	.00	.00	21	8.3	4.6	1.3	1.2	12
CFSM	.04	.02	.000	.000	.000	.77	.86	.41	.24	.11	.14	3.67
IN.	.04	.02	.00	.00	.00	.88	.96	.47	.26	.12	.16	4.09

CAL YR 1976 TOTAL 20133.51 MEAN 55.0 MAX 1330 MIN .00 CFSM .64 IN 8.75
WTR YR 1977 TOTAL 16131.41 MEAN 44.2 MAX 3150 MIN .00 CFSM .52 IN 7.01

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, on left bank, 65 ft upstream from twin culverts on National Forest Development Road 116, 4.5 miles upstream from mouth, 10 miles northeast of Hoyt Lakes and 10 miles south of Babbitt.

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

PERIOD OF RECORD.--June to September 1977.

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

REMARKS.--Records good.

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

EXTREMES FOR CURRENT PERIOD.--Maximum discharge during period June to September, 82 ft^3/s (2.32 m^3/s) Sept. 26, gage height, 3.05 ft (0.930 m); minimum, 0.59 ft^3/s (0.017 m^3/s) Aug. 19, 20, gage height, 0.76 ft (0.232 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1									45	13	1.0	57
2									58	12	.98	51
3									46	25	.98	40
4									34	32	.97	59
5									25	32	.96	74
6									20	26	.92	67
7									18	19	.90	54
8									17	14	.87	39
9									16	9.9	.83	48
10									11	6.8	.78	57
11									8.4	5.2	.74	52
12									6.2	4.4	.71	47
13									4.7	3.9	.69	40
14									3.9	3.5	.66	34
15									3.2	2.8	.65	35
16									3.6	4.2	.68	27
17									3.5	6.5	.66	21
18									6.2	5.0	.63	17
19									10	4.1	.61	17
20									14	3.4	.68	17
21									10	2.6	.76	15
22									7.0	1.8	.75	14
23									12	1.5	.72	16
24									15	1.3	.69	31
25									12	1.2	.74	66
26									8.1	1.1	.86	81
27									5.8	1.1	4.0	76
28									5.8	1.0	31	63
29									6.2	1.0	32	64
30									8.4	1.0	34	67
31									---	1.0	52	---
TOTAL									444.0	247.3	173.42	1346
MEAN									14.8	7.98	5.59	44.9
MAX									58	32	52	81
MIN									3.2	1.0	.61	14
CFSM									.80	.43	.30	2.43
IN.									.89	.50	.35	2.71

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.14W., St. Louis County, Hydrologic Unit 04010201, 10 ft (3.0 m) downstream from bridge on County Highway 110, 1 mi (1.6 km) east of Hoyt Lakes.

DRAINAGE AREA.--106 mi^2 (275 km^2), approximately.

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

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

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

REMARKS.--The recorder malfunotioned causing a loss of more than 20 percent in missing days.

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	192	189	191	196	191	194	273	269	272			
2	193	190	191	196	193	194	275	269	272			
3	193	190	192	193	191	192	278	273	275			
4	192	181	186	193	190	192	285	275	281			
5	189	186	188	194	191	193	285	284	285			
6	189	187	188	197	194	195	285	283	284			
7	189	187	188	210	198	205	284	278	282			
8	188	185	187	220	211	216	288	275	282			
9	187	184	185	220	218	219	291	288	290			
10	188	183	186	220	216	217	294	291	292			
11	188	184	187	226	221	224	296	294	295			
12	188	184	186	228	226	228	298	296	296			
13	186	184	185	231	228	230	298	295	297			
14	185	184	185	233	231	232	298	297	298			
15	185	183	184	236	233	234	299	297	298			
16	184	182	183	238	235	237	301	299	300			
17	183	180	182	238	237	237	302	301	302			
18	183	181	182	238	236	237	303	302	302			
19	184	180	182	238	237	237	306	303	305			
20	184	180	182	238	237	237	309	306	307			
21	182	180	181	238	237	238	314	309	311			
22	182	179	180	241	238	240	318	315	316			
23	188	180	184	245	241	243	318	316	317			
24	189	183	185	247	245	246	316	314	315			
25	187	184	185	248	246	247	315	313	314			
26	195	186	191	246	245	245	316	316	316			
27	198	188	192	251	245	248	319	316	317			
28	198	192	195	258	252	255	320	319	319			
29	193	190	192	266	259	261	321	319	320			
30	191	187	189	269	266	267	---	---	---			
31	192	188	190	---	---	---	---	---	---			
MONTH	198	179	187	269	190	228	321	269	299			

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1							---	---	---	---	---	---
2							---	---	---	---	---	---
3							---	---	---	---	---	---
4							---	---	---	---	---	---
5							---	---	---	---	---	---
6							---	---	---	---	---	---
7							---	---	---	---	---	---
8							---	---	---	---	---	---
9							---	---	---	---	---	---
10							---	---	---	---	---	---
11							---	---	---	---	---	---
12							---	---	---	---	---	---
13							---	---	---	254	236	245
14							---	---	---	274	255	265
15							---	---	---	278	258	269
16							---	---	---	291	274	283
17							---	---	---	301	296	299
18							---	---	---	299	294	296
19							---	---	---	295	284	289
20							---	---	---	284	295	266
21							---	---	---	255	249	251
22							---	---	---	249	238	243
23							---	---	---	240	235	237
24							---	---	---	235	214	222
25							---	---	---	215	201	207
26							---	---	---	201	183	192
27							202	189	195	184	177	180
28							189	182	184	177	174	175
29							183	178	180	176	174	175
30							183	178	181	180	176	178
31							---	---	---	180	151	169

		JUNE			JULY			AUGUST			SEPTEMBER	
1	156	149	152	154	147	151	203	195	200	87	84	87
2	152	137	147	154	142	150	209	199	204	---	---	---
3	137	130	132	150	143	144	210	199	204	---	---	---
4	130	129	130	144	135	140	216	209	212	---	---	---
5	130	129	129	135	126	132	219	214	217	---	---	---
6	131	130	130	127	113	123	221	215	219	---	---	---
7	134	131	132	120	116	118	225	220	222	---	---	---
8	137	133	135	121	109	114	229	223	226	---	---	---
9	142	137	139	245	107	118	231	226	229	---	---	---
10	146	143	143	116	113	115	234	228	232	---	---	---
11	151	146	149	119	115	117	235	227	231	---	---	---
12	156	152	153	122	117	120	238	232	235	---	---	---
13	160	154	157	129	122	126	242	229	237	---	---	---
14	165	160	163	136	127	132	246	238	242	---	---	---
15	170	165	167	141	137	139	246	233	244	---	---	---
16	171	163	167	144	138	141	248	244	246	---	---	---
17	175	169	172	145	141	143	251	244	247	---	---	---
18	173	170	171	149	144	146	251	246	249	---	---	---
19	185	174	179	152	144	148	252	240	249	---	---	---
20	196	183	190	163	153	157	252	227	238	---	---	---
21	196	182	191	174	163	170	238	228	234	---	---	---
22	183	164	173	180	174	177	241	237	239	---	---	---
23	163	140	147	178	177	177	244	237	242	---	---	---
24	141	136	139	181	177	179	244	231	240	---	---	---
25	156	136	148	183	175	181	243	193	233	---	---	---
26	158	155	157	185	181	183	225	207	222	---	---	---
27	154	146	150	186	184	185	209	175	198	---	---	---
28	148	143	145	189	185	187	187	153	169	---	---	---
29	147	143	146	192	186	190	153	116	135	---	---	---
30	146	133	145	194	188	191	114	90	101	---	---	---
31	---	---	---	199	195	197	92	87	90	---	---	---

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

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	13.5	11.0	12.5	3.0	1.5	2.5	0.5	0.5	0.5	1.0	1.0	1.0
2	13.5	10.5	12.0	3.5	2.5	3.0	0.5	0.5	0.5	1.0	1.0	1.0
3	13.5	11.5	12.5	3.0	1.5	2.5	1.0	0.5	0.5	1.0	1.0	1.0
4	13.5	12.0	13.0	1.5	1.0	1.5	1.0	0.5	0.5	1.0	1.0	1.0
5	11.5	9.5	10.5	1.5	0.5	1.0	1.0	0.5	1.0	1.0	1.0	1.0
6	9.5	8.0	8.5	1.0	0.5	0.5	1.0	0.5	1.0	1.0	1.0	1.0
7	8.5	7.0	8.0	0.5	0.0	0.5	1.0	0.5	1.0	1.0	1.0	1.0
8	7.0	6.5	6.5	0.5	0.0	0.5	1.0	0.5	1.0	1.0	1.0	1.0
9	7.0	6.0	6.5	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.5	0.5
10	9.0	6.0	7.5	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.5
11	10.0	7.0	8.5	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.5
12	10.0	8.0	9.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.5	1.0
13	9.5	8.0	8.5	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0
14	9.0	7.5	8.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0
15	8.0	6.0	7.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.5
16	6.0	5.0	5.5	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.5
17	5.5	4.5	5.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.5	1.0
18	5.0	4.5	4.5	0.5	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0
19	5.0	4.5	4.5	0.5	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
20	4.5	4.0	4.5	0.5	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
21	4.5	4.0	4.0	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
22	4.0	3.5	4.0	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0
23	4.0	3.0	3.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	0.5	1.0
24	4.5	3.5	4.0	0.5	0.5	0.5	1.0	1.0	1.0	1.0	0.5	1.0
25	4.0	3.0	3.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	0.5	0.5
26	4.0	2.5	3.5	0.5	0.5	0.5	1.0	1.0	1.0	0.5	0.5	0.5
27	4.0	2.0	3.0	0.5	0.5	0.5	1.0	1.0	1.0	0.5	0.5	0.5
28	3.5	2.0	2.5	0.5	0.5	0.5	1.0	1.0	1.0	0.5	0.5	0.5
29	3.5	2.0	2.5	0.5	0.5	0.5	1.0	1.0	1.0	0.5	0.5	0.5
30	3.0	1.5	2.5	0.5	0.5	0.5	1.0	0.0	0.5	0.5	0.5	0.5
31	3.0	1.5	2.5	---	---	---	1.0	0.0	0.5	0.5	0.5	0.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	0.5	0.5	0.5				---	---	---	---	---	---
2	0.5	0.5	0.5				---	---	---	---	---	---
3	0.5	0.5	0.5				---	---	---	---	---	---
4	0.5	0.5	0.5				---	---	---	---	---	---
5	0.5	0.0	0.5				---	---	---	---	---	---
6	0.5	0.0	0.0				---	---	---	---	---	---
7	0.5	0.0	0.0				---	---	---	---	---	---
8	0.0	0.0	0.0				---	---	---	---	---	---
9	0.0	0.0	0.0				---	---	---	---	---	---
10	0.0	0.0	0.0				---	---	---	---	---	---
11	0.0	0.0	0.0				---	---	---	---	---	---
12	---	---	---				---	---	---	---	---	---
13	---	---	---				---	---	---	22.0	18.0	20.5
14	---	---	---				---	---	---	23.5	19.5	21.5
15	---	---	---				---	---	---	22.0	19.5	21.0
16	---	---	---				---	---	---	23.0	19.0	21.0
17	---	---	---				---	---	---	21.5	19.5	21.0
18	---	---	---				---	---	---	23.5	19.0	21.5
19	---	---	---				---	---	---	23.5	21.0	22.0
20	---	---	---				---	---	---	22.0	19.5	21.0
21	---	---	---				---	---	---	21.0	18.5	19.5
22	---	---	---				---	---	---	20.0	18.5	19.5
23	---	---	---				---	---	---	19.0	18.5	18.5
24	---	---	---				---	---	---	20.5	16.5	18.5
25	---	---	---				---	---	---	22.0	18.5	20.0
26	---	---	---				---	---	---	23.0	19.5	21.0
27	---	---	---				13.5	12.0	13.0	24.5	21.0	22.5
28	---	---	---				14.0	11.5	12.5	24.5	22.0	23.5
29	---	---	---				13.5	11.0	12.5	23.5	20.5	22.0
30	---	---	---				16.0	12.5	14.0	22.5	19.5	21.0
31	---	---	---				---	---	---	22.0	18.0	20.0

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

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

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

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, revised.

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) above mean sea level, 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.--22 years, 22.4 ft^3/s (0.634 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, 92 ft^3/s (2.61 m^3/s) Aug. 27, gage height, 4.61 ft (1.405 m); maximum gage height, 4.90 ft (1.494 m) Mar. 12 (backwater from ice); minimum daily discharge, 1.2 ft^3/s (0.034 m^3/s) Oct. 17, creek dammed upstream to flood swamp fire; minimum gage height, 3.09 ft (0.942 m) Oct. 16, 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	16	7.5	7.0	6.0	8.0	16	4.9	32	17	12	54
2	13	18	8.0	7.5	5.7	8.1	12	5.2	40	16	9.3	47
3	11	20	9.0	8.0	5.6	8.0	12	6.9	35	21	13	42
4	21	20	11	8.6	5.4	8.0	11	8.8	29	27	12	65
5	20	19	18	9.0	4.7	8.2	11	13	22	27	10	58
6	17	17	17	8.8	3.9	8.0	6.3	14	22	22	14	54
7	19	16	16	8.0	3.6	8.3	5.7	11	20	19	14	49
8	21	13	16	7.2	3.4	8.7	8.4	10	17	16	12	43
9	20	15	16	6.8	3.2	9.2	6.3	8.7	13	15	8.3	50
10	19	21	16	6.5	3.9	11	8.2	7.6	9.8	13	7.0	51
11	16	20	16	6.0	6.0	13	9.3	7.9	9.9	13	5.9	49
12	17	19	16	5.7	5.9	25	12	8.1	9.9	11	5.9	47
13	17	17	16	5.5	6.0	27	12	5.5	10	11	5.9	48
14	15	15	16	5.6	6.5	24	7.8	5.4	10	9.9	6.4	46
15	14	15	16	5.7	6.4	20	8.5	7.1	8.5	8.3	6.1	39
16	1.8	16	16	5.8	6.5	17	8.6	7.0	11	11	5.6	36
17	1.2	16	16	5.8	6.6	14	10	8.6	14	14	4.4	35
18	1.8	15	16	5.8	6.6	13	12	6.7	17	11	3.9	35
19	6.4	13	16	5.9	6.5	11	14	5.5	19	9.8	3.5	39
20	36	13	11	6.0	6.4	10	13	12	20	16	7.4	34
21	23	14	8.0	6.2	6.4	9.3	20	15	19	16	15	31
22	20	14	13	6.4	6.5	9.0	18	18	19	14	18	31
23	18	14	15	6.6	7.0	9.3	17	18	25	13	16	30
24	18	14	15	6.8	7.7	8.0	14	16	28	12	14	40
25	17	14	15	7.2	7.7	8.4	11	15	28	12	8.6	46
26	16	14	15	7.6	7.6	11	9.0	13	21	7.7	15	46
27	16	12	14	7.5	7.6	16	8.1	9.7	19	7.4	46	45
28	17	10	14	7.2	7.7	17	7.8	8.9	16	8.6	76	44
29	17	9.0	13	7.0	---	19	5.4	8.5	16	9.6	65	48
30	17	7.0	9.0	6.7	---	21	5.6	7.6	15	12	63	45
31	16	---	7.6	6.4	---	15	---	13	---	13	63	---
TOTAL	504.2	456.0	428.1	210.8	167.0	402.5	320.0	306.6	575.1	433.3	566.2	1327
MEAN	16.3	15.2	13.8	6.80	5.96	13.0	10.7	9.89	19.2	14.0	18.3	44.2
MAX	36	21	18	9.0	7.7	27	20	18	40	27	76	65
MIN	1.2	7.0	7.5	5.5	3.2	8.0	5.4	4.9	8.5	7.4	3.5	30

CAL YR 1976 TOTAL 6654.8 MEAN 18.2 MAX 85 MIN 1.2
WTR YR 1977 TOTAL 5696.8 MEAN 15.6 MAX 76 MIN 1.2

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, revised.

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) above mean sea level. Aug. 5, 1942, to Aug. 25, 1944, nonrecording gage, and Aug. 26, 1944, to July 1, 1956, water-stage recorder at site 45 ft (14 m) downstream at same datum.

REMARKS.--Records good. Flow regulated at times by storage in off-channel Partridge Reservoir, formerly known as Whitewater Lake. Reservoir formed from lake by levees around marsh areas and natural outlet. Usable capacity, 20,000 acre-ft (24.7 hm^3) between elevations 1,410 ft (430 m), natural lake level, and 1,440 ft (439 m). Storage began Apr. 9, 1955. Storage in reservoir obtained from Colby Lake during periods of high flow; release from storage returned to Colby Lake to maintain lake elevation during diversion for iron-ore processing. Diversion began Feb. 7, 1956. Some seepage losses from reservoir bypass station. Flow also affected by mining activities in Second Creek basin (see sta 04015500).

AVERAGE DISCHARGE (adjusted for storage and diversion).--35 years, 126 ft^3/s (3.568 m^3/s), 10.83 in/yr (275 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, 734 ft^3/s (20.8 m^3/s) Sept. 29, gage height, 4.66 ft (1.420 m); minimum daily. 2.9 ft^3/s (0.082 m^3/s) Oct. 17; minimum gage height, 0.93 ft (0.283 m) Oct. 17, 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	17	8.5	8.1	7.7	9.5	17	9.3	40	22	30	273
2	14	19	9.8	9.2	7.5	9.5	14	9.2	44	24	27	416
3	13	21	10	10	7.4	9.3	13	11	39	47	30	496
4	20	21	15	11	7.2	9.2	13	13	34	49	28	622
5	22	20	18	11	6.6	9.3	13	17	28	55	27	648
6	18	19	17	11	5.2	9.3	8.8	20	27	48	27	664
7	20	17	16	10	4.7	9.5	7.2	17	24	46	27	657
8	21	15	16	9.2	4.1	10	8.8	17	22	46	25	614
9	21	19	16	8.5	3.8	13	7.1	15	19	48	22	578
10	20	24	16	8.3	5.5	16	9.4	13	15	48	20	539
11	17	23	16	8.1	7.7	17	13	13	16	50	17	513
12	18	22	16	7.4	7.2	31	16	14	15	52	16	500
13	18	20	16	7.0	7.6	32	17	11	15	47	16	470
14	17	18	16	7.2	10	28	13	10	15	43	15	426
15	17	17	16	7.4	8.8	25	13	13	13	39	15	370
16	5.7	18	16	7.2	7.8	19	13	14	16	42	16	331
17	2.9	19	16	7.2	8.2	16	15	15	19	48	15	293
18	3.1	17	16	7.5	8.0	14	18	13	23	46	15	264
19	4.6	16	16	7.5	8.0	12	20	11	24	48	14	281
20	32	15	12	7.5	7.8	11	20	18	24	46	21	309
21	24	16	9.2	8.1	7.9	9.5	27	26	24	48	28	295
22	22	16	14	8.3	7.8	9.1	25	27	23	45	30	272
23	20	16	15	8.3	8.6	9.2	23	27	29	39	28	253
24	20	16	15	8.5	9.0	8.1	20	24	31	38	26	278
25	20	16	15	9.6	8.6	8.8	17	21	31	36	23	371
26	20	16	15	10	8.6	11	15	21	26	31	31	535
27	18	14	14	9.6	9.4	18	13	19	24	29	78	657
28	18	12	14	9.5	9.3	17	13	15	21	30	135	707
29	19	10	14	9.3	---	21	10	14	20	29	114	713
30	19	8.3	11	8.8	---	24	9.9	13	21	32	145	666
31	18	---	9.6	8.2	---	17	---	17	---	32	214	---
TOTAL	544.3	517.3	444.1	268.5	210.0	462.3	442.2	497.5	722	1283	1275	14011
MEAN	17.6	17.2	14.3	8.66	7.50	14.9	14.7	16.0	24.1	41.4	41.1	467
MAX	32	24	18	11	10	32	27	27	44	55	214	713
MIN	2.9	8.3	8.5	7.0	3.8	8.1	7.1	9.2	13	22	14	253
(†)	-.07	-.09	+.56	-.02	-.02	+3.04	+13.4	+41.6	+127	+26.1	+24.8	+6.67
MEAN ‡	17.5	17.1	14.9	8.64	7.48	17.9	28.1	57.6	151	67.5	65.9	474
CFSM ‡	.11	.11	.09	.05	.05	.11	.17	.36	.94	.42	.41	2.94
IN ‡	.13	.12	.11	.06	.05	.13	.20	.41	1.05	.48	.47	3.28

CAL YR 1976 TOTAL 21987.7 MEAN 60.1 MAX 909 MIN 2.9 MEAN ‡ 79.6 CFSM ‡ 0.49 IN ‡ 6.73
WTR YR 1977 TOTAL 20677.2 MEAN 56.6 MAX 713 MIN 2.9 MEAN ‡ 76.9 CFSM ‡ 0.48 IN ‡ 6.49

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

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, revised.

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) above mean sea level. Prior to Aug. 26, 1944, nonrecording gage at same site and datum.

REMARKS.--Records good except those for winter period, which are poor. 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 Seoond Creek basin (see sta 04015500).

AVERAGE DISCHARGE (adjusted for storage and diversion).--35 years, 244 ft^3/s (6.910 m^3/s), 11.51 in/yr (292 mm/yr).

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,200 ft^3/s (34.0 m^3/s) Sept. 29, gage height, 3.87 ft (1.180 m); minimum daily, 4.0 ft^3/s (0.11 m^3/s) Jan. 29 to Feb. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	24	16	4.8	4.0	4.3	30	21	96	180	63	516
2	23	24	15	4.7	4.0	4.4	28	20	86	180	56	696
3	21	26	14	4.7	4.0	4.5	25	19	121	215	61	762
4	28	26	15	4.7	4.0	4.6	22	24	137	230	55	982
5	34	26	15	4.6	4.0	4.8	20	29	115	256	51	1060
6	26	25	16	4.6	4.0	5.5	18	33	121	273	46	1100
7	26	23	14	4.5	4.0	7.0	16	29	113	270	48	1050
8	28	21	13	4.5	4.0	10	15	26	113	256	44	988
9	29	22	12	4.5	4.0	14	14	24	106	239	39	1020
10	27	24	11	4.5	4.0	28	15	22	99	224	35	1020
11	25	28	11	4.5	4.1	40	16	23	94	215	34	982
12	24	27	10	4.5	4.1	59	17	22	91	203	29	946
13	24	25	10	4.5	4.1	60	17	21	85	182	29	898
14	23	24	10	4.5	4.1	53	14	19	82	162	29	844
15	23	23	9.8	4.5	4.1	47	13	26	79	148	30	768
16	19	24	9.6	4.5	4.1	42	14	29	86	150	28	696
17	13	25	9.4	4.4	4.2	38	17	26	80	180	27	630
18	12	24	9.2	4.4	4.2	34	21	20	88	188	26	580
19	13	23	8.6	4.4	4.2	30	29	18	94	177	25	615
20	38	21	7.8	4.3	4.2	27	26	31	91	157	32	615
21	32	21	7.2	4.3	4.2	24	40	45	85	148	41	570
22	88	21	6.8	4.3	4.2	22	45	50	77	133	39	530
23	26	20	6.4	4.2	4.2	20	42	57	101	115	39	498
24	26	20	6.0	4.2	4.2	19	40	64	113	104	35	580
25	26	20	5.7	4.2	4.2	18	40	75	119	93	35	814
26	26	20	5.5	4.1	4.2	19	45	69	115	80	48	1050
27	24	20	5.3	4.1	4.2	21	32	62	106	72	101	1150
28	24	19	5.2	4.1	4.3	29	27	53	129	72	224	1160
29	25	19	5.1	4.0	---	35	24	46	159	64	224	1180
30	25	18	5.0	4.0	---	37	24	40	177	67	301	1140
31	24	---	4.9	4.0	---	34	---	53	---	68	408	---
TOTAL	774	683	299.5	136.1	115.1	795.1	746	1096	3158	5101	2282	25440
MEAN	25.0	22.8	9.66	4.39	4.11	25.6	24.9	35.4	105	165	73.6	848
MAX	38	28	16	4.8	4.3	60	45	75	177	273	408	1180
MIN	12	18	4.9	4.0	4.0	4.3	13	18	77	64	25	498
(†)	-.07	-.09	+.56	-.02	-.02	+3.04	+13.4	+41.6	+127	+26.1	+24.8	+6.67
MEAN ‡	24.9	22.7	10.2	4.37	4.09	28.6	38.3	77.0	232	191	98.4	855
CFSM ‡	.09	.08	.04	.02	.01	.10	.13	.27	.80	.66	.34	2.95
IN ‡	.10	.09	.04	.02	.01	.11	.15	.31	.89	.76	.39	3.29

CAL YR 1976 TOTAL 53281.5 MEAN 146 MAX 1980 MIN 4.9 MEAN ‡ 165 CFSM ‡ .57 IN ‡ 7.75
WTR YR 1977 TOTAL 40625.8 MEAN 111 MAX 1180 MIN 4.0 MEAN ‡ 132 CFSM ‡ .46 IN ‡ 6.16

† 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.
NOTE.--No gage-height record Jan. 3 to Apr. 11.

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) above mean sea level. Prior to Oct. 28, 1964, nonreoording gage at same site and datum.

REMARKS.--Records good except those for the winter periods, which are poor. Natural flow of stream affected by continually changing iron-mining activities that include diversions for iron-ore processing, regulation of storage reservoirs and tailing ponds, and mine pit dewatering. There is some regulation at medium and low flows by Eveleth Taconite Company dam 0.5 mi (0.8 km) upstream.

AVERAGE DISCHARGE.--13 years, 543 ft^3/s (15.38 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,610 ft^3/s (159 m^3/s) Apr. 16, 1971, gage height, 16.20 ft (4.938 m), result of release of storage behind ice jam at dam 0.5 mi (0.8 km) upstream; maximum daily discharge, 5,170 ft^3/s (146 m^3/s) Apr. 18, 1969; maximum gage height, 16.27 ft (4.959 m) Apr. 15, 1971 (backwater from ice); minimum daily discharge, 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, 2,210 ft^3/s (62.6 m^3/s) Sept. 7, gage height, 11.00 ft (3.353 m); minimum daily discharge, 28 ft^3/s (0.68 m^3/s) Feb. 10-15; minimum gage height, 5.24 ft (1.597 m) Nov. 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	43	70	56	41	31	34	135	158	287	463	143	1170
2	41	73	54	40	31	33	106	123	356	434	158	1320
3	57	74	53	40	31	33	143	129	249	439	120	1480
4	42	72	52	40	30	32	103	112	396	468	112	1750
5	56	79	52	39	30	32	117	115	398	478	152	2020
6	57	91	51	39	30	32	103	130	395	492	152	2170
7	64	40	51	39	29	40	101	133	395	493	140	2200
8	50	42	50	38	29	100	89	124	399	486	135	2140
9	49	100	50	38	29	55	87	113	393	470	115	2140
10	71	37	49	38	28	32	89	101	361	446	61	2120
11	66	80	49	38	28	30	66	76	328	339	106	2090
12	40	37	49	37	28	30	63	62	300	411	103	2060
13	41	90	48	37	28	70	95	85	153	399	95	1980
14	42	37	48	37	28	80	89	86	248	350	80	1860
15	45	55	47	36	28	70	89	87	253	330	42	1730
16	109	70	47	36	29	58	66	99	245	311	78	1580
17	40	60	46	36	31	50	50	103	245	330	93	1450
18	41	51	46	35	33	50	129	79	239	344	59	1320
19	41	42	45	35	34	60	129	67	249	337	40	1240
20	41	55	45	35	35	60	129	131	135	317	71	1250
21	87	60	44	34	35	60	184	126	270	285	106	1200
22	41	55	44	34	35	55	155	176	261	253	109	1120
23	93	75	44	34	35	45	175	206	301	231	80	1070
24	41	70	43	33	35	36	164	167	406	210	63	1170
25	87	50	43	33	35	50	161	204	416	196	95	1420
26	42	55	43	33	35	60	158	186	399	126	109	1670
27	68	80	42	32	35	70	166	209	374	172	143	1860
28	123	70	42	32	34	87	164	202	363	178	373	1980
29	46	60	42	32	---	138	101	191	343	175	498	2040
30	41	58	41	32	---	143	115	186	438	164	706	2050
31	70	---	41	31	---	140	---	192	---	120	960	---
TOTAL	1775	1888	1457	1114	879	1865	3521	4158	9595	10247	5297	50650
MEAN	57.3	62.9	47.0	35.9	31.4	60.2	117	134	320	331	171	1688
MAX	123	100	56	41	35	143	184	209	438	493	960	2200
MIN	40	37	41	31	28	30	50	62	135	120	40	1070
CFSM	.08	.09	.07	.05	.04	.08	.16	.19	.45	.46	.24	2.37
IN.	.09	.10	.08	.06	.05	.10	.18	.22	.50	.53	.28	2.64

CAL YR 1976 TOTAL 118618 MEAN 324 MAX 2910 MIN 37 CFSM .45 IN 6.19
WTR YR 1977 TOTAL 92446 MEAN 253 MAX 2200 MIN 28 CFSM .36 IN 4.82

NOTE.--No gage-height record Nov. 29 to Jan. 5.

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.--11 years, 31.8 ft^3/s (0.901 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, 114 ft^3/s (3.23 m^3/s) Aug. 29, gage height, 7.00 ft (2.134 m); minimum daily, 4.1 ft^3/s (0.12 m^3/s) Aug. 19; minimum gage height, 2.59 ft (0.789 m) Aug. 19, 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.9	4.9	6.3	5.6	5.2	9.2	12	7.9	21	12	5.6	105
2	4.9	4.5	6.2	5.6	5.1	9.5	12	7.6	24	11	5.8	85
3	4.7	4.5	6.2	5.6	5.1	9.8	12	7.8	20	11	5.9	60
4	4.9	5.3	6.2	5.6	5.1	10	12	7.5	18	12	6.4	75
5	5.0	6.2	6.2	5.6	5.1	10	12	8.5	15	14	6.8	100
6	5.3	5.3	6.2	5.5	5.1	10	12	8.9	14	14	6.5	92
7	5.4	5.2	6.1	5.5	5.0	11	12	9.1	12	13	6.2	67
8	5.4	5.8	6.1	5.5	5.0	12	12	8.1	12	12	5.8	51
9	5.3	5.4	6.1	5.5	5.0	12	11	7.8	12	12	5.6	52
10	5.2	5.9	6.1	5.5	5.1	13	11	7.5	10	10	5.4	52
11	5.3	6.0	6.1	5.5	5.3	14	10	7.5	9.5	9.5	5.2	46
12	5.2	6.2	6.0	5.4	5.5	15	9.5	7.0	9.1	8.5	4.9	45
13	5.0	6.2	6.0	5.4	5.7	16	8.5	7.0	8.3	7.9	4.7	44
14	4.7	6.2	6.0	5.4	5.9	18	8.1	7.0	7.5	7.5	4.6	40
15	4.7	6.4	5.9	5.4	6.0	19	7.9	6.7	7.0	7.0	4.5	36
16	4.6	6.6	5.9	5.3	6.1	18	7.8	7.3	7.6	6.7	4.5	31
17	4.6	6.8	5.9	5.3	6.2	17	8.7	7.5	9.7	7.5	4.5	25
18	4.6	7.0	5.9	5.3	6.2	16	10	7.3	11	7.9	4.4	21
19	4.6	7.1	5.9	5.3	6.3	14	11	7.1	13	7.6	4.1	21
20	4.6	7.2	5.9	5.3	6.4	12	11	8.3	14	7.0	4.2	22
21	4.6	7.1	5.8	5.3	6.6	11	14	9.9	14	6.7	4.7	18
22	4.9	7.0	5.8	5.3	6.9	10	14	10	13	6.4	4.8	16
23	4.6	6.8	5.8	5.3	7.1	9.1	13	11	14	5.9	5.0	17
24	4.6	6.7	5.8	5.2	7.4	8.5	12	9.5	18	5.6	4.7	41
25	4.7	6.6	5.8	5.2	7.7	8.2	11	8.5	18	5.3	4.9	58
26	4.7	6.5	5.8	5.2	8.0	8.4	9.9	7.9	16	4.7	7.0	71
27	5.0	6.4	5.7	5.2	8.4	9.1	9.5	7.8	14	4.6	24	76
28	4.9	6.4	5.7	5.2	8.8	9.9	9.3	7.1	13	4.5	75	59
29	5.0	6.3	5.7	5.2	---	11	8.7	6.8	12	4.6	107	51
30	5.0	6.3	5.7	5.2	---	11	8.1	6.8	12	4.9	110	49
31	5.3	---	5.6	5.2	---	12	---	10	---	5.4	110	---
TOTAL	152.2	184.8	184.4	166.6	171.3	373.7	320.0	248.7	398.7	256.7	562.7	1526
MEAN	4.91	6.16	5.95	5.37	6.12	12.1	10.7	8.02	13.3	8.28	18.2	50.9
MAX	5.4	7.2	6.3	5.6	8.8	19	14	11	24	14	110	105
MIN	4.6	4.5	5.6	5.2	5.0	8.2	7.8	6.7	7.0	4.5	4.1	16

CAL YR 1976 TOTAL 6299.4 MEAN 17.2 MAX 263 MIN 4.5
WTR YR 1977 TOTAL 4545.8 MEAN 12.5 MAX 110 MIN 4.1

NOTE.--No gage-height record Dec. 24 to Apr. 10.

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) above mean sea level (Minnesota Highway Department bench mark).

REMARKS.--Records 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.--21 years, 44.4 ft^3/s (1.257 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 916 ft^3/s (25.9 m^3/s) Apr. 17, 1954, gage height, 9.85 ft (3.002 m), site and datum then in use; 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, 175 ft^3/s (4.96 m^3/s) Aug. 28, gage height, 4.64 ft (1.414 m); minimum daily discharge, 3.9 ft^3/s (0.110 m^3/s) Aug. 15, 19; minimum gage height, 1.73 ft (0.527 m) May 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.9	5.0	4.8	4.5	4.7	6.0	9.0	11	20	12	8.0	94
2	4.9	4.9	4.8	4.5	4.7	6.0	8.0	10	17	10	6.5	74
3	5.1	4.7	4.8	4.5	4.8	6.0	7.5	8.6	16	13	6.0	59
4	5.5	4.7	4.8	4.5	4.8	6.1	7.0	7.8	17	14	6.0	99
5	5.5	5.5	4.8	4.5	4.9	6.3	6.5	9.5	16	12	5.5	91
6	5.1	7.0	4.8	4.5	5.0	6.6	6.2	11	15	11	5.3	82
7	4.9	6.5	4.7	4.5	5.2	6.8	6.0	9.2	13	9.5	5.1	77
8	5.3	6.0	4.7	4.5	5.4	7.0	5.9	8.3	12	8.9	5.1	68
9	5.3	5.8	4.7	4.5	5.7	7.5	5.8	7.5	12	8.6	4.7	74
10	5.1	5.6	4.7	4.5	6.0	8.0	5.8	7.2	11	8.0	4.5	62
11	5.1	5.5	4.7	4.5	6.2	9.0	6.2	6.8	10	7.8	4.3	52
12	5.5	5.4	4.7	4.5	6.4	10	7.0	7.0	9.2	7.5	4.3	48
13	5.3	5.4	4.7	4.5	6.6	11	8.3	7.0	8.9	7.5	6.5	39
14	5.5	5.4	4.7	4.5	6.6	12	8.3	7.0	9.2	7.2	4.1	32
15	5.5	5.3	4.7	4.5	6.8	13	8.6	6.8	8.0	7.0	3.9	25
16	5.5	5.3	4.7	4.4	6.8	13	9.2	6.8	13	7.5	4.5	21
17	5.5	5.2	4.6	4.4	6.8	12	11	7.0	12	9.8	5.3	18
18	5.5	5.2	4.6	4.4	6.8	11	13	6.8	14	18	4.1	16
19	5.8	5.2	4.6	4.4	6.7	10	15	7.0	15	17	3.9	20
20	5.8	5.1	4.6	4.5	6.7	9.0	14	11	14	14	7.2	21
21	6.0	5.1	4.6	4.5	6.7	8.0	20	14	12	12	5.1	15
22	5.8	5.0	4.6	4.5	6.6	7.5	18	12	9.8	9.5	4.5	16
23	5.8	5.0	4.6	4.5	6.6	7.2	19	11	21	8.6	4.3	18
24	5.8	5.0	4.6	4.5	6.5	7.0	18	10	20	7.0	4.1	50
25	6.0	4.9	4.6	4.5	6.4	7.0	16	8.9	15	6.8	4.7	79
26	6.0	4.9	4.6	4.5	6.3	7.5	15	8.0	12	6.8	9.8	95
27	6.2	4.9	4.6	4.5	6.2	8.0	14	7.8	11	6.2	41	103
28	6.2	4.9	4.6	4.6	6.1	9.0	13	7.2	10	7.2	162	94
29	5.8	4.9	4.6	4.6	---	9.5	12	7.2	10	7.0	116	84
30	5.5	4.8	4.6	4.6	---	10	11	7.2	12	6.2	97	67
31	5.2	---	4.5	4.6	---	9.5	---	13	---	7.0	112	---
TOTAL	170.9	158.1	144.7	139.5	169.0	266.5	324.3	269.6	395.1	294.6	665.3	1693
MEAN	5.51	5.27	4.67	4.50	6.04	8.60	10.8	8.70	13.2	9.50	21.5	56.4
MAX	6.2	7.0	4.8	4.6	6.8	13	20	14	21	18	162	103
MIN	4.9	4.7	4.5	4.4	4.7	6.0	5.8	6.8	8.0	6.2	3.9	15

CAL YR 1976 TOTAL 8875.1 MEAN 24.2 MAX 346 MIN 4.5
WTR YR 1977 TOTAL 4690.6 MEAN 12.9 MAX 162 MIN 3.9

NOTE.--No gage-height record Nov. 28 to Apr. 11.

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 current year.

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 fair. Natural flow affected by extensive iron mining activities in headwaters of stream.

AVERAGE DISCHARGE.--14 years, 10.2 ft^3/s (0.289 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.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 130 ft^3/s (3.68 m^3/s) Sept. 25, gage height, 3.24 ft (0.988 m); no flow on many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.43	.01	.00	.00	.00	2.0	1.6	14	1.7	.04	36
2	.00	.43	.00	.00	.00	.00	1.7	1.3	10	1.2	.03	24
3	.00	.43	.00	.00	.00	.00	1.4	1.2	7.1	1.5	.04	16
4	.00	.39	.00	.00	.00	.00	1.2	1.1	6.0	1.7	.03	35
5	.00	.43	.00	.00	.00	.00	1.0	1.8	4.2	2.2	.03	46
6	.00	.43	.00	.00	.00	.01	.94	2.8	4.1	1.9	.02	39
7	.00	.32	.00	.00	.00	.01	1.1	2.7	3.5	1.7	.02	28
8	.00	.25	.00	.00	.00	.01	1.3	2.3	4.9	1.6	.02	18
9	.00	.21	.00	.00	.00	.02	1.6	1.6	3.2	.94	.01	35
10	.00	.18	.00	.00	.00	.06	1.8	1.3	2.3	.57	.01	50
11	.00	.15	.00	.00	.00	.17	2.3	1.1	1.6	1.7	.00	38
12	.00	.12	.00	.00	.00	.60	3.7	.94	1.1	1.1	.00	28
13	.00	.10	.00	.00	.00	2.0	3.8	.94	.57	.78	.00	22
14	.00	.10	.00	.00	.00	5.4	2.3	.89	.39	.68	.00	17
15	.00	.09	.00	.00	.00	7.5	2.3	.84	.21	.68	.00	13
16	.00	.09	.00	.00	.00	6.0	3.4	.89	2.3	.50	.00	9.7
17	.00	.09	.00	.00	.00	4.8	2.4	.62	4.4	.62	.00	7.7
18	.00	.08	.00	.00	.00	3.9	4.4	.68	5.2	.68	.00	8.6
19	.00	.07	.00	.00	.00	3.1	5.9	.62	6.6	.50	.00	20
20	.00	.07	.00	.00	.00	2.6	6.9	1.0	4.5	.32	.00	27
21	.00	.05	.00	.00	.00	2.2	8.8	1.9	3.0	.21	.00	20
22	.00	.04	.00	.00	.00	2.0	9.2	2.2	1.9	.16	.00	15
23	.00	.03	.00	.00	.00	1.8	6.9	2.0	6.0	.15	.00	12
24	.00	.03	.00	.00	.00	1.9	5.4	1.6	9.0	.13	.00	44
25	.04	.02	.00	.00	.00	2.1	4.1	1.2	5.2	.10	14	117
26	.13	.02	.00	.00	.00	2.5	3.2	.73	2.8	.07	27	92
27	.19	.01	.00	.00	.00	3.6	2.7	.62	1.8	.04	40	57
28	.28	.01	.00	.00	.00	4.8	2.3	.50	1.5	.04	53	35
29	.43	.01	.00	.00	---	4.4	1.9	1.6	1.1	.04	66	26
30	.50	.01	.00	.00	---	3.2	1.8	1.8	1.5	.04	44	22
31	.50	---	.00	.00	---	2.5	---	7.8	---	.04	41	---
TOTAL	2.07	4.69	.01	.00	.00	67.18	97.74	48.17	119.97	23.59	285.25	958.0
MEAN	.067	.16	.000	.000	.000	2.17	3.26	1.55	4.00	.76	9.20	31.9
MAX	.50	.43	.01	.00	.00	7.5	9.2	7.8	14	2.2	66	117
MIN	.00	.01	.00	.00	.00	.00	.94	.50	.21	.04	.00	7.7

CAL YR 1976 TOTAL 1473.45 MEAN 4.03 MAX 134 MIN .00
WTR YR 1977 TOTAL 1606.67 MEAN 4.40 MAX 117 MIN .00

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) above mean sea level. Oct. 5, 1909, to Sept. 5, 1914, nonrecording gage 3 mi (5 km) downstream and 50 ft (15 m) below powerplant at datum about 420 ft (128 m) lower. Sept. 6, 1914, to Aug. 4, 1953, powerplant record at Thomson hydroelectric plant.

REMARKS.--Records good. Diurnal fluctuation caused by powerplant upstream. Flow regulated by Whiteface Reservoir and Boulder, Island, Rice and Fish Lakes, combined capacity, 332,160 acre-ft (410 hm^3).

AVERAGE DISCHARGE (UNADJUSTED).--69 years, 2,265 ft^3/s (64.14 m^3/s), 8.97 in/yr (228 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, 9,970 ft^3/s (282 m^3/s) Sept. 30, gage height, 7.41 ft (2.259 m); minimum, 63 ft^3/s (1.78 m^3/s) Aug. 22, 24, 25; minimum daily, 88 ft^3/s (2.49 m^3/s) Aug. 24; minimum gage height, 1.85 ft (0.564 m) Aug. 22, 24, 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	490	812	410	490	530	562	880	650	1240	1200	700	2320
2	490	821	434	490	538	570	870	522	1950	1300	550	2850
3	490	704	450	490	546	578	758	426	2370	1400	470	2760
4	498	650	466	482	538	578	677	466	2060	1400	450	3350
5	522	650	466	482	546	578	659	434	2030	1400	450	3780
6	514	650	466	482	546	570	538	450	1840	1300	460	5120
7	506	546	506	490	546	578	578	482	1880	1500	400	5600
8	506	434	514	490	562	578	426	418	1580	1000	354	5580
9	506	538	498	490	562	586	442	474	1310	1100	326	5180
10	498	618	498	490	562	594	466	466	1380	900	340	5510
11	506	554	506	490	554	610	442	410	1250	980	305	5490
12	514	498	514	490	586	812	618	368	1080	794	291	5100
13	554	626	514	490	602	1360	498	361	1020	767	264	4760
14	578	530	530	482	602	1890	562	382	722	578	132	4410
15	498	530	530	482	594	1920	530	418	900	668	102	4130
16	466	554	530	474	602	1730	474	704	490	803	246	3630
17	522	677	530	474	610	1330	498	650	749	758	195	3410
18	498	602	530	474	602	1110	498	530	910	920	160	3050
19	490	514	530	474	586	910	586	514	704	910	93	2790
20	514	594	538	482	586	870	610	618	830	980	216	2630
21	642	586	538	482	594	812	930	677	950	940	180	2660
22	650	610	538	482	594	767	930	668	803	659	90	2680
23	980	554	530	490	586	713	1130	970	713	821	180	2590
24	940	530	522	498	586	686	1000	950	1000	530	88	3220
25	990	482	514	514	578	659	1000	950	1440	514	105	4540
26	1220	618	506	522	562	626	794	930	1560	490	205	6580
27	1120	626	498	522	554	704	695	695	1330	450	312	7320
28	1160	396	490	522	562	803	722	650	1240	396	375	7800
29	1260	382	498	530	---	960	668	668	1260	326	368	8560
30	1320	389	490	530	---	1010	530	538	1010	361	1380	9290
31	920	---	490	530	---	980	---	950	---	554	1900	---
TOTAL	21362	17275	15574	15310	16016	27034	20009	18389	37601	26699	11687	136690
MEAN	689	576	502	494	572	872	667	593	1253	861	377	4556
MAX	1320	821	538	530	610	1920	1130	970	2370	1500	1900	9290
MIN	466	382	410	474	530	562	426	361	490	326	88	2320
(†)	-553	-365	-287	-295	-318	+143	+350	+226	+422	+269	+77	+1295
MEAN ‡	136	211	215	199	254	1015	1017	819	1675	1130	454	5851
CFSM ‡	.04	.06	.06	.06	.07	.30	.30	.24	.49	.33	.13	1.71
IN ‡	.05	.07	.07	.07	.08	.34	.33	.28	.54	.38	.15	1.90

CAL YR 1976 TOTAL 526249 MEAN 1438 MAX 12600 MIN 260 MEAN ‡ 1369 CFSM ‡ .40 IN ‡ 5.43
WTR YR 1977 TOTAL 363646 MEAN 996 MAX 9290 MIN 88 MEAN ‡ 1079 CFSM ‡ .31 IN ‡ 4.26

† 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.--Letter B indicates non-ideal colony count. Letter E indicates estimated value. Letters ND indicate none detected.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	FECAL COLIFORM .7UM-MF (COL./100 ML) (31625)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML) (31673)	HARDNESS (CA,MG) (MG/L) (00900)
OCT 19...	1500	477	230	7.5	2.0	5.0	4	--	--	83
NOV 29...	1315	385	270	7.4	.0	.0	6	670	B18	95
JAN 10...	1500	490	250	7.3	-5.0	.0	9	1300	B990	85
FEB 14...	1530	623	235	8.2	--	.5	7	B2600	B43	82
APR 04...	1445	653	260	7.3	1.5	2.5	6	B540	B1700	87
MAY 16...	1315	936	315	7.3	27.0	21.5	10	--	230	120
JUN 28...	1000	1260	225	7.8	27.0	25.0	7	E20000	B69	100
AUG 08...	1500	356	305	7.3	26.0	24.0	3	B11000	B50	110
SEP 19...	1415	2810	152	7.4	9.5	15.5	4	B27	49	73

DATE	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)
OCT 19...	11	20	8.1	21	35	1.0	1.6	72	21
NOV 29...	21	22	9.7	25	36	1.1	1.8	74	24
JAN 10...	0	20	8.4	17	30	.8	1.5	88	19
FEB 14...	9	20	7.8	18	32	.9	1.7	73	17
APR 04...	20	21	8.5	20	32	.9	2.4	67	24
MAY 16...	19	29	11	30	35	1.2	2.8	98	36
JUN 28...	25	24	9.9	13	22	.6	2.0	75	23
AUG 08...	16	26	10	27	35	1.1	2.2	90	28
SEP 19...	28	17	7.3	6.6	16	.3	1.7	44	17

DATE	DISSOLVED CHLORIDE (CL) (MG/L) (00940)	DISSOLVED FLUORIDE (F) (MG/L) (00950)	DISSOLVED SILICA (SIO2) (MG/L) (00955)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DISSOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	TOTAL PHOSPHORUS (P) (MG/L) (00665)
OCT 19...	24	.2	6.0	165	146	213	.00	.47	.06
NOV 29...	32	.2	6.5	193	166	201	.01	.65	.08
JAN 10...	15	.2	9.2	161	143	213	.19	.74	.05
FEB 14...	26	.1	9.2	164	144	276	.23	.43	.06
APR 04...	28	.1	8.5	185	153	326	.60	.69	.08
MAY 16...	26	.2	2.9	238	197	601	.09	1.5	.11
JUN 28...	16	.1	6.3	182	140	619	.05	1.8	.09
AUG 08...	32	.2	9.0	243	190	234	.02	1.0	.08
SEP 19...	8.9	.8	18	165	104	1250	.10	--	.06

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	TOTAL ALDRIN (UG/L) (39330)	ALDRIN IN BOTTOM MATERIAL (UG/KG) (39333)	TOTAL ATRAZINE (UG/L) (39630)	ATRAZINE IN BOTTOM MATERIAL (UG/KG DRY SOLIDS) (39631)	TOTAL CHLORDANE (UG/L) (39350)	CHLORDANE IN BOTTOM MATERIAL (UG/KG) (39351)	TOTAL DDD (UG/L) (39360)	DDD IN BOTTOM MATERIAL (UG/KG) (39363)	TOTAL DDE (UG/L) (39365)
OCT 19...	1500	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAN 25...	1350	ND	--	ND	--	ND	--	ND	--	ND
MAY 16...	1315	ND	--	ND	--	ND	--	ND	--	ND
AUG 11...	1330	ND	--	ND	--	ND	--	ND	--	ND

DATE	DDE IN BOTTOM MATERIAL (UG/KG) (39368)	TOTAL DDT (UG/L) (39370)	DDT IN BOTTOM MATERIAL (UG/KG) (39373)	TOTAL DIAZINON (UG/L) (39570)	DIAZINON IN BOTTOM MATERIAL (UG/KG) (39571)	TOTAL DIELDRIN (UG/L) (39380)	DIELDRIN IN BOTTOM MATERIAL (UG/KG) (39383)	TOTAL ENDRIN (UG/L) (39390)	ENDRIN IN BOTTOM MATERIAL (UG/KG) (39393)	TOTAL ETHION (UG/L) (39398)
OCT 19...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAN 25...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY 16...	--	ND	--	ND	--	ND	--	ND	--	ND
AUG 11...	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	ETHION IN BOTTOM MATERIAL (UG/KG) (39399)	TOTAL HEPTACHLOR (UG/L) (39410)	HEPTACHLOR IN BOTTOM MATERIAL (UG/KG) (39413)	TOTAL HEPTACHLOR EPOXIDE (UG/L) (39420)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG) (39423)	TOTAL LINDANE (UG/L) (39340)	LINDANE IN BOTTOM MATERIAL (UG/KG) (39343)	TOTAL MALATHION (UG/L) (39530)	MALATHION IN BOTTOM MATERIAL (UG/KG) (39531)	TOTAL METHOXYCHLOR (UG/L) (39480)
OCT 19...	ND	NO	ND	ND	ND	ND	ND	ND	ND	ND
JAN 25...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY 16...	--	ND	--	ND	--	ND	--	ND	--	ND
AUG 11...	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	METHOXYCHLOR IN BOTTOM MATERIAL (UG/KG) (39481)	TOTAL METHYL PARATHION (UG/L) (39600)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG) (39601)	TOTAL METHYL TRITHION (UG/L) (39790)	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG) (39791)	TOTAL PARATHION (UG/L) (39540)	PARATHION IN BOTTOM MATERIAL (UG/KG) (39541)	TOTAL TOXAPHENE (UG/L) (39400)	TOXAPHENE IN BOTTOM MATERIAL (UG/KG) (39403)	TOTAL TRITHION (UG/L) (39786)
OCT 19...	ND	ND	ND	ND	ND	NO	ND	ND	ND	ND
JAN 25...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY 16...	--	ND	--	ND	--	ND	--	ND	--	ND
AUG 11...	--	ND	--	ND	--	ND	--	ND	--	ND

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TRI-THION IN BOTTOM MA-TERIAL (UG/KG) (39787)	TOTAL 2,4-D (UG/L) (39730)	2,4-D IN BOTTOM MA-TERIAL (UG/KG) (39731)	TOTAL 2,4,5-T (UG/L) (39740)	2,4,5-T IN BOTTOM MA-TERIAL (UG/KG) (39741)	TOTAL SILVEX (UG/L) (39760)	SILVEX IN BOTTOM MA-TERIAL (UG/KG) (39761)	SIMA-ZINE TOTAL COUL-SON COND. (UG/L) (39025)	SIMA-ZINE IN BOTTOM MATERI-AL (UG/KG DRY SOLIDS) (39046)
OCT 19...	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAN 25...	--	ND	--	ND	--	ND	--	ND	--
MAY 16...	--	ND	--	ND	--	ND	--	ND	--
AUG 11...	--	ND	--	ND	--	ND	--	ND	--

DATE	TIME	TOTAL ARSENIC (AS) (UG/L) (01002)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	TOTAL CAD-MIUM (CD) (UG/L) (01027)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	TOTAL CHRO-MIUM (CR) (UG/L) (01034)	DIS-SOLVED CHRO-MIUM (CR) (UG/L) (01030)	TOTAL COBALT (CO) (UG/L) (01037)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	TOTAL COPPER (CU) (UG/L) (01042)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	TOTAL IRON (FE) (UG/L) (01045)
OCT 19...	1500	1	1	<10	0	0	0	<50	0	<10	4	440
FEB 14...	1530	1	1	<10	0	0	0	<50	0	<10	3	460
AUG 08...	1500	2	2	20	19	0	0	<50	1	10	10	830

DATE	DIS-SOLVED IRON (FE) (UG/L) (01046)	TOTAL LEAD (PB) (UG/L) (01051)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	TOTAL MAN-GANESE (MN) (UG/L) (01055)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	TOTAL MERCURY (HG) (UG/L) (71900)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	TOTAL SELE-NIUM (SE) (UG/L) (01147)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	TOTAL ZINC (ZN) (UG/L) (01092)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	TOTAL ORGANIC CARBON (C) (MG/L) (00680)
OCT 19...	230	<100	2	100	40	--	.0	0	0	10	10	17
FEB 14...	330	<100	2	60	50	.0	.0	0	0	10	10	16
AUG 08...	600	100	100	170	140	.1	.0	5	0	40	20	31

DATE	TIME	LENGTH OF EXPO-SURE (DAYS) (00022)	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M (00573)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M (00572)	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2) (70957)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2) (70958)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS) (70950)	SAMPLING METHOD
AUG 08...	1500	42	1.26	.472	.001	.001	788000	POLYETHYLENE STRIP

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

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	OCT 19,76	NOV 29,76	JAN 10,77	FEB 14,77
TIME	1500	1315	1500	1530
TOTAL CELLS/ML	1200	11000	2800	10000
DIVERSITY: DIVISION	0.6	0.5	0.4	0.1
.CLASS	0.6	0.5	0.4	0.1
..ORDER	1.2	0.6	0.4	1.1
...FAMILY	1.2	0.6	0.5	1.1
....GENUS	1.2	0.6	0.5	1.2

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	*	0	--	-
...COELASTRACEAE								
....COELASTRUM	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....FRANCEIA	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	24	1	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	*	0	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	*	0	150	1
....TETRASTRUM	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	*	0	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....COSMARIUM	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	55	5	9500#	88	51	2	*	0
....MELOSIRA	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	*	0
....RHOICOSPHENIA	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	*	0	*	0
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	*	0
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
....SYNEDRA	11	1	--	-	*	0	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	*	0	--	-
...MERIDIONACEAE								
....MERIDION	--	-	--	-	--	-	*	0
...NAVICULACEAE								
....NAVICULA	66	6	--	-	*	0	--	-
...NITZSCHIACEAE								
....NITZSCHIA	--	-	99	1	38	1	--	-

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

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

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	OCT 19,76 1500		NOV 29,76 1315		JAN 10,77 1500		FEB 14,77 1530	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROCCOCCALES								
...CHROCCOCCAEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	130	11	*	0	--	-	3900#	37
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	1100	10	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	*	0
....OSCILLATORIA	880#	76	99	1	2700#	94	6200#	60
..CHROCCOCCALES								
...CHROCCOCCAEAE								
....GOMPHOSPHAERIA	--	-	--	-	*	0	110	1
EUGLENOPHYTA (EUGLENOIDS)								
.CRYPTOPHYCEAE								
..CRYPTOMONIDALES								
...CRYPTOMONODACEAE								
....CRYPTOMONAS	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	11	1	--	-	--	-	--	-

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

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

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	MAY 16,77	JUN 28,77	AUG 8,77	SEP 19,77
TIME	1315	1000	1500	1415
TOTAL CELLS/ML	760000	1400	5200	360
DIVERSITY: DIVISION	0.2	1.3	1.0	1.4
.CLASS	0.2	1.3	1.0	1.4
..ORDER	0.3	1.7	1.8	1.6
...FAMILY	0.3	2.9	1.9	2.1
....GENUS	0.3	3.5	2.5	2.3

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	--	-	83	6	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	83	6	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	*	0	13	1	--	-	--	-
....MICRACTINIUM	*	0	100	7	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	*	0	--	-	26	1	7	2
....CHODATELLA	*	0	--	-	--	-	--	-
....DICTYOSPHAERIUM	*	0	--	-	--	-	--	-
....FRANCEIA	*	0	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	*	0	--	-	53	1	55#	15
....SELENASTRUM	*	0	--	-	--	-	--	-
....TETRAEDRON	*	0	*	0	--	-	--	-
....TREUBARIA	--	-	70	5	26	1	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	280#	20	--	-	--	-
....CRUCIGENIA	--	-	40	3	79	2	--	-
....SCENEDESMUS	*	0	160	12	210	4	14	4
....TETRASTRUM	--	-	--	-	160	3	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....COSMARIUM	--	-	13	1	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	4200	1	10	1	250	5	7	2
....MELOSIRA	*	0	160	12	280	5	7	2
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	7	2
....COCCONEIS	--	-	--	-	--	-	7	2
....RHOICOSPHENIA	--	-	*	0	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	*	0	--	-	7	2
...DIATOMACEAE								
....DIATOMA	*	0	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	23	2	26	1	--	-
....SYNEDRA	*	0	23	2	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	7	2
...MERIDIONACEAE								
....MERIDION	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	*	0	17	1	--	-	27	8
...NITZSCHIACEAE								
....NITZSCHIA	*	0	*	0	*	0	14	4

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

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

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	MAY 16,77 1315		JUN 28,77 1000		AUG 8,77 1500		SEP 19,77 1415	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROCCOCCALES								
...CHROCCOCCACEAE								
....AGMENELLUM	--	-	--	-	110	2	--	-
....ANACYSTIS	15000	2	250#	18	2100#	41	--	-
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	*	0	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	210#	57
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	380	7	--	-
....OSCILLATORIA	730000#	96	46	3	1400#	28	--	-
..CHROCCOCCALES								
...CHROCCOCCACEAE								
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.CRYPTOPHYCEAE								
..CRYPTOMONIDALES								
...CRYPTOMONODACEAE								
....CRYPTOMONAS	*	0	--	-	--	-	--	-
.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%

SUSPENDED-SEDIMENT DISCHARGE

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)	SUS. SED. FALL DIAM. % FINER THAN .062 MM
JAN						
10...	1500	482	.0	6	7.8	--
APR						
04...	1400	653	2.5	26	46	88
MAY						
16...	1315	936	21.5	23	58	43
JUN						
28...	0930	1160	25.0	8	25	--
AUG						
11...	1335	305	21.5	11	9.1	--
SEP						
19...	1350	2810	15.5	8	61	95

04024090 ELIM CREEK NEAR HOLYOKE, MN

LOCATION.--Lat 46°31'03", long 92°28'55", in NE 1/4 NE 1/4 sec.33, T.47 N., R.17 W., Carlton County, Hydrologic Unit 04010301, on right bank, 250 ft (76.2 m) downstream from Soo Line Railroad tracks, 1.2 mi (1.9 km) above confluence of Skunk Creek, and 5.6 mi (9.0 km) northwest of Holyoke.

DRAINAGE AREA.--1.06 mi^2 (2.75 km^2).

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 955.12 ft (291.121 m) above mean sea level.

REMARKS.--Records good except those for November and March, which are fair.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 54 ft^3/s (1.53 m^3/s) June 17, 1976, gage height, 3.72 ft (1.134 m), from rating curve extended above 3.5 ft^3/s (0.099 m^3/s); no flow at times each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 15 ft^3/s (0.425 m^3/s) Sept. 24, gage height, 1.92 ft (0.585 m); maximum gage height, 2.22 ft (0.677 m) Mar. 26, backwater from ice; no flow many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.04	.05	.00	.00	.00	.00	1.8	.14	2.6	.29	.18	.51
2	.04	.05	.00	.00	.00	.00	1.5	.14	1.4	.18	.14	.39
3	.04	.05	.00	.00	.00	.00	1.7	.14	.89	1.7	.10	.36
4	.07	.05	.00	.00	.00	.00	1.3	.13	1.1	1.5	.09	2.9
5	.07	.05	.00	.00	.00	.00	1.7	.26	.73	1.9	.08	1.2
6	.05	.05	.00	.00	.00	.00	1.5	.28	.57	.95	.07	6.6
7	.04	.03	.00	.00	.00	.00	1.3	.21	.47	.57	.06	3.1
8	.02	.03	.00	.00	.00	.00	1.2	.17	.40	.36	.06	1.4
9	.02	.03	.00	.00	.00	.00	1.0	.13	.30	.26	.03	.84
10	.02	.03	.00	.00	.00	.01	.93	.10	.25	.23	.03	.57
11	.02	.03	.00	.00	.00	.25	.88	.11	.17	.24	.00	.57
12	.02	.03	.00	.00	.00	10	.79	.10	.14	.19	.00	.76
13	.02	.03	.00	.00	.00	5.6	.75	.09	.12	.16	.05	.45
14	.02	.03	.00	.00	.00	3.0	.72	.08	.11	.15	.03	.33
15	.02	.03	.00	.00	.00	1.7	.69	1.3	.10	.14	.05	.29
16	.02	.03	.00	.00	.00	.80	.77	1.5	.46	.88	.08	.21
17	.03	.03	.00	.00	.00	.49	.69	.98	.41	1.0	.06	.21
18	.03	.02	.00	.00	.00	.12	.80	.94	.41	.36	.02	.23
19	.04	.01	.00	.00	.00	.04	1.1	.78	.32	.20	.01	.27
20	.05	.00	.00	.00	.00	.02	.85	2.4	.40	.12	.01	.25
21	.04	.00	.00	.00	.00	.02	2.0	2.1	.26	.08	.01	.23
22	.04	.00	.00	.00	.00	.02	1.2	2.4	.22	.07	.00	.80
23	.04	.00	.00	.00	.00	.02	.75	2.1	.70	.03	.00	1.8
24	.04	.00	.00	.00	.00	.02	.49	1.5	.44	.01	.00	10
25	.05	.00	.00	.00	.00	.02	.37	1.2	.23	.00	.01	6.1
26	.04	.00	.00	.00	.00	.02	.30	.75	.05	.00	.15	3.8
27	.01	.00	.00	.00	.00	.06	.25	.69	.07	.00	1.2	2.1
28	.06	.00	.00	.00	.00	.12	.17	.59	.11	.05	.60	1.2
29	.06	.00	.00	.00	---	.45	.16	.52	.15	.01	.27	1.1
30	.06	.00	.00	.00	---	1.5	.15	.50	.20	.57	.27	.91
31	.05	---	.00	.00	---	2.3	---	3.2	---	.53	.76	---
TOTAL	1.17	.66	.00	.00	.00	26.58	27.81	25.53	13.78	12.73	4.42	49.48
MEAN	.038	.022	.000	.000	.000	.86	.93	.82	.46	.41	.14	1.65
MAX	.07	.05	.00	.00	.00	10	2.0	3.2	2.6	1.9	1.2	10
MIN	.01	.00	.00	.00	.00	.00	.15	.08	.05	.00	.00	.21
CFSM	.04	.02	.000	.000	.000	.81	.88	.77	.43	.39	.13	1.56
IN.	.04	.02	.00	.00	.00	.93	.98	.90	.48	.45	.15	1.73

WTR YR 1977 TOTAL 162.16 MEAN .44 MAX 10 MIN .00 CFSM .42 IN 5.69

04024090 ELIM CREEK NEAR HOLYOKE, MN--Continued

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD.--
SUSPENDED-SEDIMENT DISCHARGE: March 1976 to current year.

INSTRUMENTATION.--Automatic pumping sediment sampler since March 1976.

REMARKS.--One or more samples obtained daily and at every 0.35 ft stage change 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, 1,130 mg/L June 18, 1976; minimum daily mean, 0 mg/L many days each year.
SEDIMENT LOADS: Maximum daily, 65 tons (59 tonnes) June 18, 1976; minimum daily, 0 ton (0 tonne) many days each year.

EXTREMES FOR CURRENT PERIOD.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 531 mg/L Sept. 6; minimum daily mean, 0 mg/L on many days.
SEDIMENT LOADS: Maximum daily, 12 tons (11 tonnes) Sept. 6; minimum daily, 0 ton (0 tonne) on many days.

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

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	15	.00	8	.00							---	---
2	17	.00	6	.00							---	---
3	11	.00	8	.00							---	---
4	5	.00	7	.00							---	---
5	15	.00	7	.00							---	---
6	25	.00	6	.00							---	---
7	10	.00	9	.00							---	---
8	7	.00	8	.00							---	---
9	18	.00	6	.00							---	---
10	6	.00	7	.00							4	.00
11	4	.00	9	.00							8	0.01
12	8	.00	8	.00							42	1.1
13	8	.00	9	.00							32	0.48
14	5	.00	9	.00							26	0.21
15	2	.00	8	.00							24	0.11
16	3	.00	8	.00							17	0.04
17	2	.00	8	.00							5	0.01
18	3	.00	8	.00							5	.00
19	5	.00	7	.00							5	.00
20	7	.00	---	---							5	.00
21	8	.00	---	---							5	.00
22	8	.00	---	---							5	.00
23	8	.00	---	---							5	.00
24	9	.00	---	---							5	.00
25	9	.00	---	---							5	.00
26	9	.00	---	---							18	.00
27	10	.00	---	---							71	0.01
28	11	.00	---	---							52	0.02
29	10	.00	---	---							80	0.10
30	6	.00	---	---							78	0.32
31	8	.00	---	---							78	0.48
TOTAL	---	.00	---	.00							---	2.89

04024090 ELIM CREEK NEAR HOLYOKE, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	73	0.35	2	.00	60	0.46	6	.00	51	0.02	14	0.02
2	62	0.25	2	.00	18	0.07	5	.00	37	0.01	12	0.01
3	49	0.22	2	.00	15	0.04	127	1.1	21	0.01	58	0.21
4	37	0.13	2	.00	17	0.05	158	1.2	10	.00	213	1.9
5	44	0.20	4	.00	11	0.02	74	0.39	9	.00	38	0.12
6	43	0.17	2	.00	10	0.02	30	0.08	9	.00	531	12
7	18	0.06	2	.00	8	0.01	14	0.02	9	.00	65	0.56
8	22	0.07	2	.00	7	0.01	10	0.01	9	.00	31	0.12
9	23	0.06	2	.00	5	.00	9	0.01	12	.00	19	0.04
10	13	0.03	2	.00	10	0.01	8	.00	13	.00	15	0.02
11	8	0.02	2	.00	8	.00	7	.00	0	.00	14	0.02
12	11	0.02	2	.00	7	.00	6	.00	0	.00	15	0.03
13	11	0.02	2	.00	7	.00	6	.00	14	.00	11	0.01
14	10	0.02	2	.00	6	.00	7	.00	14	.00	6	0.01
15	6	0.01	25	0.09	6	.00	8	.00	17	.00	6	.00
16	8	0.02	14	0.06	13	0.02	296	3.4	20	.00	3	.00
17	6	0.01	5	0.01	7	0.01	93	0.28	14	.00	5	.00
18	13	0.03	3	0.01	8	0.01	55	0.05	10	.00	10	0.01
19	16	0.05	3	0.01	9	0.01	15	0.01	9	.00	10	0.01
20	9	0.02	29	0.19	9	0.01	31	0.01	10	.00	6	.00
21	65	0.35	12	0.07	6	.00	34	0.01	9	.00	8	.00
22	18	0.06	11	0.07	5	.00	19	.00	0	.00	26	0.07
23	8	0.02	5	0.03	23	0.04	10	.00	0	.00	110	1.3
24	5	0.01	12	0.06	13	0.02	8	.00	0	.00	316	9.8
25	3	.00	28	0.09	10	0.01	0	.00	8	.00	76	1.3
26	2	.00	7	0.01	7	.00	0	.00	34	0.11	30	.0.31
27	2	.00	7	0.01	10	.00	0	.00	149	0.71	13	0.07
28	2	.00	5	0.01	6	.00	23	.00	9	0.02	12	0.04
29	2	.00	5	0.01	5	.00	7	.00	6	.00	11	0.03
30	2	.00	5	0.01	8	.00	199	0.94	14	0.01	9	0.02
31	---	---	179	1.9	---	---	110	0.17	26	0.05	---	---
TOTAL	---	2.20	---	2.64	---	0.82	---	7.68	---	0.94	---	28.03

TOTAL LOAD FOR YEAR: 45.20 TONS.

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT

DATE	TIME	INSTAN-TANEOUS DIS-CHARGE (CFS)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. FALL DIAM. % FINER THAN .002 MM	SUS. SED. FALL DIAM. % FINER THAN .004 MM	SUS. SED. FALL DIAM. % FINER THAN .008 MM	SUS. SED. FALL DIAM. % FINER THAN .016 MM	SUS. SED. FALL DIAM. % FINER THAN .062 MM	SUS. SED. FALL DIAM. % FINER THAN .125 MM
JUL										
16...	2030	2.2	2750	16	70	74	76	87	98	100
SEP										
03...	2245	3.7	1000	10	78	81	87	92	99	100
06...	0410	12	2260	73	76	80	83	93	99	100

PARTICLE-SIZE DISTRIBUTION OF BED MATERIAL

DATE	TIME	NUMBER OF SAM-PLING POINTS	INSTAN-TANEOUS DIS-CHARGE (CFS)	BED MAT. FALL DIAM. % FINER THAN .004 MM	BED MAT. FALL DIAM. % FINER THAN .062 MM	BED MAT. FALL DIAM. % FINER THAN .125 MM	BED MAT. FALL DIAM. % FINER THAN .250 MM	BED MAT. FALL DIAM. % FINER THAN .500 MM	BED MAT. FALL DIAM. % FINER THAN 1.00 MM
JUL									
07...	1308	2	.59	4	5	7	39	94	100

04024093 SKUNK CREEK BELOW ELIM CREEK NEAR HOLYOKE, MN

LOCATION.--Lat 46°30'56", long 92°27'45", in SW 1/4 NW 1/4 sec.35, T.47 N., R.17 W., Carlton County, Hydrologic Unit 04010301, on right bank, 250 ft (76.2 m) downstream from County Road No. 103, 1.2 mi (1.9 km) above mouth and 4.4 mi (7.1 km) northwest of Holyoke.

DRAINAGE AREA.--8.83 mi^2 (22.9 km^2).

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 853.33 ft (260.095 m) above mean sea level. Prior to Oct. 1, 1976, at datum 2.00 ft (0.61 m) higher.

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

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 204 ft^3/s (5.78 m^3/s) June 18, 1976, gage height, 4.66 ft (1.420 m), from rating curve extended above 32 ft^3/s (0.906 m^3/s); maximum gage height, 4.74 ft (1.445 m) Mar. 15, 1977, (backwater from ice); no flow many days each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 79 ft^3/s (2.24 m^3/s) Sept. 24, gage height, 3.99 ft (1.216 m); maximum gage height, 4.74 ft (1.445 m) Mar. 15, (backwater from ice); no flow many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.10	.11	.00	.00	.00	.10	5.7	1.8	24	1.1	4.1	6.7
2	.10	.11	.00	.00	.00	.10	5.6	1.4	9.7	.45	2.4	3.6
3	.10	.11	.00	.00	.00	.20	5.5	1.2	4.5	7.3	1.2	3.8
4	.10	.11	.00	.00	.00	.20	5.5	1.1	8.5	8.2	.59	29
5	.10	.11	.00	.00	.00	.14	5.4	1.3	5.2	18	.49	36
6	.10	.10	.00	.00	.00	.12	5.4	1.4	2.9	7.9	.34	32
7	.10	.09	.00	.00	.00	.11	5.3	.99	1.9	4.0	.30	20
8	.10	.08	.00	.00	.00	.10	5.2	.74	1.2	2.1	.28	14
9	.10	.08	.00	.00	.00	.09	5.2	.57	.65	.56	.22	10
10	.10	.08	.00	.00	.00	.30	5.2	.51	.65	.34	.22	6.3
11	.10	.07	.00	.00	.00	1.5	6.0	.58	.48	.35	.22	4.5
12	.00	.07	.00	.00	.00	7.0	5.0	.46	.35	.33	.18	3.4
13	.30	.06	.00	.00	.00	24	4.9	.39	.32	.29	.24	2.7
14	.15	.06	.00	.00	.50	22	4.9	.35	.27	.24	.24	2.4
15	.10	.05	.00	.00	.38	20	5.2	4.9	.27	.23	.21	2.0
16	.00	.05	.00	.00	.30	14	5.6	13	.57	1.4	.31	1.3
17	.00	.05	.10	.00	.24	7.4	5.2	5.4	.94	9.9	.28	1.1
18	.30	.04	.11	.00	.20	6.0	6.0	5.5	.84	3.8	.25	1.1
19	.15	.04	.10	.00	.18	5.8	7.0	3.3	1.1	1.5	.22	1.1
20	.11	.03	.00	.00	.15	5.8	6.0	15	1.3	.52	.20	1.0
21	.11	.03	.00	.00	.14	5.8	20	17	1.0	.33	.20	1.0
22	.11	.02	.00	.00	.12	5.8	18	16	.48	.26	.19	2.2
23	.00	.02	.00	.00	.12	5.8	11	19	1.2	.23	.17	9.3
24	.00	.02	.00	.00	.11	5.9	7.2	10	1.8	.20	.16	55
25	.30	.01	.00	.00	.10	5.8	5.0	5.8	.68	.18	.16	34
26	.15	.00	.00	.00	.10	5.8	3.7	3.1	.31	.16	.42	25
27	.11	.00	.00	.00	.10	7.0	3.2	2.2	.32	.16	11	19
28	.11	.00	.00	.00	.10	6.0	2.6	2.0	.41	.21	7.7	14
29	.11	.00	.00	.00	---	8.0	2.1	1.3	.49	.21	3.4	12
30	.00	.00	.00	.00	---	7.3	2.0	.91	1.1	5.1	1.8	9.2
31	.00	---	.00	.00	---	5.9	---	18	---	12	6.0	---
TOTAL	3.21	1.60	.31	.00	2.84	184.06	184.6	155.20	73.43	87.55	43.69	362.7
MEAN	.10	.053	.010	.000	.10	5.94	6.15	5.01	2.45	2.82	1.41	12.1
MAX	.30	.11	.11	.00	.50	24	20	19	24	18	11	55
MIN	.00	.00	.00	.00	.00	.09	2.0	.35	.27	.16	.16	1.0
CFSM	.01	.006	.001	.000	.01	.67	.70	.57	.28	.32	.16	1.37
IN.	.01	.01	.00	.00	.01	.78	.78	.65	.31	.37	.18	1.53

WTR YR 1977 TOTAL 1099.19 MEAN 3.01 MAX 55 MIN .00 CFSM .34 IN 4.63

04024093 SKUNK CREEK BELOW ELIM CREEK NEAR HOLYOKE, MN--Continued

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD.--
SUSPENDED-SEDIMENT DISCHARGE: March 1976 to current year.

INSTRUMENTATION.--Automatic pumping sediment sampler since March 1976.

REMARKS.--One or more samples obtained daily and at every 0.35 ft stage change for storm events. For storm events, suspended-sediment load was obtained by averaging for intervals of a day. (Letter B indicates unideal colony count).

EXTREMES FOR PERIOD OF DAILY RECORD.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 2,400 mg/L June 17, 1976; minimum daily mean, no flow each year.
SEDIMENT LOADS: Maximum daily, 284 tons (258 tonnes) June 18, 1976; minimum daily, 0 ton (0 tonne) eaoh year.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 728 mg/L July 17; minimum daily mean, no flow many days during Oct. to Mar.
SEDIMENT LOADS: Maximum daily, 82 tons (74 tonnes) Sept. 24; minimum daily, 0 ton (0 tonne) many days during Oct. to Mar.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)	FECAL COLIFORM .7UM-MF (COL./100 ML) (31625)
OCT										
27...	1347	.11	255	7.9	2.5	.0	10	13.4	95	2
MAR										
15...	1427	20	160	8.1	5.5	.5	8	13.5	96	190
APR										
12...	1414	4.9	215	8.0	7.0	.5	35	13.1	94	820
JUN										
02...	1130	9.4	161	8.0	16.5	15.0	35	9.3	0	260
JUL										
06...	1526	6.6	180	8.0	25.0	20.5	80	--	--	47
AUG										
11...	1505	.22	265	8.4	19.0	16.0	15	--	--	11
SEP										
15...	1653	1.5	200	8.0	20.0	15.0	30	9.4	96	59

DATE	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML) (31673)	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)
OCT										
27...	814	120	10	33	9.4	5.1	8	2.2	111	11
MAR										
15...	3500	50	15	9.0	6.6	1.9	7	3.0	34	23
APR										
12...	840	94	29	24	8.3	2.8	6	1.9	65	30
JUN										
02...	840	86	25	23	6.9	3.5	8	1.3	61	21
JUL										
06...	1600	74	0	23	4.1	3.1	8	1.5	74	12
AUG										
11...	130	130	16	36	10	3.9	6	2.1	110	14
SEP										
15...	210	110	23	29	7.9	2.3	4	1.7	82	17

04024093 SKUNK CREEK BELOW ELIM CREEK NEAR HOLYOKE, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L) (70300)	DIS-SOLVED SOLIDS (TONS PER AC-FT) (70303)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L) (00625)	TOTAL PHOS-PHORUS (P) (MG/L) (00665)	TOTAL ORGANIC CARBON (C) (MG/L) (00680)
OCT 27...	2.3	.1	18	145	.20	.04	.14	.20	.02	5.4
MAR 15...	4.4	.1	8.0	139	.19	7.51	1.4	1.1	.30	28
APR 12...	3.1	.1	9.4	146	.20	1.93	.28	.80	.05	6.7
JUN 02...	1.8	.3	7.6	149	.20	3.79	.04	1.6	.10	19
JUL 06...	2.6	.1	15	165	.22	2.94	.11	1.0	.15	31
AUG 11...	3.5	.1	11	182	.25	.11	.00	.73	.05	17
SEP 15...	2.7	.1	15	156	.21	.63	.02	.94	.04	19

DATE	TIME	TOTAL ARSENIC (AS) (UG/L) (01002)	SUS-PENDED ARSENIC (AS) (UG/L) (01001)	TOTAL CAD-MIUM (CD) (UG/L) (01027)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	TOTAL CHRO-MIUM (CR) (UG/L) (01034)	DIS-SOLVED CHRO-MIUM (CR) (UG/L) (01030)	TOTAL COBALT (CO) (UG/L) (01037)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	TOTAL COPPER (CU) (UG/L) (01042)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	TOTAL IRON (FE) (UG/L) (01045)
OCT 27...	1347	1	0	<10	0	0	0	<50	0	<10	0	520
APR 12...	1414	1	--	10	1	10	0	<50	0	<10	0	2300
AUG 11...	1505	3	2	<10	7	0	0	<50	1	10	5	910

DATE	DIS-SOLVED IRON (FE) (UG/L) (01046)	TOTAL LEAD (PB) (UG/L) (01051)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	TOTAL MAN-GANESE (MN) (UG/L) (01055)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	TOTAL MERCURY (HG) (UG/L) (71900)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	TOTAL SELE-NIUM (SE) (UG/L) (01147)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	TOTAL ZINC (ZN) (UG/L) (01092)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)
OCT 27...	80	<100	2	30	30	.0	.0	0	0	0	0
APR 12...	340	<100	4	270	240	.0	.0	1	0	20	10
AUG 11...	410	<100	42	60	50	.3	.0	0	0	10	10

DATE	TIME	TOTAL PCB (UG/L) (39516)	PCB IN BOTTOM MA-TERIAL (UG/KG) (39519)	POLY-CHLO-RINATED NAPH-THA-LENES (UG/L) (39250)	TOTAL ALDRIN (UG/L) (39330)	ALDRIN IN BOTTOM MA-TERIAL (UG/KG) (39333)	TOTAL CHLOR-DANE (UG/L) (39350)	CHLOR-DANE IN BOTTOM MA-TERIAL (UG/KG) (39351)	TOTAL DDD (UG/L) (39360)	DDD IN BOTTOM MA-TERIAL (UG/KG) (39363)	TOTAL DDE (UG/L) (39365)	DDE IN BOTTOM MA-TERIAL (UG/KG) (39368)
OCT 27...	1347	.0	0	.00	.00	.0	.0	0	.00	.0	.00	.0

DATE	TOTAL DDT (UG/L) (39370)	DDT IN BOTTOM MA-TERIAL (UG/KG) (39373)	TOTAL DI-AZINON (UG/L) (39570)	DI-AZINON IN BOTTOM MA-TERIAL (UG/KG) (39571)	TOTAL DI-ELDRIN (UG/L) (39380)	DI-ELDRIN IN BOTTOM MA-TERIAL (UG/KG) (39383)	TOTAL ENDRIN (UG/L) (39390)	ENDRIN IN BOTTOM MA-TERIAL (UG/KG) (39393)	TOTAL ETHION (UG/L) (39398)	ETHION IN BOTTOM MA-TERIAL (UG/KG) (39399)	TOTAL HEPTA-CHLOR (UG/L) (39410)	HEPTA-CHLOR IN BOTTOM MA-TERIAL (UG/KG) (39413)
OCT 27...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0

04024093 SKUNK CREEK BELOW ELIM CREEK NEAR HOLYOKE, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TOTAL HEPTACHLOR EPOXIDE (UG/L) (39420)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG) (39423)	TOTAL LINDANE (UG/L) (39340)	LINDANE IN BOTTOM MATERIAL (UG/KG) (39343)	TOTAL MALATHION (UG/L) (39530)	MALATHION IN BOTTOM MATERIAL (UG/KG) (39531)	TOTAL METHYL PARATHION (UG/L) (39600)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG) (39601)	TOTAL METHYL TRITHION (UG/L) (39790)	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG) (39791)	TOTAL PARATHION (UG/L) (39540)
OCT 27...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.00

DATE	PARATHION IN BOTTOM MATERIAL (UG/KG) (39541)	TOTAL TOXAPHENE (UG/L) (39400)	TOXAPHENE IN BOTTOM MATERIAL (UG/KG) (39403)	TOTAL TRITHION (UG/L) (39786)	TRITHION IN BOTTOM MATERIAL (UG/KG) (39787)	TOTAL 2,4-D (UG/L) (39730)	2,4-D IN BOTTOM MATERIAL (UG/KG) (39731)	TOTAL 2,4,5-T (UG/L) (39740)	2,4,5-T IN BOTTOM MATERIAL (UG/KG) (39741)	TOTAL SILVEX (UG/L) (39760)	SILVEX IN BOTTOM MATERIAL (UG/KG) (39761)
OCT 27...	.0	0	0	.00	.0	.00	0	.00	0	.00	0

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	0	.00	9	.00	0	.00	0	.00	0	.00	15	.00
2	3	.00	7	.00	0	.00	0	.00	0	.00	15	.00
3	5	.00	5	.00	0	.00	0	.00	0	.00	20	0.01
4	5	.00	5	.00	0	.00	0	.00	0	.00	25	0.01
5	3	.00	5	.00	0	.00	0	.00	0	.00	20	0.01
6	5	.00	5	.00	0	.00	0	.00	0	.00	19	0.01
7	3	.00	5	.00	0	.00	0	.00	0	.00	18	0.01
8	5	.00	5	.00	0	.00	0	.00	0	.00	17	.00
9	10	.00	5	.00	0	.00	0	.00	0	.00	15	.00
10	12	.00	5	.00	0	.00	0	.00	0	.00	23	0.02
11	13	.00	5	.00	0	.00	0	.00	0	.00	32	0.13
12	0	.00	5	.00	0	.00	0	.00	0	.00	288	5.4
13	13	0.01	5	.00	0	.00	0	.00	0	.00	456	30
14	8	.00	5	.00	0	.00	0	.00	25	0.03	412	24
15	7	.00	5	.00	0	.00	0	.00	25	0.03	411	22
16	0	.00	5	.00	0	.00	0	.00	25	0.02	197	7.4
17	0	.00	5	.00	5	.00	0	.00	25	0.02	56	1.1
18	7	0.01	5	.00	5	.00	0	.00	24	0.01	18	0.29
19	8	.00	5	.00	5	.00	0	.00	24	0.01	15	0.23
20	8	.00	5	.00	0	.00	0	.00	23	0.01	15	0.23
21	8	.00	5	.00	0	.00	0	.00	22	0.01	15	0.23
22	8	.00	5	.00	0	.00	0	.00	22	0.01	15	0.23
23	0	.00	5	.00	0	.00	0	.00	21	0.01	15	0.23
24	0	.00	5	.00	0	.00	0	.00	20	0.01	15	0.24
25	8	0.01	5	.00	0	.00	0	.00	19	0.01	15	0.23
26	8	.00	0	.00	0	.00	0	.00	18	.00	18	0.28
27	8	.00	0	.00	0	.00	0	.00	17	.00	18	0.34
28	9	.00	0	.00	0	.00	0	.00	15	.00	18	0.29
29	11	.00	0	.00	0	.00	0	.00	---	---	59	1.3
30	0	.00	0	.00	0	.00	0	.00	---	---	66	1.3
31	0	.00	---	---	0	.00	0	.00	---	---	43	0.68
TOTAL	---	0.03	---	0.00	---	0.00	---	0.00	---	0.18	---	96.20

04024093 SKUNK CREEK BELOW ELIM CREEK NEAR HOLYOKE, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	34	0.52	20	0.10	121	7.8	23	0.07	47	0.52	34	0.62
2	32	0.48	20	0.08	41	1.1	21	0.03	35	0.23	25	0.24
3	32	0.48	22	0.07	26	0.32	59	1.4	40	0.13	50	1.9
4	32	0.48	25	0.07	44	1.1	66	2.5	30	0.05	338	27
5	31	0.45	22	0.08	29	0.41	163	8.1	22	0.03	424	66
6	30	0.44	15	0.06	25	0.20	109	2.3	17	0.02	396	35
7	28	0.40	13	0.03	28	0.14	105	1.1	21	0.02	204	11
8	27	0.38	20	0.04	22	0.07	57	0.34	22	0.02	161	6.1
9	26	0.37	28	0.04	22	0.04	39	0.06	19	0.01	100	2.7
10	27	0.38	23	0.03	31	0.05	38	0.03	29	0.02	80	1.4
11	46	0.75	15	0.02	25	0.03	58	0.05	23	0.01	66	0.80
12	60	0.81	13	0.02	22	0.02	130	0.12	21	0.01	59	0.54
13	51	0.67	17	0.02	22	0.02	34	0.03	29	0.02	53	0.39
14	47	0.62	55	0.05	24	0.02	31	0.02	22	0.01	40	0.26
15	42	0.59	153	2.0	27	0.02	28	0.02	24	0.01	22	0.12
16	37	0.56	72	2.5	43	0.07	111	1.4	39	0.03	17	0.06
17	32	0.45	31	0.45	25	0.06	728	21	21	0.02	17	0.05
18	27	0.44	26	0.39	24	0.05	73	0.81	21	0.01	17	0.05
19	21	0.40	12	0.11	24	0.07	63	0.26	17	0.01	13	0.04
20	15	0.24	512	21	35	0.12	50	0.07	13	0.01	13	0.04
21	248	13	156	7.2	31	0.08	38	0.03	13	0.01	13	0.04
22	63	3.1	114	4.9	26	0.03	31	0.02	275	0.14	16	0.10
23	25	0.74	100	5.1	61	0.25	26	0.02	27	0.01	78	4.6
24	20	0.39	54	1.5	32	0.16	28	0.02	21	0.01	538	82
25	17	0.23	49	0.77	32	0.06	35	0.02	17	0.01	198	18
26	15	0.15	43	0.36	31	0.03	35	0.02	93	0.35	91	6.1
27	20	0.17	34	0.20	54	0.05	30	0.01	492	15	56	2.9
28	33	0.23	26	0.14	25	0.03	47	0.03	107	2.5	44	1.7
29	35	0.20	20	0.07	21	0.03	36	0.02	35	0.32	40	1.3
30	24	0.13	18	0.04	30	0.09	243	10	43	0.21	31	0.77
31	---	---	254	12	---	---	176	7.0	71	1.0	---	---
TOTAL	---	28.25	---	59.44	---	12.52	---	56.90	---	20.75	---	271.82

TOTAL LOAD FOR YEAR: 546.09 TONS.

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT

DATE	TIME	TEMPER-ATURE (DEG C)	INSTAN-TANEOUS DIS-CHARGE (CFS)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. FALL DIAM. % FINER THAN .002 MM	SUS. SED. FALL DIAM. % FINER THAN .004 MM	SUS. SED. FALL DIAM. % FINER THAN .008 MM	SUS. SED. FALL DIAM. % FINER THAN .016 MM	SUS. SED. FALL DIAM. % FINER THAN .062 MM
MAR 15...	1430	.5	20	399	22	46	58	72	87	97

PARTICLE-SIZE DISTRIBUTION OF BED MATERIAL

DATE	TIME	NUMBER OF SAM-PLING POINTS	INSTAN-TANEOUS DIS-CHARGE (CFS)	BED MAT. FALL DIAM. % FINER THAN .004 MM	BED MAT. FALL DIAM. % FINER THAN .062 MM	BED MAT. FALL DIAM. % FINER THAN .125 MM	BED MAT. FALL DIAM. % FINER THAN .250 MM	BED MAT. FALL DIAM. % FINER THAN .500 MM	BED MAT. FALL DIAM. % FINER THAN 1.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM
JUL 06...	1515	1	6.7	57	86	89	93	96	98	98	100

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 September 1977.

GAGE.--Water-stage recorder. Datum of gage is 786.14 ft (239.615 m) above mean sea level.

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

EXTREMES FOR CURRENT PERIOD.--Maximum discharge during period October to September, 289 ft^3/s (8.18 m^3s) Sept. 24, gage height, 16.40 ft (5.00 m) from rating curve extended above 17.6 ft^3/s (0.498 m^3/s); maximum gage height, 16.99 ft (5.18 m) Mar. 12 (backwater from ice); minimum daily discharge 0.35 ft^3/s (0.010 m^3/s) July 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.5	1.9	1.3	1.4	1.2	1.2	5.1	1.9	16	1.3	3.0	3.2
2	1.6	1.9	1.3	1.4	1.2	1.2	4.9	1.9	5.6	1.4	2.2	2.1
3	1.7	1.8	1.3	1.4	1.2	1.2	4.3	1.9	3.2	14	1.5	2.4
4	1.8	1.8	1.3	1.4	1.2	1.2	3.6	1.8	3.8	4.9	1.3	42
5	1.7	1.8	1.3	1.4	1.2	1.3	3.0	7.6	2.7	6.4	1.4	7.0
6	1.5	1.8	1.3	1.4	1.2	1.3	2.6	5.6	2.3	2.8	1.2	77
7	1.5	1.7	1.3	1.4	1.2	1.3	2.6	1.9	1.6	1.7	1.2	12
8	1.6	1.7	1.3	1.4	1.2	1.4	2.5	1.8	1.7	1.4	.93	5.8
9	1.8	1.6	1.3	1.4	1.2	1.6	3.0	1.7	1.6	1.0	.93	3.9
10	1.8	1.7	1.3	1.4	1.2	2.1	3.8	1.7	1.3	.93	1.2	3.0
11	1.9	1.6	1.3	1.4	1.2	4.0	4.3	1.7	1.5	2.4	1.2	2.3
12	2.1	1.6	1.3	1.4	1.2	7.0	11	1.7	1.4	1.9	1.3	2.3
13	1.7	1.6	1.3	1.4	1.2	13	4.8	1.6	1.3	1.3	1.8	2.0
14	1.7	1.6	1.3	1.4	1.2	26	4.3	1.6	1.2	1.2	1.4	2.0
15	1.5	1.7	1.3	1.4	1.2	23	4.6	8.6	1.2	1.3	1.7	1.9
16	1.7	1.7	1.3	1.4	1.2	16	3.9	11	2.0	3.3	2.4	1.7
17	1.8	1.7	1.3	1.4	1.2	11	3.8	10	2.0	9.8	1.6	1.6
18	1.7	1.7	1.3	1.4	1.2	8.8	4.2	9.5	2.1	3.2	1.4	1.8
19	1.8	1.6	1.3	1.4	1.2	8.0	6.2	9.4	1.6	2.1	1.2	1.9
20	1.9	1.6	1.3	1.3	1.2	7.5	3.7	22	1.6	11	1.3	1.9
21	1.8	1.5	1.3	1.3	1.2	7.2	12	45	1.3	3.4	1.3	1.8
22	1.8	1.5	1.3	1.3	1.2	6.7	5.8	28	1.1	.60	1.4	2.5
23	1.8	1.4	1.3	1.3	1.2	6.4	3.8	9.4	1.6	.40	1.3	8.1
24	1.8	1.4	1.3	1.3	1.2	6.0	2.7	6.7	1.7	.40	1.6	121
25	1.9	1.4	1.3	1.3	1.2	6.2	2.4	3.4	1.3	.35	1.7	25
26	1.9	1.3	1.3	1.3	1.2	6.6	2.4	2.7	.93	.40	2.3	15
27	1.7	1.3	1.3	1.3	1.2	6.8	2.1	2.4	.91	.46	8.5	8.3
28	1.6	1.3	1.4	1.3	1.2	7.0	2.0	2.3	.89	1.3	4.2	5.5
29	2.3	1.3	1.4	1.3	---	6.5	2.0	2.2	.88	.93	2.5	5.3
30	1.9	1.3	1.4	1.3	---	6.2	1.9	2.1	1.1	14	2.3	4.4
31	1.9	---	1.4	1.2	---	5.7	---	17	---	12	12	---
TOTAL	54.7	47.8	40.7	42.1	35.6	209.4	123.3	226.1	67.41	107.57	69.26	374.7
MEAN	1.76	1.59	1.31	1.36	1.20	6.75	4.11	7.29	2.25	3.47	2.23	12.5
MAX	2.3	1.9	1.4	1.4	1.2	26	12	45	16	14	12	121
MIN	1.5	1.3	1.3	1.2	1.2	1.2	1.9	1.6	.88	.35	.93	1.6
CFSM	.23	.21	.17	.18	.15	.87	.53	.94	.29	.45	.29	1.61
IN.	.26	.23	.19	.20	.16	1.00	.59	1.08	.32	.51	.33	1.79

WTR YR 1977 TOTAL 1396.64 MEAN 3.83 MAX 121 MIN .35 CFSM .49 IN 6.69

04024098 DEER CREEK NEAR HOLYOKE, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1976 to September 1977.

PERIOD OF DAILY RECORD.--
SUSPENDED-SEDIMENT DISCHARGE: October 1976 to September 1977.

INSTRUMENTATION.--Automatic 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. Letter B indicates non-ideal colony count.

EXTREMES FOR CURRENT PERIOD.--October 1976 to September 1977.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 2,370 mg/L Sept. 24; minimum daily mean, 1 mg/L Oct. 1-27.
SEDIMENT LOADS: Maximum daily, 908 tons (824 tonnes) Sept. 24; minimum daily, 0 ton (0 tonne) Oct. 1-10, 13-19, 21-24, 27.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)	FECAL COLIFORM .7UM-MF (COL./100 ML) (31625)
OCT										
28...	1533	1.6	310	8.1	12.0	.0	10	13.0	92	3
NOV										
30...	1629	1.2	335	7.8	-15.0	.0	10	13.6	96	6
JAN										
05...	1609	1.4	345	8.0	-12.0	.0	10	13.0	94	2
FEB										
08...	1414	1.2	305	8.0	-.5	.0	15	13.4	94	1
MAR										
14...	1555	26	178	8.0	6.0	.5	180	13.4	95	430
APR										
12...	1122	4.3	255	8.2	7.0	5.5	55	11.4	93	2
MAY										
31...	1445	17	230	7.7	15.0	12.0	120	--	--	B1900
JUL										
06...	1051	2.6	280	8.1	21.0	17.5	35	--	--	260
AUG										
11...	1256	.86	305	8.3	15.5	16.0	15	--	--	58
SEP										
15...	1417	1.7	290	8.1	16.5	12.5	25	9.6	92	12

DATE	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML) (31673)	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)
OCT										
28...	25	160	3	40	14	5.0	6	1.5	155	9.9
NOV										
30...	92	170	0	42	15	5.4	7	1.5	167	7.7
JAN										
05...	118	150	4	37	15	5.1	7	1.4	150	7.7
FEB										
08...	12	150	0	38	14	5.1	7	1.4	158	9.6
MAR										
14...	5300	68	19	18	5.6	2.1	6	3.2	49	19
APR										
12...	80	120	16	31	11	3.4	6	1.7	110	16
MAY										
31...	B48000	120	14	30	11	4.2	7	2.1	110	18
JUL										
06...	810	150	6	37	13	4.6	6	1.7	139	10
AUG										
11...	140	150	0	37	13	4.9	7	1.5	160	8.6
SEP										
15...	160	150	3	39	13	4.1	6	1.8	150	5.9

04024098 DEER CREEK NEAR HOLYOKE, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L) (70300)	DIS-SOLVED SOLIDS (TONS PER AC-FT) (70303)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L) (00625)	TOTAL PHOS-PHORUS (P) (MG/L) (00665)	TOTAL ORGANIC CARBON (C) (MG/L) (00680)
OCT										
28...	.7	.2	16	194	.26	.86	.01	.11	.02	2.1
NOV										
30...	.6	.2	16	199	.27	.68	.06	.42	.06	--
JAN										
05...	.5	.2	20	183	.25	.71	.06	.21	.03	2.1
FEB										
08...	.7	.1	1.2	168	.23	.54	.09	.24	.04	1.6
MAR										
14...	4.8	.1	7.5	116	.16	8.14	1.0	2.2	.30	--
APR										
12...	1.7	.1	10	160	.22	1.86	.11	1.1	.05	14
MAY										
31...	2.2	.1	13	170	.23	8.08	.08	1.1	.16	14
JUL										
06...	1.7	.1	14	186	.25	1.31	.05	.52	.13	12
AUG										
11...	1.8	.2	14	180	.24	.42	.01	.21	.04	4.4
SEP										
15...	1.1	.2	17	174	.24	.80	.01	.26	.03	6.2

DATE	TIME	TOTAL ARSENIC (AS) (UG/L) (01002)	SUS-PENDED ARSENIC (AS) (UG/L) (01001)	TOTAL CAD-MIUM (CD) (UG/L) (01027)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	TOTAL CHRO-MIUM (CR) (UG/L) (01034)	DIS-SOLVED CHRO-MIUM (CR) (UG/L) (01030)	TOTAL COBALT (CO) (UG/L) (01037)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	TOTAL COPPER (CU) (UG/L) (01042)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	TOTAL IRON (FE) (UG/L) (01045)
OCT												
28...	1533	3	1	<10	1	0	0	<50	0	<10	0	320
MAR												
14...	1555	8	--	10	1	0	0	<50	0	20	15	7100
APR												
12...	1122	2	--	<10	0	10	0	<50	0	10	0	2300
AUG												
11...	1256	4	0	<10	1	0	0	<50	1	<10	2	480

DATE	DIS-SOLVED IRON (FE) (UG/L) (01046)	TOTAL LEAD (PB) (UG/L) (01051)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	TOTAL MAN-GANESE (MN) (UG/L) (01055)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	TOTAL MERCURY (HG) (UG/L) (71900)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	TOTAL SELE-NIUM (SE) (UG/L) (01147)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	TOTAL ZINC (ZN) (UG/L) (01092)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)
OCT											
28...	20	<100	4	30	10	.0	.0	0	0	10	0
MAR											
14...	230	100	8	230	40	2.4	.0	1	0	30	10
APR											
12...	200	<100	0	90	50	.0	.0	0	0	20	10
AUG											
11...	50	<100	6	40	20	1.9	1.3	0	0	10	0

04024098 DEER CREEK NEAR HOLYOKE, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	TOTAL PCB (UG/L) (39516)	PCB IN BOTTOM MATERIAL (UG/KG) (39519)	POLYCHLORINATED NAPHTHALENES (UG/L) (39250)	TOTAL ALDRIN (UG/L) (39330)	ALDRIN IN BOTTOM MATERIAL (UG/KG) (39333)	TOTAL CHLORDANE (UG/L) (39350)	CHLORDANE IN BOTTOM MATERIAL (UG/KG) (39351)	TOTAL DDD (UG/L) (39360)	DDD IN BOTTOM MATERIAL (UG/KG) (39363)	TOTAL DDE (UG/L) (39365)	DDE IN BOTTOM MATERIAL (UG/KG) (39368)
OCT												
29...	1436	.0	0	.00	.00	.0	.0	0	.00	.0	.00	.0

DATE	TOTAL DDT (UG/L) (39370)	DDT IN BOTTOM MATERIAL (UG/KG) (39373)	TOTAL DIAZINON (UG/L) (39570)	DIAZINON IN BOTTOM MATERIAL (UG/KG) (39571)	TOTAL DIELDRIN (UG/L) (39380)	DIELDRIN IN BOTTOM MATERIAL (UG/KG) (39383)	TOTAL ENDRIN (UG/L) (39390)	ENDRIN IN BOTTOM MATERIAL (UG/KG) (39393)	TOTAL ETHION (UG/L) (39398)	ETHION IN BOTTOM MATERIAL (UG/KG) (39399)	TOTAL HEPTACHLOR (UG/L) (39410)	HEPTACHLOR IN BOTTOM MATERIAL (UG/KG) (39413)
OCT												
29...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0

DATE	TOTAL HEPTACHLOR EPOXIDE (UG/L) (39420)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG) (39423)	TOTAL LINDANE (UG/L) (39340)	LINDANE IN BOTTOM MATERIAL (UG/KG) (39343)	TOTAL MALATHION (UG/L) (39530)	MALATHION IN BOTTOM MATERIAL (UG/KG) (39531)	TOTAL METHYL PARATHION (UG/L) (39600)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG) (39601)	TOTAL METHYL TRITHION (UG/L) (39790)	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG) (39791)	TOTAL PARATHION (UG/L) (39540)
OCT											
29...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.00

DATE	PARATHION IN BOTTOM MATERIAL (UG/KG) (39541)	TOTAL TOXAPHENE (UG/L) (39400)	TOXAPHENE IN BOTTOM MATERIAL (UG/KG) (39403)	TOTAL TRITHION (UG/L) (39786)	TRITHION IN BOTTOM MATERIAL (UG/KG) (39787)	TOTAL 2,4-D (UG/L) (39730)	2,4-D IN BOTTOM MATERIAL (UG/KG) (39731)	TOTAL 2,4,5-T (UG/L) (39740)	2,4,5-T IN BOTTOM MATERIAL (UG/KG) (39741)	TOTAL SILVEX (UG/L) (39760)	SILVEX IN BOTTOM MATERIAL (UG/KG) (39761)
OCT											
29...	.0	0	0	.00	.0	.00	0	.00	0	.00	0

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT

DATE	TIME	TEMPERATURE (DEG C)	INSTANTANEOUS DISCHARGE (CFS)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)	SUS. SED. FALL DIAM. % FINER THAN .002 MM	SUS. SED. FALL DIAM. % FINER THAN .004 MM	SUS. SED. FALL DIAM. % FINER THAN .008 MM	SUS. SED. FALL DIAM. % FINER THAN .016 MM	SUS. SED. FALL DIAM. % FINER THAN .062 MM
MAR										
14...	1620	.5	26	366	26	42	50	63	78	90
26...	2245	--	212	1460	836	47	58	70	87	98
APR										
12...	1700	--	62	3810	638	46	56	74	92	99
SEP										
06...	0500	--	170	5080	2330	62	63	74	84	98

PARTICLE-SIZE DISTRIBUTION OF BED MATERIAL

DATE	TIME	NUMBER OF SAMPLING POINTS	BED MAT. FALL DIAM. % FINER THAN .004 MM	BED MAT. FALL DIAM. % FINER THAN .062 MM	BED MAT. FALL DIAM. % FINER THAN .125 MM	BED MAT. FALL DIAM. % FINER THAN .250 MM	BED MAT. FALL DIAM. % FINER THAN .500 MM	BED MAT. FALL DIAM. % FINER THAN 1.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM
JUL										
06...	1130	1	29	42	45	52	62	86	90	96

STREAMS TRIBUTARY TO LAKE SUPERIOR

04024098 DEER CREEK NEAR HOLYOKE, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

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	1	.00	3	0.02	16	0.06	3	0.01	3	0.01	7	0.02
2	1	.00	3	0.02	20	0.07	3	0.01	3	0.01	3	0.01
3	1	.00	3	0.01	36	0.13	3	0.01	3	0.01	3	0.01
4	1	.00	3	0.01	6	0.02	3	0.01	3	0.01	3	0.01
5	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	3	0.01
6	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	3	0.01
7	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	3	0.01
8	1	.00	3	0.01	3	0.01	3	0.01	15	0.05	4	0.02
9	1	.00	3	0.01	3	0.01	3	0.01	7	0.02	4	0.02
10	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	7	0.04
11	1	0.01	3	0.01	3	0.01	3	0.01	3	0.01	70	0.76
12	1	0.01	3	0.01	3	0.01	3	0.01	3	0.01	258	4.9
13	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	357	13
14	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	357	25
15	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	253	16
16	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	138	6.0
17	1	.00	3	0.01	3	0.01	3	0.01	7	0.02	43	1.3
18	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	36	0.86
19	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	32	0.69
20	1	0.01	3	0.01	3	0.01	3	0.01	3	0.01	31	0.63
21	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	30	0.58
22	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	37	0.67
23	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	37	0.64
24	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	24	0.39
25	1	0.01	3	0.01	3	0.01	3	0.01	7	0.02	43	0.72
26	1	0.01	3	0.01	3	0.01	3	0.01	3	0.01	186	3.3
27	1	.00	3	0.01	3	0.01	3	0.01	3	0.01	408	7.5
28	3	0.01	3	0.01	3	0.01	3	0.01	3	0.01	208	3.9
29	3	0.02	3	0.01	3	0.01	3	0.01	---	---	721	13
30	3	0.02	10	0.04	3	0.01	3	0.01	---	---	285	4.8
31	3	0.02	---	---	3	0.01	3	0.01	---	---	82	1.3
TOTAL	---	0.12	---	0.35	---	0.55	---	0.31	---	0.35	---	106.10
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	46	0.63	34	0.17	95	4.2	47	0.16	56	0.45	166	1.8
2	28	0.37	35	0.18	47	0.71	29	0.11	37	0.22	27	0.15
3	39	0.45	31	0.16	30	0.26	160	6.0	30	0.12	28	0.44
4	23	0.22	29	0.14	41	0.42	88	1.3	28	0.10	499	82
5	23	0.19	26	0.53	32	0.23	75	1.4	22	0.08	70	1.3
6	23	0.16	44	0.67	25	0.16	42	0.32	22	0.07	647	253
7	25	0.18	30	0.15	21	0.09	43	0.20	21	0.07	18	0.58
8	35	0.24	22	0.11	18	0.08	38	0.14	18	0.05	19	0.30
9	53	0.43	22	0.10	17	0.07	38	0.10	16	0.04	21	0.22
10	51	0.52	32	0.15	20	0.07	38	0.10	16	0.05	21	0.17
11	38	0.44	32	0.15	22	0.09	42	0.27	16	0.05	21	0.13
12	575	42	42	0.19	20	0.08	50	0.26	16	0.06	21	0.13
13	106	1.7	47	0.20	17	0.06	37	0.13	19	0.09	21	0.11
14	42	0.49	32	0.14	16	0.05	38	0.12	14	0.05	21	0.11
15	79	0.98	35	0.81	17	0.06	39	0.14	12	0.06	22	0.11
16	48	0.51	194	5.8	24	0.13	44	0.39	26	0.17	32	0.15
17	42	0.43	82	2.2	26	0.14	180	5.2	17	0.07	38	0.16
18	50	0.61	42	1.1	29	0.16	54	0.47	15	0.06	22	0.11
19	81	1.4	50	1.3	25	0.11	42	0.24	25	0.08	20	0.10
20	54	0.54	62	3.7	37	0.16	660	34	16	0.06	25	0.13
21	47	1.5	195	24	29	0.10	376	3.5	11	0.04	24	0.12
22	151	2.4	77	5.8	25	0.07	64	0.15	11	0.04	13	0.09
23	73	0.75	43	1.1	42	0.18	34	0.04	13	0.05	83	9.0
24	48	0.35	37	0.67	35	0.16	23	0.02	12	0.05	2370	908
25	38	0.25	28	0.26	31	0.11	37	0.03	12	0.06	834	54
26	29	0.19	23	0.17	25	0.06	35	0.04	18	0.11	150	6.1
27	29	0.16	22	0.14	48	0.12	30	0.04	122	2.9	43	0.96
28	27	0.15	23	0.14	43	0.10	39	0.14	51	0.58	29	0.43
29	27	0.15	22	0.13	40	0.10	33	0.08	25	0.17	24	0.34
30	32	0.16	19	0.11	42	0.12	229	32	19	0.12	20	0.24
31	---	---	103	5.5	---	---	230	12	338	25	---	---
TOTAL	---	58.55	---	55.97	---	8.45	---	99.09	---	31.12	---	1320.48

TOTAL LOAD FOR YEAR: 1681.44 TONS.

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) above mean sea level (levels by Minnesota Highway Department). 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 periods, which are fair.

AVERAGE DISCHARGE.--38 years (water years, 1910-12, 1943-77), 78.4 ft^3/s (2.220 m^3/s), 56,800 acre-ft/yr (70.0 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, 129 ft^3/s (3.65 m^3/s) May 14, gage height, 3.70 ft (1.128 m); maximum gage height observed, 4.47 ft (1.362 m) Mar. 19 (backwater from ice); no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.53	1.7	.00	.00	.00	13	12	13	6.3	6.3	11
2	.00	.43	1.5	.00	.00	.00	13	12	12	6.3	6.0	17
3	.00	.37	.90	.00	.00	.00	8.0	11	11	4.5	7.6	18
4	.00	.33	.50	.00	.00	.00	8.0	9.3	9.7	4.2	6.0	18
5	.00	.28	.30	.00	.00	.00	18	11	9.7	4.7	4.9	16
6	.00	.38	.18	.00	.00	.00	22	17	7.9	3.6	4.9	14
7	.00	.58	.10	.00	.00	.00	15	18	6.5	2.9	5.8	14
8	.00	.60	.06	.00	.00	.00	14	16	5.6	3.2	5.6	13
9	.00	.75	.04	.00	.00	.50	12	12	4.9	2.9	5.7	12
10	.00	.79	.02	.00	.00	2.0	13	12	4.5	2.9	5.4	11
11	.00	.90	.01	.00	.00	4.5	14	12	4.0	4.0	4.9	13
12	.00	.94	.01	.00	.00	8.0	14	11	3.6	3.6	4.8	15
13	.00	1.0	.00	.00	.00	12	19	11	3.2	3.1	4.6	17
14	.00	1.1	.00	.00	.00	15	18	28	2.9	4.2	4.0	16
15	.00	1.2	.00	.00	.00	18	20	28	3.8	4.7	4.0	14
16	.00	1.3	.00	.00	.00	22	20	18	8.2	4.5	4.8	14
17	.00	1.5	.00	.00	.00	26	19	14	8.6	4.0	4.6	12
18	.00	1.7	.00	.00	.00	29	24	12	9.3	3.4	4.3	12
19	.00	1.7	.00	.00	.00	37	30	10	7.9	3.2	4.0	11
20	.03	1.8	.00	.00	.00	37	29	12	7.6	3.1	3.7	11
21	.03	1.9	.00	.00	.00	37	26	7.0	6.5	4.5	3.5	13
22	.03	1.9	.00	.00	.00	37	21	7.9	7.3	4.7	3.3	24
23	.03	2.0	.00	.00	.00	36	18	8.2	7.9	4.2	3.0	24
24	.04	2.0	.00	.00	.00	36	20	9.0	12	4.2	2.7	44
25	.06	2.0	.00	.00	.00	36	18	13	7.6	4.0	8.6	48
26	.04	2.0	.00	.00	.00	35	15	6.5	6.0	3.1	5.2	54
27	.06	2.0	.00	.00	.00	34	13	7.0	5.4	2.9	11	63
28	.09	1.9	.00	.00	.00	32	14	11	7.3	4.0	5.7	70
29	.51	1.9	.00	.00	---	32	13	14	5.6	3.8	5.6	71
30	.86	1.8	.00	.00	---	30	12	12	16	6.5	5.7	65
31	.78	---	.00	.00	---	25	---	14	---	7.0	7.3	---
TOTAL	2.56	37.58	5.32	.00	.00	581.00	513.0	395.9	225.5	128.2	163.5	755
MEAN	.083	1.25	.17	.000	.000	18.7	17.1	12.8	7.52	4.14	5.27	25.2
MAX	.86	2.0	1.7	.00	.00	37	30	28	16	7.0	11	71
MIN	.00	.28	.00	.00	.00	.00	8.0	6.5	2.9	2.9	2.7	11
AC-FT	5.1	75	11	.00	.00	1150	1020	785	447	254	324	1500

CAL YR 1976 TOTAL 16369.23 MEAN 44.7 MAX 186 MIN .00 AC-FT 32470
WTR YR 1977 TOTAL 2807.56 MEAN 7.69 MAX 71 MIN .00 AC-FT 5570

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 at mean sea level, adjustment of 1912.

REMARKS.--Reservoir is formed by earth dam with concrete spillway with one tainter 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, 14,220 acre-ft (17.5 hm^3) Aug. 28, elevation, 1,070.10 ft (326.166 m); minimum, 2,900 acre-ft (3.58 hm^3) Oct. 1, elevation, 1,054.25 ft (321.335 m).

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	54.18	2870	
Oct. 31	55.68	3510	+640
Nov. 30	56.29	3780	+270
Dec. 31	57.13	4160	+380
CAL YR 1976			-1710
Jan. 31	56.37	3820	-340
Feb. 28	55.75	3540	-280
Mar. 31	60.03	5770	+2230
Apr. 30	64.94	9350	+3580
May 31	68.56	12560	+3210
June 30	69.62	13680	+1120
July 31	69.43	13470	-210
Aug. 31	69.91	14000	+530
Sept. 30	69.18	13200	-800
WTR YR 1977			+10330

NOTE.--Add 1000.00 ft to obtain elevation above mean sea level.

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) above mean sea level, 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 beginning Mar. 21, 1953 (see preceding page) and powerplants upstream.

AVERAGE DISCHARGE.--47 years, 300 ft^3/s (8.50 m^3/s), 217,400 acre-ft/yr (268 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, 300 ft^3/s (8.50 m^3/s) Sept. 19, gage height, 2.88 ft (0.878 m); minimum discharge, 7.6 ft^3/s (0.22 m^3/s) May 27, gage height, 1.85 ft (0.564 m), result of regulation.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.3	8.7	8.1	8.1	23	22	22	25	13	71	36	81
2	9.0	8.9	8.1	8.1	23	22	22	25	13	70	36	81
3	8.9	8.8	8.1	8.1	23	22	23	24	13	70	36	92
4	9.4	8.6	8.1	8.1	23	22	23	24	13	71	36	95
5	9.5	8.7	8.1	8.1	23	22	24	25	13	69	36	92
6	9.7	8.7	8.1	8.1	23	22	24	25	13	69	36	95
7	9.9	8.7	8.1	19	23	22	24	25	14	69	36	95
8	10	8.3	8.1	20	23	24	24	25	22	69	36	95
9	10	11	8.1	21	23	66	24	16	31	69	36	97
10	9.6	8.2	8.1	21	23	66	24	8.3	31	67	38	95
11	9.5	8.2	8.1	22	23	66	24	8.7	31	69	38	97
12	9.8	7.9	8.1	23	22	66	24	9.2	31	68	39	97
13	9.7	8.0	8.1	23	22	66	24	9.3	31	67	39	97
14	9.6	8.0	8.1	24	22	66	25	9.9	31	69	40	97
15	9.5	8.2	8.1	24	22	38	25	9.9	35	66	39	97
16	9.1	8.2	8.1	24	22	20	26	9.9	40	66	39	100
17	9.1	8.3	8.1	23	22	20	25	9.9	55	66	39	100
18	8.7	8.3	8.1	23	22	20	25	9.5	73	66	39	101
19	8.7	8.3	8.1	23	22	20	24	10	73	66	39	141
20	8.9	8.3	8.1	23	22	20	58	10	76	66	39	153
21	8.8	8.3	8.1	23	22	21	116	10	73	66	39	157
22	8.7	8.3	8.1	23	22	20	130	10	76	65	39	157
23	8.7	8.3	8.1	23	22	19	137	10	141	58	39	157
24	8.7	8.3	8.1	23	22	21	137	9.9	107	48	39	173
25	8.7	8.3	8.1	23	22	21	137	9.9	103	36	39	182
26	8.7	8.3	8.1	23	22	21	100	11	107	36	48	196
27	8.7	8.3	8.1	23	22	20	31	11	110	38	69	205
28	8.7	8.1	8.1	23	22	22	24	11	113	36	145	205
29	8.7	8.1	8.1	23	---	22	24	12	92	36	145	205
30	8.7	8.1	8.1	23	---	22	25	12	76	36	113	210
31	8.7	---	8.1	23	---	22	---	13	---	36	95	---
TOTAL	283.7	252.7	251.1	614.6	627	943	1375	438.4	1650	1854	1562	3845
MEAN	9.15	8.42	8.10	19.8	22.4	30.4	45.8	14.1	55.0	59.8	50.4	128
MAX	10	11	8.1	24	23	66	137	25	141	71	145	210
MIN	8.7	7.9	8.1	8.1	22	19	22	8.3	13	36	36	81
AC-FT	563	501	498	1220	1240	1870	2730	870	3270	3680	3100	7630

CAL YR 1976	TOTAL	66762.5	MEAN	182	MAX 624	MIN 7.8	AC-FT	132400
WTR YR 1977	TOTAL	13696.5	MEAN	37.5	MAX 210	MIN 7.9	AC-FT	27170

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 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) above mean sea level, 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.--36 years, 75.2 ft^3/s (2.130 m^3/s), 54,480 acre-ft/yr (67.2 hm^3/yr).

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 27 ft^3/s (0.76 m^3/s) Mar. 13, gage height, 5.52 ft (1.682 m) (backwater from ice); no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	.65	.97	.06	.01	.01	.05
2	.00	.00	.00	.00	.00	.00	.65	.68	.02	.01	.01	.05
3	.00	.00	.00	.00	.00	.00	.65	.48	.00	.01	.00	.04
4	.00	.00	.00	.00	.00	.00	.65	.33	.00	.01	.00	.05
5	.00	.00	.00	.00	.00	.00	.65	.81	.00	.01	.00	.04
6	.00	.00	.00	.00	.00	.00	.65	.88	.00	.01	.00	.03
7	.00	.00	.00	.00	.00	.00	.65	.65	.00	.01	.00	.04
8	.00	.00	.00	.00	.00	.00	.65	.57	.00	.01	.00	.01
9	.00	.00	.00	.00	.00	.00	.62	.40	.00	.01	.00	.01
10	.00	.00	.00	.00	.00	.01	.57	.26	.00	.01	.00	.01
11	.00	.00	.00	.00	.00	.02	.54	.20	.00	.04	.00	.00
12	.00	.00	.00	.00	.00	.05	.47	.18	.00	.05	.00	.00
13	.00	.00	.00	.00	.00	.88	.43	.17	.00	.04	.00	.00
14	.00	.00	.00	.00	.00	19	.46	.10	.00	.04	.00	.00
15	.00	.00	.00	.00	.00	15	.60	.03	.00	.05	.04	.00
16	.00	.00	.00	.00	.00	11	.69	.02	.00	.05	.05	.00
17	.00	.00	.00	.00	.00	10	.97	.06	.00	.04	.03	.00
18	.00	.00	.00	.00	.00	8.6	3.8	.02	.00	.02	.01	.00
19	.00	.00	.00	.00	.00	7.5	3.8	.02	.00	.00	.01	.02
20	.00	.00	.00	.00	.00	5.0	2.7	.02	.00	.00	.01	.02
21	.00	.00	.00	.00	.00	3.0	2.9	.04	.00	.00	.01	.02
22	.00	.00	.00	.00	.00	2.4	2.0	.06	.00	.00	.01	.13
23	.00	.00	.00	.00	.00	1.7	2.9	.02	.02	.00	.01	.18
24	.00	.00	.00	.00	.00	1.0	2.1	.01	.03	.00	.00	.43
25	.00	.00	.00	.00	.00	.70	1.5	.00	.00	.00	.00	.65
26	.00	.00	.00	.00	.00	.64	1.5	.00	.00	.00	.00	.63
27	.00	.00	.00	.00	.00	.58	1.2	.00	.06	.01	.01	.13
28	.00	.00	.00	.00	.00	.52	.83	.00	.09	.01	.01	.05
29	.00	.00	.00	.00	---	.65	.69	.01	.01	.01	.01	.01
30	.00	.00	.00	.00	---	.78	.64	.02	.00	.02	.01	.02
31	.00	---	.00	.00	---	.70	---	.05	---	.02	.03	---
TOTAL	.00	.00	.00	.00	.00	89.73	37.11	7.06	.29	.50	.27	2.62
MEAN	.000	.000	.000	.000	.000	2.89	1.24	.23	.010	.016	.009	.087
MAX	.00	.00	.00	.00	.00	19	3.8	.97	.09	.05	.05	.65
MIN	.00	.00	.00	.00	.00	.00	.43	.00	.00	.00	.00	.00
AC-FT	.00	.00	.00	.00	.00	178	74	14	.6	1.0	.5	5.2

CAL YR 1976 TOTAL 11632.06 MEAN 31.8 MAX 434 MIN .00 AC-FT 23070
WTR YR 1977 TOTAL 137.58 MEAN .38 MAX 19 MIN .00 AC-FT 273

05051500 RED RIVER OF THE NORTH AT WAHPETON, ND

LOCATION.--Lat 46°15'55", long 96°35'40", in NE 1/4 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) above mean sea level. 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) above mean sea level, 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.--34 years (1943-77), 517 ft^3/s (14.64 m^3/s) 374,600 acre-ft/yr (462 hm^3/yr); median of yearly mean discharges, 470 ft^3/s (13.3 m^3/s) 341,000 acre-ft/yr (420 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, 526 ft^3/s (14.9 m^3/s) June 25, gage height, 4.49 ft (1.369 m); minimum daily, 2.0 ft^3/s (0.057 m^3/s) Nov. 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.0	8.0	5.0	7.8	14	20	121	60	16	90	35	161
2	3.0	8.0	5.0	7.8	14	20	101	40	13	77	36	120
3	3.0	8.0	4.6	7.8	14	20	90	34	13	73	35	70
4	3.0	8.0	4.6	7.8	14	20	79	30	12	81	35	94
5	3.0	2.0	4.6	7.8	14	20	66	30	8.8	83	34	113
6	3.0	2.5	4.6	7.8	14	20	59	35	7.7	77	35	116
7	3.0	3.0	4.6	7.8	14	25	50	50	6.6	74	41	137
8	3.0	4.0	4.6	7.8	15	30	54	45	6.0	72	40	116
9	3.0	5.5	4.6	7.8	15	45	64	40	5.3	80	37	99
10	3.0	7.5	4.6	7.8	17	42	70	29	5.4	73	35	101
11	3.0	7.6	4.6	7.8	18	50	66	25	7.4	76	32	103
12	3.0	7.5	4.8	7.8	20	80	56	20	9.2	70	32	103
13	3.0	7.5	5.0	7.8	20	80	55	15	12	70	35	103
14	4.1	7.5	6.0	7.8	20	110	100	18	14	66	34	101
15	4.1	7.5	7.0	7.8	20	170	200	11	29	58	40	101
16	4.1	7.5	8.0	7.8	20	160	300	9.9	36	67	40	101
17	5.0	7.5	8.5	7.5	20	140	270	12	74	65	40	101
18	7.5	7.5	8.5	7.5	20	85	236	11	155	63	38	118
19	8.8	7.5	8.5	7.5	20	65	250	11	109	58	38	116
20	9.0	7.5	8.3	7.5	20	55	300	11	71	57	36	120
21	9.0	8.0	8.3	7.5	20	45	250	12	62	60	36	135
22	9.0	10	8.2	7.5	20	45	150	15	74	60	36	193
23	9.0	10	8.2	7.5	20	40	170	14	116	105	36	190
24	9.0	10	8.0	7.8	20	45	200	13	243	73	36	225
25	9.0	10	8.0	8.0	20	65	170	12	513	62	39	257
26	9.0	10	8.0	10	20	143	152	12	415	57	65	220
27	8.5	10	8.0	14	20	250	140	14	281	49	74	206
28	8.5	9.5	8.0	14	20	218	130	16	161	31	70	260
29	8.5	7.0	8.0	14	---	185	110	13	113	33	126	307
30	8.2	6.0	8.0	14	---	179	80	17	113	39	200	287
31	8.0	---	8.0	14	---	140	---	23	---	35	212	---
TOTAL	177.3	222.1	204.7	273.1	503	2612	4139	697.9	2701.4	2034	1658	4474
MEAN	5.72	7.40	6.60	8.81	18.0	84.3	138	22.5	90.0	65.6	53.5	149
MAX	9.0	10	8.5	14	20	250	300	60	513	105	212	307
MIN	3.0	2.0	4.6	7.5	14	20	50	9.9	5.3	31	32	70
AC-FT	352	441	406	542	998	5180	8210	1380	5360	4030	3290	8870

CAL YR 1976 TOTAL 90342.5 MEAN 247 MAX 2650 MIN 1.7 AC-FT 179200
WTR YR 1977 TOTAL 19696.5 MEAN 54.0 MAX 513 MIN 2.0 AC-FT 39070

05051522 RED RIVER OF THE NORTH NEAR HICKSON, ND

LOCATION.--Lat 46°39'35", long 96°47'44", in SW 1/4 sec.19, T.137 N., R.48 W., Clay County, Minnesota, Hydrologic Unit 09020104, on right bank 60 ft (18 m) downstream from bridge on township road 1 mi (2 km) southeast of Hickson.

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. Altitude of gage is 890 ft (271.3 m) from topographic map.

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) above mean sea level, 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, about 2,500 ft^3/s (70.8 m^3/s) Mar. 31, 1976, gage height, 16.94 ft (5.163 m), observed, (backwater from ice); no flow from Oct. 26, 1976 to Jan. 9, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 408 ft^3/s (11.6 m^3/s) June 27, gage height, 10.30 ft (3.139 m); no flow Oct. 26 to Jan. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.7	.00	.00	.00	7.0	25	224	62	23	152	26	166
2	2.7	.00	.00	.00	7.0	25	220	33	23	128	28	205
3	2.7	.00	.00	.00	7.5	25	195	23	23	108	26	191
4	2.7	.00	.00	.00	7.5	25	180	19	20	89	28	148
5	2.7	.00	.00	.00	8.0	25	160	24	19	85	28	104
6	2.5	.00	.00	.00	8.0	25	121	27	16	85	26	79
7	2.5	.00	.00	.00	8.0	25	129	44	15	85	28	88
8	2.5	.00	.00	.00	8.0	25	139	39	13	74	29	94
9	2.5	.00	.00	.00	8.5	25	101	23	10	68	35	107
10	2.5	.00	.00	6.5	8.5	25	73	20	8.4	55	37	127
11	2.5	.00	.00	7.0	9.0	25	76	22	6.8	71	35	111
12	2.5	.00	.00	7.0	9.0	25	92	24	6.8	78	31	94
13	2.5	.00	.00	7.0	9.5	25	100	24	6.8	74	29	89
14	2.5	.00	.00	7.0	9.5	25	89	23	5.3	64	29	92
15	2.5	.00	.00	7.0	9.5	25	93	19	6.8	68	29	89
16	2.5	.00	.00	7.0	9.5	74	89	18	12	74	33	89
17	2.5	.00	.00	7.0	20	85	276	18	16	64	33	88
18	2.5	.00	.00	7.0	20	93	288	18	24	61	37	85
19	2.5	.00	.00	7.0	20	128	224	15	78	58	37	91
20	2.5	.00	.00	7.0	20	144	268	12	164	51	35	98
21	2.5	.00	.00	7.0	20	124	292	12	160	52	32	107
22	2.5	.00	.00	7.0	20	104	236	15	124	49	30	128
23	2.5	.00	.00	7.0	20	78	152	17	89	53	29	178
24	2.5	.00	.00	7.0	22	78	148	18	85	71	26	255
25	1.5	.00	.00	7.0	22	89	172	16	112	116	25	263
26	.00	.00	.00	7.0	24	89	191	16	260	93	27	306
27	.00	.00	.00	7.0	25	104	183	15	388	64	41	339
28	.00	.00	.00	7.0	25	140	172	13	376	55	47	334
29	.00	.00	.00	7.0	---	200	154	13	304	53	73	317
30	.00	.00	.00	7.0	---	215	125	16	196	47	74	330
31	.00	---	.00	7.0	---	232	---	24	---	29	80	---
TOTAL	62.50	.00	.00	153.50	392.0	2352	4962	682	2590.9	2274	1103	4792
MEAN	2.02	.000	.000	4.95	14.0	75.9	165	22.0	86.4	73.4	35.6	160
MAX	2.7	.00	.00	7.0	25	232	292	62	388	152	80	339
MIN	.00	.00	.00	.00	7.0	25	73	12	5.3	29	25	79
AC-FT	124	.00	.00	304	778	4670	9840	1350	5140	4510	2190	9500

CAL YR 1976 TOTAL 94364.00 MEAN 258 MAX 2450 MIN .00 AC-FT 187200
WTR YR 1977 TOTAL 19363.90 MEAN 53.1 MAX 388 MIN .00 AC-FT 38410

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

WATER-QUALITY RECORDS

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

REMARKS.--No flow Oct. 26, 1976 to Jan. 9, 1977.

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

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,900 micromhos Jan. 27, 1977; minimum daily, 399 micromhos Aug. 6, 1976.
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, 1,900 micromhos Jan. 27; minimum daily, 430 micromhos Mar. 11.
WATER TEMPERATURES: Maximum daily, 30.0°C July 23; minimum daily, 0.0°C on many days during winter months.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE (DEG C) (00010)	COLOR (PLATINUM-COBALT UNITS) (00080)	TURBIDITY (JTU) (00070)	DISSOLVED OXYGEN (MG/L) (00300)	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)
JAN										
21...	1045	6.9	1330	7.9	1.0	90	8	1.0	680	210
FEB										
14...	1445	9.4	1590	7.5	.5	55	9	1.0	800	160
MAR										
24...	1500	81	615	8.7	1.0	25	10	18.6	300	60
APR										
26...	1445	196	560	9.4	16.0	27	60	15.5	270	150
MAY										
25...	0910	15	740	8.2	23.0	11	5	7.1	360	110
JUN										
29...	1055	295	700	8.0	23.5	25	25	5.4	320	150
JUL										
26...	1015	92	650	8.2	25.0	13	25	5.0	330	73
AUG										
24...	0915	26	600	8.3	18.0	18	15	6.2	270	43
SEP										
21...	1005	101	600	8.4	15.5	12	10	8.2	290	49

DATE	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)	DISSOLVED CHLORIDE (CL) (MG/L) (00940)	DISSOLVED FLUORIDE (F) (MG/L) (00950)
JAN										
21...	120	92	55	15	.9	11	472	280	24	.3
FEB										
14...	140	110	92	20	1.4	16	645	340	44	.6
MAR										
24...	61	35	20	13	.5	6.5	240	91	11	.2
APR										
26...	63	28	16	11	.4	5.5	130	160	5.4	.3
MAY										
25...	76	41	25	13	.6	8.0	246	130	13	.3
JUN										
29...	68	37	25	14	.6	6.8	170	180	9.4	.2
JUL										
26...	65	40	20	11	.5	6.7	250	84	13	.2
AUG										
24...	53	34	22	15	.6	6.3	230	84	14	.2
SEP										
21...	57	37	18	11	.5	6.3	250	72	11	.2

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L) (70300)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL AMMONIA NITRO-GEN (N) (MG/L) (00610)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L) (00625)	TOTAL PHOS-PHORUS (P) (MG/L) (00665)	DIS-SOL-VED PHOS-PHORUS (P) (MG/L) (00666)
JAN 21...	16	938	883	17.5	.01	.56	1.2	.15	.06
FEB 14...	17	1180	1150	29.9	.04	4.4	4.8	1.2	.84
MAR 24...	7.5	389	383	85.1	2.0	.57	1.9	.41	.17
APR 26...	.1	348	355	184	.00	.01	1.3	.26	.05
MAY 25...	4.4	473	446	19.2	.01	.07	1.5	.30	.23
JUN 29...	11	464	441	370	.02	.26	1.6	.24	.07
JUL 26...	12	386	394	95.9	.05	.09	1.4	.19	.10
AUG 24...	6.6	356	358	25.0	.03	.06	1.1	.14	.07
SEP 21...	7.1	368	357	100	.03	.00	1.1	.11	.04

DATE	TOTAL ORTHO PHOS-PHORUS (P) (MG/L) (70507)	TOTAL ORTHO + HYDRO. PHOS-PHORUS (P) (MG/L) (00678)	TOTAL ORGANIC PHOS-PHORUS (P) (MG/L) (00670)	DIS-SOLVED BORON (B) (UG/L) (01020)	DIS-SOL-VED ORGANIC CARBON (C) (MG/L) (00681)	SUS-PENDED ORGANIC CARBON (C) (MG/L) (00689)	PHENOLS (UG/L) (32730)	SUS-PENDED SEDI-MENT (MG/L) (80154)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY) (80155)
JAN 21...	.16	.13	.00	280	22	.7	2	22	.41
FEB 14...	.89	1.1	.00	530	18	1.1	1	28	.71
MAR 24...	.04	.28	.09	120	9.9	<3.4	2	21	4.6
APR 26...	.04	.21	.01	260	22	>5.0	6	104	55
MAY 25...	.10	.25	.00	130	11	.6	1	30	1.2
JUN 29...	.10	.19	.00	130	8.6	3.2	2	64	51
JUL 26...	.09	.14	.00	130	8.7	1.0	2	44	11
AUG 24...	.09	.10	.00	120	9.2	1.1	2	22	1.5
SEP 21...	.01	.11	.00	120	8.5	14	3	26	7.1

DATE	TIME	DIS-SOLVED ALUM-INUM (AL) (UG/L) (01106)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	DIS-SOLVED BARIUM (BA) (UG/L) (01005)	DIS-SOLVED BERYL-LIUM (BE) (UG/L) (01010)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	DIS-SOLVED CHRO-MIUM (CR) (UG/L) (01030)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	DIS-SOLVED IRON (FE) (UG/L) (01046)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	DIS-SOLVED LITHIUM (LI) (UG/L) (01130)
MAR 24...	1500	40	3	0	0	1	0	1	300	6	30

DATE	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	DIS-SOLVED MOLYB-DENUM (MO) (UG/L) (01060)	DIS-SOLVED NICKEL (NI) (UG/L) (01065)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	DIS-SOLVED SILVER (AG) (UG/L) (01075)	DIS-SOLVED STRON-TIUM (SR) (UG/L) (01080)	DIS-SOLVED VANA-DIUM (V) (UG/L) (01085)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	CYANIDE (CN) (MG/L) (00720)
MAR 24...	20	.0	2	6	0	0	250	.1	10	4.0

RED RIVER OF THE NORTH BASIN

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	TOTAL PCB (UG/L) (39516)	POLY-CHLO-RINATED NAPH-THA-LENES (UG/L) (39250)	TOTAL ALDRIN (UG/L) (39330)	TOTAL CHLOR-DANE (UG/L) (39350)	TOTAL DDD (UG/L) (39360)	TOTAL DDE (UG/L) (39365)	TOTAL DDT (UG/L) (39370)	TOTAL DI-AZINON (UG/L) (39570)	TOTAL DI-ELDRIN (UG/L) (39380)	TOTAL ENDO-SULFAN (UG/L) (39388)
JAN 21...	1045	.0	.00	.00	.0	.00	.00	.00	.00	.00	.00
MAR 24...	1500	.0	.00	.00	.0	.00	.00	.00	.00	.00	.00
JUL 26...	1015	.0	.00	.00	.0	.00	.00	.00	.00	.00	.00

DATE	TOTAL ENDRIN (UG/L) (39390)	TOTAL ETHION (UG/L) (39398)	TOTAL HEPTA-CHLOR (UG/L) (39410)	TOTAL HEPTA-CHLOR EPOXIDE (UG/L) (39420)	TOTAL LINDANE (UG/L) (39340)	TOTAL METHYL TRI-THION (UG/L) (39790)	TOTAL PARA-THION (UG/L) (39540)	TOTAL TOX-APHENE (UG/L) (39400)	TOTAL TRI-THION (UG/L) (39786)	TOTAL 2,4-D (UG/L) (39730)	TOTAL 2,4,5-T (UG/L) (39740)
JAN 21...	.00	.00	.00	.00	.00	.00	.00	0	.00	.16	.00
MAR 24...	.00	.00	.00	.00	.00	.00	.00	0	.00	.21	.01
JUL 26...	.00	.00	.00	.00	.00	.00	.00	0	.00	.06	.00

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	540			---	1550	1300	520	625	760	450	580	---
2	542			---	1600	1400	550	675	775	450	570	600
3	---			---	1600	1350	---	675	780	---	560	560
4	554			---	1600	1450	500	---	790	470	550	---
5	563			---	1600	1500	480	675	---	490	540	550
6	567			---	---	---	460	700	775	490	550	560
7	569			---	1600	800	460	625	760	500	---	560
8	572			---	1600	1400	480	---	780	520	560	560
9	573			---	1250	800	500	675	775	540	560	540
10	---			950	1450	500	---	675	750	---	550	560
11	578			950	1400	430	500	650	750	550	540	---
12	578			960	1400	1000	540	675	---	590	520	570
13	576			940	---	---	500	700	740	590	540	625
14	579			1000	1400	830	480	700	740	600	---	625
15	585			990	1500	940	530	---	740	600	560	625
16	586			---	1450	900	530	700	710	590	560	625
17	---			1150	1500	850	---	725	700	---	580	625
18	590			1200	1400	750	580	725	730	590	580	---
19	591			1300	1450	670	540	725	---	580	600	600
20	593			1300	---	---	480	775	850	590	600	600
21	597			1400	1500	500	460	750	850	590	---	600
22	---			1300	1400	625	500	---	850	600	650	625
23	612			---	1400	625	500	750	750	600	600	600
24	---			1250	1350	650	---	750	750	---	600	550
25	613			1200	1300	600	490	760	650	---	600	---
26	---			1350	1250	540	550	760	---	600	600	520
27	---			1900	---	---	675	775	640	600	600	540
28	---			1400	1200	560	600	775	640	600	---	520
29	---			1500	---	570	600	---	660	600	600	560
30	---			---	---	540	625	750	510	600	625	540
31	---			1600	---	550	---	750	---	---	600	---
MEAN	578			1240	1450	838	524	712	739	559	577	578

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

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.5			---	-0.5	.0	3.5	19.0	23.0	24.0	24.5	17.5
2	18.0			---	-0.5	.0	1.5	20.0	23.5	24.0	25.5	18.5
3	---			---	.0	.0	---	19.0	22.0	---	24.0	18.0
4	13.0			---	.0	.0	.5	---	24.5	25.5	25.0	---
5	10.5			---	.0	.0	.0	19.9	---	29.5	22.5	19.5
6	8.5			---	---	---	2.0	16.0	25.0	28.5	20.0	18.0
7	9.5			---	.0	.0	2.0	20.5	24.5	27.5	---	18.0
8	10.0			---	.5	.0	3.0	---	24.5	24.5	25.5	20.5
9	12.5			---	.5	.0	7.0	19.5	20.5	24.0	23.5	17.5
10	---			-0.5	.5	2.5	---	20.0	22.5	---	21.0	19.5
11	13.5			-0.5	.5	1.0	8.0	21.0	23.5	23.0	21.5	---
12	13.0			-0.5	.5	1.0	8.0	22.0	---	25.5	22.0	17.5
13	11.0			-0.5	---	---	9.5	24.0	23.5	25.5	21.5	18.5
14	10.0			-0.5	.0	2.5	10.0	22.0	24.0	25.5	---	19.5
15	5.0			-0.5	.0	2.0	12.0	---	24.0	26.0	18.5	18.5
16	5.0			---	.0	1.0	15.5	23.0	24.5	29.0	20.0	17.5
17	---			-0.5	.0	.5	---	24.0	23.5	---	20.0	18.0
18	4.0			.0	.0	1.0	12.5	25.0	22.5	29.5	21.5	---
19	4.5			.0	.0	2.0	12.5	24.0	---	29.0	22.0	15.5
20	4.0			.0	---	---	12.0	24.5	22.0	26.5	20.0	15.0
21	3.5			.0	.0	.0	13.0	22.0	21.5	27.5	---	15.0
22	---			.0	.0	.0	13.5	---	21.0	28.0	19.0	14.5
23	4.0			---	.0	.0	14.0	23.0	28.0	30.0	18.0	14.5
24	---			.0	.0	2.5	---	25.0	27.0	---	20.5	14.0
25	3.5			.0	.0	2.0	15.0	25.0	26.0	---	18.5	---
26	---			.0	.0	1.5	16.0	24.0	---	26.0	21.0	13.5
27	---			-0.5	---	---	15.5	24.0	25.0	26.0	18.5	14.0
28	---			-0.5	.0	3.0	15.5	25.0	24.0	27.5	---	14.0
29	---			-0.5	---	1.5	16.5	---	24.0	25.5	20.0	14.0
30	---			---	---	1.0	19.0	23.0	22.5	25.0	21.0	13.0
31	---			-0.5	---	1.5	---	23.0	---	---	19.0	---
MEAN	9.0			-0.5	.0	1.0	10.0	22.0	23.5	26.5	21.5	16.5

05054000 RED RIVER OF THE NORTH AT FARGO, ND

LOCATION.--Lat 46°51'40", long 96°47'00", in NW 1/4 NE 1/4 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) above mean sea level. 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) above mean sea level, 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).--76 years, 541 ft^3/s (15.32 m^3/s), 392,000 acre-ft/yr (483 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, 878 ft^3/s (24.9 m^3/s) July 4, gage height, 14.99 ft (4.569 m); no flow Oct. 10-19; minimum gage height, 12.44 ft (3.792 m) Oct. 14-16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.8	6.7	13	10	18	20	332	107	130	165	27	70
2	.90	6.7	13	10	18	20	310	63	156	121	20	122
3	1.0	8.4	13	10	18	20	285	40	124	100	21	174
4	9.2	9.2	13	10	18	20	252	45	82	299	22	181
5	17	10	13	10	18	20	196	638	56	133	12	136
6	13	9.2	13	10	18	20	154	598	43	87	8.1	100
7	6.7	9.2	13	10	18	40	136	248	33	79	10	83
8	2.6	8.4	13	10	18	60	141	125	29	72	8.1	82
9	.60	9.2	13	10	18	60	159	65	24	61	7.6	81
10	.00	12	13	10	18	60	142	37	23	57	10	95
11	.00	8.4	12	12	20	60	111	22	16	69	10	105
12	.00	6.7	12	15	20	80	99	20	16	49	7.6	98
13	.00	8.4	12	15	19	65	96	18	14	53	7.6	89
14	.00	13	12	15	19	55	101	21	8.3	55	8.1	89
15	.00	14	12	15	19	55	91	28	21	58	10	91
16	.00	12	12	15	19	60	82	21	27	164	14	88
17	.00	10	12	15	19	78	118	17	23	66	13	88
18	.00	13	12	18	19	95	341	12	27	51	13	114
19	.00	12	12	20	19	104	318	7.0	37	49	14	96
20	.70	9.2	12	19	19	122	268	3.1	69	44	14	94
21	1.0	10	11	19	20	129	335	.58	112	30	12	110
22	2.6	12	11	18	20	117	332	12	109	30	14	170
23	5.1	17	11	18	20	90	232	25	89	31	14	155
24	6.7	19	10	18	20	74	177	29	63	36	18	373
25	9.2	21	10	18	20	76	179	25	55	39	16	419
26	9.2	21	10	18	20	80	188	20	73	59	21	413
27	6.7	19	10	18	20	84	175	20	226	66	33	413
28	5.1	16	10	18	20	99	173	20	395	55	47	413
29	5.1	16	10	18	---	172	159	19	390	46	42	399
30	5.9	13	10	18	---	277	135	30	263	52	46	389
31	6.7	---	10	18	---	329	---	54	---	42	54	---
TOTAL	116.80	359.7	363	458	532	2641	5817	2389.68	2733.3	2318	574.1	5330
MEAN	3.77	12.0	11.7	14.8	19.0	85.2	194	77.1	91.1	74.8	18.5	178
MAX	17	21	13	20	20	329	341	638	395	299	54	419
MIN	.00	6.7	10	10	18	20	82	.58	8.3	30	7.6	70
AC-FT	232	713	720	908	1060	5240	11540	4740	5420	4600	1140	10570
(+)	994	835	828	1090	983	930	919	1130	1070	1050	1040	881
(-)	1540	1490	1540	1540	1390	793	0	595	942	0	0	0
MEAN*	-5.11	.97	.13	7.45	11.8	87.5	209	85.9	93.3	91.9	35.5	192
AC-FT*	-314	58	8	458	653	5380	12460	5280	5550	5650	2180	11450

		OBSERVED						ADJUSTED		
CAL YR 1976	TOTAL 98497.20	MEAN 269	MAX 3000	MIN .00	AC-FT 195400		MEAN 278	AC-FT	201900
WTR YR 1977	TOTAL 23632.58	MEAN 64.7	MAX 638	MIN .00	AC-FT 46880		MEAN 67.4	AC-FT	48810

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

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

LOCATION.--Lat 46°55'50", long 96°47'05", in SW 1/4 NE 1/4 sec.19, T.140 N., R.48 W., Cass County, Hydrologic Unit 09020104, at bridge on county highway 2 mi (3.2 km) north of North Dakota State University campus in Fargo, and 12 mi (19 km) above mouth of Sheyenne River.

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

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

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

INSTRUMENTATION.--Water-quality monitor since October 1973.

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.

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.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)	FECAL COLIFORM .7UM-MF (COL./100 ML) (31625)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML) (31673)	HARDNESS (CA,MG) (MG/L) (00900)
OCT											
27...	1130	8.9	960	7.6	.5	5	9.3	67	450	660	250
NOV											
18...	0930	12	1050	8.3	1.0	3	11.6	82	630	2250	320
DEC											
21...	1020	11	1140	7.6	.5	4	8.8	63	406	640	310
JAN											
19...	0950	20	1120	7.8	.0	9	6.8	48	77	320	360
FEB											
15...	0935	19	1100	8.4	.5	7	5.6	18	3300	3850	330
MAR											
23...	1130	120	1090	8.2	.5	10	11.6	83	510	960	500
APR											
25...	1145	181	710	8.4	14.0	35	8.9	88	130	300	310
MAY											
23...	1155	29	790	8.3	22.0	15	8.4	96	310	1700	270
JUN											
27...	1255	246	660	8.2	25.0	15	5.8	71	1000	1800	280
JUL											
25...	1200	40	620	8.2	23.5	25	4.7	56	140	210	250
AUG											
22...	1100	10	780	8.2	20.5	30	7.7	86	290	250	290
SEP											
20...	1130	94	540	8.0	15.5	15	4.6	45	B75000	58	240

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	NON-CARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)	DISSOLVED CHLORIDE (CL) (MG/L) (00940)
OCT										
27...	42	44	34	100	45	2.8	13	208	190	53
NOV										
18...	51	64	38	110	42	2.7	12	265	210	65
DEC										
21...	31	69	34	94	39	2.3	10	281	210	59
JAN										
19...	37	81	39	110	39	2.5	11	326	220	62
FEB										
15...	52	68	38	110	41	2.7	11	274	180	96
MAR										
23...	110	84	70	61	21	1.2	11	390	210	35
APR										
25...	130	64	37	29	16	.7	6.9	180	160	15
MAY										
23...	110	54	32	63	33	1.7	9.6	160	190	29
JUN										
27...	83	61	31	37	22	1.0	8.0	200	120	24
JUL										
25...	74	49	32	33	21	.9	7.0	180	120	14
AUG										
22...	73	52	38	45	25	1.2	9.0	210	140	28
SEP										
20...	51	45	31	23	17	.6	6.6	190	79	13

DATE	DISSOLVED FLUORIDE (F) (MG/L) (00950)	DISSOLVED SILICA (SIO2) (MG/L) (00955)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DISSOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	SUSPENDED SEDIMENT (MG/L) (80154)	SUSPENDED SEDIMENT DISCHARGE (T/DAY) (80155)
OCT										
27...	.4	10	573	570	13.8	2.0	3.4	4.1	15	.36
NOV										
18...	.6	13	663	672	21.5	1.4	2.3	2.1	11	.36
DEC										
21...	.5	20	753	666	22.4	1.8	2.4	1.1	10	.30
JAN										
19...	.5	22	751	741	40.6	.94	4.2	.99	12	.65
FEB										
15...	.6	21	558	689	28.6	1.9	2.5	1.1	12	.62
MAR										
23...	.7	16	761	720	247	.79	4.1	.82	8	2.6
APR										
25...	.3	.9	457	421	223	.29	1.1	.34	112	55
MAY										
23...	--	--	497	--	38.9	.89	1.2	1.3	36	2.8
JUN										
27...	.3	7.3	428	407	284	.52	.90	.47	29	19
JUL										
25...	.3	10	397	374	42.9	.52	1.3	.62	88	9.5
AUG										
22...	.5	14	478	455	12.9	2.4	1.6	1.0	56	1.5
SEP										
20...	.3	8.0	331	319	84.0	.57	1.3	.35	28	7.1

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	TOTAL ARSENIC (AS) (UG/L) (01002)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	TOTAL CAD-MIUM (CD) (UG/L) (01027)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	TOTAL CHRO-MIUM (CR) (UG/L) (01034)	DIS-SOLVED CHRO-MIUM (CR) (UG/L) (01030)	TOTAL COBALT (CO) (UG/L) (01037)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	TOTAL COPPER (CU) (UG/L) (01042)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	TOTAL IRON (FE) (UG/L) (01045)
NOV 18...	0930	2	2	<10	3	0	0	<50	1	<10	4	430
JAN 19...	0950	4	3	<10	1	0	0	<50	0	<10	2	570
MAR 23...	1130	8	5	10	1	0	0	<50	0	10	4	900
JUL 25...	1200	8	8	<10	0	10	0	<50	0	<10	1	1100

DATE	DIS-SOLVED IRON (FE) (UG/L) (01046)	TOTAL LEAD (PB) (UG/L) (01051)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	TOTAL MAN-GANESE (MN) (UG/L) (01055)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	TOTAL MERCURY (HG) (UG/L) (71900)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	TOTAL SELE-NIUM (SE) (UG/L) (01147)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	TOTAL ZINC (ZN) (UG/L) (01092)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	TOTAL ORGANIC CARBON (C) (MG/L) (00680)
NOV 18...	10	<100	12	70	30	.0	.0	0	0	10	10	8.9
JAN 19...	10	<100	8	220	190	3.6	.0	0	0	20	10	9.9
MAR 23...	50	100	3	140	70	.6	.0	1	1	20	20	14
JUL 25...	20	<100	2	180	60	.0	.0	2	0	20	4	7.0

DATE	TIME	TOTAL FILT-RABLE RESIDUE (MG/L) (00515)	TOTAL NON-FILT-RABLE RESIDUE (MG/L) (00530)	DIS-SOLVED GROSS ALPHA AS U-NAT. (UG/L) (80030)	SUS-PENDED GROSS ALPHA AS U-NAT. (UG/L) (80040)	DIS-SOLVED GROSS BETA AS CS-137 (PC/L) (03515)	SUS-PENDED GROSS BETA AS CS-137 (PC/L) (03516)	DIS-SOLVED GROSS BETA AS SR90 /Y90 (PC/L) (80050)	SUS-PENDED GROSS BETA AS SR90 /Y90 (PC/L) (80060)	DIS-SOLVED RA-226 (RADON METHOD) (PC/L) (09511)	DIS-SOLVED NATURAL URANIUM (U) (UG/L) (22703)
MAR 23...	1130	810	25	<9.2	1.7	14	2.3	11	1.9	.12	2.5

DATE	TIME	LENGTH OF EXPO-SURE (DAYS) (00022)	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M (00573)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M (00572)	UNCOR-RECTED PERI-PHYTON CHLORO-PHYLL A MG/SQ M (32228)	UNCOR-RECTED PERI-PHYTON CHLORO-PHYLL B MG/SQ M (32226)	BIOMASS PIGMENT RATIO	SAMPLING METHOD
NOV. 18		51	65,540	9,325	5.04	3.85	9,325	POLYETHYLENE STRIP
JULY 25		30	8,910	6,320	.185	.026	14,000	POLYETHYLENE STRIP

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

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	OCT 27,76		NOV 18,76		DEC 21,76		JAN 19,77		FEB 15,77	
TIME	1130		0930		1020		0950		0935	
TOTAL CELLS/ML	610		10000		310		1400		14000	
DIVERSITY: DIVISION	0.2		0.8		1.3		0.6		0.0	
.CLASS	0.2		0.8		1.3		0.6		0.0	
..ORDER	0.8		1.1		1.8		0.6		0.0	
...FAMILY	2.0		1.3		2.0		0.7		0.0	
....GENUS	2.2		1.5		2.1		0.0		0.0	
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	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	550	5	20	6	80	6	*	0
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	61	1	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	--	-	--	-	--	-
....TETRASTRUM	--	-	61	1	--	-	--	-	--	-
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	110	1	--	-	*	0	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
....STAURASTRUM	--	-	--	-	--	-	--	-	--	-
...ZYGNEMATACEAE										
....MOUGEOTIA	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	38	6	150	1	83#	26	7	1	--	-
....MELOSIRA	38	6	*	0	--	-	--	-	--	-
...RHIZOSOLENIACEAE										
....RHIZOSOLENIA	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	13	2	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	13	2	--	-	--	-	--	-	--	-
....CYMBELLA	25	4	--	-	3	1	7	1	--	-
....RHOPALODIA	--	-	--	-	3	1	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	*	0	--	-
...FRAGILARIACEAE										
....SYNEDRA	--	-	*	0	--	-	--	-	--	-
...NAVICULACEAE										
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	89	15	*	0	3	1	*	0	--	-
...NITZSCHIACEAE										
....DENTICULA	--	-	--	-	3	1	--	-	--	-
....NITZSCHIA	340#	56	240	2	33	11	36	3	--	-
...SURIRELLACEAE										
....SURIRELLA	25	4	*	0	7	2	7	1	--	-
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CHLOROTHECIACEAE										
....OPHIOCYTIUM	--	-	--	-	--	-	--	-	--	-

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

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	OCT 27,76		NOV 18,76		DEC 21,76		JAN 19,77		FEB 15,77	
TIME	1130		0930		1020		0950		0935	
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										
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....ANACYSTIS	--	-	240	2	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....APHANIZOMENON	--	-	170	2	--	-	--	-	--	-
...OSCILLATORIACEAE	--	-	--	-	--	-	1200#	90	--	-
....LYNGBYA	--	-	380	4	--	-	--	-	--	-
....OSCILLATORIA	--	-	8000#	78	160#	49	--	-	14000#	100
....SPIRULINA	--	-	*	0	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	91	1	--	-	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	25	4	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....PHACUS	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	150	1	3	1	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
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05054020 RED RIVER OF THE NORTH BELOW FARGO, ND--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	MAY 23,77	JUN 27,77	JUL 25,77	AUG 22,77	SEP 20,77
TIME	1155	1255	1200	1100	1130
TOTAL CELLS/ML	20000	6400	7000	9900	53000
DIVERSITY: DIVISION	1.3	1.0	1.8	1.7	0.6
.CLASS	1.3	1.0	1.8	1.7	0.6
..ORDER	1.5	1.0	2.3	2.0	0.7
...FAMILY	1.8	2.3	2.6	2.6	0.7
....GENUS	2.6	2.6	3.1	2.8	0.7

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										
...CHARACIACEAE										
....SCHROEDERIA	--	-	140	2	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	960#	15	--	-	640	7	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	2200#	34	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	34	1	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	980	5	120	2	240	3	440	4	*	0
....DICTYOSPHAERIUM	--	-	--	-	--	-	160	2	--	-
....KIRCHNERIELLA	980	5	--	-	280	4	160	2	*	0
....OOCYSTIS	--	-	--	-	240	3	160	2	--	-
....SELENASTRUM	--	-	--	-	--	-	*	0	--	-
....TETRAEDRON	160	1	--	-	170	2	--	-	*	0
...SCENEDESMACEAE										
....ACTINASTRUM	650	3	--	-	--	-	--	-	--	-
....CRUCIGENIA	3700#	19	320	5	350	5	*	0	*	0
....SCENEDESMUS	1300	6	900	14	520	7	2100#	21	*	0
....TETRASTRUM	980	5	90	1	--	-	--	-	--	-
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	480	7	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	--	-	360	4	*	0
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	130	2	--	-	--	-
....STAURASTRUM	--	-	--	-	--	-	*	0	--	-
...ZYGNEMATACEAE										
....MOUGEOTIA	--	-	--	-	--	-	--	-	5100	10
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	9400#	47	--	-	--	-	--	-	--	-
....MELOSIRA	--	-	34	1	1200#	17	3300#	34	430	1
...RHIZOSOLENIACEAE										
....RHIZOSOLENIA	--	-	--	-	*	0	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	*	0
....COCCONEIS	--	-	--	-	--	-	--	-	*	0
....RHOICOSPHENIA	--	-	*	0	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	43	1	--	-	--	-
....RHOPALODIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....SYNEDRA	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....GYROSIGMA	--	-	*	0	--	-	*	0	--	-
....NAVICULA	330	2	*	0	280	4	*	0	*	0
...NITZSCHIACEAE										
....DENTICULA	--	-	--	-	--	-	--	-	--	-
....NITZSCHIA	160	1	--	-	--	-	120	1	--	-
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	43	1	--	-	--	-
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CHLOROTHECIACEAE										
....OPHIOCYTIUM	--	-	--	-	--	-	*	0	--	-

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

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE / TIME / ORGANISM	MAY 23,77 1155 CELLS /ML	PER-CENT	JUN 27,77 1255 CELLS /ML	PER-CENT	JUL 25,77 1200 CELLS /ML	PER-CENT	AUG 22,77 1100 CELLS /ML	PER-CENT	SEP 20,77 1130 CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....ANACYSTIS	--	-	--	-	2600#	37	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....APHANIZOMENON	--	-	1500#	23	--	-	--	-	--	-
...OSCILLATORIACEAE	--	-	--	-	--	-	--	-	--	-
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	1900#	19	46000#	88
....SPIRULINA	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	160	1	--	-	--	-	80	1	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	330	2	--	-	150	2	160	2	*	0
....PHACUS	980	5	--	-	110	2	--	-	*	0
....TRACHELOMONAS	--	-	79	1	150	2	*	0	*	0

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

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	---	---	946	819							---	---
2	---	---	858	805							---	---
3	---	---	886	819							---	---
4	---	---	922	824							---	---
5	---	---	956	906							---	---
6	---	---	953	909							---	---
7	---	---	1220	939							---	---
8	523	506	---	---							---	---
9	---	---	---	---							---	---
10	---	---	769	679							---	---
11	---	---	---	---							---	---
12	---	---	---	---							---	---
13	---	---	---	---							---	---
14	---	---	---	---							---	---
15	---	---	---	---							---	---
16	---	---	---	---							---	---
17	---	---	---	---							1060	1050
18	---	---	---	---							1090	1050
19	---	---	---	---							1120	1090
20	---	---	---	---							1110	1070
21	---	---	---	---							1110	1080
22	1070	867	---	---							1110	1090
23	1150	1070	---	---							1090	1040
24	1120	1070	---	---							1030	919
25	1120	1100	---	---							915	870
26	1100	1030	---	---							864	836
27	1040	978	---	---							846	794
28	1000	906	---	---							899	742
29	932	874	---	---							737	618
30	899	816	---	---							622	528
31	929	827	---	---							526	487

	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	524	487	---	---	727	691	794	668	---	---	674	618
2	528	509	---	---	710	653	672	657	521	484	700	610
3	548	524	---	---	738	691	665	654	---	---	684	661
4	578	552	---	---	750	713	677	206	---	---	693	677
5	563	552	---	---	772	757	459	333	---	---	719	650
6	585	563	---	---	788	519	529	465	---	---	705	674
7	597	576	---	---	843	754	616	531	507	467	696	650
8	603	574	---	---	---	---	769	622	533	509	745	659
9	616	591	---	---	---	---	742	693	540	509	703	641
10	616	583	---	---	---	---	735	714	---	---	681	605
11	589	576	---	---	---	---	722	616	---	---	705	652
12	593	572	---	---	---	---	668	601	---	---	684	657
13	570	489	1200	717	892	807	665	605	783	710	714	652
14	565	397	1160	707	830	763	665	628	750	639	707	637
15	548	381	1040	624	813	781	648	605	745	663	724	657
16	---	---	---	---	810	772	648	406	748	727	693	646
17	---	---	---	---	788	744	546	497	769	729	632	492
18	526	489	---	610	760	699	572	486	769	742	608	542
19	563	529	---	---	763	688	628	563	777	750	---	---
20	570	559	---	---	791	716	628	578	---	---	---	---
21	581	561	---	---	803	778	639	601	---	---	595	487
22	601	537	---	---	775	688	657	618	---	---	583	462
23	657	603	---	727	683	633	679	593	722	652	576	462
24	677	661	719	525	630	599	672	583	719	628	585	514
25	686	668	698	608	---	---	630	610	696	650	---	---
26	677	641	712	591	---	---	654	601	724	679	764	735
27	648	612	708	628	---	---	650	585	703	686	748	701
28	614	574	686	544	775	696	643	583	735	585	727	698
29	624	546	531	472	849	777	661	593	753	641	758	729
30	670	624	611	498	855	799	---	---	786	688	750	710
31	---	---	705	618	---	---	---	---	742	688	---	---

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

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	---	---	5.5	3.5							---	---
2	---	---	5.5	3.5							---	---
3	---	---	4.0	2.0							---	---
4	---	---	3.0	2.0							---	---
5	---	---	3.5	1.5							---	---
6	---	---	3.0	2.0							---	---
7	---	---	2.0	1.0							---	---
8	9.5	5.5	1.0	.5							---	---
9	---	---	1.5	1.0							---	---
10	---	---	1.5	1.0							---	---
11	---	---	---	---							---	---
12	---	---	---	---							---	---
13	---	---	---	---							---	---
14	---	---	---	---							---	---
15	---	---	---	---							---	---
16	---	---	---	---							---	---
17	---	---	---	---							1.0	.5
18	---	---	---	---							1.0	1.0
19	---	---	---	---							1.0	1.0
20	---	---	---	---							1.0	1.0
21	---	---	---	---							1.0	1.0
22	2.5	.5	---	---							1.0	1.0
23	2.5	1.5	---	---							1.5	.5
24	2.5	1.0	---	---							2.0	1.0
25	2.0	1.5	---	---							5.0	2.0
26	1.5	.5	---	---							5.0	4.0
27	1.5	.5	---	---							5.5	3.5
28	3.0	1.0	---	---							7.0	5.5
29	4.5	2.5	---	---							6.5	3.5
30	4.5	3.0	---	---							3.0	2.0
31	4.0	2.5	---	---							3.0	1.0

	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	3.5	2.0	---	---	23.5	20.5	24.0	21.5	---	---	19.5	18.5
2	3.0	1.5	---	---	25.5	22.0	24.5	21.5	24.5	19.5	19.0	17.5
3	2.5	1.0	---	---	25.5	20.5	25.0	23.5	---	---	18.0	17.0
4	3.0	1.5	---	---	26.0	21.0	24.5	20.0	---	---	17.0	15.5
5	2.5	1.0	---	---	25.5	21.5	25.0	22.0	---	---	16.0	15.5
6	3.0	1.0	---	---	23.0	19.0	26.5	24.5	---	---	16.5	15.5
7	5.5	3.0	---	---	22.0	17.5	25.5	24.0	22.5	17.5	17.5	16.0
8	7.0	4.5	---	---	23.5	19.0	24.0	22.0	23.5	16.5	17.5	16.5
9	9.0	5.5	---	---	---	---	23.5	21.0	21.0	17.5	17.5	16.5
10	10.5	8.0	---	---	---	---	25.0	21.5	---	---	18.0	17.0
11	10.5	9.0	---	---	---	---	23.5	22.0	---	---	18.0	17.5
12	11.5	10.0	---	---	---	---	25.0	21.0	21.5	19.5	18.0	17.0
13	13.5	8.0	---	---	26.5	22.5	26.0	22.0	21.5	18.5	18.0	17.5
14	13.5	8.5	---	---	25.5	22.5	26.0	24.0	21.0	18.0	18.5	17.5
15	15.0	8.5	---	---	24.5	20.5	26.0	22.0	23.0	18.0	19.0	18.0
16	---	---	---	---	23.0	20.5	26.5	22.0	24.0	19.0	19.0	18.0
17	---	---	---	---	22.5	20.0	29.5	26.0	23.0	19.5	19.0	16.0
18	13.5	10.0	---	---	22.5	20.5	31.0	27.0	23.0	20.0	16.0	13.5
19	11.5	9.5	---	---	22.0	21.0	31.5	28.5	22.5	20.0	---	---
20	11.5	10.5	---	---	25.0	20.5	28.5	26.0	---	---	---	---
21	12.5	10.0	---	---	25.5	23.5	28.0	23.5	---	---	16.5	15.0
22	13.5	7.0	---	---	26.0	22.5	28.0	23.5	---	---	16.5	16.0
23	15.0	13.0	---	---	27.5	24.5	29.5	25.5	21.0	20.5	16.0	16.0
24	14.5	12.0	26.5	23.5	26.0	24.5	28.5	26.0	21.0	20.5	17.0	16.0
25	15.0	12.0	---	---	---	---	27.0	23.0	23.0	21.0	---	---
26	16.0	13.5	---	---	---	---	27.0	23.0	22.5	19.5	---	---
27	16.0	15.0	---	---	---	---	26.0	24.0	20.5	16.0	---	---
28	16.5	14.0	24.0	21.0	25.0	22.5	---	---	19.5	16.5	---	---
29	17.0	15.0	23.5	20.5	24.0	22.5	---	---	19.5	18.0	---	---
30	18.5	16.0	23.5	20.5	23.5	22.5	24.0	20.0	19.0	18.0	---	---
31	---	---	23.0	21.0	---	---	---	---	19.5	18.5	---	---

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).

WATER-DISCHARGE RECORDS

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 (338.91 m) above mean sea level. 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.--32 years, 72.9 ft^3/s (2.065 m^3/s), 52,820 acre-ft/yr (65.1 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, 121 ft^3/s (3.43 m^3/s) July 4, gage height, 5.31 ft (1.618 m); minimum, 2.8 ft^3/s (0.079 m^3/s) Aug. 26, gage height, 3.46 ft (1.055 m); minimum gage height, 3.15 ft (0.960 m) June 27 and July 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	14	10	11	11	13	39	25	19	12	5.4	8.0
2	12	14	10	11	11	13	39	24	20	12	5.6	7.3
3	11	15	10	11	12	14	36	23	20	11	5.3	11
4	12	14	10	11	12	14	34	23	20	38	5.1	13
5	16	14	10	11	12	15	32	36	19	27	4.9	15
6	16	14	10	11	12	17	29	40	18	19	5.3	11
7	15	13	10	11	12	24	27	40	16	15	5.6	9.3
8	15	13	10	11	12	29	27	34	14	13	6.0	8.7
9	15	13	10	11	12	36	26	29	12	11	5.8	10
10	14	12	10	11	12	46	32	26	12	9.5	6.1	14
11	14	13	10	11	12	57	34	24	11	11	5.4	13
12	13	13	10	11	12	68	35	21	11	10	5.9	11
13	12	13	10	11	12	66	33	19	10	9.6	5.6	13
14	12	13	10	11	12	64	32	19	10	9.4	7.0	12
15	11	13	10	11	12	53	29	20	10	8.2	7.1	8.1
16	11	13	10	11	12	41	34	23	12	9.6	6.3	11
17	11	13	10	11	12	41	44	21	12	8.3	6.0	11
18	11	12	10	11	12	38	52	21	11	7.3	6.6	13
19	11	12	11	11	12	33	50	20	11	6.8	6.2	11
20	12	12	12	11	12	43	48	17	11	6.6	6.7	14
21	13	12	12	11	12	50	45	16	11	6.7	6.6	15
22	13	11	12	11	12	40	41	16	11	5.9	5.5	23
23	13	11	12	11	12	42	36	16	10	5.3	4.9	24
24	12	10	12	11	12	36	32	15	10	5.0	3.8	31
25	11	9.9	11	11	12	32	30	16	9.2	4.5	4.3	38
26	12	9.9	11	11	12	38	31	13	9.3	4.5	3.8	44
27	12	9.9	11	11	13	40	30	11	8.7	5.8	6.4	45
28	12	9.9	11	11	13	45	28	11	9.7	5.9	8.4	43
29	13	9.9	11	11	---	51	27	13	9.9	5.8	9.3	39
30	14	10	11	11	---	45	26	14	13	6.3	7.4	35
31	14	---	11	11	---	39	---	19	---	5.5	8.6	---
TOTAL	394	366.5	328	341	336	1183	1038	665	380.8	315.5	186.9	561.4
MEAN	12.7	12.2	10.6	11.0	12.0	38.2	34.6	21.5	12.7	10.2	6.03	18.7
MAX	16	15	12	11	13	68	52	40	20	38	9.3	45
MIN	11	9.9	10	11	11	13	26	11	8.7	4.5	3.8	7.3
AC-FT	781	727	651	676	666	2350	2060	1320	755	626	371	1110

CAL YR 1976 TOTAL 11697.7 MEAN 32.0 MAX 386 MIN 3.2 AC-FT 23200
WTR YR 1977 TOTAL 6096.1 MEAN 16.7 MAX 68 MIN 3.8 AC-FT 12090

05061000 BUFFALO RIVER NEAR HAWLEY, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--August 1965, March to September 1977.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE (DEG C) (00010)	COLOR (PLATINUM-COBALT UNITS) (00080)	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)
MAY 06...	1100	41	1080	8.2	15.0	27	560	240	130	56

DATE	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)	DISSOLVED CHLORIDE (CL) (MG/L) (00940)	DISSOLVED FLUORIDE (F) (MG/L) (00950)	DISSOLVED SILICA (SIO2) (MG/L) (00955)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)
MAY 06...	24	8	.4	6.5	310	300	9.0	.3	15	735

DATE	VOLATILE FILTRABLE RESIDUE (MG/L) (00520)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DISSOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED BORON (B) (UG/L) (01020)	TOTAL IRON (FE) (UG/L) (01045)	TOTAL MANGANESE (MN) (UG/L) (01055)
MAY 06...	178	728	82.4	.22	.83	.06	150	790	120

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						---	2.0	13.0	16.0	16.0	15.0	14.0
2						---	3.0	10.0	16.0	18.0	18.0	13.0
3						---	2.0	11.0	17.0	22.0	18.0	14.0
4						---	3.0	15.0	16.0	21.0	18.0	17.0
5						---	1.0	14.0	16.0	21.0	16.0	15.0
6						---	.0	14.0	17.0	22.0	15.0	16.0
7						---	1.0	11.0	19.0	20.0	14.0	15.0
8						---	3.0	15.0	18.0	18.0	15.0	16.0
9						---	1.0	14.0	17.0	16.0	17.0	14.0
10						---	12.0	15.0	15.0	17.0	16.0	13.0
11						---	8.0	15.0	16.0	20.0	12.0	14.0
12						---	10.0	16.0	17.0	17.0	15.0	14.0
13						---	---	18.0	18.0	20.0	18.0	14.0
14						---	---	20.0	19.0	22.0	14.0	12.0
15						---	10.0	18.0	---	19.0	16.0	15.0
16						---	11.0	16.0	---	20.0	15.0	15.0
17						---	13.0	18.0	---	24.0	13.0	17.0
18						---	12.0	19.0	---	24.0	13.0	15.0
19						---	8.0	20.0	17.0	25.0	15.0	---
20						---	9.0	20.0	15.0	22.0	16.0	---
21						---	8.0	18.0	16.0	19.0	16.0	13.0
22						---	9.0	18.0	18.0	20.0	16.0	13.0
23						.0	---	18.0	17.0	22.0	14.0	14.0
24						2.0	---	17.0	20.0	22.0	14.0	13.0
25						5.0	---	20.0	19.0	18.0	15.0	14.0
26						5.0	---	21.0	21.0	19.0	17.0	12.0
27						2.0	---	20.0	21.0	19.0	17.5	10.0
28						3.0	---	19.0	18.0	19.0	15.0	12.0
29						3.0	12.0	18.0	18.0	20.0	14.0	---
30						1.0	13.0	18.0	17.0	20.0	17.0	11.0
31						2.0	---	17.0	---	18.0	16.5	---
MEAN						2.5	7.0	16.5	17.5	20.0	15.5	14.0

05061000 BUFFALO RIVER NEAR HAWLEY, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

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											---	---
21											---	---
22											40	4.3
23											43	4.9
24											37	3.6
25											24	2.1
26											42	4.3
27											28	3.0
28											37	4.5
29											29	4.0
30											25	3.0
31											36	3.8
TOTAL											---	37.5

	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	36	3.8	209	14	86	4.4	115	3.7	89	1.3	80	1.7
2	28	2.9	122	7.9	74	4.0	86	2.8	62	.94	67	1.3
3	28	2.7	222	14	86	4.6	109	3.2	40	.57	74	2.2
4	39	3.6	151	9.4	70	3.8	67	6.9	66	.91	38	1.3
5	27	2.3	455	44	73	3.7	290	21	59	.78	47	1.9
6	33	2.6	127	14	90	4.4	75	3.8	65	.93	49	1.5
7	38	2.8	181	20	50	2.2	50	2.0	75	1.1	35	.88
8	39	2.8	132	12	56	2.1	79	2.8	47	.76	55	1.3
9	54	3.8	66	5.2	75	2.4	86	2.6	48	.75	60	1.6
10	64	5.5	143	10	48	1.6	82	2.1	95	1.6	64	2.4
11	74	6.8	146	9.5	56	1.7	79	2.3	117	1.7	36	1.3
12	54	5.1	139	7.9	116	3.4	69	1.9	96	1.5	51	1.5
13	---	---	157	8.1	46	1.2	53	1.4	33	.50	56	2.0
14	---	---	53	2.7	53	1.4	59	1.5	50	.94	62	2.0
15	63	4.9	89	4.8	64	1.7	85	1.9	55	1.1	56	1.2
16	38	3.5	64	4.0	84	2.7	60	1.6	102	1.7	66	2.0
17	63	7.5	124	7.0	89	2.9	70	1.6	74	1.2	77	2.3
18	121	17	86	4.9	83	2.5	40	.79	89	1.6	49	1.7
19	52	7.0	112	6.0	71	2.1	54	.99	80	1.3	83	2.5
20	72	9.3	128	5.9	56	1.7	99	1.8	112	2.0	85	3.2
21	54	6.6	61	2.6	46	1.4	77	1.4	88	1.6	73	3.0
22	99	11	64	2.8	41	1.2	58	.92	74	1.1	52	3.2
23	---	---	64	2.8	45	1.2	91	1.3	83	1.1	46	3.0
24	---	---	55	2.2	37	1.0	48	.65	82	.84	83	6.9
25	---	---	54	2.3	66	1.6	53	.64	73	.85	51	5.2
26	---	---	84	2.9	37	.93	60	.73	74	.76	49	5.8
27	---	---	57	1.7	30	.70	48	.75	64	1.1	52	6.3
28	---	---	33	.98	53	1.4	33	.53	53	1.2	49	5.7
29	124	9.0	49	1.7	27	.72	66	1.0	78	2.0	52	5.5
30	213	15	45	1.7	46	1.6	56	.95	71	1.4	41	3.9
31	---	---	74	3.8	---	---	32	.48	48	1.1	---	---
TOTAL	---	135.5	---	236.78	---	66.25	---	76.03	---	36.23	---	84.28

TOTAL LOAD FOR YEAR: 672.57 TONS.

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).

WATER-DISCHARGE RECORDS

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) above mean sea level, (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 the winter period, which are poor.

AVERAGE DISCHARGE.--32 years, 54.7 ft^3/s (1.549 m^3/s), 39,630 acre-ft/yr (48.9 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, 234 ft^3/s (6.63 m^3/s) June 3, gage height, 9.05 ft (2.758 m); no flow on many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.60	1.0	.46	.10	.09	63	18	61	6.0	.75	1.5
2	.00	1.0	.95	.43	.10	.09	56	16	166	4.6	.50	2.0
3	.00	1.2	.90	.39	.10	.09	50	12	228	7.1	.15	2.5
4	.00	1.4	.88	.36	.10	.09	43	13	170	9.6	.10	3.0
5	.00	1.6	.86	.33	.10	.09	39	15	110	12	.06	3.5
6	.00	1.8	.84	.30	.10	.12	34	13	66	15	.04	4.4
7	.00	2.0	.82	.28	.10	.16	28	12	50	24	.02	5.8
8	.00	2.2	.80	.26	.10	.22	25	14	36	34	.02	4.4
9	.00	2.2	.79	.24	.10	.35	26	15	27	30	.02	4.4
10	.00	2.4	.79	.22	.10	.66	26	17	21	25	.52	4.4
11	.00	2.5	.78	.20	.10	1.1	24	18	17	31	.22	3.8
12	.00	2.5	.78	.18	.10	1.7	23	15	13	29	.18	3.2
13	.00	2.5	.78	.15	.09	2.7	23	12	8.9	26	.15	3.7
14	.00	2.5	.78	.13	.09	4.5	23	10	7.0	26	.70	3.7
15	.00	2.6	.78	.13	.09	7.2	27	9.0	6.5	21	1.1	5.2
16	.00	2.6	.78	.12	.09	12	28	8.1	13	26	3.0	5.2
17	.00	2.6	.78	.12	.09	18	39	6.5	8.4	23	2.4	5.2
18	.00	2.6	.78	.12	.09	20	45	4.9	6.9	20	1.1	5.7
19	.00	2.6	.78	.12	.09	40	47	4.3	6.6	18	.09	6.4
20	.00	2.5	.78	.12	.09	48	51	3.5	5.0	19	.08	6.0
21	.00	2.4	.78	.12	.09	64	54	3.0	3.6	15	.07	6.7
22	.00	2.3	.78	.12	.09	67	58	3.0	4.1	12	.06	10
23	.00	2.3	.78	.12	.09	66	58	2.9	4.0	6.5	.05	11
24	.00	2.2	.78	.11	.09	62	51	2.7	4.7	6.5	.04	22
25	.00	2.2	.75	.11	.09	59	46	2.7	4.7	6.5	.03	37
26	.00	2.1	.72	.11	.09	55	40	3.0	4.5	4.9	.02	52
27	.00	1.8	.67	.11	.09	57	33	3.0	4.3	4.7	.04	58
28	.01	1.6	.62	.11	.09	66	30	3.4	5.7	5.0	.09	65
29	.10	1.4	.58	.11	---	77	26	4.4	5.5	2.2	.10	72
30	.20	1.2	.54	.10	---	81	22	5.4	5.5	1.7	.50	78
31	.40	---	.50	.10	---	80	---	6.5	---	1.0	1.0	---
TOTAL	.71	61.40	23.93	5.88	2.64	891.16	1138	276.3	1073.9	472.3	13.20	495.7
MEAN	.023	2.05	.77	.19	.094	28.7	37.9	8.91	35.8	15.2	.43	16.5
MAX	.40	2.6	1.0	.46	.10	81	63	18	228	34	3.0	78
MIN	.00	.60	.50	.10	.09	.09	22	2.7	3.6	1.0	.02	1.5
AC-FT	1.4	122	47	12	5.2	1770	2260	548	2130	937	26	983

CAL YR 1976 TOTAL 5190.29 MEAN 14.2 MAX 366 MIN .00 AC-FT 10290
WTR YR 1977 TOTAL 4455.12 MEAN 12.2 MAX 228 MIN .00 AC-FT 8840

05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--August 1965, March to September 1977.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE (DEG C) (00010)	COLOR (PLATINUM-COBALT UNITS) (00080)	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG/L) (00925)
MAY										
06...	1400	12	1250	8.0	15.0	35	640	360	140	70

DATE	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)	DISSOLVED CHLORIDE (CL) (MG/L) (00940)	DISSOLVED FLUORIDE (F) (MG/L) (00950)	DISSOLVED SILICA (SIO2) (MG/L) (00955)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)
MAY										
06...	30	9	.5	7.4	280	390	18	.3	15	881

DATE	VOLATILE FILTRABLE RESIDUE (MG/L) (00520)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DISSOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED BORON (B) (UG/L) (01020)	TOTAL IRON (FE) (UG/L) (01045)	TOTAL MANGANESE (MN) (UG/L) (01055)
MAY									
06...	188	839	29.7	.05	.95	.07	190	70	40

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						---	3.0	22.0	21.0	22.0	17.0	15.0
2						---	3.0	18.0	---	22.0	19.0	15.0
3						---	---	20.0	---	---	19.0	---
4						---	3.0	---	---	---	---	---
5						---	4.0	---	---	27.0	17.0	---
6						---	4.0	17.0	24.0	25.0	---	16.0
7						---	5.0	17.0	22.0	26.0	---	17.0
8						---	7.0	---	21.0	23.0	21.0	16.0
9						---	---	---	20.0	23.0	18.0	17.0
10						---	5.0	20.0	---	23.5	16.0	14.0
11						---	11.0	---	20.0	22.0	14.0	16.0
12						---	11.0	23.0	---	20.0	16.0	16.0
13						---	15.0	23.0	23.0	22.0	16.0	18.0
14						---	14.0	---	21.0	24.0	---	17.0
15						---	16.0	---	24.0	22.0	17.0	17.0
16						---	16.0	24.0	24.0	23.0	18.0	17.0
17						---	18.0	---	23.0	---	17.0	---
18						---	13.0	24.0	23.0	26.0	17.0	---
19						---	12.0	23.0	---	27.0	17.0	14.0
20						---	12.0	---	22.0	25.0	17.0	14.0
21						.5	13.0	21.0	21.0	24.0	---	15.0
22						---	---	---	21.0	23.0	16.0	---
23						3.0	12.0	22.0	23.0	24.0	17.0	16.0
24						3.0	11.0	25.0	24.5	---	15.0	16.0
25						3.5	15.0	26.0	23.0	23.0	17.0	---
26						1.0	---	25.0	---	21.0	17.0	15.0
27						---	---	24.0	23.5	---	18.0	14.0
28						2.0	15.0	22.0	24.0	22.0	---	15.0
29						2.0	---	---	23.0	22.0	17.0	15.0
30						1.5	---	---	---	---	18.0	14.0
31						---	---	20.0	---	---	17.0	---
MEAN						2.0	10.5	22.0	22.5	23.5	17.0	15.5

05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

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											---	---
21											6	.36
22											6	.45
23											6	.87
24											6	1.3
25											4	.97
26											3	.77
27											7	1.8
28											17	4.2
29											11	2.9
30											7	2.0
31											6	1.8
TOTAL											---	17.42

DAY	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	8	2.7	54	8.3	12	.68	9	.29	28	.60	25	.74
2	45	16	57	8.2	10	.57	7	.25	29	.41	25	.60
3	33	11	52	6.6	7	.74	7	.28	30	.45	---	---
4	16	5.1	57	6.6	8	3.0	7	.72	28	.41	---	---
5	8	2.4	63	12	7	3.0	7	1.4	28	.47	---	---
6	12	3.0	67	9.4	5	1.8	6	1.5	26	.43	19	.82
7	16	5.1	60	9.6	5	1.2	6	1.0	24	.38	19	1.0
8	17	4.4	53	8.4	6	1.1	7	.87	42	.65	18	.87
9	19	3.9	42	6.7	4	.55	10	1.0	43	.80	21	1.0
10	20	4.0	30	4.3	5	.55	7	.66	24	.36	25	1.0
11	21	4.0	35	4.3	7	.64	5	.51	15	.16	29	1.2
12	23	4.2	33	3.7	7	.55	5	.50	13	.15	33	1.6
13	19	3.5	31	3.4	7	.47	6	.55	13	.15	35	2.3
14	21	3.8	32	3.3	6	.32	7	.43	10	.09	38	2.4
15	34	6.1	33	3.0	6	.31	7	.66	7	.09	40	2.5
16	19	3.4	33	2.8	6	.29	9	.73	6	.07	42	3.1
17	12	2.1	32	2.5	10	.51	9	.70	7	.07	38	2.5
18	14	2.6	34	2.7	9	.49	9	.80	11	.16	36	2.1
19	15	3.9	50	3.9	8	.39	11	.86	15	.25	32	2.3
20	15	4.3	33	2.3	7	.34	7	.45	20	.27	28	2.3
21	15	4.2	10	.62	8	.37	9	.51	23	.31	18	1.3
22	15	4.1	8	.45	7	.28	11	.59	26	.37	7	.51
23	15	4.1	8	.43	8	.32	12	.58	27	.36	5	.41
24	15	4.1	8	.39	6	.24	13	.63	30	.37	6	.79
25	15	3.9	14	.64	10	.41	14	.60	31	.42	6	1.0
26	15	3.6	16	.69	16	.60	16	.56	32	.37	5	1.0
27	17	3.6	11	.42	20	.65	16	.48	76	.88	3	.76
28	21	4.3	15	.57	13	.35	16	.43	46	.67	3	.92
29	26	4.8	13	.49	4	.10	19	.48	10	.17	3	1.0
30	37	6.2	11	.45	6	.16	23	.61	19	.47	3	1.0
31	---	---	12	.62	---	---	26	.70	21	.57	---	---
TOTAL	---	138.4	---	117.77	---	20.98	---	20.33	---	11.38	---	37.02

TOTAL LOAD FOR YEAR: 363.30 TONS.

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 (267.71 m) above mean sea level (levels by Corps of Engineers). Prior to Apr. 5, 1937, nonrecording gage at same site and datum.

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

AVERAGE DISCHARGE.--46 years, 128 ft^3/s (3.625 m^3/s), 92,700 acre-ft/yr (114 hm^3/yr).

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 163 ft^3/s (4.62 m^3/s) June 5, gage height, 5.99 ft (1.826 m); maximum gage height, 6.47 ft (1.972 m) Apr. 2 (backwater from ice); minimum discharge, 1.6 ft^3/s (0.045 m^3/s) Oct. 8; minimum gage height, 1.93 ft (0.588 m) Aug. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.6	12	9.6	8.3	9.1	9.8	124	57	21	12	7.9	11
2	7.3	13	9.4	8.3	9.1	10	131	53	21	13	5.2	8.9
3	8.9	13	9.2	8.4	9.1	11	126	47	39	15	5.6	8.5
4	9.6	13	8.9	8.4	9.1	11	118	43	138	38	5.4	11
5	9.6	13	8.8	8.4	9.1	11	110	73	158	73	6.2	13
6	9.8	13	8.6	8.4	9.1	12	92	52	132	92	6.1	16
7	6.5	13	8.5	8.4	9.1	12	117	59	92	62	5.8	20
8	2.0	13	8.4	8.5	9.1	13	95	59	66	46	5.7	18
9	2.4	13	8.4	8.5	9.1	14	76	59	51	37	6.9	18
10	4.4	13	8.4	8.6	9.1	15	74	53	41	35	5.5	15
11	5.7	13	8.4	8.6	9.2	16	71	46	34	38	3.9	15
12	6.1	13	8.4	8.7	9.2	16	68	42	29	37	4.3	18
13	7.5	12	8.4	8.8	9.3	19	68	41	25	34	4.2	24
14	6.9	12	8.4	8.9	9.3	23	67	38	20	23	3.4	23
15	8.5	12	8.4	9.0	9.4	40	66	34	19	35	4.9	23
16	7.9	13	8.4	9.0	9.4	43	66	31	18	30	4.6	27
17	8.3	13	8.4	9.0	9.5	42	64	29	19	29	3.6	24
18	9.8	13	8.4	9.0	9.5	37	70	29	20	33	5.4	22
19	9.8	13	8.3	9.0	9.5	33	96	29	18	29	6.1	27
20	9.8	13	8.2	9.1	9.5	31	106	26	18	24	5.0	30
21	9.8	13	8.2	9.1	9.5	22	103	23	17	21	5.0	27
22	9.8	13	8.2	9.1	9.6	28	102	21	15	20	5.2	27
23	10	13	8.2	9.1	9.6	54	101	20	15	18	5.0	30
24	10	13	8.2	9.1	9.7	78	100	18	15	18	4.6	49
25	10	12	8.2	9.1	9.8	90	96	17	15	16	5.0	62
26	10	12	8.2	9.1	9.8	95	88	16	14	13	4.3	76
27	10	11	8.2	9.1	9.8	93	79	14	12	11	4.3	94
28	10	11	8.2	9.1	9.8	91	75	14	10	10	5.4	114
29	11	10	8.2	9.1	---	96	69	14	8.9	9.3	6.3	124
30	12	10	8.2	9.1	---	104	62	15	9.8	9.8	9.2	126
31	12	---	8.3	9.1	---	113	---	19	---	10	10	---
TOTAL	261.0	374	262.2	273.4	262.4	1282.8	2680	1091	1110.7	891.1	170.0	1101.4
MEAN	8.42	12.5	8.46	8.82	9.37	41.4	89.3	35.2	37.0	28.7	5.48	36.7
MAX	12	13	9.6	9.1	9.8	113	131	73	158	92	10	126
MIN	2.0	10	8.2	8.3	9.1	9.8	62	14	8.9	9.3	3.4	8.5
AC-FT	518	742	520	542	520	2540	5320	2160	2200	1770	337	2180

CAL YR 1976 TOTAL 20953.86 MEAN 57.3 MAX 997 MIN .36 AC-FT 41560
WTR YR 1977 TOTAL 9760.00 MEAN 26.7 MAX 158 MIN 2.0 AC-FT 19360

05062000 BUFFALO RIVER NEAR DILWORTH, MN--Continued

WATER-QUALITY RECORDS

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE (DEG C) (00010)	COLOR (PLATINUM-COBALT UNITS) (00080)	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)
MAY										
05...	1600	63	810	7.9	18.0	35	410	180	92	44

DATE	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)	DISSOLVED CHLORIDE (CL) (MG/L) (00940)	DISSOLVED FLUORIDE (F) (MG/L) (00950)	DISSOLVED SILICA (SIO2) (MG/L) (00955)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)
MAY										
05...	18	9	.4	6.3	230	230	6.4	.3	13	552

DATE	VOLATILE FILTRABLE RESIDUE (MG/L) (00520)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DISSOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED BORON (B) (UG/L) (01020)	TOTAL IRON (FE) (UG/L) (01045)	TOTAL MANGANESE (MN) (UG/L) (01055)
MAY									
05...	136	548	93.9	.33	.77	.11	120	16000	800

05062000 BUFFALO RIVER NEAR DILWORTH, MN--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

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											---	---
21											---	---
22											---	---
23											---	---
24											---	---
25											---	---
26											---	---
27											---	---
28											11	2.0
29											11	2.3
30											10	2.2
31											13	2.8
TOTAL											---	9.3
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	20	3.4	---	---	99	16	---	---	---	---	---	---
2	13	2.0	---	---	---	---	---	---	---	---	---	---
3	12	1.6	---	---	---	---	---	---	---	---	---	---
4	18	2.1	---	---	---	---	---	---	---	---	---	---
5	15	1.6	494	20	---	---	---	---	---	---	---	---
6	74	6.8	---	---	---	---	157	6.4	---	---	---	---
7	100	7.6	---	---	---	---	---	---	---	---	---	---
8	77	5.2	---	---	---	---	---	---	94	.01	---	---
9	53	3.7	---	---	---	---	---	---	---	---	---	---
10	40	2.8	---	---	---	---	---	---	---	---	---	---
11	25	1.6	---	---	---	---	---	---	---	---	---	---
12	22	1.4	---	---	---	---	---	---	---	---	---	---
13	36	2.2	---	---	---	---	---	---	---	---	---	---
14	49	3.0	---	---	---	---	---	---	---	---	---	---
15	73	5.3	---	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---	---	---	---
17	---	---	---	---	---	---	---	---	---	---	---	---
18	---	---	---	---	---	---	---	---	148	.44	---	---
19	50	6.3	---	---	---	---	---	---	---	---	---	---
20	42	5.8	---	---	---	---	---	---	---	---	60	.97
21	77	11	---	---	---	---	---	---	---	---	---	---
22	130	20	---	---	---	---	---	---	---	---	---	---
23	196	31	---	---	49	.53	---	---	---	---	---	---
24	120	17	---	---	---	---	---	---	---	---	---	---
25	74	9.2	---	---	---	---	---	---	---	---	53	5.3
26	74	8.0	---	---	---	---	---	---	---	---	56	7.9
27	100	8.9	---	---	---	---	---	---	---	---	55	8.6
28	139	11	---	---	---	---	---	---	---	---	91	16
29	---	---	---	---	---	---	---	---	---	---	87	17
30	---	---	---	---	---	---	---	---	---	---	65	14
31	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	---	178.5	---	20	---	16.53	---	6.4	---	0.45	---	69.77

TOTAL LOAD FOR YEARS 300.95 TONS.

25 days

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) above mean sea level, (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.--55 years, 173 ft^3/s (4.899 m^3/s), 125,340 acre-ft/yr (155 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, 146 ft^3/s (4.13 m^3/s) Apr. 21, gage height, 2.29 ft (0.698 m); maximum gage height, 4.45 ft (1.356 m) Mar. 20, backwater from ice; minimum discharge, 2.8 ft^3/s (0.079 m^3/s) Aug. 4, gage height, 0.55 ft (0.168 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.5	15	9.0	7.3	11	15	64	58	38	18	5.1	24
2	5.3	14	8.9	7.3	11	15	64	47	36	19	4.9	20
3	4.9	14	8.7	7.4	11	15	63	44	33	17	6.5	18
4	4.6	14	8.6	7.4	11	15	64	40	38	16	5.3	20
5	4.4	12	8.4	7.4	12	15	65	40	35	16	4.4	17
6	4.8	13	8.3	7.5	12	16	68	45	30	16	4.2	17
7	5.3	12	8.2	7.5	12	16	73	39	30	16	4.4	15
8	6.2	14	8.1	7.6	12	17	82	48	31	15	4.8	15
9	7.0	14	8.0	7.6	12	18	114	43	28	14	4.8	16
10	20	14	7.8	7.6	12	18	130	36	27	14	4.9	14
11	16	14	7.7	7.7	12	19	124	30	24	14	4.2	14
12	12	14	7.5	7.8	12	20	104	26	22	14	4.0	12
13	9.6	13	7.4	7.8	12	21	77	24	20	17	4.2	13
14	8.8	13	7.4	7.9	13	22	69	24	21	16	4.0	12
15	10	13	7.4	8.0	13	24	52	29	28	15	4.0	12
16	11	13	7.3	8.1	13	25	51	28	28	16	4.6	12
17	10	13	7.3	8.2	13	26	73	26	26	15	4.6	11
18	11	12	7.3	8.4	13	27	109	28	26	16	4.2	14
19	12	12	7.3	8.5	13	28	113	25	26	14	4.0	19
20	16	12	7.3	8.6	13	29	136	22	25	12	4.6	21
21	14	11	7.2	8.8	13	29	141	21	25	11	4.8	18
22	13	11	7.2	8.9	14	30	135	23	23	10	4.8	30
23	13	11	7.2	9.0	14	31	128	23	25	9.3	4.6	28
24	13	10	7.2	9.2	14	32	120	22	24	8.7	4.8	39
25	13	10	7.2	9.4	14	36	108	23	21	7.2	4.9	44
26	13	10	7.2	9.5	14	45	96	22	20	6.7	5.5	48
27	12	9.8	7.2	9.7	14	55	77	20	20	6.7	6.7	53
28	14	9.6	7.2	9.9	14	62	82	23	22	6.7	7.8	60
29	14	9.4	7.2	10	---	62	79	22	21	6.4	9.2	66
30	14	9.2	7.2	10	---	63	71	21	19	5.9	9.5	54
31	14	---	7.3	10	---	64	---	35	---	5.2	23	---
TOTAL	332.4	366.0	237.2	260.0	354	910	2732	957	792	393.8	177.3	756
MEAN	10.7	12.2	7.65	8.39	12.6	29.4	91.1	30.9	26.4	12.7	5.72	25.2
MAX	20	15	9.0	10	14	64	141	58	38	19	23	66
MIN	4.4	9.2	7.2	7.3	11	15	51	20	19	5.2	4.0	11
AC-FT	659	726	470	516	702	1800	5420	1900	1570	781	352	1500

CAL YR 1976	TOTAL	39476.4	MEAN	108	MAX	1240	MIN	2.8	AC-FT	78300
WTR YR 1977	TOTAL	8267.7	MEAN	22.7	MAX	141	MIN	4.0	AC-FT	16400

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

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: May 1976 to current year.
WATER TEMPERATURES: May 1976 to current year.
SEDIMENT-SUSPENDED DISCHARGE: March 1976 to current year.

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

REMARKS.--Letter B indicates nonideal colony count.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 984 micromhos, Jan. 3, 1977; minimum, 405 micromhos, July 7, 1976.
WATER TEMPERATURES: Maximum 33°C July 17, 1977; minimum, 0.5°C Mar. 15, 1976, Jan. 13, 1977.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 1,140 mg/L Apr. 2, 1976; minimum daily mean, 9 mg/L July 18, 1976, Sept. 2,3, 1977.
SEDIMENT LOADS: Maximum daily, 2,920 tons (2,650 tonnes) Apr. 2, 1976; minimum daily, 0.13 tons (0.12 tonnes) Oct. 3, 1976.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 984 micromhos, Jan. 3; minimum, 427 micromhos, Apr. 12.
WATER TEMPERATURES: Maximum, 33°C July 17; minimum, 0.5°C Jan. 13.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 82 mg/L Apr. 1; minimum daily mean, 9 mg/L Sept. 2, 3.
SEDIMENT LOADS: Maximum daily, 24 tons (22 tonnes) Apr. 20, 21; minimum daily, 0.13 tons (6.12 tonnes) Oct. 3.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	COLOR (PLATINUM-COBALT UNITS) (00080)	TURBIDITY (JTU) (00070)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L) (00310)
OCT											
05...	1300	5.5	660	8.2	3.0	9.5	17	5	9.4	85	2.6
12...	1530	12	650	7.4	21.0	11.0	12	6	9.8	91	4.2
19...	1145	12	550	8.3	5.0	2.0	12	2	12.6	93	3.8
28...	1445	14	795	8.5	6.5	1.2	12	3	13.4	98	1.8
NOV											
15...	1250	13	800	8.4	10.0	1.0	8	5	13.8	100	1.0
DEC											
13...	1315	7.4	867	7.9	-1.0	.0	8	6	9.0	63	3.8
JAN											
03...	1730	7.4	926	7.7	--	.0	7	4	--	--	2.9
FEB											
07...	1715	12	780	7.9	20.0	.0	12	3	10.6	75	2.8
MAR											
07...	1615	16	660	7.8	3.5	.0	9	3	9.5	67	20
28...	1345	56	468	7.5	14.0	.5	25	7	13.0	94	11
APR											
05...	1130	65	449	8.2	--	.5	24	9	--	--	8.4
12...	0945	111	430	7.7	12.0	5.0	23	9	11.6	94	--
18...	1600	109	500	8.5	--	11.0	12	8	--	--	4.3
26...	1300	93	455	8.8	19.0	13.5	23	8	11.8	118	7.8
MAY											
03...	--	44	510	8.5	24.0	17.5	23	4	10.8	117	4.8
09...	1530	41	590	8.5	--	20.0	23	10	--	--	7.0
17...	1330	24	575	8.3	23.0	20.0	22	4	10.6	119	6.1
24...	1400	21	620	8.7	27.5	22.0	13	5	8.5	100	--
31...	1330	42	520	8.1	21.0	19.5	18	5	8.9	98	8.6
JUN											
07...	1115	29	505	8.5	22.0	20.0	15	5	7.7	95	5.1
14...	1230	19	550	8.4	22.0	22.0	16	7	7.8	92	8.2
20...	1600	25	510	8.5	--	22.5	15	8	9.4	110	8.5
28...	1300	22	492	8.4	21.0	23.0	25	10	9.4	112	8.2
JUL											
05...	1320	16	480	8.4	27.0	24.0	22	9	6.7	81	--
11...	1440	14	495	8.4	--	23.5	17	5	9.1	110	8.2
19...	1500	13	497	8.0	31.0	31.0	22	8	8.1	89	23
26...	1330	6.4	500	8.6	26.5	20.0	13	3	8.1	96	4.9
AUG											
02...	1430	5.0	558	8.2	23.5	19.0	12	6	6.1	68	5.0
SEP											
12...	1530	13	565	8.4	18.0	16.5	12	2	7.2	0	7.5

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	FECAL COLI-FORM .7UM-MF (COL./100 ML) (31625)	FECAL STREP-TOCOCCI KF AGAR (COL. PER 100 ML) (31673)	HARD-NESS (CA,MG) (MG/L) (00900)	NON-CAR-BONATE HARD-NESS (MG/L) (00902)	DIS-SOLVED CAL-CIUM (CA) (MG/L) (00915)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L) (00925)	DIS-SOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM AD-SORP-TION RATIO (00931)	DIS-SOLVED PO-TAS-SIUM (K) (MG/L) (00935)	ALKA-LINITY AS CACO3 (MG/L) (00410)
OCT											
05...	83	61	290	0	64	32	19	12	.5	4.7	291
12...	75	180	330	16	73	36	20	11	.5	5.1	314
19...	28	80	330	11	73	37	28	15	.7	5.7	323
28...	812	37	350	4	81	36	21	11	.5	5.3	347
NOV											
15...	9	--	420	30	94	46	21	10	.4	5.2	394
DEC											
13...	3	22	460	31	110	45	22	9	.4	4.7	429
JAN											
03...	89	21	480	9	110	49	23	9	.5	5.3	468
FEB											
07...	1	28	360	3	87	35	17	9	.4	3.9	358
MAR											
07...	5	23	330	1	79	32	16	9	.4	3.7	328
28...	11	130	240	39	58	24	10	8	.3	4.9	210
APR											
05...	2	815	230	31	55	22	11	9	.3	4.1	200
12...	11	49	210	24	49	20	8.9	8	.3	3.4	180
18...	22	37	270	28	62	27	11	8	.3	4.1	240
26...	5	6	240	15	55	26	10	8	.3	4.8	230
MAY											
03...	--	--	270	27	60	30	13	9	.3	5.2	250
09...	26	18	300	83	66	32	15	10	.4	5.0	210
17...	23	89	310	33	69	34	15	9	.4	3.7	280
24...	27	40	300	16	67	33	31	18	.8	6.1	290
31...	116	205	260	6	58	28	15	11	.4	4.7	250
JUN											
07...	42	360	270	7	60	30	13	9	.3	4.4	270
14...	168	245	280	16	62	30	13	9	.3	4.2	260
20...	210	350	260	8	59	28	13	10	.4	3.7	250
28...	217	153	260	9	56	28	14	10	.4	3.7	250
JUL											
05...	186	180	240	0	51	28	14	11	.4	3.8	250
11...	29	350	250	9	51	29	16	12	.4	3.7	240
19...	39	243	240	0	49	29	16	12	.4	4.3	250
26...	46	120	260	18	55	30	17	12	.5	4.4	240
AUG											
02...	45	182	260	2	53	32	18	13	.5	4.1	260
SEP											
12...	16	73	270	7	58	31	16	11	.4	4.5	270

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DIS-SOLVED SULFATE (SO4) (MG/L) (00945)	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)	TOTAL FLUO-RIDE (F) (MG/L) (00951)	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L) (70300)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER AC-FT) (70303)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRATE (N) (MG/L) (00620)
OCT										
05...	52	4.6	.3	.2	15	375	367	.51	5.57	.00
12...	57	4.5	.3	.2	16	393	401	.53	13.2	.00
19...	57	12	.2	.2	16	438	423	.60	14.5	.01
28...	55	5.5	.2	.2	19	435	432	.59	16.4	.01
NOV										
15...	54	5.3	.5	.2	22	470	485	.64	16.6	.03
DEC										
13...	61	5.7	.4	.3	24	524	531	.71	10.5	.07
JAN										
03...	64	5.2	.3	.3	31	575	570	.78	11.5	.12
FEB										
07...	50	4.3	1.9	.3	25	422	459	.57	13.7	.19
MAR										
07...	47	3.7	1.1	.3	22	391	402	.53	17.2	.26
28...	57	4.0	.6	.1	15	312	298	.42	47.8	.33
APR										
05...	52	4.0	.2	.1	14	303	282	.41	53.3	.28
12...	42	3.2	1.3	.2	12	269	248	.37	80.6	.17
18...	51	3.6	.5	.1	11	322	314	.44	94.8	.28
26...	32	4.0	.5	.2	12	299	282	.41	75.7	.00
MAY										
03...	38	4.5	1.0	.2	15	330	314	.45	39.9	.01
09...	55	5.1	.4	.2	13	356	320	.48	39.6	.02
17...	53	4.5	.4	.2	1.5	377	349	.51	25.3	.00
24...	49	18	.8	.3	9.3	396	386	.54	22.9	.04
31...	35	4.5	.5	.0	10	328	308	.45	37.5	.00
JUN										
07...	28	3.6	.4	.2	9.6	316	309	.43	25.4	.00
14...	31	3.0	2.1	.2	11	333	312	.45	17.3	.00
20...	29	2.8	.3	.1	15	319	304	.43	22.3	.05
28...	24	3.2	.3	.2	16	304	293	.41	18.6	.03
JUL										
05...	26	3.4	.7	.2	17	312	293	.42	13.7	.02
11...	32	3.5	1.1	.3	16	319	295	.43	12.1	.01
19...	31	3.7	.5	.2	17	317	303	.43	11.6	.00
26...	32	7.1	.3	.2	17	333	304	.45	5.82	.01
AUG										
02...	38	4.0	.3	.2	15	330	322	.45	4.53	.01
SEP										
12...	38	4.4	.2	.2	14	317	326	.43	11.8	.00

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DIS-SOLVED NITRATE (N) (MG/L) (00618)	TOTAL NITRITE (N) (MG/L) (00615)	DIS-SOLVED NITRITE (N) (MG/L) (00613)	TOTAL AMMONIA NITRO-GEN (N) (MG/L) (00610)	DIS-SOLVED AMMONIA NITRO-GEN (N) (MG/L) (00608)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L) (00625)	DIS-SOLVED KJEL. NITRO-GEN (N) (MG/L) (00623)	TOTAL PHOS-PHORUS (P) (MG/L) (00665)	DIS-SOL-VED PHOS-PHORUS (P) (MG/L) (00666)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L) (70507)
OCT										
05...	.00	.00	.00	.01	.00	.86	.27	.05	.05	.01
12...	.00	.00	.00	.00	.00	.33	.28	.05	.02	.03
19...	.01	.00	.00	.00	.00	.65	.53	.04	.04	.02
28...	.00	.00	.00	.01	.00	.33	.33	.04	.02	.03
NOV										
15...	.04	.01	.00	.00	.00	.40	.24	.04	.03	.04
DEC										
13...	.07	.01	.00	.05	.01	.39	.39	.03	.01	.02
JAN										
03...	.12	.01	.00	.07	.07	.51	.51	.05	.02	.03
FEB										
07...	.18	.00	.00	.31	--	.60	--	.03	.02	.03
MAR										
07...	.27	.01	.00	.14	.08	1.2	1.2	.03	.03	.03
28...	.32	.01	.00	.16	.13	.67	.49	.05	.01	.01
APR										
05...	.27	.01	.00	.30	.23	1.2	.78	.15	.07	.10
12...	.17	.01	.00	.09	.09	.57	.57	.04	.02	.03
18...	.24	.01	.00	.06	.00	.58	.35	.01	.01	.01
26...	.00	.00	.00	.00	.00	1.1	.58	.11	.01	.05
MAY										
03...	.01	.00	.00	.00	.00	.81	.75	.06	.01	.00
09...	.02	.00	.00	.01	.00	.97	.65	.04	.04	.04
17...	.03	.04	.00	.04	.01	.26	.19	.05	.02	.00
24...	.03	.00	.00	.00	.00	.21	.07	.05	.02	.03
31...	.01	.01	.00	.05	.00	1.1	1.1	.05	.04	.00
JUN										
07...	.01	.01	.00	.01	.00	.46	.46	.05	.05	.05
14...	.00	.01	.00	.01	.01	.64	.48	.04	.01	.03
20...	.01	.00	.00	.04	.04	.61	.59	.04	.03	.01
28...	.03	.01	.00	.02	.01	.82	.50	.05	.03	.03
JUL										
05...	.06	.01	.00	.05	.00	.62	.62	.07	.02	.05
11...	.01	.01	.00	.04	.01	.55	.25	.04	.03	.02
19...	.00	.00	.00	.01	.00	1.1	.46	.03	.02	.02
26...	.01	.01	.01	.00	.00	.72	.62	.04	.03	.03
AUG										
02...	.01	.01	.00	.00	.00	.64	.61	.05	.03	.05
SEP										
12...	.01	.01	.00	.00	.00	.28	.03	.02	.02	.01

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L) (00671)	TOTAL ORGANIC PHOS-PHORUS (P) (MG/L) (00670)	DIS-SOLVED ORGANIC PHOS-PHORUS (P) (MG/L) (00673)	TOTAL IRON (FE) (UG/L) (01045)	DIS-SOLVED IRON (FE) (UG/L) (01046)	TOTAL MAN-GANESE (MN) (UG/L) (01055)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	TOTAL ORGANIC CARBON (C) (MG/L) (00680)	DIS-SOL-VED ORGANIC CARBON (C) (MG/L) (00681)	SUS-PENDED ORGANIC CARBON (C) (MG/L) (00689)
OCT										
05...	.01	.03	.03	290	70	90	60	--	--	--
12...	.02	.00	.00	330	30	50	40	--	6.4	--
19...	.02	.00	.00	290	60	50	20	6.8	--	--
28...	.02	.00	.00	350	80	50	20	--	--	--
NOV										
15...	.03	.00	.00	360	120	50	40	--	--	--
DEC										
13...	.01	.00	.00	10	10	90	80	--	--	--
JAN										
03...	.02	.00	.00	290	40	100	90	--	--	--
FEB										
07...	.00	.00	.02	360	20	80	80	--	4.4	.5
MAR										
07...	.03	.00	.00	320	30	60	50	--	--	--
28...	.00	.01	.00	630	150	90	80	--	--	--
APR										
05...	.02	.00	.00	1200	180	120	70	--	--	--
12...	.02	.00	.00	670	40	100	60	--	--	--
18...	.01	.00	.00	570	50	130	30	--	--	--
26...	.00	.01	.01	530	40	160	30	--	--	--
MAY										
03...	.00	.01	.00	460	60	160	80	--	--	--
09...	.04	.00	.00	380	20	160	40	--	11	--
17...	.02	.03	.02	320	30	140	60	--	11	.5
24...	.01	.00	.00	250	30	80	30	--	--	--
31...	.00	.04	.04	390	30	100	9	--	--	--
JUN										
07...	.00	.00	.00	250	30	110	30	--	--	--
14...	.01	.00	.00	300	40	90	50	--	--	--
20...	.01	.02	.02	240	20	70	30	--	--	--
28...	.01	.00	.00	--	30	--	40	--	--	--
JUL										
05...	.01	.00	.00	270	20	100	40	--	--	--
11...	.02	.00	.01	240	70	60	20	--	--	--
19...	.02	.00	.00	350	40	90	20	--	--	--
26...	.03	.00	.00	300	40	100	30	--	--	--
AUG										
02...	.05	.00	.00	280	30	100	20	--	9.5	.7
SEP										
12...	.00	.00	.01	250	60	400	30	--	--	--

DATE	TIME	TOTAL ALUM-INUM (AL) (UG/L) (01105)	TOTAL ARSENIC (AS) (UG/L) (01002)	TOTAL BARIUM (BA) (UG/L) (01007)	TOTAL BERYL-LIUM (BE) (UG/L) (01012)	TOTAL BORON (B) (UG/L) (01022)	TOTAL CAD-MIUM (CD) (UG/L) (01027)	TOTAL CHRO-MIUM (CR) (UG/L) (01034)	TOTAL COBALT (CO) (UG/L) (01037)	TOTAL COPPER (CU) (UG/L) (01042)	TOTAL LEAD (PB) (UG/L) (01051)
OCT											
12...	1530	90	3	0	0	130	<10	0	<50	<10	<100
FEB											
07...	1715	100	2	0	0	410	<10	0	50	<10	200
MAY											
09...	1530	100	4	0	0	100	<10	--	<50	<10	100
AUG											
02...	1430	100	7	300	0	130	<10	5	<50	<10	<100

DATE	TOTAL LITHIUM (LI) (UG/L) (01132)	TOTAL MERCURY (MG) (UG/L) (71900)	TOTAL MOLYB-DENUM (MO) (UG/L) (01062)	TOTAL NICKEL (NI) (UG/L) (01067)	TOTAL SELE-NIUM (SE) (UG/L) (01147)	TOTAL SILVER (AG) (UG/L) (01077)	TOTAL STRON-TIUM (SR) (UG/L) (01082)	TOTAL ZINC (ZN) (UG/L) (01092)	CYANIDE (CN) (MG/L) (00720)	DIS-SOLVED VANA-DIUM (V) (UG/L) (01085)
OCT										
12...	30	.0	2	<50	0	<10	260	10	.00	1.2
FEB										
07...	20	.1	1	<50	0	<10	270	10	.00	.0
MAY										
09...	20	.0	2	<50	0	<10	--	10	.00	.3
AUG										
02...	20	.0	1	<50	1	<10	230	10	.00	.0

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	TOTAL PCB (UG/L) (39516)	PCB IN BOTTOM MATERIAL (UG/KG) (39519)	POLYCHLORINATED NAPHTHALENES (UG/L) (39250)	TOTAL ALDRIN (UG/L) (39330)	ALDRIN IN BOTTOM MATERIAL (UG/KG) (39333)	TOTAL CHLORDANE (UG/L) (39350)	CHLORDANE IN BOTTOM MATERIAL (UG/KG) (39351)	TOTAL DDD (UG/L) (39360)	DDD IN BOTTOM MATERIAL (UG/KG) (39363)	TOTAL DDE (UG/L) (39365)	DDE IN BOTTOM MATERIAL (UG/KG) (39368)
MAY												
17...	1330	--	0	--	--	.0	--	0	--	.0	--	.0
JUN												
20...	1600	.0	0	.00	.00	.0	.0	0	.00	.0	.00	.0
JUL												
11...	1440	.0	1	.00	.00	.0	.0	0	.00	.0	.00	.0
AUG												
02...	1430	.0	0	.00	.00	.0	.0	0	.00	.0	.00	.0

DATE	TOTAL DDT (UG/L) (39370)	DDT IN BOTTOM MATERIAL (UG/KG) (39373)	TOTAL DIAZINON (UG/L) (39570)	DIAZINON IN BOTTOM MATERIAL (UG/KG) (39571)	TOTAL DIELDRIN (UG/L) (39380)	DIELDRIN IN BOTTOM MATERIAL (UG/KG) (39383)	TOTAL ENDRIN (UG/L) (39390)	ENDRIN IN BOTTOM MATERIAL (UG/KG) (39393)	TOTAL ETHION (UG/L) (39398)	ETHION IN BOTTOM MATERIAL (UG/KG) (39399)	TOTAL TRITHION (UG/L) (39786)
MAY											
17...	--	.0	.00	.0	--	.0	--	.0	.00	.0	.00
JUN											
20...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.00
JUL											
11...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.00
AUG											
02...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.00

DATE	TOTAL HEPTACHLOR (UG/L) (39410)	HEPTACHLOR IN BOTTOM MATERIAL (UG/KG) (39413)	TOTAL HEPTACHLOR EPOXIDE (UG/L) (39420)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG) (39423)	TOTAL LINDANE (UG/L) (39340)	LINDANE IN BOTTOM MATERIAL (UG/KG) (39343)	TOTAL MALATHION (UG/L) (39530)	MALATHION IN BOTTOM MATERIAL (UG/KG) (39531)	TOTAL METHYL PARATHION (UG/L) (39600)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG) (39601)	TOTAL METHYL TRITHION (UG/L) (39790)
MAY											
17...	--	.0	--	.0	--	.0	.00	.0	.00	.0	.00
JUN											
20...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.00
JUL											
11...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.00
AUG											
02...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.00

DATE	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG) (39791)	TOTAL PARATHION (UG/L) (39540)	PARATHION IN BOTTOM MATERIAL (UG/KG) (39541)	TOTAL TOXAPHENE (UG/L) (39400)	TOXAPHENE IN BOTTOM MATERIAL (UG/KG) (39403)	TOTAL 2,4-D (UG/L) (39730)	2,4-D IN BOTTOM MATERIAL (UG/KG) (39731)	TOTAL 2,4,5-T (UG/L) (39740)	2,4,5-T IN BOTTOM MATERIAL (UG/KG) (39741)	TOTAL SILVEX (UG/L) (39760)	SILVEX IN BOTTOM MATERIAL (UG/KG) (39761)
MAY											
17...	.0	.00	.0	--	0	.03	0	.00	0	.00	0
JUN											
20...	.0	.00	.0	0	0	.04	0	.00	0	.00	0
JUL											
11...	.0	.00	.0	0	0	.00	0	.00	0	.00	0
AUG											
02...	.0	.00	.0	0	0	.00	1	.00	0	.00	0

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	TOTAL KJEL. NITROGEN IN BOTTOM MAT. (MG/KG) (00626)	TOTAL NITROGEN IN BOTTOM MATERIAL (N) (MG/KG) (00603)	TOTAL PHOSPHORUS IN BOTTOM MATERIAL (MG/KG) (00668)	TOTAL ALUMINUM IN BOTTOM MATERIAL (UG/G) (01108)	TOTAL ARSENIC IN BOTTOM MATERIAL (UG/G) (01003)	TOTAL BARIUM IN BOTTOM MATERIAL (UG/G) (01008)	TOTAL BERYLLIUM IN BOTTOM MATERIAL (UG/G) (01013)	TOTAL BORON IN BOTTOM MATERIAL (UG/G) (01023)	TOTAL CADMIUM IN BOTTOM MATERIAL (UG/G) (01028)	TOTAL CHROMIUM IN BOTTOM MATERIAL (UG/G) (01029)	TOTAL COBALT IN BOTTOM MATERIAL (UG/G) (01038)
JUN 20...	1600	57	132	3000	610	2	30	1	6	<1	2	<5

DATE	TOTAL COPPER IN BOTTOM MATERIAL (UG/G) (01043)	TOTAL LEAD IN BOTTOM MATERIAL (UG/G) (01052)	TOTAL MOLYBDENUM IN BOTTOM MATERIAL (UG/G) (01063)	TOTAL NICKEL IN BOTTOM MATERIAL (UG/G) (01068)	TOTAL SELENIUM IN BOTTOM MATERIAL (UG/G) (01148)	TOTAL SILVER IN BOTTOM MATERIAL (UG/G) (01078)	TOTAL STRONTIUM IN BOTTOM MATERIAL (UG/G) (01083)	TOTAL ZINC IN BOTTOM MATERIAL (UG/G) (01093)	ORGANIC CARBON IN BOTTOM MATERIAL (C) (G/KG) (00687)	TOTAL CYANIDE IN BOTTOM MATERIAL (UG/G) (00721)	OIL AND GREASE IN BOTTOM MATERIAL (MG/KG) (00553)
JUN 20...	3	<10	0	5	0	<1	200	8	.7	0	.0

DATE	TIME	TEMPERATURE (DEG C) (00010)	PH (UNITS) (00400)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
NOV					
16...	0800	.0	8.1	13.8	97
16...	1000	.0	7.4	13.6	96
16...	1200	.0	7.4	13.6	96
16...	1400	.0	8.3	13.6	96
16...	1600	.0	8.3	13.7	96
16...	1800	.0	8.1	13.2	93
16...	2000	.0	7.7	13.1	92
16...	2200	.0	8.2	13.0	92
16...	2400	.0	8.3	13.1	92
17...	0200	.0	8.2	13.0	92
17...	0400	.0	8.4	13.4	94
17...	0600	.0	8.4	12.9	91
17...	0800	.0	8.3	13.2	93
FEB					
08...	1400	.0	7.9	9.6	68
08...	1600	.0	7.8	9.2	65
08...	1800	.0	7.8	8.8	62
08...	2000	.0	7.8	9.4	66
08...	2200	.0	7.7	9.3	65
08...	2400	.0	7.7	9.3	65
09...	0200	.0	7.5	9.3	65
09...	0400	.0	7.5	9.4	66
09...	0600	.0	7.5	9.4	66
09...	0800	.0	7.8	9.5	67
09...	1000	.0	7.7	9.0	63
09...	1200	.0	7.8	9.2	65
09...	1400	.0	7.8	9.4	66
JUN					
07...	1000	20.0	8.5	7.7	86
07...	1100	21.0	8.8	8.1	93
07...	1115	20.0	8.5	7.7	95
07...	1300	24.0	8.9	8.9	108
07...	1500	25.0	8.8	9.6	118
07...	1700	26.0	8.9	9.4	119
07...	1900	26.0	8.5	8.9	111
07...	2100	25.0	9.0	8.2	101
07...	2300	24.0	7.8	7.3	89
08...	0100	23.0	8.6	6.7	80
08...	0300	22.0	8.5	6.3	74
08...	0500	21.0	8.4	6.1	70
08...	0700	20.0	8.2	6.3	71
08...	0900	19.0	8.3	7.0	78
JUL					
26...	1200	23.0	8.6	8.1	96
26...	1330	20.0	8.6	8.1	96
26...	1600	26.0	8.6	8.8	111
26...	1800	27.0	8.5	8.7	111
26...	2000	26.0	8.4	8.7	110
26...	2200	23.5	8.5	8.0	96
26...	2400	22.0	8.2	7.7	91
27...	0200	21.0	8.2	6.7	77
27...	0400	21.0	8.2	6.4	74
27...	0600	21.0	8.1	6.4	74
27...	0800	21.0	8.1	6.3	72
27...	1000	20.5	8.2	6.9	78
27...	1200	21.0	8.3	6.5	75
27...	1400	21.0	8.3	8.0	92

05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued
PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	OCT 12,76		OCT 19,76		OCT 28,76		NOV 15,76		DEC 13,76		JAN 3,77	
TIME	1530		1145		1445		1250		1315		1730	
TOTAL CELLS/ML	830		1000		500		150		36000		430	
DIVERSITY: DIVISION	1.7		0.9		1.2		1.0		0.5		1.3	
.CLASS	1.7		1.2		1.2		1.0		0.5		1.3	
..ORDER	2.0		1.3		1.5		1.8		0.7		1.7	
...FAMILY	3.1		2.5		1.8		2.6		0.8		2.2	
....GENUS	3.4		2.9		1.8		2.6		0.9		2.5	
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												
...CHARACIACEAE												
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE												
....COELASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE												
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE												
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	170#	17	--	-	--	-	--	-	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	12	1	37	4	17	3	15	10	*	0	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-	--	-
....FRANCEIA	--	-	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-	--	-
....NEPHROCYTIUM	--	-	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	23	5	--	-	--	-	5	1
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	37	4	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE												
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	190#	23	390#	39	68	14	30#	21	1100	3	39	9
....TETRASTRUM	--	-	37	4	--	-	--	-	--	-	--	-
..TETRASPORALES												
...PALMELLACEAE												
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CARTERIA	--	-	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	--	-	28	6	20	14	--	-	20	5
...PHACOTACEAE												
....PHACOTUS	--	-	--	-	--	-	--	-	--	-	--	-
...POLYBLEPHARIDACEAE												
....SPERMATOZOOPSIS	--	-	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES												
...DESMIDIACEAE												
....COSMARIUM	--	-	--	-	--	-	--	-	--	-	--	-

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, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	OCT 12,76 1530		OCT 19,76 1145		OCT 28,76 1445		NOV 15,76 1250		DEC 13,76 1315		JAN 3,77 1730	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	48	6	9	1	--	-	15	10	--	-	12	3
....MELOSIRA	--	-	37	4	--	-	--	-	270	1	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	12	1	--	-	*	0	--	-	--	-	2	1
...CYMBELLACEAE												
....AMPHORA	36	4	9	1	6	1	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	--	-	5	3	--	-	--	-
....EPITHEMIA	--	-	9	1	--	-	--	-	*	0	5	1
....RHOPALODIA	12	1	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE												
....DIATOMA	24	3	9	1	--	-	--	-	*	0	7	2
...EUNOTIACEAE												
....EUNOTIA	--	-	--	-	--	-	--	-	*	0	--	-
...FRAGILARIACEAE												
....FRAGILARIA	36	4	--	-	--	-	--	-	*	0	2	1
....SYNEDRA	59	7	--	-	--	-	--	-	230	1	7	2
...GOMPHONEMATACEAE												
....GOMPHONEMA	12	1	--	-	--	-	--	-	--	-	5	1
...MERIDIONACEAE												
....MERIDION	--	-	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE												
....CALONEIS	--	-	9	1	--	-	--	-	--	-	--	-
....GYROSIGMA	12	1	--	-	--	-	--	-	--	-	--	-
....NAVICULA	120	14	73	7	6	1	20	14	770	2	24	6
....NEIDIUM	--	-	9	1	--	-	--	-	--	-	--	-
....PINNULARIA	12	1	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE												
....NITZSCHIA	48	6	64	6	34	7	40#	28	500	1	12	3
...SURIRELLACEAE												
....CYMATOPLEURA	--	-	--	-	--	-	--	-	--	-	--	-
....SURIRELLA	--	-	--	-	--	-	--	-	--	-	2	1
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...CHROMULINACEAE												
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE												
....DINOBRYON	--	-	92	9	--	-	--	-	--	-	--	-
.XANTHOPHYCEAE												
..HETEROTRICHALES												
...TRIBONEMATACEAE												
....TRIBONEMA	--	-	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												

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, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	OCT 12,76 1530		OCT 19,76 1145		OCT 28,76 1445		NOV 15,76 1250		DEC 13,76 1315		JAN 3,77 1730	
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
..CHROCCOCCALES												
...CHROCCOCCAEAE												
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	--	-	--	-	--	-	960	3	15	3
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE												
....LYNGBYA	--	-	--	-	--	-	--	-	190	1	24	6
....OSCILLATORIA	--	-	--	-	310#	63	--	-	32000#	88	240#	57
...RIVULARIACEAE												
....RAPHIDIOPSIS	120	14	--	-	--	-	--	-	--	-	--	-
..CHROCCOCCALES												
...CHROCCOCCAEAE												
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.CRYPTOPHYCEAE												
..CRYPTOMONIDALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONODACEAE												
....CRYPTOMONAS	83	10	--	-	*	0	--	-	--	-	--	-
...NEPHROSELMIDIACEAE												
....PROTOCHRYSIS	--	-	--	-	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	--	-	--	-	--	-	--	-	--	-
....LEPOCINCLIS	--	-	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..GYMNODINIALES												
...GYMNODINIACEAE												
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-	--	-
..PERIDINIALES												
...GLENODINIACEAE												
....GLENODINIUM	--	-	--	-	--	-	--	-	--	-	--	-
...PERIDINIACEAE												
....PERIDINIUM	--	-	--	-	--	-	--	-	--	-	--	-

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

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	FEB 7,77		MAR 7,77		MAR 28,77		APR 5,77		APR 12,77		APR 18,77	
TIME	1715		1615		1345		0000		0945		1600	
TOTAL CELLS/ML	310		690		29000		5400		140		16000	
DIVERSITY: DIVISION	1.3		1.3		0.4		0.9		0.6		2.0	
.CLASS	1.3		1.3		0.4		0.9		0.6		2.2	
..ORDER	1.4		1.4		0.4		1.0		0.6		2.6	
...FAMILY	1.9		1.9		0.5		1.2		0.6		3.1	
....GENUS	2.0		2.0		0.5		1.3		0.6		3.1	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...CHARACIACEAE												
....SCHROEDERIA	--	-	--	-	--	-	40	1	--	-	--	-
...COELASTRACEAE												
....COELASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE												
....PEDIASTRUM	44	14	--	-	--	-	--	-	--	-	*	0
...MICRACTINIACEAE												
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-	2600#	16
...OOCYSTACEAE												
....ANKISTRODESMUS	3	1	4	1	1900	7	200	4	--	-	2000	13
....CHODATELLA	--	-	*	0	*	0	--	-	--	-	*	0
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-	--	-
....FRANCEIA	--	-	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-	--	-
....NEPHROCYTIUM	--	-	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	7	2	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	4	1	*	0	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE												
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	13	4	57	8	*	0	67	1	--	-	330	2
....TETRASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES												
...PALMELLACEAE												
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CARTERIA	--	-	--	-	--	-	--	-	--	-	*	0
....CHLAMYDOMONAS	7	2	14	2	*	0	340	6	--	-	660	4
...PHACOTACEAE												
....PHACOTUS	--	-	--	-	--	-	*	0	--	-	*	0
...POLYBLEPHARIDACEAE												
....SPERMATOZOOPSIS	--	-	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES												
...DESMIDIACEAE												
....COSMARIUM	--	-	--	-	--	-	--	-	--	-	--	-

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, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	FEB 7,77 1715		MAR 7,77 1615		MAR 28,77 1345		APR 5,77 0000		APR 12,77 0945		APR 18,77 1600	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	--	-	--	-	--	-	--	-	--	-	2000	13
....MELOSIRA	--	-	--	-	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	3	1	*	0	--	-	--	-	--	-	--	-
....COCCONEIS	3	1	4	1	--	-	--	-	--	-	--	-
...CYMBELLACEAE												
....AMPHORA	--	-	11	2	*	0	*	0	--	-	--	-
....CYMBELLA	--	-	--	-	--	-	--	-	--	-	--	-
....EPITHEMIA	--	-	7	1	--	-	--	-	--	-	--	-
....RHOPALODIA	--	-	--	-	--	-	--	-	--	-	*	0
...DIATOMACEAE												
....DIATOMA	3	1	--	-	--	-	--	-	--	-	--	-
...EUNOTIACEAE												
....EUNOTIA	--	-	--	-	*	0	--	-	--	-	--	-
...FRAGILARIACEAE												
....FRAGILARIA	--	-	47	7	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	14	2	--	-	120	2	--	-	*	0
...GOMPHONEMATACEAE												
....GOMPHONEMA	7	2	*	0	--	-	*	0	--	-	--	-
...MERIDIONACEAE												
....MERIDION	--	-	--	-	--	-	--	-	--	-	*	0
...NAVICULACEAE												
....CALONEIS	--	-	--	-	--	-	--	-	--	-	--	-
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-	--	-
....NAVICULA	13	4	39	6	*	0	54	1	--	-	83	1
....NEIDIUM	--	-	--	-	--	-	--	-	--	-	--	-
....PINNULARIA	--	-	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE												
....NITZSCHIA	3	1	29	4	*	0	*	0	--	-	1200	7
...SURIRELLACEAE												
....CYMATOPLEURA	--	-	--	-	--	-	--	-	--	-	--	-
....SURIRELLA	--	-	--	-	--	-	*	0	--	-	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...CHROMULINACEAE												
....CHRYSOCOCCUS	--	-	--	-	*	0	--	-	--	-	170	1
...OCHROMONADACEAE												
....DINOBRYON	--	-	--	-	--	-	--	-	--	-	330	2
.XANTHOPHYCEAE												
..HETEROTRICHALES												
...TRIBONEMATACEAE												
....TRIBONEMA	--	-	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												

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

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	FEB 7,77 1715		MAR 7,77 1615		MAR 28,77 1345		APR 5,77 0000		APR 12,77 0945		APR 18,77 1600	
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
..CHROCCOCCALES												
...CHROCCOCCACEAE												
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE												
....LYNGBYA	--	-	--	-	--	-	94	2	--	-	--	-
....OSCILLATORIA	200#	65	450#	65	27000#	92	4300#	80	120#	85	4000#	25
...RIVULARIACEAE												
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-	--	-
..CHROCCOCCALES												
...CHROCCOCCACEAE												
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.CRYPTOPHYCEAE												
..CRYPTOMONIDALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	4	1	--	-	--	-	--	-	83	1
...CRYPTOMONODACEAE												
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-	250	2
...NEPHROSELMIDIACEAE												
....PROTOCHRYSIS	3	1	--	-	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	--	-	--	-	--	-	--	-	*	0
....LEPOCINCLIS	--	-	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	4	1	--	-	--	-	21	15	2200	14
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..GYMNODINIALES												
...GYMNODINIACEAE												
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-	--	-
..PERIDINIALES												
...GLENODINIACEAE												
....GLENODINIUM	--	-	--	-	--	-	120	2	--	-	--	-
...PERIDINIACEAE												
....PERIDINIUM	--	-	--	-	--	-	--	-	--	-	83	1

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05062500 WILD RICE RIVER AT TWIN VALLEY, MN--Continued
PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

	APR 26,77	MAY 3,77	MAY 9,77	MAY 17,77	MAY 24,77	MAY 31,77
TIME	1300	1500	1530	1330	1400	1330
CELLS/ML	550000	62000	150000	29000	4800	7500
DIVERSITY: DIVISION	0.1	0.7	1.2	0.8	0.4	1.5
CLASS	0.1	0.7	1.2	0.8	0.4	1.5
..ORDER	0.1	0.8	1.4	0.9	1.3	1.8
...FAMILY	0.2	1.6	1.9	2.3	1.6	2.4
....GENUS	0.6	2.4	2.1	3.0	2.2	3.0

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												
...CHARACIACEAE												
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE												
....COELASTRUM	--	-	--	-	--	-	3600	12	--	-	*	0
...HYDRODICTYACEAE												
....PEDIASTRUM	*	0	--	-	--	-	--	-	--	-	*	0
...MICRACTINIACEAE												
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-	*	0
....MICRACTINIUM	--	-	2200	4	7200	5	650	2	--	-	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	46000	8	3000	5	2900	2	320	1	290	6	530	7
....CHODATELLA	--	-	--	-	*	0	*	0	--	-	--	-
....DICTYOSPHAERIUM	490000#	90	4800	8	19000	13	11000#	38	--	-	800	11
....FRANCEIA	--	-	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-	*	0
....NEPHROCYTIUM	--	-	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	390	1	--	-	690	9
....SELENASTRUM	--	-	--	-	--	-	*	0	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-	*	0
....TREUBARIA	--	-	*	0	--	-	--	-	--	-	--	-
....WESTELLA	--	-	34000#	55	--	-	--	-	--	-	--	-
...SCENEDESMACEAE												
....ACTINASTRUM	*	0	5100	8	22000#	15	3100	11	100	2	*	0
....CRUCIGENIA	--	-	--	-	--	-	3500	12	1400#	28	--	-
....SCENEDESMUS	*	0	5000	8	3700	2	1800	6	1100#	22	960	13
....TETRASTRUM	--	-	--	-	--	-	--	-	--	-	320	4
..TETRASPORALES												
...PALMELLACEAE												
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-	--	-
.VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CARTERIA	*	0	--	-	*	0	--	-	--	-	--	-
....CHLAMYDOMONAS	*	0	--	-	--	-	390	1	1700#	35	110	1
..PHACOTACEAE												
....PHACOTUS	--	-	*	0	--	-	--	-	--	-	110	1
..POLYBLEPHARIDACEAE												
....SPERMATOZOOPSIS	--	-	--	-	--	-	--	-	--	-	130	2
..ZYGNEMATALES												
...DESMIDIACEAE												
....COSMARIUM	--	-	--	-	--	-	--	-	--	-	--	-

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

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE / TIME	APR 26,77 1300		MAY 3,77 1500		MAY 9,77 1530		MAY 17,77 1330		MAY 24,77 1400		MAY 31,77 1330	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	*	0	400	1	--	-	190	1	--	-	130	2
....MELOSIRA	*	0	--	-	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	--	-	*	0
...CYMBELLACEAE												
....AMPHORA	--	-	--	-	--	-	190	1	--	-	*	0
....CYMBELLA	--	-	--	-	--	-	--	-	--	-	*	0
....EPITHEMIA	--	-	--	-	*	0	--	-	--	-	*	0
....RHOPALODIA	--	-	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE												
....DIATOMA	--	-	--	-	--	-	--	-	--	-	110	1
...EUNOTIACEAE												
....EUNOTIA	--	-	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE												
....FRAGILARIA	--	-	--	-	820	1	--	-	--	-	--	-
....SYNEDRA	*	0	--	-	--	-	--	-	26	1	53	1
...GOMPHONEMATACEAE												
....GOMPHONEMA	*	0	--	-	--	-	--	-	--	-	--	-
...MERIDIONACEAE												
....MERIDION	--	-	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE												
....CALONEIS	--	-	--	-	--	-	--	-	--	-	--	-
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-	--	-
....NAVICULA	*	0	--	-	--	-	*	0	--	-	*	0
....NEIDIUM	--	-	--	-	--	-	--	-	--	-	--	-
....PINNULARIA	--	-	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE												
....NITZSCHIA	*	0	2700	4	1600	1	450	2	52	1	210	3
...SURIRELLACEAE												
....CYMATOPLEURA	--	-	--	-	--	-	--	-	--	-	--	-
....SURIRELLA	--	-	--	-	*	0	--	-	--	-	*	0
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...CHROMULINACEAE												
....CHRYSOCOCCUS	--	-	--	-	--	-	320	1	--	-	--	-
...OCHROMONADACEAE												
....DINOBRYON	--	-	--	-	*	0	--	-	--	-	--	-
.XANTHOPHYCEAE												
..HETEROTRICHALES												
...TRIBONEMATACEAE												
....TRIBONEMA	--	-	--	-	--	-	*	0	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												

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

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	APR 26,77 1300		MAY 3,77 1500		MAY 9,77 1530		MAY 17,77 1330		MAY 24,77 1400		MAY 31,77 1330	
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
..CHROCCOCCALES												
...CHROCCOCCACEAE												
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	4100	1	3500	6	85000#	57	910	3	260	5	3000#	39
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE												
....LYNGBYA	--	-	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	400	1	3100	2	--	-	--	-	--	-
...RIVULARIACEAE												
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-	--	-
..CHROCCOCCALES												
...CHROCCOCCACEAE												
....GOMPHOSPHAERIA	--	-	--	-	--	-	1700	6	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.CRYPTOPHYCEAE												
..CRYPTOMONIDALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	*	0	--	-	--	-	--	-	240	3
...CRYPTOMONODACEAE												
....CRYPTOMONAS	*	0	--	-	--	-	--	-	--	-	*	0
...NEPHROSELMIDIACEAE												
....PROTOCHRYSIS	--	-	--	-	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	*	0	*	0	*	0	--	-	--	-	--	-
....LEPOCINCLIS	--	-	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	320	1	3100	2	320	1	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..GYMNODINIALES												
...GYMNODINIACEAE												
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-	--	-
..PERIDINIALES												
...GLENODINIACEAE												
....GLENODINIUM	*	0	--	-	--	-	--	-	--	-	--	-
...PERIDINIACEAE												
....PERIDINIUM	--	-	--	-	--	-	--	-	--	-	--	-

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, OCTOBER 1976 TO SEPTEMBER 1977

DATE	JUN 7,77	JUN 14,77	JUN 20,77	JUN 28,77	JUL 5,77
TIME	1115	1230	1600	1300	1320
TOTAL CELLS/ML	7200	2900	1700	1600	1300
DIVERSITY: DIVISION	0.5	1.3	0.6	0.7	1.0
.CLASS	0.5	1.3	0.6	0.7	1.0
..ORDER	0.5	1.8	1.0	1.4	1.7
...FAMILY	0.5	2.5	1.9	2.1	2.5
....GENUS	0.6	2.8	2.4	2.1	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										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	*	0
...COELASTRACEAE										
....COELASTRUM	--	-	140	5	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	*	0	*	0	--	-	190	15
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	*	0	400	14	96	6	730#	46	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....FRANCEIA	--	-	--	-	10	1	--	-	--	-
....KIRCHNERIELLA	79	1	--	-	--	-	--	-	--	-
....NEPHROCYTIUM	--	-	39	1	--	-	--	-	--	-
....OOCYSTIS	--	-	58	2	10	1	--	-	34	3
....SELENASTRUM	--	-	--	-	830#	48	--	-	17	1
....TETRAEDRON	--	-	*	0	19	1	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....CRUCIGENIA	95	1	--	-	--	-	--	-	14	1
....SCENEDESMUS	190	3	680#	24	480#	28	380#	24	500#	40
....TETRASTRUM	--	-	78	3	--	-	--	-	--	-
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	77	4	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	*	0	--	-	--	-	--	-
...PHACOTACEAE										
....PHACOTUS	--	-	*	0	29	2	--	-	--	-
...POLYBLEPHARIDACEAE										
....SPERMATOZOOPSIS	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	*	0	19	1	270#	17	140	11

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

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	JUN 7,77 1115		JUN 14,77 1230		JUN 20,77 1600		JUN 28,77 1300		JUL 5,77 1320	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	110	2	19	1	10	1	--	-	--	-
....MELOSIRA	--	-	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	29	2	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	*	0	10	1	--	-	--	-
....CYMBELLA	--	-	--	-	--	-	--	-	7	1
....EPITHEMIA	--	-	19	1	--	-	--	-	--	-
....RHOPALODIA	--	-	--	-	--	-	10	1	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	19	1	--	-	--	-
...EUNOTIACEAE										
....EUNOTIA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	*	0	19	1	57	4	10	1
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	10	1	--	-	--	-
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....CALONEIS	--	-	*	0	--	-	--	-	--	-
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	48	1	29	1	10	1	67	4	20	2
....NEIDIUM	--	-	*	0	--	-	--	-	--	-
....PINNULARIA	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	49	2	38	2	--	-	--	-
...SURIRELLACEAE										
....CYMATOPLEURA	--	-	*	0	--	-	--	-	--	-
....SURIRELLA	--	-	*	0	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-
.XANTHOPHYCEAE										
..HETEROTRICHALES										
...TRIBONEMATACEAE										
....TRIBONEMA	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										

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, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	JUN 7,77 1115		JUN 14,77 1230		JUN 20,77 1600		JUN 28,77 1300		JUL 5,77 1320	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	--	-	110	9
....ANACYSTIS	6600#	92	470#	16	58	3	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	57	4	27	2
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	190	15
....OSCILLATORIA	--	-	850#	29	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-
...NEPHROSELMIDIACEAE										
....PROTOCHRYSIS	--	-	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....LEPOCINCLIS	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	*	0	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	*	0	--	-	--	-	--	-	--	-
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	--	-	--	-	*	0

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, OCTOBER 1976 TO SEPTEMBER 1977

DATE	JUL 11,77	JUL 19,77	JUL 26,77	AUG 2,77	SEP 12,77
TIME	1440	1500	1330	1430	1530
TOTAL CELLS/ML	4500	9300	2500	970	1200
DIVERSITY: DIVISION	1.5	0.6	1.1	1.5	1.6
.CLASS	1.3	0.6	1.2	1.5	1.6
..ORDER	2.0	1.2	1.6	1.5	1.8
...FAMILY	2.7	2.6	2.3	2.0	2.3
....GENUS	3.2	3.0	3.0	2.6	2.6

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	6	1	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	450	5	--	-	--	-	34	3
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	110	2	1200	13	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	660	15	3000#	33	350	14	24	2	30	2
....CHODATELLA	--	-	--	-	--	-	--	-	9	1
....DICTYOSPHAERIUM	110	2	--	-	180	7	150#	16	--	-
....FRANCEIA	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	82	2	--	-	--	-	--	-	--	-
....NEPHROCYTIUM	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	790	8	--	-	53	5	17	1
....SELENASTRUM	--	-	--	-	--	-	18	2	--	-
....TETRAEDRON	--	-	56	1	23	1	--	-	--	-
....TREUBARIA	27	1	--	-	*	0	--	-	--	-
....WESTELLA	110	2	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	94	10	--	-
....SCENEDESMUS	490	11	1200	13	750#	30	94	10	440#	36
....TETRASTRUM	330	7	*	0	270	11	--	-	51	4
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	270	6	1200	13	170	7	--	-	30	2
...PHACOTACEAE										
....PHACOTUS	--	-	510	5	--	-	--	-	--	-
...POLYBLEPHARIDACEAE										
....SPERMATOZOOPSIS	850#	19	56	1	79	3	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	--	-	--	-	--	-

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, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	JUL 11,77 1440		JUL 19,77 1500		JUL 26,77 1330		AUG 2,77 1430		SEP 12,77 1530	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	82	2	--	-	--	-	--	-	9	1
....MELOSIRA	--	-	--	-	--	-	--	-	38	3
....STEPHANODISCUS	--	-	--	-	--	-	12	1	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	18	2	21	2
....CYMBELLA	--	-	--	-	*	0	--	-	--	-
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-
....RHOPALODIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	*	0
...EUNOTIACEAE										
....EUNOTIA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	--	-	9	1
...GOMPHONEMATACEAE										
....GOMPHONEMA	55	1	--	-	--	-	--	-	--	-
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....CALONEIS	--	-	--	-	--	-	--	-	--	-
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	--	-	--	-	57	2	*	0	13	1
....NEIDIUM	--	-	--	-	--	-	--	-	--	-
....PINNULARIA	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	140	3	110	1	34	1	--	-	--	-
...SURIRELLACEAE										
....CYMATOPLEURA	--	-	--	-	--	-	--	-	--	-
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-
.XANTHOPHYCEAE										
..HETEROTRICHALES										
...TRIBONEMATACEAE										
....TRIBONEMA	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										

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, OCTOBER 1976 TO SEPTEMBER 1977

DATE / TIME	JUL 11,77 1440		JUL 19,77 1500		JUL 26,77 1330		AUG 2,77 1430		SEP 12,77 1530	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....AGMENELLUM	--	-	56	1	--	-	--	-	--	-
....ANACYSTIS	1100#	25	390	4	490#	19	440#	46	450#	37
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	*	0	--	-	*	0
...CRYPTOMONODACEAE										
....CRYPTOMONAS	27	1	--	-	57	2	--	-	*	0
...NEPHROSELMIDIACEAE										
....PROTOCHRYSIS	--	-	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	56	1	--	-	--	-	--	-
....LEPOCINCLIS	--	-	56	1	--	-	--	-	--	-
....TRACHELOMONAS	27	1	56	1	*	0	35	4	55	4
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	27	1	--	-	--	-	--	-	13	1
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	56	1	--	-	--	-	--	-
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	--	-	18	2	--	-

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

PARTICLE-SIZE DISTRIBUTION OF BED MATERIAL

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	BED MAT. FALL DIAM. % FINER THAN .062 MM	BED MAT. FALL DIAM. % FINER THAN .125 MM	BED MAT. FALL DIAM. % FINER THAN .250 MM	BED MAT. FALL DIAM. % FINER THAN .500 MM	BED MAT. FALL DIAM. % FINER THAN 1.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 16.0 MM
MAY 17...	1330	25	32	36	43	60	80	84	90	95	100
JUN 20...	1600	26	4	7	21	74	97	--	--	--	--
JUL 12...	1440	14	4	12	29	74	96	99	100	--	--
AUG 02...	1445	5.1	26	27	32	48	69	71	80	93	100

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	655	636	648	694	678	690	---	---	---	---	---	---
2	652	639	647	694	681	688	---	---	---	979	952	964
3	655	642	649	688	678	682	---	---	---	984	905	940
4	658	642	652	681	671	679	---	---	---	915	889	898
5	652	642	649	688	678	683	---	---	---	915	884	902
6	652	645	649	691	678	686	968	915	940	889	868	880
7	652	645	651	704	688	695	915	905	910	910	873	885
8	658	652	655	707	691	698	910	900	904	910	863	890
9	662	655	657	710	694	706	900	878	889	---	---	---
10	668	662	664	720	710	717	878	868	871	---	---	---
11	678	668	674	741	725	736	878	873	873	820	783	804
12	681	671	677	752	736	744	878	873	876	820	799	810
13	681	668	679	815	752	771	878	868	875	804	783	794
14	710	684	693	794	752	790	868	852	860	---	---	---
15	815	714	758	820	794	810	847	847	847	---	---	---
16	852	820	844	836	815	825	868	847	855	---	---	---
17	847	778	813	847	826	835	852	847	849	773	757	765
18	778	720	748	847	810	825	852	836	846	773	768	771
19	720	707	714	820	799	807	841	826	833	820	773	798
20	707	697	702	820	810	817	841	826	833	783	762	772
21	697	691	694	820	810	814	863	841	851	831	762	789
22	694	694	694	810	804	809	863	857	862	778	752	765
23	697	688	693	815	810	812	878	863	872	799	752	763
24	694	691	694	815	804	808	900	884	893	752	741	744
25	697	694	695	804	789	793	900	894	897	741	731	738
26	707	697	701	799	783	788	894	884	888	725	717	719
27	717	704	710	826	799	812	921	894	905	717	710	715
28	714	701	709	852	826	839	963	921	938	720	710	718
29	704	694	701	878	857	870	---	---	---	720	714	717
30	701	684	695	926	878	898	---	---	---	717	707	714
31	694	681	691	---	---	---	---	---	---	710	707	709
MONTH	852	636	694	926	671	771	968	826	877	984	707	799
		FEBRUARY			MARCH			APRIL			MAY	
1	710	707	710	694	681	686	479	438	462	518	503	513
2	710	704	707	694	681	687	457	442	447	527	503	520
3	704	697	703	694	681	688	468	446	456	540	510	526
4	697	694	696	688	678	684	466	443	453	536	518	529
5	714	697	703	681	668	676	492	432	459	527	507	522
6	704	697	701	681	668	674	496	468	480	558	527	549
7	736	707	731	688	671	680	501	474	485	590	525	567
8	810	720	748	688	675	681	494	468	486	626	561	601
9	752	725	736	684	665	677	---	---	---	613	587	598
10	725	710	716	675	639	662	---	---	---	632	606	618
11	710	701	706	649	616	635	---	---	---	628	580	608
12	704	691	697	629	547	608	446	427	435	618	569	596
13	697	691	693	564	545	553	485	438	448	618	547	586
14	697	691	693	558	547	554	488	455	473	594	555	576
15	707	691	698	571	547	560	512	481	497	604	568	585
16	725	701	713	564	536	553	529	503	520	616	589	602
17	725	710	717	561	538	552	540	523	534	626	609	620
18	714	704	709	561	532	546	543	527	536	640	617	630
19	714	701	706	547	529	538	536	525	531	641	598	620
20	720	704	711	538	523	531	536	521	530	622	586	607
21	725	707	716	547	532	538	525	505	518	616	574	605
22	720	714	717	545	534	540	514	494	505	647	618	636
23	714	704	707	558	545	551	499	470	486	658	568	630
24	704	697	700	554	540	548	499	483	491	632	587	613
25	701	694	696	558	536	548	501	483	492	591	533	572
26	694	688	691	534	527	531	505	481	494	555	523	542
27	688	681	684	536	505	524	507	488	501	547	527	540
28	694	678	687	518	485	504	512	499	506	546	510	536
29	---	---	---	488	463	477	512	490	504	537	521	532
30	---	---	---	463	455	459	507	492	500	557	516	543
31	---	---	---	485	461	475	---	---	---	564	532	542
MONTH	810	678	707	694	455	585	543	427	490	658	503	576

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	564	529	547	532	499	517	554	512	538	598	576	589
2	554	527	542	525	505	515	574	525	555	605	570	578
3	556	538	548	523	512	517	578	548	570	724	614	688
4	554	529	543	518	503	511	589	553	573	689	571	616
5	545	521	535	527	507	517	591	558	575	574	561	569
6	545	525	536	527	521	523	589	566	578	576	568	572
7	538	527	534	521	514	518	587	562	574	584	575	580
8	540	527	534	523	501	511	585	551	572	586	573	582
9	538	527	534	523	507	516	586	541	567	578	569	574
10	532	521	529	521	507	513	566	539	559	584	564	574
11	538	525	530	516	505	510	573	559	567	569	556	563
12	538	523	530	527	507	517	571	562	567	577	512	571
13	538	523	529	529	516	523	570	561	567	587	559	571
14	556	523	541	525	514	520	577	559	571	581	563	572
15	556	543	549	527	505	518	585	566	576	584	564	572
16	551	529	536	521	494	510	572	561	566	582	561	569
17	545	529	536	521	490	509	581	567	574	581	568	574
18	547	523	537	523	499	515	592	575	581	589	550	565
19	554	529	543	540	516	530	599	573	592	573	567	569
20	540	527	534	538	529	533	605	585	595	579	568	575
21	538	521	530	538	523	528	606	561	593	602	580	590
22	536	525	530	536	521	527	607	594	600	590	583	588
23	529	481	514	538	525	531	615	596	611	592	576	588
24	512	477	495	540	523	533	623	597	610	582	547	562
25	523	505	516	543	521	532	620	598	609	555	539	547
26	521	512	516	543	516	529	613	596	607	558	544	550
27	514	490	506	538	521	528	610	591	596	553	511	533
28	529	483	505	536	512	528	595	583	589	517	485	501
29	536	521	528	536	518	528	597	579	589	536	480	489
30	536	518	529	540	527	533	593	580	589	489	481	485
31	---	---	---	549	529	541	593	588	589	---	---	---

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	16.0	13.0	14.5	5.5	2.5	4.0	1.0	1.0	1.0	1.0	1.0	1.0
2	15.0	12.5	14.0	5.5	3.5	4.0	1.0	1.0	1.0	1.0	1.0	1.0
3	16.0	13.0	14.5	3.5	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0
4	16.0	13.0	14.5	2.0	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0
5	12.5	9.0	11.0	2.5	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0
6	9.5	7.0	8.0	2.0	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0
7	8.5	6.5	7.5	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
8	9.5	7.0	8.5	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
9	9.5	7.5	8.5	1.0	1.0	1.0	1.0	1.0	1.0	---	---	---
10	11.5	8.0	10.0	1.0	1.0	1.0	1.0	1.0	1.0	---	---	---
11	13.5	10.0	11.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
12	13.0	10.5	12.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
13	11.5	9.5	11.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	1.0
14	11.0	9.0	10.5	1.5	1.0	1.0	1.0	1.0	1.0	---	---	---
15	9.0	6.0	7.0	1.5	1.0	1.0	1.0	1.0	1.0	---	---	---
16	6.5	5.0	5.5	1.5	1.0	1.0	1.0	1.0	1.0	---	---	---
17	6.0	4.0	5.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
18	5.0	4.5	4.5	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
19	4.5	3.0	4.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
20	5.0	3.5	4.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
21	4.5	3.0	3.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
22	4.0	1.5	2.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
23	3.5	1.5	2.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
24	2.5	1.5	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
25	3.0	1.5	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
26	2.5	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
27	2.5	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
28	4.0	1.0	2.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
29	4.5	1.5	3.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
30	4.5	2.5	3.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
31	4.0	1.5	3.0	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0

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

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0	1.5	20.0	15.0	18.0
2	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0	1.0	19.0	12.5	16.0
3	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0	1.0	21.5	14.0	17.5
4	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0	1.5	21.0	16.5	18.5
5	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0	1.0	22.0	17.0	19.5
6	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0	1.0	18.5	15.0	16.5
7	1.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.5	20.5	12.0	16.0
8	1.0	1.0	1.0	1.0	1.0	1.0	2.5	1.0	1.5	22.5	14.5	18.0
9	1.0	1.0	1.0	1.0	1.0	1.0	3.0	1.0	2.0	23.0	16.0	19.5
10	1.0	1.0	1.0	1.0	1.0	1.0	5.5	1.5	3.0	24.5	17.0	20.5
11	1.0	1.0	1.0	1.0	1.0	1.0	8.0	5.0	6.0	25.0	18.0	21.5
12	1.0	1.0	1.0	1.0	1.0	1.0	6.5	4.0	5.5	27.0	19.0	23.0
13	1.0	1.0	1.0	1.0	1.0	1.0	10.0	3.0	6.5	28.0	21.0	24.5
14	1.0	1.0	1.0	1.0	1.0	1.0	8.0	7.0	7.0	26.5	22.0	24.5
15	1.0	1.0	1.0	1.0	1.0	1.0	10.5	7.0	8.0	26.0	21.5	23.5
16	1.0	1.0	1.0	1.0	1.0	1.0	12.0	8.0	10.0	25.5	19.5	22.5
17	1.0	1.0	1.0	1.0	1.0	1.0	15.0	10.5	12.5	27.0	21.0	24.0
18	1.0	1.0	1.0	1.0	1.0	1.0	14.0	11.0	12.5	28.5	21.5	25.0
19	1.0	1.0	1.0	1.0	1.0	1.0	11.0	9.5	10.5	28.5	23.0	25.5
20	1.0	1.0	1.0	1.0	1.0	1.0	11.0	9.5	10.5	28.0	22.5	25.0
21	1.0	1.0	1.0	1.0	1.0	1.0	13.5	8.5	11.0	24.5	20.0	22.5
22	1.0	1.0	1.0	1.0	1.0	1.0	14.5	10.0	12.0	23.5	19.5	21.0
23	1.0	1.0	1.0	1.0	1.0	1.0	15.5	11.5	13.5	25.0	19.0	22.0
24	1.0	1.0	1.0	1.0	1.0	1.0	15.5	10.5	13.0	28.0	20.0	24.0
25	1.0	1.0	1.0	1.0	1.0	1.0	16.0	10.5	13.0	29.0	23.0	26.0
26	1.0	1.0	1.0	1.0	1.0	1.0	18.0	12.0	15.0	28.0	24.0	25.5
27	1.0	1.0	1.0	1.5	1.0	1.0	17.0	14.0	15.5	26.0	23.0	24.5
28	1.0	1.0	1.0	1.5	1.0	1.0	18.0	12.5	15.0	26.5	22.0	23.5
29	---	---	---	1.5	1.0	1.0	20.0	13.0	16.5	26.5	20.5	23.0
30	---	---	---	1.0	1.0	1.0	22.0	15.5	18.5	25.5	21.0	23.0
31	---	---	---	1.5	1.0	1.0	---	---	---	25.0	19.5	22.0
MONTH	1.0	1.0	1.0	1.5	1.0	1.0	22.0	1.0	8.0	29.0	12.0	22.0
		JUNE			JULY			AUGUST			SEPTEMBER	
1	24.5	19.5	22.0	26.0	18.0	22.0	25.0	18.5	21.5	18.5	16.5	17.0
2	25.5	18.5	22.0	27.5	20.5	24.0	25.5	19.0	22.5	19.0	15.5	16.5
3	23.0	20.0	21.0	30.0	24.0	27.0	26.0	20.5	23.0	19.5	15.5	17.5
4	25.0	18.0	22.0	27.5	24.0	26.0	25.5	20.0	22.5	18.5	18.0	18.5
5	27.5	21.0	24.0	30.0	24.5	27.0	23.5	19.0	21.0	20.0	16.5	18.0
6	26.5	19.5	23.5	31.5	26.0	28.5	21.0	18.0	19.0	19.0	18.0	18.5
7	28.0	21.0	24.5	29.0	24.5	27.0	23.0	17.0	19.5	19.0	16.5	17.5
8	27.0	21.0	24.0	26.0	22.5	24.5	24.5	17.5	21.0	21.0	17.0	18.5
9	23.5	19.5	21.0	27.0	20.0	23.5	26.0	20.0	23.0	19.5	17.0	18.0
10	23.5	17.5	20.5	28.0	21.5	24.5	23.5	19.5	21.5	18.5	14.5	16.5
11	25.0	20.5	22.5	26.0	22.5	24.0	23.5	17.5	20.5	20.5	15.5	17.5
12	25.5	20.5	23.0	28.0	21.0	24.0	22.0	19.0	20.5	18.0	15.5	17.0
13	25.5	20.5	23.0	27.5	22.5	25.0	22.0	17.0	19.5	20.0	16.0	17.5
14	26.0	21.0	23.5	28.5	24.5	26.0	22.5	17.5	20.0	20.5	15.5	17.5
15	27.0	22.0	24.5	28.0	22.0	25.0	21.5	18.5	19.5	21.0	17.0	18.5
16	28.0	23.0	25.5	30.5	23.5	27.0	21.0	17.5	19.0	20.5	16.5	18.5
17	25.0	22.5	23.5	33.0	26.5	29.5	20.5	16.0	18.5	20.5	19.0	19.5
18	25.5	19.5	22.5	32.5	27.5	30.0	22.5	16.0	19.5	18.5	16.0	17.0
19	24.0	20.0	22.0	33.0	28.5	30.5	23.5	18.0	21.0	16.0	15.0	15.5
20	25.5	19.5	22.0	29.5	26.0	27.5	23.5	19.5	21.5	16.0	14.5	15.0
21	25.0	20.5	23.0	29.5	22.5	26.0	23.5	19.5	21.5	16.0	14.0	15.0
22	23.0	21.0	21.5	30.0	23.0	26.5	22.5	19.5	21.0	15.0	15.0	15.0
23	28.0	20.5	24.0	30.5	25.0	27.5	21.0	17.5	18.5	15.0	14.5	15.0
24	29.0	22.5	26.0	30.0	25.5	27.5	20.0	16.0	18.0	16.5	14.5	15.5
25	29.0	22.0	25.5	29.0	22.5	25.5	19.5	17.0	18.0	16.0	14.5	15.0
26	30.5	24.5	27.5	28.0	22.0	24.5	20.5	18.0	19.0	14.5	14.0	14.0
27	29.5	24.5	26.5	25.0	22.0	23.5	20.0	18.5	19.0	16.5	13.0	14.5
28	26.5	22.5	24.5	29.0	21.5	25.0	21.5	18.0	19.5	14.5	13.5	14.0
29	26.0	21.0	23.5	29.0	22.5	25.5	22.0	17.0	19.5	15.0	12.5	13.5
30	24.5	20.5	22.5	28.0	22.5	25.0	23.0	19.0	20.5	14.5	12.5	13.5
31	---	---	---	24.0	20.5	22.5	21.0	19.0	19.5	---	---	---
MONTH	30.5	17.5	23.5	33.0	18.0	26.0	26.0	16.0	20.5	21.0	12.5	16.5

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

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

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	19	.33	31	1.3	39	.95	40	.79	42	1.2	38	1.5
2	15	.21	36	1.4	39	.94	40	.79	42	1.2	38	1.5
3	10	.13	29	1.1	39	.92	40	.80	42	1.2	38	1.5
4	12	.15	15	.57	39	.91	40	.80	42	1.2	37	1.5
5	16	.19	12	.39	39	.88	40	.80	42	1.4	37	1.5
6	18	.23	16	.56	39	.87	40	.81	42	1.4	37	1.6
7	21	.30	18	.58	39	.86	40	.81	42	1.4	37	1.6
8	13	.22	21	.79	39	.85	41	.84	42	1.4	35	1.6
9	18	.34	23	.87	39	.84	41	.84	42	1.4	34	1.7
10	24	1.3	26	.98	39	.82	41	.84	41	1.3	32	1.6
11	22	.95	28	1.1	39	.81	41	.85	41	1.3	31	1.6
12	17	.55	31	1.2	39	.79	41	.86	41	1.3	30	1.6
13	18	.47	33	1.2	39	.78	41	.86	41	1.3	28	1.6
14	23	.55	35	1.2	39	.78	41	.87	41	1.4	27	1.6
15	34	.92	38	1.3	39	.78	41	.89	40	1.4	24	1.6
16	34	1.0	38	1.3	39	.77	41	.90	40	1.4	14	.94
17	14	.38	38	1.3	40	.79	41	.91	40	1.4	18	1.3
18	16	.48	38	1.2	40	.79	41	.93	40	1.4	23	1.7
19	18	.58	38	1.2	40	.79	41	.94	40	1.4	16	1.2
20	18	.78	38	1.2	40	.79	41	.95	40	1.4	15	1.2
21	22	.83	38	1.1	40	.78	41	.97	39	1.4	19	1.5
22	28	.98	38	1.1	40	.78	41	.99	39	1.5	25	2.0
23	28	.98	38	1.1	40	.78	41	1.0	39	1.5	29	2.4
24	24	.84	38	1.0	40	.78	41	1.0	39	1.5	30	2.6
25	27	.95	38	1.0	40	.78	41	1.0	39	1.5	23	2.2
26	18	.63	38	1.0	40	.78	41	1.1	38	1.4	11	1.3
27	15	.42	38	1.0	40	.78	41	1.1	38	1.4	18	2.7
28	47	1.8	39	1.0	40	.78	41	1.1	38	1.4	22	3.7
29	52	2.0	39	.99	40	.78	42	1.1	---	---	41	6.9
30	31	1.2	39	.97	40	.78	42	1.1	---	---	63	11
31	28	1.1	---	---	40	.79	42	1.1	---	---	40	6.9
TOTAL	---	21.79	---	31.00	---	25.30	---	28.64	---	38.4	---	73.14
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	82	14	18	2.8	38	3.9	37	1.8	24	.33	17	1.1
2	34	5.9	32	4.1	28	2.7	40	2.1	20	.26	9	.49
3	34	5.8	35	4.2	18	1.6	40	1.8	22	.39	9	.44
4	38	6.6	35	3.8	16	1.6	38	1.6	20	.29	12	.65
5	39	6.8	39	4.2	17	1.6	35	1.5	20	.24	17	.78
6	23	4.2	47	5.7	32	2.6	38	1.6	19	.22	16	.73
7	20	3.9	42	4.4	33	2.7	30	1.3	14	.17	19	.77
8	23	5.1	47	6.1	31	2.6	30	1.2	16	.21	17	.69
9	41	13	40	4.6	33	2.5	22	.83	18	.23	18	.78
10	51	18	33	3.2	33	2.4	18	.68	18	.24	19	.72
11	22	7.4	48	3.9	26	1.7	22	.83	20	.23	18	.68
12	29	8.1	36	2.5	26	1.5	29	1.1	19	.21	15	.49
13	47	9.8	36	2.3	21	1.1	31	1.4	18	.20	15	.53
14	38	7.1	31	2.0	20	1.1	31	1.3	16	.17	14	.45
15	33	4.6	24	1.9	24	1.8	31	1.3	18	.19	12	.39
16	37	5.1	32	2.4	26	2.0	42	1.8	20	.25	12	.39
17	53	10	47	3.3	27	1.9	51	2.1	22	.27	15	.45
18	57	17	51	3.9	28	2.0	51	2.2	21	.24	16	.60
19	56	17	39	2.6	36	2.5	31	1.2	24	.26	15	.77
20	66	24	37	2.2	35	2.4	29	.94	25	.31	11	.62
21	64	24	48	2.7	39	2.6	35	1.0	24	.31	14	.68
22	49	18	60	3.7	46	2.9	35	.94	22	.29	16	1.3
23	33	11	66	4.1	54	3.6	27	.68	21	.26	14	1.1
24	27	8.7	41	2.4	64	4.1	30	.70	22	.29	12	1.3
25	25	7.3	31	1.9	67	3.8	22	.43	21	.28	16	1.9
26	25	6.5	32	1.9	52	2.8	23	.42	21	.31	25	3.2
27	23	4.8	35	1.9	44	2.4	47	.85	18	.33	33	4.7
28	21	4.6	33	2.0	41	2.4	57	1.0	16	.34	32	5.2
29	25	5.3	28	1.7	45	2.6	51	.88	18	.45	37	6.6
30	21	4.0	38	2.2	40	2.1	37	.59	21	.54	32	4.7
31	---	---	47	4.4	---	---	29	.41	23	1.4	---	---
TOTAL	---	287.6	---	99.0	---	71.5	---	36.48	---	9.71	---	43.20

TOTAL LOAD FOR YEAR: 765.76 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 (255.03 m) above mean sea level (levels by Corps of Engineers).

REMARKS.--Records good 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.--33 years, 256 ft^3/s (7.250 m^3/s), 185,500 acre-ft/yr (229 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,300 ft^3/s (235 m^3/s) Apr. 15, 1969, gage height, 31.42 ft (9.577 m); maximum gage height, 32.05 ft (9.769 m) July 9, 1975 (backwater from Red River of the North); no flow some days in 1948-49.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 245 ft^3/s (6.94 m^3/s) Apr. 11, gage height, 5.55 ft (1.692 m), from graph based on gage readings; maximum gage height, 6.74 ft (2.054 m) Mar. 29 (backwater from ice); minimum daily discharge, 0.05 ft^3/s (0.001 m^3/s) Oct. 1; minimum gage height, 0.60 ft (0.183 m) Aug. 22-26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.05	15	3.7	.11	.10	.50	170	98	80	21	2.6	4.0
2	2.8	18	3.4	.11	.11	.55	180	87	76	21	2.5	5.8
3	3.2	17	3.1	.10	.11	.60	190	70	76	21	1.7	11
4	2.4	17	2.8	.10	.11	.65	190	65	78	20	.94	21
5	1.7	16	2.5	.09	.11	.70	202	70	67	20	1.3	28
6	1.6	16	2.1	.09	.12	.80	200	80	58	19	1.0	24
7	1.5	14	1.9	.09	.12	.90	190	92	51	19	.68	17
8	1.4	13	1.7	.09	.13	.99	172	79	41	18	.50	14
9	1.3	11	1.5	.08	.14	1.1	206	64	35	16	.35	14
10	1.2	10	1.3	.08	.14	1.2	239	64	33	15	.25	15
11	1.0	10	1.2	.08	.15	1.4	242	57	33	14	.20	14
12	.68	10	1.1	.08	.16	1.7	227	50	29	14	.50	13
13	20	11	.99	.08	.17	2.1	176	45	25	13	.32	12
14	22	11	.90	.09	.18	2.7	180	40	22	14	.24	8.8
15	12	11	.75	.09	.19	3.4	155	39	27	15	.26	6.8
16	9.9	10	.65	.09	.20	5.0	130	50	30	15	.20	7.5
17	7.0	10	.55	.09	.22	8.0	107	62	29	15	.30	10
18	5.6	10	.45	.09	.23	13	99	52	29	14	.26	20
19	7.0	9.6	.40	.09	.25	12	138	44	29	13	.14	30
20	11	9.0	.35	.09	.27	11	178	40	26	13	.12	23
21	11	8.5	.30	.09	.29	10	180	36	26	11	.09	19
22	12	8.0	.26	.09	.31	9.3	190	36	26	9.0	.06	22
23	12	7.4	.23	.09	.33	8.7	178	34	25	8.0	.06	27
24	11	6.8	.20	.09	.35	8.3	164	52	24	7.0	.06	36
25	11	6.2	.19	.09	.37	13	150	46	24	6.0	.06	52
26	11	5.8	.17	.10	.40	25	142	42	24	5.4	.06	55
27	11	5.3	.16	.10	.43	50	136	40	20	4.6	.08	62
28	9.9	4.9	.15	.10	.45	100	111	40	16	4.0	1.0	64
29	11	4.5	.14	.10	---	220	99	39	21	3.5	10	68
30	12	4.0	.13	.10	---	200	100	36	21	3.0	4.8	70
31	13	---	.12	.10	---	180	---	87	---	2.7	2.6	---
TOTAL	238.23	310.0	33.39	2.86	6.14	892.59	5021	1740	1101	394.2	33.23	704.3
MEAN	7.68	10.3	1.08	.092	.22	28.8	167	56.1	36.7	12.7	1.07	25.5
MAX	22	18	3.7	.11	.45	220	242	98	80	21	10	70
MIN	.05	4.0	.12	.08	.10	.50	99	34	16	2.7	.06	4.0
AC-FT	473	615	66	5.7	12	1770	9960	3450	2180	782	66	1520

CAL YR 1976	TOTAL	54199.67	MEAN	148	MAX	2080	MIN	.05	AC-FT	107500
WTR YR 1977	TOTAL	10537.54	MEAN	28.9	MAX	242	MIN	.05	AC-FT	20900

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 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
OCT									
05...	1630	1.6	790	8.3	8.0	9.0	4	7.8	70
13...	0845	15	790	8.0	1.0	7.5	6	5.2	44
19...	1500	6.3	530	8.0	3.0	3.0	5	9.5	73
29...	1000	10	775	8.3	-.5	1.0	4	11.2	82
NOV									
15...	1510	10	900	8.3	10.0	1.0	4	13.2	96
DEC									
13...	1600	.99	1300	8.1	-3.0	.0	6	5.3	38
JAN									
05...	1200	.09	1810	7.7	--	.0	5	--	--
FEB									
08...	1030	.13	1900	7.5	12.0	.0	30	1.0	7
MAR									
08...	0930	.99	2150	7.4	3.5	.0	15	.8	6
28...	1530	150	420	7.2	14.0	1.0	20	12.5	91
APR									
05...	1530	203	460	8.2	--	.5	35	--	--
12...	1415	223	430	8.3	14.0	4.0	40	11.5	91
19...	1100	135	550	8.6	--	--	25	--	--
27...	0800	140	535	8.4	14.0	14.0	20	9.8	84
MAY									
04...	--	65	570	8.3	18.0	16.0	10	8.0	83
10...	1245	65	625	8.5	--	18.5	4	--	--
18...	0900	53	610	8.2	24.0	21.0	8	5.6	64
25...	0700	48	590	8.4	18.5	22.0	10	5.4	64
31...	1545	105	540	8.3	23.0	21.0	30	6.9	79
JUN									
07...	1600	51	540	8.3	34.0	23.0	10	6.8	80
14...	1415	24	580	8.5	21.0	21.5	6	7.9	92
21...	0800	25	560	8.5	23.0	21.5	8	8.2	94
29...	0930	20	580	8.4	22.5	20.0	9	8.2	92
JUL									
05...	1545	17	540	8.0	32.0	24.5	8	5.2	63
12...	1300	--	550	8.6	--	24.0	10	7.5	90
20...	--	12	492	8.8	18.5	26.0	10	5.4	0
26...	1550	5.4	520	8.2	28.0	24.5	9	6.2	--
AUG									
02...	0830	2.5	552	8.2	16.5	21.0	20	6.0	67
SEP									
13...	1230	12	540	8.4	20.0	16.5	7	9.7	0

05064000 WILD RICE RIVER AT HENDRUM, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	BIO-CHEMICAL OXYGEN DEMAND 5 DAY (MG/L) (00310)	DISSOLVED CHLORIDE (CL) (MG/L) (00940)	TOTAL NITRATE (N) (MG/L) (00620)	TOTAL NITRITE (N) (MG/L) (00615)	TOTAL AMMONIA NITROGEN (N) (MG/L) (00610)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED PHOSPHORUS (P) (MG/L) (00666)
OCT								
05...	6.5	6.7	.00	.00	.00	.80	.06	.04
13...	6.6	8.8	.00	.00	.00	1.2	.16	.08
19...	6.1	7.0	.00	.00	.01	.65	.07	.03
29...	9.0	7.3	.00	.00	.01	.55	.03	.01
NOV								
15...	1.8	8.9	.10	.01	.00	.48	.03	.00
DEC								
13...	3.2	11	.01	.00	.03	.80	.04	.01
JAN								
05...	5.7	14	.03	.00	.00	.82	.07	.06
FEB								
08...	17	21	.00	.00	.29	.92	.25	.15
MAR								
08...	>27	15	.01	.00	2.7	2.9	.31	.31
28...	11	5.0	.43	.04	.17	.90	.20	.12
APR								
05...	8.8	5.1	.27	.01	.18	.86	.12	.08
12...	--	4.1	.22	.00	.23	.67	.10	.03
19...	15	4.7	.07	.01	.03	.47	.01	.00
27...	6.4	5.1	.00	.01	.00	.85	.10	.01
MAY								
04...	2.8	2.5	.01	.00	.00	.99	.06	.02
10...	2.7	5.5	.01	.00	.01	.65	.03	.02
18...	7.6	5.4	.00	.01	.08	.27	.08	.03
25...	--	6.0	.02	.00	.03	.10	.09	.04
31...	9.0	11	.09	.03	.12	.90	.13	.10
JUN								
07...	3.9	4.4	.02	.01	.04	.42	.08	.06
14...	8.2	4.9	.02	.01	.03	.52	.06	.03
21...	13	4.0	.01	.00	.03	.34	.04	.03
29...	20	4.2	.02	.01	.04	.54	.06	.03
JUL								
05...	--	4.1	.04	.01	.14	.64	.08	.05
12...	22	4.6	.00	.02	.05	.54	.07	.04
20...	28	4.2	.04	.01	.07	.44	.05	.04
26...	4.9	4.7	.03	.00	.01	.79	.08	.08
AUG								
02...	6.2	4.9	.03	.02	.04	.94	.09	.05
SEP								
13...	6.8	6.3	.02	.01	.01	.36	.03	.02

05064000 WILD RICE RIVER AT HENDRUM, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	TEMPERATURE (DEG C) (00010)	PH (UNITS) (00400)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
NOV					
16...	0900	.0	8.7	13.4	94
16...	1100	.0	7.3	11.2	79
16...	1300	.0	7.9	11.0	77
16...	1500	.0	8.4	10.8	76
16...	1700	.0	7.3	11.2	79
16...	1900	.0	7.9	11.4	80
16...	2100	.0	8.1	11.2	79
16...	2300	.0	8.1	10.9	77
17...	0100	.0	8.1	10.6	75
17...	0300	.0	8.1	10.4	73
17...	0500	.0	8.2	10.4	73
17...	0700	.0	8.1	10.3	72
17...	0900	.0	8.0	10.4	73
FEB					
08...	1030	.0	7.5	1.0	7
08...	1500	.0	7.6	.8	0
08...	1700	.0	7.6	.9	0
08...	1900	.0	7.7	1.0	0
08...	2100	.0	7.6	1.1	0
08...	2300	.0	7.4	1.0	0
09...	0100	.0	7.6	1.1	0
09...	0300	.0	7.3	1.1	0
09...	0500	.0	7.4	1.2	0
09...	0700	.0	7.4	1.1	0
09...	0900	.0	7.7	1.2	0
09...	1100	.0	7.7	1.2	0
09...	1300	.0	7.5	1.1	0

DATE	TIME	TEMPERATURE (DEG C) (00010)	PH (UNITS) (00400)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
JUN					
07...	1200	22.0	8.2	7.1	83
07...	1400	23.0	8.6	6.9	81
07...	1500	23.0	8.6	7.1	84
07...	1600	23.0	8.3	6.8	80
07...	1800	24.0	8.4	6.7	81
07...	2000	24.0	8.5	6.9	83
07...	2200	23.0	8.2	6.6	78
07...	2400	23.0	8.8	6.4	75
08...	0200	23.0	8.9	6.4	75
08...	0400	22.0	8.8	6.3	73
08...	0600	21.0	8.7	6.2	70
08...	0800	21.0	8.5	7.6	86
08...	1000	21.0	8.3	6.4	73
JUL					
26...	1500	24.5	8.2	6.2	76
26...	1550	24.5	8.2	6.2	76
26...	1700	24.0	8.2	6.2	75
26...	1900	24.0	8.2	6.3	77
26...	2100	23.5	8.2	6.4	76
26...	2300	23.0	8.6	5.6	66
27...	0100	22.0	8.2	5.9	67
27...	0300	22.0	8.0	6.0	70
27...	0500	21.5	8.0	5.5	63
27...	0700	20.5	8.2	6.3	71
27...	0900	20.0	8.2	5.4	60
27...	1100	20.5	8.0	5.3	60
27...	1300	21.0	8.1	6.0	68

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) above mean sea level. 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.--16 years, 1,783 ft^3/s (50.49 m^3/s), 1,292,000 acre-ft/yr (1.59 km^3/yr); median of yearly mean discharges, 1,640 ft^3/s (46.4 m^3/s), 1,190,000 acre-ft/yr (1.5 km^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 39,900 ft^3/s (1,130 m^3/s) July 10, 1975, gage height, 38.55 ft (11.750 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, 2,050 ft^3/s (58.1 m^3/s) May 7, gage height, 7.50 ft (2.286 m); minimum daily, 24 ft^3/s (0.680 m^3/s) Oct. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	107	60	40	45	60	890	370	424	453	94	109
2	30	105	60	40	45	60	940	330	496	431	90	110
3	32	114	60	40	45	65	960	290	440	357	88	110
4	38	123	60	40	45	65	1000	250	405	288	78	115
5	40	127	58	40	43	70	1240	216	370	249	62	120
6	42	113	55	35	40	70	1280	904	383	578	56	120
7	37	113	55	35	40	75	1210	1980	444	708	54	125
8	25	111	55	35	38	80	890	1520	392	532	52	130
9	24	107	55	35	35	80	798	973	308	396	46	130
10	40	105	55	30	35	85	875	652	263	302	46	135
11	48	100	55	30	35	95	890	677	209	242	44	140
12	52	100	55	25	40	145	819	610	183	204	40	140
13	46	100	55	25	40	145	705	550	163	212	37	150
14	78	95	55	25	45	180	607	500	138	212	37	174
15	78	95	52	25	45	230	572	440	132	183	40	170
16	54	90	52	25	50	270	535	390	132	188	37	156
17	38	90	50	25	50	300	509	345	116	180	34	148
18	28	85	50	25	50	340	460	305	114	224	34	163
19	28	85	50	25	50	310	437	280	111	266	58	176
20	50	85	45	25	50	300	568	255	107	214	58	200
21	62	85	45	25	50	340	691	236	105	183	40	226
22	78	80	45	25	50	410	691	221	114	165	34	202
23	90	80	45	25	50	490	694	180	152	144	32	192
24	94	75	45	25	50	560	694	156	204	118	31	260
25	96	75	45	30	50	580	635	167	212	115	42	305
26	102	70	45	35	55	610	555	185	207	112	60	402
27	113	70	45	35	55	650	506	180	192	109	74	548
28	104	65	45	40	60	770	486	165	169	106	86	572
29	107	60	45	40	---	930	447	158	195	103	105	555
30	109	60	45	45	---	980	415	169	367	100	132	558
31	113	---	45	45	---	910	---	266	---	97	125	---
TOTAL	1907	2770	1587	995	1286	10255	21999	13920	7247	7771	1846	6641
MEAN	61.5	92.3	51.2	32.1	45.9	331	733	449	242	251	59.5	221
MAX	113	127	60	45	60	980	1280	1980	496	708	132	572
MIN	24	60	45	25	35	60	415	156	105	97	31	109
AC-FT	3780	5490	3150	1970	2550	20340	43640	27610	14370	15410	3660	13170

CAL YR 1976 TOTAL 294150 MEAN 804 MAX 9850 MIN 10 AC-FT 583400
WTR YR 1977 TOTAL 78224 MEAN 214 MAX 1980 MIN 24 AC-FT 155200

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

WATER-QUALITY RECORDS

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

REMARKS.--Some chemical data furnished by North Dakota State Water Commission.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE (DEG C) (00010)	SUSPENDED SEDIMENT (MG/L) (80154)	SUSPENDED SEDIMENT DISCHARGE (T/DAY) (80155)	SUS. SED. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT								
12...	1445	47	1350	--	12.0	91	12	96
NOV								
08...	1450	116	1000	--	.5	20	6.3	98
DEC								
06...	1400	58	1300	8.4	.0	6	.94	--
JAN								
12...	1345	23	1650	--	.0	6	.37	--
FEB								
01...	1535	46	1210	--	.0	--	--	--
10...	1430	34	1120	7.5	.0	7	.64	--
MAR								
08...	1450	74	1000	--	.5	24	4.8	--
18...	1305	347	890	--	.5	--	--	--
28...	1400	773	680	--	.5	--	--	--
APR								
08...	1245	873	610	8.9	3.5	170	401	--
12...	1440	799	540	--	8.0	E141	--	--
MAY								
10...	1520	620	600	8.0	22.0	280	469	--
JUN								
02...	1600	512	760	8.8	22.5	74	102	--
JUL								
01...	1130	460	700	8.3	21.0	46	57	--
07...	1045	--	--	--	--	131	--	--
AUG								
03...	1500	89	850	8.3	24.0	--	--	--
29...	1335	105	755	--	20.5	62	18	--
30...	1500	--	--	--	--	44	--	--

DATE	TIME	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)
APR										
08...	1245	260	85	60	27	27	18	.7	5.4	176

DATE	DISSOLVED SULFATE (SO4) (MG/L) (00945)	DISSOLVED CHLORIDE (CL) (MG/L) (00940)	DISSOLVED FLUORIDE (F) (MG/L) (00950)	DISSOLVED SILICA (SIO2) (MG/L) (00955)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DISSOLVED SOLIDS (TONS PER DAY) (70302)	DISSOLVED BORON (B) (UG/L) (01020)	DISSOLVED IRON (FE) (UG/L) (01046)	DISSOLVED MANGANESE (MN) (UG/L) (01056)
APR										
08...	130	16	.1	3.8	405	375	955	0	80	40

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

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT

DATE	TIME	SUS. SED. FALL DIAM. % FINER THAN .004 MM (70338)	SUS. SED. FALL DIAM. % FINER THAN .016 MM (70340)	SUS. SED. FALL DIAM. % FINER THAN .062 MM (70342)	SUS. SED. FALL DIAM. % FINER THAN .125 MM (70343)	SUS. SED. FALL DIAM. % FINER THAN .250 MM (70344)	SUS. SED. FALL DIAM. % FINER THAN .500 MM (70345)	SUS. SED. FALL DIAM. % FINER THAN 1.00 MM (70346)
APR								
12...	1440	65	77	83	84	86	91	97

PARTICLE-SIZE DISTRIBUTION OF BED MATERIAL

DATE	TIME	BED MAT. SIEVE DIAM. % FINER THAN .062 MM (80164)	BED MAT. SIEVE DIAM. % FINER THAN .125 MM (80165)	BED MAT. SIEVE DIAM. % FINER THAN .250 MM (80166)	BED MAT. SIEVE DIAM. % FINER THAN .500 MM (80167)	BED MAT. SIEVE DIAM. % FINER THAN 1.00 MM (80168)	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM (80169)	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM (80170)	BED MAT. SIEVE DIAM. % FINER THAN 16.0 MM (80172)	BED MAT. SIEVE DIAM. % FINER THAN 32.0 MM (80173)
APR										
08...	1245	41	43	45	57	69	72	82	100	--
12...	1440	13	16	22	42	69	76	87	96	100
JUL										
07...	1045	52	53	55	62	69	70	76	91	100

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) above mean sea level (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.--33 years, 69.6 ft^3/s (1.971 m^3/s), 50,430 acre-ft/yr (62.2 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,660 ft^3/s (132 m^3/s) May 11, 1950, gage height, 21.96 ft (6.693 m), from floodmark, present datum; no flow for many days most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 42 ft^3/s (1.19 m^3/s) Apr. 10, gage height, 4.13 ft (1.259 m), from highwater mark; no flow during most of the year.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	10	.10	7.7	.00	.00	.00
2	.00	.00	.00	.00	.00	.00	18	.10	2.2	.00	.00	.00
3	.00	.00	.00	.00	.00	.00	34	.04	.50	.00	.00	.00
4	.00	.00	.00	.00	.00	.00	27	.02	2.3	.00	.00	.00
5	.00	.00	.00	.00	.00	.00	23	.04	2.1	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	15	.02	1.2	.00	.00	.00
7	.00	.00	.00	.00	.00	.00	14	.02	.34	.00	.00	.00
8	.00	.00	.00	.00	.00	.00	15	.01	.42	.00	.00	.00
9	.00	.00	.00	.00	.00	.00	16	.04	.04	.00	.00	.00
10	.00	.00	.00	.00	.00	.00	31	.04	.02	.00	.00	.00
11	.00	.00	.00	.00	.00	.00	28	.01	.01	.00	.00	.00
12	.00	.00	.00	.00	.00	.00	20	.02	.02	.00	.00	.00
13	.00	.00	.00	.00	.00	.00	15	.00	.02	.00	.00	.00
14	.00	.00	.00	.00	.00	.02	9.8	.00	.02	.00	.00	.00
15	.00	.00	.00	.00	.00	.05	7.0	1.1	.01	.00	.00	.00
16	.00	.00	.00	.00	.00	.10	4.9	.50	.02	.00	.00	.00
17	.00	.00	.00	.00	.00	.20	4.7	.22	.01	.00	.00	.00
18	.00	.00	.00	.00	.00	.34	3.1	.01	.01	.00	.00	.00
19	.00	.00	.00	.00	.00	.90	2.5	.00	.01	.00	.00	.00
20	.00	.00	.00	.00	.00	.90	2.0	.00	.00	.00	.00	.00
21	.00	.00	.00	.00	.00	1.0	1.7	.00	.01	.00	.00	.00
22	.00	.00	.00	.00	.00	.82	1.2	.00	.00	.00	.00	.00
23	.00	.00	.00	.00	.00	.82	.90	.00	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	.66	.50	.00	.00	.00	.00	.00
25	.00	.00	.00	.00	.00	1.4	.50	.00	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	1.4	.50	.00	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	4.5	.34	.00	.00	.00	.00	.00
28	.00	.00	.00	.00	.00	3.5	.34	.34	.00	.00	.00	.04
29	.00	.00	.00	.00	---	17	.22	.50	.00	.00	.00	.04
30	.00	.00	.00	.00	---	32	.16	12	.00	.00	.00	.04
31	.00	---	.00	.00	---	21	---	27	---	.00	.00	---
TOTAL	.00	.00	.00	.00	.00	86.61	306.36	42.13	16.96	.00	.00	.12
MEAN	.000	.000	.000	.000	.000	2.79	10.2	1.36	.57	.000	.000	.004
MAX	.00	.00	.00	.00	.00	32	34	27	7.7	.00	.00	.04
MIN	.00	.00	.00	.00	.00	.00	.16	.00	.00	.00	.00	.00
AC-FT	.00	.00	.00	.00	.00	172	608	84	34	.00	.00	.2

CAL YR 1976 TOTAL 4439.98 MEAN 12.1 MAX 774 MIN .00 AC-FT 8810
WTR YR 1977 TOTAL 452.18 MEAN 1.24 MAX 34 MIN .00 AC-FT 897

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 Climsx 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 ourrent 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) above mean sea level (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.--Reoords poor.

AVERAGE DISCHARGE.--31 years (water years 1947-77), 69.4 ft^3/s (1.965 m^3/s), 50,280 acre-ft/yr (62.0 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, 28.32 ft (8.632 m) Apr. 17, 1969, 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, 298 ft^3/s (8.44 m^3/s) May 31; maximum gage height, 8.36 ft (2.548 m) Apr. 9, from floodmark (backwater from ice); minimum daily discharge, 5.1 ft^3/s (0.14 m^3/s) Aug. 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.7	10	9.8	8.0	8.0	8.4	39	18	176	12	9.1	11
2	7.7	9.9	9.8	8.0	8.0	8.4	38	21	120	12	7.6	9.6
3	7.7	7.9	9.7	7.9	8.0	8.4	47	20	109	12	7.1	7.1
4	7.7	6.2	9.6	7.9	8.0	8.5	51	17	102	12	5.8	8.6
5	7.7	8.1	9.6	7.9	8.0	8.5	43	22	77	11	5.4	10
6	7.9	11	9.5	7.9	8.0	8.5	38	26	56	12	5.4	11
7	7.9	10	9.4	7.8	8.0	8.5	34	28	52	13	5.1	13
8	8.0	10	9.4	7.8	8.1	8.6	65	28	46	12	5.4	13
9	8.0	12	9.3	7.8	8.1	8.6	138	27	43	12	5.4	12
10	8.0	11	9.2	7.8	8.1	8.6	140	26	37	12	5.4	9.1
11	8.0	11	9.2	7.8	8.1	8.6	123	22	27	13	5.4	8.1
12	8.0	11	9.1	7.8	8.1	8.6	100	21	26	13	5.8	8.1
13	8.2	11	9.1	7.8	8.2	8.7	77	21	26	13	5.4	7.6
14	8.6	11	9.0	7.8	8.2	8.7	67	21	26	15	5.4	7.1
15	9.4	11	9.0	7.8	8.2	8.7	57	20	26	14	5.4	7.1
16	9.9	11	8.9	7.8	8.2	8.7	51	19	26	12	6.2	7.1
17	10	11	8.8	7.8	8.2	8.7	44	17	26	11	6.6	7.1
18	11	11	8.8	7.8	8.2	8.8	38	17	27	10	6.6	12
19	11	11	8.7	7.8	8.2	8.8	39	15	22	9.5	7.6	17
20	12	11	8.7	7.8	8.3	9.0	36	14	22	8.5	7.6	22
21	12	11	8.6	7.8	8.3	10	33	13	20	8.4	7.3	23
22	11	10	8.6	7.8	8.3	15	33	14	18	8.3	7.1	23
23	9.5	10	8.5	7.8	8.3	21	33	15	15	8.2	7.1	24
24	10	10	8.4	7.9	8.3	28	31	15	15	8.3	7.0	25
25	11	10	8.4	7.9	8.4	38	28	15	13	8.5	7.0	28
26	11	10	8.3	7.9	8.4	54	27	17	13	8.7	7.4	27
27	12	10	8.3	7.9	8.4	53	27	18	13	9.1	8.1	27
28	11	10	8.2	7.9	8.4	52	26	20	13	9.1	9.0	27
29	11	10	8.2	8.0	---	50	24	89	13	11	10	27
30	10	9.9	8.1	8.0	---	48	22	194	12	11	11	22
31	9.4	---	8.1	8.0	---	45	---	182	---	9.1	11	---
TOTAL	292.3	307.0	276.3	243.7	229.0	586.3	1549	1012	1217	338.7	215.7	460.6
MEAN	9.43	10.2	8.91	7.86	8.18	18.9	51.6	32.6	40.6	10.9	6.96	15.4
MAX	12	12	9.8	8.0	8.4	54	140	194	176	15	11	28
MIN	7.7	6.2	8.1	7.8	8.0	8.4	22	13	12	8.2	5.1	7.1
AC-FT	580	609	548	483	454	1160	3070	2010	2410	672	428	914

CAL YR 1976 TOTAL 17345.9 MEAN 47.4 MAX 1340 MIN 6.2 AC-FT 34410
WTR YR 1977 TOTAL 6727.6 MEAN 18.4 MAX 194 MIN 5.1 AC-FT 13340

NOTE.--No gage-height record Oct. 1 to Mar. 19 and May 31.

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 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) above mean sea level, 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 5.21 ft (1.588 m) May 19; maximum daily, 4.68 ft (1.426 m) Sept. 24; minimum 2.98 ft (0.908 m) Sept. 9; minimum daily, 3.60 ft (1.097 m) Sept. 9.

MONTHEND GAGE HEIGHT, IN FEET, OCTOBER 1976 TO SEPTEMBER 1977

Oct. 31 ..... 4.11	Feb. 28 ..... 4.14	June 30 ..... 4.10
Nov. 30 ..... 4.01	Mar. 31 ..... 4.26	July 31 ..... 4.07
Dec. 26 ..... 4.02	Apr. 30 ..... 4.25	Aug. 31 ..... 4.15
Jan. 31 ..... 4.06	May 31 ..... 4.62	Sept.30 ..... 4.67

NOTE.--Mean daily gage heights are available.

05074500 RED LAKE RIVER NEAR RED LAKE, MN

LOCATION.--Lat 47°57'27", long 95°16'35", in SW 1/4 NW 1/4 sec.28, T.152 N., R.36 W., Clearwater County, Hydrologic Unit 09020302, 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) above mean sea level, 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 poor. Flow completely regulated by outlet dam on Lower Red Lake.

AVERAGE DISCHARGE.--44 years, 486 ft^3/s (13.76 m^3/s), 352,100 acre-ft/yr (434 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, 252 ft^3/s (7.14 m^3/s) Oct. 1, gage height, 3.30 ft (1.006 m); maximum gage height, 3.32 ft (1.012 m) Oct. 4, affected by seiches and backwater from aquatic vegetation; maximum daily discharge, 245 ft^3/s (6.94 m^3/s) Oct. 1; minimum daily discharge, 25 ft^3/s (0.71 m^3/s) June 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	245	143	155	120	120	125	109	99	106	110	99	65
2	241	145	150	120	120	125	118	82	99	110	99	68
3	237	145	145	120	120	125	111	77	100	110	101	67
4	240	145	140	120	120	125	114	73	100	110	101	73
5	245	150	135	120	120	125	121	75	100	110	101	67
6	241	150	130	120	120	125	114	78	100	110	97	67
7	241	150	128	120	120	126	118	75	100	110	96	65
8	239	150	125	120	120	127	104	72	100	110	96	70
9	239	150	125	120	120	128	101	67	100	110	92	72
10	233	150	125	120	120	128	107	65	100	110	106	72
11	237	150	125	120	120	129	107	67	100	110	96	67
12	214	160	125	120	120	127	106	70	100	110	87	67
13	170	165	125	120	120	125	102	70	100	105	87	73
14	170	170	125	120	120	125	99	68	95	110	80	72
15	172	170	125	120	120	125	99	65	80	107	78	68
16	164	175	125	120	120	125	99	67	50	111	84	67
17	160	175	120	120	125	125	99	67	40	106	84	73
18	145	175	120	120	125	125	102	72	45	106	72	84
19	118	170	120	120	125	125	99	73	41	111	73	85
20	118	170	120	120	125	125	104	80	38	111	80	77
21	126	170	120	125	125	120	104	73	35	106	80	73
22	121	175	120	125	125	120	97	72	25	106	77	80
23	124	180	120	130	125	120	107	84	35	107	70	77
24	128	180	120	130	125	120	104	73	90	112	65	80
25	130	180	120	125	125	120	102	72	95	109	62	96
26	135	175	120	125	125	120	102	68	100	106	67	106
27	140	175	120	125	125	120	101	75	100	107	72	111
28	140	170	120	120	125	120	94	82	100	106	70	104
29	140	165	120	120	---	118	101	82	100	104	62	107
30	138	160	120	120	---	123	97	90	80	104	62	104
31	141	---	120	120	---	118	---	104	---	109	67	---
TOTAL	5532	4888	3908	3765	3420	3834	3142	2337	2454	3363	2563	2357
MEAN	178	163	126	121	122	124	105	75.4	81.8	108	82.7	78.6
MAX	245	180	155	130	125	129	121	104	106	112	106	111
MIN	118	143	120	120	120	118	94	65	25	104	62	65
AC-FT	10970	9700	7750	7470	6780	7600	6230	4640	4870	6670	5080	4680

CAL YR 1976 TOTAL 254988 MEAN 697 MAX 1080 MIN 118 AC-FT 505800
WTR YR 1977 TOTAL 41563 MEAN 114 MAX 245 MIN 25 AC-FT 82440

NOTE.--Stage-discharge relation indefinite June 3 to July 14.

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) above mean sea level, 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.--48 years, 536 ft^3/s (15.18 m^3/s), 388,300 acre-ft/yr (479 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, 667 ft^3/s (18.9 m^3/s) May 19, gage height, 5.31 ft (1.618 m); minimum daily, 47 ft^3/s (1.33 m^3/s) June 24; minimum gage height, 1.06 ft (0.323 m) June 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	334	135	172	115	124	130	140	94	138	81	96	93
2	324	129	170	115	124	130	140	95	121	74	97	98
3	323	126	160	116	124	130	140	96	111	103	94	95
4	315	199	153	116	125	131	135	95	108	114	96	102
5	301	173	148	117	125	131	133	98	106	128	94	106
6	303	156	142	117	125	132	130	92	101	137	94	106
7	306	118	138	117	125	132	130	103	103	120	92	102
8	306	153	133	117	125	132	130	96	101	115	95	98
9	303	162	130	117	125	133	130	92	104	110	92	98
10	305	161	127	117	125	133	125	94	101	104	89	101
11	305	161	123	117	125	135	115	90	101	105	92	109
12	300	157	120	117	125	140	110	91	99	109	94	100
13	274	162	118	118	126	150	108	93	103	109	92	96
14	226	174	116	118	126	160	106	96	100	108	92	95
15	198	179	115	118	126	150	106	102	103	107	92	96
16	210	184	114	119	126	140	103	98	110	107	99	97
17	205	188	115	119	127	135	106	93	88	105	104	94
18	204	188	115	119	127	130	106	108	73	106	103	102
19	196	190	115	120	127	130	102	512	63	104	90	121
20	159	188	115	120	128	130	100	192	60	102	84	121
21	146	188	115	120	128	130	96	133	58	100	91	110
22	144	184	115	120	128	130	101	135	55	100	97	112
23	152	178	115	121	129	130	103	180	53	97	92	115
24	172	194	115	122	130	130	97	137	47	99	92	135
25	167	198	115	123	130	130	101	122	51	102	93	144
26	173	197	115	123	130	135	102	112	74	103	102	143
27	179	192	115	123	130	140	101	110	88	102	108	146
28	179	188	115	123	130	150	101	110	100	111	110	139
29	181	180	115	123	---	150	99	106	99	110	102	130
30	144	178	115	124	---	140	95	105	104	101	95	124
31	130	---	115	124	---	140	---	137	---	99	91	---
TOTAL	7174	5160	3904	3695	3545	4219	3391	3817	2723	3272	2954	3328
MEAN	231	172	126	119	127	136	113	123	90.8	106	95.3	111
MAX	334	199	172	124	130	160	140	512	138	137	110	146
MIN	136	118	114	115	124	130	95	90	47	74	84	93
AC-FT	14230	10230	7740	7330	7030	8370	6730	7570	5400	6490	5860	6600

CAL YR 1976 TOTAL 290633 MEAN 794 MAX 1320 MIN 114 AC-FT 576500
WTR YR 1977 TOTAL 47182 MEAN 129 MAX 512 MIN 47 AC-FT 93590

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) above mean sea level (levels by Minnesota Department of Transportation). Prior to May 4, 1939, nonrecording gages at same site and datum.

REMARKS.--Records good except those for March and April, which are fair. Some regulation by Thief and Mud Lakes.

AVERAGE DISCHARGE.--60 years, 157 ft^3/s (4.446 m^3/s), 113,700 acre-ft/yr (140 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, 403 ft^3/s (11.4 m^3/s) May 19, gage height, 6.35 ft (1.935 m); no flow Dec. 12 to Mar. 10, Aug. 18-20, 22, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.99	.42	.02	.00	.00	.00	12	.41	25	.67	.05	.02
2	.71	.38	.02	.00	.00	.00	24	.33	27	.90	.04	.02
3	.39	.27	.02	.00	.00	.00	33	.36	30	8.7	.04	.02
4	.36	.16	.02	.00	.00	.00	42	.38	39	9.2	.04	.04
5	.46	.16	.02	.00	.00	.00	49	.46	21	8.3	.04	.04
6	.90	.18	.02	.00	.00	.00	60	.43	16	6.8	.03	.03
7	1.2	.15	.01	.00	.00	.00	70	.45	13	5.3	.02	.03
8	1.5	.11	.01	.00	.00	.00	80	.41	10	3.3	.02	.04
9	1.5	.10	.01	.00	.00	.00	90	.37	7.5	1.9	.01	.05
10	1.2	.10	.01	.00	.00	.00	90	.37	5.4	.83	.03	.04
11	1.3	.09	.01	.00	.00	.01	78	.39	3.6	.78	.02	.05
12	1.7	.08	.00	.00	.00	.02	52	.38	2.5	.63	.01	.05
13	1.9	.08	.00	.00	.00	.03	40	.38	1.4	.55	.01	.05
14	1.9	.07	.00	.00	.00	.04	27	.60	.87	1.0	.01	.05
15	1.5	.07	.00	.00	.00	.08	22	60	3.2	.75	.01	.05
16	1.2	.06	.00	.00	.00	.17	15	32	4.0	.52	.01	.04
17	1.3	.06	.00	.00	.00	.35	11	27	2.4	.40	.01	.04
18	1.9	.06	.00	.00	.00	.65	12	46	3.6	.29	.00	.06
19	2.3	.05	.00	.00	.00	1.5	13	305	3.9	.29	.00	.10
20	2.1	.05	.00	.00	.00	1.7	8.7	143	3.6	.25	.00	.14
21	1.7	.04	.00	.00	.00	1.3	4.2	60	7.9	.16	.01	.14
22	1.4	.04	.00	.00	.00	1.0	2.5	53	11	.11	.00	.12
23	1.1	.04	.00	.00	.00	.90	2.2	87	8.6	.10	.00	.11
24	1.0	.04	.00	.00	.00	.80	1.9	61	6.5	.08	.00	12
25	.98	.03	.00	.00	.00	.75	1.5	66	3.9	.07	.00	28
26	1.0	.03	.00	.00	.00	.75	.87	30	2.2	.07	.00	47
27	.89	.03	.00	.00	.00	.90	.83	22	1.0	.07	.01	65
28	.76	.03	.00	.00	.00	1.1	.84	17	.82	.07	.02	44
29	.58	.02	.00	.00	---	1.6	.65	13	.61	.06	.03	38
30	.47	.02	.00	.00	---	2.6	.53	11	.69	.06	.03	32
31	.42	---	.00	.00	---	5.0	---	16	---	.05	.02	---
TOTAL	36.61	3.02	.17	.00	.00	21.25	844.72	1054.72	266.19	52.26	.52	267.33
MEAN	1.18	.10	.005	.000	.000	.69	28.2	34.0	8.87	1.69	.017	8.91
MAX	2.3	.42	.02	.00	.00	5.0	90	305	39	9.2	.05	65
MIN	.36	.02	.00	.00	.00	.00	.53	.33	.61	.05	.00	.02
AC-FT	73	6.0	.3	.00	.00	42	1680	2090	528	104	1.0	530

CAL YR 1976 TOTAL 21138.91 MEAN 57.8 MAX 1310 MIN .00 AC-FT 41930
WTR YR 1977 TOTAL 2546.79 MEAN 6.98 MAX 305 MIN .00 AC-FT 5050

05077700 RUFFY BROOK NEAR GONVICK, MN

LOCATION.--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 mi (6.4 km) upstream from mouth, and 4.8 mi (7.7 km) east of Gonvick.

DRAINAGE AREA.--45.2 mi^2 (117.1 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 1913.

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 1,227.93 ft (374.273 m) above mean sea level, adjustment of 1912 (levels by Corps of Engineers). Prior to Sept. 9, 1960, reference point at same site and datum.

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

AVERAGE DISCHARGE.--17 years, 13.8 ft^3/s (0.391 m^3/s), 10,000 acre-ft/yr (12.3 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 453 ft^3/s (12.8 m^3/s) Mar. 30, 1967, gage height, 6.35 ft (1.935 m); maximum gage height, 6.62 ft (2.018 m) Apr. 9, 1969 (backwater from ice); no flow Feb. 20 to Mar. 6, 1968.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 47 ft^3/s (1.33 m^3/s) Sept. 24, gage height, 2.05 ft (0.625 m), no peak above base of 65 ft^3/s (1.84 m^3/s); minimum daily, 0.26 ft^3/s (0.007 m^3/s) Dec. 14-30; minimum gage height, 0.83 ft (0.253 m) July 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.60	1.0	.60	.28	.75	1.3	8.0	3.4	13	2.4	1.3	2.1
2	.70	1.1	.55	.29	.75	1.3	7.8	3.2	6.6	1.7	1.0	2.3
3	.80	1.4	.50	.30	.70	1.3	7.6	3.0	4.8	38	1.1	2.0
4	.70	1.1	.45	.30	.70	1.3	7.4	2.8	4.8	11	1.1	3.9
5	.80	1.6	.40	.30	.70	1.3	7.0	7.7	3.7	12	.80	4.5
6	.90	1.4	.40	.30	.70	1.4	7.0	6.6	2.3	7.4	1.0	5.0
7	1.3	2.0	.35	.30	.70	1.6	7.0	4.5	2.1	4.8	.70	4.3
8	.80	1.8	.35	.30	.70	2.0	8.0	3.9	2.0	3.2	.80	3.7
9	1.0	1.7	.30	.30	.70	2.5	10	3.4	1.7	2.6	.70	5.8
10	1.1	1.7	.30	.30	.70	2.8	12	3.4	1.7	3.0	1.1	5.8
11	1.1	2.0	.29	.30	.75	3.2	11	2.8	1.7	2.6	1.0	4.5
12	1.0	1.8	.28	.30	.80	3.5	10	2.8	1.7	2.4	.60	3.0
13	.90	1.8	.27	.30	.90	4.0	9.0	2.8	4.0	2.1	.80	3.0
14	1.3	1.8	.26	.30	1.0	4.0	8.0	11	2.3	2.3	.70	2.8
15	1.8	1.9	.26	.30	1.1	4.0	7.1	6.6	3.4	2.1	.80	2.4
16	1.3	1.8	.26	.35	1.1	3.8	7.1	5.3	6.6	2.6	1.3	2.3
17	1.4	1.7	.26	.35	1.1	3.6	6.8	3.2	3.2	2.0	1.3	3.0
18	1.4	1.6	.26	.35	1.1	3.5	10	2.4	3.0	1.7	1.1	15
19	1.4	1.6	.26	.35	1.1	3.5	8.3	2.4	2.8	1.4	.80	28
20	1.3	1.5	.26	.35	1.1	3.5	6.8	2.4	2.1	1.7	1.1	34
21	1.4	1.4	.26	.35	1.2	3.5	6.1	2.6	2.0	2.0	1.6	24
22	1.3	1.4	.26	.40	1.3	3.5	5.3	2.6	1.8	.70	1.1	30
23	1.0	1.3	.26	.40	1.4	3.5	3.9	3.4	2.6	.90	.90	27
24	1.4	1.3	.26	.45	1.4	3.5	4.5	2.8	2.3	.80	.90	40
25	1.6	1.2	.26	.50	1.4	4.0	3.9	2.3	2.4	.60	.70	34
26	2.1	1.1	.26	.54	1.4	5.0	3.9	1.8	2.8	.70	1.3	34
27	2.1	1.0	.26	.58	1.4	7.0	3.7	2.1	2.3	.80	13	31
28	1.6	.90	.26	.65	1.3	8.5	3.4	2.6	6.1	2.1	11	24
29	1.4	.80	.26	.70	---	9.0	3.4	2.1	3.4	1.4	4.1	20
30	1.0	.70	.26	.75	---	8.5	3.4	2.1	2.4	1.3	3.2	17
31	1.0	---	.27	.75	---	8.0	---	35	---	2.1	1.8	---
TOTAL	37.50	43.40	9.73	12.29	27.95	117.4	207.4	143.0	101.6	120.40	58.70	418.4
MEAN	1.21	1.45	.31	.40	1.00	3.79	6.91	4.61	3.39	3.88	1.89	13.9
MAX	2.1	2.0	.60	.75	1.4	9.0	12	35	13	38	13	40
MIN	.60	.70	.26	.28	.70	1.3	3.4	1.8	1.7	.60	.60	2.0
AC-FT	74	86	19	24	55	233	411	284	202	239	116	830

CAL YR 1976 TOTAL 2300.12 MEAN 6.28 MAX 110 MIN .20 AC-FT 4560
WTR YR 1977 TOTAL 1297.77 MEAN 3.56 MAX 40 MIN .26 AC-FT 2570

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 current year.

GAGE.--Water-stage recorder. Datum of gage is 1,099.12 ft (335.012 m) above mean sea level, 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.--38 years, 178 ft^3/s (5.041 m^3/s), 129,000 acre-ft/yr (159 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,640 ft^3/s (103 m^3/s) June 9, 1962, gage height, 11.90 ft (3.627 m); maximum gage height, 12.31 ft (3.752 m) Apr. 10, 1969 (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.--Maximum discharge, 429 ft^3/s (12.1 m^3/s) Sept. 27, gage height, 4.85 ft (1.478 m), no peak above base of 500 ft^3/s (14.2 m^3/s); minimum, 2.5 ft^3/s (0.071 m^3/s) May 16, 17, gage height, 1.71 ft (0.521 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	37	40	35	34	34	65	3.2	73	60	113	96
2	17	38	39	35	34	35	60	3.6	121	76	95	91
3	20	37	39	35	34	36	55	4.0	85	114	103	90
4	19	28	38	35	34	36	52	4.2	86	265	101	86
5	17	34	38	35	34	35	50	4.0	66	300	118	96
6	17	45	38	34	34	34	50	5.0	51	299	117	107
7	18	40	38	34	34	33	40	6.6	43	264	106	114
8	18	34	37	34	34	32	35	4.5	35	230	102	114
9	18	34	37	34	34	31	33	3.5	36	224	82	108
10	18	36	37	34	34	30	40	3.2	37	202	71	156
11	19	35	37	34	34	32	60	2.8	31	193	78	163
12	21	31	37	34	34	35	60	3.2	38	171	77	157
13	23	30	36	34	34	37	30	2.9	28	173	59	147
14	23	35	36	34	34	30	24	2.8	23	180	47	134
15	22	40	36	34	34	33	22	2.8	23	174	50	123
16	25	43	36	34	34	35	16	2.6	11	173	43	112
17	28	45	36	34	34	32	12	5.2	15	166	37	101
18	28	47	36	34	34	20	10	4.3	42	170	39	97
19	31	47	36	34	34	16	14	18	72	161	37	127
20	30	47	36	34	34	15	11	12	88	154	34	255
21	33	46	35	34	34	15	9.5	8.9	79	148	30	265
22	31	45	35	34	34	15	12	5.6	81	150	28	257
23	28	44	35	34	34	20	7.9	12	73	138	28	275
24	36	43	35	34	34	40	5.4	14	68	131	26	303
25	39	43	35	34	34	25	4.9	12	53	119	25	375
26	35	42	35	34	34	20	5.6	7.0	37	106	27	407
27	41	42	35	34	34	25	6.4	6.4	35	114	27	425
28	34	41	35	34	34	45	4.5	6.4	34	108	60	413
29	23	41	35	34	---	60	4.0	6.4	39	113	120	381
30	29	40	35	34	---	80	3.6	14	51	112	118	348
31	30	---	35	34	---	70	---	42	---	107	106	---
TOTAL	788	1190	1128	1059	952	1036	802.8	233.1	1554	5095	2104	5923
MEAN	25.4	39.7	36.4	34.2	34.0	33.4	26.8	7.52	51.8	164	67.9	197
MAX	41	47	40	35	34	80	65	42	121	300	120	425
MIN	17	28	35	34	34	15	3.6	2.6	11	60	25	86
AC-FT	1560	2360	2240	2100	1890	2050	1590	462	3080	10110	4170	11750

CAL YR 1976 TOTAL 31859.7 MEAN 87.0 MAX 1200 MIN 4.5 AC-FT 63190
WTR YR 1977 TOTAL 21864.9 MEAN 59.9 MAX 425 MIN 2.6 AC-FT 43370

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) above mean sea level, adjustment of 1912 (levels by Corps of Engineers). Prior to Sept. 9, 1960, referenoe points at same site at datum 8.00 ft (2.438 m) higher. Sept. 9, 1960, to Sept. 30, 1964, nonreoording gage at same site at datum 8.00 ft (2.438 m) higher.

REMARKS.--Records fair.

AVERAGE DISCHARGE.--17 years, 78.7 ft^3/s (2.229 m^3/s), 57,020 acre-ft/yr (70.3 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; 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) Apr. 21, 1950, present datum, from floodmarks, discharge, 2,790 ft^3/s (79.0 m^3/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 855 ft^3/s (24.2 m^3/s) July 3, gage height, 9.40 ft (2.865 m), from graph based on gage readings; no flow Jan. 6 to Mar. 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.92	2.5	.18	.01	.00	.00	85	26	20	15	4.7	14
2	2.2	2.3	.15	.01	.00	.00	80	25	29	18	5.1	14
3	.81	2.1	.14	.01	.00	.00	75	24	31	407	5.1	15
4	.70	2.0	.12	.01	.00	.00	72	24	27	502	4.7	22
5	1.1	1.8	.10	.01	.00	.00	65	32	22	320	3.6	35
6	1.5	1.7	.09	.00	.00	.00	60	37	19	290	3.4	33
7	1.6	1.6	.08	.00	.00	.00	55	32	14	289	3.4	31
8	1.4	1.6	.07	.00	.00	.00	50	29	13	111	3.6	27
9	1.5	1.5	.06	.00	.00	.00	47	26	12	59	6.2	63
10	1.7	1.4	.05	.00	.00	.00	106	24	12	42	6.4	119
11	2.2	1.4	.05	.00	.00	.00	71	21	12	34	4.9	82
12	2.1	1.3	.04	.00	.00	.01	46	20	12	26	4.7	43
13	1.9	1.3	.04	.00	.00	.04	40	16	20	20	4.4	32
14	2.1	1.2	.03	.00	.00	.10	39	16	9.8	19	3.1	26
15	2.3	1.1	.03	.00	.00	.30	38	16	12	17	3.4	25
16	2.6	1.1	.03	.00	.00	.80	37	12	20	14	5.3	20
17	2.7	1.0	.03	.00	.00	2.0	35	9.8	26	16	6.2	19
18	2.6	.92	.03	.00	.00	1.7	40	8.8	30	22	5.8	73
19	2.7	.82	.03	.00	.00	1.5	45	9.1	32	17	3.6	115
20	2.7	.74	.03	.00	.00	1.4	46	8.4	31	17	4.2	121
21	3.0	.66	.02	.00	.00	1.3	45	8.6	27	13	5.1	88
22	2.7	.59	.02	.00	.00	1.2	40	10	19	8.4	5.8	87
23	2.8	.52	.02	.00	.00	1.1	38	14	15	6.0	6.4	185
24	2.7	.46	.02	.00	.00	1.0	35	11	10	5.5	5.1	210
25	2.8	.40	.02	.00	.00	2.0	33	8.1	7.5	4.1	5.5	214
26	2.8	.35	.02	.00	.00	10	32	5.8	4.7	3.7	8.1	223
27	2.7	.30	.01	.00	.00	50	30	6.0	3.7	4.4	14	206
28	3.0	.27	.01	.00	.00	120	29	7.3	5.5	14	21	145
29	3.3	.24	.01	.00	---	100	27	6.8	7.7	10	24	117
30	3.0	.21	.01	.00	---	95	25	7.0	7.5	7.9	15	100
31	2.8	---	.01	.00	---	90	---	18	---	6.0	13	---
TOTAL	68.93	33.38	1.55	.05	.00	479.45	1466	518.7	511.4	2338.0	214.8	2504
MEAN	2.22	1.11	.050	.002	.000	15.5	48.9	16.7	17.0	75.4	6.93	83.5
MAX	3.3	2.5	.18	.01	.00	120	106	37	32	502	24	223
MIN	.70	.21	.01	.00	.00	.00	25	5.8	3.7	3.7	3.1	14
AC-FT	137	66	3.1	.10	.00	951	2910	1030	1010	4640	426	4970

CAL YR 1976 TOTAL 10515.63 MEAN 28.7 MAX 800 MIN .01 AC-FT 20860
WTR YR 1977 TOTAL 8136.26 MEAN 22.3 MAX 502 MIN .00 AC-FT 16140

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) above mean sea level, 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 and those for period of no gage-height record, Nov. 30 to Mar. 19, which are fair.

AVERAGE DISCHARGE.--51 years, 314 ft^3/s (8.892 m^3/s), 227,500 acre-ft/yr (281 hm^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,740 ft^3/s (276 m^3/s) Apr. 12, 1969, gage height, 11.82 ft (3.603 m); maximum gage height observed, 17.5 ft (5.344 m) Apr. 15, 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, 866 ft^3/s (24.5 m^3/s) July 5, gage height, 4.13 ft (1.259 m); minimum, 1.2 ft^3/s (0.034 m^3/s) Nov. 4, gage height, 1.17 ft (0.357 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	31	42	37	36	37	200	41	69	66	114	124
2	20	38	42	37	36	37	180	35	113	78	118	115
3	22	36	41	37	36	38	170	32	156	282	105	110
4	19	17	41	37	36	38	160	31	132	757	103	114
5	18	31	41	37	36	39	155	32	126	753	102	113
6	19	30	40	36	36	40	145	37	107	581	113	128
7	20	24	40	36	36	41	140	45	87	506	115	144
8	21	44	40	36	36	43	140	54	77	378	104	152
9	23	50	39	36	36	44	150	50	63	309	102	152
10	23	43	39	36	36	50	170	47	58	273	90	145
11	23	46	39	36	36	55	160	41	57	250	76	244
12	23	46	38	36	36	60	140	41	57	222	77	235
13	24	46	38	36	36	65	120	36	55	197	82	208
14	27	36	37	36	36	75	100	31	54	194	71	185
15	28	31	37	36	36	80	80	31	46	187	67	169
16	39	38	37	36	36	80	70	25	52	184	61	155
17	34	41	37	36	36	75	70	24	44	177	57	144
18	30	44	37	36	36	70	70	25	30	173	53	146
19	28	47	37	36	36	65	82	26	44	173	49	144
20	28	50	37	36	36	65	86	26	89	171	46	209
21	29	50	37	36	36	62	91	29	108	163	42	364
22	29	50	37	36	36	60	89	30	105	159	39	348
23	35	50	37	36	36	60	80	29	101	154	37	341
24	36	49	37	36	36	65	78	18	97	148	36	428
25	33	48	37	36	37	80	65	24	88	135	38	521
26	26	47	37	36	37	100	56	33	78	125	41	643
27	30	46	37	36	37	120	51	28	62	116	45	657
28	31	45	37	36	37	180	50	22	61	120	47	655
29	40	44	37	36	---	220	48	20	54	115	60	597
30	42	43	37	36	---	220	45	22	54	118	131	535
31	40	---	37	36	---	210	---	34	---	116	133	---
TOTAL	860	1241	1186	1121	1012	2474	3241	999	2324	7380	2354	8225
MEAN	27.7	41.4	38.3	36.2	36.1	79.8	108	32.2	77.5	238	75.9	274
MAX	42	50	42	37	37	220	200	54	156	757	133	657
MIN	18	17	37	36	36	37	45	18	30	66	36	110
AC-FT	1710	2460	2350	2220	2010	4910	6430	1980	4610	14640	4670	16310

CAL YR 1976 TOTAL 59317 MEAN 162 MAX 2810 MIN 12 AC-FT 117700
WTR YR 1977 TOTAL 32417 MEAN 88.8 MAX 757 MIN 17 AC-FT 64300

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 highway 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.

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) above mean sea level. 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 periods, which are fair. Diurnal fluctuation prior to 1975 caused by powerplant 1,000 ft (300 m) upstream. Flow partially regulated by outlet dam at Red Lake.

AVERAGE DISCHARGE.--76 years, 1,110 ft^3/s (31.44 m^3/s), 804,200 acre-ft/yr (992 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, 3,440 ft^3/s (97.4 m^3/s) May 20, gage height, 8.66 ft (2.640 m); minimum, 68 ft^3/s (1.93 m^3/s) Nov. 7, gage height, 2.58 ft (0.786 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	428	202	220	180	175	193	545	161	320	172	248	267
2	375	235	210	180	175	194	530	156	348	197	254	252
3	342	216	205	180	175	198	510	147	421	257	236	242
4	342	192	205	180	175	199	508	141	412	537	213	245
5	327	125	200	180	175	200	500	169	348	975	214	247
6	312	172	200	180	175	202	500	159	310	859	212	268
7	334	112	200	180	175	204	600	156	263	772	215	268
8	306	159	200	180	175	206	700	172	247	680	225	298
9	317	192	200	180	175	212	800	166	217	544	218	314
10	327	209	200	180	175	220	900	150	183	502	225	336
11	315	144	200	175	180	225	950	156	176	430	204	334
12	314	185	200	175	180	230	822	150	178	407	188	383
13	328	161	200	175	180	235	675	147	184	422	185	370
14	328	172	200	175	180	240	622	150	188	371	182	360
15	317	185	200	175	180	250	447	159	214	339	176	330
16	300	156	195	175	180	245	349	162	207	364	162	299
17	265	185	190	175	180	240	287	213	216	323	175	281
18	216	185	190	175	180	240	262	192	226	329	169	316
19	236	203	190	175	180	235	245	202	156	316	150	318
20	257	187	190	175	180	233	229	2870	185	306	156	320
21	253	198	190	175	185	230	225	1410	197	287	172	418
22	259	192	190	175	190	230	212	702	193	282	169	531
23	234	182	190	175	190	235	221	591	221	280	154	558
24	192	198	190	175	190	245	199	450	181	262	141	590
25	178	205	190	175	190	275	198	442	172	256	122	658
26	156	224	185	175	190	315	172	411	156	240	159	906
27	147	197	185	175	190	380	175	379	159	240	185	971
28	180	182	185	175	192	500	170	244	175	241	213	1020
29	243	150	180	175	---	600	166	268	150	263	178	975
30	264	210	180	175	---	595	153	199	136	229	177	851
31	273	---	180	175	---	570	---	272	---	224	254	---
TOTAL	8667	5515	6040	5475	5067	8576	12872	11346	6739	11906	5931	13526
MEAN	280	184	195	177	181	277	429	366	225	384	191	451
MAX	428	235	220	180	192	600	950	2870	421	975	254	1020
MIN	147	112	180	175	175	193	153	141	136	172	122	242
AC-FT	17190	10940	11980	10860	10050	17010	25530	22500	13370	23620	11760	26830

CAL YR 1976 TOTAL 404664 MEAN 1106 MAX 9610 MIN 112 AC-FT 802700
WTR YR 1977 TOTAL 101660 MEAN 279 MAX 2870 MIN 112 AC-FT 201600

NOTE.--No gage-height record Feb. 24 to Mar. 31.

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND

LOCATION.--Lat 47°56'34", long 97°03'10", in SW 1/4 NE 1/4 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) above mean sea level. 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.--95 years, 2,502 ft^3/s (70.86 m^3/s) 1,813,000 acre-ft/yr (2.24 km^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 80,000 ft^3/s (2,270 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, 2,190 ft^3/s (62.0 m^3/s) Apr. 10, gage height, 8.52 ft (2.597 m); maximum gage height, 8.71 ft (2.655 m) Apr. 5, (backwater from ice); minimum discharge, 1.8 ft^3/s (0.051 m^3/s) Sept. 2, gage height, 1.00 ft (0.3048 m), observed.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	514	400	195	215	215	235	1460	690	977	361	333	153
2	514	400	185	215	212	230	1580	660	1020	465	319	1.8
3	484	380	180	215	212	230	1590	619	1040	554	312	434
4	452	365	180	215	212	230	1620	586	989	586	305	570
5	437	350	175	215	212	230	1800	579	941	660	284	451
6	425	340	180	215	212	235	1750	538	851	875	265	432
7	418	330	180	215	212	240	1650	575	760	1070	245	461
8	405	320	180	215	212	250	1620	1410	715	1260	242	490
9	412	320	185	215	212	260	1800	1780	678	1240	232	508
10	410	320	190	215	212	270	2100	1460	619	1020	228	508
11	407	315	195	215	212	280	2150	1040	558	848	227	490
12	407	315	195	215	212	300	2040	824	508	738	220	484
13	405	310	200	215	212	390	1920	794	458	648	200	490
14	404	310	200	215	212	410	1740	730	425	605	203	501
15	413	305	200	215	210	420	1590	648	440	588	206	499
16	429	300	200	215	207	420	1360	564	423	558	208	487
17	434	290	200	215	207	450	1170	526	423	526	208	468
18	429	285	200	215	207	480	1030	516	414	508	206	482
19	407	280	200	215	210	500	911	536	406	487	209	508
20	370	275	200	215	210	530	854	526	388	494	201	499
21	362	270	200	215	210	540	833	1450	326	506	193	492
22	370	265	200	215	210	530	875	1880	284	492	193	508
23	372	260	200	215	210	480	896	1280	284	456	196	605
24	383	260	200	215	220	480	905	887	284	425	200	730
25	386	260	200	215	240	540	899	730	347	401	177	760
26	377	255	205	215	240	650	881	641	357	364	104	824
27	356	250	210	215	240	780	836	629	374	333	143	950
28	338	240	210	215	240	820	772	617	404	340	217	1180
29	336	230	210	215	---	1180	728	612	406	337	258	1400
30	360	210	210	215	---	1330	705	665	378	308	261	1450
31	390	---	215	215	---	1380	---	875	---	312	251	---
TOTAL	12606	9010	6080	6665	6032	15300	40065	25867	16477	18365	7046	17815.8
MEAN	407	300	196	215	215	494	1336	834	549	592	227	594
MAX	514	400	215	215	240	1380	2150	1880	1040	1260	333	1450
MIN	336	210	175	215	207	230	705	516	284	308	104	1.8
AC-FT	25000	17870	12060	13220	11960	30350	79470	51310	32680	36430	13980	35340

CAL YR 1976 TOTAL 731936.0 MEAN 2000 MAX 22900 MIN 175 AC-FT 1452000
WTR. YR 1977 TOTAL 181328.8 MEAN 497 MAX 2150 MIN 1.8 AC-FT 359700

05083500 RED RIVER OF THE NORTH AT OSLO, MN
(National water-quality accounting network station)
(Pesticide Station)

LOCATION.--Lat 48°11'40", long 97°08'30", in SW 1/4 SW 1/4 sec.36, T.155 N., R.51 W., Walsh County, Hydrologic Unit 09020306, on interstate highway bridge at Oslo, and at mile 271.2 (436.4 km).

DRAINAGE AREA.--31,200 mi^2 (80,800 km^2), approximately, including 3,800 mi^2 (9,840 km^2) in closed basins.

PERIOD OF RECORD.--Water years 1973 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 December 1974.

REMARKS.--Discharge obtained by hydrographic comparison of stations 05082500 Red River of the North at Grand Forks and 05092000 Red River of the North at Drayton. Letters ND indicate none detected.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 1,860 micromhos Mar. 18, 1977; minimum, 352 micromhos Aug. 11, 12, 1976.
WATER TEMPERATURES: Maximum, 26.5°C Aug. 24-26, 1976; minimum, 0.0°C on many days during winter months.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 1,860 micromhos Mar. 18; minimum, 373 micromhos May 23.
WATER TEMPERATURES: Maximum, 25.5°C June 20-22, 25, 26, July 30; minimum, 0.0°C on many days during winter months.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)	FECAL COLIFORM .7UM-MF (COL./100 ML) (31625)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML) (31673)	HARDNESS (CA,MG) (MG/L) (00900)
OCT											
19...	1215	400	440	8.2	5.5	10	11.8	103	230	--	190
NOV											
30...	1200	250	1020	7.8	.0	7	14.1	99	--	203	360
DEC											
28...	1400	200	725	7.7	.0	4	11.0	77	55	68	370
JAN											
24...	1130	215	800	7.7	.5	6	6.7	48	B36	171	340
FEB											
14...	1045	200	670	7.8	.0	10	5.6	39	300	1100	320
MAR											
21...	1130	450	1150	7.9	1.0	6	7.7	56	340	1860	350
APR											
25...	1130	1500	670	8.8	12.5	30	11.7	109	B13	B36	280
MAY											
24...	1100	1800	445	8.2	21.0	130	--	--	1000	1B00	180
JUN											
28...	1100	420	845	8.8	23.5	55	8.0	95	B32	960	310
JUL											
25...	1300	500	800	8.5	25.5	25	7.7	95	B37	B28000	270
30...	1500	--	745	--	25.0	--	--	--	--	--	280
AUG											
25...	1130	200	600	8.7	19.0	60	8.1	89	30	630000	270
SEP											
27...	1000	800	775	8.3	14.5	40	8.2	82	400	640	280

05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	NON-CARBONATE HARDNESS (MG/L) (00902)	DIS-SOLVED CALCIUM (CA) (MG/L) (00915)	DIS-SOLVED MAGNESIUM (MG) (MG/L) (00925)	DIS-SOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DIS-SOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DIS-SOLVED SULFATE (SO4) (MG/L) (00945)	DIS-SOLVED CHLORIDE (CL) (MG/L) (00940)
OCT										
19...	11	46	19	18	16	.6	4.6	182	32	16
NOV										
30...	72	80	40	77	31	1.8	11	292	150	76
DEC										
28...	27	86	38	42	19	.9	7.0	340	79	34
JAN										
24...	36	82	34	44	21	1.0	6.5	308	74	30
FEB										
14...	34	72	33	42	22	1.0	6.5	282	89	38
MAR										
21...	90	84	33	100	38	2.3	8.2	260	130	130
APR										
25...	100	64	29	40	23	1.0	5.9	180	130	37
MAY										
24...	58	46	16	22	20	.7	5.0	120	70	18
JUN										
28...	93	70	32	64	31	1.6	8.1	210	140	72
JUL										
25...	76	60	28	66	34	1.8	7.8	190	100	76
30...	77	65	29	54	29	1.4	7.5	210	97	55
AUG										
25...	70	59	29	32	20	.9	5.2	200	94	31
SEP										
27...	63	61	30	62	32	1.6	6.7	210	90	74

DATE	DIS-SOLVED FLUORIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)	DIS-SOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	SUSPENDED SEDIMENT (MG/L) (80154)	SUSPENDED SEDIMENT DISCHARGE (T/DAY) (80155)
OCT										
19...	.2	2.2	267	247	288	.09	1.2	.13	32	35
NOV										
30...	.4	5.5	668	615	451	.10	2.3	1.5	6	4.0
DEC										
28...	.3	9.0	524	502	283	.11	1.4	.71	17	9.2
JAN										
24...	.4	13	507	469	294	.33	1.6	.59	10	5.8
FEB										
14...	.4	14	464	465	251	.30	1.9	1.2	12	6.5
MAR										
21...	.3	16	679	655	825	.45	2.6	.75	8	9.7
APR										
25...	.2	.9	433	413	1750	.01	.98	.18	62	251
MAY										
24...	.2	7.9	282	259	1370	.54	1.3	.28	182	885
JUN										
28...	.3	7.5	526	522	596	.01	1.6	.43	87	99
JUL										
25...	.3	12	490	464	661	.32	1.3	.46	86	116
30...	--	--	454	--	--	--	--	--	--	--
AUG										
25...	.3	6.1	391	375	211	.03	1.6	.40	76	41
SEP										
27...	.2	7.9	479	460	1040	.12	--	.36	84	181

DATE	TIME	TOTAL ARSENIC (AS) (UG/L) (01002)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	TOTAL CADMIUM (CD) (UG/L) (01027)	DIS-SOLVED CADMIUM (CD) (UG/L) (01025)	TOTAL CHROMIUM (CR) (UG/L) (01034)	DIS-SOLVED CHROMIUM (CR) (UG/L) (01030)	TOTAL COBALT (CO) (UG/L) (01037)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	TOTAL COPPER (CU) (UG/L) (01042)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	TOTAL IRON (FE) (UG/L) (01045)
JAN												
24...	1130	3	3	<10	1	0	0	<50	0	<10	4	320
APR												
25...	1130	3	3	<10	2	0	0	<50	0	<10	3	1300
JUL												
25...	1300	11	9	<10	2	0	10	<50	0	10	14	3000

05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DIS-SOLVED IRON (FE) (UG/L) (01046)	TOTAL LEAD (PB) (UG/L) (01051)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	TOTAL MAN-GANESE (MN) (UG/L) (01055)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	TOTAL MERCURY (HG) (UG/L) (71900)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	TOTAL SELE-NIUM (SE) (UG/L) (01147)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	TOTAL ZINC (ZN) (UG/L) (01092)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	TOTAL ORGANIC CARBON (C) (MG/L) (00680)
JAN 24...	30	<100	8	90	80	.1	.2	0	0	10	20	15
APR 25...	30	100	15	230	10	.0	.0	1	1	10	10	11
JUL 25...	320	<100	9	250	0	.2	.2	1	0	20	6	11

DATE	TIME	TOTAL ALDRIN (UG/L) (39330)	ALDRIN IN BOTTOM MA-TERIAL (UG/KG) (39333)	TOTAL ATRA-ZINE (UG/L) (39630)	ATRA-ZINE IN BOTTOM MATERI-AL (UG/KG DRY SOLIDS) (39631)	TOTAL CHLOR-DANE (UG/L) (39350)	CHLOR-DANE IN BOTTOM MA-TERIAL (UG/KG) (39351)	TOTAL DDD (UG/L) (39360)	DDD IN BOTTOM MA-TERIAL (UG/KG) (39363)	TOTAL DDE (UG/L) (39365)
NOV 30...	1200	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAN 24...	1130	ND	--	ND	--	ND	--	ND	--	ND
APR 25...	1130	ND	ND	ND	ND	ND	0	ND	--	ND
JUL 25...	1300	ND	--	--	--	ND	--	ND	--	ND

DATE	DDE IN BOTTOM MA-TERIAL (UG/KG) (39368)	TOTAL DDT (UG/L) (39370)	DDT IN BOTTOM MA-TERIAL (UG/KG) (39373)	TOTAL DI-AZINON (UG/L) (39570)	DI-AZINON IN BOTTOM MA-TERIAL (UG/KG) (39571)	TOTAL DI-ELDRIN (UG/L) (39380)	DI-ELDRIN IN BOTTOM MA-TERIAL (UG/KG) (39383)	TOTAL ENDRIN (UG/L) (39390)	ENDRIN IN BOTTOM MA-TERIAL (UG/KG) (39393)	TOTAL ETHION (UG/L) (39398)
NOV 30...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAN 24...	--	ND	--	ND	--	ND	--	ND	--	ND
APR 25...	ND	ND	--	ND	ND	ND	ND	ND	ND	ND
JUL 25...	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	ETHION IN BOTTOM MA-TERIAL (UG/KG) (39399)	TOTAL HEPTA-CHLOR (UG/L) (39410)	HEPTA-CHLOR IN BOTTOM MA-TERIAL (UG/KG) (39413)	TOTAL HEPTA-CHLOR EPOXIDE (UG/L) (39420)	HEPTA-CHLOR EPOXIDE IN BOT-TOM MA-TERIAL (UG/KG) (39423)	TOTAL LINDANE (UG/L) (39340)	LINDANE IN BOTTOM MA-TERIAL (UG/KG) (39343)	TOTAL MALA-THION (UG/L) (39530)	MALA-THION IN BOTTOM MA-TERIAL (UG/KG) (39531)	TOTAL METH-OXY-CHLOR (UG/L) (39480)
NOV 30...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAN 24...	--	ND	--	ND	--	ND	--	ND	--	ND
APR 25...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JUL 25...	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	METHOX-YCHLOR IN BOT-TOM MA-TERIAL (UG/KG) (39481)	TOTAL METHYL PARA-THION (UG/L) (39600)	METHYL PARA-THION IN BOT-TOM MA-TERIAL (UG/KG) (39601)	TOTAL METHYL TRI-THION (UG/L) (39790)	METHYL TRI-THION IN BOT-TOM MA-TERIAL (UG/KG) (39791)	TOTAL PARA-THION (UG/L) (39540)	PARA-THION IN BOTTOM MA-TERIAL (UG/KG) (39541)	TOTAL TOX-APHENE (UG/L) (39400)	TOX-APHENE IN BOTTOM MA-TERIAL (UG/KG) (39403)	TOTAL TRI-THION (UG/L) (39786)
NOV 30...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAN 24...	--	ND	--	ND	--	ND	--	ND	--	ND
APR 25...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
JUL 25...	--	ND	--	ND	--	ND	--	ND	--	ND

05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TRI-THION IN BOTTOM MATERIAL (UG/KG) (39787)	TOTAL 2,4-D (UG/L) (39730)	2,4-D IN BOTTOM MATERIAL (UG/KG) (39731)	TOTAL 2,4,5-T (UG/L) (39740)	2,4,5-T IN BOTTOM MATERIAL (UG/KG) (39741)	TOTAL SILVEX (UG/L) (39760)	SILVEX IN BOTTOM MATERIAL (UG/KG) (39761)	SIMAZINE TOTAL COULSON COND. (UG/L) (39025)	SIMAZINE IN BOTTOM MATERIAL (UG/KG DRY SOLIDS) (39046)
NOV 30...	ND	ND	ND	ND	ND	ND	ND	ND	ND
JAN 24...	--	ND	--	ND	--	ND	--	ND	--
APR 25...	ND	ND	ND	ND	ND	ND	ND	ND	ND
JUL 25...	--	--	--	--	--	--	--	--	--

DATE	TIME	LENGTH OF EXPOSURE (DAYS) (00022)	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M (00573)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M (00572)	UNCORRECTED PERIPHYTON CHLOROPHYLL A MG/SQ M (32228)	UNCORRECTED PERIPHYTON CHLOROPHYLL B MG/SQ M (32226)	BIOMASS PIGMENT RATIO	SAMPLING METHOD
OCT. 19		28	8,231	6,000	.316	.085	7,060	POLYETHYLENE STRIP
JULY 25		28	4,250	3,540	.216	.008	3,287	POLYETHYLENE STRIP

05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	NOV 30,76		DEC 28,76		JAN 24,77		FEB 14,77		MAY 24,77	
TIME	1200		1400		1130		1045		1100	
TOTAL CELLS/ML	9200		2900		5000		170		4700	
DIVERSITY: DIVISION	1.1		1.1		0.9		0.8		1.5	
.CLASS	1.1		1.1		0.9		0.8		1.5	
..ORDER	1.4		1.5		1.4		1.0		2.1	
...FAMILY	1.5		2.1		1.7		1.9		2.9	
....GENUS	1.5		2.2		2.0		1.9		3.1	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...OOCYSTACEAE										
....DICHOTOMOCOCCUS	--	-	--	-	95	2	--	-	--	-
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	1300#	28
...MICRACTINIACEAE										
....GOLENKINIA	--	-	46	2	140	3	--	-	--	-
....MICRACTINIUM	--	-	270	9	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	170	6	95	2	--	-	290	6
....DICTYOSPHAERIUM	--	-	--	-	--	-	36#	22	--	-
....KIRCHNERIELLA	150	2	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....QUADRIGULA	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	290	6
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	31	1	--	-	--	-	--	-
....CRUCIGENIA	890	10	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	460#	16	720	15	91#	54	*	0
....TETRASTRUM	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
...PALMELLACEAE										
....GLOEOCYSTIS	300	3	--	-	--	-	--	-	--	-
....SPHAEROCYSTIS	--	-	31	1	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	*	0	36	1	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										

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

05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	NOV 30,76 1200		DEC 28,76 1400		JAN 24,77 1130		FEB 14,77 1045		MAY 24,77 1100	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
..PENNALES										
...NAVICULACEAE										
....ENTOMONEIS	--	-	*	0	--	-	--	-	--	-
..CENTRALES										
...CHAETOCERACEAE										
....CHAETOCEROS	--	-	*	0	--	-	--	-	--	-
...COSCINODISCACEAE										
....CYCLOTELLA	6500#	70	31	1	--	-	23	14	72	2
....MELOSIRA	--	-	--	-	--	-	--	-	650	14
....STEPHANODISCUS	--	-	--	-	--	-	--	-	*	0
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	140	3
....COCCONEIS	--	-	--	-	--	-	5	3	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	72	2
....CYMBELLA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	*	0	5	3	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	48	1	--	-	430	9
....SYNEDRA	150	2	15	1	--	-	--	-	--	-
...NAVICULACEAE										
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	--	-	--	-	*	0	--	-	220	5
...NITZSCHIACEAE										
....NITZSCHIA	150	2	*	0	*	0	9	5	140	3
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....ANACYSTIS	--	-	1600#	55	640	13	--	-	580	12
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	1100	12	--	-	300	6	--	-	--	-
....OSCILLATORIA	--	-	230	8	2900#	58	--	-	500	11
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....PHACUS	--	-	--	-	--	-	--	-	--	-
....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%

05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	JUN 28,77	JUL 25,77	AUG 25,77	SEP 27,77
TIME	1100	1300	1130	1000
TOTAL CELLS/ML	52000	18000	1500	11000
DIVERSITY: DIVISION	1.6	1.3	1.3	1.4
.CLASS	1.7	1.4	1.3	1.5
..ORDER	2.3	1.9	1.3	1.9
...FAMILY	2.6	2.7	1.4	3.0
....GENUS	3.0	2.9	2.4	3.6

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...OOCYSTACEAE								
....DICHOTOMOCOCCUS	--	-	--	-	--	-	--	-
...CHARACIACEAE								
....SCHROEDERIA	--	-	380	2	--	-	230	2
...COELASTRACEAE								
....COELASTRUM	--	-	140	1	--	-	1100	11
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	--	-	--	-	--	-	--	-
....MICRACTINIUM	7200	14	--	-	--	-	160	2
...OOCYSTACEAE								
....ANKISTRODESMUS	550	1	100	1	51	3	360	3
....DICTYOSPHAERIUM	--	-	--	-	--	-	990	9
....KIRCHNERIELLA	--	-	--	-	*	0	160	2
....OOCYSTIS	--	-	--	-	--	-	200	2
....QUADRIGULA	--	-	--	-	--	-	130	1
....TETRAEDRON	--	-	*	0	--	-	*	0
....TREUBARIA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	1100	2	*	0	--	-	--	-
....CRUCIGENIA	*	0	410	2	29	2	790	7
....SCENEDESMUS	1700	3	650	4	43	3	1900#	18
....TETRASTRUM	1100	2	140	1	29	2	--	-
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	66	1
...PALMELLACEAE								
....GLOEOCYSTIS	--	-	--	-	--	-	--	-
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	830	2	--	-	*	0	66	1
..ZYGNEMATALES								
...DESMIDIACEAE								
....CLOSTERIUM	1100	2	--	-	--	-	--	-
....COSMARIUM	--	-	310	2	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								

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

05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	JUN 28,77 1100		JUL 25,77 1300		AUG 25,77 1130		SEP 27,77 1000	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
..PENNALES								
...NAVICULACEAE								
....ENTOMONEIS	--	-	--	-	--	-	--	-
..CENTRALES								
...CHAETOCERACEAE								
....CHAETOCEROS	--	-	--	-	--	-	--	-
...COSCINODISCACEAE								
....CYCLOTELLA	19000#	36	--	-	58	4	330	3
....MELOSIRA	3600	7	1100	6	110	7	230	2
....STEPHANODISCUS	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	--	-
....CYMBELLA	280	1	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	440	3	--	-	300	3
...NAVICULACEAE								
....GYROSIGMA	--	-	*	0	--	-	--	-
....NAVICULA	--	-	380	2	*	0	--	-
...NITZSCHIACEAE								
....NITZSCHIA	1400	3	--	-	*	0	66	1
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROCOCCALES								
...CHROCOCCACEAE								
....ANACYSTIS	6900	13	1200	7	--	-	2200#	21
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	5400#	30	570#	38	--	-
....APHANIZOMENON	--	-	--	-	540#	36	--	-
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
....OSCILLATORIA	6100	12	5700#	33	--	-	950	9
EUGLENOPHYTA (EUGLENOIDS)								
.CRYPTOPHYCEAE								
..CRYPTOMONIDALES								
...CHYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	550	3	--	-	99	1
...CRYPTOMONODACEAE								
....CRYPTOMONAS	550	1	--	-	--	-	--	-
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	280	1	140	1	22	1	66	1
....PHACUS	--	-	270	2	--	-	99	1
....TRACHELOMONAS	280	1	200	1	14	1	99	1
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	*	0	--	-	22	1	--	-

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

05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	388	380	443	429	1100	972	696	684	740	724	786	780
2	393	382	445	432	1120	1040	696	686	740	724	791	780
3	395	386	448	440	1050	988	698	691	753	740	783	772
4	399	384	448	443	1030	1010	691	681	750	722	780	772
5	413	397	447	428	1070	1030	681	677	719	696	786	777
6	420	408	455	439	1100	1070	684	674	724	696	783	772
7	429	411	---	---	1080	1030	696	681	745	727	777	767
8	420	406	---	---	1080	1050	722	693	748	740	761	727
9	429	411	---	---	1080	1010	719	707	756	745	729	722
10	427	410	---	---	1020	988	745	714	799	756	729	722
11	421	411	---	---	1020	996	759	745	849	756	727	707
12	432	416	---	---	1030	1010	759	750	767	759	761	707
13	437	418	---	---	1010	896	788	761	777	764	753	707
14	433	423	---	---	892	874	799	783	827	761	767	722
15	441	436	---	---	870	846	805	796	764	756	786	677
16	446	430	---	---	843	799	813	799	761	756	717	661
17	450	434	---	---	799	786	805	796	761	753	722	681
18	445	434	---	---	788	780	802	794	764	756	1860	724
19	453	441	1140	657	827	788	802	791	761	756	1790	1300
20	454	440	1100	672	839	824	805	799	764	759	1560	1220
21	459	443	823	722	836	830	810	807	764	759	1410	1070
22	462	448	1120	767	830	807	821	805	761	748	1260	1080
23	469	445	928	758	819	802	813	802	756	745	1090	915
24	454	444	801	759	805	788	802	783	769	756	1060	870
25	456	443	812	780	788	767	786	775	791	769	1060	902
26	456	444	963	841	769	756	775	756	802	788	925	877
27	458	433	1020	944	753	735	764	748	802	794	936	824
28	445	414	1050	946	740	722	769	753	796	783	929	821
29	448	418	1100	982	727	421	769	750	---	---	919	833
30	451	433	1090	1010	710	423	750	742	---	---	855	745
31	454	433	---	---	703	427	745	737	---	---	839	714
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	824	735	761	742	700	614	---	---	764	727	626	599
2	764	677	764	753	783	681	---	---	737	729	620	603
3	710	639	772	759	902	791	---	---	732	724	622	616
4	686	610	767	759	909	712	---	---	735	717	855	589
5	628	502	769	753	724	643	---	---	759	729	641	580
6	635	561	810	772	674	654	---	---	764	753	574	542
7	618	540	849	807	691	654	---	---	756	745	700	578
8	670	555	852	788	735	693	---	---	748	740	707	665
9	672	599	929	788	783	735	---	---	737	705	677	663
10	595	540	1050	929	833	783	---	---	717	698	698	679
11	552	519	1110	858	864	836	---	---	707	688	696	688
12	553	531	846	786	896	864	---	---	700	661	691	674
13	540	523	780	672	915	896	---	---	672	650	700	679
14	521	512	670	648	925	880	---	---	688	668	703	691
15	529	514	659	646	880	821	---	---	670	626	693	684
16	552	517	710	663	899	877	---	---	635	616	681	641
17	581	553	740	712	925	899	---	---	637	618	646	637
18	608	585	750	727	922	889	---	---	637	624	654	648
19	650	608	724	693	886	861	---	---	626	595	654	635
20	684	650	719	693	939	750	---	---	618	595	691	648
21	693	674	727	646	855	722	---	---	630	612	703	684
22	693	679	657	427	939	714	---	---	637	616	719	700
23	677	661	419	373	932	896	---	---	632	610	719	698
24	681	654	471	408	953	880	---	---	622	603	745	719
25	703	677	574	470	942	919	---	---	626	608	750	735
26	717	703	603	578	939	925	---	---	641	628	788	745
27	745	717	583	566	925	909	---	---	679	630	805	791
28	767	745	585	557	---	---	---	---	740	679	889	810
29	764	740	587	550	---	---	783	777	759	665	932	896
30	745	732	727	572	---	---	777	753	663	632	932	915
31	---	---	610	553	---	---	775	750	641	630	---	---

05083500 RED RIVER OF THE NORTH AT OSLO, MN--Continued

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

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

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) above mean sea level. 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.--27 years (water years 1951-77), 42.1 ft^3/s (1.192 m^3/s), 30,500 acre-ft/yr (37.6 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, 24 ft^3/s (0.68 m^3/s) May 28, gage height, 2.50 ft (0.762 m); maximum gage height, 3.58 ft (1.091 m) Mar. 16 (backwater from ice); no flow on many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	2.5	3.0	8.4	.15	.00	.01
2	.00	.00	.00	.00	.00	.00	2.6	2.6	7.8	.98	.00	.00
3	.00	.00	.00	.00	.00	.00	2.8	6.4	7.4	1.8	.00	.02
4	.00	.00	.00	.00	.00	.00	3.9	6.4	5.9	.66	.09	.01
5	.00	.00	.00	.00	.00	.00	5.2	6.2	5.0	.87	.11	.00
6	.00	.00	.00	.00	.00	.00	7.8	5.6	6.6	.28	.06	.00
7	.00	.00	.00	.00	.00	.00	11	5.0	7.7	.33	.06	.00
8	.00	.00	.00	.00	.00	.00	20	4.2	6.4	.15	.04	.44
9	.00	.00	.00	.00	.00	.00	18	3.7	5.6	.13	.03	.13
10	.00	.00	.00	.00	.00	.01	17	3.1	4.6	.11	.12	.01
11	.00	.00	.00	.00	.00	.02	16	2.6	3.9	.15	.04	.00
12	.00	.00	.00	.00	.00	.06	15	2.2	3.6	.13	.00	.00
13	.00	.00	.00	.00	.00	.14	15	2.0	3.7	.09	.00	.00
14	.00	.00	.00	.00	.00	.27	17	1.6	3.7	.66	.00	.00
15	.00	.00	.00	.00	.00	.64	17	1.2	3.2	.11	.00	.00
16	.00	.00	.00	.00	.00	1.1	15	.44	2.3	.11	.02	.00
17	.00	.00	.00	.00	.00	1.1	17	.98	2.3	.06	.00	.00
18	.00	.00	.00	.00	.00	.98	16	.66	2.5	.06	.00	.00
19	.00	.00	.00	.00	.00	.80	13	1.5	1.4	.02	.00	.00
20	.00	.00	.00	.00	.00	.71	11	.98	1.2	.00	.00	.00
21	.00	.00	.00	.00	.00	.63	8.6	2.9	.98	.00	.00	.00
22	.00	.00	.00	.00	.00	.58	7.1	5.2	.75	.00	.00	.00
23	.00	.00	.00	.00	.00	.56	7.1	3.7	.75	.00	.04	.13
24	.00	.00	.00	.00	.00	.66	8.3	2.8	.66	.00	.75	.75
25	.00	.00	.00	.00	.00	.92	8.2	2.0	.33	.02	.28	.44
26	.00	.00	.00	.00	.00	1.2	7.3	1.7	.22	.00	.15	.13
27	.00	.00	.00	.00	.00	1.7	6.3	5.2	.18	.00	.09	.06
28	.00	.00	.00	.00	.00	2.4	5.5	16	.18	.00	.22	.04
29	.00	.00	.00	.00	---	3.0	4.6	14	.13	.00	2.4	.04
30	.00	.00	.00	.00	---	3.0	4.1	12	.22	.01	4.0	.02
31	.00	---	.00	.00	---	2.6	---	10	---	.00	1.4	---
TOTAL	.00	.00	.00	.00	.00	23.08	309.9	135.86	97.60	6.88	9.90	2.23
MEAN	.000	.000	.000	.000	.000	.74	10.3	4.38	3.25	.22	.32	.074
MAX	.00	.00	.00	.00	.00	3.0	20	16	8.4	1.8	4.0	.75
MIN	.00	.00	.00	.00	.00	.00	2.5	.44	.13	.00	.00	.00
AC-FT	.00	.00	.00	.00	.00	46	615	269	194	14	20	4.4

CAL YR 1976 TOTAL 7077.99 MEAN 19.3 MAX 606 MIN .00 AC-FT 14040
WTR YR 1977 TOTAL 585.45 MEAN 1.60 MAX 20 MIN .00 AC-FT 1160

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND

LOCATION.--Lat 48°34'20", long 97°08'50", in SE 1/4 SE 1/4 SE 1/4 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) above mean sea level (Minnesota Department of Transportation benchmark). Prior to Nov. 30, 1954, nonrecording gage at site 1.5 mi (2.4 km) upstream at datum 1.59 ft (0.485 m) higher.

REMARKS.--Records good except those for winter and missing gage height periods, which are fair. Some regulation by reservoirs on tributaries.

AVERAGE DISCHARGE.--28 years (1949-77), 3,742 ft^3/s (106.0 m^3/s) 2,711,000 acre-ft/yr (3.34 km^3/yr); median of yearly mean discharges, 2,650 ft^3/s (75.0 m^3/s) 1,920,000 acre-ft/yr (2.4 km^3/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 86,500 ft^3/s (2,450 m^3/s) May 12, 1950, gage height, 41.58 ft (12.674 m), former site and datum; 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 May 12, 1950. 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, 3,400 ft^3/s (96.3 m^3/s) Apr. 9; gage height, 12.12 ft (3.694 m) (backwater from ice); minimum, 103 ft^3/s (2.92 m^3/s) Aug. 30, gage height, 8.96 ft (2.731 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	467	302	160	190	195	220	1080	830	1300	406	406	245
2	481	312	150	190	195	220	1390	770	1320	406	358	250
3	488	346	145	200	195	220	1640	743	1290	394	358	250
4	467	394	140	200	195	220	1910	689	1280	430	340	178
5	454	352	130	200	195	220	2080	670	1240	509	334	182
6	418	340	130	200	195	220	2210	660	1190	586	340	412
7	400	302	125	200	200	220	2400	648	1090	689	329	474
8	376	280	120	200	200	220	2580	600	1000	880	329	467
9	382	280	120	200	200	220	3120	672	920	1130	291	448
10	370	280	122	200	200	220	3250	1400	830	1270	245	495
11	358	270	125	200	200	220	2910	1760	752	1270	250	495
12	364	270	125	200	200	220	2780	1530	716	1140	235	509
13	370	270	125	200	200	235	2620	1260	640	990	235	488
14	340	280	130	200	200	250	2470	1030	565	910	240	495
15	334	280	130	200	200	280	2290	910	495	830	230	481
16	376	280	135	200	200	296	2000	810	442	698	204	474
17	370	280	140	200	200	340	1800	716	442	640	217	467
18	376	280	145	200	200	388	1650	624	454	586	212	460
19	394	280	150	200	200	436	1500	551	424	551	217	467
20	376	280	152	195	200	488	1300	502	418	544	212	467
21	376	280	155	195	200	551	1200	488	406	530	217	481
22	364	275	160	195	200	565	1100	593	382	502	204	481
23	334	260	165	195	200	624	1050	1270	358	502	199	481
24	329	250	170	195	200	632	1100	1910	318	488	186	586
25	324	240	175	195	210	640	1150	1530	318	481	182	624
26	334	230	175	195	220	640	1150	1170	285	454	182	743
27	334	220	180	195	220	650	1130	940	324	430	190	830
28	340	210	185	195	220	680	1060	780	340	418	150	930
29	324	195	185	195	---	870	980	734	376	394	136	1070
30	307	180	190	195	---	970	905	1020	376	382	129	1200
31	302	---	190	195	---	1110	---	1270	---	358	186	---
TOTAL	11629	8298	4629	6120	5640	13285	53805	29080	20291	19798	7543	15630
MEAN	375	277	149	197	201	429	1794	938	676	639	243	521
MAX	488	394	190	200	220	1110	3250	1910	1320	1270	406	1200
MIN	302	180	120	190	195	220	905	488	285	358	129	178
AC-FT	23070	16460	9180	12140	11190	26350	106700	57680	40250	39270	14960	31000

CAL YR 1976 TOTAL 877031 MEAN 2396 MAX 27500 MIN 120 AC-FT 1740000
WTR YR 1977 TOTAL 195748 MEAN 536 MAX 3250 MIN 120 AC-FT 388300

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 2 mi (3 km) downstream from dam at outlet of Bronson Lake.

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

PERIOD OF RECORD.--September 1928 to November 1936, April to September 1937, April 1941 to October 1943, April to December 1944, April 1945 to September 1947, October 1953 to 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) above mean sea level (Minnesota Department of Transportation bench mark). Prior to Nov. 23, 1953, nonrecording gage at bridge 100 ft (30 m) downstream at datum 2.00 ft (0.610 m) higher. Nov. 23, 1953, to Oct. 5, 1963, water-stage recorder at same site at datum 2.00 ft (0.610 m) higher.

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

AVERAGE DISCHARGE.--36 years (water years 1929-36, 1942, 1943, 1946, 1947, 1954-77), 89.7 ft^3/s (2.540 m^3/s), 64,990 acre-ft/yr (80.1 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, 219 ft^3/s (6.20 m^3/s) Apr. 8, gage height, 5.06 ft (1.542 m); minimum daily, 0.37 ft^3/s (0.010 m^3/s) Dec. 14-22; minimum gage height, 3.25 ft (0.991 m) May 9, July 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.1	.81	.88	.43	.69	.70	4.5	3.0	50	2.1	1.7	3.4
2	2.6	.60	.81	.44	.69	.66	3.8	2.8	65	2.2	1.9	2.9
3	3.9	.59	.75	.45	.69	.64	3.3	3.0	49	4.1	2.0	3.3
4	4.9	.67	.70	.46	.69	.62	3.2	3.6	35	3.0	1.8	3.4
5	5.2	.81	.65	.47	.70	.61	3.1	4.6	28	3.0	54	2.4
6	5.4	.79	.60	.48	.72	.60	3.1	2.8	20	2.6	8.0	2.0
7	4.9	.86	.54	.49	.73	.60	100	2.5	15	2.7	2.4	1.8
8	5.0	1.0	.49	.50	.75	1.0	192	2.2	11	2.5	2.3	2.1
9	5.2	1.0	.45	.52	.79	1.6	132	1.6	8.2	2.2	1.7	2.8
10	5.0	1.0	.42	.53	.82	2.5	88	3.4	6.3	2.3	2.0	2.1
11	5.0	1.0	.40	.54	.86	3.0	94	2.8	5.4	2.4	1.9	1.6
12	5.1	1.0	.39	.56	.89	3.1	143	2.5	5.0	2.7	1.8	1.6
13	4.9	1.1	.38	.58	.93	3.2	75	2.2	5.9	2.2	2.0	1.4
14	5.1	1.1	.37	.60	.96	2.9	35	2.0	71	4.1	2.0	1.5
15	5.1	1.1	.37	.62	.99	2.5	33	3.0	12	2.9	1.8	1.7
16	5.3	1.1	.37	.62	1.0	2.0	28	3.6	2.3	2.4	1.8	2.6
17	5.2	1.3	.37	.63	1.0	1.6	24	2.5	2.2	2.5	1.8	2.8
18	32	1.3	.37	.65	1.0	1.3	21	2.2	2.4	2.6	1.8	2.5
19	71	1.3	.37	.66	1.0	1.1	17	4.0	1.6	2.0	3.8	2.6
20	41	1.3	.37	.67	1.0	1.0	14	3.4	1.6	2.4	3.4	2.8
21	1.3	1.3	.37	.68	.97	.95	11	2.8	1.5	2.0	3.8	2.8
22	.50	1.3	.37	.68	.95	.94	10	2.8	1.6	1.7	3.5	2.9
23	.56	1.4	.38	.69	.91	.97	7.0	3.0	1.8	1.4	3.2	2.8
24	.71	1.3	.38	.69	.87	1.0	5.5	3.6	1.8	1.4	2.9	4.0
25	.65	1.3	.39	.69	.84	3.2	5.2	3.6	1.6	1.4	3.1	2.4
26	.71	1.2	.39	.70	.79	8.4	4.6	3.3	1.6	1.5	3.2	2.1
27	.73	1.1	.39	.70	.76	9.8	4.2	4.6	2.4	1.7	2.8	1.8
28	.71	1.1	.39	.70	.72	9.6	4.2	4.4	1.7	2.0	2.8	1.4
29	.61	1.0	.40	.70	---	7.6	3.4	4.4	2.0	1.8	2.9	1.3
30	.58	.93	.41	.70	---	6.3	2.8	8.7	2.7	1.6	2.5	1.3
31	.61	---	.42	.70	---	5.5	---	21	---	1.4	2.9	---
TOTAL	231.57	31.66	14.34	18.53	23.71	85.49	1074.9	119.9	415.6	70.8	133.5	70.1
MEAN	7.47	1.06	.46	.60	.85	2.76	35.8	3.87	13.9	2.28	4.31	2.34
MAX	71	1.4	.88	.70	1.0	9.8	192	21	71	4.1	54	4.0
MIN	.50	.59	.37	.43	.69	.60	2.8	1.6	1.5	1.4	1.7	1.3
AC-FT	459	63	28	37	47	170	2130	238	824	140	265	139

CAL YR 1976 TOTAL 9331.14 MEAN 25.5 MAX 956 MIN .22 AC-FT 18510
WTR YR 1977 TOTAL 2290.10 MEAN 6.27 MAX 192 MIN .37 AC-FT 4540

NOTE.--No gage-height record Jan. 11 to Feb. 28.

05102500 RED RIVER OF THE NORTH AT EMERSON, MANITOBA

(International gaging station)

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

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

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) above mean sea level, datum of 1929, by Geodetic Survey of Canada. See WSP 1728 or 1913 for history of changes prior to Apr. 10, 1953.

REMARKS.--Reoords 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.--65 years (water years 1913-77), 3,219 ft^3/s (91.16 m^3/s), 2,332,000 acre-ft/yr (2.88 km^3/yr); median of yearly mean discharges, 2,630 ft^3/s (74.5 m^3/s), 1,900,000 acre-ft/yr (2.3 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); minimum observed, 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, 4,590 ft^3/s (130 m^3/s) Apr. 10, gage height, 53.77 ft (16.389 m); minimum daily discharge, 144 ft^3/s (4.08 m^3/s) Dec. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	493	313	250	167	190	182	1220	1050	1520	401	326	206
2	490	300	244	169	197	180	1390	977	1580	409	328	232
3	490	307	235	170	204	178	1590	946	1590	433	333	259
4	482	311	222	170	209	176	1860	906	1570	448	326	280
5	476	318	210	169	211	174	2100	880	1560	438	322	256
6	466	424	195	169	205	171	2290	845	1500	471	312	225
7	445	387	174	171	191	169	2420	831	1420	550	315	295
8	417	370	160	175	187	166	2590	825	1310	635	312	464
9	395	370	154	176	196	165	3600	793	1190	777	301	534
10	382	350	153	177	201	166	4440	807	1070	1040	288	513
11	374	322	150	179	201	168	3760	1450	985	1280	262	533
12	363	299	153	180	199	172	3280	1890	899	1320	255	551
13	361	288	149	183	195	179	3020	1730	870	1210	250	559
14	357	284	145	188	194	189	2930	1450	787	1110	249	560
15	353	296	144	192	192	202	2790	1240	720	987	247	545
16	342	309	147	192	187	215	2600	1090	636	876	251	524
17	362	317	150	190	182	232	2480	985	582	760	236	517
18	370	320	154	185	180	256	2200	890	617	681	227	506
19	373	315	162	184	182	287	1960	1140	629	609	235	496
20	380	312	171	183	184	331	1740	1020	594	545	238	536
21	383	307	179	183	181	389	1560	789	530	518	243	546
22	379	302	183	184	178	462	1430	786	492	507	235	555
23	374	298	182	183	174	558	1280	1310	454	482	235	571
24	358	296	186	178	173	664	1210	2060	440	464	230	612
25	340	299	186	176	177	785	1220	2240	412	447	229	627
26	332	297	182	179	180	869	1240	1880	380	429	225	680
27	320	290	182	185	182	896	1250	1550	377	420	226	782
28	354	279	179	189	183	896	1240	1300	369	396	221	928
29	340	271	173	190	---	913	1200	1160	373	371	226	1020
30	334	261	166	190	---	955	1130	1160	390	362	204	1100
31	320	---	164	187	---	1060	---	1280	---	340	196	---
TOTAL	12005	9412	5484	5593	5315	12405	63020	37260	25846	19716	8083	16012
MEAN	387	314	177	180	190	400	2101	1202	862	636	261	534
MAX	493	424	250	192	211	1060	4440	2240	1590	1320	333	1100
MIN	320	261	144	167	173	165	1130	786	369	340	196	206
AC-FT	23810	18670	10880	11090	10540	24610	125000	73910	51270	39110	16030	31760

CAL YR 1976 TOTAL 1043532 MEAN 2851 MAX 31300 MIN 144 AC-FT 2070000
WTR YR 1977 TOTAL 220151 MEAN 603 MAX 4440 MIN 144 AC-FT 436700

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 (313.84 m) above mean sea level, adjustment of 1912.

REMARKS.--Records good except those for period of no gage-height record, Apr. 14 to May 24, 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.--31 years, 149 ft^3/s (4.220 m^3/s), 108,000 acre-ft/yr (133 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, 181 ft^3/s (5.13 m^3/s) Apr. 10, gage height, 6.21 ft (1.893 m); no flow Dec. 22 to Mar. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.32	.55	.05	.00	.00	.00	28	15	31	26	5.3	1.5
2	.32	.58	.04	.00	.00	.00	50	15	31	21	4.3	1.8
3	.35	.52	.04	.00	.00	.00	60	14	31	18	3.4	2.0
4	.35	.46	.03	.00	.00	.00	68	15	32	17	3.2	2.6
5	.28	.49	.03	.00	.00	.00	73	15	29	20	3.2	3.3
6	.24	.50	.02	.00	.00	.00	74	17	24	21	3.2	4.2
7	.24	.50	.02	.00	.00	.00	72	18	20	26	2.8	4.8
8	.26	.50	.02	.00	.00	.00	60	19	16	32	2.1	6.5
9	.29	.50	.02	.00	.00	.00	65	20	13	37	1.7	11
10	.34	.50	.02	.00	.00	.00	108	22	12	38	1.8	11
11	.34	.52	.02	.00	.00	.01	92	24	12	38	1.7	13
12	.33	.52	.01	.00	.00	.02	74	27	8.7	37	1.2	11
13	.33	.58	.01	.00	.00	.02	68	30	8.5	44	1.1	22
14	.36	.58	.01	.00	.00	.04	60	33	7.2	68	.94	25
15	.36	.58	.01	.00	.00	.20	54	38	8.5	70	.82	17
16	.31	.55	.01	.00	.00	.19	48	43	8.7	66	.55	16
17	.31	.55	.01	.00	.00	.18	44	49	11	57	.40	14
18	.33	.55	.01	.00	.00	.18	39	54	13	48	.36	12
19	.37	.52	.01	.00	.00	.17	35	56	17	40	.37	8.5
20	.39	.49	.01	.00	.00	.17	32	54	26	34	.43	15
21	.43	.46	.01	.00	.00	.16	30	60	35	29	.40	23
22	.40	.41	.00	.00	.00	.16	27	72	38	26	.36	30
23	.37	.33	.00	.00	.00	.15	25	86	40	23	.30	33
24	.35	.26	.00	.00	.00	.15	24	94	38	17	.26	48
25	.36	.20	.00	.00	.00	.15	22	85	55	12	.25	60
26	.37	.14	.00	.00	.00	.14	20	82	80	9.8	.28	84
27	.38	.11	.00	.00	.00	.20	19	64	68	7.4	.34	97
28	.96	.09	.00	.00	.00	.50	18	48	46	6.7	.46	112
29	.67	.07	.00	.00	---	3.0	17	38	36	5.7	.67	125
30	.55	.06	.00	.00	---	6.0	16	33	31	5.3	.94	125
31	.52	---	.00	.00	---	14	---	32	---	4.9	1.2	---
TOTAL	11.78	12.67	.41	.00	.00	25.79	1422	1272	826.6	904.8	44.33	939.2
MEAN	.38	.42	.013	.000	.000	.83	47.4	41.0	27.6	29.2	1.43	31.3
MAX	.96	.58	.05	.00	.00	14	108	94	80	70	5.3	125
MIN	.24	.06	.00	.00	.00	.00	16	14	7.2	4.9	.25	1.5
AC-FT	23	25	.8	.00	.00	51	2820	2520	1640	1790	88	1860

CAL YR 1976 TOTAL 17462.80 MEAN 47.7 MAX 700 MIN .00 AC-FT 34640
WTR YR 1977 TOTAL 5459.58 MEAN 15.0 MAX 125 MIN .00 AC-FT 10830

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 B indicates non-ideal colony count. Letter E indicates estimated value.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	COLOR (PLATINUM-COBALT UNITS) (00080)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L) (00310)	IMMEDIATE COLIFORM (COL. PER 100 ML) (31501)	FECAL COLIFORM .7UM-MF (COL./100 ML) (31625)
OCT												
26...	1620	1.3	1280	8.3	.5	1.0	23	11.3	84	4.8	61	79
DEC												
07...	1430	E.03	1250	7.5	--	.0	22	--	--	9.9	110	95
APR												
11...	1600	218	252	--	15.0	2.0	45	11.0	83	--	65	7
MAY												
23...	1545	22	480	7.8	22.5	19.0	33	5.6	29	8.5	101	72
JUL												
05...	1445	24	412	8.2	28.0	22.0	45	6.6	78	8.2	540	340
AUG												
15...	1500	.97	350	8.1	22.0	16.5	43	7.6	79	--	400	B110
SEP												
26...	1630	88	275	7.9	11.0	12.0	45	9.1	88	10	370	160

DATE	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML) (31673)	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)	DISSOLVED CHLORIDE (CL) (MG/L) (00940)
OCT												
26...	60	380	25	73	48	130	42	2.9	6.2	355	110	150
DEC												
07...	B34	650	82	130	80	50	14	.9	7.5	572	180	16
APR												
11...	40	130	14	32	12	3.2	5	.1	3.7	110	23	3.6
MAY												
23...	150	220	2	55	21	7.9	7	.2	3.6	220	12	3.0
JUL												
05...	710	190	8	49	16	15	15	.5	1.9	180	13	14
AUG												
15...	450	180	3	42	19	9.6	10	.3	1.5	180	20	2.9
SEP												
26...	600	160	10	40	14	3.4	4	.1	1.8	150	6.8	1.8

DATE	DISSOLVED FLUORIDE (F) (MG/L) (00950)	DISSOLVED SILICA (SIO2) (MG/L) (00955)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)	VOLATILE FILTRABLE RESIDUE (MG/L) (00520)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DISSOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED BORON (B) (UG/L) (01020)	TOTAL IRON (FE) (UG/L) (01045)	TOTAL MANGANESE (MN) (UG/L) (01055)
OCT												
26...	.6	7.4	762	170	739	2.76	.14	1.8	.89	280	1300	60
DEC												
07...	.3	20	815	272	828	--	.01	.96	.08	170	570	250
APR												
11...	.1	7.5	175	59	154	103	.42	1.4	.11	60	910	100
MAY												
23...	.1	5.9	267	131	242	16.1	.09	.59	.13	90	270	30
JUL												
05...	.1	7.9	250	115	225	16.4	.02	.51	.13	100	330	80
AUG												
15...	.1	9.8	246	84	213	.64	.01	.64	.06	100	190	30
SEP												
26...	.1	14	201	88	171	48.0	.03	.68	.07	70	180	10

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) above mean sea level. Prior to Mar. 15, 1929, nonrecording gage at same site and datum.

REMARKS.--Records good except those for winter periods and those for period of no gage-height record, which are poor.

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

AVERAGE DISCHARGE.--38 years (water years 1929, 1941-77), 59.4 ft^3/s (1.682 m^3/s), 43,040 acre-ft/yr (53.1 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, 100 ft^3/s (2.83 m^3/s) Sept. 27, gage height, 4.35 ft (1.326 m); maximum gage height, 10.13 ft (3.088 m) Mar. 4, from high-water mark (backwater from ice); no flow Dec. 8-19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.98	1.2	.40	.28	.15	.10	6.5	.72	22	5.0	1.5	.76
2	.81	1.2	.35	.27	.15	.10	10	.68	21	7.0	1.3	.63
3	.74	1.1	.30	.26	.15	.10	16	.48	17	8.9	1.3	.86
4	.74	1.4	.25	.25	.15	.10	20	.40	15	8.0	1.2	1.9
5	.76	1.6	.20	.25	.15	.10	14	.42	13	7.9	1.4	2.5
6	.85	1.4	.18	.25	.15	.15	12	.44	11	6.9	2.0	2.4
7	.94	1.3	.12	.25	.15	.20	11	.90	11	8.9	1.9	2.9
8	1.0	1.2	.00	.25	.15	.30	11	1.1	8.3	6.6	1.3	2.2
9	1.1	1.2	.00	.25	.15	.40	14	1.5	5.7	5.5	.96	2.9
10	1.0	1.2	.00	.25	.15	.50	19	1.8	4.3	6.0	.90	5.5
11	1.1	1.2	.00	.25	.15	.75	17	2.6	5.2	4.8	1.2	10
12	1.2	1.1	.00	.25	.15	1.0	14	3.0	4.8	4.8	.93	8.5
13	1.1	1.1	.00	.25	.15	1.4	13	2.2	5.8	4.7	.68	7.9
14	1.0	1.1	.00	.25	.15	1.8	12	2.0	4.6	8.1	.46	7.7
15	1.1	1.1	.00	.25	.15	2.0	11	1.4	6.9	11	.35	7.4
16	.97	1.1	.00	.20	.10	1.9	11	7.9	6.5	11	.29	6.0
17	1.0	1.2	.00	.20	.10	1.8	10	20	6.7	7.9	.22	5.4
18	.99	1.3	.00	.20	.10	1.7	9.9	11	7.8	8.1	.20	4.9
19	1.1	1.4	.00	.20	.10	1.6	9.4	6.8	16	7.5	.14	4.3
20	1.2	1.3	.40	.20	.10	1.5	9.0	8.5	14	7.0	.19	4.0
21	1.4	1.2	.50	.20	.10	1.5	8.0	7.0	10	7.9	.16	3.5
22	1.1	1.1	.45	.20	.10	1.4	6.7	12	8.4	7.2	.15	3.6
23	1.1	1.0	.40	.20	.10	1.4	5.3	17	7.0	6.2	.09	3.6
24	1.2	.90	.36	.20	.10	1.4	4.0	9.7	5.7	7.4	.09	17
25	1.0	.80	.34	.20	.10	1.4	3.0	11	5.1	5.8	.09	42
26	.97	.75	.32	.20	.10	1.5	2.3	12	4.3	4.7	.83	72
27	.89	.70	.31	.20	.10	1.6	1.8	8.3	3.7	3.7	.83	97
28	1.1	.65	.31	.20	.10	1.8	1.4	10	4.3	3.1	.68	97
29	1.3	.60	.30	.20	---	2.1	1.1	8.9	4.3	2.4	.63	86
30	1.4	.50	.30	.20	---	2.7	.89	9.3	5.2	2.1	.55	70
31	1.2	---	.29	.20	---	4.1	---	11	---	2.0	.71	---
TOTAL	32.34	32.90	6.08	7.01	3.55	38.40	284.29	190.04	264.6	198.1	23.23	580.35
MEAN	1.04	1.10	.20	.23	.13	1.24	9.48	6.13	8.82	6.39	.75	19.3
MAX	1.4	1.6	.50	.28	.15	4.1	20	20	22	11	2.0	97
MIN	.74	.50	.00	.20	.10	.10	.89	.40	3.7	2.0	.09	.63
AC-FT	64	65	12	14	7.0	76	564	377	525	393	46	1150

CAL YR 1976 TOTAL 8454.65 MEAN 23.1 MAX 185 MIN .00 AC-FT 16770
WTR YR 1977 TOTAL 1660.89 MEAN 4.55 MAX 97 MIN .00 AC-FT 3290

NOTE.--No gage-height record Jan. 9 to May 5.

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) above mean sea level, adjustment of 1928 by Geodetic Survey of Canada; gage readings have been reduced to elevations above mean sea level. 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 recorded, 1,024.75 ft (312.344 m) Apr. 6; minimum recorded, 1,020.71 ft (311.112 m) Aug. 4.

GAGE HEIGHT, IN FEET, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22.20					---	23.66	21.22	21.83	21.92	20.83	21.51
2	22.21					---	23.88	21.23	22.13	21.82	20.76	21.51
3	22.22					---	24.33	21.23	22.03	21.77	20.72	21.50
4	22.22					---	24.67	21.25	21.88	21.77	20.72	21.53
5	22.22					---	24.74	21.30	21.82	21.72	20.72	21.55
6	22.23					---	24.69	21.37	21.73	21.76	20.73	21.62
7	22.24					---	24.13	21.36	21.60	21.79	20.81	21.73
8	22.25					---	23.68	21.37	21.51	21.85	20.93	21.79
9	22.26					---	23.27	21.32	21.47	21.88	20.95	21.92
10	22.26					---	23.62	21.42	21.35	21.93	20.99	21.98
11	22.27					---	24.11	21.57	21.29	21.98	21.03	22.05
12	22.28					---	23.76	21.51	21.28	22.02	21.07	22.10
13	22.29					---	23.27	21.48	21.28	22.00	21.14	22.05
14	22.29					---	22.89	21.52	21.29	22.19	21.16	22.03
15	22.29					---	22.74	21.51	21.25	22.47	21.15	22.09
16	22.28					---	22.53	21.46	21.26	22.55	21.15	22.15
17	22.28					22.43	22.35	21.54	21.30	22.50	21.16	22.03
18	22.29					22.80	22.21	21.70	21.45	22.36	21.17	22.01
19	22.32					22.75	22.03	21.71	21.58	22.22	21.17	21.98
20	22.36					22.70	21.90	21.65	21.74	22.10	21.19	21.98
21	22.39					22.58	21.76	21.63	21.84	21.93	21.20	22.01
22	22.39					22.37	21.69	21.68	21.92	21.80	21.22	22.21
23	22.39					22.43	21.64	21.83	21.94	21.72	21.23	22.26
24	22.37					22.52	21.59	21.95	21.93	21.62	21.24	22.47
25	22.35					22.33	21.48	22.20	21.86	21.49	21.26	22.87
26	22.34					22.14	21.35	22.42	22.02	21.34	21.31	23.19
27	---					22.10	21.30	22.39	22.31	21.20	21.36	23.59
28	---					22.46	21.27	22.18	22.27	21.10	21.46	23.89
29	---					23.34	21.21	21.99	22.02	21.01	21.47	24.07
30	---					23.83	21.21	21.82	21.92	20.93	21.48	24.10
31	---					23.82	---	21.77	---	20.88	21.52	---
MEAN	---	---	---	---	---	---	22.77	21.63	21.70	21.79	21.11	22.26
MAX	---	---	---	---	---	---	24.74	22.42	22.31	22.55	21.52	24.10
MIN	---	---	---	---	---	---	21.21	21.22	21.25	20.88	20.72	21.50

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) above mean sea level, adjustment of 1928 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.--49 years, 266 ft^3/s (7.533 m^3/s), 192,700 acre-ft/yr (238 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, 267 ft^3/s (7.56 m^3/s) Apr. 11, gage height, 4.81 ft (1.466 m); maximum gage height, 5.79 ft (1.765 m) Apr. 4, (backwater from ice); no flow Jan. 3 to Mar. 3, and Aug. 23-25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.49	4.0	.64	.02	.00	.00	180	38	71	58	9.9	.23
2	.56	2.7	.60	.01	.00	.00	200	37	84	54	6.8	.06
3	.88	2.3	.55	.00	.00	.00	220	34	80	50	4.0	.02
4	1.1	2.1	.51	.00	.00	.02	230	34	71	49	2.8	.09
5	.88	2.1	.47	.00	.00	.04	240	36	66	46	2.2	.04
6	.72	2.0	.43	.00	.00	.06	240	41	61	49	2.0	.12
7	.56	2.0	.40	.00	.00	.08	230	42	54	48	1.7	.42
8	.64	2.0	.38	.00	.00	.10	210	51	48	49	2.0	.80
9	.80	1.9	.36	.00	.00	.10	200	44	41	51	1.6	1.5
10	.96	1.9	.33	.00	.00	.11	209	52	35	52	1.5	3.1
11	1.1	1.8	.31	.00	.00	.13	261	58	30	54	1.4	6.8
12	.88	1.8	.29	.00	.00	.20	228	52	28	57	1.1	21
13	.72	1.7	.28	.00	.00	.40	180	50	27	56	1.8	22
14	.88	1.7	.27	.00	.00	2.0	145	53	28	66	1.4	21
15	1.6	1.6	.25	.00	.00	1.9	133	54	26	85	1.2	24
16	1.9	1.6	.24	.00	.00	1.7	117	53	25	89	.78	35
17	1.7	1.6	.22	.00	.00	1.6	104	54	27	87	.48	31
18	1.4	1.5	.21	.00	.00	1.5	94	65	36	79	.31	30
19	1.5	1.4	.20	.00	.00	1.4	83	67	44	70	.25	29
20	2.6	1.4	.19	.00	.00	1.4	75	66	51	63	.71	27
21	6.2	1.3	.18	.00	.00	1.4	67	63	56	54	.23	26
22	10	1.2	.17	.00	.00	1.4	63	65	60	47	.05	26
23	10	1.2	.16	.00	.00	1.5	60	76	60	44	.00	27
24	9.7	1.1	.15	.00	.00	2.0	57	82	59	40	.00	45
25	10	1.0	.14	.00	.00	4.0	52	96	56	35	.00	65
26	20	.92	.13	.00	.00	10	44	109	62	30	.02	100
27	26	.86	.12	.00	.00	40	42	109	84	25	.08	150
28	20	.80	.11	.00	.00	60	44	95	81	21	.25	213
29	19	.75	.10	.00	---	86	38	84	66	18	.11	233
30	11	.69	.08	.00	---	115	38	74	57	14	.06	239
31	6.2	---	.05	.00	---	150	---	70	---	11	.17	---
TOTAL	169.97	48.92	8.52	.03	.00	484.04	4084	1904	1574	1551	44.90	1377.18
MEAN	5.48	1.63	.27	.001	.000	15.6	136	61.4	52.5	50.0	1.45	45.9
MAX	26	4.0	.64	.02	.00	150	261	109	84	89	9.9	239
MIN	.49	.69	.05	.00	.00	.00	38	34	25	11	.00	.02
AC-FT	337	97	17	.06	.00	960	8100	3780	3120	3080	89	2730

CAL YR 1976 TOTAL 40300.71 MEAN 110 MAX 1230 MIN .05 AC-FT 79940
WTR YR 1977 TOTAL 11246.56 MEAN 30.8 MAX 261 MIN .00 AC-FT 22310

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, publiahed 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) above mean sea level, adjustment of 1928, 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 and those for period of no gage-height record, 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.--20 years (water years 1921-30, 1933, 1937, 1941-43, 1973-77), 290 ft^3/s (8.213 m^3/s), 210,100 acre-ft/yr (259 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, 380 ft^3/s (10.8 m^3/s) Apr. 10, from correlation with nearby stations, gage height, 4.10 ft (2.25 m), from highwater mark, (backwater from ice); minimum daily discharge, 3.5 ft^3/s (0.099 m^3/s) Jan 17 to Feb. 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.7	24	8.4	4.7	3.5	5.7	87	31	87	76	16	11
2	5.2	22	8.2	4.6	3.5	5.7	110	29	76	69	15	12
3	5.5	19	8.1	4.5	3.5	5.7	127	25	85	65	14	9.7
4	6.7	14	8.0	4.4	3.5	5.7	136	22	92	57	13	11
5	6.1	22	7.8	4.3	3.5	5.8	113	22	81	55	12	12
6	7.1	18	7.7	4.2	3.5	5.8	196	20	70	54	10	13
7	6.1	13	7.5	4.1	3.5	5.8	220	23	64	49	9.9	14
8	5.2	17	7.4	4.0	3.5	5.8	245	22	56	49	9.5	14
9	5.0	17	7.2	3.9	3.6	5.8	280	25	48	50	8.6	18
10	5.0	16	7.0	3.8	3.7	5.9	365	34	42	50	8.8	18
11	5.8	16	6.9	3.8	3.8	6.2	345	36	39	53	8.3	18
12	6.6	15	6.8	3.7	3.9	6.5	323	38	33	58	10	15
13	6.9	15	6.7	3.7	4.0	6.7	280	40	32	59	17	14
14	7.8	14	6.5	3.6	4.1	6.9	250	36	30	64	19	19
15	8.4	14	6.4	3.6	4.2	7.0	227	38	29	66	15	22
16	11	14	6.3	3.6	4.3	7.0	206	42	29	82	13	22
17	11	13	6.2	3.5	4.5	6.9	184	38	29	93	10	26
18	11	13	6.1	3.5	4.6	6.9	171	40	32	98	9.1	34
19	14	12	6.0	3.5	4.8	6.8	143	47	34	92	8.8	31
20	16	12	5.8	3.5	4.9	6.7	118	58	41	81	9.2	30
21	18	11	5.7	3.5	5.0	6.6	99	50	45	71	8.8	30
22	16	11	5.6	3.5	5.1	6.5	83	51	53	63	8.8	31
23	17	10	5.5	3.5	5.2	6.4	73	52	60	52	7.7	33
24	20	10	5.4	3.5	5.3	6.3	64	56	64	46	6.7	46
25	19	9.8	5.3	3.5	5.4	6.3	57	63	62	40	5.5	63
26	24	9.6	5.2	3.5	5.5	6.3	51	80	60	35	5.8	97
27	25	9.3	5.1	3.5	5.6	41	44	108	62	31	7.4	130
28	34	9.1	5.0	3.5	5.6	64	38	116	82	27	11	163
29	40	8.9	5.0	3.5	---	65	36	107	97	25	11	196
30	33	8.7	4.9	3.5	---	34	32	96	92	22	11	220
31	25	---	4.8	3.5	---	54	---	95	---	18	10	---
TOTAL	426.1	417.4	198.5	117.0	121.1	421.7	4703	1540	1706	1750	329.9	1372.7
MEAN	13.7	13.9	6.40	3.77	4.33	13.6	157	49.7	56.9	56.5	10.6	45.8
MAX	40	24	8.4	4.7	5.6	65	365	116	97	98	19	220
MIN	4.7	8.7	4.8	3.5	3.5	5.7	32	20	29	18	5.5	9.7
AC-FT	845	828	394	232	240	836	9330	3050	3380	3470	654	2720

CAL YR 1976	TOTAL	46707.5	MEAN	128	MAX	1320	MIN 3.2	AC-FT	92640
WTR YR 1977	TOTAL	13103.4	MEAN	35.9	MAX	365	MIN 3.5	AC-FT	25990

NOTE.--No gage-height record Dec. 9 to Apr. 14.

05112000 ROSEAU RIVER BELOW STATE DITCH 51, NEAR CARIBOU, MN--Continued
(National atream-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.--Less than 50 percent of the daily specific conductance record was obtained because of instrument malfunctions. Letter B indicates non-ideal colony count. Letters ND indicate none detected.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	COLOR (PLATINUM-COBALT UNITS) (00080)	TURBIDITY (JTU) (00070)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
OCT										
27...	1110	25	560	8.2	-5.0	.0	45	8	14.1	100
DEC										
08...	1500	7.4	891	8.2	--	.0	65	--	--	--
JAN										
18...	1215	3.4	905	7.2	-15.0	.0	45	15	--	--
MAR										
01...	1315	5.6	550	7.1	-5.0	.5	90	10	1.6	11
APR										
12...	1300	323	300	--	19.0	5.0	55	--	11.2	91
MAY										
24...	1300	53	475	8.2	29.0	21.0	42	6	9.0	103
JUL										
06...	1510	53	324	8.2	30.0	24.5	55	35	6.9	88
AUG										
16...	1230	12	340	7.8	18.0	18.0	55	--	8.9	98
SEP										
27...	1600	133	400	8.1	18.0	13.0	55	10	8.4	81

DATE	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L) (00310)	IMMEDIATE COLIFORM (COL. PER 100 ML) (31501)	FECAL COLIFORM .7UM-MF (COL./ 100 ML) (31625)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML) (31673)	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)
OCT									
27...	4.2	810	8	823	290	14	61	34	9.2
DEC									
08...	5.7	102	82	813	510	29	110	56	14
JAN									
18...	14	860	86	88	480	0	110	50	12
MAR									
01...	10	824	812	57	290	0	70	27	6.9
APR									
12...	--	48	5	79	150	25	36	14	4.4
MAY									
24...	3.3	220	58	69	230	21	56	23	8.4
JUL									
06...	7.7	8340	140	78	170	8	41	17	4.6
AUG									
16...	--	330	68	60	210	4	44	24	6.5
SEP									
27...	5.0	300	110	290	220	19	50	22	11

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)	DISSOLVED CHLORIDE (CL) (MG/L) (00940)	DISSOLVED FLUORIDE (F) (MG/L) (00950)	DISSOLVED SILICA (SIO2) (MG/L) (00955)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)
OCT									
27...	6	.2	2.0	278	35	2.4	.2	3.4	344
DEC									
08...	6	.3	3.8	477	48	3.2	.2	9.5	592
JAN									
18...	5	.2	2.4	500	14	3.3	.2	25	558
MAR									
01...	5	.2	1.7	303	12	2.4	.1	20	340
APR									
12...	6	.2	4.4	120	23	4.4	.1	8.0	202
MAY									
24...	7	.2	3.6	210	26	3.3	.1	3.2	279
JUL									
06...	5	.2	1.5	160	12	1.6	.1	7.7	215
AUG									
16...	6	.2	1.2	210	9.1	1.8	.1	4.6	255
SEP									
27...	10	.3	2.6	200	21	4.6	.1	11	269

DATE	VOLATILE FILTRABLE RESIDUE (MG/L) (00520)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DISSOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED BORON (B) (UG/L) (01020)	TOTAL IRON (FE) (UG/L) (01045)	TOTAL MANGANESE (MN) (UG/L) (01055)
OCT									
27...	161	315	23.4	.03	1.5	.08	130	430	40
DEC									
08...	265	531	11.8	.08	4.1	.05	180	580	140
JAN									
18...	240	523	5.26	.08	2.9	.20	110	4800	1400
MAR									
01...	139	323	5.20	.01	.97	.13	50	2500	560
APR									
12...	75	168	176	.57	1.5	.09	80	640	60
MAY									
24...	89	252	40.1	.06	.54	.09	90	180	40
JUL									
06...	68	184	30.8	.04	.75	.11	90	830	80
AUG									
16...	141	215	8.26	.02	.85	.03	130	260	20
SEP									
27...	78	241	96.6	.01	.66	.06	90	450	30

DATE	TIME	TOTAL ARSENIC (AS) (UG/L) (01002)	DISSOLVED ARSENIC (AS) (UG/L) (01000)	TOTAL CADMIUM (CD) (UG/L) (01027)	DISSOLVED CADMIUM (CD) (UG/L) (01025)	TOTAL CHROMIUM (CR) (UG/L) (01034)	DISSOLVED CHROMIUM (CR) (UG/L) (01030)	TOTAL COBALT (CO) (UG/L) (01037)	DISSOLVED COBALT (CO) (UG/L) (01035)	TOTAL COPPER (CU) (UG/L) (01042)	DISSOLVED COPPER (CU) (UG/L) (01040)
OCT											
27...	1110	1	1	<10	0	10	0	<50	2	<10	0
JAN											
18...	1215	2	2	10	1	0	0	<50	2	<10	1
MAY											
24...	1300	2	2	<10	1	0	0	<50	0	10	2
AUG											
16...	1230	3	3	<10	0	12	0	<50	1	<10	2

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DIS-SOLVED IRON (FE) (UG/L) (01046)	TOTAL LEAD (PB) (UG/L) (01051)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	TOTAL MERCURY (HG) (UG/L) (71900)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	TOTAL SELE-NIUM (SE) (UG/L) (01147)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	TOTAL ZINC (ZN) (UG/L) (01092)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	TOTAL ORGANIC CARBON (C) (MG/L) (00680)
OCT											
27...	60	100	0	20	.0	.0	0	0	10	0	35
JAN											
18...	4200	100	2	1400	.1	.1	0	0	10	10	--
MAY											
24...	40	<100	6	30	.0	.0	0	0	10	10	16
AUG											
16...	80	<100	2	20	.1	.0	0	0	30	20	24

DATE	TIME	TOTAL ALDRIN (UG/L) (39330)	ALDRIN IN BOTTOM MA-TERIAL (UG/KG) (39333)	TOTAL ATRA-ZINE (UG/L) (39630)	ATRA-ZINE IN BOTTOM MATERI-AL (UG/KG DRY SOLIDS) (39631)	TOTAL CHLOR-DANE (UG/L) (39350)	CHLOR-DANE IN BOTTOM MA-TERIAL (UG/KG) (39351)	TOTAL DDD (UG/L) (39360)	DDD IN BOTTOM MA-TERIAL (UG/KG) (39363)	TOTAL DDE (UG/L) (39365)
OCT										
27...	1110	ND	--	ND	--	ND	--	ND	--	ND
JAN										
18...	1810	ND	--	ND	--	ND	--	ND	--	ND
MAY										
24...	1200	ND	ND	ND	--	ND	ND	ND	ND	ND
27...	1200	ND	--	--	ND	ND	--	ND	--	ND
AUG										
16...	1230	ND	--	ND	--	ND	--	ND	--	ND

DATE	DDE IN BOTTOM MA-TERIAL (UG/KG) (39368)	TOTAL DDT (UG/L) (39370)	DDT IN BOTTOM MA-TERIAL (UG/KG) (39373)	TOTAL DI-AZINON (UG/L) (39570)	DI-AZINON IN BOTTOM MA-TERIAL (UG/KG) (39571)	TOTAL DI-ELDRIN (UG/L) (39380)	DI-ELDRIN IN BOTTOM MA-TERIAL (UG/KG) (39383)	TOTAL ENDRIN (UG/L) (39390)	ENDRIN IN BOTTOM MA-TERIAL (UG/KG) (39393)	TOTAL ETHION (UG/L) (39398)
OCT										
27...	--	ND	--	ND	--	ND	--	ND	--	ND
JAN										
18...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY										
24...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
27...	--	ND	--	ND	--	ND	--	ND	--	ND
AUG										
16...	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	ETHION IN BOTTOM MA-TERIAL (UG/KG) (39399)	TOTAL HEPTA-CHLOR (UG/L) (39410)	HEPTA-CHLOR IN BOTTOM MA-TERIAL (UG/KG) (39413)	TOTAL HEPTA-CHLOR EPOXIDE (UG/L) (39420)	HEPTA-CHLOR EPOXIDE IN BOT-TOM MA-TERIAL (UG/KG) (39423)	TOTAL LINDANE (UG/L) (39340)	LINDANE IN BOTTOM MA-TERIAL (UG/KG) (39343)	TOTAL MALA-THION (UG/L) (39530)	MALA-THION IN BOTTOM MA-TERIAL (UG/KG) (39531)	TOTAL METH-OXY-CHLOR (UG/L) (39480)
OCT										
27...	--	ND	--	ND	--	ND	--	ND	--	ND
JAN										
18...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY										
24...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
27...	--	ND	--	ND	--	ND	--	ND	--	ND
AUG										
16...	--	ND	--	ND	--	ND	--	ND	--	ND

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	METHOXYCHLOR IN BOTTOM MATERIAL (UG/KG) (39481)	TOTAL METHYL PARATHION (UG/L) (39600)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG) (39601)	TOTAL METHYL TRITHION (UG/L) (39790)	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG) (39791)	TOTAL PARATHION (UG/L) (39540)	PARATHION IN BOTTOM MATERIAL (UG/KG) (39541)	TOTAL TOXAPHENE (UG/L) (39400)	TOXAPHENE IN BOTTOM MATERIAL (UG/KG) (39403)	TOTAL TRITHION (UG/L) (39786)
OCT										
27...	--	ND	--	ND	--	ND	--	ND	--	ND
JAN										
18...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY										
24...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
27...	--	ND	--	ND	--	ND	--	ND	--	ND
AUG										
16...	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	TRITHION IN BOTTOM MATERIAL (UG/KG) (39787)	TOTAL 2,4-D (UG/L) (39730)	2,4-D IN BOTTOM MATERIAL (UG/KG) (39731)	TOTAL 2,4,5-T (UG/L) (39740)	2,4,5-T IN BOTTOM MATERIAL (UG/KG) (39741)	TOTAL SILVEX (UG/L) (39760)	SILVEX IN BOTTOM MATERIAL (UG/KG) (39761)	SIMAZINE TOTAL COULSON COND. (UG/L) (39025)	SIMAZINE IN BOTTOM MATERIAL (UG/KG DRY SOLIDS) (39046)
OCT									
27...	--	ND	--	ND	--	ND	--	ND	--
JAN									
18...	--	ND	--	ND	--	ND	--	ND	--
MAY									
24...	ND	ND	--	ND	--	ND	--	ND	--
27...	--	--	ND	--	ND	--	ND	--	ND
AUG									
16...	--	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)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS) (70950)	SAMPLING METHOD
JUL								
06...	1510	43	48.4	42.4	.000	1.30	.00	POLYETHYLENE STRIP

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

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	OCT 27,76		DEC 8,76		JAN 18,77		MAR 1,77	
TIME	1110		1500		1215		1315	
TOTAL CELLS/ML	2100		770		14000		13000	
DIVERSITY: DIVISION	1.2		1.6		0.0		0.0	
.CLASS	1.9		1.9		0.0		0.0	
..ORDER	2.4		2.3		0.1		0.0	
...FAMILY	2.7		3.0		0.1		0.0	
....GENUS	2.7		3.0		0.1		0.0	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...COELASTRACEAE								
....COELASTRUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	83	4	25	3	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-
....NEPHROCYTIUM	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	--	-	--	-	--	-	*	0
....TETRASTRUM	--	-	25	3	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	97	5	120#	16	--	-	--	-
...PHACOTACEAE								
....PHACOTUS	--	-	--	-	--	-	--	-
...VOLVOCACEAE								
....GONIUM	--	-	25	3	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	300	15	75	10	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....SYNEDRA	--	-	*	0	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	41	2	--	-	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	800#	39	44	6	*	0	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBRYON	350#	17	12	2	--	-	--	-
....OCHROMONAS	--	-	--	-	--	-	--	-
...SYNURACEAE								
....SYNURA	--	-	25	3	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROCCOCCALES								
...CHROCCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	--	-	88	1	--	-
..HORMOGONALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	55	3	--	-	14000#	99	13000#	100
..CHROCCOCCALES								
...CHROCCOCCACEAE								
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-

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, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	OCT 27,76 1110		DEC 8,76 1500		JAN 18,77 1215		MAR 1,77 1315	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
EUGLENOPHYTA (EUGLENOIDS)								
.CRYPTOPHYCEAE								
..CRYPTOMONIDALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	140	7	160#	20	--	-	--	-
...CRYPTOMONODACEAE								
....CRYPTOMONAS	140	7	220#	28	--	-	--	-
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	28	1	6	1	*	0	--	-
....PHACUS	--	-	--	-	--	-	--	-
....TRACHELOMONAS	28	1	6	1	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	19	2	--	-	--	-
...PERIDINIACEAE								
....PERIDINIUM	--	-	6	1	--	-	--	-

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, OCTOBER 1976 TO SEPTEMBER 1977

DATE	MAY 24,77		JUL 6,77		AUG 16,77		SEP 27,77	
TIME	1300		1510		1230		1600	
TOTAL CELLS/ML	1200		200		540		510	
DIVERSITY: DIVISION	1.6		1.4		1.8		1.0	
.CLASS	1.8		1.4		1.9		1.0	
..ORDER	2.5		1.4		2.3		1.7	
...FAMILY	2.9		2.2		2.9		1.9	
....GENUS	3.0		2.2		2.9		1.9	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLORDCOCCALES								
...COELASTRACEAE								
....COELASTRUM	--	-	--	-	52	10	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	14	1	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	21	2	--	-	15	3	34	7
....CHODATELLA	31	3	--	-	--	-	--	-
....NEPHROCYTIUM	--	-	--	-	30	6	--	-
....OOCYSTIS	--	-	40#	20	--	-	--	-
....SELENASTRUM	59	5	--	-	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	69	6	40#	20	--	-	68	13
....TETRASTRUM	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	17	1	--	-	22	4	--	-
...PHACOTACEAE								
....PHACOTUS	7	1	--	-	37	7	--	-
...VOLVOCACEAE								
....GONIUM	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	17	1	--	-	30	6	--	-
..PENNALES								
...ACHNANTHACEAE								
....COCCONEIS	--	-	10	5	7	1	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	7	1	--	-
...FRAGILARIACEAE								
....SYNEDRA	--	-	10	5	--	-	11	2
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	7	1	--	-
...NAVICULACEAE								
....NAVICULA	80	7	80#	40	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	86	7	--	-	90#	17	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	--	-	--	-
....OCHROMONAS	48	4	--	-	7	1	--	-
...SYNURACEAE								
....SYNURA	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROCCOCCALES								
...CHROCCOCCACEAE								
....AGMENELLUM	--	-	--	-	*	0	--	-
....ANACYSTIS	250#	21	--	-	--	-	--	-
..HORMOGONALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	420#	35	--	-	200#	38	110#	22
..CHROCCOCCALES								
...CHROCCOCCACEAE								
....GOMPHOSPHAERIA	--	-	--	-	--	-	270#	53

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, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	MAY 24,77 1300		JUL 6,77 1510		AUG 16,77 1230		SEP 27,77 1600	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
EUGLENOPHYTA (EUGLENOIDS)								
.CRYPTOPHYCEAE								
..CRYPTOMONIDALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	10	1	--	-	--	-	6	1
...CRYPTOMONODACEAE								
....CRYPTOMONAS	62	5	20	10	30	6	--	-
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	*	0	--	-	--	-	--	-
....PHACUS	--	-	--	-	--	-	6	1
....TRACHELOMONAS	*	0	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	--	-	--	-
...PERIDINIACEAE								
....PERIDINIUM	--	-	--	-	--	-	--	-

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

SUSPENDED-SEDIMENT DISCHARGE

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)	SUS. SED. FALL DIAM. % FINER THAN .062 MM
JAN						
18...	1215	3.5	.0	183	1.7	32
APR						
12...	1330	323	5.0	4	3.5	78
MAY						
24...	1415	53	21.0	3	.43	91
JUL						
06...	1515	53	27.0	41	5.9	--
AUG						
16...	1230	12	18.0	7	.23	68
SEP						
27...	1600	133	13.0	14	5.0	95

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

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	410	405	505	500								
2	410	410	510	505								
3	410	410	520	510								
4	410	410	530	520								
5	410	400	540	530								
6	410	405	555	540								
7	420	410	575	555								
8	425	420	585	570								
9	430	425	590	585								
10	435	430	590	580								
11	440	435	595	585								
12	435	435	600	590								
13	435	435	620	600								
14	440	435	630	620								
15	445	445	635	625								
16	445	445	640	635								
17	---	---	640	630								
18	---	---	635	630								
19	---	---	630	620								
20	---	---	625	625								
21	---	---	625	620								
22	---	---	640	625								
23	---	---	650	640								
24	---	---	650	645								
25	---	---	650	650								
26	---	---	---	---								
27	560	545	---	---								
28	545	520	---	---								
29	530	505	---	---								
30	505	505	---	---								
31	505	505	---	---								
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	---	---	---	---	410	405	---	---	---	---	295	295
2	---	---	---	---	405	405	---	---	---	---	300	295
3	---	---	---	---	405	390	---	---	---	---	310	300
4	---	---	---	---	415	400	---	---	---	---	305	300
5	---	---	---	---	400	400	---	---	---	---	310	305
6	290	280	---	---	395	395	335	325	---	---	315	310
7	295	265	---	---	395	395	340	335	---	---	315	315
8	290	260	---	---	395	395	355	340	---	---	320	315
9	290	290	---	---	395	395	370	350	---	---	315	310
10	---	---	---	---	395	390	385	370	---	---	315	315
11	---	---	---	---	395	395	385	380	---	---	315	315
12	---	---	---	---	390	390	390	385	---	---	330	315
13	---	---	---	---	390	390	395	390	---	---	340	330
14	---	---	---	---	395	390	390	390	---	---	375	340
15	305	300	---	---	400	395	390	385	---	---	375	375
16	315	300	---	---	400	395	385	380	350	340	370	360
17	325	315	---	---	390	385	385	380	380	350	360	305
18	335	325	---	---	385	385	380	380	370	365	305	290
19	335	335	---	---	385	385	380	375	365	360	315	300
20	335	335	---	---	395	385	375	375	360	355	325	315
21	335	335	---	---	395	380	370	360	355	345	330	325
22	---	---	---	---	385	375	360	350	345	340	335	330
23	---	---	---	---	380	375	360	350	345	340	---	---
24	---	---	475	450	375	375	350	340	340	330	---	---
25	---	---	470	455	375	375	---	---	330	325	---	---
26	---	---	465	450	380	370	---	---	320	310	---	---
27	---	---	455	450	---	---	---	---	310	310	---	---
28	---	---	455	450	---	---	---	---	310	305	375	355
29	---	---	450	430	---	---	---	---	305	295	360	330
30	---	---	430	415	---	---	---	---	295	295	330	295
31	---	---	415	405	---	---	---	---	295	295	---	---

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 period of no gage-height record, Sept. 16-30, which are fair.

AVERAGE DISCHARGE.--11 years, 223 ft^3/s (6.315 m^3/s), 11.97 in/yr (304 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, 1,000 ft^3/s (28.3 m^3/s) Sept. 30, from correlation with nearby stations; minimum, 4.5 ft^3/s (0.13 m^3/s) Jan. 30 to Feb. 2, gage height, 2.14 ft (0.652 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	10	8.4	6.4	4.5	5.0	7.6	11	50	210	186	210
2	14	10	8.4	6.1	4.5	5.0	7.6	10	53	210	179	210
3	14	10	8.4	6.1	4.6	5.0	7.3	10	53	222	169	206
4	15	10	8.1	6.1	4.6	5.0	7.3	9.7	54	229	163	222
5	14	10	8.1	5.9	4.6	5.0	7.3	10	57	255	167	232
6	14	10	8.1	5.9	4.6	5.0	6.8	10	69	279	163	240
7	14	10	7.8	5.9	4.6	5.0	6.8	11	72	279	158	244
8	14	9.7	7.8	5.6	4.6	5.0	7.1	11	74	283	152	258
9	13	9.7	7.8	5.6	4.8	5.0	7.3	11	74	283	144	383
10	13	9.7	7.6	5.4	4.8	5.0	7.3	11	74	283	139	417
11	13	9.7	7.6	5.4	4.8	5.1	7.6	11	76	287	128	470
12	13	9.7	7.6	5.4	4.8	5.6	7.6	11	76	291	123	519
13	13	9.7	7.6	5.4	4.8	6.6	7.8	11	76	291	118	565
14	12	9.7	7.3	5.4	4.8	6.6	7.8	11	77	296	113	614
15	12	9.7	7.3	5.2	4.8	6.6	8.1	12	77	296	110	658
16	12	9.4	7.3	5.2	4.8	6.6	8.1	11	91	300	111	680
17	12	9.4	7.1	5.2	4.8	6.6	8.1	11	99	304	107	690
18	11	9.4	6.8	5.2	4.8	6.6	8.4	11	115	304	100	700
19	11	9.4	6.8	5.2	4.8	6.4	9.4	12	127	300	96	700
20	11	9.4	6.8	5.2	4.8	6.1	9.1	13	139	296	94	690
21	11	9.4	6.8	5.1	4.8	5.9	11	14	148	283	96	680
22	11	9.1	6.8	5.0	4.8	5.9	12	14	156	270	92	690
23	11	9.1	6.8	5.0	4.8	5.9	12	15	176	262	90	700
24	11	8.8	6.8	5.0	5.0	5.6	12	16	189	255	85	720
25	11	8.8	6.6	5.0	5.0	5.6	12	16	194	232	82	750
26	11	8.8	6.4	4.8	5.0	5.6	11	17	197	219	94	780
27	11	8.8	6.4	4.8	5.0	5.9	11	18	203	213	144	810
28	10	8.8	6.4	4.8	5.0	6.6	11	18	206	210	210	850
29	10	8.4	6.4	4.6	---	7.1	11	19	203	206	200	900
30	10	8.4	6.4	4.6	---	7.6	11	20	203	197	194	950
31	10	---	6.4	4.5	---	7.6	---	28	---	194	203	---
TOTAL	376	283.0	224.9	165.0	133.6	182.1	268.4	413.7	3458	8039	4210	16738
MEAN	12.1	9.43	7.25	5.32	4.77	5.87	8.95	13.3	115	259	136	558
MAX	15	10	8.4	6.4	5.0	7.6	12	28	206	304	210	950
MIN	10	8.4	6.4	4.5	4.5	5.0	6.8	9.7	50	194	82	206
CFSM	.05	.04	.03	.02	.02	.02	.04	.05	.46	1.02	.54	2.21
IN.	.06	.04	.03	.02	.02	.03	.04	.06	.51	1.18	.62	2.46

CAL YR 1976 TOTAL 60535.9 MEAN 165 MAX 1710 MIN 6.4 CFSM .65 IN 8.90
WTR YR 1977 TOTAL 34491.7 MEAN 94.5 MAX 950 MIN 4.5 CFSM .37 IN 5.07

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 B indicates non-ideal colony count.

COOPERATION.--Minnesota Pollution Control Administration personnel collected samples on days that heavy metals were collected.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.5°C July 9, 10, 11, 12, 13, 1974; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 23.5°C July 23 to Aug. 2; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)	IMMEDIATE COLIFORM (COL. PER 100 ML) (31501)	FECAL COLIFORM .7UM-MF (COL./ 100 ML) (31625)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML) (31673)
DEC											
07...	1030	7.7	38	7.6	-30.0	1.5	--	--	66	<1	<1
FEB											
01...	1100	4.3	39	7.5	-5.0	1.0	12.2	89	68	<1	26
APR											
26...	0945	11	35	7.9	12.0	11.0	11.0	102	140	<1	8340
AUG											
29...	1515	195	38	7.1	23.5	17.0	8.5	91	10	7	200

DATE	HARDNESS (CA,MG) (MG/L) (00900)	NON-CARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)
DEC										
07...	15	8	3.2	1.7	1.0	12	.1	.4	7	6.6
FEB										
01...	16	2	3.6	1.6	1.0	12	.1	.4	13	6.1
APR										
26...	16	6	3.8	1.6	1.3	15	.1	.4	10	4.3
AUG										
29...	15	4	4.0	1.3	1.1	13	.1	.3	11	3.9

DATE	DISSOLVED CHLORIDE (CL) (MG/L) (00940)	DISSOLVED FLUORIDE (F) (MG/L) (00950)	DISSOLVED SILICA (SIO2) (MG/L) (00955)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L) (70300)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L) (70301)	DISSOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	TOTAL IRON (FE) (UG/L) (01045)	TOTAL MANGANESE (MN) (UG/L) (01055)
DEC										
07...	.6	.0	3.1	38	21	.79	.02	.03	140	0
FEB										
01...	.5	.0	3.7	40	25	.47	.07	.06	160	20
APR										
26...	.5	.1	3.3	42	21	1.25	.02	.02	210	20
AUG										
29...	.5	.0	2.6	29	21	15.3	.02	.02	240	20

05124480 KAWISHIWI RIVER NEAR ELY, MN--Continued

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.0	13.0	5.0	5.0	3.0	2.0	1.0	1.0	.5	.5	.0	.0
2	13.0	13.0	5.0	5.0	2.0	2.0	1.0	1.0	.5	.5	.0	.0
3	13.0	13.0	5.0	5.0	2.0	1.5	1.0	1.0	.5	.5	.0	.0
4	13.0	13.0	5.0	4.5	1.5	1.5	1.0	1.0	.5	.5	.0	.0
5	13.0	13.0	4.5	4.5	1.5	1.5	1.0	1.0	.5	.5	.0	.0
6	13.0	12.0	4.5	4.5	1.5	1.5	1.0	1.0	.5	.5	.0	.0
7	12.0	11.0	4.5	4.5	1.5	1.5	1.0	1.0	.5	.5	.0	.0
8	11.0	10.5	4.5	4.0	1.5	1.5	1.0	1.0	.5	.5	.0	.0
9	10.5	10.5	4.0	4.0	1.5	1.5	1.0	1.0	.5	.5	.0	.0
10	10.5	10.0	4.0	3.5	1.5	1.5	1.0	1.0	.5	.5	.0	.0
11	10.0	10.0	3.5	3.5	1.5	1.5	1.0	1.0	.5	.5	.0	.0
12	10.0	10.0	3.5	3.5	1.5	1.5	1.0	1.0	.5	.5	.0	.0
13	10.0	10.0	3.5	3.5	1.5	1.5	1.0	1.0	.5	.5	.0	.0
14	10.0	9.5	3.5	3.5	1.5	1.5	1.0	1.0	.5	.5	.0	.0
15	9.5	9.0	3.5	3.5	1.5	1.5	1.0	1.0	.5	.5	.0	.0
16	9.0	9.0	3.5	3.5	1.5	1.5	1.0	1.0	.5	.5	.0	.0
17	9.0	8.5	3.5	3.5	1.5	1.5	1.0	.5	.5	.5	.0	.0
18	8.5	8.0	3.5	3.0	1.5	1.5	.5	.5	.5	.5	.0	.0
19	8.0	7.0	3.0	3.0	1.5	1.5	.5	.5	.5	.5	.5	.0
20	7.0	6.5	3.0	3.0	1.5	1.0	.5	.5	.5	.5	.5	.5
21	6.5	6.0	3.0	3.0	1.0	1.0	.5	.5	.5	.5	.5	.5
22	6.0	6.0	3.0	3.0	1.0	1.0	.5	.5	.5	.5	.5	.5
23	6.0	6.0	3.0	3.0	1.0	1.0	.5	.5	.5	.0	.5	.5
24	6.0	5.5	3.0	3.0	1.0	1.0	.5	.5	.0	.0	1.0	.5
25	5.5	5.5	3.0	3.0	1.0	1.0	.5	.5	.0	.0	1.0	1.0
26	5.5	5.5	3.0	3.0	1.0	1.0	.5	.5	.0	.0	1.0	1.0
27	5.5	5.5	3.0	3.0	1.0	1.0	.5	.5	.0	.0	1.0	1.0
28	5.5	5.0	3.0	3.0	1.0	1.0	.5	.5	.0	.0	1.5	1.0
29	5.0	5.0	3.0	3.0	1.0	1.0	.5	.5	---	---	1.5	1.5
30	5.0	5.0	3.0	3.0	1.0	1.0	.5	.5	---	---	2.0	1.5
31	5.0	5.0	---	---	1.0	1.0	.5	.5	---	---	2.0	2.0
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.0	2.0	12.0	11.5	21.0	19.5	21.0	21.0	23.5	23.5	19.5	19.5
2	2.0	2.0	11.5	11.5	19.5	18.5	21.0	21.0	23.5	23.0	19.5	19.5
3	3.0	2.0	13.0	11.5	18.5	18.5	21.0	21.0	23.0	23.0	19.5	19.5
4	3.0	3.0	13.5	13.0	18.5	18.5	21.0	21.0	23.0	23.0	19.5	19.5
5	3.0	3.0	13.5	13.5	18.5	18.5	21.0	21.0	22.0	22.0	19.5	19.5
6	3.0	3.0	13.5	13.5	18.5	18.5	21.0	21.0	22.0	22.0	19.5	19.5
7	3.0	3.0	13.5	13.5	18.5	18.5	21.0	21.0	22.0	22.0	19.5	19.5
8	3.5	3.0	14.0	13.5	18.5	18.5	21.0	21.0	22.0	22.0	19.5	19.5
9	4.0	3.5	15.0	14.5	18.5	18.5	21.0	21.0	22.0	22.0	19.5	19.5
10	4.5	4.0	15.0	15.0	18.5	18.5	21.0	21.0	22.0	22.0	19.5	19.0
11	4.5	4.5	15.0	15.0	18.5	18.5	21.0	21.0	22.0	22.0	19.0	19.0
12	5.0	4.5	15.5	15.0	18.5	18.5	21.0	21.0	22.0	22.0	19.0	19.0
13	5.5	5.0	16.5	15.5	18.5	18.5	21.0	21.0	22.0	21.5	19.0	19.0
14	6.0	5.5	18.0	16.5	18.5	18.5	21.5	21.5	22.0	21.5	19.0	19.0
15	6.0	6.0	18.0	18.0	18.5	18.5	21.5	21.5	21.5	21.5	19.0	19.0
16	7.0	6.0	18.0	18.0	19.0	18.5	21.5	21.5	21.5	21.0	19.0	19.0
17	8.5	7.0	18.0	18.0	19.0	18.5	21.5	21.0	21.0	21.0	19.0	19.0
18	8.5	8.5	18.5	18.0	19.0	19.0	21.5	21.5	21.0	20.5	19.0	19.0
19	9.0	9.0	19.5	18.5	19.0	19.0	22.0	21.5	20.5	20.5	19.0	19.0
20	9.0	9.0	19.5	19.5	19.0	19.0	22.0	21.5	20.5	20.5	19.0	19.0
21	9.0	9.0	19.5	19.5	19.0	19.0	23.0	22.5	19.5	19.5	19.0	19.0
22	9.0	9.0	19.5	19.0	19.0	19.0	23.0	22.5	19.5	19.5	19.0	19.0
23	9.5	9.0	19.0	19.0	19.0	19.0	23.5	23.0	19.5	19.5	19.0	19.0
24	10.0	9.5	19.0	19.0	19.0	19.0	23.5	23.0	20.0	19.5	19.0	18.5
25	10.5	10.0	19.5	19.0	19.5	19.0	23.5	23.5	20.0	19.5	18.5	18.0
26	11.0	10.5	19.5	19.5	20.0	20.0	23.5	23.5	19.5	19.5	18.0	18.0
27	11.0	11.0	20.0	19.5	20.5	20.0	23.5	23.5	19.5	19.0	18.0	18.0
28	11.0	11.0	21.0	20.0	21.0	20.5	23.5	23.5	19.5	19.0	18.0	18.0
29	11.0	11.0	21.0	21.0	21.0	20.5	23.5	23.5	19.5	19.5	18.0	18.0
30	11.5	11.0	21.0	21.0	21.0	21.0	23.5	23.5	19.5	19.5	18.0	17.0
31	---	---	21.0	21.0	---	---	23.5	23.5	19.5	19.5	---	---

05124500 ISABELLA RIVER NEAR ISABELLA, MN

LOCATION.--Lat 47°48'00", long 91°31'15", in NW 1/4 NE 1/4 sec.6, T.61 N., R.9 W., Lake County, Hydrologic Unit 09030001, on left bank, 200 ft (61 m) upstream from Bald Eagle Lake, 0.5 mi (0.8 km) upstream from Snake River, and 14.5 mi (23.3 km) northwest of Isabella.

DRAINAGE AREA.--341 mi^2 (883 km^2).

PERIOD OF RECORD.--October 1952 to September 1961, April 1976 to November 1977 (discontinued).

GAGE.--Water-atage recorder. Datum of gage is 1,453.10 ft (442.905 m) above mean sea level.

REMARKS.--Records good except those for periods of no gage-height record, which are fair.

AVERAGE DISCHARGE.--10 years (water years 1953-61, 1977), 272 ft^3/s (7.703 m^3/s), 10.83 in/yr (275 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,900 ft^3/s (110 m^3/s) Apr. 19, 1976, gage height, 9.73 ft (2.966 m); minimum, 24 ft^3/s (0.68 m^3/s) Aug. 21, 22, 1961, and Sept. 11, 12, 13, 1976; minimum gage height, 2.86 ft (0.081 m) Aug. 22, 1961.

EXTREMES FOR CURRENT PERIOD.--Water year 1977: Maximum discharge, 1,930 ft^3/s (54.7 m^3/s) Sept. 30, stage rising, peak occurred Oct. 1, 1977, from correlation with nearby stations; maximum peak discharge, 1,020 ft^3/s (28.9 m^3/s) Sept. 5, 6, 9, 11, 12, gage height, 6.48 ft (1.975 m); minimum recorded discharge, 28 ft^3/s (0.79 m^3/s) Oct. 1, gage height, 3.21 ft (0.978 m), but may have been less during period of no gage-height record, Dec. 29 to May 2.

October to November 1977: Maximum discharge during period, 1,950 ft^3/s (55.2 m^3/s) Oct. 1, from correlation with nearby stations; minimum daily discharge, 370 ft^3/s (10.5 m^3/s) Nov. 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	29	35	33	29	32	33	92	185	216	510	93	508
2	29	36	33	29	33	33	93	160	277	558	88	640
3	29	35	33	29	33	33	93	149	314	611	84	777
4	30	36	33	29	33	33	92	142	426	642	81	963
5	32	35	33	29	33	33	91	141	453	692	77	1010
6	32	35	33	29	33	34	90	145	440	766	74	992
7	32	34	32	29	33	34	89	139	410	766	70	919
8	31	33	32	29	33	35	87	133	386	720	67	825
9	32	34	33	29	33	38	85	131	372	646	64	1000
10	33	36	33	29	33	41	82	128	346	562	61	988
11	34	35	32	29	33	45	80	128	313	488	58	1010
12	36	34	31	29	33	62	79	126	278	436	55	1010
13	36	34	32	29	33	74	78	122	243	395	53	961
14	36	33	31	29	33	88	77	116	218	350	51	894
15	36	32	30	29	33	98	75	115	199	315	49	876
16	36	33	30	29	33	96	76	113	200	285	48	883
17	35	34	29	29	33	94	79	112	222	260	46	882
18	35	34	29	29	33	92	94	111	260	240	45	887
19	35	35	29	29	33	90	120	107	310	230	44	889
20	35	35	29	29	33	88	140	110	376	210	43	892
21	36	35	30	30	33	88	160	107	426	198	42	916
22	36	34	30	30	33	87	180	108	432	182	40	947
23	35	35	29	30	33	86	195	112	468	170	39	952
24	36	35	30	30	33	84	215	119	492	158	38	973
25	36	36	30	31	33	83	230	121	460	144	37	1100
26	35	36	29	31	33	83	250	116	432	132	44	1270
27	34	35	30	31	33	84	270	114	394	125	120	1500
28	35	34	29	31	33	86	250	112	362	117	210	1680
29	36	33	29	32	---	88	230	107	359	110	260	1870
30	36	33	29	32	---	90	205	103	415	103	315	1920
31	36	---	29	32	---	91	---	109	---	98	415	---
TOTAL	1054	1034	954	920	923	2124	3977	3841	10499	11219	2811	30934
MEAN	34.0	34.5	30.8	29.7	33.0	68.5	133	124	350	362	90.7	1031
MAX	36	36	33	32	33	98	270	185	492	766	415	1920
MIN	29	32	29	29	32	33	75	103	199	98	37	508
CFSM	.10	.10	.09	.09	.10	.20	.39	.36	1.03	1.06	.27	3.02
IN.	.11	.11	.10	.10	.10	.23	.43	.42	1.15	1.22	.31	3.37

WTR YR 1977 TOTAL 70290 MEAN 193 MAX 1920 MIN 29 CFSM .57 IN 7.67

NOTE.--No gage-height record Dec. 29 to May 2, July 21 to Aug. 30, and Sept. 25-30.

LAKE OF THE WOODS BASIN

05124500 ISABELLA RIVER NEAR ISABELLA, MN--Continued

DISCHARGE IN CUBIC FEET PER SECOND, OCTOBER 1977 TO NOVEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1940	581										
2	1900	562										
3	1770	543										
4	1560	526										
5	1330	506										
6	1190	487										
7	1090	468										
8	990	451										
9	950	451										
10	960	476										
11	1000	492										
12	1090	511										
13	1190	531										
14	1290	512										
15	1360	495										
16	1410	486										
17	1420	488										
18	1410	480										
19	1360	470										
20	1300	460										
21	1220	450										
22	1120	450										
23	1030	440										
24	941	430										
25	857	420										
26	794	410										
27	748	400										
28	707	390										
29	669	380										
30	634	370										
31	604	---										
TOTAL	35834	14116										
MEAN	1156	471										
MAX	1940	581										
MIN	604	370										
CFSM	3.39	1.38										
IN.	3.91	1.54										

NOTE.--No gage-height record Oct. 1-11.

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 poor.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 129 ft^3/s (3.65 m^3/s) Apr. 25, 1975, gage height 6.99 ft (2.131 m); maximum gage height, 7.19 ft (2.192 m) Apr. 25, 1975 (backwater from ice); no flow at times each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge 95 ft^3/s (2.69 m^3/s) Sept. 9, gage height, 6.62 ft (2.018 m), no flow Dec. 26 to Mar. 6.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.06	.04	.08	.00	.00	.00	.55	3.1	34	8.5	1.2	35
2	.06	.12	.07	.00	.00	.00	.36	3.1	30	8.5	.97	30
3	.06	.15	.06	.00	.00	.00	.31	3.1	24	15	.94	24
4	.31	.15	.06	.00	.00	.00	.31	2.9	21	17	.87	36
5	.42	.15	.10	.00	.00	.00	.26	2.9	18	27	.87	37
6	.22	.15	.15	.00	.00	.00	.22	3.8	24	30	.71	33
7	.12	.18	.20	.00	.00	.01	.22	3.8	20	24	.62	29
8	.02	.15	.18	.00	.00	.01	.31	3.8	20	19	.55	27
9	.02	.15	.16	.00	.00	.01	.62	3.5	18	16	.55	83
10	.02	.26	.15	.00	.00	.01	1.1	2.8	14	12	.55	81
11	.02	.26	.15	.00	.00	.08	1.1	2.5	12	10	.55	61
12	.02	.22	.15	.00	.00	.50	.87	2.5	10	9.5	.48	46
13	.04	.22	.15	.00	.00	2.0	.70	2.5	8.0	8.5	.48	36
14	.06	.22	.15	.00	.00	4.0	.42	2.5	7.1	6.2	.48	29
15	.06	.22	.15	.00	.00	3.0	.48	2.6	5.3	4.9	.36	24
16	.06	.18	.20	.00	.00	2.6	.48	3.0	8.0	4.1	.72	19
17	.06	.18	.25	.00	.00	1.9	.55	2.8	9.5	4.5	.70	16
18	.04	.22	.26	.00	.00	1.5	.70	2.8	21	4.5	.70	14
19	.02	.26	.25	.00	.00	1.2	.96	2.8	26	3.8	.70	14
20	.02	.26	.20	.00	.00	.90	1.1	4.3	27	3.1	.83	13
21	.04	.22	.15	.00	.00	.70	2.5	6.6	22	2.5	1.4	11
22	.12	.22	.06	.00	.00	.60	3.8	9.8	18	2.1	.85	10
23	.12	.22	.04	.00	.00	.54	4.3	15	21	2.1	.78	9.0
24	.12	.22	.04	.00	.00	.50	5.3	15	20	1.9	.66	22
25	.12	.22	.01	.00	.00	.60	4.5	12	16	1.6	.77	43
26	.09	.22	.00	.00	.00	.70	4.1	10	12	1.4	2.1	47
27	.06	.16	.00	.00	.00	1.0	4.5	8.8	10	1.3	15	44
28	.06	.13	.00	.00	.00	1.3	4.1	7.0	9.0	1.2	48	39
29	.09	.10	.00	.00	---	1.6	3.9	5.5	8.5	1.2	33	40
30	.09	.09	.00	.00	---	.87	3.3	4.6	8.0	1.2	26	37
31	.04	---	.00	.00	---	.96	---	7.6	---	1.2	29	---
TOTAL	2.66	5.54	3.42	.00	.00	27.09	51.92	163.0	501.4	253.8	171.39	989.0
MEAN	.086	.18	.11	.000	.000	.87	1.73	5.26	16.7	8.19	5.53	33.0
MAX	.42	.26	.26	.00	.00	4.0	5.3	15	34	30	48	83
MIN	.02	.04	.00	.00	.00	.00	.22	2.5	5.3	1.2	.36	9.0
CFSM	.009	.02	.01	.000	.000	.09	.18	.55	1.73	.85	.57	3.42
IN.	.01	.02	.01	.00	.00	.10	.20	.63	1.93	.98	.66	3.81

CAL YR 1976 TOTAL 2069.31 MEAN 5.65 MAX 114 MIN .00 CFSM .59 IN 7.97
WTR YR 1977 TOTAL 2169.22 MEAN 5.94 MAX 83 MIN .00 CFSM .62 IN 8.35

05125000 SOUTH KAWISHIWI RIVER NEAR ELY, MN

LOCATION.--Lat 47°50'24", long 91°41'43", in NE 1/4 SW 1/4 sec.23, T.62 N., R.11 W., Lake County, Hydrologic Unit 09030001, on left bank 5 mi (8 km) upstream from Biroh Lake and 9 mi (14 km) southeast of Ely.

PERIOD OF RECORD.--October 1951 to September 1961, April 1976 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,430 ft (436 m), from topographic map.

REMARKS.--Records good except those for period of no gage-height record, Aug. 25 to Sept. 30, which are fair.

AVERAGE DISCHARGE.--11 years (water years 1951-61, 1977), 419 ft^3/s (11.87 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,130 ft^3/s (145 m^3/s) May 4, 1954, gage height, 7.25 ft (2.210 m); minimum, 25 ft^3/s (0.71 m^3/s) Oct. 12, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,200 ft^3/s (62.3 m^3/s) Sept. 30, stage rising, peak occurred Oct. 1, 1977, from correlation with nearby stations; maximum peak discharge, 1,430 ft^3/s (40.5 m^3/s) Sept. 12, from correlation with nearby stations; minimum discharge, 32 ft^3/s (0.91 m^3/s) Feb. 23, 24, gage height 1.28 ft (0.390 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	36	46	51	40	35	34	108	232	228	527	269	343
2	36	46	52	39	35	34	109	222	233	515	258	423
3	36	47	52	39	34	34	109	212	223	570	248	520
4	38	48	52	39	34	34	110	205	229	619	238	615
5	39	48	52	38	34	35	110	206	249	756	235	780
6	38	48	52	38	34	35	110	204	308	836	226	880
7	38	47	52	38	34	35	110	194	353	898	216	1000
8	38	47	52	38	34	35	110	189	393	951	209	1110
9	38	47	52	38	34	35	110	182	409	968	201	1200
10	38	48	52	38	33	36	111	178	416	938	194	1300
11	38	48	51	38	33	36	113	177	413	879	185	1400
12	38	49	51	38	33	40	110	172	398	811	175	1420
13	38	49	50	37	33	50	107	168	380	746	168	1400
14	38	49	47	37	33	52	106	161	363	687	161	1330
15	38	49	44	37	33	56	105	161	350	639	156	1290
16	39	50	44	37	33	56	105	158	383	598	154	1200
17	39	50	43	37	34	56	106	161	374	568	148	1140
18	39	50	43	37	33	56	107	167	381	534	141	1080
19	39	50	43	36	33	56	111	158	392	509	136	1040
20	39	50	42	36	33	58	113	165	407	485	133	1000
21	39	50	42	36	33	60	132	168	419	456	135	970
22	39	50	41	36	33	63	135	173	439	425	129	930
23	39	50	41	36	32	68	135	188	500	402	124	900
24	39	50	40	36	33	73	140	189	534	386	117	900
25	39	50	40	36	33	77	149	181	554	365	114	990
26	40	50	40	36	33	81	176	171	575	340	140	1100
27	41	50	40	36	34	89	197	165	578	324	200	1300
28	42	51	40	36	34	95	212	160	576	315	220	1520
29	43	51	40	36	---	98	223	153	560	303	240	1800
30	44	51	40	36	---	105	231	150	540	290	256	2100
31	45	---	40	36	---	107	---	165	---	281	295	---
TOTAL	1210	1469	1421	1151	937	1779	3910	5535	12157	17921	5821	32981
MEAN	39.0	49.0	45.8	37.1	33.5	57.4	130	179	405	578	188	1099
MAX	45	51	52	40	35	107	231	232	578	968	295	2100
MIN	36	46	40	36	32	34	105	150	223	281	114	343

WTR YR 1977 TOTAL 86292 MEAN 236 MAX 2100 MIN 32

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, 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 miles (13.7 km) southeast of Babbitt.

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

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 1,564.42 ft (476.835 m) above mean sea level (levels by Minnesota Department of Natural Resources).

REMARKS.--Records good except those for winter period and those for period of no gage-height record, Dec. 21 to Apr. 12, which are fair.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,490 ft^3/s (70.5 m^3/s) April 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, 925 ft^3/s (26.2 m^3/s) Sept. 30, stage rising, peak occurred Oct. 1, 1977; maximum peak discharge, 601 ft^3/s (17.0 m^3/s) Sept. 10, gage height, 5.25 ft (1.600 m); minimum discharge, 6.4 ft^3/s (0.18 m^3/s) Nov. 29, gage height, 2.16 ft (0.658 m), result of freeze up; minimum daily, 7.1 ft^3/s (0.20 m^3/s) Oct. 2, 3, 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.4	10	11	10	9.6	10	37	102	129	254	46	203
2	7.1	11	11	10	9.6	10	38	97	166	260	44	250
3	7.1	11	11	9.9	9.6	10	39	89	197	299	44	300
4	8.2	11	11	9.9	9.6	10	39	78	261	319	42	390
5	7.9	12	11	9.9	9.6	10	39	72	310	375	39	442
6	7.5	12	11	9.8	9.6	10	39	66	350	440	36	476
7	7.3	12	11	9.8	9.6	10	39	62	345	480	34	488
8	7.1	11	11	9.8	9.7	10	38	58	330	460	33	496
9	7.4	11	11	9.8	9.7	11	37	56	303	400	32	565
10	7.6	12	11	9.8	9.8	12	35	56	280	350	31	588
11	7.7	12	11	9.8	9.8	13	32	58	258	300	28	565
12	7.7	12	11	9.8	9.9	15	32	57	232	250	26	570
13	7.5	12	11	9.7	9.9	19	32	57	210	210	26	570
14	7.6	12	11	9.7	9.9	24	29	55	190	187	26	560
15	7.9	12	11	9.7	9.9	29	28	55	172	165	25	529
16	7.9	12	11	9.7	9.9	35	27	53	176	152	26	484
17	7.7	12	11	9.7	9.9	35	27	50	167	142	24	436
18	7.5	12	11	9.7	9.9	35	29	50	165	129	23	390
19	7.5	12	11	9.7	9.9	34	36	50	174	123	22	351
20	7.7	12	10	9.7	9.9	33	44	53	185	112	22	318
21	8.2	12	10	9.6	10	33	59	53	188	100	23	292
22	8.7	12	10	9.6	10	33	76	56	190	90	21	278
23	8.7	12	10	9.6	10	33	88	63	208	79	20	260
24	9.4	12	10	9.6	10	33	97	68	224	73	19	270
25	9.7	13	10	9.6	10	32	109	71	230	68	19	300
26	9.8	13	10	9.6	10	31	120	70	230	60	22	379
27	10	13	10	9.6	10	32	124	71	235	54	35	520
28	11	10	10	9.6	10	34	124	69	243	54	91	686
29	11	8.4	10	9.6	---	36	120	67	246	50	129	840
30	11	10	10	9.6	---	37	112	66	246	49	140	910
31	10	---	10	9.6	---	35	---	75	---	48	168	---
TOTAL	258.8	348.4	329	301.5	275.3	744	1725	2003	6840	6132	1316	13706
MEAN	8.35	11.6	10.6	9.73	9.83	24.0	57.5	64.6	228	198	42.5	457
MAX	11	13	11	10	10	37	124	102	350	480	168	910
MIN	7.1	8.4	10	9.6	9.6	10	27	50	129	48	19	203
CFSM	.04	.05	.05	.04	.05	.11	.26	.30	1.04	.90	.19	2.09
IN.	.04	.06	.06	.05	.05	.13	.29	.34	1.16	1.04	.22	2.33

CAL YR 1976 TOTAL 53435.8 MEAN 146 MAX 2460 MIN 6.7 CFSM .67 IN 9.08
WTR YR 1977 TOTAL 33979.0 MEAN 93.1 MAX 910 MIN 7.1 CFSM .43 IN 5.77

05125550 STONY RIVER NEAR BABBITT, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--March 1976 to current year (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

SUSPENDED-SEDIMENT DISCHARGE

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
NOV					
10...	1530	12	.5	2	.06
DEC					
15...	1510	11	.5	3	.09
MAR					
23...	1330	33	.5	2	.18
APR					
27...	1220	125	13.5	2	.68
JUN					
09...	1015	306	18.5	6	5.0
JUL					
19...	0945	122	24.5	4	1.3
AUG					
03...	0955	164	16.5	2	.89

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, 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, revised.

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) above mean sea level.

REMARKS.--Records poor. 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.--13 years (water years 1952-62, 1976-77), 36.6 ft^3/s (1.037 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 691 ft^3/s (19.6 m^3/s) Apr. 16, 1954, gage height, 7.84 ft (2.390 m); no flow on many days in 1976 and 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 173 ft^3/s (4.90 m^3/s) Sept. 27, gage height, 5.91 ft (1.801 m); no flow Oct. 10-26 and Nov. 28 to March 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.30	.34	.00	.00	.00	.00	18	12	74	52	8.6	163
2	.11	.46	.00	.00	.00	.00	17	10	112	53	5.4	172
3	.11	.49	.00	.00	.00	.00	15	9.2	126	64	5.1	161
4	.12	.46	.00	.00	.00	.00	8.5	7.9	109	83	4.3	153
5	1.7	.49	.00	.00	.00	.00	15	8.8	95	99	3.4	167
6	10	.46	.00	.00	.00	.00	13	16	88	111	2.9	172
7	5.8	.40	.00	.00	.00	.00	12	21	88	102	3.0	156
8	1.9	.34	.00	.00	.00	.00	3.0	23	84	76	8.4	135
9	.32	.30	.00	.00	.00	.00	14	21	78	62	13	143
10	.00	.32	.00	.00	.00	.00	16	20	65	51	11	157
11	.00	.32	.00	.00	.00	.06	11	21	52	41	8.1	163
12	.00	.32	.00	.00	.00	1.2	4.4	21	42	33	5.1	160
13	.00	.34	.00	.00	.00	5.1	4.0	22	35	29	3.6	151
14	.00	.34	.00	.00	.00	8.8	4.0	20	29	26	2.5	138
15	.00	.34	.00	.00	.00	9.1	4.1	24	24	27	1.7	123
16	.00	.34	.00	.00	.00	6.8	4.2	25	27	19	1.8	104
17	.00	.34	.00	.00	.00	9.1	6.1	26	35	18	1.2	85
18	.00	.34	.00	.00	.00	7.2	8.3	25	50	18	.64	76
19	.00	.34	.00	.00	.00	6.4	12	24	66	16	.37	81
20	.00	.36	.00	.00	.00	6.2	14	25	85	13	.30	83
21	.00	.40	.00	.00	.00	6.0	21	29	86	9.3	.80	81
22	.00	.43	.00	.00	.00	5.0	27	36	74	7.8	.57	75
23	.00	.46	.00	.00	.00	3.8	29	39	74	7.9	.39	72
24	.00	.43	.00	.00	.00	3.2	27	42	84	7.2	.17	78
25	.00	.38	.00	.00	.00	2.9	24	37	84	6.4	.12	116
26	.00	.36	.00	.00	.00	3.7	21	33	72	6.1	.45	158
27	.11	.22	.00	.00	.00	7.0	22	28	54	5.0	19	172
28	.24	.00	.00	.00	.00	12	17	31	50	4.4	86	161
29	.32	.00	.00	.00	---	19	14	26	47	18	137	154
30	.36	.00	.00	.00	---	20	12	17	47	23	148	158
31	.32	---	.00	.00	---	19	---	26	---	23	150	---
TOTAL	21.71	10.12	.00	.00	.00	161.56	417.6	725.9	2036	1111.1	632.91	3968
MEAN	.70	.34	.000	.000	.000	5.21	13.9	23.4	67.9	35.8	20.4	132
MAX	10	.49	.00	.00	.00	20	29	42	126	111	150	172
MIN	.00	.00	.00	.00	.00	.00	3.0	7.9	24	4.4	.12	72

CAL YR 1976 TOTAL 10874.17 MEAN 29.7 MAX 388 MIN .00
WTR YR 1977 TOTAL 9084.90 MEAN 24.9 MAX 172 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.--The recorder malfunctioned causing a loss of more than 20 percent in missing days.

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	438	415	425									
2	441	419	429									
3	443	431	436									
4	445	418	429									
5	439	387	406									
6	483	446	467									
7	505	493	499									
8	491	481	488									
9	495	490	492									
10	---	---	---									
11	---	---	---									
12	---	---	---									
13	---	---	---									
14	---	---	---									
15	---	---	---									
16	---	---	---									
17	---	---	---									
18	---	---	---									
19	---	---	---									
20	---	---	---									
21	---	---	---									
22	---	---	---									
23	---	---	---									
24	---	---	---									
25	---	---	---									
26	---	---	---									
27	---	---	---									
28	470	449	462									
29	460	407	431									
30	407	375	395									
31	381	368	375									

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1							422	388	404	173	167	170
2							389	381	385	172	164	168
3							401	374	389	178	170	174
4							412	289	345	188	175	182
5							419	406	412	186	174	181
6							440	411	429	183	170	175
7							455	432	444	180	169	175
8							442	332	380	182	170	176
9							504	365	478	180	172	176
10							497	479	492	179	162	172
11							483	421	465	161	150	154
12							411	360	373	159	154	156
13							370	361	366	166	159	161
14							370	359	365	173	166	169
15							384	368	373	174	167	171
16							407	375	386	176	168	173
17							397	368	382	171	166	169
18							370	309	342	171	167	169
19							307	259	281	171	160	166
20							293	258	271	163	155	160
21							335	285	309	168	155	160
22							291	197	237	173	161	170
23							197	167	186	179	154	167
24							167	163	165	167	149	157
25							162	155	159	148	138	142
26							160	150	155	148	136	142
27							161	153	158	147	139	142
28							173	154	167	247	154	218
29							170	158	161	268	199	245
30							170	155	161	195	161	172
31							---	---	---	191	161	171

05126000 DUNKA RIVER NEAR BABBITT, MN--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	194	163	177	182	144	156	406	336	355	122	121	122
2	180	156	167	172	150	155	359	342	351	119	114	116
3	166	146	160	152	146	150	364	350	356	116	105	113
4	145	142	143	151	143	145	380	364	371	110	100	104
5	153	144	148	168	130	143	383	379	381	113	109	111
6	176	153	156	175	169	173	383	375	379	109	103	105
7	192	178	187	178	149	172	379	370	375	104	94	100
8	196	191	193	145	131	134	375	356	368	110	94	98
9	196	165	187	142	133	138	391	350	359	116	113	115
10	166	159	163	151	141	146	439	396	424	---	---	---
11	153	117	127	159	151	154	440	421	431	---	---	---
12	117	115	116	159	147	153	431	419	425	---	---	---
13	117	115	116	172	152	157	422	409	417	---	---	---
14	122	116	118	209	161	175	416	404	410	---	---	---
15	128	122	125	254	214	239	406	389	397	---	---	---
16	142	128	135	212	172	187	396	384	391	---	---	---
17	161	136	148	172	164	168	396	385	390	---	---	---
18	167	156	163	181	154	167	391	375	383	---	---	---
19	188	165	178	176	163	169	388	380	384	---	---	---
20	200	188	196	177	167	171	385	373	377	---	---	---
21	196	192	193	182	177	179	376	360	368	---	---	---
22	210	194	205	190	180	185	364	355	360	---	---	---
23	210	199	205	218	192	202	364	355	360	---	---	---
24	207	198	203	231	218	226	364	352	359	---	---	---
25	204	194	198	242	220	228	361	335	354	---	---	---
26	200	178	193	268	243	261	345	275	330	---	---	---
27	179	172	176	316	269	293	299	161	231	---	---	---
28	177	168	174	356	322	340	239	199	225	---	---	---
29	168	162	167	440	359	423	194	126	150	93	88	92
30	161	150	155	439	421	426	135	111	121	105	85	91
31	---	---	---	421	412	416	130	122	126	---	---	---

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	16.0	11.5	13.5									
2	16.0	11.0	13.5									
3	14.0	11.5	13.0									
4	14.0	12.0	13.0									
5	11.5	8.0	10.0									
6	7.5	6.0	7.0									
7	6.0	5.5	6.0									
8	5.5	4.0	4.5									
9	5.0	4.5	5.0									
10	---	---	---									
11	---	---	---									
12	---	---	---									
13	---	---	---									
14	---	---	---									
15	---	---	---									
16	---	---	---									
17	---	---	---									
18	---	---	---									
19	---	---	---									
20	---	---	---									
21	---	---	---									
22	---	---	---									
23	---	---	---									
24	---	---	---									
25	---	---	---									
26	---	---	---									
27	---	---	---									
28	---	---	---									
29	---	---	---									
30	---	---	---									
31	---	---	---									

05126000 DUNKA RIVER NEAR BABBITT, MN--Continued

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1							2.5	1.0	2.0	18.5	15.0	16.5
2							3.0	1.5	2.5	18.0	12.5	15.5
3							4.5	1.0	2.5	17.5	13.0	15.5
4							4.0	1.5	3.0	18.0	14.0	16.0
5							5.0	1.5	3.0	16.5	14.5	15.5
6							5.0	1.5	3.0	16.0	12.5	14.0
7							5.0	2.0	3.5	16.5	11.5	14.0
8							6.0	2.0	4.0	18.5	12.5	15.0
9							9.0	2.5	5.5	18.5	12.0	15.0
10							11.5	5.0	8.0	19.0	13.0	14.0
11							11.5	6.5	9.0	20.0	13.0	16.5
12							12.5	10.0	11.0	22.5	16.5	19.5
13							15.0	9.5	11.5	23.0	19.0	21.0
14							12.0	9.0	11.0	24.0	19.5	22.0
15							12.0	10.0	11.0	24.0	20.5	22.5
16							14.0	10.0	12.0	25.0	21.0	23.0
17							16.0	12.0	14.0	23.0	21.0	22.5
18							14.5	13.5	14.0	25.0	19.5	22.5
19							13.0	12.0	12.5	25.0	22.0	23.5
20							12.0	10.5	11.5	23.5	21.5	22.5
21							14.0	9.5	11.5	22.0	18.5	20.5
22							13.0	10.0	11.5	22.0	19.0	20.5
23							13.5	10.0	11.5	20.5	19.0	20.0
24							14.0	10.5	12.0	22.0	17.0	19.5
25							14.0	10.0	12.0	23.5	19.0	21.5
26							15.5	10.5	13.0	24.5	20.0	22.5
27							14.0	12.5	13.5	25.0	21.5	23.0
28							15.0	10.5	12.0	25.0	21.5	23.0
29							13.5	10.5	13.0	22.5	20.5	21.0
30							19.0	12.5	15.0	23.0	18.5	20.5
31							---	---	---	20.5	16.5	18.5
		JUNE			JULY			AUGUST			SEPTEMBER	
1	16.5	14.5	15.5	20.5	17.0	19.0	21.5	17.5	19.0	16.5	15.5	16.0
2	16.5	12.5	14.5	22.0	17.5	20.0	22.5	16.5	19.5	16.5	15.0	15.5
3	16.0	13.5	15.0	23.5	20.0	22.0	23.0	18.0	20.5	16.5	14.0	15.5
4	18.5	14.5	16.5	22.5	21.0	21.5	22.5	17.5	20.0	17.0	15.5	16.0
5	17.5	15.5	16.5	21.5	20.5	21.0	23.5	18.5	21.0	16.0	15.5	15.5
6	18.0	15.0	16.5	23.0	20.5	21.5	23.5	17.5	20.5	15.0	14.5	15.0
7	16.5	15.0	16.0	23.0	20.5	22.0	23.5	19.0	21.0	16.0	13.5	14.5
8	17.0	14.5	15.5	21.5	20.0	21.0	23.5	20.0	21.5	15.0	14.0	14.5
9	18.0	14.0	16.0	22.0	18.0	20.0	23.0	20.0	21.5	15.0	13.5	14.5
10	17.0	15.0	16.0	21.5	18.5	20.0	23.0	20.0	21.5	---	---	---
11	20.0	16.0	18.0	21.5	18.5	20.0	20.5	18.0	19.5	---	---	---
12	19.0	17.0	18.0	22.0	19.5	20.5	21.5	17.0	19.0	---	---	---
13	19.0	15.5	17.5	23.5	18.5	21.0	21.0	16.5	18.5	---	---	---
14	20.5	16.5	18.5	25.0	21.0	23.0	20.0	15.5	18.0	---	---	---
15	19.5	18.5	19.0	25.0	21.5	23.5	17.5	16.0	16.5	---	---	---
16	20.0	18.0	19.0	24.5	21.0	23.0	21.5	15.5	18.0	---	---	---
17	21.0	18.0	19.5	25.5	21.0	23.5	19.0	17.0	18.0	---	---	---
18	19.5	17.5	18.5	28.0	23.0	25.5	20.5	15.5	18.0	---	---	---
19	19.0	16.0	17.5	28.0	25.5	27.0	23.0	16.5	19.5	---	---	---
20	20.0	16.5	18.0	27.5	25.0	26.5	19.5	16.5	18.0	---	---	---
21	21.8	16.5	19.0	27.5	23.0	25.0	20.0	16.5	18.0	---	---	---
22	20.0	17.5	19.0	26.5	22.0	24.5	19.5	16.5	18.0	---	---	---
23	19.5	18.0	18.5	28.5	23.0	25.5	19.5	16.0	17.5	---	---	---
24	22.0	18.0	20.0	27.5	25.0	26.0	21.5	15.0	18.0	---	---	---
25	22.5	18.5	20.5	25.5	22.5	24.0	18.5	15.5	17.0	---	---	---
26	23.5	19.5	21.5	24.5	20.0	22.5	19.0	17.0	18.0	---	---	---
27	23.0	21.5	22.5	23.5	21.0	22.0	19.0	17.0	18.0	---	---	---
28	22.0	20.0	21.0	23.0	20.5	21.5	18.0	17.0	17.5	---	---	---
29	22.5	18.5	20.5	21.5	20.0	20.5	18.0	15.5	17.0	13.0	11.5	12.0
30	21.5	19.0	20.5	20.0	18.5	19.0	17.0	16.5	16.0	13.0	11.0	12.0
31	---	---	---	20.0	18.0	19.0	17.0	16.5	16.5	---	---	---

05126000 DUNKA RIVER NEAR BABBITT, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

SUSPENDED-SEDIMENT DISCHARGE

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
NOV					
09...	1645	.30	.0	6	.00
APR					
28...	1515	16	12.5	3	.13
JUN					
09...	1550	78	17.0	3	.63
JUL					
27...	1515	5.0	21.5	4	.05
AUG					
30...	1650	151	16.0	9	3.7

05126210 SOUTH KAWISHIWI RIVER ABOVE WHITE IRON LAKE NEAR ELY, MN

LOCATION.--Lat 47°50'31", long 91°47'56", in SW 1/4 NW 1/4 sec.19, T.62 N., R.11 W., Lake County, Hydrologic Unit 09030001, on right bank 0.5 mi (0.8 km) above inlet to White Iron Lake and 5 mi (8 km) southeast of Ely.

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

GAGE.--Water-stage recorder. Altitude of gage is 1,420 ft (433 m), from topographic map.

REMARKS.--Records fair. Flow is regulated by Minnesota Power and Light Co. dam located 2.1 mi (3.4 km) above gage at outlet of Birch Lake.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,080 ft^3/s (229 m^3/s) Apr. 22, 1976, gage height, 11.42 ft (3.481 m); minimum, 19 ft^3/s (0.54 m^3/s) Mar. 22, 1977; minimum gage height, 2.82 ft (0.860 m) Oct. 7, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,020 ft^3/s (114 m^3/s) Sept. 9, gage height, 8.73 ft (2.661 m); minimum, 19 ft^3/s (0.54 m^3/s) Mar. 22; minimum gage height, 2.82 ft (0.860 m) Oct. 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	99	78	84	80	78	62	141	145	382	977	429	885
2	98	78	84	81	78	62	146	150	482	1000	422	1010
3	99	76	84	82	78	63	149	148	632	1200	414	1140
4	103	76	84	84	76	63	149	145	787	1440	406	1170
5	97	76	84	84	74	63	147	153	788	1540	401	1190
6	78	76	84	83	74	65	149	155	870	1580	394	1320
7	36	74	84	82	74	66	147	155	933	1700	385	1600
8	76	74	84	82	76	67	149	156	951	1710	373	1830
9	87	76	84	82	76	66	150	158	954	1640	371	2920
10	90	76	84	81	75	62	151	160	948	1620	361	3770
11	90	74	85	81	74	62	142	162	950	1410	319	2980
12	86	74	86	80	72	69	122	162	943	1220	245	1880
13	86	74	87	80	72	69	121	162	839	1140	208	1630
14	86	74	88	80	72	109	121	160	743	953	203	1880
15	84	74	88	80	69	178	120	160	628	745	203	1990
16	86	74	86	80	67	175	124	160	662	666	203	1980
17	86	72	86	80	69	175	128	161	779	675	201	1910
18	84	72	86	80	69	173	128	161	747	677	198	1900
19	84	74	86	80	66	174	129	159	753	680	178	1880
20	84	84	86	80	66	173	132	163	920	674	149	1770
21	84	86	84	80	66	122	138	163	1070	662	143	1570
22	84	84	86	80	66	27	136	166	1060	654	142	1430
23	84	84	84	80	65	68	135	167	1310	649	141	1340
24	84	84	84	80	64	93	136	198	1420	644	138	1330
25	82	84	84	80	62	94	140	233	1330	625	144	2080
26	82	84	82	79	63	97	140	258	1320	620	145	2500
27	80	84	85	79	62	101	141	292	1060	613	162	2270
28	78	84	84	79	64	102	145	293	891	613	172	2530
29	80	84	82	78	---	105	147	295	949	530	342	2880
30	80	84	78	78	---	107	148	294	960	444	701	3460
31	78	---	78	78	---	118	---	306	---	439	846	---
TOTAL	2615	2348	2615	2493	1965	3030	4151	5800	27061	29740	9139	58025
MEAN	84.4	78.3	84.4	80.4	70.2	97.7	138	187	902	959	295	1934
MAX	103	86	88	84	78	178	151	306	1420	1710	846	3770
MIN	36	72	78	78	62	27	120	145	382	439	138	885

CAL YR 1976 TOTAL 252505 MEAN 690 MAX 8040 MIN 31
WTR YR 1977 TOTAL 148982 MEAN 408 MAX 3770 MIN 27

NOTE.--No gage-height record Dec. 31 to Feb. 3.

05126500 BEAR ISLAND RIVER NEAR ELY, MN

LOCATION.--Lat 47°49'56", long 91°50'12", in SE 1/4 SW 1/4 sec.23, T.62 N., R.12 W., St. Louis County, Hydrologic Unit 09030001, on right bank, 10 ft (3 m) downstream from bridge on State Highway 1, 1.2 mi (1.9 km) upstream from mouth and 5.0 mi (8.0 km) south of Ely.

DRAINAGE AREA.--68.5 mi^2 (177.4 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1952 to September 1962, March 1975 to September 1977 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 1,388.86 ft (423.325 m) above mean sea level.

REMARKS.--Records fair.

AVERAGE DISCHARGE.--12 years (water years 1953-62, 1976-77), 41.2 ft^3/s (1.167 m^3/s), 8.17 in/yr (208 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 423 ft^3/s (12.0 m^3/s) May 3, 1954, gage height, 7.03 ft (2.143 m); maximum gage height, 7.20 ft (2.195 m) Apr. 24, 25, 1961; no flow Nov. 27 to Mar. 8, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 290 ft^3/s (8.21 m^3/s) Sept. 10, 12, gage height, 6.99 ft (2.131 m); no flow Nov. 27 to Mar. 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.30	.58	.00	.00	.00	.00	16	4.5	80	78	27	129
2	.26	.71	.00	.00	.00	.00	16	2.7	86	74	25	151
3	.26	.64	.00	.00	.00	.00	15	3.8	91	88	23	167
4	.63	.57	.00	.00	.00	.00	15	4.7	91	91	21	199
5	.90	.61	.00	.00	.00	.00	14	4.6	91	109	20	214
6	.74	.62	.00	.00	.00	.00	13	4.5	99	122	18	211
7	.65	.50	.00	.00	.00	.00	12	4.0	106	128	16	206
8	.62	.32	.00	.00	.00	.00	14	4.1	110	127	15	202
9	.62	.32	.00	.00	.00	.01	17	4.4	119	121	13	258
10	.62	.31	.00	.00	.00	.05	15	6.7	121	111	11	276
11	.59	.23	.00	.00	.00	.10	14	10	116	102	9.9	282
12	.59	.20	.00	.00	.00	.25	13	14	110	96	8.3	279
13	.49	.17	.00	.00	.00	.75	11	17	106	89	7.5	268
14	.51	.11	.00	.00	.00	2.4	10	24	99	84	7.9	252
15	.48	.06	.00	.00	.00	2.7	9.3	39	92	80	6.9	233
16	.53	.04	.00	.00	.00	2.3	8.9	55	94	76	6.5	212
17	.56	.06	.00	.00	.00	1.8	10	57	95	73	6.0	193
18	.61	.08	.00	.00	.00	1.5	11	59	114	67	5.3	179
19	.60	.11	.00	.00	.00	1.8	11	63	123	62	4.8	174
20	.63	.11	.00	.00	.00	2.0	11	65	127	60	4.6	164
21	.75	.11	.00	.00	.00	2.4	14	73	125	63	4.5	153
22	.78	.06	.00	.00	.00	2.6	12	79	117	59	4.1	140
23	.81	.04	.00	.00	.00	2.7	8.6	71	122	54	3.6	132
24	.71	.02	.00	.00	.00	2.3	6.8	69	119	47	2.9	140
25	.63	.02	.00	.00	.00	2.3	6.1	71	111	42	3.2	164
26	.59	.01	.00	.00	.00	3.3	5.3	72	100	39	4.7	171
27	.50	.00	.00	.00	.00	5.6	4.7	70	87	35	19	173
28	.51	.00	.00	.00	.00	9.0	3.9	63	83	34	47	172
29	.59	.00	.00	.00	---	14	3.8	55	79	31	43	177
30	.64	.00	.00	.00	---	21	3.8	53	77	29	57	173
31	.62	---	.00	.00	---	19	---	59	---	29	96	---
TOTAL	18.32	6.61	.00	.00	.00	99.86	325.2	1182.0	3090	2300	541.7	5844
MEAN	.59	.22	.000	.000	.000	3.22	10.8	38.1	103	74.2	17.5	195
MAX	.90	.71	.00	.00	.00	21	17	79	127	128	96	282
MIN	.26	.00	.00	.00	.00	.00	3.8	2.7	77	29	2.9	129
CFSM	.009	.003	.000	.000	.000	.05	.16	.56	1.50	1.08	.26	2.85
IN.	.01	.00	.00	.00	.00	.05	.18	.64	1.68	1.25	.29	3.17

CAL YR 1976 TOTAL 12357.25 MEAN 33.8 MAX 276 MIN .00 CFSM .49 IN 6.71
WTR YR 1977 TOTAL 13407.69 MEAN 36.7 MAX 282 MIN .00 CFSM .54 IN 7.28

05126500 BEAR ISLAND RIVER NEAR ELY, MN--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--March 1976 to current year (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

SUSPENDED-SEDIMENT DISCHARGE

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
NOV					
09...	1140	.28	1.5	10	.01
MAR					
14...	1625	2.4	.5	8	.05
23...	0915	2.6	.5	5	.04
APR					
25...	1630	6.0	13.5	4	.06
JUN					
09...	1735	118	20.0	4	1.3
JUL					
19...	0830	62	26.5	3	.50
SEP					
01...	0940	126	16.5	5	1.7

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, at powerplant of Minnesota Power & Light Co., just upstream from Fall Lake, and 1.8 mi (2.9 km) east of Winton.

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 except those below 300 ft^3/s (8.50 m^3/s), which are poor. 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).--58 years (water years 1906, 1916-17, 1919, 1924-77), 1,019 ft^3/s (28.86 m^3/s), 11.26 in/yr (286 mm/yr).

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

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 4,230 ft^3/s (120 m^3/s) Sept. 11; no flow for several days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	100	100	65	96	101	235	40	678	1200	782	1190
2	100	100	100	32	100	100	299	80	899	1290	633	1390
3	100	100	100	132	100	100	267	116	899	1390	665	1590
4	165	68	.00	100	100	100	299	55	929	1600	629	1850
5	35	100	32	100	32	.00	299	119	960	2040	429	1890
6	100	100	132	100	.00	32	265	77	1060	2190	362	1920
7	100	79	68	100	132	100	233	97	1060	2050	426	2150
8	100	100	100	32	100	100	329	32	1090	2090	462	2520
9	68	100	100	.00	68	100	329	77	1060	2190	494	2670
10	68	100	100	100	100	100	265	125	1120	2100	398	3510
11	100	100	65	100	100	68	140	115	1030	2100	398	4230
12	100	68	97	100	25	165	129	51	1030	1790	301	4060
13	68	100	3.0	100	32	100	32	141	964	1690	267	2950
14	100	.00	100	100	100	250	97	65	964	1440	265	2540
15	68	132	100	32	68	303	129	129	964	1140	366	2670
16	68	68	100	32	100	335	32	116	1020	1090	398	2690
17	100	68	100	100	68	303	97	136	1000	928	398	2580
18	100	100	65	100	132	270	65	230	1100	960	269	2620
19	100	100	.00	68	.00	302	65	215	1030	950	398	2950
20	68	68	68	100	.00	334	97	733	1090	895	.00	2560
21	100	65	100	100	100	269	161	97	1320	960	129	2400
22	100	35	100	32	100	237	112	194	1410	928	193	2290
23	100	100	132	32	100	237	32	233	1480	928	65	2140
24	68	100	65	117	100	301	65	266	1610	928	97	2490
25	.00	197	32	104	100	204	76	266	1600	895	97	2360
26	100	100	65	100	.00	107	121	461	1660	895	258	3200
27	150	.00	100	100	32	332	53	467	1600	863	995	3340
28	132	.00	100	100	100	462	55	298	1420	940	1020	3370
29	35	165	35	100	---	332	65	298	1340	862	766	3440
30	100	68	100	.00	---	365	68	266	1340	895	1090	3690
31	96	---	.00	110	---	268	---	547	---	679	1150	---
TOTAL	2789.00	2581.00	2359.00	2488.00	2085.00	6377.00	4511	6142	34727	40896	14200.00	79250
MEAN	90.0	86.0	76.1	80.3	74.5	206	150	198	1158	1319	458	2642
MAX	165	197	132	132	132	462	329	733	1660	2190	1150	4230
MIN	.00	.00	.00	.00	.00	.00	32	32	678	679	.00	1190
(†)	-51	-20	-6	-18	-24	-27	+118	+221	+43	-63	+28	+22
MEAN ‡	39.0	66.0	70.1	62.3	50.5	179	268	419	1201	1256	486	2664
CFSM ‡	.03	.05	.06	.05	.04	.15	.22	.34	.98	1.02	.40	2.17
IN ‡	.04	.06	.07	.06	.04	.17	.24	.39	1.09	1.18	.46	2.42

CAL YR 1976 TOTAL 301675.00 MEAN 824 MAX 8740 MIN .00 MEAN ‡ 809 CFSM ‡ 0.66 IN ‡ 8.97
WTR YR 1977 TOTAL 198405.00 MEAN 544 MAX 4230 MIN .00 MEAN ‡ 562 CFSM ‡ 0.46 IN ‡ 6.21

† 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.

05127205 BURNTSIDE RIVER NEAR ELY, MN

LOCATION.--Lat 47°54'55", long 91°56'59", in NE 1/4 NE 1/4 sec.26, T.63 N., R.13 W., St. Louis County, Hydrologic Unit 09030001, on downstream handrail of bridge on County Road 88, 2.5 mi (4.0 km) upstream from mouth, 4 mi (6 km) northwest of Ely and 5 mi (8 km) downstream from outlet of Burntside Lake.

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

GAGE.--Nonrecording gage. Altitude of gage is 1,340 ft (408 m), from topographic map.

REMARKS.--Records fair except those below 1 ft^3/s (0.028 m^3/s), which are poor.

AVERAGE DISCHARGE.--10 years, 56.9 ft^3/s (1.611 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 455 ft^3/s (12.9 m^3/s) June 12, 1970, gage height, 8.59 ft (2.618 m), from floodmark; minimum daily, 0.04 ft (0.001 m^3/s) Jan. 1 to Mar. 10, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 237 ft^3/s (6.71 m^3/s) Sept. 12, gage height, 8.07 ft (2.460 m), from graph based on gage readings; minimum daily, 0.04 ft^3/s (0.001 m^3/s) Jan. 1 to Mar. 10; minimum gage height, 4.53 ft (1.381 m) Nov. 2, 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.14	.11	.18	.04	.04	.04	.68	.33	27	56	40	118
2	.13	.10	.18	.04	.04	.04	.62	.30	30	55	39	128
3	.12	.10	.18	.04	.04	.04	.52	.32	31	68	37	136
4	.19	.12	.18	.04	.04	.04	.45	.32	30	74	38	142
5	.19	.13	.18	.04	.04	.04	.40	.35	29	83	36	150
6	.17	.13	.18	.04	.04	.04	.38	.32	28	90	35	153
7	.17	.14	.18	.04	.04	.04	.38	.35	28	90	33	153
8	.16	.14	.18	.04	.04	.04	.38	.33	28	88	32	154
9	.16	.14	.18	.04	.04	.04	.32	.28	40	88	30	190
10	.15	.14	.18	.04	.04	.04	.27	.28	46	86	28	210
11	.14	.14	.18	.04	.04	.05	.22	.30	44	82	27	230
12	.14	.15	.18	.04	.04	.10	.21	.28	41	78	25	235
13	.13	.15	.18	.04	.04	.18	.21	.28	39	77	24	235
14	.13	.15	.18	.04	.04	.28	.23	.54	41	75	23	233
15	.12	.15	.18	.04	.04	.46	.20	1.1	41	70	22	228
16	.14	.15	.18	.04	.04	.54	.22	1.9	49	68	21	218
17	.13	.16	.17	.04	.04	.53	.25	1.9	51	67	20	217
18	.11	.16	.17	.04	.04	.53	.28	1.9	56	66	19	210
19	.13	.16	.17	.04	.04	.53	.35	2.5	60	63	18	207
20	.13	.16	.16	.04	.04	.52	.40	2.5	65	61	18	203
21	.15	.16	.16	.04	.04	.52	.74	4.6	65	58	18	194
22	.15	.17	.16	.04	.04	.52	.56	6.8	64	56	18	186
23	.13	.17	.15	.04	.04	.52	.52	7.2	67	55	18	181
24	.13	.17	.15	.04	.04	.52	.48	9.6	66	54	17	196
25	.13	.17	.14	.04	.04	.52	.48	10	63	52	16	210
26	.14	.17	.13	.04	.04	.52	.45	8.8	60	48	27	216
27	.14	.17	.12	.04	.04	.52	.56	8.8	58	47	50	217
28	.15	.18	.09	.04	.04	.55	.40	8.0	57	45	69	212
29	.15	.18	.08	.04	---	.60	.40	8.0	57	44	82	211
30	.13	.18	.06	.04	---	.67	.36	8.8	57	43	87	207
31	.13	---	.05	.04	---	.70	---	10	---	43	95	---
TOTAL	4.41	4.50	4.84	1.24	1.12	10.28	11.92	106.98	1418	2030	1062	5780
MEAN	.14	.15	.16	.040	.040	.33	.40	3.45	47.3	65.5	34.3	193
MAX	.19	.18	.18	.04	.04	.70	.74	10	67	90	95	235
MIN	.11	.10	.05	.04	.04	.04	.20	.28	27	43	16	118

CAL YR 1976 TOTAL 10093.76 MEAN 27.6 MAX 148 MIN .05
WTR YR 1977 TOTAL 10435.29 MEAN 28.6 MAX 235 MIN .04

05127207 BJORKMAN'S CREEK NEAR ELY, MN

LOCATION.--Lat 47°55'31", long 91°53'26", in NW 1/4 SE 1/4 sec.20, T.63 N., R.12 W., St. Louis County, Hydrologic Unit 09030001, on right bank 5 ft (2 m) downstream from culverts, on County Highway 88, at mouth, 2.5 mi (4.0 km) northwest of Ely.

DRAINAGE AREA.--1.36 mi^2 (3.52 km^2)

PERIOD OF RECORD.--July 1972 to current year.

GAGE.--Nonrecording gage. Altitude of gage is 1,340 ft (408 m), from topographic map.

REMARKS.--Records fair.

AVERAGE DISCHARGE.--5 years, 1.03 ft^3/s (0.029 m^3/s), 10.28 in/yr (261 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 47 ft^3/s (1.33 m^3/s) Oct. 10, 1973, gage height, 2.62 ft (0.799 m); no flow on many days.

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 60 ft^3/s (1.70 m^3/s) was measured June 10, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 43 ft^3/s (1.22 m^3/s) Aug. 28, gage height, 2.53 ft (0.771 m), from high water mark; no flow on many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	.03	.40	7.2	.60	.08	11
2	.00	.00	.00	.00	.00	.00	.03	.35	5.8	.38	.08	7.9
3	.00	.00	.00	.00	.00	.00	.03	.31	4.2	2.8	.08	7.1
4	.00	.00	.00	.00	.00	.00	.04	.29	3.8	1.5	.07	6.1
5	.00	.00	.00	.00	.00	.00	.04	.41	3.5	2.8	.12	5.5
6	.00	.00	.00	.00	.00	.00	.04	.44	3.1	3.4	.10	5.0
7	.00	.00	.00	.00	.00	.00	.03	.40	3.0	2.7	.09	4.1
8	.00	.00	.00	.00	.00	.00	.06	.36	3.4	2.2	.07	3.7
9	.00	.00	.00	.00	.00	.00	.07	.35	3.0	1.0	.05	20
10	.00	.00	.00	.00	.00	.00	.07	.41	2.5	.80	.04	21
11	.00	.00	.00	.00	.00	.00	.07	.48	2.0	.60	.04	15
12	.00	.00	.00	.00	.00	.00	.10	.41	1.6	.44	.02	7.7
13	.00	.00	.00	.00	.00	.00	.10	.38	1.1	.41	.01	3.8
14	.00	.00	.00	.00	.00	.00	.09	.50	1.0	.31	.00	2.9
15	.00	.00	.00	.00	.00	.00	.12	1.0	.78	.25	.00	2.3
16	.00	.00	.00	.00	.00	.05	.18	3.3	2.7	.22	.00	1.8
17	.00	.00	.00	.00	.00	.04	.25	2.7	2.5	.19	.00	1.6
18	.00	.00	.00	.00	.00	.03	.21	2.1	2.4	.17	.00	1.5
19	.00	.00	.00	.00	.00	.02	.38	1.6	2.4	.15	.00	2.0
20	.00	.00	.00	.00	.00	.02	.52	1.6	2.3	.12	.00	2.0
21	.00	.00	.00	.00	.00	.02	1.5	2.2	1.8	.08	.00	1.7
22	.00	.00	.00	.00	.00	.01	1.6	2.8	1.3	.08	.00	1.6
23	.00	.00	.00	.00	.00	.01	1.4	2.9	1.6	.08	.00	1.6
24	.00	.00	.00	.00	.00	.00	1.1	2.3	1.3	.07	.00	9.6
25	.00	.00	.00	.00	.00	.00	.88	2.1	1.0	.07	.00	19
26	.00	.00	.00	.00	.00	.01	.78	1.7	.71	.04	.00	13
27	.00	.00	.00	.00	.00	.02	.73	1.3	.41	.03	1.0	8.2
28	.00	.00	.00	.00	.00	.02	.60	1.1	.41	.07	33	5.6
29	.00	.00	.00	.00	---	.04	.52	1.0	.48	.07	17	4.8
30	.00	.00	.00	.00	---	.03	.45	1.0	.60	.11	8.8	3.9
31	.00	---	.00	.00	---	.07	---	1.7	---	.11	7.5	---
TOTAL	.00	.00	.00	.00	.00	.39	12.02	37.89	67.89	21.85	68.15	201.0
MEAN	.000	.000	.000	.000	.000	.013	.40	1.22	2.26	.70	2.20	6.70
MAX	.00	.00	.00	.00	.00	.07	1.6	3.3	7.2	3.4	33	21
MIN	.00	.00	.00	.00	.00	.00	.03	.29	.41	.03	.00	1.5
CFSM	.000	.000	.000	.000	.000	.01	.29	.90	1.66	.52	1.62	4.93
IN.	.00	.00	.00	.00	.00	.01	.33	1.04	1.86	.60	1.86	5.49

CAL YR 1976 TOTAL 245.33 MEAN .67 MAX 17 MIN .00 CFSM .49 IN 6.71
WTR YR 1977 TOTAL 409.19 MEAN 1.12 MAX 33 MIN .00 CFSM .82 IN 11.18

05127210 ARMSTRONG CREEK NEAR ELY, MN

LOCATION.--Lat 47°53'48", long 91°55'50", in SW 1/4 NE 1/4 sec.36, T.63 N., R.13 W., St. Louis County, Hydrologic Unit 09030001, near right bank 50 ft (15 m) upstream from culvert on County Road 88, 1.2 mi (1.9 km) upstream from mouth and 2.5 mi (4.0 km) southwest of Ely.

DRAINAGE AREA.--5.29 mi^2 (13.70 km^2).

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

GAGE.--Nonrecording gage and crest-stage gage. Altitude of gage is 1,365 ft (416 m), from topographic map. Prior to Oct. 1, 1969, at site 100 ft (30 m) downstream at same datum.

REMARKS.--Records poor.

AVERAGE DISCHARGE.--10 years, 4.64 ft^3/s (0.131 m^3/s), 11.91 in/yr (303 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 131 ft^3/s (3.71 m^3/s) May 21, 1970, gage height, 5.88 ft (1.792 m), from floodmark; no flow Feb. 28 to Mar. 6, 1968, many days in September 1976, and Jan. 27 to Feb. 7, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 36 ft^3/s (1.02 m^3/s) Aug. 28, gage height, 4.15 ft (1.265 m); no flow Jan. 27 to Feb. 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.18	.30	.15	.02	.00	.02	.53	.55	27	7.3	.51	22
2	.21	.31	.12	.02	.00	.02	.55	.58	24	3.2	.40	17
3	.19	.31	.09	.02	.00	.02	.60	.53	16	10	.45	16
4	.30	.34	.09	.02	.00	.02	.64	.49	12	9.4	.35	15
5	.33	.34	.09	.02	.00	.02	.51	1.2	9.1	16	.60	14
6	.31	.31	.09	.02	.00	.02	.43	.93	7.3	18	.54	13
7	.30	.36	.07	.02	.00	.02	.42	.90	7.1	15	.47	9.9
8	.30	.31	.06	.02	.01	.02	.38	.80	6.7	12	.44	8.9
9	.33	.31	.05	.02	.02	.02	.50	.70	6.7	6.5	.39	24
10	.33	.33	.05	.02	.02	.03	.70	.79	4.2	3.0	.33	25
11	.33	.34	.05	.02	.02	.07	.73	1.3	2.5	2.2	.30	17
12	.33	.40	.05	.02	.02	.30	.73	1.0	1.7	1.5	.28	18
13	.33	.38	.05	.02	.02	1.0	.55	.93	1.0	1.0	.25	9.2
14	.30	.38	.05	.02	.02	2.0	.43	2.4	.97	1.3	.23	7.3
15	.33	.34	.04	.02	.02	3.5	.41	17	1.2	.76	.20	6.0
16	.38	.36	.04	.02	.02	3.0	.80	18	6.7	.61	.33	2.1
17	.41	.33	.04	.02	.02	1.7	1.2	12	5.1	.48	.66	1.4
18	.33	.33	.04	.02	.02	.93	1.1	7.6	6.4	.40	.52	1.3
19	.34	.34	.04	.02	.02	.75	2.5	5.2	7.7	.38	.42	1.8
20	.33	.34	.04	.01	.02	.70	1.7	4.9	9.1	.33	.50	1.9
21	.33	.36	.04	.01	.02	.64	7.0	7.0	7.6	.40	.58	1.6
22	.31	.38	.04	.01	.02	.58	1.9	9.1	3.9	.36	.66	3.7
23	.28	.40	.03	.01	.02	.51	1.4	9.8	5.4	.31	.56	5.1
24	.33	.42	.03	.01	.02	.47	1.0	10	4.8	.27	.48	14
25	.38	.40	.03	.01	.02	.42	.82	9.1	4.1	.23	.40	28
26	.33	.40	.03	.01	.02	.50	.76	6.3	3.5	.20	.51	24
27	.34	.36	.03	.00	.02	.60	.76	4.2	3.2	.18	14	19
28	.34	.33	.03	.00	.02	.67	.61	3.7	1.4	.20	34	15
29	.38	.26	.03	.00	---	.61	.55	3.7	1.2	.18	28	13
30	.40	.19	.03	.00	---	.61	.55	4.6	1.8	.31	18	12
31	.31	---	.03	.00	---	.55	---	8.6	---	.38	17	---
TOTAL	9.92	10.26	1.65	.45	.41	20.32	30.76	153.90	199.37	112.38	122.36	366.2
MEAN	.32	.34	.053	.015	.015	.66	1.03	4.96	6.65	3.63	3.95	12.2
MAX	.41	.42	.15	.02	.02	3.5	7.0	18	27	18	34	28
MIN	.18	.19	.03	.00	.00	.02	.38	.49	.97	.18	.20	1.3
CFSM	.06	.06	.01	.003	.003	.13	.20	.94	1.26	.69	.75	2.31
IN.	.07	.07	.01	.00	.00	.14	.22	1.08	1.40	.79	.86	2.57

CAL YR 1976 TOTAL 895.42 MEAN 2.45 MAX 30 MIN .00 CFSM .46 IN 6.30
WTR YR 1977 TOTAL 1027.98 MEAN 2.82 MAX 34 MIN .00 CFSM .53 IN 7.23

05127215 LONGSTORFF CREEK NEAR ELY, MN

LOCATION.--Lat 47°53'33", long 91°54'55", in SE 1/4 SW 1/4 sec.31, T.63 N., R.12 W., St. Louis County, Hydrologic Unit 09030001, on left bank at downstream side of culvert on county road, 500 ft (152 m) downstream from U.S. Highway 169, 0.7 mi (1.1 km) upstream from mouth, 1.5 mi (2.4 km) southwest of Ely and 2.5 mi (4.0 km) downstream from outlet of Mitchell Lake.

DRAINAGE AREA.--8.84 mi^2 (22.90 km^2).

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

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 1,360.67 ft (414.732 m) above mean sea level, levels by Minnesota Department of Transportation.

REMARKS.--Records fair.

AVERAGE DISCHARGE.--10 years, 7.73 ft^3/s (0.219 m^3/s), 11.87 in/yr (301 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 230 ft^3/s (6.51 m^3/s) June 10, 1970, gage height, 6.52 ft (1.987 m), from floodmark; no flow on many days in 1968, 1969, 1976, and 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 66 ft^3/s (1.87 m^3/s) Aug. 28, gage height, 3.06 ft (0.933 m); no flow on many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.02	.29	.03	.00	.00	.00	1.5	1.6	25	6.6	1.3	31
2	.03	.33	.03	.00	.00	.00	1.3	1.5	22	5.3	1.2	27
3	.02	.33	.03	.00	.00	.00	1.2	1.3	15	14	1.5	23
4	.12	.33	.03	.00	.00	.00	1.2	1.1	14	13	1.3	32
5	.04	.33	.02	.00	.00	.00	1.2	1.4	11	23	1.2	33
6	.04	.33	.02	.00	.00	.00	1.2	2.1	10	39	1.1	27
7	.09	.37	.02	.00	.00	.00	1.2	1.8	9.8	28	1.0	22
8	.15	.37	.02	.00	.00	.01	1.1	1.5	9.3	20	.98	21
9	.12	.29	.02	.00	.00	.01	1.2	1.4	8.9	15	.86	48
10	.15	.29	.01	.00	.00	.01	1.3	1.5	7.0	13	.74	47
11	.29	.33	.01	.00	.00	.02	1.4	1.9	5.8	9.3	.62	32
12	.80	.37	.01	.00	.00	.10	1.3	1.9	4.8	8.1	.56	26
13	.37	.33	.01	.00	.00	.50	1.3	1.6	3.9	6.6	.47	23
14	.56	.41	.00	.00	.00	1.9	1.2	4.0	3.6	6.0	.38	20
15	.51	.41	.01	.00	.00	1.7	1.3	8.5	3.4	5.0	.29	16
16	.37	.46	.02	.00	.00	1.4	1.8	17	12	4.4	1.1	13
17	.29	.51	.02	.00	.00	1.7	3.4	12	11	4.2	1.0	11
18	.33	.51	.02	.00	.00	.92	3.4	9.3	11	4.2	.74	9.3
19	.29	.33	.01	.00	.00	.95	4.0	5.6	12	3.4	.56	11
20	.25	.29	.00	.00	.00	.98	3.7	5.3	12	3.2	.71	8.9
21	.33	.25	.00	.00	.00	1.0	6.4	6.8	11	2.4	.86	7.4
22	.25	.21	.00	.00	.00	.98	5.3	9.3	8.1	1.8	1.0	7.7
23	.29	.18	.00	.00	.00	1.2	4.6	9.8	10	1.9	.92	7.2
24	.33	.21	.00	.00	.00	.98	3.9	10	8.9	2.0	.56	23
25	.29	.21	.00	.00	.00	.86	3.6	10	6.8	2.1	.46	42
26	.15	.18	.00	.00	.00	1.1	3.2	8.7	5.2	1.2	2.1	36
27	.18	.18	.00	.00	.00	1.3	2.9	6.6	4.3	.92	18	28
28	.18	.02	.00	.00	.00	1.5	2.5	6.0	4.6	1.8	55	23
29	.21	.03	.00	.00	---	1.6	1.7	5.6	4.4	1.2	31	21
30	.25	.03	.00	.00	---	1.3	1.6	5.5	6.4	1.8	18	20
31	.29	---	.00	.00	---	2.1	---	7.2	---	1.8	26	---
TOTAL	7.59	8.71	.34	.00	.00	24.12	70.9	167.8	281.2	250.22	171.51	696.5
MEAN	.24	.29	.011	.000	.000	.78	2.36	5.41	9.37	8.07	5.53	23.2
MAX	.80	.51	.03	.00	.00	2.1	6.4	17	25	39	55	48
MIN	.02	.02	.00	.00	.00	.00	1.1	1.1	3.4	.92	.29	7.2
CFSM	.03	.03	.001	.000	.000	.09	.27	.61	1.06	.91	.63	2.62
IN.	.03	.04	.00	.00	.00	.10	.30	.71	1.18	1.05	.72	2.93

CAL YR 1976 TOTAL 1387.94 MEAN 3.79 MAX 59 MIN .00 CFSM .43 IN 5.84
WTR YR 1977 TOTAL 1678.89 MEAN 4.60 MAX 55 MIN .00 CFSM .52 IN 7.06

05127219 SHAGAWA LAKE TRIBUTARY AT ELY, MN

LOCATION.--Lat 47°54'24", long 91°52'23", in NE 1/4 SW 1/4 sec.28, T.63 N., R.12 W., St. Louis County, Hydrologic Unit 09030001, on left bank, 200 ft (61 m) upstream from mouth, 500 ft (152 m) northwest of sewage plant in Ely.

DRAINAGE AREA.--0.71 mi^2 (1.84 km^2).

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

GAGE.--Water-stage recorder and V-notch sharp crested weir. Datum of gage is 1,348.29 ft (410.959 m) above mean sea level. Prior to June 8, 1971, nonrecording gage at site 75 ft (23 m) downstream at different datum.

REMARKS.--Records poor. On Mar. 20, 1972, storm sewer carrying runoff from business and residential areas in basin was diverted 1,700 ft (518 m) upstream from gage to open mine pit.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 54 ft^3/s (1.53 m^3/s) Sept. 1, 1973, gage height, 3.16 ft (0.963 m); no flow at times each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 17 ft^3/s (0.481 m^3/s) Aug. 27, gage height, 2.85 ft (0.869 m); no flow during most of the year.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	.00	.00	.34	.00	.00	.04
2	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
3	.00	.00	.00	.00	.00	.00	.00	.00	.00	.23	.00	.00
4	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.09
5	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00
6	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
7	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
8	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.44
9	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.84
10	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.18
11	.00	.00	.00	.00	.00	.02	.00	.00	.00	.00	.00	.00
12	.00	.00	.00	.00	.00	.07	.00	.00	.00	.00	.00	.00
13	.00	.00	.00	.00	.00	.02	.00	.00	.00	.00	.00	.00
14	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00
15	.00	.00	.00	.00	.00	.01	.00	.26	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00	.08	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
18	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
19	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
20	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
21	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
22	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
23	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.80
25	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.75
26	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.40	.48
27	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	2.9	.27
28	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.61	.15
29	.00	.00	.00	.00	---	.00	.00	.00	.00	.00	.02	.31
30	.00	.00	.00	.00	---	.00	.00	.00	.00	.00	.10	.08
31	.00	---	.00	.00	---	.00	---	.18	---	.00	.27	---
TOTAL	.00	.00	.00	.00	.00	.14	.00	.44	.42	.24	4.30	4.43
MEAN	.000	.000	.000	.000	.000	.005	.000	.014	.014	.008	.14	.15
MAX	.00	.00	.00	.00	.00	.07	.00	.26	.34	.23	2.9	.84
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CFSM	.000	.000	.000	.000	.000	.007	.000	.02	.02	.01	.20	.21
IN.	.00	.00	.00	.00	.00	.01	.00	.02	.02	.01	.22	.23

CAL YR 1976 TOTAL 1.88 MEAN .005 MAX .45 MIN .00 CFSM .007 IN .10
WTR YR 1977 TOTAL 9.97 MEAN .027 MAX 2.9 MIN .00 CFSM .04 IN .52

05127220 BURGO CREEK NEAR ELY, MN

LOCATION.--Lat 47°55'32", long 91°51'40", in SW 1/4 NW 1/4 sec.22, T.63 N., R.12 W., St. Louis County, Hydrologic Unit 09030001, near right bank 10 ft (3 m) upstream from culvert on County Road 88, 0.5 mi (0.8 km) upstream from mouth and 1.5 mi (2.4 km) north of Ely.

DRAINAGE AREA.--3.04 mi^2 (7.87 km^2).

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

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 1,328.49 ft (404.924 m) above mean sea level. Prior to Nov. 18, 1972, nonrecording gage and crest-stage gage at same site at different datum. Nov. 18, 1972, to July 12, 1973, reference point on downstream side of culvert at present datum, and July 13, 1973, to Sept. 26, 1973, nonrecording gage at site 125 ft (38 m) upstream at present datum.

REMARKS.--Records good except those below 0.5 ft^3/s (0.01 m^3/s), which are poor.

AVERAGE DISCHARGE.--10 years, 3.32 ft^3/s (0.094 m^3/s), 14.83 in/yr (377 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 732 ft^3/s (20.7 m^3/s) June 10, 1970, gage height, 12.14 ft (3.700 m), from floodmark (datum then in use), from rating curve extended above 150 ft^3/s (4.25 m^3/s) on basis of flow through culvert and flow-over-road measurement of peak flow; no flow at times in most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 127 ft^3/s (3.60 m^3/s) Aug. 28, gage height, 12.51 ft (3.813 m); no flow Nov. 19 to Mar. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.01	.01	.00	.00	.00	.00	.60	2.2	15	1.3	.24	25
2	.01	.01	.00	.00	.00	.00	.90	2.1	12	.90	.21	18
3	.01	.01	.00	.00	.00	.00	1.0	1.6	8.3	4.4	.27	15
4	.06	.01	.00	.00	.00	.00	1.1	1.4	7.5	3.4	.21	17
5	.03	.01	.00	.00	.00	.00	1.0	1.4	6.5	6.0	.42	15
6	.02	.01	.00	.00	.00	.00	1.1	1.8	6.1	7.5	.35	14
7	.03	.01	.00	.00	.00	.00	1.0	1.6	5.4	5.6	.30	10
8	.02	.01	.00	.00	.00	.00	1.0	1.4	5.3	5.0	.27	8.1
9	.01	.01	.00	.00	.00	.00	2.0	1.2	4.1	3.0	.27	40
10	.03	.01	.00	.00	.00	.00	3.5	1.2	3.5	2.5	.24	27
11	.03	.01	.00	.00	.00	.00	3.7	1.4	2.9	2.1	.21	18
12	.03	.01	.00	.00	.00	.00	3.2	1.3	2.4	1.8	.21	15
13	.03	.01	.00	.00	.00	.00	2.8	1.3	1.8	1.8	.19	14
14	.03	.01	.00	.00	.00	.10	2.4	2.0	1.7	1.2	.17	12
15	.03	.01	.00	.00	.00	.12	2.1	3.0	1.3	.85	.16	11
16	.03	.01	.00	.00	.00	.12	2.1	4.1	5.0	.75	.24	10
17	.03	.01	.00	.00	.00	.11	2.2	3.5	4.4	.68	.24	8.8
18	.03	.01	.00	.00	.00	.10	2.2	2.7	4.3	.62	.24	9.3
19	.03	.00	.00	.00	.00	.10	2.7	2.1	4.2	.54	.18	9.8
20	.03	.00	.00	.00	.00	.10	3.1	2.2	4.1	.50	.27	11
21	.06	.00	.00	.00	.00	.09	6.0	3.6	3.0	.46	.40	7.5
22	.02	.00	.00	.00	.00	.08	6.1	5.1	2.2	.33	.50	6.5
23	.02	.00	.00	.00	.00	.08	5.4	4.6	3.1	.31	.33	7.0
24	.02	.00	.00	.00	.00	.07	4.8	4.1	2.4	.29	.27	27
25	.02	.00	.00	.00	.00	.07	6.3	3.7	1.9	.27	.24	38
26	.02	.00	.00	.00	.00	.25	3.9	3.2	1.5	.24	.90	26
27	.02	.00	.00	.00	.00	.40	3.7	2.8	1.2	.18	82	18
28	.02	.00	.00	.00	.00	.50	3.0	2.7	1.1	.30	97	15
29	.02	.00	.00	.00	---	.60	2.8	2.5	1.2	.24	38	13
30	.02	.00	.00	.00	---	.60	2.4	2.3	1.3	.36	16	11
31	.01	---	.00	.00	---	.60	---	2.8	---	.36	16	---
TOTAL	.78	.18	.00	.00	.00	4.09	84.10	76.9	124.7	53.78	256.53	477.0
MEAN	.025	.006	.000	.000	.000	.13	2.80	2.48	4.16	1.73	8.28	15.9
MAX	.06	.01	.00	.00	.00	.60	6.3	5.1	15	7.5	97	40
MIN	.01	.00	.00	.00	.00	.00	.60	1.2	1.1	.18	.16	6.5
CFSM	.008	.002	.000	.000	.000	.04	.92	.82	1.37	.57	2.72	5.23
IN.	.01	.00	.00	.00	.00	.05	1.03	.94	1.53	.66	3.14	5.84

CAL YR 1976 TOTAL 607.22 MEAN 1.66 MAX 28 MIN .00 CFSM .55 IN 7.43
WTR YR 1977 TOTAL 1078.06 MEAN 2.95 MAX 97 MIN .00 CFSM .97 IN 13.19

05127225 SHAGAWA LAKE AT ELY, MN

LOCATION.--Lat 47°54'18", long 91°53'00", in NE 1/4 NE 1/4 sec.33, T.63 N., R.12 W., St. Louis County, Hydrologic Unit 09030001, on south shore of Shagawa Lake, on east pier of dock at U.S. Forest Service Seaplane Base in Ely.

PERIOD OF RECORD.--April 1967 to current year. April 1962 to July 1966 (fragmentary) in files of Minnesota Department of Natural Resources, Division of Waters.

GAGE.--Nonrecording gage. Datum of gage is 1,330.00 ft (405.384 m) above mean sea level, levels by Minnesota Department of Conservation. Gage readings have been reduced to elevations above mean sea level.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation observed, 1,340.22 ft (408.499 m) June 13, 1970; minimum observed, 1,336.66 ft (407.414 m) Nov. 18, 1976.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum elevation observed, April 1962 to July 1966, 1,339.95 ft (408.417 m) April 27, 28, 1966, from Minnesota Department of Natural Resources, Division of Waters.

EXTREMES FOR CURRENT YEAR.--Maximum elevation observed, 1,339.30 ft (408.219 m) Sept. 28, 29; minimum observed, 1,336.66 ft (407.414 m) Nov. 18.

MONTHEND ELEVATIONS, IN FEET, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

Oct. 31	1,336.67	Feb. 28	1,336.90	June 30	1,337.91
Nov. 30	1,336.73	Mar. 31	1,337.08	July 29	1,337.81
Dec. 30	1,336.79	Apr. 29	1,337.18	Aug. 31	1,338.24
Jan. 31	1,336.85	May 31	1,337.47	Sept. 30	1,339.28

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

05127230 SHAGAWA RIVER AT ELY, MN

LOCATION.--Lat 47°55'09", long 91°50'08", in SW 1/4 SW 1/4 sec.23, T.63 N., R.12 W., St. Louis County, Hydrologic Unit 09030001, on right bank 300 ft (91 m) downstream from outlet of Shagawa Lake, 150 ft (46 m) north of the village limits of Ely, 0.8 mi (1.3 km) upstream from County Road 88 and 3 mi (5 km) upstream from Fall Lake.

DRAINAGE AREA.--99 mi^2 (256 km^2).

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

GAGE.--Water-stage recorder. Altitude of gage is 1,335 ft (407 m), from topographic map. Prior to Aug. 2, 1967, nonrecording gage at same site and datum.

REMARKS.--Records fair.

AVERAGE DISCHARGE.--10 years, 86.6 ft^3/s (2.453 m^3/s), 11.88 in/yr (302 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 640 ft^3/s (18.1 m^3/s) June 12, 1970, gage height, 6.89 ft (2.100 m); minimum, 0.17 ft^3/s (0.005 m^3/s) Nov. 11, 1976, gage height, 3.50 ft (1.067 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 301 ft^3/s (8.52 m^3/s) Sept. 27, gage height, 6.01 ft (1.832 m); minimum, 0.17 ft^3/s (0.005 m^3/s) Nov. 11, gage height, 3.50 ft (1.067 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.31	.22	.49	1.9	2.4	4.2	8.7	13	45	80	63	133
2	.28	.28	.55	2.0	2.2	3.9	8.7	12	50	77	59	146
3	.26	.26	.55	2.0	2.2	3.6	8.2	12	54	87	57	152
4	.43	.23	.55	1.8	2.2	3.9	8.2	11	56	88	57	168
5	.55	.24	.70	2.0	2.1	3.9	8.2	13	55	98	56	176
6	.34	.26	.98	2.0	2.1	3.9	7.7	12	60	107	54	184
7	.31	.23	.87	2.0	2.0	3.9	7.2	12	58	118	51	188
8	.31	.22	.87	1.9	2.7	4.6	6.7	11	58	122	50	194
9	.31	.22	.78	1.9	2.7	4.6	6.7	11	58	122	47	234
10	.31	.22	.87	1.8	2.4	4.6	6.2	10	57	120	46	245
11	.28	.21	.94	2.0	3.0	5.0	6.7	11	57	116	43	262
12	.31	.22	1.0	2.0	2.9	5.5	6.2	11	56	116	38	272
13	.31	.22	1.2	2.0	2.8	6.0	6.2	11	54	111	38	279
14	.31	.22	1.2	2.0	2.7	6.7	6.2	10	54	110	36	286
15	.31	.23	1.1	1.9	2.7	7.7	6.2	16	54	108	34	286
16	.26	.24	1.2	1.7	2.7	8.2	6.2	22	64	104	33	283
17	.24	.24	1.1	1.6	2.7	6.7	7.2	23	66	102	32	279
18	.23	.26	.98	1.4	2.7	6.7	8.2	23	70	101	30	275
19	.24	.26	1.1	2.2	2.7	6.7	9.7	24	72	96	28	270
20	.24	.28	1.2	1.4	2.7	6.7	10	28	73	93	27	270
21	.28	.28	1.4	2.2	2.7	6.7	13	29	73	87	28	262
22	.28	.34	1.2	2.3	2.7	6.7	13	31	74	83	28	255
23	.26	.34	1.2	2.4	2.7	6.7	15	34	80	79	27	247
24	.24	.34	1.3	2.4	2.7	6.7	14	35	80	75	26	253
25	.24	.38	1.4	2.4	2.7	6.2	13	36	80	72	23	275
26	.23	.43	1.5	2.7	3.0	6.2	13	38	80	70	27	290
27	.23	.38	1.6	2.2	3.5	6.7	13	35	77	67	47	294
28	.23	.49	1.6	2.7	4.2	6.7	12	33	78	65	77	297
29	.22	.49	1.7	2.7	---	7.7	12	31	80	64	92	294
30	.23	.49	1.8	2.7	---	9.2	12	31	80	62	103	292
31	.23	---	1.9	2.7	---	9.2	---	34	---	64	120	---
TOTAL	8.81	8.72	34.83	64.9	74.8	185.7	279.3	663	1953	2864	1477	7341
MEAN	.28	.29	1.12	2.09	2.67	5.99	9.31	21.4	65.1	92.4	47.6	245
MAX	.55	.49	1.9	2.7	4.2	9.2	15	38	80	122	120	297
MIN	.22	.21	.49	1.4	2.0	3.6	6.2	10	45	62	23	133
CFSM	.003	.003	.01	.02	.03	.06	.09	.22	.66	.93	.48	2.48
IN.	.00	.00	.01	.02	.03	.07	.10	.25	.73	1.08	.55	2.76

CAL YR 1976 TOTAL 15392.33 MEAN 42.1 MAX 230 MIN .21 CFSM .43 IN 5.78
WTR YR 1977 TOTAL 14955.06 MEAN 41.0 MAX 297 MIN .21 CFSM .41 IN 5.62

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-atage recorder. Datum of gage is 1,296.80 ft (395.265 m) above mean sea level, adjustment of 1928, 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.--Reoorda good. Some regulation by powerplant on Kawishiwi River at Winton, MN, and by many lakes located upatream from station.

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

AVERAGE DISCHARGE.--49 years (water years 1926, 1927, 1931-77), 1,376 ft^3/s (38.97 m^3/s), 10.74 in/yr (273 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, 5,200 ft^3/s (147 m^3/s) Sept. 30, stage rising, peak occurred Oct. 20, 1977; maximum peak discharge, 1,990 ft^3/s (56.4 m^3/s) July 13, gage height, 4.23 ft (1.289 m); minimum discharge, 55 ft^3/s (1.56 m^3/s) Nov. 18, gage height, 1.67 ft (0.509 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	59	65	83	90	101	221	250	261	1420	1180	1090
2	71	59	65	83	91	101	226	245	269	1460	1160	1180
3	71	58	66	83	92	101	231	242	281	1530	1130	1240
4	76	60	66	83	92	102	236	235	297	1560	1100	1300
5	73	62	68	83	92	103	239	236	325	1610	1100	1440
6	69	59	71	83	92	103	242	237	365	1690	1070	1550
7	68	58	71	83	92	103	248	231	386	1760	1030	1660
8	69	59	72	86	92	105	254	225	434	1830	979	1740
9	68	58	73	86	92	108	259	220	455	1880	940	2240
10	68	58	76	86	93	114	264	215	478	1920	897	3380
11	69	58	76	86	94	114	267	213	495	1940	827	3880
12	68	58	76	86	94	121	273	209	514	1940	785	4320
13	65	58	77	86	94	130	277	206	531	1970	749	4690
14	66	58	77	86	94	130	276	208	557	1960	713	4930
15	64	59	77	86	94	130	273	212	580	1920	688	5060
16	63	59	77	86	96	130	271	208	671	1890	672	5060
17	63	59	77	86	97	130	272	207	725	1850	646	5020
18	62	58	79	86	97	131	284	214	815	1780	623	4990
19	63	59	79	86	97	132	293	213	868	1720	599	5100
20	63	62	79	86	97	135	293	220	908	1650	591	5030
21	63	62	79	86	97	138	315	227	934	1590	588	4970
22	62	60	79	86	97	141	309	236	961	1530	575	4880
23	62	62	80	87	97	147	304	238	1020	1480	549	4770
24	62	62	81	88	97	153	297	239	1060	1450	526	4820
25	60	63	81	88	99	158	291	235	1100	1400	509	4930
26	59	62	81	88	99	162	286	231	1150	1350	510	4950
27	60	63	82	90	101	173	277	225	1190	1290	584	5020
28	60	64	83	90	101	181	271	223	1270	1280	762	5090
29	59	65	83	90	---	188	266	218	1320	1260	883	5120
30	59	65	83	90	---	204	261	215	1370	1240	938	5170
31	59	---	83	90	---	213	---	231	---	1210	994	---
TOTAL	2017	1806	2362	2672	2660	4182	8076	6964	21590	50360	24897	114620
MEAN	65.1	60.2	76.2	86.2	95.0	135	269	225	720	1625	803	3821
MAX	76	65	83	90	101	213	315	250	1370	1970	1180	5170
MIN	59	58	65	83	90	101	221	206	261	1210	509	1090
CFSM	.04	.04	..04	.05	.06	.08	.16	.13	.41	.93	.46	2.20
IN.	.04	.04	.05	.06	.06	.09	.17	.15	.46	1.08	.53	2.45

CAL YR 1976 TOTAL 413861 MEAN 1131 MAX 7830 MIN 58 CFSM .65 IN 8.85
WTR YR 1977 TOTAL 242206 MEAN 664 MAX 5170 MIN 58 CFSM .38 IN 5.18

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 above mean sea level, United States and Canada Boundary Survey datum. Prior to October 1933, nonrecording gages at various sites on Lac la Croix. October 1933 to Mar. 13, 1963, nonrecording gage at present site and datum.

REMARKS.--Records excellent.

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

AVERAGE DISCHARGE.--55 years (water years 1923-77), 3,774 ft^3/s (106.9 m^3/s), 9.91 in/yr (252 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, 15,900 ft^3/s (450 m^3/s) Sept. 28, 29; maximum elevation, 1,189.48 ft (362.554 m) Sept. 28; minimum discharge, 536 ft^3/s (15.2 m^3/s) Feb. 22, 23; minimum elevation, 1,181.03 ft (359.978 m) Feb. 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1020	701	579	555	543	541	571	681	1350	2720	3380	2610
2	1010	665	576	555	543	541	571	702	1400	2850	3310	2720
3	1010	672	576	555	544	541	572	713	1440	2970	3250	2870
4	967	678	574	553	545	542	573	719	1460	3060	3190	3030
5	937	671	573	552	541	542	571	721	1510	3260	3140	3220
6	932	660	574	553	541	542	571	741	1560	3380	3080	3410
7	924	655	573	553	542	543	572	743	1610	3480	2990	3520
8	918	657	571	550	541	543	572	755	1660	3560	2930	4000
9	903	651	571	549	541	541	575	760	1680	3650	2890	4940
10	901	646	573	549	541	541	573	766	1710	3740	2780	6180
11	892	639	572	547	541	540	575	780	1730	3770	2660	7450
12	863	630	572	547	541	546	579	782	1750	3740	2630	8700
13	843	616	572	547	542	555	586	792	1760	3870	2550	9770
14	840	625	569	546	541	555	588	799	1790	3870	2520	10700
15	822	622	570	546	541	556	589	828	1820	3900	2480	11600
16	819	619	569	545	541	556	590	834	1850	3930	2430	12200
17	812	612	567	544	540	557	600	848	1900	3970	2360	12700
18	802	606	567	545	540	556	609	870	2030	3970	2310	13200
19	793	604	565	545	539	555	630	903	2100	3990	2280	14000
20	785	606	563	545	539	556	639	933	2170	3890	2230	14300
21	769	603	562	544	539	556	648	970	2210	3880	2180	14600
22	758	597	562	543	538	555	656	1010	2260	3840	2140	14800
23	761	595	562	546	536	554	655	1020	2310	3830	2080	14900
24	752	594	561	546	542	554	662	1070	2350	3910	2030	15300
25	744	591	560	544	544	554	670	1110	2380	3840	2030	15500
26	735	588	559	542	544	554	679	1130	2420	3790	2070	15700
27	723	585	560	543	545	560	683	1140	2490	3730	2270	15800
28	716	584	558	542	542	559	687	1160	2500	3670	2350	15900
29	713	582	557	543	---	560	695	1180	2590	3630	2380	15900
30	708	580	556	543	---	568	693	1180	2640	3560	2420	15800
31	702	---	555	542	---	570	---	1240	---	3420	2500	---
TOTAL	25874	18734	17578	16959	15155	17093	18434	27880	58430	112670	79840	305320
MEAN	835	624	567	547	541	551	614	899	1948	3635	2575	10180
MAX	1020	701	579	555	545	570	695	1240	2640	3990	3380	15900
MIN	702	580	555	542	536	540	571	681	1350	2720	2030	2610
CFSM	.16	.12	.11	.11	.11	.11	.12	.17	.38	.70	.50	1.97
IN.	.19	.13	.13	.12	.11	.12	.13	.20	.42	.81	.57	2.20

CAL YR 1976 TOTAL 1181706 MEAN 3229 MAX 12800 MIN 555 CFSM .63 IN 8.50
WTR YR 1977 TOTAL 713967 MEAN 1956 MAX 15900 MIN 536 CFSM .38 IN 5.14

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, at McKinley Park, 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) above mean sea level. 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 (412.88 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 above mean sea level.

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, 1,358.55 ft (414.086 m) Sept. 9, result of wind action; maximum daily, 1,358.53 ft (414.080 m) Sept. 29; minimum, 1,355.96 ft (413.297 m) Dec. 14, 1976, result of wind action; minimum daily, 1,356.07 ft (413.330 m) on several days in November.

MONTHEND ELEVATION, IN FEET, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

Oct. 31	1,356.13	Feb. 28	1,356.30	June 30	1,357.21
Nov. 30	1,356.08	Mar. 31	1,356.47	July 28	1,357.19
Dec. 31	1,356.14	Apr. 30	1,356.64	Aug. 31	--------
Jan. 31	1,356.23	May 31	1,356.86	Sept.30	1,358.52

NOTE.--Elevations other than those shown above are available.
No gage height record from July 29 to Sept. 8.

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, 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 September 1977.

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

REMARKS.--Records fair.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period January to September, 101 ft^3/s (2.86 m^3/s) Sept. 6, gage height 6.61 ft (2.015 m); no flow Jan. 1 to Mar. 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1				.00	.00	.00	5.0	4.4	22	13	.66	93
2				.00	.00	.00	5.3	4.1	27	12	.66	88
3				.00	.00	.00	5.6	4.6	27	18	.66	82
4				.00	.00	.00	5.0	3.6	26	18	.62	90
5				.00	.00	.00	4.7	5.3	23	16	.58	94
6				.00	.00	.00	4.4	5.9	22	16	.62	100
7				.00	.00	.00	4.1	5.0	20	16	.66	95
8				.00	.00	.00	3.9	4.5	19	15	.52	90
9				.00	.00	.01	3.3	4.0	18	15	.40	86
10				.00	.00	.05	2.8	3.8	16	15	.34	80
11				.00	.00	.20	2.4	3.7	13	12	.28	70
12				.00	.00	.50	2.2	3.6	12	10	.25	64
13				.00	.00	1.5	1.9	3.5	10	8.6	.22	61
14				.00	.00	3.6	1.7	3.5	11	7.2	.19	58
15				.00	.00	3.6	1.5	3.5	9.5	6.2	.17	51
16				.00	.00	4.4	1.4	3.7	12	6.8	.16	46
17				.00	.00	4.3	1.7	4.0	13	7.0	.14	38
18				.00	.00	4.8	1.6	4.5	16	5.6	.12	32
19				.00	.00	4.8	2.0	5.0	17	4.1	.10	29
20				.00	.00	4.8	2.4	6.5	19	3.1	.40	26
21				.00	.00	4.1	6.0	8.5	19	2.6	.45	24
22				.00	.00	3.9	6.7	10	18	2.2	.50	23
23				.00	.00	3.6	6.8	11	20	1.9	.39	23
24				.00	.00	2.6	6.2	9.0	20	1.7	.30	38
25				.00	.00	2.3	5.8	7.5	19	1.5	.24	50
26				.00	.00	2.2	4.6	6.0	17	1.3	1.5	77
27				.00	.00	2.5	3.3	5.5	15	1.2	7.2	86
28				.00	.00	3.0	4.6	5.0	14	1.0	55	88
29				.00	---	3.5	3.6	5.0	12	.80	84	86
30				.00	---	4.0	4.7	8.0	13	.72	95	85
31				.00	---	4.5	---	12	---	.72	94	---
TOTAL				.00	.00	68.76	115.2	174.2	519.5	240.24	346.33	1953
MEAN				.000	.000	2.22	3.84	5.62	17.3	7.75	11.2	65.1
MAX				.00	.00	4.8	6.8	12	27	18	95	100
MIN				.00	.00	.00	1.4	3.5	9.5	.72	.10	23

NOTE.--No gage-height record Jan. 1 to Feb. 28.

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 September 1977.

GAGE.--Water-stage recorder. Datum of gage is 1,410.27 ft (429.850 m) above mean sea level.

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

AVERAGE DISCHARGE.--11 years (water years 1954-64), 74.8 ft^3/s (2.118 m^3/s), 8.83 in/yr (224 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.--Maximum discharge during period December to September, 453 ft^3/s (12.8 m^3/s) Sept. 1, gage height, 7.72 ft (2.353 m); minimum daily, 3.3 ft^3/s (0.093 m^3/s) Dec. 6-25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1			3.7	3.4	3.4	4.3	16	16	107	64	12	448
2			3.6	3.4	3.4	4.3	16	14	148	61	10	426
3			3.5	3.4	3.4	4.4	13	10	158	83	9.8	391
4			3.5	3.4	3.4	4.5	14	7.8	153	106	9.9	407
5			3.4	3.4	3.4	4.7	12	9.2	137	106	9.0	440
6			3.3	3.4	3.4	5.3	11	19	123	104	8.1	426
7			3.3	3.4	3.5	6.4	9.6	22	107	99	8.0	408
8			3.3	3.4	3.5	7.2	8.5	21	99	92	7.5	384
9			3.3	3.4	3.6	9.2	8.2	18	90	83	8.4	360
10			3.3	3.4	3.7	10	8.2	15	76	75	7.7	347
11			3.3	3.4	3.8	12	8.8	20	64	65	7.1	325
12			3.3	3.4	3.9	15	8.2	22	52	59	6.9	325
13			3.3	3.4	3.9	23	6.2	23	42	53	7.0	306
14			3.3	3.4	3.9	30	5.3	22	33	45	6.4	278
15			3.3	3.4	4.0	29	5.6	22	26	38	5.7	254
16			3.3	3.4	4.0	28	6.5	25	24	35	6.0	228
17			3.3	3.4	4.0	25	9.7	28	26	48	6.5	205
18			3.3	3.4	4.0	23	18	27	38	43	6.3	184
19			3.3	3.4	4.0	22	27	24	51	38	6.1	169
20			3.3	3.4	4.0	22	33	28	62	36	8.5	158
21			3.3	3.4	4.0	21	48	49	68	34	15	145
22			3.3	3.4	4.0	21	55	66	67	30	14	137
23			3.3	3.4	4.1	20	54	74	77	25	13	132
24			3.3	3.4	4.1	20	52	71	91	22	12	145
25			3.3	3.4	4.1	18	46	64	91	18	14	190
26			3.4	3.4	4.1	19	42	56	87	15	24	228
27			3.4	3.4	4.1	22	35	47	79	12	128	256
28			3.4	3.4	4.2	22	29	37	73	15	293	274
29			3.4	3.4	---	22	24	28	67	13	347	289
30			3.4	3.4	---	20	19	22	64	11	383	292
31			3.4	3.4	---	18	---	30	---	11	433	---
TOTAL	---	---	104.1	105.4	106.9	512.3	648.8	937.0	2380	1539	1832.9	8557
MEAN	---	---	3.36	3.40	3.82	16.5	21.6	30.2	79.3	49.6	59.1	285
MAX	---	---	3.7	3.4	4.2	30	55	74	158	106	433	448
MIN	---	---	3.3	3.4	3.4	4.3	5.3	7.8	24	11	5.7	132
CFSM	---	---	.03	.03	.03	.14	.19	.26	.69	.43	.51	2.48
IN.	---	---	.03	.03	.03	.17	.21	.30	.77	.50	.59	2.77

NOTE.--No gage-height record Dec. 1 to Feb. 2.

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, snd 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) above mean sea level. 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 except those for period of no gage height record, Nov. 23 to May 3, which are poor.

AVERAGE DISCHARGE.--55 years, 315 ft^3/s (8.921 m^3/s), 8.86 in/yr (225 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, 1,030 ft^3/s (29.2 m^3/s) Sept. 28, gage height, 5.98 ft (1.823 m); minimum daily, 0.19 ft^3/s (0.005 m^3/s) Jan. 3-5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.62	.50	.32	.20	.40	.40	1.3	8.5	59	137	149	423
2	.63	.50	.32	.20	.40	.40	1.3	8.5	73	166	144	450
3	.67	.47	.32	.19	.40	.40	1.4	8.0	81	194	136	490
4	.71	.47	.32	.19	.40	.40	1.4	7.4	75	203	135	536
5	.73	.47	.32	.19	.40	.40	1.4	7.2	82	241	130	572
6	.71	.47	.32	.22	.40	.40	1.5	5.0	80	254	129	611
7	.73	.44	.32	.27	.37	.40	1.5	4.8	88	265	119	627
8	.71	.47	.32	.28	.35	.40	1.5	4.5	96	254	112	676
9	.70	.47	.32	.28	.35	.40	1.6	5.2	99	266	114	749
10	.67	.47	.32	.29	.35	.40	1.6	4.7	101	280	95	824
11	.68	.47	.32	.29	.35	.40	1.7	6.2	88	271	75	872
12	.66	.47	.32	.30	.35	.40	1.8	6.5	94	233	74	885
13	.66	.47	.32	.31	.35	.40	1.9	7.4	87	253	66	894
14	.70	.47	.32	.31	.35	.40	2.1	13	86	231	61	907
15	.69	.47	.32	.31	.35	.40	2.2	15	89	220	63	917
16	.70	.47	.32	.31	.35	.40	2.6	13	96	234	60	904
17	.65	.47	.32	.31	.35	.40	2.9	9.6	99	251	52	879
18	.65	.44	.25	.31	.35	.40	3.5	11	108	250	51	867
19	.66	.41	.20	.31	.35	.40	4.0	12	117	247	51	893
20	.66	.41	.20	.31	.35	.40	5.0	13	117	218	56	890
21	.59	.41	.20	.31	.35	.40	6.0	16	123	211	48	882
22	.53	.41	.20	.33	.35	.40	7.0	25	129	212	41	870
23	.56	.41	.20	.36	.35	.40	7.5	24	139	203	39	855
24	.55	.35	.20	.38	.35	.42	7.5	30	128	193	39	932
25	.53	.32	.20	.40	.35	.44	7.5	34	137	175	54	939
26	.53	.32	.20	.40	.35	.48	7.5	35	138	176	63	946
27	.53	.32	.20	.40	.35	.64	7.5	32	134	173	148	962
28	.53	.32	.20	.40	.35	.74	7.5	28	134	174	234	994
29	.53	.32	.20	.40	---	.90	8.0	29	145	166	287	995
30	.53	.32	.20	.40	---	1.1	8.0	25	161	183	333	995
31	.50	---	.20	.40	---	1.2	---	38	---	151	376	---
TOTAL	19.48	12.78	8.29	9.56	10.12	15.12	116.2	486.5	3183	6685	3534	24236
MEAN	.63	.43	.27	.31	.36	.49	3.87	15.7	106	216	114	808
MAX	.73	.50	.32	.40	.40	1.2	8.0	38	161	280	376	995
MIN	.50	.32	.20	.19	.35	.40	1.3	4.5	59	137	39	423
CFSM	.001	.001	.001	.001	.001	.001	.008	.03	.22	.45	.24	1.67
IN.	.00	.00	.00	.00	.00	.00	.01	.04	.25	.51	.27	1.87

CAL YR 1976 TOTAL 59533.64 MEAN 163 MAX 725 MIN .20 CFSM .34 IN 4.59
WTR YR 1977 TOTAL 38316.05 MEAN 105 MAX 995 MIN .19 CFSM .22 IN 2.95

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 1975, in reports of Water Survey of Canada, Inland Water Branch. 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 mean sea level (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, 1108.78 ft (337.956 m) Sept. 30, stage rising, peak occurred Oct. 11, 1977; no maximum independent peak, rising stage since Mar. 27; maximum daily elevation, 1108.75 ft (337.947 m) Sept. 30; minimum, 1104.76 ft (336.731 m) Mar. 26; minimum daily, 1104.79 ft (336.740 m) Mar. 26.

MONTHEND ELEVATION, IN FEET, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

Oct. 31 ..... 5.69	Feb. 28 ..... 4.96	June 30 ..... 5.98
Nov. 30 ..... 5.49	Mar. 31 ..... 4.88	July 31 ..... 6.49
Dec. 31 ..... 5.54	Apr. 30 ..... 5.10	Aug. 31 ..... 6.89
Jan. 31 ..... 5.29	May 31 ..... 5.54	Sept.30 ..... 8.75

NOTE.--Add 1,100 ft to obtain elevation above mean sea level. 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) above mean sea level. 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 period of no gage-height record, Nov. 28 to Apr. 16, which are fair.

AVERAGE DISCHARGE.--35 years, 124 ft^3/s (3.512 m^3/s), 9.00 in/yr (229 mm/yr).

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

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

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Aug. 30	1300	*835	23.6	*4.61	1.405
Sept. 27	1230	595	16.9	4.04	1.231

Minimum daily discharge, 3.8 ft^3/s (0.11 m^3/s) Jan. 31 to Feb. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.9	9.6	6.3	4.1	3.8	5.0	32	26	70	65	27	742
2	5.0	11	6.1	4.1	3.8	5.0	32	26	83	59	26	659
3	5.1	12	5.9	4.1	3.8	5.0	31	22	77	76	27	539
4	5.2	9.9	5.8	4.1	3.9	5.1	31	20	65	91	26	549
5	5.3	14	5.6	4.1	3.9	5.4	30	22	54	109	26	523
6	5.6	10	5.5	4.1	4.0	6.6	30	24	49	95	26	511
7	6.1	8.7	5.4	4.0	4.1	8.0	30	25	42	84	25	490
8	6.2	7.8	5.3	4.0	4.2	9.8	29	24	37	71	25	449
9	6.7	8.1	5.2	4.0	4.4	12	29	22	32	62	25	459
10	6.7	9.0	5.0	4.0	4.6	15	29	21	30	55	24	425
11	7.0	8.7	5.0	4.0	4.7	18	29	20	27	52	22	395
12	7.0	8.4	4.9	4.0	4.7	22	29	20	23	50	22	381
13	7.0	8.1	4.8	4.0	4.7	26	28	20	21	47	22	354
14	6.4	7.8	4.8	4.0	4.8	31	28	20	19	42	21	326
15	7.5	7.8	4.7	4.0	4.8	35	27	17	18	38	20	297
16	8.1	8.1	4.6	4.0	4.7	35	27	17	23	38	21	272
17	9.0	7.8	4.6	4.0	4.7	33	28	16	27	43	21	255
18	9.0	8.4	4.5	4.0	4.8	31	32	16	46	37	20	248
19	9.3	9.3	4.5	4.0	4.8	29	61	16	66	34	20	274
20	10	9.6	4.4	4.0	4.8	26	69	29	87	33	22	281
21	11	9.9	4.4	3.9	4.8	24	84	31	86	30	25	281
22	10	9.9	4.3	3.9	4.9	22	85	31	74	28	22	276
23	9.3	9.3	4.3	3.9	4.9	20	78	31	82	26	20	266
24	9.0	8.7	4.3	3.9	4.9	19	67	31	84	25	18	336
25	9.6	8.7	4.2	3.9	4.9	17	71	28	81	23	17	443
26	9.6	8.7	4.2	3.9	4.9	19	52	25	67	22	25	540
27	9.3	7.5	4.2	3.9	4.9	21	39	22	52	22	210	587
28	9.3	7.0	4.2	3.9	5.0	25	34	21	61	24	562	566
29	9.6	6.8	4.2	3.9	---	29	31	18	61	25	746	530
30	9.6	6.5	4.1	3.9	---	32	28	19	65	26	827	476
31	9.9	---	4.1	3.8	---	32	---	31	---	29	802	---
TOTAL	243.3	267.1	149.4	123.4	127.2	622.9	1230	711	1609	1461	3742	12730
MEAN	7.85	8.90	4.82	3.98	4.54	20.1	41.0	22.9	53.6	47.1	121	424
MAX	11	14	6.3	4.1	5.0	35	85	31	87	109	827	742
MIN	4.9	6.5	4.1	3.8	3.8	5.0	27	16	18	22	17	248
CFSM	.04	.05	.03	.02	.02	.11	.22	.12	.29	.25	.65	2.27
IN.	.05	.05	.03	.02	.03	.12	.24	.14	.32	.29	.74	2.53

CAL YR 1976 TOTAL 24296.6 MEAN 66.4 MAX 687 MIN 4.0 CFSM .36 IN 4.83
WTR YR 1977 TOTAL 23016.3 MEAN 63.1 MAX 827 MIN 3.8 CFSM .34 IN 4.58

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, 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) above mean sea level, surveyed by Topographic Division. Prior to Aug. 24, 1944, nonrecording gage at site 59 ft (15 m) upstream at same datum.

REMARKS.--Records good except those for periods of no gage-height record (Dec. 14 to Apr. 10 and May 8 to June 8), which are fair. Natural flow of stream affected by continually changing iron-mining activities that inolude 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.--31 years, 36.6 ft^3/s (1.037 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, 204 ft^3/s (5.78 m^3/s) Aug. 28, gage height, 3.55 ft (1.082 m); minimum daily discharge, 2.4 ft^3/s (0.068 m^3/s) Oct. 3; minimum gage height, 1.05 ft (0.320 m) Aug. 14, 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	4.6	6.5	7.8	4.3	6.8	13	8.9	18	24	5.0	163
2	2.5	4.6	6.5	7.9	4.3	6.9	13	7.8	20	22	5.0	142
3	2.4	4.6	6.1	8.0	4.3	7.0	12	7.8	20	32	5.9	113
4	2.8	4.8	5.2	8.1	4.4	7.1	12	7.8	19	29	5.0	141
5	3.0	5.0	6.5	8.2	4.6	7.4	12	7.8	17	29	5.2	126
6	3.1	5.2	7.3	8.2	4.8	7.6	11	8.4	16	28	4.5	120
7	2.7	5.4	6.8	8.2	4.9	7.9	11	8.1	15	25	4.5	107
8	3.0	5.2	6.5	8.1	5.1	8.3	11	7.6	14	22	4.2	92
9	3.4	5.6	6.5	8.0	5.4	8.9	11	7.1	13	21	4.0	99
10	3.3	6.1	6.3	7.8	5.6	9.6	11	6.5	12	18	3.9	85
11	3.4	5.9	6.5	7.6	5.8	10	11	6.1	11	17	3.5	80
12	3.4	6.1	6.8	7.3	6.0	11	11	5.9	9.8	16	3.2	73
13	3.4	6.3	6.8	7.0	6.1	12	11	5.5	9.2	15	3.2	66
14	3.4	6.3	6.7	6.7	6.3	13	11	5.1	8.4	14	3.0	63
15	3.5	6.1	6.8	6.4	6.4	14	11	4.8	8.1	12	3.2	55
16	3.5	6.3	6.8	6.1	6.5	13	11	4.6	11	12	3.8	52
17	3.8	7.3	6.9	5.8	6.6	13	11	4.5	13	13	3.8	46
18	3.8	7.6	7.0	5.6	6.6	12	12	4.5	21	12	3.5	47
19	3.9	7.3	7.1	5.3	6.6	11	17	5.8	24	11	3.2	60
20	3.9	7.2	7.2	5.1	6.6	10	16	8.4	28	10	4.6	56
21	4.1	7.2	7.2	4.9	6.5	9.4	19	8.9	27	8.9	5.6	51
22	4.1	7.2	7.3	4.8	6.5	8.5	18	9.1	25	7.6	4.8	52
23	4.2	7.2	7.3	4.6	6.5	7.7	16	9.0	29	6.1	4.8	52
24	4.4	7.2	7.3	4.5	6.5	7.4	15	8.4	28	5.2	4.5	76
25	4.2	7.2	7.4	4.4	6.5	7.2	13	7.6	25	4.4	4.6	90
26	4.1	7.0	7.4	4.4	6.5	7.6	13	7.0	22	3.9	9.8	102
27	4.1	6.1	7.5	4.3	6.5	8.8	11	6.5	21	3.9	73	110
28	4.4	6.5	7.6	4.3	6.6	10	11	6.0	24	5.4	165	102
29	4.5	6.5	7.7	4.3	---	12	10	5.7	23	4.6	148	101
30	4.5	6.5	7.7	4.3	---	13	8.9	5.6	25	5.9	168	91
31	4.5	---	7.8	4.3	---	13	---	10	---	6.8	169	---
TOTAL	111.8	186.1	215.0	192.3	163.3	301.1	373.9	216.8	556.5	444.7	839.3	2613
MEAN	3.61	6.20	6.94	6.20	5.83	9.71	12.5	6.99	18.6	14.3	27.1	87.1
MAX	4.5	7.6	7.8	8.2	6.6	14	19	10	29	32	169	163
MIN	2.4	4.6	5.2	4.3	4.3	6.8	8.9	4.5	8.1	3.9	3.0	46

CAL YR 1976 TOTAL 6098.1 MEAN 16.7 MAX 138 MIN 2.2
WTR YR 1977 TOTAL 6213.8 MEAN 17.0 MAX 169 MIN 2.4

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) above mean sea level. 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.--54 years (water years 1912-16, 1929-77), 1,040 ft^3/s (29.45 m^3/s), 8.16 in/yr (207 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, 8,990 ft^3/s (255 m^3/s) Sept. 11, gage height, 21.49 ft (6.550 m); minimum daily, 32.0 ft^3/s (0.91 m^3/s) Oct. 1-3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	55	57	49	45	53	310	205	352	644	269	5350
2	32	56	57	48	45	54	310	191	693	795	259	5500
3	32	60	56	48	45	56	300	165	939	752	257	5250
4	33	59	56	48	45	58	300	165	920	809	265	4840
5	37	58	55	48	45	60	290	158	838	1130	272	5750
6	37	61	55	48	45	62	280	155	731	1760	265	6400
7	38	70	54	48	45	66	270	148	622	2300	259	5750
8	38	52	54	47	46	68	260	147	525	2160	244	5090
9	38	65	54	47	46	70	250	140	457	1840	230	5270
10	39	64	54	47	47	73	243	139	409	1540	218	8000
11	38	68	54	47	47	76	235	139	367	1250	209	8780
12	38	66	54	47	47	80	238	136	327	989	201	7780
13	40	66	53	47	47	84	246	136	289	825	189	6460
14	41	65	53	46	47	90	243	132	261	712	184	5160
15	43	64	53	46	47	96	238	130	246	622	180	4240
16	45	63	53	46	47	105	238	126	250	546	177	3500
17	46	62	53	46	48	115	238	125	344	525	175	2960
18	48	62	52	46	48	135	241	125	634	696	173	2630
19	49	62	52	46	48	160	249	131	774	825	170	3120
20	47	61	52	46	48	180	303	145	812	774	167	3930
21	47	60	51	46	48	190	396	168	851	709	162	4260
22	47	60	51	46	49	200	415	182	845	634	151	4120
23	48	59	51	46	49	195	418	192	796	555	134	3780
24	48	59	51	45	49	190	407	194	709	492	125	3600
25	50	58	50	45	50	185	385	216	647	437	121	4560
26	51	58	50	45	51	180	352	244	600	344	125	6010
27	52	58	50	45	52	180	322	232	579	308	147	6560
28	49	58	49	45	52	180	285	214	582	287	180	6240
29	54	58	49	45	---	190	257	292	567	278	2320	5680
30	54	57	49	45	---	220	228	234	600	278	4550	5110
31	54	---	49	45	---	250	---	272	---	280	5360	---
TOTAL	1345	1824	1631	1439	1328	3901	8747	5378	17566	26096	17738	155680
MEAN	43.4	60.8	52.6	46.4	47.4	126	292	173	586	842	572	5189
MAX	54	70	57	49	52	250	418	292	939	2300	5360	8780
MIN	32	52	49	45	45	53	228	125	246	278	121	2630
CFSM	.03	.04	.03	.03	.03	.07	.17	.10	.34	.49	.33	3.00
IN.	.03	.04	.04	.03	.03	.08	.19	.12	.38	.56	.38	3.35

CAL YR 1976 TOTAL 202916 MEAN 554 MAX 9280 MIN 23 CFSM .32 IN 4.36
WTR YR 1977 TOTAL 242673 MEAN 665 MAX 8780 MIN 32 CFSM .38 IN 5.22

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1969, 1971, 1973 to current year.

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	FECAL COLIFORM .7UM-MF (COL./100 ML) (31625)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML) (31673)	HARDNESS (CA,MG) (MG/L) (00900)
OCT										
05...	1150	37	305	8.2	2.0	9.0	9	54	37	150
NOV										
16...	1350	64	350	8.1	3.5	.0	5	84	84	170
JAN										
04...	1315	48	389	7.2	--	.5	9	1	2	180
FEB										
08...	1215	46	352	--	1.5	.5	8	5	15	180
MAR										
22...	1300	200	275	7.8	3.5	.0	10	2	12	140
MAY										
03...	1215	177	190	8.2	18.5	16.5	15	1	5	100
JUN										
14...	1000	272	195	7.4	19.0	20.0	3	15	20	97
JUL										
26...	1215	347	155	8.1	20.0	23.5	10	16	150	87
SEP										
07...	1130	5820	85	7.3	19.5	15.5	40	72	8400	56

DATE	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)
OCT									
05...	2	40	13	6.7	9	.2	2.2	151	20
NOV									
16...	0	45	14	8.5	10	.3	2.8	172	19
JAN									
04...	2	46	16	8.7	9	.3	2.6	179	19
FEB									
08...	8	48	15	8.6	9	.3	2.6	174	22
MAR									
22...	10	37	12	7.3	10	.3	2.6	130	19
MAY									
03...	18	27	7.8	5.8	7	.2	2.4	81	16
JUN									
14...	23	26	7.7	4.4	9	.2	2.0	74	20
JUL									
26...	17	23	7.1	2.2	5	.1	1.3	70	12
SEP									
07...	15	16	3.9	1.6	6	.1	2.2	41	16

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L) (70300)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L) (00625)	TOTAL PHOS-PHORUS (P) (MG/L) (00665)
OCT									
05...	1.9	.1	3.7	183	178	18.5	.01	.61	.04
NOV									
16...	2.2	.1	9.3	228	204	39.8	.00	.11	.02
JAN									
04...	2.4	.2	18	237	220	31.0	.03	.37	.03
FEB									
08...	2.5	.2	17	224	221	27.8	.13	.24	.03
MAR									
22...	3.5	.2	14	186	175	100	.27	.47	.04
MAY									
03...	2.9	.1	3.2	139	112	66.4	.18	.59	.02
JUN									
14...	3.0	.1	11	163	119	120	.05	.93	.07
JUL									
26...	2.4	.1	8.6	148	99	139	.08	1.2	.08
SEP									
07...	3.1	.1	10	140	78	2200	.02	1.6	.10

DATE	TIME	TOTAL ARSENIC (AS) (UG/L) (01002)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	TOTAL CAD-MIUM (CD) (UG/L) (01027)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	TOTAL CHRO-MIUM (CR) (UG/L) (01034)	DIS-SOLVED CHRO-MIUM (CR) (UG/L) (01030)	TOTAL COBALT (CO) (UG/L) (01037)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	TOTAL COPPER (CU) (UG/L) (01042)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	TOTAL IRON (FE) (UG/L) (01045)
OCT												
05...	1150	2	2	<10	1	0	0	<50	0	<10	3	370
FEB												
08...	1215	2	1	10	0	0	0	<50	0	<10	3	600
JUN												
14...	1000	2	1	<10	0	0	0	<50	0	<10	4	1200

DATE	DIS-SOLVED IRON (FE) (UG/L) (01046)	TOTAL LEAD (PB) (UG/L) (01051)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	TOTAL MAN-GANESE (MN) (UG/L) (01055)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	TOTAL MERCURY (HG) (UG/L) (71900)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	TOTAL SELE-NIUM (SE) (UG/L) (01147)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	TOTAL ZINC (ZN) (UG/L) (01092)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	TOTAL ORGANIC CARBON (C) (MG/L) (00680)
OCT												
05...	30	<100	0	60	30	.0	.0	0	0	20	0	11
FEB												
08...	290	100	2	70	40	--	.0	0	0	0	0	7.8
JUN												
14...	270	<100	3	170	70	.0	.0	1	0	10	0	32

DATE	TIME	LENGTH OF EXPO-SURE (DAYS) (00022)	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M (00573)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M (00572)	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2) (70957)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2) (70958)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS) (70950)	SAMPLING METHOD
JUN								
14...	1000	42	.393	.236	.080	.009	1962	POLYETHYLENE STRIP

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	OCT 5,76		NOV 16,76		JAN 4,77		FEB 8,77	
TIME	1150		1350		1315		1215	
TOTAL CELLS/ML	350		590		100		27	
DIVERSITY: DIVISION	1.4		1.5		0.6		0.7	
.CLASS	1.4		2.3		0.6		0.7	
..ORDER	2.4		2.7		0.8		0.7	
...FAMILY	3.0		2.8		1.9		1.5	
....GENUS	3.2		2.8		2.1		1.5	
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								
....MICRACTINIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	15	4	49	8	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	15	4	--	-	14	13	--	-
..TETRASPORALES								
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CARTERIA	--	-	27	5	--	-	--	-
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-
..ZYGNEMATALES								
...ZYGNEMATACEAE								
....MOUGEOTIA	7	2	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	100#	29	110#	18	3	3	--	-
....MELOSIRA	4	1	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	26	8	--	-	--	-	--	-
....COCCONEIS	11	3	--	-	3	3	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	13	2	3	3	11#	40
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	26	8	4	1	24#	23	11#	40
....PINNULARIA	--	-	--	-	7	7	--	-
...NITZSCHIACEAE								
....NITZSCHIA	52#	15	49	8	48#	47	--	-
...SURIRELLACEAE								
....SURIRELLA	--	-	4	1	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	--	-	--	-
....OCHROMONAS	--	-	190#	32	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROCCOCCALES								
...CHROCCOCCACEAE								
....ANACYSTIS	37	11	27	5	--	-	--	-
..HORMOGONALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	37	11	--	-	--	-	--	-

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, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	OCT 5,76 1150		NOV 16,76 1350		JAN 4,77 1315		FEB 8,77 1215	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
EUGLENOPHYTA (EUGLENOIDS)								
.CRYPTOPHYCEAE								
..CRYPTOMONIDALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	7	2	--	-	--	-	--	-
...CRYPTOMONODACEAE								
....CRYPTOMONAS	7	2	27	5	--	-	5#	20
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	--	-
....LEPOCINCLIS	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	94#	16	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	--	-	--	-

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

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	MAY 3,77		JUN 14,77		JUL 26,77		SEP 7,77	
TIME	1215		1000		1215		1130	
TOTAL CELLS/ML	3100		2000		1400		120	
DIVERSITY: DIVISION	1.0		1.1		1.4		0.5	
.CLASS	1.0		1.1		1.5		0.5	
..ORDER	1.5		1.8		2.3		0.5	
...FAMILY	2.2		2.2		2.7		2.5	
....GENUS	2.7		2.6		2.8		2.5	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	33	2	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	79	3	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	220	7	58	3	41	3	--	-
....KIRCHNERIELLA	--	-	92	5	33	2	--	-
....OOCYSTIS	20	1	12	1	--	-	--	-
....SELENASTRUM	*	0	--	-	--	-	--	-
....WESTELLA	890#	28	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	12	1	--	-	--	-
....SCENEDESMUS	40	1	140	7	83	6	--	-
..TETRASPORALES								
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	200	10	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CARTERIA	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	35	2	--	-	--	-
..ZYGNEMATALES								
...ZYGNEMATACEAE								
....MOUGEOTIA	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	500#	16	1000#	54	120	8	--	-
....MELOSIRA	--	-	120	6	50	3	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	23	1	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	*	0	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	*	0	--	-	--	-	27#	22
...FRAGILARIACEAE								
....ASTERIONELLA	180	6	--	-	--	-	--	-
....FRAGILARIA	--	-	92	5	--	-	--	-
....SYNEDRA	670#	22	--	-	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	20	1	12	1	25	2	27#	22
...NAVICULACEAE								
....NAVICULA	20	1	12	1	58	4	14	11
....PINNULARIA	--	-	--	-	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	500#	16	46	2	120	9	27#	22
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--	-	14	11
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	8	1	--	-
....OCHROMONAS	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROCCOCCALES								
...CHROCCOCCACEAE								
....ANACYSTIS	--	-	--	-	550#	38	--	-
..HORMOGONALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	310#	22	--	-

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, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	MAY 3,77 1215		JUN 14,77 1000		JUL 26,77 1215		SEP 7,77 1130	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
EUGLENOPHYTA (EUGLENOIDS)								
.CRYPTOPHYCEAE								
..CRYPTOMONIDALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	--	-	--	-
...CRYPTOMONODACEAE								
....CRYPTOMONAS	--	-	--	-	8	1	--	-
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	8	1	--	-
....LEPOCINCLIS	--	-	--	-	--	-	14	11
....TRACHELOMONAS	--	-	35	2	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	35	2	--	-	--	-

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

SUSPENDED-SEDIMENT DISCHARGE

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)	SUS. SED. FALL DIAM. % FINER THAN .062 MM
NOV						
16...	1350	64	.0	6	1.0	--
JAN						
04...	1315	48	.5	10	1.3	--
FEB						
08...	1215	46	.5	37	4.6	90
MAR						
22...	1210	200	.0	31	17	86
MAY						
03...	1215	177	16.5	30	14	73
JUN						
14...	1000	272	20.0	37	27	--
JUL						
26...	1215	347	23.5	16	14	--
SEP						
07...	1130	5820	15.5	112	1760	86

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.

WATER-DISCHARGE RECORDS

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 current year.

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

GAGE.--Water-stage recorder. Datum of gage is 1,144.71 ft (348.908 m) above mean sea level. 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. Prior to 1971, a powerplant, located 0.3 mi (0.5 km) upstream, caused some diurnal fluctuation at low flows.

AVERAGE DISCHARGE.--49 years (water years 1929-77), 693 ft^3/s (19.63 m^3/s), 6.45 in/yr (164 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, 3,090 ft^3/s (87.5 m^3/s) Sept. 27, gage height, 6.98 ft (2.128 m); minimum, 34 ft^3/s (0.96 m^3/s) Aug. 22, gage height, 2.64 ft (0.805 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	61	69	54	47	40	45	310	230	280	305	84	214
2	61	81	54	47	40	45	310	227	328	295	79	274
3	61	76	53	46	40	46	300	221	327	305	79	288
4	61	69	53	46	40	46	295	215	304	404	79	486
5	61	67	52	46	40	48	290	217	276	517	74	824
6	61	58	52	46	40	50	280	215	243	713	72	919
7	61	49	52	45	40	54	270	206	222	712	67	898
8	63	56	52	45	40	56	260	207	198	628	65	953
9	65	57	51	45	41	60	240	208	180	543	63	1180
10	67	58	51	45	41	63	245	197	163	456	56	1350
11	72	58	50	44	42	68	255	187	150	389	52	1320
12	74	58	50	44	42	72	265	173	130	346	49	1210
13	74	58	50	44	42	78	270	165	116	304	45	1120
14	72	54	50	44	42	80	270	160	102	263	43	994
15	70	52	50	43	42	88	270	159	98	226	40	882
16	71	49	49	43	42	100	275	151	136	198	40	794
17	72	47	49	43	42	120	288	136	225	196	41	716
18	72	45	49	43	43	140	301	128	280	203	40	726
19	72	47	49	43	43	165	329	167	343	184	36	1270
20	75	50	49	42	43	190	395	150	343	163	34	2040
21	75	56	49	42	43	200	460	148	319	142	34	1980
22	73	59	49	42	44	210	471	143	312	129	34	1890
23	66	61	48	42	44	200	448	138	303	121	35	1740
24	60	61	48	42	44	195	408	162	287	112	35	1780
25	60	61	48	41	44	185	369	166	262	105	34	2340
26	61	59	48	41	45	180	340	148	232	98	38	2950
27	58	57	47	41	45	170	311	133	209	93	58	3050
28	66	56	47	41	45	175	283	122	212	90	72	2960
29	74	55	47	41	---	180	259	130	249	89	89	2770
30	76	54	47	41	---	200	245	131	262	89	92	2500
31	63	---	47	41	---	240	---	160	---	86	118	---
TOTAL	2078	1737	1544	1346	1179	3749	9312	5300	7091	8504	1777	42418
MEAN	67.0	57.9	49.8	43.4	42.1	121	310	171	236	274	57.3	1414
MAX	76	81	54	47	45	240	471	230	343	713	118	3050
MIN	58	45	47	41	40	45	240	122	98	86	34	214
CFSM	.05	.04	.03	.03	.03	.08	.21	.12	.16	.19	.04	.97
IN.	.05	.04	.04	.03	.03	.10	.24	.14	.18	.22	.05	1.08

CAL YR 1976 TOTAL 132136 MEAN 361 MAX 3580 MIN 45 CFSM .25 IN 3.37
WTR YR 1977 TOTAL 86035 MEAN 236 MAX 3050 MIN 34 CFSM .16 IN 2.19

05132000 BIG FORK RIVER AT BIG FALLS, MN--Continued
(National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1968, 1971 to current year (discontinued).

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	FECAL COLIFORM .7UM-MF (COL./100 ML) (31625)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML) (31673)	HARDNESS (CA,MG) (MG/L) (00900)
OCT										
04...	1445	60	340	8.5	11.0	12.0	2	B3	B19	170
NOV										
15...	1540	54	380	8.3	2.0	.0	2	1	<1	200
JAN										
03...	1600	46	420	7.6	--	.5	5	13	4	240
FEB										
07...	1500	40	398	--	-4.0	.0	4	8	1	220
MAR										
28...	1400	177	340	7.6	13.0	1.5	3	2	38	140
MAY										
02...	1515	219	250	8.6	18.0	17.0	4	2	3	140
JUN										
13...	1230	1.1	220	7.3	14.0	18.5	4	4	14	110
JUL										
25...	1530	102	220	7.9	17.0	24.0	6	2	B640	120
SEP										
06...	1545	922	130	7.5	17.5	15.0	9	43	180	80

DATE	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	SODIUM ADSORPTION RATIO (00931)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	ALKALINITY AS CACO3 (MG/L) (00410)	DISSOLVED SULFATE (SO4) (MG/L) (00945)
OCT									
04...	0	43	14	4.8	6	.2	2.5	166	10
NOV									
15...	5	53	17	5.8	6	.2	2.6	198	12
JAN									
03...	0	62	20	6.3	5	.2	3.0	240	12
FEB									
07...	0	60	17	6.6	6	.2	2.6	223	16
MAR									
28...	0	38	12	4.7	6	.2	3.2	144	11
MAY									
02...	6	37	11	3.5	5	.1	2.6	130	9.0
JUN									
13...	15	30	9.3	5.7	7	.2	1.3	98	14
JUL									
25...	9	33	10	4.0	7	.2	1.3	110	10
SEP									
06...	17	21	6.6	2.2	6	.1	1.3	62	13

05132000 BIG FORK RIVER AT BIG FALLS, MN--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L) (70300)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L) (00625)	TOTAL PHOS-PHORUS (P) (MG/L) (00665)
OCT 04...	1.6	.1	1.5	188	177	30.5	.01	.20	.02
NOV 15...	2.1	.1	4.6	242	216	35.3	.00	.75	.02
JAN 03...	1.8	.2	15	281	264	35.2	.09	.71	.02
FEB 07...	1.9	.2	17	264	256	28.5	.09	.59	.03
MAR 28...	3.3	.1	11	199	170	95.1	.35	.76	.03
MAY 02...	1.9	.1	.6	163	145	96.4	.19	.60	.03
JUN 13...	1.7	.1	7.9	169	127	.52	.01	.75	.04
JUL 25...	1.9	.1	9.6	181	139	49.8	.03	1.1	.04
SEP 06...	2.7	.1	8.9	161	93	401	.01	1.5	.05

DATE	TIME	TOTAL ARSENIC (AS) (UG/L) (01002)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	TOTAL CAD-MIUM (CD) (UG/L) (01027)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	TOTAL CHRO-MIUM (CR) (UG/L) (01034)	DIS-SOLVED CHRO-MIUM (CR) (UG/L) (01030)	TOTAL COBALT (CO) (UG/L) (01037)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	TOTAL COPPER (CU) (UG/L) (01042)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	TOTAL IRON (FE) (UG/L) (01045)
OCT 04...	1445	2	1	<10	1	0	0	<50	0	<10	5	160
FEB 07...	1500	1	1	10	1	0	0	<50	0	<10	1	270
JUN 13...	1230	1	1	<10	2	0	0	<50	0	<10	2	330

DATE	DIS-SOLVED IRON (FE) (UG/L) (01046)	TOTAL LEAD (PB) (UG/L) (01051)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	TOTAL MAN-GANESE (MN) (UG/L) (01055)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	TOTAL MERCURY (HG) (UG/L) (71900)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	TOTAL SELE-NIUM (SE) (UG/L) (01147)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	TOTAL ZINC (ZN) (UG/L) (01092)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	TOTAL ORGANIC CARBON (C) (MG/L) (00680)
OCT 04...	60	<100	1	20	20	.0	.0	0	0	20	10	14
FEB 07...	80	100	3	160	150	.0	.0	0	0	10	10	9.1
JUN 13...	240	<100	17	120	90	.0	.0	0	0	0	0	24

DATE	TIME	LENGTH OF EXPO-SURE (DAYS) (00022)	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M (00573)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M (00572)	CHLOR-A PERI-PHYTON CHROMO-SPECT-METRIC (MG/M2) (70955)	CHLOR-B PERI-PHYTON CHROMO-SPECT-METRIC (MG/M2) (70956)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS) (70950)	SAMPLING METHOD
OCT 04...	1445	42	5.30	4.15	.592	.370	1949	POLYETHYLENE STRIP

05132000 BIG FORK RIVER AT BIG FALLS, MN--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	OCT 4,76		NOV 15,76		JAN 3,77		FEB 7,77	
TIME	1445		1540		1600		1500	
TOTAL CELLS/ML	260		470		160		400	
DIVERSITY: DIVISION	1.6		1.7		1.6		0.8	
.CLASS	1.6		1.8		1.9		0.8	
..ORDER	1.8		2.0		1.9		1.4	
...FAMILY	3.2		2.1		2.7		1.6	
....GENUS	3.3		2.2		2.8		1.6	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	6	2	--	-	--	-	18	4
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....NEPHROCYTIUM	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	6	1	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	31	7	--	-	--	-
....SCENEDESMUS	22	9	--	-	29#	19	57	14
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	--	-
...PALMELLACEAE								
....GLOEOCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	22	9	53	11	--	-	--	-
...POLYBLEPHARIDACEAE								
....SPERMATOZOOPSIS	--	-	--	-	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....CLOSTERIUM	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	17	4	--	-	--	-
....MELOSIRA	--	-	22	5	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	8	3	--	-	--	-	--	-
....COCCONEIS	6	2	--	-	7	5	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
....EPITHEMIA	3	1	--	-	4	2	--	-
...DIATOMACEAE								
....DIATOMA	33	13	--	-	4	2	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
....FRAGILARIA	3	1	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	3	1	--	-	--	-	--	-
...MERIDIONACEAE								
....MERIDION	--	-	--	-	--	-	4	1
...NAVICULACEAE								
....NAVICULA	22	9	--	-	11	7	*	0
....NEIDIUM	--	-	--	-	--	-	*	0
....PINNULARIA	3	1	--	-	4	2	--	-
...NITZSCHIACEAE								
....NITZSCHIA	67#	26	14	3	50#	33	*	0
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...CHROMULINACEAE								
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	7	5	--	-

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--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	OCT 4,76 1445		NOV 15,76 1540		JAN 3,77 1600		FEB 7,77 1500	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROCCOCCALES								
...CHROCCOCCACEAE								
....ANACYSTIS	28	11	--	-	29#	19	82#	20
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	270#	58	--	-	240#	60
EUGLENOPHYTA (EUGLENOIDS)								
.CRYPTOPHYCEAE								
..CRYPTOMONIDALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	22	9	--	-	--	-	--	-
...CRYPTOMONODACEAE								
....CRYPTOMONAS	11	4	42	9	11	7	--	-
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	11	2	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..GYMNODINIALES								
...GYMNODINIACEAE								
....GYMNODINIUM	--	-	--	-	--	-	--	-
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	--	-	--	-
...PERIDINIACEAE								
....PERIDINIUM	--	-	3	1	--	-	--	-

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--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE	MAY 2,77		JUN 13,77		JUL 25,77		SEP 6,77	
TIME	1515		1230		1530		1545	
TOTAL CELLS/ML	3100		500		750		490	
DIVERSITY: DIVISION	1.9		1.5		1.9		1.6	
.CLASS	2.0		1.5		1.9		1.6	
..ORDER	2.5		2.2		2.4		1.7	
...FAMILY	3.2		3.2		2.9		3.1	
....GENUS	3.6		3.5		3.1		3.1	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	19	1	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	58	2	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	150	4	11	2	14	2	8	2
....DICTYOSPHAERIUM	120	4	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	14	2	--	-
....NEPHROCYTIUM	--	-	14	3	--	-	--	-
....OOCYSTIS	--	-	4	1	14	2	--	-
....TETRAEDRON	39	1	--	-	--	-	--	-
....WESTELLA	--	-	--	-	86	12	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	620#	20	50	10	100	13	82#	17
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	58	2	--	-	--	-	--	-
...PALMELLACEAE								
....GLOEOCYSTIS	--	-	7	1	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	19	1	28	6	14	2	--	-
...POLYBLEPHARIDACEAE								
....SPERMATOZOOPSIS	--	-	7	1	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....CLOSTERIUM	--	-	4	1	--	-	--	-
....COSMARIUM	--	-	4	1	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	250	8	--	-	--	-	8	2
....MELOSIRA	96	3	--	-	150#	20	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	28	6	14	2	82#	17
...CYMBELLACEAE								
....CYMBELLA	19	1	4	1	--	-	--	-
....EPITHEMIA	--	-	*	0	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	11	2	--	-	41	8
...FRAGILARIACEAE								
....ASTERIONELLA	150	5	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	440	14	--	-	--	-	25	5
...GOMPHONEMATACEAE								
....GOMPHONEMA	19	1	14	3	--	-	--	-
...MERIDIONACEAE								
....MERIDION	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	19	1	14	3	22	3	82#	17
....NEIDIUM	--	-	--	-	--	-	--	-
....PINNULARIA	--	-	--	-	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	96	3	4	1	120#	15	41	8
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--	-	8	2
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...CHROMULINACEAE								
....CHRYSOCOCCUS	77	2	--	-	--	-	--	-
...OCHROMONADACEAE								
....DINOBRYON	*	0	--	-	--	-	--	-

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--Continued

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO SEPTEMBER 1977

DATE TIME	MAY 2,77 1515		JUN 13,77 1230		JUL 25,77 1530		SEP 6,77 1545	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROCOCCALES								
...CHROCOCCACEAE								
....ANACYSTIS	600#	19	43	9	140#	19	82#	17
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	75	15	--	-	--	-
...OSCILLATORIACEAE								
....LYNGBYA	--	-	35	7	--	-	--	-
....OSCILLATORIA	--	-	130#	27	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.CRYPTOPHYCEAE								
..CRYPTOMONIDALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	130	4	--	-	--	-	--	-
...CRYPTOMONODACEAE								
....CRYPTOMONAS	96	3	7	1	36	5	--	-
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	59	1	4	1	--	-	25	5
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..GYMNODINIALES								
...GYMNODINIACEAE								
....GYMNODINIUM	--	-	--	-	22	3	--	-
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	19	1	--	-	--	-	--	-
...PERIDINIACEAE								
....PERIDINIUM	--	-	--	-	--	-	--	-

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

SUSPENDED-SEDIMENT DISCHARGE

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
NOV					
15...	1535	54	.0	3	.44
JAN					
03...	1600	46	.5	4	.50
FEB					
07...	1500	40	.0	38	4.1
MAR					
28...	1400	177	1.5	4	1.9
MAY					
02...	1515	219	17.0	7	4.1
JUN					
13...	1230	114	18.5	4	1.2
JUL					
25...	1530	102	24.0	5	1.4
SEP					
06...	1545	922	15.0	21	52

LAKE OF THE WOODS BASIN

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.

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) above mean sea level. 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.--49 years, 12,740 ft^3/s (360.8 m^3/s), 8.92 in/yr (227 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 71,600 ft^3/s (2,030 m^3/s) May 12, 1950, gage height, 21.04 ft (6.413 m); minimum daily, 928 ft^3/s (26.3 m^3/s) Dec. 26, 1929.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 44,900 ft^3/s (1.270 m^3/s) Sept. 28, gage height, 15.51 ft (4.727 m); minimum, 3,400 ft^3/s (96.3 m^3/s) May 14, 15, gage height, 1.38 ft (0.421 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4310	4000	3550	3600	3700	3800	4100	4310	6180	4750	3690	8890
2	4420	4050	3550	3600	3700	3750	4100	4320	6520	4970	3650	9090
3	4350	4220	3600	3600	3700	3700	4100	4280	6680	5050	3620	9310
4	4330	4050	3600	3700	3650	3700	4100	4170	6590	4970	3620	9230
5	4390	3880	3600	3700	3600	3700	4100	4140	6110	5100	3630	9060
6	4370	3970	3600	3700	3600	3700	4100	3930	5580	5580	3630	10300
7	4350	4260	3600	3700	3600	3700	4150	3620	5120	6650	3580	11100
8	4250	4490	3550	3700	3600	3700	4200	3520	4760	7270	3580	11000
9	4150	4250	3500	3700	3600	3700	4200	3470	4460	7110	3570	11400
10	4130	4120	3500	3700	3600	3600	4200	3450	4190	6600	3520	14400
11	4120	3800	3500	3650	3600	3650	4050	3430	4010	5980	3490	17600
12	4120	3650	3500	3650	3600	3750	4200	3430	3910	5510	3470	19000
13	5250	3600	3500	3650	3600	3800	4200	3440	3750	5230	3520	20500
14	5390	3700	3500	3650	3600	3850	4300	3430	3620	4920	3520	24500
15	5390	3700	3500	3650	3650	3950	4400	3480	3570	4740	3520	26700
16	5780	3700	3500	3600	3700	3900	4500	3500	3590	4500	3520	26800
17	5850	3700	3600	3600	3700	4000	4500	3480	3720	4350	3480	27600
18	5830	3600	3700	3600	3700	4100	4600	3470	4200	4280	3490	28500
19	6020	3700	3700	3600	3700	4100	4500	3620	5070	4380	3490	30100
20	5840	3700	3700	3600	3700	4100	4390	4030	5380	4430	3510	32000
21	5670	3700	3700	3650	3700	4050	4450	4650	5380	4330	3550	35700
22	4860	3650	3700	3650	3700	3950	4760	5050	5250	4210	3550	37300
23	4760	3600	3650	3650	3700	3900	4790	5210	5010	4090	3540	37200
24	4870	3600	3600	3700	3700	3900	4910	5170	4780	3960	3530	37500
25	5090	3600	3600	3900	3700	3900	4820	4990	4540	3880	3550	39400
26	5140	3600	3500	3700	3700	3950	4710	4880	4300	3780	3540	42100
27	4850	3550	3500	3650	3700	3950	4590	4700	4140	3680	3590	44200
28	4290	3500	3500	3650	3700	3950	4510	4390	4080	3670	3630	44800
29	4150	3450	3500	3650	---	4000	4420	4350	4330	3680	3660	44300
30	4060	3500	3500	3650	---	4000	4390	4440	4540	3670	5300	43300
31	4020	---	3500	3650	---	4050	---	4950	---	3600	7760	---
TOTAL	148400	113890	110600	113450	102500	119850	131340	127300	143360	148920	116300	762880
MEAN	4787	3796	3568	3660	3661	3866	4378	4106	4779	4804	3752	25430
MAX	6020	4490	3700	3900	3700	4100	4910	5210	6680	7270	7760	44800
MIN	4020	3450	3500	3600	3600	3600	4050	3430	3570	3600	3470	8890
CFSM	.25	.20	.18	.19	.19	.20	.23	.21	.25	.25	.19	1.31
IN.	.28	.22	.21	.22	.20	.23	.25	.24	.27	.29	.22	1.46

CAL YR 1976 TOTAL 3279030 MEAN 8959 MAX 26000 MIN 3450 CFSM .46 IN 6.29
WTR YR 1977 TOTAL 2138790 MEAN 5860 MAX 44800 MIN 3430 CFSM .30 IN 4.10

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, Hydrologio 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) above mean sea level, Minnesota Department of Transportation bench mark.

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

AVERAGE DISCHARGE.--21 years, 317 ft^3/s (8.977 m^3/s), 7.93 in/yr (201 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,500 ft^3/s (156 m^3/s) Apr. 14, 1969, gage height, 17.86 ft (5.444 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 7,000 ft^3/s (198 m^3/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,460 ft^3/s (41.3 m^3/s) Sept. 27, gage height, 7.88 ft (2.402 m); no flow Dec. 20 to Mar. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.72	1.4	.49	.00	.00	.00	33	28	274	115	3.0	2.0
2	.72	1.3	.43	.00	.00	.00	54	30	283	99	3.1	1.9
3	.64	1.2	.35	.00	.00	.00	70	20	228	150	3.4	1.8
4	1.0	1.2	.30	.00	.00	.00	76	16	187	240	3.9	2.6
5	1.1	1.2	.25	.00	.00	.00	80	27	161	470	3.8	4.4
6	1.1	1.2	.19	.00	.00	.00	86	32	139	350	3.3	17
7	1.1	1.2	.14	.00	.00	.00	110	45	114	280	2.4	40
8	1.2	1.1	.11	.00	.00	.00	142	44	88	240	2.3	62
9	1.4	1.0	.09	.00	.00	.00	179	42	80	200	2.2	160
10	1.4	1.0	.07	.00	.00	.01	182	40	69	155	2.5	328
11	1.5	1.0	.05	.00	.00	.01	155	32	62	105	2.0	372
12	1.5	1.0	.04	.00	.00	.01	130	56	54	80	1.9	385
13	1.4	1.0	.03	.00	.00	.01	115	47	43	64	1.7	360
14	1.3	1.0	.02	.00	.00	.02	100	34	40	54	1.6	332
15	1.5	1.1	.02	.00	.00	.02	90	60	44	45	1.7	308
16	1.8	1.0	.02	.00	.00	.02	80	164	45	41	1.8	276
17	1.9	1.0	.02	.00	.00	.03	71	202	62	36	1.6	245
18	1.8	1.0	.01	.00	.00	.03	70	159	127	26	1.5	251
19	1.8	1.0	.01	.00	.00	.12	75	159	316	21	1.4	552
20	1.8	1.0	.00	.00	.00	.70	111	219	403	16	1.3	768
21	1.7	1.0	.00	.00	.00	2.7	98	239	370	12	1.0	786
22	1.7	.99	.00	.00	.00	2.5	88	233	294	8.7	1.1	768
23	1.6	.97	.00	.00	.00	2.0	78	206	233	7.0	.93	793
24	1.7	.94	.00	.00	.00	1.5	67	198	201	6.7	.93	927
25	1.6	.87	.00	.00	.00	1.2	61	189	176	4.8	1.1	1230
26	1.5	.80	.00	.00	.00	1.2	56	170	140	3.9	1.4	1390
27	1.4	.73	.00	.00	.00	1.4	49	147	112	3.9	1.8	1460
28	1.4	.66	.00	.00	.00	1.7	39	133	98	4.2	1.9	1430
29	1.3	.59	.00	.00	---	5.0	35	131	108	3.6	1.6	1340
30	1.3	.54	.00	.00	---	9.8	24	133	100	3.5	1.8	1210
31	1.4	---	.00	.00	---	21	---	175	---	3.1	1.9	---
TOTAL	43.28	29.99	2.64	.00	.00	50.98	2604	3410	4651	2848.4	61.86	15802.7
MEAN	1.40	1.00	.085	.000	.000	1.64	86.8	110	155	91.9	2.00	527
MAX	1.9	1.4	.49	.00	.00	21	182	239	403	470	3.9	1460
MIN	.64	.54	.00	.00	.00	.00	24	16	40	3.1	.93	1.8
CFSM	.003	.002	.000	.000	.000	.003	.16	.20	.29	.17	.004	.97
IN.	.00	.00	.00	.00	.00	.00	.18	.23	.32	.20	.00	1.08

CAL YR 1976 TOTAL 42526.74 MEAN 116 MAX 1400 MIN .00 CFSM .21 IN 2.91
WTR YR 1977 TOTAL 29504.85 MEAN 80.8 MAX 1460 MIN .00 CFSM .15 IN 2.02

NOTE.--No gage-height record Jan. 20 to Apr. 18.

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) above mean sea level, levels by Stanley Johnson, consulting engineer and instructor at University of North Dakota.

REMARKS.--Records poor.

AVERAGE DISCHARGE.--31 years, 43.0 ft^3/s (1.218 m^3/s), 3.60 in/yr (91 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,780 ft^3/s (50.4 m^3/s) Apr. 15, 1965, gage height, 9.95 ft (3.033 m); no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 106 ft^3/s (3.00 m^3/s) June 19, gage height, 4.41 ft (1.344 m); no flow Nov. 12 to Mar. 6 and Aug. 4 to Sept. 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.27	.59	.00	.00	.00	.00	35	1.3	11	12	.06	.00
2	.27	.53	.00	.00	.00	.00	35	1.8	9.9	12	.06	.00
3	.26	.47	.00	.00	.00	.00	34	1.2	9.9	11	.04	.00
4	.25	.41	.00	.00	.00	.00	32	1.0	9.3	10	.00	.00
5	.24	.35	.00	.00	.00	.00	30	1.0	9.0	9.0	.00	.00
6	.23	.29	.00	.00	.00	.00	28	1.2	8.5	8.2	.00	.00
7	.22	.23	.00	.00	.00	.01	27	1.5	5.9	7.7	.00	.00
8	.21	.17	.00	.00	.00	.01	25	1.7	4.2	9.0	.00	.00
9	.21	.11	.00	.00	.00	.01	24	2.0	3.8	11	.00	.02
10	.21	.05	.00	.00	.00	.01	40	2.0	3.4	12	.00	.10
11	.21	.03	.00	.00	.00	.02	55	2.1	2.7	17	.00	.33
12	.21	.00	.00	.00	.00	.03	50	2.3	2.5	20	.00	.75
13	.33	.00	.00	.00	.00	.10	46	2.3	2.1	16	.00	1.7
14	.45	.00	.00	.00	.00	.15	35	2.5	2.1	13	.00	2.4
15	.69	.00	.00	.00	.00	.20	28	2.5	1.8	10	.00	1.6
16	1.1	.00	.00	.00	.00	.18	23	4.7	3.9	8.8	.00	1.0
17	.81	.00	.00	.00	.00	.16	19	16	31	7.1	.00	.64
18	.87	.00	.00	.00	.00	.14	18	14	42	6.6	.00	1.7
19	1.1	.00	.00	.00	.00	.13	15	6.9	66	5.9	.00	3.0
20	.93	.00	.00	.00	.00	.12	13	6.1	70	4.4	.00	6.4
21	.92	.00	.00	.00	.00	.11	8.2	5.6	57	3.6	.00	10
22	.90	.00	.00	.00	.00	.10	8.0	8.0	53	2.7	.00	12
23	.88	.00	.00	.00	.00	.10	7.1	21	49	1.8	.00	13
24	.87	.00	.00	.00	.00	.10	6.4	29	33	1.0	.00	14
25	.85	.00	.00	.00	.00	.10	4.7	44	24	.75	.00	20
26	.84	.00	.00	.00	.00	.12	3.4	37	19	.54	.00	54
27	.82	.00	.00	.00	.00	.20	2.3	24	15	.33	.00	67
28	.81	.00	.00	.00	.00	1.0	2.3	18	14	.18	.00	67
29	.77	.00	.00	.00	---	10	2.3	16	13	.12	.00	70
30	.71	.00	.00	.00	---	25	1.8	15	12	.09	.00	50
31	.65	---	.00	.00	---	34	---	13	---	.07	.00	---
TOTAL	18.09	3.23	.00	.00	.00	72.10	658.5	304.7	588.0	221.88	.16	396.64
MEAN	.58	.11	.000	.000	.000	2.33	22.0	9.83	19.6	7.16	.005	13.2
MAX	1.1	.59	.00	.00	.00	34	55	44	70	20	.06	70
MIN	.21	.00	.00	.00	.00	.00	1.8	1.0	1.8	.07	.00	.00
CFSM	.004	.001	.000	.000	.000	.01	.14	.06	.12	.04	.000	.08
IN.	.00	.00	.00	.00	.00	.02	.15	.07	.14	.05	.00	.09

CAL YR 1976 TOTAL 6866.64 MEAN 18.8 MAX 298 MIN .00 CFSM .12 IN 1.58
WTR YR 1977 TOTAL 2263.30 MEAN 6.20 MAX 70 MIN .00 CFSM .04 IN .52

05140000 BULLDOG RUN NEAR WARROAD, MN

LOCATION.--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, near right bank 5 ft (2 m) downstream from culvert on county highway, 0.8 mi (1.3 km) upstream from mouth and 2.5 mi (4.0 km) south of Warroad.

DRAINAGE AREA.--11.1 mi^2 (28.7 km^2).

PERIOD OF RECORD.--March 1946 to November 1951, June 1966 to September 1977 (discontinued as a continuous-record station; converted to a crest-stage partial-record station).

REVISED RECORDS.--WDR MN-75-1: Drainage area.

GAGE.--Nonrecording gage and crest-stage gage. Altitude of gage is 1,090 ft (322 m), from topographic map.

REMARKS.--Records fair.

AVERAGE DISCHARGE.--16 years, 3.20 ft^3/s (0.091 m^3/s), 3.91 in/yr (99.3 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 420 ft^3/s (11.9 m^3/s) June 10, 1947, gage height, 6.91 ft (2.106 m); maximum gage height, 7.07 ft (2.155 m) Apr. 14, 1974; no flow for many days in most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6.0 ft^3/s (0.17 m^3/s) Mar. 29, gage height, 3.80 ft (1.158 m); no flow during most of the year.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	3.5	.09	.13	.00	.00	.00
2	.00	.00	.00	.00	.00	.00	1.5	.09	.07	.00	.00	.00
3	.00	.00	.00	.00	.00	.00	3.6	.09	.06	.00	.00	.00
4	.00	.00	.00	.00	.00	.00	3.9	.09	.04	.00	.00	.00
5	.00	.00	.00	.00	.00	.00	3.5	.09	.03	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	3.2	.09	.02	.00	.00	.00
7	.00	.00	.00	.00	.00	.00	1.4	.07	.00	.00	.00	.00
8	.00	.00	.00	.00	.00	.00	.98	.07	.00	.00	.00	.00
9	.00	.00	.00	.00	.00	.00	1.7	.07	.00	.00	.00	.00
10	.00	.00	.00	.00	.00	.00	2.4	.13	.00	.00	.00	.00
11	.00	.00	.00	.00	.00	.00	3.6	.11	.00	.00	.00	.00
12	.00	.00	.00	.00	.00	.00	4.1	.09	.00	.00	.00	.00
13	.00	.00	.00	.00	.00	.00	2.2	.09	.00	.00	.00	.00
14	.00	.00	.00	.00	.00	.00	1.5	.07	.00	.00	.00	.00
15	.00	.00	.00	.00	.00	.00	1.2	.06	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.78	.06	.00	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	.63	.05	.00	.00	.00	.00
18	.00	.00	.00	.00	.00	.00	.50	.05	.30	.00	.00	.00
19	.00	.00	.00	.00	.00	.00	.40	.05	.26	.00	.00	.00
20	.00	.00	.00	.00	.00	.00	.30	.05	.20	.00	.00	.00
21	.00	.00	.00	.00	.00	.00	.26	.07	.16	.00	.00	.00
22	.00	.00	.00	.00	.00	.01	.20	.13	.13	.00	.00	.00
23	.00	.00	.00	.00	.00	.01	.16	.20	.07	.00	.00	.00
24	.00	.00	.00	.00	.00	.01	.16	.22	.03	.00	.00	.00
25	.00	.00	.00	.00	.00	.01	.14	.30	.01	.00	.00	.00
26	.00	.00	.00	.00	.00	.04	.14	.19	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	2.4	.13	.22	.00	.00	.00	.00
28	.00	.00	.00	.00	.00	2.0	.13	.20	.00	.00	.00	.00
29	.00	.00	.00	.00	---	5.9	.11	.20	.00	.00	.00	.00
30	.00	.00	.00	.00	---	3.1	.11	.20	.00	.00	.00	.00
31	.00	---	.00	.00	---	5.4	---	.20	---	.00	.00	---
TOTAL	.00	.00	.00	.00	.00	18.88	42.43	3.69	1.51	.00	.00	.00
MEAN	.000	.000	.000	.000	.000	.61	1.41	.12	.050	.000	.000	.000
MAX	.00	.00	.00	.00	.00	5.9	4.1	.30	.30	.00	.00	.00
MIN	.00	.00	.00	.00	.00	.00	.11	.05	.00	.00	.00	.00
CFSM	.000	.000	.000	.000	.000	.04	.10	.008	.004	.000	.000	.000
IN.	.00	.00	.00	.00	.00	.05	.11	.01	.00	.00	.00	.00

CAL YR 1976 TOTAL 391.80 MEAN 1.07 MAX 137 MIN .00 CFSM .08 IN 1.03
WTR YR 1977 TOTAL 66.51 MEAN .18 MAX 5.9 MIN .00 CFSM .01 IN .17

05140500 EAST BRANCH WARROAD RIVER NEAR WARROAD, MN

LOCATION.--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, near right piling at upstream side of highway bridge, 3.3 mi (5.3 km) upstream from mouth and 2.5 mi (4.0 km) south of Warroad.

DRAINAGE AREA.--45.8 mi^2 (119 km^2).

PERIOD OF RECORD.--March 1946 to September 1954, June 1966 to September 1977 (discontinued as a continuous-record station; converted to a crest-stage partial record station). Monthly discharge only for some periods prior to April 1947, published in WSP 1308.

REVISED RECORDS.--WDR MN-75-1: Drainage area.

GAGE.--Nonrecording gage and crest-stage gage. Altitude of gage is 1,080 ft (329 m) from topographic map.

REMARKS.--Records poor.

AVERAGE DISCHARGE.--19 years (water years 1947-54, 1967-77), 22.7 ft^3/s (0.643 m^3/s), 6.73 in/yr (171 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,340 ft^3/s (37.9 m^3/s) June 11, 1947, gage height, 9.36 ft (2.853 m) from floodmark; no flow at times in most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 49 ft^3/s (1.39 m^3/s) Sept. 27, gage height, 4.10 ft (1.250 m), maximum gage height, 4.15 ft (1.265 m) June 19; no flow Oct. 1 to Mar. 8 and Aug. 4 to Sept. 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	10	3.1	20	7.3	.03	.00
2	.00	.00	.00	.00	.00	.00	18	3.2	22	4.9	.02	.00
3	.00	.00	.00	.00	.00	.00	17	8.0	21	6.5	.01	.00
4	.00	.00	.00	.00	.00	.00	16	7.0	15	8.0	.00	.00
5	.00	.00	.00	.00	.00	.00	16	6.5	12	11	.00	.00
6	.00	.00	.00	.00	.00	.00	16	6.6	9.0	13	.00	.00
7	.00	.00	.00	.00	.00	.00	16	5.4	8.0	7.3	.00	.00
8	.00	.00	.00	.00	.00	.00	19	5.6	7.0	6.3	.00	.00
9	.00	.00	.00	.00	.00	.01	24	4.0	6.0	6.0	.00	.01
10	.00	.00	.00	.00	.00	.01	24	3.8	5.0	6.0	.00	.05
11	.00	.00	.00	.00	.00	.01	20	4.0	4.5	8.0	.00	.20
12	.00	.00	.00	.00	.00	.01	15	4.0	4.0	11	.00	.50
13	.00	.00	.00	.00	.00	.02	13	3.8	3.5	9.6	.00	.80
14	.00	.00	.00	.00	.00	.02	13	3.7	3.0	7.7	.00	1.0
15	.00	.00	.00	.00	.00	.03	13	4.3	3.0	6.7	.00	.80
16	.00	.00	.00	.00	.00	.05	14	5.8	4.0	6.0	.00	.60
17	.00	.00	.00	.00	.00	.10	14	6.0	9.0	5.0	.00	.40
18	.00	.00	.00	.00	.00	.20	14	6.8	21	4.0	.00	1.0
19	.00	.00	.00	.00	.00	.40	20	5.3	35	3.5	.00	2.0
20	.00	.00	.00	.00	.00	.60	14	5.0	25	2.7	.00	4.0
21	.00	.00	.00	.00	.00	.50	7.0	8.8	19	2.1	.00	5.5
22	.00	.00	.00	.00	.00	.40	4.3	13	11	1.7	.00	6.5
23	.00	.00	.00	.00	.00	.30	4.8	14	8.5	1.2	.00	7.0
24	.00	.00	.00	.00	.00	.25	4.8	15	7.0	.60	.00	8.0
25	.00	.00	.00	.00	.00	.20	4.9	16	5.5	.50	.00	10
26	.00	.00	.00	.00	.00	.20	5.4	11	4.5	.35	.00	30
27	.00	.00	.00	.00	.00	.20	4.9	10	3.6	.20	.00	34
28	.00	.00	.00	.00	.00	.20	4.0	9.0	3.6	.10	.00	33
29	.00	.00	.00	.00	---	.40	3.8	8.0	3.6	.07	.00	33
30	.00	.00	.00	.00	---	1.5	4.0	7.0	3.3	.06	.00	27
31	.00	---	.00	.00	---	4.0	---	10	---	.04	.00	---
TOTAL	.00	.00	.00	.00	.00	9.61	373.9	223.7	306.6	147.42	.06	205.36
MEAN	.000	.000	.000	.000	.000	.31	12.5	7.22	10.2	4.76	.002	6.85
MAX	.00	.00	.00	.00	.00	4.0	24	16	35	13	.03	34
MIN	.00	.00	.00	.00	.00	.00	3.8	3.1	3.0	.04	.00	.00
CFSM	.000	.000	.000	.000	.000	.003	.12	.07	.10	.05	.000	.07
IN.	.00	.00	.00	.00	.00	.00	.14	.08	.11	.05	.00	.07

CAL YR 1976 TOTAL 3936.06 MEAN 10.8 MAX 170 MIN .00 CFSM .11 IN 1.44
WTR YR 1977 TOTAL 1266.65 MEAN 3.47 MAX 35 MIN .00 CFSM .03 IN .46

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 1977

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements	
					Date	Discharge (ft^3/s)
		Streams tributary to Lake Superior				
04011000	Brule River near Hovland, MN	Lat 47°49'06", long 90°03'04", in SE 1/4 SW 1/4 sec.27, T.62 N., R.3 E., Cook County, at bridge on U.S. Highway 61, 0.3 mile upstream from mouth, and 4.5 miles southwest of Hovland.	264	1912, 1970-71, 1974, 1976-77	10-21-76	18.2
04011500	Devil Track River near Grand Marais, MN	Lat 47°46'12", long 90°15'39", in SW 1/4 NE 1/4 sec.13, T.61 N., R.1 E., Cook County, at bridge on U.S. Highway 61, 0.1 mile upstream from mouth, and 3.9 miles northeast of Grand Marais.	74.8	1911-12, 1970-71, 1974, 1976-77	10-21-76	3.12
04012000	Cascade River near Grand Marais, MN	Lat 47°42'26", long 90°31'21", in NE 1/4 SW 1/4 sec.1, T.60 N., R.2 W., Cook County, at bridge on U.S. Highway 61, at mouth, and 9.2 miles southwest of Grand Marais.	111	1911-12, 1970-71, 1974, 1976-77	10-21-76	8.12
*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, 350 ft upstream from bridge on U.S. Highway 61 at Lutsen, and 0.3 mile upstream from mouth.	112	1912-17‡, 1928-47‡, 1952-61‡, 1962-63, 1970-77	10-20-76 1-11-77 2-16-77 5-17-77	8.91 2.68 3.89 22.9
04015000	Beaver River at Beaver Bay, MN	Lat 47°15'37", long 91°17'45", in SE 1/4 SW 1/4 sec.12, T.55 N., R.8 W., Lake County, at bridge on U.S. Highway 61, 0.1 mile upstream from mouth at Beaver Bay.	126	1911-14‡, 1928-31‡, 1968, 1970-71, 1974, 1976-77	10-21-76	1.57
04018710	Mud Hen Creek near Forbes, MN	Lat 47°21'29", long 92°28'24", on line between secs.3 and 10, T.56 N., R.17 W., St. Louis County, at bridge on County Highway 16, 0.9 mile upstream from mouth, 4.5 miles north of Central Lakes, and 6 miles southeast of Forbes.	101	1970-71, 1973-77	10-13-76	1.24
04019500	East Swan River near Toivola, MN	Lat 47°16'55", long 92°50'05", in NE 1/4 NE 1/4 sec.2, T.55 N., R.20 W., St. Louis County, on left bank 350 ft downstream from bridge on St. Louis County Road 442, 4.8 miles upstream from West Swan River, 8 miles northwest of Toivola, and 8.8 miles upstream from mouth.	112	1953-62‡, 1964-71‡, 1977	b10-20-76	15.1

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

Discharge measurements made at low-flow partial-record stations during water year 1977--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Superior--Continued				
04020000	Swan River near Toivola, MN	Lat 47°15'02", long 92°48'36", in NE 1/4 NE 1/4 sec.13, T.55 N., R.20 W., St. Louis County, on left bank at upstream side of bridge on St. Louis County Highway 5, 0.4 mile downstream from confluence of East Swan and West Swan Rivers, 3.5 miles upstream from mouth, and 5.8 miles north of Toivola.	254	1952-61‡, 1977	10-20-76	20.2
04020800	Paleface River near Cotton, MN	Lat 47°12'37", long 92°29'17", in NW 1/4 NW 1/4 sec.34, T.55 N., R.17 W., St. Louis County, at bridge on U.S. Highway 53, about 2 miles upstream from mouth, and 2.9 miles north of Cotton.	62.6	1970-71, 1973-77	10-13-76	0
04021200	Floodwood River near Floodwood, MN	Lat 46°58'05", long 92°54'29", in SW 1/4 SW 1/4 sec.20, T.52 N., R.20 W., St. Louis County, at bridge on farm driveway, 2.8 miles north of Floodwood, and 3.8 miles upstream from mouth.	190	1970-71, 1973-77	10-14-76	2.50
04021250	East Savanna River at Floodwood, MN	Lat 46°55'17", long 92°54'43", in SE 1/4 NE 1/4 sec.7, T.51 N., R.20 W., St. Louis County, at bridge on U.S. Highway 2, 0.4 mile upstream from mouth at Floodwood.	114	1970-71, 1973-77	10-14-76	0.21
04021530	Stoney Brook at Brookston, MN	Lat 46°51'42", long 92°36'17", in NW 1/4 SE 1/4 sec.34, T.51 N., R.18 W., St. Louis County, at bridge on County Highway 31, 0.8 mile upstream from mouth at Brookston.	97.3	1970-71, 1973-77	10-14-76	7.65
04021700	Cloquet River near Brimson, MN	Lat 47°15'24", long 91°52'02", in SE 1/4 SW 1/4 sec.9, T.55 N., R.12 W., St. Louis County, at bridge on County Highway 52 (Forest Service Road 6202), about 1 mile upstream from Pine Creek, and 1.5 miles south of Brimson.	144	1970-71, 1973-77	10-13-76	12.8
04021960	Cloquet River near Island Lake, MN	Lat 47°06'57", long 92°01'28", in SW 1/4 SW 1/4 sec.32, T.54 N., R.13 W., St. Louis County, at boat launching site on State Forest Road (Carroll Forest Road), 1.7 miles upstream from Little Cloquet River, and 7.5 miles northeast of village of Island Lake.	327	1970-71, 1974-77	10-13-76	24.0
04022970	Us-Kab-Wan-Ka River near Twig, MN	Lat 46°58'55", long 92°20'01", in SE 1/4 SW 1/4 sec.14, T.52 N., R.16 W., St. Louis County, at bridge on trail, 0.8 mile upstream from mouth, and 6.2 miles north of Twig.	38.9	1970-71, 1973-77	10-14-76	4.21
04023400	Pine River near Cloquet, MN	Lat 46°47'52", long 92°26'58", on line between secs.23 and 24, T.50 N., R.17 W., St. Louis County, at concrete box culvert on State Highway 33, 0.9 mile upstream from mouth, and 5.2 miles north of Cloquet.	43.2	1970-71, 1973-77	10-14-76	6.26
04024010	Midway River at Thomson, MN	Lat 46°40'56", long 92°23'08", in NE 1/4 SE 1/4 sec.32, T.49 N., R.16 W., Carlton County, at bridge on county road, 0.2 mile north of Thomson city limits, and 0.9 mile upstream from Thomson Reservoir.	64.2	1968, 1970-71, 1974-77	10-14-76	6.31

‡ Operated as a continuous-record gaging station.

Discharge measurements made at low-flow partial-record stations during water year 1977--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Superior--Continued				
*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, at bridge on State Highway 23, 3.5 miles north of Holyoke.	118	-	-	-
		Red River of the North basin				
05030140	Otter Tail River northwest of Luce, MN	Lat 46°40'20", long 95°39'56", in NW 1/4 SW 1/4 sec.19, T.137 N., R.39 W., Otter Tail County, at bridge on U.S. Highway 10, 1 mile northwest of Luce.	331	1968, 1970-71, 1973-74, 1976-77	9-21-77	21.7
05030181	Otter Tail River at Little Pine Lake outlet, near Perham, MN	Lat 46°37'36", long 95°32'23", in NW 1/4 NE 1/4 sec.1, T.136 N., R.39 W., Otter Tail County, at bridge on County Highway 8, 2.2 miles northeast of Perham.	a383	1933, 1964-66, 1970, 1973-74, 1976-77	9-21-77	27.7
05030255	Toad River near Perham, MN	Lat 46°39'55", long 95°31'27", in S 1/2 NE 1/4 sec.19, T.137 N., R.38 W., Otter Tail County, at bridge on County Highway 60, 5.5 miles northeast of Perham.	111	1968, 1970, 1973-74, 1976-77	9-21-77	6.51
05030300	Otter Tail River near Richville, MN	Lat 46°30'48", long 95°31'04", on line between secs.7 and 18, T.135 N., R.38 W., Otter Tail County, at bridge on County Highway 14, 5 miles east of Richville.	a765	1968, 1970-74, 1976-77	9-21-77	44.8
05030401	Otter Tail River at Otter Tail Lake outlet near Amor, MN	Lat 46°21'34", long 95°44'00", in NE 1/4 SW 1/4 sec.4, T.133 N., R.40 W., Otter Tail County, at bridge on County Highway 72, 4 miles south of Amor.	a1,160	1933, 1935-36, 1968, 1970-74, 1976-77	9-21-77	52.5
05040000	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 millpond dam on Buck Lake, and 6.5 miles southwest of city of Detroit Lakes.	123	1942-53‡, 1968-71, 1976-77	9-21-77	3.02
05051520	Whisky Creek near Kent, MN	Lat 46°24'41", long 96°39'32", on line between secs.13 and 24, T.134 N., R.48 W., Wilkin County, at double pipe-arch culvert on County Highway 20, 1.7 miles southeast of Kent.	61.3	1964-66, 1970-74, 1976-77	10-14-76	0
05051525	Wolverton Creek at Comstock, MN	Lat 46°39'59", long 96°44'13", on line between secs.21 and 22, T.137 N., R.48 W., Clay County, at bridge on county road, 1 mile northeast of Comstock.	89.3	1964-66, 1970-73, 1976-77	10-14-76	0
05060820	Buffalo River near Ogema, MN	Lat 46°59'31", long 96°02'08", on line between secs.29 and 32, T.141 N., R.42 W., Becker County, at bridge on County Highway 14, 6 miles west of Callaway, and about 9.5 miles southwest of Ogema.	128	1970-73, 1976-77	10-14-76	0
05061080	Deerhorn Creek near Lawndale, MN	Lat 46°34'45", long 96°29'17", on line between secs.20 and 21, T.136 N., R.46 W., Wilkin County, at bridge on county road, 1.2 miles west of State Highway 9, about 6 miles southwest of Barnesville, and 6.4 miles northwest of Lawndale.	48.4	1970-73, 1976-77	10-14-76 11- 9-76	3.50 2.97

* Also a crest-stage partial-record station.
‡ Operated as a continuous-record gaging station.
a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1977--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				
05061100	South Branch Buffalo River near Barnesville, MN	Lat 46°39'35", long 96°34'57", on line between secs.23 and 26, T.137 N., R.47 W., Clay County, at bridge on County Highway 2, 4 miles south of Baker, and 7.4 miles west of Barnesville.	a185	1964-66, 1970-73, 1976-77	10-14-76	1.64
05061490	Stony Creek near Sabin, MN	Lat 46°44'48", long 96°36'26", on line between secs.22 and 27, T.138 N., R.47 W., Clay County, at bridge on County Highway 65, 3 miles southeast of Sabin.	a145	1964-66, 1970-73, 1976-77	10-14-76 11-11-76	0 0
#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, at bridge on County Highway 193, 3.5 miles upstream from Wild Rice River, and 4 miles northwest of Borup.	254	1944-49‡, 1966-67, 1972-77	10-13-76	1.65
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, at bridge on County Highway 4, 6.5 miles north of Skime, and about 11 miles southeast of Malung.	134	1971-73, 1975-77	8-17-77	.40
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, at culvert on State Highway 11, 1.3 miles southwest of Salol, and about 8.5 miles northeast of Malung.	66.1	1930, 1949, 1971-73, 1975-77	8-17-77	0
		Lake of the Woods basin				
05125500	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, 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, 1975-77	b11-10-76 b12-16-76 b2- 3-77	7.65 8.83 7.60
#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, at bridge on State Highway 6, 5.5 miles west of Bigfork (revised).	602	-	-	-

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 1977

Station No.	Station name	Location	Drainage area (mi^2)	Period of Record	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, at culvert on County Highway 12, 1.6 miles upstream from mouth, and 2.5 miles north of Grand Marais.	7.49	1961-77	9-24-77	22.33	388
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, at culvert on County Highway 55, 0.2 mile upstream from mouth, and 2.8 miles north of Grand Marais.	.47	1966-77	9-24-77	16.75	77
#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, 350 ft upstream from bridge on U.S. Highway 61 at Lutsen, and 0.3 mile upstream from mouth.	a112	1912-17‡, 1928-47‡, 1952-61‡, 1972-77	9-25-77	8.09	4,780
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, at culvert on U.S. Highway 61, 0.2 mile upstream from mouth, and 3.7 miles southwest of Taconite Harbor.	1.56	1964-77	9-24-77	14.60	416
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, at culvert on U.S. Highway 61, 0.2 mile upstream from mouth, and 5.2 miles northeast of Little Marais.	22.7	1961-77	9-24-77	27.00	4,430
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, at culvert on County Highway 3, 0.3 mile north of Silver Creek, and 1.4 miles upstream from mouth.	.96	1960-77	9-24-77	8.42	60
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, at culvert on County Highway 3, 1.0 mile upstream from mouth, and 4.5 miles northeast of Two Harbors.	3.72	1965-77	9-24-77	5.95	318
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, at culvert on county highway, 2.0 miles upstream from mouth, and 2.7 miles north of Two Harbors.	5.54	1960-77	9-24-77	13.24	377
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, at culvert on U.S. Highway 61, 0.35 mile upstream from mouth, and 0.7 mile west of French River.	1.41	1964-77	9-24-77	23.63	283

\# Also a low-flow partial-record station.
‡ Operated as a continuous-record gaging station.
a Revised.

Annual maximum discharge at crest-stage partial-record stations during water year 1977--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of Record	Date	Annual maximum Gage height (feet)	Annual maximum Discharge (ft^3/s)
		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, at culvert on U.S. Highway 61, 0.6 mile upstream from mouth, and 0.5 mile northeast of Duluth city limits.	5.79	1964-77	9-24-77	15.94	415
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, at culvert on U.S. Highway 53, 0.2 mile northwest of Duluth city limits.	4.92	1960-77	9-24-77	18.16	360
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, at culvert on State Highway 135 at west edge of McKinley.	.37	1960-77	8-27-77	11.65	39
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, at bridge on County Highway 835, 500 ft west of State Highway 73, and 2 miles north of Floodwood.	-	1972-77	9-27-77	12.78	491
*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, at bridge on State Highway 23, 3.5 miles north of Holyoke.	118	1972-77	9-24-77	(b)	c900
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, at culvert on State Highway 23, 4.0 miles upstream from mouth, and 4.4 miles east of Blackhoof.	4.94	1961-65, 1967-77	9-24-77	16.20	375
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, at culvert on State Highway 23, 0.1 mile upstream from mouth, and 4.5 miles east of Blackhoof.	.20	1961-77	9-24-77	9.71	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, at culvert on State Highway 23, 1.7 miles downstream from Clear Creek, and 2.0 miles northwest of Holyoke.	19.4	1961-77	9-24-77	12.51	688
		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, at culvert on county highway, 6.0 miles northeast of Graceville.	3.37	1964-77	3-12-77	d9.73	26
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, at culvert on County Highway 67, 1.4 miles upstream from mouth, and 2.0 miles southwest of Wheaton.	68.5	1965-68, 1970-77	4-19-77	e5.38	(†)

* Also a low-flow partial-record station.
† Discharge not determined.
b Peak stage did not reach bottom of gage.
c Estimated; gage height unknown.
d Backwater from ice.
e Affected by shifting control.

Annual maximum discharge at crest-stage partial-record stations during water year 1977--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of Record	Date	Annual maximum Gage height (feet)	Annual maximum Discharge (ft^3/s)
		Red River of the North basin--Continued					
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, at culvert on U.S. Highway 59, 2.7 miles north of Callaway.	94.5	1960-77	1977	(b)	c40
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, 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‡, 1967-77	5-30-77	4.43	117
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, at culvert on county road, 3.1 miles east of Downer.	5.81	1961-77	7- 5-77	7.02	(†)
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, at culvert on State Highway 92, 5.0 miles south of Bagley.	3.98	1961-77	3-12-77	d8.50	8
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, at culvert on State Highway 31, 0.1 mile upstream from mouth, and 5.2 miles west of Mahnomen.	11.9	1961-77	7-16-77	e9.61	61
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, at culvert on State Highway 31, 1.2 miles upstream from mouth, and 4.1 miles northwest of Twin Valley.	4.72	1961-77	9-24-77	11.10	20
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, at bridge on County Highway 28, 1.3 miles upstream from mouth, and 4.0 miles west of Twin Valley.	50.8	1962-77	9-24-77	(b)	c40
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, at culvert on county highway, 2.0 miles northwest of Ogema.	4.99	1963-77	1977	(b)	c8
#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, at bridge on County Highway 193, 3.5 miles upstream from Wild Rice River, and 4 miles northwest of Borup (revised).	254	1944-49‡, 1972-77	3-30-77	-	c60
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, at culvert on U.S. Highway 71, 0.7 mile west of Northome, and 3.1 miles upstream from Battle Lake.	2.80	1960-77	8-27-77	13.48	20
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, at culvert on County Highway 304, 3.1 miles north of Blackduck, and 3.2 miles upstream from mouth.	7.96	1960-77	8-27-77	12.71	31

Also a low-flow partial-record station.
† Discharge not determined.
‡ Operated as a continuous-record gaging station.
b Peak stage did not reach bottom of gage.
c Estimated; gage height unknown.
d Backwater from ice.
e Affected by shifting control.

Annual maximum discharge at crest-stage partial-record stations during water year 1977--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of Record	Date	Annual maximum Gage height (feet)	Annual maximum Discharge (ft^3/s)
		Red River of the North basin--Continued					
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, at culvert on State Highway 72, 5.2 miles west of Shooks.	1.14	1960-77	8-27-77	6.34	13
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, at culvert on County Highway 7, 0.5 mile upstream from mouth, and 3.1 miles south of Thief River Falls.	2.33	1962-77	5-18-77	7.48	89
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, at culvert on county highway, 3.4 miles south of Clearbrook.	4.96	1960-77	3-12-77	d6.25	(†)
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, at culvert on county highway, at north edge of Clearbrook, 0.9 mile upstream from mouth.	6.02	1960-77	8-27-77	e10.10	23
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, at culvert on county highway, 1.2 miles upstream from mouth, and 5.3 miles southwest of Plummer.	6.51	1961-77	1977	(b)	(†)
		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, at culvert on State Highway 135, 1.1 miles west of Gilbert.	.73	1966-77	8-27-77	7.48	20
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, at culvert on State Highway 135, 1.2 miles south of Wahlsten, and 2.7 miles upstream from mouth.	1.93	1961-77	8-27-77	7.47	68
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, at culvert on State Highway 73, 1.2 miles upstream from mouth, and 7.8 miles north of Chisholm.	13.7	1959-77	8-27-77	12.27	216
*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, at bridge on State Highway 6, 5.5 miles west of Bigfork (revised).	602	1973-77	9-26-77	(b)	c550

* Also a low-flow partial-record station.
† Discharge not determined.
b Peak stage did not reach bottom of gage.
c Estimated; gage height unknown.
d Backwater from ice.
e 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 1977

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
Streams tributary to Lake Superior						
St. Louis River	Lake Superior	Lat 47°29'29", long 91°50'44", in SE 1/4 SW 1/4 sec.22, T.58 N., R.12 W., St. Louis County, at railroad bridge, 1.3 miles downstream from Seven Beaver Lake, 9.3 miles northeast of Fairbanks, and 14 miles east of Hoyt Lakes, MN.	-	1976	11-11-76	*.19
					12-17-76	*.58
					2- 2-77	3.9
					3-10-77	1.2
					4-26-77	2.2
					6- 7-77	42
					7-21-77	40
					9- 1-77	94
St. Louis River	Lake Superior	Lat 47°28'58", long 92°02'24", in NE 1/4 SW 1/4 sec.30, T.58 N., R.13 W., St. Louis County, at bridge on Forest Service Road 133, 2 miles southeast of Skibo, and 6 miles southeast of Hoyt Lakes, MN.	a84	1971, 1974, 1976	11- 9-76	*.41
					12-14-76	*.28
					2-10-77	*.22
					3- 9-77	1.4
					4-29-77	10
					6-10-77	74
					7-18-77	77
					8-29-77	89
					9- 7-77	328
Colvin Creek	Partridge River	Lat 47°31'47", long 91°59'53", in NE 1/4 NW 1/4 sec.9, T.58 N., R.13 W., St. Louis County, at culvert on Forest Route 420, 3.7 miles upstream from mouth, 7 miles east of Hoyt Lakes, and 13 miles south of Babbitt, MN.	-	1976	11- 9-76	*.90
					12-14-76	*.84
					2-10-77	*.40
					3- 9-77	1.4
					3-24-77	1.2
					4-29-77	5.7
					6-10-77	12
					7-18-77	10
					8-29-77	63
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, at bridge on County Highway 620, 0.1 mile upstream from Spring Mine Creek, and 5.9 miles southwest of Babbitt, MN.	-	1971, 1976	11- 8-76	*.12
					12-13-76	*.06
					1-31-77	*0
					3-14-77	4.5
					4-25-77	5.2
					6-17-77	5.8
					7-18-77	3.9
					9- 1-77	27.3
					9- 9-77	26.5
					9-28-77	44.3
Embarrass River	St. Louis River	Lat 47°39'24", long 92°11'51", in NW 1/4 sec.25, T.60 N., R.15 W., St. Louis County, at bridge on County Highway 362 in Embarrass, MN.	93.8	1942-65‡, 1971, 1974-76	11- 8-76	*5.4
					12- 8-76	*1.4
					1-31-76	*1.6
					3-14-77	49
					4-25-77	52
					6-13-77	38
					7-18-77	82
					9- 1-77	418
East Swan River	Swan River	Lat 47°16'55", long 92°50'05", in NE 1/4 NE 1/4 sec.2, T.55 N., R.20 W., St. Louis County, on left bank 350 ft downstream from bridge on St. Louis County Road 442, 4.8 miles upstream from confluence with West Swan River, 8 miles northwest of Toivola, MN., and 8.8 miles upstream from St. Louis River.	112	1953-62‡, 1964-71‡	b10-20-76	15.1
Swan River	St. Louis River	Lat 47°15'02", long 92°48'36", in NE 1/4 NE 1/4 sec.13, T.55 N., R.20 W., St. Louis County, on left bank at upstream side of bridge on St. Louis County Highway 5, 0.4 mile downstream from confluence of East Swan and West Swan Rivers, 3.5 miles upstream from mouth, and 5.8 miles north of Toivola, MN.	254	1952-61‡,	10-20-76	20

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

Discharge measurements made at miscellaneous sites during water year 1977--Continued

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Lake of the Woods basin				
Stony River	South Kawishiwi River	Lat 47°38'05", long 91°31'19", in SW 1/4 SE 1/4 sec.31, T.60 N., R.9 W., Lake County, at bridge on Forest Route 106, 0.8 mile upstream from McDougal Lake, 8 miles west of Isabella, and 13 miles northwest of Murphy City, MN.	-	1976	11-10-76 12-16-76 2- 3-77 3-10-77 4-26-77 6- 8-77 7-21-77 8-31-77	*3.2 *2.4 *.94 3.1 83 120 18 82
Greenwood River	Stony River	Lat 47°35'17", long 91°36'51", in NW 1/4 NW 1/4 sec.21, T.59 N., R.10 W., Lake County, at bridge on logging trail, 4.5 miles downstream from Greenwood Lake, 13 miles west of Isabella, and 30 miles southeast of Ely, MN.	-	1976	11-10-76 12-16-76 2- 1-77 3-10-77 4-26-77 6- 7-77 7-20-77 8-31-77	*0 *0 *0 *0 14 56 27 42
Stony 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, at bridge on State Highway 1, 11 miles upstream from Birch Lake, and 12.8 miles northwest of Isabella, MN.	180	1953-65‡, 1967-68, 1972-73, 1975-76	b11-10-76 b12-16-76 b2- 3-77 3-16-77 4-27-77 6- 8-77 7-21-77 9- 1-77	*7.65 *8.83 7.60 23 121 259 85 131
Denley Creek	Stony River	Lat 47°44'30", long 91°43'30", in NW 1/4 SW 1/4 sec.27, T.61 N., R.11 W., Lake County, 0.1 mile upstream from Nira Creek, and 13 miles southeast of Ely, MN.	-	1976	c8- 4-76 10- 6-76	*0 *0
Nira Creek	Denley Creek	Lat 47°44'40", long 91°43'24", in SW 1/4 NW 1/4 sec.27, T.61 N., R.11 W., Lake County, 0.1 mile above mouth, and 13 miles southeast of Ely, MN.	-	1976	c8- 4-76 10- 6-76	*.80 *.57
Denley Creek	Stony River	Lat 47°44'35", long 91°43'40", in SE 1/4 NE 1/4 sec.28, T.61 N., R.11 W., Lake County, at culvert on unnumbered Forest Route, 0.1 mile downstream from Nira Creek, and 13 miles southeast of Ely, MN.	-	-	4-28-77	13
Stony River	South Kawishiwi River	Lat 47°44'18", long 91°46'11", in NW 1/4 SW 1/4 sec.29, T.61 N., R.11 W., Lake County, 0.1 mile upstream from Birch Lake, 0.2 mile downstream from Denley Creek, and 14 miles southeast of Ely, MN.		1976	c8- 4-76 10- 6-76 4-13-77 4-28-77	25 9.0 38 151
Dunka River	Birch Lake (South Kawishiwi River)	Lat 47°41'03", long 91°50'54", in NW 1/4 NE 1/4 sec.15, T.60 N., R.12 W., St. Louis County, at bridge on County Highway 623 (Forest Route 424), 1.4 miles downstream from Twenty Proof Creek, and 5 miles southeast of Babbitt, MN.	-	1976	10- 6-76 11- 9-76 4-13-77 4-27-77 6- 9-77	9.2 *1.7 5.2 16 61
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, at bridge on County Highway 23 at Buyck, and 20 miles northeast of Cook, MN.	-	-	9-15-77	1,390

‡ Operated as a continuous-record gaging station.
b Also published under measurements made at low-flow partial-record stations.
c Not previously published.

Discharge measurements made at miscellaneous sites during water year 1977--Continued

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Lake of the Woods basin--Continued				
Vermilion River	Namakan River	Lat 48°15'54", long 92°33'56", in NE 1/4 NE 1/4 sec.30, T.67 N., R.17 W., St. Louis County, at bridge on Forest Route No. 491, 4 miles upstream from mouth, and 3.5 miles west of the city of Crane Lake, MN.	-	-	9-15-77	2,700
dLittle Fork River	Rainy River	Lat 47°51'16", long 92°41'56", in NE 1/4 SE 1/4 sec.13, T.62 N., R.19 W., St. Louis County, at bridge on U.S. Highway 53, 0.6 mile west of Cook, MN.	61.5	1950, 1958-73, 1975-76	8-30-77	796

d At site of active low-flow partial-record station.

483003092380301 - KETTLE RV BEL KETTLE FALLS NR INT FALLS MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SAMPLING DEPTH (FT) (00003)	DEPTH OF RESERVOIR (FT) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	TRANSPARENCY (SECCHI DISK) (M) (00078)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
MAR											
15...	0930	5.2	--	46	6.6	--	.5	1	--	12.4	89
AUG											
23...	0930	6.0	12	46	7.2	14.5	16.5	1	2.90	9.7	103

DATE	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	ALKALINITY AS CACO3 (MG/L) (00410)	CARBON DIOXIDE (CO2) (MG/L) (00405)
MAR										
15...	21	5	5.3	1.8	1.0	9	.6	19	16	7.6
AUG										
23...	37	0	12	1.7	1.4	7	.6	50	41	5.0

DATE	TOTAL NITRATE (N) (MG/L) (00620)	TOTAL NITRITE (N) (MG/L) (00615)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL NITRITE PLUS NITRATE IN BOT. MAT. (MG/KG) (00633)	TOTAL AMMONIA NITROGEN (N) (MG/L) (00610)	TOTAL AMMONIA NITROGEN IN BOTTOM MAT. (MG/KG) (00611)	TOTAL ORGANIC NITROGEN (N) (MG/L) (00605)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	SUSPENDED KJEL. NITROGEN (N) (MG/L) (00624)
MAR										
15...	.12	.00	.12	.11	.0	.01	14	.40	.41	.05
AUG										
23...	.00	.01	.01	.00	5.9	.01	.0	.45	.46	.27

DATE	DISSOLVED KJEL. NITROGEN (N) (MG/L) (00623)	TOTAL KJEL. NITROGEN IN BOTTOM MAT. (MG/KG) (00626)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED PHOSPHORUS (P) (MG/L) (00666)	TOTAL PHOSPHORUS IN BOTTOM MATERIAL (MG/KG) (00668)	TOTAL IRON (FE) (UG/L) (01045)	DISSOLVED IRON (FE) (UG/L) (01046)	DISSOLVED MANGANESE (MN) (UG/L) (01056)	DISSOLVED ORGANIC CARBON (C) (MG/L) (00681)	SUSPENDED ORGANIC CARBON (C) (MG/L) (00689)
MAR										
15...	.36	350	.00	.00	130	90	60	0	8.2	.5
AUG										
23...	.19	65	.02	.01	33	60	20	0	8.2	.5

483003092380301 KETTLE RV BEL KETTLE FALLS NR INT FALLS MN--Continued

PHYTOPLANKTON ANALYSES, MARCH 1977 TO AUGUST 1977

DATE	MAR 15,77		AUG 23,77	
TIME	0930		0930	
TOTAL CELLS/ML	870		4700	
DIVERSITY: DIVISION	0.9		0.8	
.CLASS	0.9		0.8	
..ORDER	1.2		1.4	
...FAMILY	1.5		1.6	
....GENUS	1.6		2.2	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...HYDRODICTYACEAE				
....PEDIASTRUM	--	-	*	0
...OOCYSTACEAE				
....ANKISTRODESMUS	*	0	30	1
....OOCYSTIS	--	-	*	0
....QUADRIGULA	--	-	160	3
....TETRAEDRON	--	-	*	0
...SCENEDESMACEAE				
....CRUCIGENIA	--	-	99	2
....SCENEDESMUS	--	-	30	1
..TETRASPORALES				
...PALMELLACEAE				
....SPHAEROCYSTIS	--	-	120	3
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	9	1	--	-
...VOLVOCACEAE				
....EUDORINA	--	-	79	2
..ZYGNEMATALES				
...DESMIDIACEAE				
....CLOSTERIUM	*	0	*	0
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	23	3	*	0
....MELOSIRA	9	1	79	2
..PENNALES				
...ACHNANTHACEAE				
....ACHNANTHES	*	0	--	-
...CYMBELLACEAE				
....CYMBELLA	6	1	--	-
...FRAGILARIACEAE				
....ASTERIONELLA	--	-	40	1
....FRAGILARIA	93	11	--	-
....SYNEDRA	6	1	--	-
...GOMPHONEMATACEAE				
....GOMPHONEMA	*	0	--	-
...NAVICULACEAE				
....CALONEIS	*	0	--	-
....NAVICULA	26	3	*	0
....PINNULARIA	*	0	--	-
...NITZSCHIACEAE				
....NITZSCHIA	6	1	54	1
...SURIRELLACEAE				
....SURIRELLA	*	0	--	-
...TABELLARIACEAE				
....TABELLARIA	*	0	89	2
CYANOPHYTA(BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROCCOCCALES				
...CHROCCOCCAEAE				
....ANACYSTIS				
.....A.INCERTA	--	-	620	13
....AGMENELLUM	--	-	570	12
....ANACYSTIS	--	-	2400#	50
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	200	4
....APHANIZOMENON	--	-	74	2
...OSCILLATORIACEAE				
....OSCILLATORIA	23	3	--	-
....PHORMIMIDIUM	--	-	59	1
..CHROCCOCCALES				
...CHROCCOCCAEAE				
....GOMPHOSPHAERIA	640#	74	--	-
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....TRACHELOMONAS	6	1	--	-

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

483015092380101 - KETTLE R NR KET. FALLS NR INTERNATIONAL FALLS MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SAMPLING DEPTH (FT) (00003)	DEPTH OF RESERVOIR (FT) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
MAR										
15...	1045	2.0	--	46	6.7	--	1.0	9	11.0	80
AUG										
23...	1030	3.0	6.1	47	7.3	14.5	16.5	1	9.6	102

DATE	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	ALKALINITY AS CACO3 (MG/L) (00410)	CARBON DIOXIDE (CO2) (MG/L) (00405)
MAR										
15...	19	7	4.9	1.6	.9	9	.6	15	12	4.8
AUG										
23...	22	6	6.0	1.6	1.5	13	.7	20	16	1.6

DATE	TOTAL NITRATE (N) (MG/L) (00620)	TOTAL NITRITE (N) (MG/L) (00615)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL NITRITE PLUS NITRATE IN BOT. MAT. (MG/KG) (00633)	TOTAL AMMONIA NITROGEN (N) (MG/L) (00610)	TOTAL AMMONIA NITROGEN IN BOTTOM MAT. (MG/KG) (00611)	TOTAL ORGANIC NITROGEN (N) (MG/L) (00605)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	SUSPENDED KJEL. NITROGEN (N) (MG/L) (00624)
MAR										
15...	.16	.00	.16	.16	.0	.04	27	.44	.48	.13
AUG										
23...	.01	.01	.02	.02	6.6	.01	.0	.36	.37	.23

DATE	DISSOLVED KJEL. NITROGEN (N) (MG/L) (00623)	TOTAL KJEL. NITROGEN IN BOTTOM MAT. (MG/KG) (00626)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED PHOSPHORUS (P) (MG/L) (00666)	TOTAL PHOSPHURUS IN BOTTOM MATERIAL (MG/KG) (00668)	TOTAL IRON (FE) (UG/L) (01045)	DISSOLVED IRON (FE) (UG/L) (01046)	DISSOLVED MANGANESE (MN) (UG/L) (01056)	DISSOLVED ORGANIC CARBON (C) (MG/L) (00681)	SUSPENDED ORGANIC CARBON (C) (MG/L) (00689)
MAR										
15...	.35	3500	.01	.00	100	280	50	0	7.7	.8
AUG										
23...	.14	140	.02	.01	41	120	20	0	8.1	.4

483015092380101 KETTLE R NR KET. FALLS NR INTERNATIONAL FALLS MN--Continued

PHYTOPLANKTON ANALYSES, MARCH 1977 TO AUGUST 1977

DATE	MAR 15,77	AUG 23,77
TIME	1045	1030
TOTAL CELLS/ML	2200	2100
DIVERSITY: DIVISION	0.2	1.3
.CLASS	0.2	1.3
..ORDER	1.1	1.9
...FAMILY	2.5	2.3
....GENUS	3.2	2.9

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...OOCYSTACEAE				
....ANKISTRODESMUS	--	-	16	1
....DICTYOSPHAERIUM	--	-	86	4
....OOCYSTIS	--	-	230	11
...SCENEDESMACEAE				
....CRUCIGENIA	--	-	320#	16
....SCENEDESMUS	58	3	--	-
..TETRASPORALES				
...COCCOMYXACEAE				
....ELAKATOTHRIX	--	-	11	1
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	29	1	11	1
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	220	10	16	1
....MELOSIRA	360#	17	--	-
....STEPHANODISCUS	--	-	*	0
..PENNALES				
...ACHNANTHACEAE				
....ACHNANTHES	58	3	--	-
....COCCONEIS	58	3	--	-
....RHOICOSPHENIA	14	1	--	-
...CYMBELLACEAE				
....AMPHORA	14	1	--	-
....CYMBELLA	14	1	--	-
...EUNOTIACEAE				
....EUNOTIA	14	1	--	-
...FRAGILARIACEAE				
....ASTERIONELLA	43	2	43	2
....FRAGILARIA	520#	24	--	-
....SYNEDRA	--	-	21	1
...GOMPHONEMATACEAE				
....GOMPHONEMA	29	1	--	-
...NAVICULACEAE				
....GYROSIGMA	14	1	--	-
....NAVICULA	200	9	--	-
....PINNULARIA	29	1	--	-
....STAURONEIS	29	1	--	-
...NITZSCHIACEAE				
....NITZSCHIA	480#	22	--	-
...TABELLARIACEAE				
....TABELLARIA	--	-	86	4
.CHRYSOPHYCEAE				
..CHRYSOMONADALES				
...OCHROMONADACEAE				
....DINOBRYON	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....ANACYSTIS	--	-	670#	33
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	260	13
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....GOMPHOSPHAERIA	--	-	270	13

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

482630093011701 - KABETOGAMA LK AT GAPPAS LANDING NR RAY MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SAMPLING DEPTH (FT) (00003)	DEPTH OF RESERVOIR (FT) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	TRANSPARENCY (SECCHI DISK) (M) (00078)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
MAR 16...	1330	1.0	2.3	43	6.8	--	.0	4	--	12.9	91
AUG 24...	1330	4.0	8.0	88	8.6	16.0	17.5	2	1.70	9.9	108

DATE	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	CARBONATE (CO3) (MG/L) (00445)	ALKALINITY AS CACO3 (MG/L) (00410)	CARBON DIOXIDE (CO2) (MG/L) (00405)
MAR 16...	16	4	4.0	1.4	.8	10	.5	15	--	12	3.8
AUG 24...	44	3	11	4.0	1.2	6	.7	46	2	41	.2

DATE	TOTAL NITRATE (N) (MG/L) (00620)	TOTAL NITRITE (N) (MG/L) (00615)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL NITRITE PLUS NITRATE IN BOT. MAT. (MG/KG) (00633)	TOTAL AMMONIA NITROGEN (N) (MG/L) (00610)	TOTAL AMMONIA NITROGEN IN BOTTOM MAT. (MG/KG) (00611)	TOTAL ORGANIC NITROGEN (N) (MG/L) (00605)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	SUSPENDED KJEL. NITROGEN (N) (MG/L) (00624)
MAR 16...	.42	.01	.43	.43	.0	.32	7.8	.21	.53	.23
AUG 24...	.02	.01	.03	.00	5.7	.06	8.0	.39	.45	.00

DATE	DISSOLVED KJEL. NITROGEN (N) (MG/L) (00623)	TOTAL KJEL. NITROGEN IN BOTTOM MAT. (MG/KG) (00626)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED PHOSPHORUS (P) (MG/L) (00666)	TOTAL PHOSPHORUS IN BOTTOM MATERIAL (MG/KG) (00668)	TOTAL IRON (FE) (UG/L) (01045)	DISSOLVED IRON (FE) (UG/L) (01046)	DISSOLVED MANGANESE (MN) (UG/L) (01056)	DISSOLVED ORGANIC CARBON (C) (MG/L) (00681)	SUSPENDED ORGANIC CARBON (C) (MG/L) (00689)
MAR 16...	.30	120	.05	.02	100	1200	20	10	3.0	1.6
AUG 24...	.45	33	.02	.02	22	50	20	0	9.6	1.1

482630093011701 KABETOGAMA LK AT GAPPAS LANDING NR RAY MN--Continued

PHYTOPLANKTON ANALYSES, MARCH 1977 TO AUGUST 1977

DATE	MAR 16,77	AUG 24,77
TIME	1330	1330
TOTAL CELLS/ML	12000	28000
DIVERSITY: DIVISION	0.6	0.1
.CLASS	0.6	0.1
..ORDER	0.7	1.1
...FAMILY	0.7	1.5
....GENUS	0.7	1.8

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...OOCYSTACEAE				
....ANKISTRODESMUS	*	0	--	-
....DICTYOSPHAERIUM	*	0	--	-
....OOCYSTIS	--	-	*	0
...SCENEDESMACEAE				
....SCENEDESMUS	*	0	--	-
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	720	6	--	-
..ZYGNEMATALES				
...DESMIDIACEAE				
....COSMARIUM	--	-	*	0
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..PENNALES				
...NAVICULACEAE				
....ENTOMONEIS	*	0	--	-
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	*	0	*	0
....MELOSIRA	*	0	*	0
....STEPHANODISCUS	230	2	*	0
..PENNALES				
...ACHNANTHACEAE				
....ACHNANTHES	*	0	--	-
...CYMBELLACEAE				
....AMPHORA	*	0	--	-
....CYMBELLA	*	0	--	-
...FRAGILARIACEAE				
....FRAGILARIA	*	0	--	-
....SYNEDRA	*	0	--	-
...NAVICULACEAE				
....GYROSIGMA	*	0	--	-
....NAVICULA	76	1	--	-
...NITZSCHIACEAE				
....NITZSCHIA	97	1	--	-
...SURIRELLACEAE				
....SURIRELLA	*	0	--	-
.XANTHOPHYCEAE				
..HETEROCOCCALES				
...CHLOROTHECIACEAE				
....OPHIOCYTIUM	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....ANACYSTIS	--	-	1500	5
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	5100#	18
...OSCILLATORIACEAE				
....PHORMIMIDIUM	--	-	7400#	26
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....GOMPHOSPHAERIA	11000#	90	14000#	49
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..PERIDINIALES				
...CERATIACEAE				
....CERATIUM	--	-	*	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

482607092511701 KABETOGAMA LK AT MOUTH OF MEADWOOD BAY NR RAY MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SAMPLING DEPTH (FT) (00003)	DEPTH OF RESERVOIR (FT) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	TRANSPARENCY (SECCHI DISK) (M) (00078)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
MAR											
17...	1100	4.0	7.8	108	7.1	--	1.0	1	--	11.1	81
AUG											
24...	1130	6.0	21	69	8.7	16.0	17.5	2	1.50	9.9	108

DATE	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	CARBONATE (CO3) (MG/L) (00445)	ALKALINITY AS CACO3 (MG/L) (00410)	CARBON DIOXIDE (CO2) (MG/L) (00405)
MAR											
17...	49	3	12	4.5	1.3	5	.9	56	--	46	7.1
AUG											
24...	34	5	9.3	2.6	1.5	9	.7	31	2	29	.1

DATE	TOTAL NITRATE (N) (MG/L) (00620)	TOTAL NITRITE (N) (MG/L) (00615)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL NITRITE PLUS NITRATE IN BOT. MAT. (MG/KG) (00633)	TOTAL AMMONIA NITROGEN (N) (MG/L) (00610)	TOTAL AMMONIA NITROGEN IN BOTTOM MAT.. (MG/KG) (00611)	TOTAL ORGANIC NITROGEN (N) (MG/L) (00605)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	SUSPENDED KJEL. NITROGEN (N) (MG/L) (00624)
MAR										
17...	.17	.01	.18	.18	.0	.00	6.1	.42	.42	.10
AUG										
24...	.00	.01	.01	.01	4.1	.07	1.3	.67	.74	.33

DATE	DISSOLVED KJEL. NITROGEN (N) (MG/L) (00623)	TOTAL KJEL. NITROGEN IN BOTTOM MAT. (MG/KG) (00626)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED PHOSPHORUS (P) (MG/L) (00666)	TOTAL PHOSPHORUS IN BOTTOM MATERIAL (MG/KG) (00668)	TOTAL IRON (FE) (UG/L) (01045)	DISSOLVED IRON (FE) (UG/L) (01046)	DISSOLVED MANGANESE (MN) (UG/L) (01056)	DISSOLVED ORGANIC CARBON (C) (MG/L) (00681)	SUSPENDED ORGANIC CARBON (C) (MG/L) (00689)
MAR										
17...	.32	300	.02	.02	120	40	40	0	5.8	--
AUG										
24...	.41	32	.05	.01	47	160	40	0	8.7	1.1

482607092511701 KABETOGAMA LK AT MOUTH OF MEADWOOD BAY NR RAY MN--Continued

PHYTOPLANKTON ANALYSES, MARCH 1977 TO AUGUST 1977

DATE	MAR 17,77		AUG 24,77	
TIME	1100		1130	
TOTAL CELLS/ML	2300		43000	
DIVERSITY: DIVISION	0.6		0.4	
.CLASS	0.6		0.4	
..ORDER	1.4		1.2	
...FAMILY	1.5		1.6	
....GENUS	1.5		2.2	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...CHARACIACEAE				
....SCHROEDERIA	*	0	--	-
...COELASTRACEAE				
....COELASTRUM	--	-	210	1
...OOCYSTACEAE				
....DICTYOSPHAERIUM	*	0	--	-
....NEPHROCYTIUM	--	-	*	0
...SCENEDESMACEAE				
....SCENEDESMUS	--	-	*	0
....TETRASTRUM	--	-	*	0
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	36	2	--	-
..ZYGNEMATALES				
...DESMIDIACEAE				
....COSMARIUM	*	0	--	-
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	--	-	*	0
....MELOSIRA	86	4	1400	3
....STEPHANODISCUS	14	1	230	1
..PENNALES				
...CYMBELLACEAE				
....AMPHORA	39	2	--	-
...FRAGILARIACEAE				
....FRAGILARIA	21	1	--	-
....SYNEDRA	--	-	*	0
...GOMPHONEMATACEAE				
....GOMPHONEMA	*	0	--	-
...NAVICULACEAE				
....DIPLONEIS	*	0	--	-
....GYROSIGMA	*	0	--	-
....NAVICULA	39	2	--	-
.XANTHOPHYCEAE				
..HETEROCOCCALES				
...CHLOROTHECIACEAE				
....OPHIOCYTIUM	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROCOCCALES				
...CHROCOCCACEAE				
....ANACYSTIS	--	-	7800#	18
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	8300#	20
...OSCILLATORIACEAE				
....LYNGBYA	--	-	770	2
....OSCILLATORIA	500#	22	4500	11
..CHROCOCCALES				
...CHROCOCCACEAE				
....GOMPHOSPHAERIA	1500#	67	19000#	44
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....EUGLENA	--	-	*	0
....TRACHELOMONAS	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..PERIDINIALES				
...CERATIACEAE				
....CERATIUM	--	-	*	0

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

482603092511401 - KABETOGAMA LK IN MEADWOOD BAY NR RAY MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SAMPLING DEPTH (FT) (00003)	DEPTH OF RESERVOIR (FT) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	TRANSPARENCY (SECCHI DISK) (M) (00078)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
MAR											
17...	0950	1.0	1.7	100	6.8	--	.5	20	--	8.6	62
AUG											
24...	1230	6.0	11	70	8.9	16.0	17.5	2	1.50	10.7	116

DATE	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	CARBONATE (CO3) (MG/L) (00445)	ALKALINITY AS CACO3 (MG/L) (00410)	CARBON DIOXIDE (CO2) (MG/L) (00405)
MAR											
17...	28	0	6.8	2.7	.8	6	.9	48	--	39	12
AUG											
24...	35	3	9.4	2.7	1.7	9	.8	35	2	32	.1

DATE	TOTAL NITRATE (N) (MG/L) (00620)	TOTAL NITRITE (N) (MG/L) (00615)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL NITRITE PLUS NITRATE IN BOT. MAT. (MG/KG) (00633)	TOTAL AMMONIA NITROGEN (N) (MG/L) (00610)	TOTAL AMMONIA NITROGEN IN BOTTOM MAT. (MG/KG) (00611)	TOTAL ORGANIC NITROGEN (N) (MG/L) (00605)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	SUSPENDED KJEL. NITROGEN (N) (MG/L) (00624)
MAR										
17...	.36	.01	.37	.33	.0	.38	11	.41	.79	.46
AUG										
24...	.00	.01	.01	.01	9.9	.08	.0	.67	.75	.05

DATE	DISSOLVED KJEL. NITROGEN (N) (MG/L) (00623)	TOTAL KJEL. NITROGEN IN BOTTOM MAT. (MG/KG) (00626)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED PHOSPHORUS (P) (MG/L) (00666)	TOTAL PHOSPHORUS IN BOTTOM MATERIAL (MG/KG) (00668)	TOTAL IRON (FE) (UG/L) (01045)	DISSOLVED IRON (FE) (UG/L) (01046)	DISSOLVED MANGANESE (MN) (UG/L) (01056)	DISSOLVED ORGANIC CARBON (C) (MG/L) (00681)	SUSPENDED ORGANIC CARBON (C) (MG/L) (00689)
MAR										
17...	.33	330	.06	.02	84	490	60	120	7.2	.4
AUG										
24...	.70	210	.06	.01	33	170	40	0	8.1	1.6

482603092511401 KABETOGAMA LK IN MEADWOOD BAY NR RAY MN--Continued

PHYTOPLANKTON ANALYSES, MARCH 1977 TO AUGUST 1977

DATE	MAR 17,77	AUG 24,77
TIME	0950	1230
TOTAL CELLS/ML	2900	44000
DIVERSITY: DIVISION	0.0	0.9
.CLASS	0.0	0.9
..ORDER	1.0	1.9
...FAMILY	1.6	2.3
....GENUS	2.0	2.9

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...OOCYSTACEAE				
....KIRCHNERIELLA	--	-	940	2
....OOCYSTIS	--	-	*	0
...SCENEDESMACEAE				
....SCENEDESMUS	--	-	*	0
..TETRASPORALES				
...PALMELLACEAE				
....SPHAEROCYSTIS	--	-	1200	3
..ZYGNEMATALES				
...DESMIDIACEAE				
....COSMARIUM	--	-	380	1
....COSMOCLADIUM	--	-	670	2
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	39	1	*	0
....MELOSIRA	1500#	52	1100	3
....STEPHANODISCUS	140	5	350	1
..PENNALES				
...ACHNANTHACEAE				
....ACHNANTHES	*	0	--	-
...FRAGILARIACEAE				
....ASTERIONELLA	26	1	*	0
....FRAGILARIA	490#	17	3300	7
....SYNEDRA	--	-	*	0
...NAVICULACEAE				
....NAVICULA	450#	16	--	-
...NITZSCHIACEAE				
....NITZSCHIA	230	8	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....ANACYSTIS	--	-	2200	5
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	11000#	24
....APHANIZOMENON	--	-	4200	9
...OSCILLATORIACEAE				
....OSCILLATORIA	--	-	270	1
....PHORMIMIDIUM	--	-	3200	7
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....GOMPHOSPHAERIA	--	-	15000#	35
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....TRACHELOMONAS	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..PERIDINIALES				
...CERATIACEAE				
....CERATIUM	--	-	*	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

482642093011901 - KABETOGAMA LK NR GAPPAS LANDING NR RAY MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SAMPLING DEPTH (FT) (00003)	DEPTH OF RESERVOIR (FT) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	TRANSPARENCY (SECCHI DISK) (M) (00078)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
MAR											
16...	1415	8.2	16	100	7.1	--	1.0	1	--	11.3	82
AUG											
24...	1400	6.0	20	88	8.6	16.0	17.0	3	1.70	10.0	108

DATE	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	CARBONATE (CO3) (MG/L) (00445)	ALKALINITY AS CACO3 (MG/L) (00410)	CARBON DIOXIDE (CO2) (MG/L) (00405)
MAR											
16...	52	4	13	4.7	1.3	5	.9	58	--	48	7.4
AUG											
24...	33	0	10	2.0	1.2	7	.7	47	2	42	.2

DATE	TOTAL NITRATE (N) (MG/L) (00620)	TOTAL NITRITE (N) (MG/L) (00615)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL NITRITE PLUS NITRATE IN BOT. MAT. (MG/KG) (00633)	TOTAL AMMONIA NITROGEN (N) (MG/L) (00610)	TOTAL AMMONIA NITROGEN IN BOTTOM MAT. (MG/KG) (00611)	TOTAL ORGANIC NITROGEN (N) (MG/L) (00605)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	SUSPENDED KJEL. NITROGEN (N) (MG/L) (00624)
MAR										
16...	.30	.01	.31	.30	--	.00	--	.39	.39	.04
AUG										
24...	.03	.01	.04	.02	5.6	.03	9.9	.71	.74	.00

DATE	DISSOLVED KJEL. NITROGEN (N) (MG/L) (00623)	TOTAL KJEL. NITROGEN IN BOTTOM MAT. (MG/KG) (00626)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED PHOSPHORUS (P) (MG/L) (00666)	TOTAL PHOSPHORUS IN BOTTOM MATERIAL (MG/KG) (00668)	TOTAL IRON (FE) (UG/L) (01045)	DISSOLVED IRON (FE) (UG/L) (01046)	DISSOLVED MANGANESE (MN) (UG/L) (01056)	DISSOLVED ORGANIC CARBON (C) (MG/L) (00681)	SUSPENDED ORGANIC CARBON (C) (MG/L) (00689)
MAR										
16...	.35	--	.03	.02	--	80	30	20	8.3	.4
AUG										
24...	.74	86	.06	.02	21	60	30	0	9.7	--

482642093011901 KABETOGAMA LK NR GAPPAS LANDING NR RAY MN--Continued

PHYTOPLANKTON ANALYSES, MARCH 1977 TO AUGUST 1977

DATE	MAR 16,77	AUG 24,77
TIME	1415	1400
TOTAL CELLS/ML	1800	14000
DIVERSITY: DIVISION	0.2	0.3
.CLASS	0.2	0.3
..ORDER	0.2	1.2
...FAMILY	0.2	1.5
....GENUS	0.2	1.7

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...CHARACIACEAE				
....SCHROEDERIA	37	2	--	-
...OOCYSTACEAE				
....OOCYSTIS	--	-	*	0
..TETRASPORALES				
...PALMELLACEAE				
....SPHAEROCYSTIS	--	-	330	2
..ZYGNEMATALES				
...DESMIDIACEAE				
....CLOSTERIUM	*	0	--	-
....COSMARIUM	--	-	*	0
....STAURASTRUM	--	-	*	0
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	*	0	82	1
....MELOSIRA	--	-	*	0
....STEPHANODISCUS	--	-	130	1
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....AGMENELLUM	*	0	--	-
....ANACYSTIS	--	-	290	2
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	1400	10
...OSCILLATORIACEAE				
....PHORMIMIDIUM	--	-	3200#	23
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....GOMPHOSPHAERIA	1700#	98	8200#	60
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....TRACHELOMONAS	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..PERIDINIALES				
...CERATIACEAE				
....CERATIUM	--	-	*	0
...PERIDINIACEAE				
....PERIDINIUM	--	-	*	0

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 NR ISLAND VIEW MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SAMPLING DEPTH (FT) (00003)	DEPTH OF RESERVOIR (FT) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	TRANSPARENCY (SECCHI DISK) (M) (00078)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
MAR											
14...	1400	2.2	4.3	50	7.1	--	1.5	6	--	12.4	92
AUG											
22...	1900	3.0	7.0	111	7.8	15.0	17.5	8	.60	9.0	98

DATE	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	ALKALINITY AS CACO3 (MG/L) (00410)	CARBON DIOXIDE (CO2) (MG/L) (00405)
MAR										
14...	21	8	5.3	1.9	2.5	20	.5	16	13	2.0
AUG										
22...	58	10	15	5.0	1.8	6	1.0	58	48	1.5

DATE	TOTAL NITRATE (N) (MG/L) (00620)	TOTAL NITRITE (N) (MG/L) (00615)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL NITRITE PLUS NITRATE IN BOT. MAT. (MG/KG) (00633)	TOTAL AMMONIA NITROGEN (N) (MG/L) (00610)	TOTAL AMMONIA NITROGEN IN BOTTOM MAT. (MG/KG) (00611)	TOTAL ORGANIC NITROGEN (N) (MG/L) (00605)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	SUSPENDED KJEL. NITROGEN (N) (MG/L) (00624)
MAR										
14...	.28	.00	.28	.24	.0	.19	59	.35	.54	.02
AUG										
22...	.00	.01	.01	.01	26	.07	.0	.93	1.0	.53

DATE	DISSOLVED KJEL. NITROGEN (N) (MG/L) (00623)	TOTAL KJEL. NITROGEN IN BOTTOM MAT. (MG/KG) (00626)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED PHOSPHORUS (P) (MG/L) (00666)	TOTAL PHOSPHORUS IN BOTTOM MATERIAL (MG/KG) (00668)	TOTAL IRON (FE) (UG/L) (01045)	DISSOLVED IRON (FE) (UG/L) (01046)	DISSOLVED MANGANESE (MN) (UG/L) (01056)	DISSOLVED ORGANIC CARBON (C) (MG/L) (00681)	SUSPENDED ORGANIC CARBON (C) (MG/L) (00689)
MAR										
14...	.52	4000	.02	.01	160	550	210	30	6.4	.7
AUG										
22...	.47	490	.05	.02	30	360	80	0	17	1.3

483511093092801 RAINY LAKE AT BLACK BAY NR ISLAND VIEW, MN--Continued

PHYTOPLANKTON ANALYSES, MARCH 1977 TO AUGUST 1977

DATE	MAR 14,77	AUG 22,77
TIME	1400	1900
TOTAL CELLS/ML	2800	170000
DIVERSITY: DIVISION	0.0	0.7
.CLASS	0.0	0.7
..ORDER	0.8	1.1
...FAMILY	1.3	1.2
....GENUS	1.5	1.4

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...OOCYSTACEAE				
....ANKISTRODESMUS	*	0	1300	1
....DICTYOSPHAERIUM	--	-	2000	1
....KIRCHNERIELLA	--	-	*	0
....OOCYSTIS	--	-	3600	2
...SCENEDESMACEAE				
....SCENEDESMUS	--	-	3700	2
..ZYGNEMATALES				
...DESMIDIACEAE				
....ARTHRODESMUS	--	-	*	0
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	23	1	*	0
....MELOSIRA	2100#	75	6200	4
..PENNALES				
...ACHNANTHACEAE				
....ACHNANTHES	23	1	--	-
....COCCONEIS	23	1	--	-
...CYMBELLACEAE				
....AMPHORA	34	1	--	-
...FRAGILARIACEAE				
....ASTERIONELLA	57	2	--	-
....FRAGILARIA	250	9	--	-
....SYNEDRA	--	-	*	0
...GOMPHONEMATACEAE				
....GOMPHONEMA	*	0	--	-
...NAVICULACEAE				
....DIPLONEIS	*	0	--	-
....NAVICULA	150	5	*	0
....PINNULARIA	23	1	--	-
...NITZSCHIACEAE				
....HANTZSCHIA	*	0	--	-
....NITZSCHIA	57	2	1300	1
...TABELLARIACEAE				
....TABELLARIA	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....ANACYSTIS	--	-	130000#	79
..HORMOGONALES				
...OSCILLATORIACEAE				
....LYNGBYA	--	-	1600	1
....PHORMIMIDIUM	--	-	12000	7
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....EUGLENA	--	-	*	0
....TRACHELOMONAS	--	-	*	0

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

483538093100001 - RAINY LAKE AT BLACK BAY NARROWS NR ISLANDVIEW MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SAMPLING DEPTH (FT) (00003)	DEPTH OF RESERVOIR (FT) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	TRANSPARENCY (SECCHI DISK) (M) (00078)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
MAR											
14...	1630	2.2	4.5	83	7.5	--	1.0	10	--	9.2	67
AUG											
22...	1930	3.5	7.0	109	7.8	15.0	17.0	8	.60	9.2	99

DATE	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	ALKALINITY AS CACO3 (MG/L) (00410)	CARBON DIOXIDE (CO2) (MG/L) (00405)
MAR										
14...	33	6	8.4	2.9	1.5	9	.7	33	27	1.7
AUG										
22...	55	7	14	4.8	1.8	7	1.0	58	48	1.5

DATE	TOTAL NITRATE (N) (MG/L) (00620)	TOTAL NITRITE (N) (MG/L) (00615)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL NITRITE PLUS NITRATE IN BOT. MAT. (MG/KG) (00633)	TOTAL AMMONIA NITROGEN (N) (MG/L) (00610)	TOTAL AMMONIA NITROGEN IN BOTTOM MAT. (MG/KG) (00611)	TOTAL ORGANIC NITROGEN (N) (MG/L) (00605)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	SUSPENDED KJEL. NITROGEN (N) (MG/L) (00624)
MAR										
14...	.11	.00	.11	.11	.0	.25	110	.61	.86	.16
AUG										
22...	.34	.01	.35	.30	21	.04	.0	1.1	1.1	.58

DATE	DISSOLVED KJEL. NITROGEN (N) (MG/L) (00623)	TOTAL KJEL. NITROGEN IN BOTTOM MAT. (MG/KG) (00626)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED PHOSPHORUS (P) (MG/L) (00666)	TOTAL PHOSPHORUS IN BOTTOM MATERIAL (MG/KG) (00668)	TOTAL IRON (FE) (UG/L) (01045)	DISSOLVED IRON (FE) (UG/L) (01046)	DISSOLVED MANGANESE (MN) (UG/L) (01056)	DISSOLVED ORGANIC CARBON (C) (MG/L) (00681)	SUSPENDED ORGANIC CARBON (C) (MG/L) (00689)
MAR										
14...	.70	1900	.06	.02	130	2700	260	90	12	1.8
AUG										
22...	.52	570	.06	.02	15	400	60	0	29	1.3

483538093100001 RAINY LAKE AT BLACK BAY NARROWS NR ISLANDVIEW, MN--Continued

PHYTOPLANKTON ANALYSES, MARCH 1977 TO AUGUST 1977

DATE	MAR 14,77	AUG 22,77
TIME	1630	1930
TOTAL CELLS/ML	500000	210000
DIVERSITY: DIVISION	1.1	0.6
.CLASS	1.1	0.6
..ORDER	1.8	1.5
...FAMILY	2.0	1.6
....GENUS	2.2	2.4

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...COELASTRACEAE				
....COELASTRUM	--	-	1200	1
...MICRACTINIACEAE				
....GOLENKINIA	--	-	*	0
...OOCYSTACEAE				
....ANKISTRODESMUS	*	0	*	0
....DICTYOSPHAERIUM	--	-	2500	1
....FRANCEIA	--	-	*	0
....KIRCHNERIELLA	--	-	*	0
....OOCYSTIS	--	-	1200	1
....TETRAEDRON	--	-	*	0
...SCENEDESMACEAE				
....SCENEDESMUS	3500	1	4600	2
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	2600	1	--	-
..ZYGNEMATALES				
...DESMIDIACEAE				
....ARTHRODESMUS	--	-	*	0
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..PENNALES				
...NAVICULACEAE				
....ENTOMONEIS	*	0	--	-
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	4300	1	*	0
....MELOSIRA	140000#	28	3300	2
....STEPHANODISCUS	*	0	--	-
..PENNALES				
...ACHNANTHACEAE				
....COCCONEIS	*	0	*	0
...FRAGILARIACEAE				
....FRAGILARIA	2600	1	--	-
....SYNEDRA	--	-	*	0
...GOMPHONEMATACEAE				
....GOMPHONEMA	--	-	*	0
...NAVICULACEAE				
....CALONEIS	*	0	--	-
....DIPLONEIS	*	0	--	-
....GYROSIGMA	*	0	--	-
....NAVICULA	5200	1	--	-
....PINNULARIA	*	0	--	-
....STAURONEIS	*	0	--	-
...NITZSCHIACEAE				
....NITZSCHIA	2600	1	1300	1
...SURIRELLACEAE				
....SURIRELLA	*	0	--	-
...TABELLARIACEAE				
....TABELLARIA	*	0	--	-
.CHRYSOPHYCEAE				
..CHRYSOMONADALES				
...OCHROMONADACEAE				
....DINOBRYON	--	-	1900	1

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

483538093100001 RAINY LAKE AT BLACK BAY NARROWS NR ISLANDVIEW, MN--Continued

PHYTOPLANKTON ANALYSES, MARCH 1977 TO AUGUST 1977

DATE TIME	MAR 14,77 1630		AUG 22,77 1930	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....ANACYSTIS	240000#	48	71000#	34
..HORMOGONALES				
...NOSTOCACEAE				
....APHANIZOMENON	--	-	1200	1
...OSCILLATORIACEAE				
....LYNGBYA	--	-	58000#	28
....OSCILLATORIA	16000	3	--	-
....SPIRULINA	6100	1	--	-
...RIVULARIACEAE				
....RAPHIDIOPSIS	65000	13	--	-
...OSCILLATORIACEAE				
....PHORMIMIDIUM	--	-	9300	4
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....GOMPHOSPHAERIA	--	-	48000#	23
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....TRACHELOMONAS	2600	1	*	0

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

483622092560701 - RAINY LAKE AT BRULE NARROWS NR INT FALLS MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SAMPLING DEPTH (FT) (00003)	DEPTH OF RESERVOIR (FT) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	TRANSPARENCY (SECCHI DISK) (M) (00078)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
MAR											
15...	1225	7.2	15	32	6.6	--	.5	1	--	12.9	93
AUG											
23...	1200	9.0	18	50	7.3	14.5	16.5	1	2.60	9.5	101

DATE	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	ALKALINITY AS CACO3 (MG/L) (00410)	CARBON DIOXIDE (CO2) (MG/L) (00405)
MAR										
15...	21	16	5.6	1.8	1.0	9	.6	6	5	2.4
AUG										
23...	22	4	6.2	1.7	1.4	12	.6	22	18	1.8

DATE	TOTAL NITRATE (N) (MG/L) (00620)	TOTAL NITRITE (N) (MG/L) (00615)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL NITRITE PLUS NITRATE IN BOT. MAT. (MG/KG) (00633)	TOTAL AMMONIA NITROGEN (N) (MG/L) (00610)	TOTAL AMMONIA NITROGEN IN BOTTOM MAT. (MG/KG) (00611)	TOTAL ORGANIC NITROGEN (N) (MG/L) (00605)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	SUSPENDED KJEL. NITROGEN (N) (MG/L) (00624)
MAR										
15...	.14	.00	.14	.11	.0	.02	4.2	.33	.35	.00
AUG										
23...	.02	.01	.03	.00	--	.01	--	.34	.35	.21

DATE	DISSOLVED KJEL. NITROGEN (N) (MG/L) (00623)	TOTAL KJEL. NITROGEN IN BOTTOM MAT. (MG/KG) (00626)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED PHOSPHORUS (P) (MG/L) (00666)	TOTAL PHOSPHORUS IN BOTTOM MATERIAL (MG/KG) (00668)	TOTAL IRON (FE) (UG/L) (01045)	DISSOLVED IRON (FE) (UG/L) (01046)	DISSOLVED MANGANESE (MN) (UG/L) (01056)	DISSOLVED ORGANIC CARBON (C) (MG/L) (00681)	SUSPENDED ORGANIC CARBON (C) (MG/L) (00689)
MAR										
15...	.35	250	.00	.00	140	110	30	10	8.0	.4
AUG										
23...	.14	--	.02	.01	--	90	20	0	11	.4

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

483622092560701 RAINY LAKE AT BRULE NARROWS NR INT FALLS, MN--Continued

PHYTOPLANKTON ANALYSES, MARCH 1977 TO AUGUST 1977

DATE	MAR 15,77	AUG 23,77
TIME	1225	1200
TOTAL CELLS/ML	720	4400
DIVERSITY: DIVISION	1.5	0.9
.CLASS	1.6	0.9
..ORDER	1.8	1.5
...FAMILY	1.9	1.8
....GENUS	2.4	2.6

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...OOCYSTACEAE				
....ANKISTRODESMUS	40	6	28	1
....DICTYOSPHAERIUM	270#	37	--	-
....KIRCHNERIELLA	*	0	--	-
....OOCYSTIS	--	-	*	0
...SCENEDESMACEAE				
....SCENEDESMUS	6	1	--	-
..TETRASPORALES				
...PALMELLACEAE				
....GLOEOCYSTIS	11	2	--	-
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	6	1	--	-
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	51	7	--	-
....MELOSIRA	97	14	100	2
..PENNALES				
...FRAGILARIACEAE				
....ASTERIONELLA	9	1	35	1
....FRAGILARIA	--	-	350	8
....SYNEDRA	--	-	*	0
...GOMPHONEMATACEAE				
....GOMPHONEMA	--	-	*	0
...NAVICULACEAE				
....NAVICULA	6	1	--	-
...NITZSCHIACEAE				
....NITZSCHIA	*	0	--	-
...TABELLARIACEAE				
....TABELLARIA	--	-	470	11
.CHRYSOPHYCEAE				
..CHRYSOMONADALES				
...OCHROMONADACEAE				
....DINOBRYON	6	1	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....AGMENELLUM	--	-	170	4
....ANACYSTIS	210#	29	2000#	46
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	83	2
....APHANIZOMENON	--	-	410	9
...OSCILLATORIACEAE				
....PHORMIMIDIUM	--	-	48	1
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....GOMPHOSPHAERIA	--	-	620	14
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..PERIDINIALES				
...PERIDINIACEAE				
....PERIDINIUM	--	-	*	0

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

482056092282001 - SANDPOINT LK ABV HARRISON NARROWS NR CRANE LK MN

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SAMPLING DEPTH (FT) (00003)	DEPTH OF RESERVOIR (FT) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	TRANSPARENCY (SECCHI DISK) (M) (00078)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
MAR											
16...	0900	26	52	53	6.9	--	2.5	1	--	13.1	99
AUG											
24...	1000	6.0	60	54	7.1	16.0	17.0	1	2.30	8.9	96

DATE	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	ALKALINITY AS CACO3 (MG/L) (00410)	CARBON DIOXIDE (CO2) (MG/L) (00405)
MAR										
16...	23	5	5.8	2.0	1.4	11	.8	22	18	4.4
AUG										
24...	26	7	6.5	2.3	1.4	10	.8	23	19	2.9

DATE	TOTAL NITRATE (N) (MG/L) (00620)	TOTAL NITRITE (N) (MG/L) (00615)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL NITRITE PLUS NITRATE IN BOT. MAT. (MG/KG) (00633)	TOTAL AMMONIA NITROGEN (N) (MG/L) (00610)	TOTAL AMMONIA NITROGEN IN BOTTOM MAT. (MG/KG) (00611)	TOTAL ORGANIC NITROGEN (N) (MG/L) (00605)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	SUSPENDED KJEL. NITROGEN (N) (MG/L) (00624)
MAR										
16...	.19	.00	.19	.19	.0	.00	210	.51	.51	.06
AUG										
24...	.01	.00	.01	.01	36	.03	250	1.3	1.3	.67

DATE	DISSOLVED KJEL. NITROGEN (N) (MG/L) (00623)	TOTAL KJEL. NITROGEN IN BOTTOM MAT. (MG/KG) (00626)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED PHOSPHORUS (P) (MG/L) (00666)	TOTAL PHOSPHORUS IN BOTTOM MATERIAL (MG/KG) (00668)	TOTAL IRON (FE) (UG/L) (01045)	DISSOLVED IRON (FE) (UG/L) (01046)	DISSOLVED MANGANESE (MN) (UG/L) (01056)	DISSOLVED ORGANIC CARBON (C) (MG/L) (00681)	SUSPENDED ORGANIC CARBON (C) (MG/L) (00689)
MAR										
16...	.45	6000	.03	.02	280	180	110	0	9.8	.4
AUG										
24...	.63	392	.02	.01	44	110	110	0	13	.4

482056092282001 SANDPOINT LK ABV HARRISON NARROWS NR CRANE LK, MN--Continued

PHYTOPLANKTON ANALYSES, MARCH 1977 TO AUGUST 1977

DATE	MAR 16,77	AUG 24,77
TIME	0900	1000
TOTAL CELLS/ML	110	9300
DIVERSITY: DIVISION	1.4	0.4
.CLASS	1.4	0.4
..ORDER	2.2	1.0
...FAMILY	2.2	1.1
....GENUS	2.6	2.0

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...OOCYSTACEAE				
....ANKISTRODESMUS	3	3	--	-
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	7	6	--	-
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	23#	22	*	0
..PENNALES				
...FRAGILARIACEAE				
....ASTERIONELLA	--	-	600	7
....FRAGILARIA	--	-	160	2
....SYNEDRA	--	-	*	0
...GOMPHONEMATACEAE				
....GOMPHONEMA	--	-	*	0
...NITZSCHIACEAE				
....NITZSCHIA	3	3	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROCCOCCALES				
...CHROCCOCCAEAE				
....ANACYSTIS	13	13	4300#	46
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA	--	-	470	5
....APHANIZOMENON	30#	28	--	-
...OSCILLATORIACEAE				
....OSCILLATORIA	--	-	730	8
..CHROCCOCCALES				
...CHROCCOCCAEAE				
....GOMPHOSPHAERIA	23#	22	3000#	32
EUGLENOPHYTA (EUGLENOIDS)				
.EUGLENOPHYCEAE				
..EUGLENALES				
...EUGLENACEAE				
....TRACHELOMONAS	3	3	--	-
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..PERIDINIALES				
...CERATIACEAE				
....CERATIUM	--	-	*	0

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 1976 TO SEPTEMBER 1977

DATE	TIME	SAMPLING DEPTH (FT) (00003)	DEPTH OF RESERVOIR (FT) (72025)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	AIR TEMPERATURE (DEG C) (00020)	TEMPERATURE (DEG C) (00010)	TURBIDITY (JTU) (00070)	TRANSPARENCY (SECCHI DISK) (M) (00078)	DISSOLVED OXYGEN (MG/L) (00300)	PERCENT SATURATION (00301)
MAR											
16...	0945	12	24	55	6.9	--	2.0	1	--	12.3	91
AUG											
24...	0900	6.0	33	52	7.2	14.0	17.0	1	2.50	9.0	97

DATE	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	ALKALINITY AS CACO3 (MG/L) (00410)	CARBON DIOXIDE (CO2) (MG/L) (00405)
MAR										
16...	23	5	5.8	2.0	1.5	12	.8	22	18	4.4
AUG										
24...	24	6	6.3	2.0	1.3	10	.8	22	18	2.2

DATE	TOTAL NITRATE (N) (MG/L) (00620)	TOTAL NITRITE (N) (MG/L) (00615)	TOTAL NITRITE PLUS NITRATE (N) (MG/L) (00630)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL NITRITE PLUS NITRATE IN BOT. MAT. (MG/KG) (00633)	TOTAL AMMONIA NITROGEN (N) (MG/L) (00610)	TOTAL AMMONIA NITROGEN IN BOTTOM MAT. (MG/KG) (00611)	TOTAL ORGANIC NITROGEN (N) (MG/L) (00605)	TOTAL KJELDAHL NITROGEN (N) (MG/L) (00625)	SUSPENDED KJEL. NITROGEN (N) (MG/L) (00624)
MAR										
16...	.20	.00	.20	.20	.0	.00	5.3	.52	.52	.03
AUG										
24...	.00	.01	.01	.00	8.6	.01	9.1	.36	.37	.00

DATE	DISSOLVED KJEL. NITROGEN (N) (MG/L) (00623)	TOTAL KJEL. NITROGEN IN BOTTOM MAT. (MG/KG) (00626)	TOTAL PHOSPHORUS (P) (MG/L) (00665)	DISSOLVED PHOSPHORUS (P) (MG/L) (00666)	TOTAL PHOSPHORUS IN BOTTOM MATERIAL (MG/KG) (00668)	TOTAL IRON (FE) (UG/L) (01045)	DISSOLVED IRON (FE) (UG/L) (01046)	DISSOLVED MANGANESE (MN) (UG/L) (01056)	DISSOLVED ORGANIC CARBON (C) (MG/L) (00681)	SUSPENDED ORGANIC CARBON (C) (MG/L) (00689)
MAR										
16...	.49	980	.02	.02	130	150	100	10	9.9	.4
AUG										
24...	.37	49	.02	.01	13	140	60	0	11	.5

482226092283301 SANDPOINT LK BL HARRISON NARROWS NR CRANE LK, MN--Continued

PHYTOPLANKTON ANALYSES, MARCH 1977 TO AUGUST 1977

DATE	MAR 16,77	AUG 24,77
TIME	0945	0900
TOTAL CELLS/ML	1000	9100
DIVERSITY: DIVISION	0.8	0.7
.CLASS	0.8	0.7
..ORDER	1.4	0.9
...FAMILY	1.5	0.9
....GENUS	1.9	1.8

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)				
.CHLOROPHYCEAE				
..CHLOROCOCCALES				
...COELASTRACEAE				
....COELASTRUM	--	-	250	3
...OOCYSTACEAE				
....ANKISTRODESMUS	38	4	--	-
....DICTYOSPHAERIUM	--	-	*	0
....OOCYSTIS	--	-	110	1
...SCENEDESMACEAE				
....SCENEDESMUS	7	1	*	0
..VOLVOCALES				
...CHLAMYDOMONADACEAE				
....CHLAMYDOMONAS	*	0	--	-
CHRYSOPHYTA				
.BACILLARIOPHYCEAE				
..CENTRALES				
...COSCINODISCACEAE				
....CYCLOTELLA	24	2	*	0
....MELOSIRA	65	6	--	-
..PENNALES				
...FRAGILARIACEAE				
....ASTERIONELLA	--	-	780	9
....FRAGILARIA	7	1	*	0
....SYNEDRA	--	-	*	0
...NITZSCHIACEAE				
....NITZSCHIA	7	1	--	-
...TABELLARIACEAE				
....TABELLARIA	*	0	--	-
.CHRYSOPHYCEAE				
..CHRYSOMONADALES				
...OCHROMONADACEAE				
....DINOBRYON	7	1	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)				
.CYANOPHYCEAE				
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....AGMENELLUM	--	-	180	2
....ANACYSTIS	96	9	5500#	61
..HORMOGONALES				
...NOSTOCACEAE				
....ANABAENA*	--	-	170	2
...OSCILLATORIACEAE				
....OSCILLATORIA	140	13	--	-
..CHROCCOCCALES				
...CHROCCOCCACEAE				
....GOMPHOSPHAERIA	640#	62	1900#	21
PYRRHOPHYTA (FIRE ALGAE)				
.DINOPHYCEAE				
..PERIDINIALES				
...PERIDINIACEAE				
....PERIDINIUM	--	-	*	0

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 1976 TO SEPTEMBER 1977

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
04010500 PIGEON RIVER AT MIDDLE FALLS, NEAR GRAND PORTAGE, MINN.							
OCT. 21, 1976...	18	1	120	MAY 04.....	174	10.5	90
NOV. 03.....	9.9	1	--	MAY 18.....	100	19	90
DEC. 01.....	3.8	0	230	JUNE 29.....	106	20.5	110
JAN. 12, 1977...	5.7	0	170	JULY 28.....	78	21	--
FEB. 15.....	8.8	0.5	120	AUG. 10.....	32	17.5	95
MAR. 16.....	155	0	140	SEPT. 10.....	7040	13	63
MAR. 24.....	63	0	135	SEPT. 21.....	3980	11	42
APR. 06.....	117	0.5	102	SEPT. 26.....	5820	11.5	60
APR. 14.....	451	1	67				
04014500 BAPTISM RIVER NEAR BEAVER BAY, MINN.							
OCT. 20, 1976...	6.7	1	75	MAY 17.....	57	16	115
NOV. 30.....	1.4	0	195	JUNE 28.....	62	21	98
JAN. 12, 1977...	<0.10	--	--	AUG. 09.....	11	18	115
MAR. 15.....	238	0	75	SEPT. 20.....	288	12	68
MAR. 23.....	26	0.5	90	SEPT. 24.....	*10000	--	--
APR. 05.....	27	0.5	112	SEPT. 25.....	4200	10.5	42
APR. 13.....	75	1	90				
04015330 KNIFE RIVER NEAR TWO HARBORS, MINN.							
OCT. 22, 1976...	2	1	200	MAY 18.....	101	19	140
MAR. 14, 1977...	378	0.5	90	JULY 07.....	8.2	26	165
MAR. 17.....	87	0	100	AUG. 10.....	2.9	24	220
MAR. 22.....	55	0.5	140	SEPT. 22.....	72	9.5	132
APR. 07.....	30	2.5	200	SEPT. 29.....	252	12	90
APR. 15.....	51	5.5	135				
04015447 SOUTH BRANCH PARTRIDGE RIVER NEAR BABBITT, MINN.							
MAR. 24, 1977...	0.11	0.5	185	AUG. 31.....	55	14.5	72
APR. 29.....	4.5	6.5	135	SEPT. 06.....	68	13	70
JUNE 08.....	17	12.5	100	SEPT. 16.....	27	12	65
JULY 19.....	3.9	25.5	80	SEPT. 27.....	75	12	53
AUG. 29.....	33	15	78				

*Indirect measurement

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
04015500 SECOND CREEK NEAR AURORA, MINN			
NOV. 08, 1976...	13	0	397
DEC. 13.....	16	0	850
FEB. 01, 1977...	6	0	450
MAR. 14.....	24	1	430
APR. 25.....	11	12	490
JUNE 06.....	20	19.5	760
JULY 25.....	11	23	800
SEPT. 01.....	55	15.5	680
04016000 PARTRIDGE RIVER NEAR AURORA, MINN.			
NOV. 08, 1976...	15	0	390
DEC. 14.....	16	0.5	850
FEB. 01, 1977...	7.8	0	640
MAR. 14.....	28	1	470
APR. 25.....	17	10	700
JUNE 07.....	25	15.5	750
JULY 25.....	38	23.5	410
SEPT. 01.....	274	17.5	455
04016500 ST. LOUIS RIVER NEAR AURORA, MINN.			
NOV. 08, 1976...	21	0	298
DEC. 13.....	10	0	605
MAR. 14, 1977...	53	1	270
MAR. 22.....	22	0.5	140
APR. 12.....	17	9.5	220
APR. 25.....	42	15	165
JUNE 06.....	121	20	160
JULY 26.....	101	22	250
SEPT. 02.....	717	16	170
04018750 ST. LOUIS RIVER AT FORBES, MINN.			
OCT. 07, 1976...	66	7.5	315
NOV. 18.....	30	0.5	380
FEB. 11, 1977...	28	0.5	230
MAR. 24.....	28	1.5	240
MAY 05.....	111	14	220
JUNE 23.....	292	19.5	215
JULY 28.....	179	21	225
SEPT. 12.....	2060	14	120
04018900 EAST TWO RIVER NEAR IRON JUNCTION, MINN.			
FEB. 18, 1977...	6.2	0	720
APR. 22.....	14	1	530
JULY 28.....	4.5	19.5	580
AUG. 29.....	113	18	300
04019000 WEST TWO RIVER NEAR IRON JUNCTION, MINN.			
FEB. 17, 1977...	6.8	0	295
JULY 28.....	7.5	20	250
AUG. 29.....	111	17	100
04019300 WEST SWAN RIVER NEAR SILICA, MINN.			
NOV. 18, 1976...	0.08	0	475
JAN. 12, 1977...	0	--	--
FEB. 16.....	0	--	--
MAR. 15.....	7.5	0.5	158
APR. 06.....	0.98	0.5	--
MAY 18.....	0.64	20	265
JUNE 22.....	2.0	17.5	150
AUG. 29.....	67	15	100
SEPT. 06.....	37	13.5	87
SEPT. 21.....	20	11	90

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
04024000 ST. LOUIS RIVER AT SCANLON, MINN.							
OCT. 19, 1976...	477	5	230	MAY 16.....	936	21.5	315
NOV. 29.....	385	0	270	JUNE 27.....	1260	25	225
JAN. 25, 1977...	529	0.5	280	AUG. 08.....	356	24	305
FEB. 14.....	623	0.5	235	SEPT. 19.....	2810	15.5	152
APR. 04.....	653	2.5	260				
05040500 PELICAN RIVER NEAR FERGUS FALLS, MINN.							
OCT. 22, 1976...	0.03	--	--	APR. 08.....	13.5	5	620
NOV. 10.....	0.79	0.5	--	MAY 10.....	11.3	21.5	650
NOV. 24.....	2.22	1	740	JUNE 17.....	5.21	22.5	625
MAR. 18, 1977...	29.2	0.5	700	JULY 21.....	5.23	2.4	520
MAR. 29.....	32.3	0.5	500	AUG. 10.....	5.17	22.5	610
APR. 05.....	20.5	1	550	SEPT. 21.....	11.6	14	580
05046000 OTTER TAIL RIVER BELOW ORWELL DAM NEAR FERGUS FALLS, MINN.							
OCT. 22, 1976...	8.72	11	380	APR. 08.....	23.9	10	420
NOV. 24.....	8.47	3.5	530	APR. 21.....	132	12.5	520
DEC. 23.....	8.13	0	580	MAY 10.....	7.93	19.5	540
JAN. 10, 1977...	21.4	--	--	MAY 10.....	8.85	19.5	540
JAN. 14.....	23.6	--	--	JUNE 17.....	52.7	22	420
FEB. 16.....	22.5	--	--	JUNE 27.....	112	20	460
MAR. 09.....	66.7	4	670	AUG. 01.....	37	25	--
MAR. 24.....	21.1	7	775	AUG. 30.....	93.1	--	--
05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, S. DAK.							
MAR. 28, 1977...	0.53	7	630	MAY 23.....	0.02	27	--
APR. 11.....	0.6	13	1350				
05061000 BUFFALO RIVER NEAR HAWLEY, MINN.							
OCT. 15, 1976...	10.3	--	--	APR. 29.....	26.9	12	925
NOV. 18.....	12	0.5	1000	MAY 31.....	19.1	21	660
DEC. 20.....	11.7	0	480	JUNE 30.....	10.9	17	580
JAN. 20, 1977...	11	0	640	AUG. 09.....	5.96	17.5	800
FEB. 17.....	12.1	1	725	AUG. 18.....	5.91	--	--
MAR. 22.....	41.8	0.5	675	SEPT. 21.....	15.1	13	800
APR. 05.....	31.4	3.5	750				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MINN.			
NOV. 17, 1976...	2.56	0	--
DEC. 20.....	0.78	0	1700
JAN. 19, 1977...	0.12	0.5	1900
FEB. 16.....	0.09	0.5	--
MAR. 21.....	64	0.5	625
APR. 06.....	34.4	0.5	725
APR. 15.....	26.5	11	950
APR. 28.....	29.7	14.5	1100
MAY 31.....	5.21	21	900
JUNE 01.....	74.4	22	850
JUNE 03.....	234	19	310
JUNE 29.....	5.48	23	750
AUG. 08.....	0.02	24	800
SEPT. 20.....	6.32	14	750
05062000 BUFFALO RIVER NEAR DILWORTH, MINN.			
OCT. 14, 1976...	6.83	8.5	800
NOV. 17.....	13.4	0.5	1200
DEC. 20.....	8.23	0	875
JAN. 20, 1977...	9.06	0	775
FEB. 17.....	9.53	1	810
MAR. 23.....	54.5	0.5	1025
APR. 05.....	106	0.5	630
APR. 15.....	66	11.5	775
APR. 28.....	73.4	16.5	925
MAY 05.....	66.6	19	660
MAY 18.....	29.5	24	900
JUNE 01.....	22.1	20	725
JUNE 23.....	14.6	22	590
JULY 20.....	23.6	26	380
AUG. 08.....	6.15	22	650
AUG. 18.....	5.07	16	690
SEPT. 20.....	28.7	14.5	750
05062500 WILD RICE RIVER AT TWIN VALLEY, MINN.			
OCT. 05, 1976...	4.5	9.5	--
OCT. 12.....	12	11	--
OCT. 19.....	12	2	--
OCT. 28.....	14	1.2	--
NOV. 15.....	13	1	--
DEC. 13.....	7.4	0	--
JAN. 03, 1977...	7.4	0	--
FEB. 07.....	12	0.5	--
MAR. 07.....	16	0	--
MAR. 28.....	57	0.5	--
APR. 05.....	65	0.5	--
APR. 12.....	111	5	--
APR. 18.....	109	11	--
APR. 26.....	94	13.5	--
MAY 03.....	45	17.5	--
MAY 09.....	41	20	--
MAY 17.....	25	20	--
MAY 25.....	21	22	--
MAY 31.....	42	19.5	--
JUNE 07.....	30	20	--
JUNE 14.....	19	22	--
JUNE 20.....	26	22.5	--
JUNE 28.....	23	23	--
JULY 05.....	16	24	--
JULY 12.....	14	23.5	--
JULY 19.....	14	31	--
JULY 26.....	6.5	23	--
AUG. 02.....	5.1	19	--
SEPT. 12.....	14	16.5	--

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05064000 WILD RICE RIVER AT HENDRUM, MINN.			
OCT. 05, 1976...	1.6	9	790
OCT. 13.....	15	7.5	790
OCT. 19.....	6.3	3	530
OCT. 29.....	11	1	775
NOV. 15.....	11	1	900
DEC. 13.....	0.99	0	1300
JAN. 05, 1977...	0.09	0	1400
FEB. 08.....	0.13	0	2000
MAR. 08.....	0.99	0	2150
APR. 05.....	203	0.5	440
APR. 12.....	223	4	430
APR. 19.....	135	10	550
APR. 27.....	140	14	535
MAY 04.....	65	16	570
MAY 10.....	66	18.5	625
MAY 18.....	54	21	650
MAY 25.....	48	22	590
MAY 31.....	105	21	540
JUNE 07.....	51	23	540
JUNE 14.....	24	21.5	580
JUNE 21.....	26	21.5	560
JUNE 29.....	21	20	580
JULY 06.....	19	24	540
JULY 13.....	14	24	550
JULY 20.....	13	26	460
JULY 26.....	5.4	24.5	520
AUG. 02.....	2.5	21	552
SEPT. 13.....	12	16.5	540
05067500 MARSH RIVER NEAR SHELLY, MINN.			
MAR. 29, 1977...	15	1	190
APR. 06.....	15	1.5	300
APR. 11.....	26	8.5	320
MAY 10.....	0.04	23.5	700
05069000 SAND HILL RIVER AT CLIMAX, MINN.			
OCT. 13, 1976...	8.2	9	600
NOV. 16.....	11	0	790
JAN. 04, 1977...	7.9	0	--
JAN. 25.....	7.9	0.5	680
MAR. 08.....	8.6	0	660
APR. 06.....	38	0.5	420
APR. 11.....	12	2	330
APR. 19.....	40	7	560
JUNE 01.....	178	20.5	2900
JULY 20.....	8.5	21	480
AUG. 23.....	7	16	610
05074500 RED LAKE RIVER NEAR RED LAKE, MINN.			
NOV. 01, 1976...	143	5	275
DEC. 16.....	140	0.5	340
JAN 24, 1977...	151	1.5	300
MAR. 11.....	129	2	320
APR. 27.....	97	9	250
MAY 31.....	105	20.5	260
JULY 15.....	107	19	280
AUG. 22.....	74	18.5	250
05075000 RED LAKE RIVER AT HIGHLANDING NEAR GOODRIDGE, MINN.			
NOV. 02, 1976	122	--	--
DEC. 16.....	114	0	290
JAN. 24, 1977...	122	1	305
MAR. 10.....	133	1	305
APR. 05.....	133	0.5	280
APR. 27.....	104	15	260
MAY 31.....	145	21.5	295
JULY 13.....	108	20	260
AUG. 22.....	98	19.5	240

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MINN.							
NOV. 02, 1976...	0.38	--	--	APR. 21.....	4.7	10	580
APR. 05, 1977...	49	1	320	JUNE 01.....	24	19	--
APR. 14.....	29	6	460	JULY 14.....	1	24	530
05077700 RUFFY BROOK NEAR GONVICK, MINN.							
NOV. 05, 1976...	1.9	1	430	APR. 15.....	7.2	3	570
DEC. 15.....	0.26	0	--	APR. 22.....	5.3	8	600
JAN. 27, 1977...	0.58	0	620	JUNE 03.....	4.8	15.5	--
MAR. 10.....	2.8	0.5	710	JULY 14.....	2.3	18	650
APR. 04.....	7.4	0.5	530	AUG. 25.....	0.8	14	620
05078000 CLEARWATER RIVER AT PLUMMER, MINN.							
NOV. 03, 1976...	36	1.5	430	APR. 22.....	12.6	8.5	560
DEC. 14.....	47	0	470	JUNE 02.....	124	20.5	--
JAN. 26, 1977...	24	0.5	410	JULY 12.....	170	18	475
MAR. 09.....	31	0	440	AUG. 24.....	26	18	660
APR. 04.....	51	1	320				
05078230 LOST RIVER AT OKLEE, MINN.							
NOV. 03, 1976...	2.1	1	600	APR. 22.....	41	8	610
DEC. 15.....	0.03	0	--	JUNE 03.....	32	19	--
APR. 04, 1977...	72	1	520	JULY 14.....	20	19.5	740
APR. 15.....	37	5.5	510	AUG. 25.....	5.5	15.5	480
05078500 CLEARWATER RIVER AT RED LAKE FALLS, MINN.							
NOV. 03, 1976...	46	1.5	470	APR. 21.....	90	11.5	540
DEC. 14.....	37	0	540	JUNE 02.....	100	21	--
JAN. 26, 1977...	36	0.5	480	JULY 12.....	225	21	540
MAR. 09.....	45	0	470	AUG. 24.....	37	17	620
APR. 05.....	154	1	460				
05079000 RED LAKE RIVER AT CROOKSTON, MINN.							
NOV. 03, 1976...	259	3	385	APR. 13.....	727	4	300
DEC. 14.....	199	0.5	470	APR. 19.....	240	11	350
JAN. 25, 1977..	173	0.5	--	JUNE 02.....	407	21	--
MAR. 08.....	206	0	395	JULY 20.....	314	28.5	400
APR. 04.....	508	0.5	340	AUG. 23.....	133	20.5	420
05087500 MIDDLE RIVER AT ARGYLE, MINN.							
APR. 05, 1977...	5.2	1	450	JUNE 01.....	9	21	--
APR. 14.....	17	4	320	JULY 13.....	0.04	18.5	500
APR. 20.....	10	10.5	400	AUG. 23.....	0.04	15	440

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MINN.							
NOV. 02, 1976...	0.66	4	--	APR. 14.....	34	8	340
DEC. 15.....	0.37	0.5	530	MAY 24.....	3.2	19.5	440
JAN. 18, 1977...	0.65	1	430	JULY 07.....	3.5	28.5	387
MAR. 01.....	0.70	0.5	525	AUG. 16.....	1.8	18.5	400
APR. 06.....	3.1	1	330	SEPT. 27.....	1.9	13	415
05104500 ROSEAU RIVER BELOW SOUTH FORK NEAR MALUNG, MINN.							
OCT. 28, 1976...	0.42	1.5	630	JULY 12.....	38	22.5	--
APR. 13.....	68	6	300	SEPT. 28.....	121	13	260
MAY 25.....	84	21.5	390				
05106000 SPRAGUE CREEK NEAR SPRAGUE, MANITOBA							
OCT. 27, 1976...	0.84	1	670	MAY 25.....	11	20	410
MAR. 15, 1977...	2	1	--	JUNE 01.....	23	15	--
APR. 07.....	11	0.5	--	JULY 08.....	6.3	20.5	346
APR. 13.....	13	1	290	AUG. 17.....	0.21	14	310
APR. 20.....	9	1	--	SEPT. 28.....	96	11.5	240
MAY 06.....	0.44	7	390				
05107500 ROSEAU RIVER AT ROSS, MINN.							
OCT. 27, 1976...	28	1	515	JULY 13.....	56	23	395
DEC. 09.....	0.36	0	1070	AUG. 17.....	0.46	18	340
APR. 14, 1977...	149	1.5	265	SEPT. 28.....	210	11.5	300
MAY 25.....	95	21.5	480				
05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MINN.							
OCT. 12, 1976...	6.4	--	--	MAY 24.....	53	21	475
OCT. 27.....	25	0	560	JUNE 01.....	83	14	--
DEC. 08.....	7.4	0	850	JULY 06.....	53	24.5	324
JAN. 18, 1977...	3.5	0	570	AUG. 16.....	12	18	340
MAR. 01.....	5.7	0.5	500	SEPT. 16.....	20	15	-
APR. 06.....	196	0.5	280	SEPT. 27.....	133	13	400
APR. 12.....	323	5	300				
05124480 KAWISHIWI RIVER NEAR ELY, MINN.							
DEC. 07, 1976...	7.7	1.5	38	JUNE 08.....	74	18.5	<50
FEB. 01, 1977...	4.4	1	42	JULY 27.....	208	23.5	--
MAR. 17.....	6.5	2	50	AUG. 29.....	195	17	38
APR. 26.....	11	11	35				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05124500 ISABELLA RIVER NEAR ISABELLA, MINN.							
DEC. 16, 1976...	30	2	--	JUNE 16.....	199	--	--
FEB. 02, 1977...	33	0.5	140	JULY 21.....	198	23	100
MAR. 15.....	98	0.5	105	AUG. 31.....	420	17.5	56
APR. 27.....	270	13	76				
05124990 FILSON CREEK NEAR ELY, MINN.							
NOV. 08, 1976...	0.16	1	60	APR. 29.....	3.3	7.5	57
DEC. 15.....	0.15	0.5	66	JUNE 06.....	24	14.5	<50
MAR. 16, 1977...	2.5	0.5	55	JULY 19.....	3.7	24.5	40
MAR. 23.....	0.54	0.5	58	AUG. 30.....	25	15.5	36.5
05125000 SOUTH KAWISHIWI RIVER NEAR ELY, MINN.							
NOV. 09, 1976...	48	2	--	APR. 26.....	174	12	66
DEC. 16.....	42	1	52	JULY 19.....	512	25.5	62
FEB. 04, 1977...	34	0	62	AUG. 30.....	256	18.5	52
MAR. 15.....	56	1	61				
05125550 STONY RIVER NEAR BABBITT, MINN.							
OCT. 06, 1976...	7.4	6.5	108	APR. 13.....	32	10	--
NOV. 10.....	12	0.5	134	APR. 27.....	125	13.5	80
DEC. 15.....	11	0.5	160	JUNE 09.....	306	18.5	85
FEB. 03, 1977...	9.6	0	150	JULY 19.....	122	24.5	75
MAR. 16.....	37	1	140	AUG. 31.....	164	16.5	85
MAR. 22.....	33	0.5	125				
05126000 DUNKA RIVER NEAR BABBITT, MINN.							
OCT. 06, 1976...	9.5	7	475	APR. 13.....	3.9	9	--
NOV. 09.....	0.30	0	460	APR. 28.....	16	12.5	179
DEC. 15.....	0	--	--	JUNE 09.....	78	17	200
FEB. 04, 1977...	0	--	--	JULY 27.....	5	21.5	300
MAR. 15.....	10	1	260	AUG. 30.....	151	16	120
05126210 SOUTH KAWISHIWI RIVER ABOVE WHITE IRON LAKE NEAR ELY, MINN.							
DEC. 15, 1976...	88	1	20.5	JUNE 09.....	949	19.5	88
FEB. 03, 1977...	78	0	83	JULY 20.....	671	25	79
MAR. 16.....	176	0.5	79	SEPT. 01.....	880	18.5	72
APR. 27.....	141	11	77				
05126500 BEAR ISLAND RIVER NEAR ELY, MINN.							
NOV. 09, 1976...	0.28	1.5	75	JUNE 09.....	118	20	55
MAR. 14, 1977...	2.4	0.5	75	JULY 18.....	67	26.5	49
MAR. 23.....	2.6	0.5	<50	SEPT. 01.....	126	16.5	42
APR. 25.....	6	13.5	77				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05127000 KAWISHIWI RIVER NEAR WINTON, MINN.							
NOV. 01, 1976...	371	4	53	MAY 03, 1977...	52	13	57
05127205 BURNTSIDE RIVER NEAR ELY, MINN.							
DEC. 14, 1976...	0.18	1.5	--	JUNE 14.....	41	23	60
MAR. 17, 1977...	0.53	1	160	JULY 21.....	58	26.5	39
MAR. 23.....	0.53	3	155	AUG. 30.....	88	18	45
MAY 02.....	0.27	16.5	117	SEPT. 15.....	226	17	<50
05127207 BJORKMAN'S CREEK NEAR ELY, MINN.							
MAR. 17, 1977...	0.03	1	160	JULY 21.....	0.07	20.5	64
MAY 03.....	0.31	9.5	115	AUG. 31.....	7.88	15	56
JUNE 14.....	0.94	14	70				
05127210 ARMSTRONG CREEK NEAR ELY, MINN.							
NOV. 10, 1976...	0.35	1	--	JUNE 15.....	1.2	15.5	155
DEC. 14.....	0.05	1	370	JULY 20.....	0.29	23.5	220
MAR. 17, 1977...	1.8	1	140	AUG. 30.....	18	15.5	120
MAY 02.....	0.62	14	195				
05127215 LONGSTORFF CREEK NEAR ELY, MINN.							
NOV. 10, 1976...	0.28	1	--	JUNE 15.....	3.3	17.5	95
DEC. 17.....	0.02	0	392	JULY 20.....	3.1	27.5	86
MAR. 16, 1977...	1.1	1	150	AUG. 30.....	17	17	75
MAY 02.....	1.5	15.5	133				
05127219 SHAGAWA LAKE TRIBUTARY AT ELY, MINN.							
MAR. 14, 1977...	0.04	1	135	AUG. 30.....	0.01	16.5	337
05127220 BURGO CREEK NEAR ELY, MINN.							
NOV. 09, 1976...	0.005	0.5	300	JUNE 14.....	1.4	18	88
MAR. 17, 1977...	0.13	1	190	JULY 21.....	0.33	22.5	101
MAY 03.....	1.6	13.5	90	AUG. 31.....	16	16.5	625
05127230 SHAGAWA RIVER AT ELY, MINN.							
NOV. 09, 1976...	0.23	1.5	85	JUNE 15.....	53	20.5	88
DEC. 14.....	1.2	1	105	JULY 19.....	90	27.5	96
JAN. 31, 1977...	2.6	0	70	AUG. 31.....	114	18.5	87
MAR. 17.....	6.7	3.6	90	SEPT. 16.....	297	15.5	80
MAY 02.....	13	14	80				
05127500 BASSWOOD RIVER NEAR WINTON, MINN.							
OCT. 07, 1976...	69	11	56	JUNE 07.....	400	10	65
DEC. 08.....	74	0.5	58	SEPT. 15.....	5150	15.5	60
MAR. 17, 1977...	130	2	55				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1976 to SEPTEMBER 1977

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05128000 NAMAKAN RIVER AT OUTLET OF LAC LA CROIX, ONTARIO							
FEB. 23, 1977...	559	1	--	MAY 25.....	1180	19	--
FEB. 23.....	521	1	--	AUG. 25.....	1980	18	--
MAY 25.....	1130	19	--				
05128340 PIKE RIVER NEAR BIWABIK, MINN.							
MAR. 14, 1977...	3.7	1	220	JUNE 23.....	21	17	160
MAR. 18.....	4.9	0.5	375	JULY 28.....	1.1	18	160
MAR. 22.....	3.9	0.5	265	AUG. 22.....	0.50	17	90
MAR. 24.....	2.7	0.5	275	AUG. 29.....	81	16	80
APR. 11.....	2.3	8.5	--	AUG. 30.....	100	15	70
APR. 28.....	5	13.5	230	SEPT. 06.....	95	14	90
MAY 04.....	3.6	15.5	--	SEPT. 09.....	82	13.5	60
JUNE 01.....	22	14.5	210	SEPT. 16.....	46	15.5	105
JUNE 06.....	22	17	200	SEPT. 27.....	84	13	100
05128500 PIKE RIVER NEAR EMBARRASS, MINN.							
DEC. 13, 1976...	3.3	0.5	400	MAY 04.....	7.5	16.5	175
JAN. 05, 1977...	3.4	0.5	--	JUNE 23.....	82	19	145
FEB. 03.....	3.4	0	420	JULY 26.....	13	23.5	120
MAR. 18.....	23	1	275	SEPT. 09.....	362	14	50
MAR. 23.....	21	0	290				
05129000 VERMILION RIVER BELOW VERMILION LAKE NEAR TOWER, MINN.							
OCT. 06, 1976...	0.72	8.5	65	MAY 04.....	6.8	13.5	--
NOV. 17.....	0.46	0.5	70	JUNE 21.....	123	20	60
JAN. 05, 1977...	0.19	0.5	--	JULY 27.....	173	22	65
FEB. 09.....	0.35	1	65	SEPT. 08.....	649	17	<50
MAR. 23.....	0.42	20	70				
05130500 STURGEON RIVER NEAR CHISHOLM, MINN.							
OCT. 06, 1976...	5.6	7.5	145	MAY 05.....	21	15.5	--
NOV. 18.....	8.4	0	180	JUNE 24.....	84	19.5	125
JAN. 06, 1977...	4	0.5	--	JULY 29.....	25	19.5	110
FEB. 11.....	4.7	0.5	190	AUG. 29.....	766	16.5	80
MAR. 15.....	35	0.5	150	SEPT. 08.....	423	14	≥50
MAR. 25.....	18	1	120	SEPT. 16.....	278	15	80

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05131000 DARK RIVER NEAR CHISHOLM, MINN.							
OCT. 06, 1976..	3.3	5	180	APR. 14.....	10	6	--
OCT. 07.....	2.8	4	--	MAY 05.....	7.5	13.5	--
NOV. 10.....	6.2	0	--	MAY 12.....	6	13	--
DEC. 13.....	6.8	0	--	JUNE 09.....	13	14	--
JAN. 06, 1977...	8.3	0	--	JULY 07.....	25	21	--
FEB. 03.....	4.3	0	--	AUG. 05.....	4.7	15	--
FEB. 11.....	5.8	1	180	AUG. 29.....	152	16	--
MAR. 02.....	6.8	0	--	Sept. 21.....	51	12	--
MAR. 30.....	13	0	--				
05131500 LITTLE FORK RIVER AT LITTLE FORK, MINN.							
OCT. 05, 1976...	37	9	305	MAY 03.....	177	16.5	190
NOV. 16.....	64	0	350	JUNE 14.....	272	20	195
JAN. 04, 1977...	48	0.5	220	JULY 26.....	347	23.5	155
FEB. 08.....	46	0.5	325	SEPT. 07.....	5820	15.5	85
MAR. 22.....	20	0	275				
05132000 BIG FORK RIVER AT BIG FALLS, MINN.							
OCT. 04, 1976...	60	12	340	MAY 02.....	219	17	250
NOV. 15.....	54	0	380	JUNE 13.....	114	18.5	220
JAN. 03, 1977...	46	0.5	420	JULY 25.....	102	24	220
FEB. 07.....	40	0	315	SEPT. 06.....	922	15	130
MAR. 28.....	177	1.5	340				
05133500 RAINY RIVER AT MANITOU RAPIDS, MINN.							
OCT. 29, 1976...	4380	3	120	AUG. 18.....	3480	20	100
JULY 18, 1977...	4500	28.5	114	SEPT. 30.....	44900	12	85
05134200 RAPID RIVER NEAR BAUDETTE, MINN.							
OCT. 28, 1976...	1.4	3	535	MAY 23.....	205	17	230
DEC. 14.....	0.02	0	800	JULY 15.....	44	25	250
APR. 07, 1977...	110	0.5	140	AUG. 18.....	1.5	14.5	400
APR. 19.....	67	8	260	SEPT. 29.....	1390	11	140
05139500 WEST BRANCH WARROAD RIVER NEAR WARROAD, MINN.							
OCT. 28, 1976...	0.81	1.5	650	MAY 26.....	36	20.5	348
APR. 07, 1977...	27	0.5	175	JULY 15.....	10	20	56
APR. 19.....	16	5	310	SEPT. 29.....	72	10	235

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05140000 BULLDOG RUN NEAR WARROAD, MINN.							
APR. 07, 1977...	1.4	0.5	330	MAY 26.....	0.16	19	700
APR. 19.....	0.41	6.5	440				
05140500 EAST BRANCH WARROAD RIVER NEAR WARROAD, MINN.							
APR. 07, 1977...	16	0.5	215	JULY 14.....	7.7	23	545
APR. 19.....	20	6	335	SEPT. 29.....	33	10	365
MAY 26.....	11	20.5	412				

BECKER COUNTY

464613095524801. Local number, 138.41.17ada1.
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) above mean sea level. Measuring point: Top of casing, 3.50 ft (1.07 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, 4.11 ft (1.25 m) above land-surface datum, Apr. 30, 1975; lowest, 1.10 ft (0.34 m) below land-surface datum, July 25, 1977.

WATER LEVEL, IN FEET BELOW OR ABOVE (+) LAND SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 10	+0.64	DEC 13	+1.69	FEB 14	+1.96	Apr 18	+2.36	JUN 24	0.28	AUG 27	+1.20
NOV 11	+1.18	JAN 14	+1.92	MAR 17	+2.14	May 21	+1.45	JUL 25	1.10	SEP 28	+2.06

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 1,180 ft (360 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, 0.03 ft (0.01 m) below land-surface datum, May 16, 1974; lowest, 4.25 ft (1.30 m) below land-surface datum, Mar. 3, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 14	3.00	MAR 3	4.25	MAY 23	1.98	JUL 11	1.24	AUG 15	1.60	SEP 26	1.55

CLAY COUNTY

465237096383901. Local number, 139.47.5cdc1.
LOCATION.--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 miles (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) above mean sea level. 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 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 14	26.19	DEC 20	24.99	FEB 16	25.48	APR 28	26.03	JUN 29	26.28	SEP 20	26.01
NOV 17	24.78	JAN 19	25.13	MAR 23	25.84	MAY 31	25.95	AUG 8	26.04		

CLAY COUNTY--Continued

465231096415801. Local number, 139.48.11aba1.
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 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 20	153.0	FEB 16	116.4	APR 28	118.0	JUN 29	119.7	AUG 8	119.4	SEP 20	118.0
JAN 20	127.7	MAR 23	114.0	MAY 31	118.0						

GRANT COUNTY

455932095582601. Local number, 129.42.9ccc1.
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 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 1	78.50	DEC 31	78.59	FEB 28	79.53	APR 30	79.54	JUN 30	79.40	SEP 30	79.53
30	78.50	JAN 31	78.59	MAR 31	79.00	MAY 31	79.00	AUG 31	79.50		

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 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	19.18	DEC 1	19.70	FEB 10	20.22	APR 6	20.62	JUN 2	20.94	AUG 10	21.18
14	19.40	8	19.72	17	20.27	13	20.68	8	20.92	17	21.20
21	19.41	15	19.78	23	20.29	20	20.72	15	20.96	24	21.22
27	19.41	JAN 5	19.94	MAR 3	20.37	27	20.79	22	21.02	31	21.18
NOV 3	19.50	12	20.02	9	20.43	MAY 5	20.84	JUL 13	21.09	SEP 7	21.22
11	19.58	20	20.10	17	20.49	13	20.83	20	21.09	14	21.06
18	19.62	26	20.10	24	20.53	18	20.88	27	21.10	21	20.88
24	19.65	FEB 3	20.11	31	20.58	26	20.92				

ITASCA COUNTY--Continued

473835093513501. Local number, 148.25.8ddd1.
LOCATION.--Lat 47°38'35", long 93°51'35", 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, 4.81 ft (1.47 m) below land-surface datum, June 17, 1974; 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 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	7.34	FEB 7	7.35	MAY 2	6.03	JUN 16	6.31	JUL 25	6.55	SEP 6	5.93
JAN 3	7.44	MAR 21	6.59								

KOOCHICHING COUNTY

481139093444001. Local number, 66.27.24daa1.
LOCATION.--Lat 48°11'39", long 93°44'40", 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 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	17.70	JAN 4	18.25	MAR 21	18.58	JUN 13	18.98	JUL 25	18.76	SEP 6	18.87
NOV 15	17.94	FEB 7	18.42	MAY 2	18.83						

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, 0.61 ft (0.19 m) below land-surface datum, Aug. 27, 1974; lowest, 3.00 ft (0.91 m) below land-surface datum, Sept. 15, 1975.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	Dry	MAY 2	2.27	JUN 13	1.00	JUL 25	2.02	SEP 6	0.79

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, 4.20 ft (1.28 m) above land-surface datum.
PERIOD OF RECORD.--September 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.12 ft (1.26 m) below land-surface datum, May 13, 1976; 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 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 28	7.27	JAN 19	7.72	APR 19	6.10	JUL 15	5.67	AUG 15	7.77	SEP 29	5.80
DEC 10	7.50	MAR 3	7.83	MAY 26	4.69						

MARSHALL COUNTY

482354096501001. Local number, 157.48.27baa.
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, 2.30 ft (0.70 m) below land-surface datum, July 17, 1974; lowest, 4.91 ft (1.50 m) below land-surface datum, Apr. 26, 1973.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 2	4.29	JAN 25	4.61	APR 20	4.88	JUN 1	4.80	JUL 13	4.71	AUG 23	4.62
DEC 15	4.47	MAR 9	4.75								

OTTER TAIL COUNTY

463418095334201. Local number, 136.39.23dcc1.
LOCATION.--Lat 46°34'18", long 95°33'42", in SW 1/4 SW 1/4 SE 1/4 sec.23, T.136 N., R.39 W., Hydrologic Unit 09020103, at Perham dump.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial outwash 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 1,350 ft (411 m). Measuring point: Top of casing, 0.90 ft (0.27 m) above land-surface datum.
REMARKS.--Well moved 110 ft (34 m) west of old well on July 1973.
PERIOD OF RECORD.--November 1967 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.90 ft (3.02 m) below land-surface datum, Aug. 10, 1972; lowest, 16.67 ft (5.08 m) below land-surface datum, Feb. 9, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 20	15.91	JAN 5	16.54	MAR 30	16.57	MAY 11	16.39	AUG 5	16.21	SEP 14	16.30
DEC 1	16.35	FEB 9	16.67	APR 27	16.49	JUN 22	16.39				

OTTER TAIL COUNTY--Continued

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 CHARACTERISTOCS.--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, 7.52 ft (2.29 m) below land-surface datum, July 31, 1975; lowest, 11.29 ft (3.44 m) below land-surface datum, Feb. 9, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 20	10.68	JAN 5	11.11	MAR 30	11.12	MAY 11	10.97	AUG 5	11.07	SEP 14	11.10
DEC 1	10.93	FEB 9	11.29	APR 27	10.97	JUN 22	11.15				

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 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	61.08	JAN 6	61.24	MAR 25	62.04	JUN 20	63.07	JUL 28	63.59	SEP 8	63.34
NOV 18	60.99	FEB 11	61.57	MAY 5	62.54						

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 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	12.23	JAN 6	13.43	MAR 25	14.48	JUN 20	6.27	JUL 28	6.72	SEP 8	5.49
NOV 18	11.90	FEB 11	14.20	MAY 5	13.25						

ST. LOUIS COUNTY--Continued

475502091494601. Local number, 63.12.26abb1.
LOCATION.--Lat 47°55'02", long 91°49'46", in NW 1/4 NW 1/4 NE 1/4 sec.26, T.63 N., R.12 W., Hydrologic Unit 09030001, at Ely.
Owner: U.S. Geological Survey.
AQUIFER.--Surficial sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Bored observation water-table well, diameter 1-1/4 in (0.03 m), depth 9 ft (2.7 m), screened 7 to 9 ft (2.1 to 2.7 m).
DATUM.--Altitude of land-surface datum is 1,342 ft (409 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.
PERIOD OF RECORD.--October 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.78 ft (0.54 m) below land-surface datum, Oct. 29, 1970; lowest, 6.87 ft (2.09 m) below land-surface datum, Sept. 27, 1976.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 9	6.45	JAN 31	6.82	MAY 3	4.11	JUN 14	4.19	JUL 20	3.87	AUG 31	2.41
DEC 14	6.57										

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).
DATUM.--Altitude of land-surface datum is 1,010 ft (308 m). Measuring point: Top of caaing, 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, 7.14 ft (2.18 m) below land-surface datum, Apr. 11, 1969; 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 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	11.65	APR 6	11.57	MAY 23	11.01	JUN 30	11.14	SEP 20	11.86

WILKIN COUNTY

463422096341701. Local number, 136.47.23ccc.
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.--Altitude of land-surface datum is 957 ft (292 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, 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 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 14	8.28	DEC 20	8.91	MAR 24	9.06	MAY 31	8.49	AUG 3	8.82	SEP 6	9.17
NOV 17	8.66	JAN 19	9.20	APR 20	8.79	JUN 29	8.49	8	8.89	20	9.31
23	8.69	FEB 16	9.42	28	8.66						

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STATION NUMBER	LOCAL IDENTIFIER	GEOLOGIC UNIT	TOTAL DEPTH OF WELL (FT) (72008)	DATE OF SAMPLE	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	COLOR (PLATINUM-COBALT UNITS) (00080)	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)
			LAKE COUNTY						
473528091385101	059N10W18DCB WHITE PINE	112WSCS		-- 76-10-19	170	6.4	2	80	22
473823091323501	060N10W36DAB MCDOUGAL LA	112WSCS		-- 76-10-19	210	6.4	2	100	2
473856091340801	060N10W26CD H-21, ISABEL	112WSCS	11	76-11-30	170	6.7	4	71	18
		112WSCS	11	77-07-24	--	6.6	--	--	--
474111091471401	060N11W18B H-10, FR 424	112WSCS	7.0	76-11-30	350	6.2	360	130	0
		112WSCS	7.0	77-07-26	--	6.2	--	--	--
474526091462301	061N11W19BDC BIRCH LAKE	400DCPX		-- 76-10-19	220	7.7	35	9	0
474637091423401	061N11W15AA H-33, KEELY	112WSCS	13	77-07-24	--	5.4	--	--	--
474713091430001	061N11W10BD H-36, KEELY	112WSCS	18	76-11-30	190	6.4	7	68	0
		112WSCS	18	77-07-23	--	6.6	--	--	--
474728091421001	061N11W11BBB H-5, HWY 1,	112WSCS	7.0	77-07-24	--	7.1	--	--	--
474843091431901	062N11W34CB H-4, SPRUCE	112WSCS	10	76-11-30	--	--	--	240	--
		112WSCS	10	77-07-24	--	6.1	--	--	--
474851091440301	062N11W33ACC S KAWISHIW	400DCPX		-- 76-10-20	1300	7.4	3	150	20
474900091434801	062N11W33AAC SO KAWISHIW	400DCPX		-- 76-10-20	320	8.5	45	7	0
474911091375501	062N10W29CD H-29, OMADAY	112WSCS	13	77-07-22	--	6.8	--	--	--
474957091403001	062N11W25BB H-2,BULK SAM	112WSCS	6.0	76-11-30	990	5.6	7	450	330
		112WSCS	6.0	77-07-24	--	5.6	--	--	--
474957091403002	062N11W25BB H-1, BULK SA	112WSCS	13	76-11-30	1250	6.9	25	640	440
		112WSCS	13	77-07-24	--	7.4	--	--	--
474957091403101	062N11W25BB H-3, BULK SA	112WSCS	11	76-11-30	360	7.0	50	170	3
		112WSCS	11	77-07-24	--	7.0	--	--	--
			ST. LOUIS COUNTY						
471617092123701	055N15W02DCC H-59 WHITEF	112WSCS		-- 76-11-29	220	6.5	100	91	4
471619092121701	055N15W02DCC H-59, TEST	112WSCS		-- 76-10-20	180	6.3	8	95	10
471629091505401	055N12W03CAC INDIAN LAK	112WSCS		-- 76-10-19	160	6.8	2	83	3
471921092091801	056N14W19ADD WHITEFACE	112WSCS		-- 76-10-18	125	6.4	2	55	17
472218092092201	057N14W31DDD H-58 HWY 16	112WSCS		-- 76-11-29	285	7.2	65	130	22
		112WSCS		-- 77-07-25	--	7.3	--	--	--
472221092092401	057N14W31DDD H-58, TEST	112WSCS		-- 76-10-20	245	6.5	70	140	34
472254091543601	057N12W31BAA CADOTTE LA	112PLSC		-- 76-10-19	220	7.7	2	110	0
472626092084501	057N14W08BDA NORWAY POI	112WSCS		-- 76-10-18	180	7.5	2	86	9
472842092023001	058N13W30CA H-25, ST. LO	112WSCS	7.0	77-07-25	--	6.0	--	--	--
472912092032201	058N14W25ABD BIRD LAKE	112WSCS		-- 76-10-18	220	7.9	8	110	0
473151091583701	058N13W10BAB H-45, FR420	112WSCS	13	76-11-30	285	7.0	7	110	50
		112WSCS	13	77-07-25	--	6.7	--	--	--
473311092045901	059N14W35AC H-26, NORTH	112WSCS	12	76-11-29	260	6.2	7	100	4
		112WSCS	12	77-07-25	--	6.3	--	--	--
473501091552301	059N12W19BB H-46, PARTRI	112WSCS	6.0	77-07-25	--	5.9	--	--	--
473557091512901	059N12W16AAC H-48, SKIBO	112WSCS	7.0	76-11-30	55	5.8	110	26	14
		112WSCS	7.0	77-07-25	--	6.5	--	--	--
473946091492701	060N12W23BD H-13, SOUTH	112WSCS	44	76-11-30	180	6.5	7	68	12
474046091513201	060N12W15CB H-17, AMAX R	112WSCS	10	76-11-30	130	6.4	45	61	40
		112WSCS	10	77-07-26	--	6.7	--	--	--
474107091401901	060N12W14AA H-9, KAME WE	112WSCS	10	76-11-30	281	5.9	90	150	1
		112WSCS	10	77-07-26	--	5.9	--	--	--
474253091574101	060N13W01BB H-18, BABBIT	112WSCS	30	76-11-30	275	6.1	3	110	40

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STATION NUMBER	DATE OF SAMPLE	TOTAL ACIDITY AS CACO3 (MG/L) (00435)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	BICARBONATE (HCO3) (MG/L) (00440)	CARBONATE (CO3) (MG/L) (00445)	ALKALINITY AS CACO3 (MG/L) (00410)	CARBON DIOXIDE (CO2) (MG/L) (00405)
LAKE COUNTY											
473528091385101	76-10-19	.0	22	6.0	3.0	8	.8	70	0	57	45
473823091323501	76-10-19	25	27	8.7	3.8	7	.9	123	0	101	78
473856091340801	76-11-30	.0	16	7.5	3.2	9	1.2	65	0	53	21
	77-07-24	--	--	--	--	--	--	--	--	--	--
474111091471401	76-11-30	.0	19	21	5.0	7	1.1	204	0	167	206
	77-07-26	--	--	--	--	--	--	--	--	--	--
474526091462301	76-10-19	.0	3.1	.3	48	92	.3	115	0	94	3.7
474637091423401	77-07-24	--	--	--	--	--	--	--	--	--	--
474713091430001	76-11-30	--	15	7.4	5.6	15	2.2	88	0	72	56
	77-07-23	--	--	--	--	--	--	--	--	--	--
474728091421001	77-07-24	--	--	--	--	--	--	--	--	--	--
474843091431901	76-11-30	--	58	23	3.3	3	2.8	--	--	--	--
	77-07-24	--	--	--	--	--	--	--	--	--	--
474851091440301	76-10-20	.0	44	9.1	220	76	3.3	155	0	127	9.9
474900091434801	76-10-20	.0	2.7	.1	73	95	.9	167	9	152	.9
474911091375501	77-07-22	--	--	--	--	--	--	--	--	--	--
474957091403001	76-11-30	--	71	65	13	6	5.2	136	0	112	547
	77-07-24	--	--	--	--	--	--	--	--	--	--
474957091403002	76-11-30	--	150	64	15	5	9.0	244	0	200	49
	77-07-24	--	--	--	--	--	--	--	--	--	--
474957091403101	76-11-30	--	39	17	7.4	9	2.4	200	0	160	32
	77-07-24	--	--	--	--	--	--	--	--	--	--
ST. LOUIS COUNTY											
471617092123701	76-11-29	--	22	8.8	2.8	6	1.3	106	0	87	54
471619092121701	76-10-20	10	24	8.5	3.9	8	1.6	104	0	85	83
471629091505401	76-10-19	.0	22	6.9	2.7	7	.9	98	0	80	25
471921092091801	76-10-18	5.0	14	4.8	2.6	9	1.0	46	0	38	29
472218092092201	76-11-29	--	39	7.3	2.1	3	1.2	128	0	105	13
	77-07-25	--	--	--	--	--	--	--	--	--	--
472221092092401	76-10-20	5.0	43	8.1	2.9	4	1.4	130	0	107	66
472254091543601	76-10-19	.0	19	14	7.9	14	1.1	141	0	116	4.5
472626092084501	76-10-18	.0	19	9.4	4.8	11	1.8	94	0	77	4.8
472842092023001	77-07-25	--	--	--	--	--	--	--	--	--	--
472912092032201	76-10-18	5.0	17	17	3.5	6	1.3	137	0	112	2.8
473151091583701	76-11-30	.0	24	13	6.4	11	2.4	77	0	63	12
	77-07-25	--	--	--	--	--	--	--	--	--	--
473311092045901	76-11-29	--	16	15	6.9	13	2.1	119	0	98	120
	77-07-25	--	--	--	--	--	--	--	--	--	--
473501091552301	77-07-25	--	--	--	--	--	--	--	--	--	--
473557091512901	76-11-30	.0	6.3	2.6	2.9	19	.4	15	0	12	38
	77-07-25	--	--	--	--	--	--	--	--	--	--
473946091492701	76-11-30	--	15	7.4	2.9	8	.9	68	0	56	34
474046091513201	76-11-30	.0	13	6.9	3.3	10	2.3	26	0	21	17
	77-07-26	--	--	--	--	--	--	--	--	--	--
474107091401901	76-11-30	.0	15	27	2.0	3	.6	180	0	148	363
	77-07-26	--	--	--	--	--	--	--	--	--	--
474253091574101	76-11-30	5.0	24	12	5.8	10	1.2	85	0	70	108

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STATION NUMBER	DATE OF SAMPLE	DIS-SOLVED SULFATE (SO4) (MG/L) (00945)	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L) (70300)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	DIS-SOLVED ALUM-INUM (AL) (UG/L) (01106)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	DIS-SOLVED CHRO-MIUM (CR) (UG/L) (01030)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	DIS-SOLVED COPPER (CU) (UG/L) (01040)
					LAKE COUNTY						
473528091385101	76-10-19	10	5.8	.3	--	.98	30	0.04	0.2	0.5	1.1
473823091323501	76-10-19	7.5	1.0	.1	--	.56	0	0.49	0.2	<0.3	13
473856091340801	76-11-30	9.4	4.2	.7	108	1.6	10	--	--	--	--
	77-07-24	--	--	--	--	--	--	0.75	1.1	<0.3	3.2
474111091471401	76-11-30	6.7	1.1	.0	192	.07	70	--	--	--	--
	77-07-26	--	--	--	--	--	--	0.27	2.1	4.2	4.1
474526091462301	76-10-19	9.6	4.3	.1	--	.01	20	0.03	<0.1	<0.3	1.0
474637091423401	77-07-24	--	--	--	--	--	--	0.20	16	6	4.5
474713091430001	76-11-30	8.6	.7	.1	97	.63	40	--	--	--	--
	77-07-23	--	--	--	--	--	--	0.99	0.2	<0.3	2.8
474728091421001	77-07-24	--	--	--	--	--	--	0.20	1.4	1.9	3.1
474843091431901	76-11-30	--	--	--	--	--	6	--	--	--	--
	77-07-24	--	--	--	--	--	--	0.54	0.7	23	5.0
474851091440301	76-10-20	45	310	.1	--	.03	10	0.09	0.4	0.4	3.3
474900091434801	76-10-20	3.8	5.3	.1	--	.06	50	0.03	0.3	0.5	1.6
474911091375501	77-07-22	--	--	--	--	--	--	0.48	1.7	1.8	15
474957091403001	76-11-30	340	5.0	.0	626	7.1	30	--	--	--	--
	77-07-24	--	--	--	--	--	--	6.2	<0.1	530	2700
474957091403002	76-11-30	450	4.7	.1	938	7.9	20	--	--	--	--
	77-07-24	--	--	--	--	--	--	1.2	0.3	12	5.5
474957091403101	76-11-30	6.1	1.5	.1	221	.31	20	--	--	--	--
	77-07-24	--	--	--	--	--	--	0.14	0.4	0.4	2.2
					ST. LOUIS COUNTY						
471617092123701	76-11-29	6.2	2.9	.1	124	.99	20	--	--	--	--
471619092121701	76-10-20	8.5	3.9	.1	--	.31	0	8.4	0.1	1.3	1.8
471629091505401	76-10-19	4.8	.6	.3	--	.02	30	0.02	0.2	0.5	2.7
471921092091801	76-10-18	6.8	7.5	.1	--	.06	0	0.31	0.1	0.4	2.0
472218092092201	76-11-29	24	.9	.1	187	.63	20	--	--	--	--
	77-07-25	--	--	--	--	--	--	0.31	1.2	0.3	0.8
472221092092401	76-10-20	29	1.4	.1	--	.09	10	1.7	1.4	0.7	5.2
472254091543601	76-10-19	1.8	.5	.4	--	.08	20	0.04	0.4	0.6	0.6
472626092084501	76-10-18	12	.6	.3	--	.04	10	0.03	0.2	0.7	1.4
472842092023001	77-07-25	--	--	--	--	--	--	0.19	0.4	<0.3	4.1
472912092032201	76-10-18	3.5	1.2	.1	--	.08	10	0.02	0.2	0.3	a190
473151091583701	76-11-30	57	.8	.1	178	1.0	0	--	--	--	--
	77-07-25	--	--	--	--	--	--	0.71	0.4	<0.3	6
473311092045901	76-11-29	14	.6	.1	153	.82	10	--	--	--	--
	77-07-25	--	--	--	--	--	--	0.75	0.5	1.0	1.9
473501091552301	77-07-25	--	--	--	--	--	--	0.18	0.7	<0.3	5.9
473557091512901	76-11-30	10	2.0	.0	--	--	280	--	--	--	--
	77-07-25	--	--	--	--	--	--	0.57	0.9	0.6	10
473946091492701	76-11-30	14	.9	.0	90	.36	10	--	--	--	--
474046091513201	76-11-30	34	8.6	.1	--	--	4	--	--	--	--
	77-07-26	--	--	--	--	--	--	0.24	0.4	<0.3	12
474107091401901	76-11-30	4.5	1.4	.1	155	.74	0	--	--	--	--
	77-07-26	--	--	--	--	--	--	0.27	1.2	10	25
474253091574101	76-11-30	6.5	18	.0	157	9.4	0	--	--	--	--

a Value may be in error due to contamination of sample.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STATION NUMBER	DATE OF SAMPLE	DIS-SOLVED IRON (FE) (UG/L) (01046)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	DIS-SOLVED NICKEL (NI) (UG/L) (01065)	DIS-SOLVED SILVER (AG) (UG/L) (01075)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	SUS-PENDED ORGANIC CARBON (C) (MG/L) (00689)
				LAKE COUNTY					
473528091385101	76-10-19	10	0.3	90	.0	<1	<0.05	100	.5
473823091323501	76-10-19	10	0.5	40	.0	2	<0.05	620	--
473856091340801	76-11-30	140	--	20	.0	--	--	--	.1
	77-07-24	--	0.9	--	--	2	<0.05	5.5	--
474111091471401	76-11-30	2400	--	520	.0	--	--	--	3.8
	77-07-26	--	3.6	--	--	12	<0.05	13	--
474526091462301	76-10-19	90	0.4	20	.0	1	<0.05	60	.7
474637091423401	77-07-24	--	2.0	--	--	22	<0.05	14	--
474713091430001	76-11-30	10	--	10	.0	--	--	--	.2
	77-07-23	--	1.0	--	--	3	<0.05	6.8	--
474728091421001	77-07-24	--	0.9	--	--	9	<0.05	3.9	--
474843091431901	76-11-30	120	--	20000	.0	--	--	--	1.3
	77-07-24	--	0.7	--	--	23	<0.05	14	--
474851091440301	76-10-20	20	1.1	60	.0	2	<0.05	180	--
474900091434801	76-10-20	50	0.5	20	.0	1	0.06	80	--
474911091375501	77-07-22	--	2.4	--	--	6	<0.05	29	--
474957091403001	76-11-30	90	--	5600	.0	--	--	--	.3
	77-07-24	--	0.1	--	--	20	<0.05	130	--
474957091403002	76-11-30	20	--	7000	.0	--	--	--	.2
	77-07-24	--	0.3	--	--	15	0.05	6.3	--
474957091403101	76-11-30	220	--	260	.0	--	--	--	.2
	77-07-24	--	1.6	--	--	7	<0.05	6.5	--
				ST. LOUIS COUNTY					
471617092123701	76-11-29	10	--	280	.0	--	--	--	2.2
471619092121701	76-10-20	10	0.2	330	.0	3	<0.05	9.6	--
471629091505401	76-10-19	10	0.2	110	.0	1	<0.05	53	.6
471921092091801	76-10-18	10	0.7	200	.0	<1	<0.05	270	--
472218092092201	76-11-29	110	--	80	.0	--	--	--	.4
	77-07-25	--	2.8	--	--	2	<0.05	5.0	--
472221092092401	76-10-20	280	1.4	320	.0	2	<0.05	15	--
472254091543601	76-10-19	20	0.2	70	.0	1	0.08	170	--
472626092084501	76-10-18	10	0.3	40	.0	<1	<0.05	8.8	--
472842092023001	77-07-25	--	2.3	--	--	4	<0.05	4.4	--
472912092032201	76-10-18	10	0.2	140	.0	<1	<0.05	57	--
473151091583701	76-11-30	0	--	660	.0	--	--	--	.2
	77-07-25	--	4.1	--	--	7	0.21	13	--
473311092045901	76-11-29	20	--	120	.1	--	--	--	.2
	77-07-25	--	1.2	--	--	15	<0.05	11	--
473501091552301	77-07-25	--	4.2	--	--	9	<0.05	4.1	--
473557091512901	76-11-30	230	--	40	.0	--	--	--	.5
	77-07-25	--	5.3	--	--	5	<0.05	13	--
473946091492701	76-11-30	30	--	50	.0	--	--	--	.2
474046091513201	76-11-30	80	--	210	.0	--	--	--	.3
	77-07-26	--	1.1	--	--	7	<0.05	6.8	--
474107091401901	76-11-30	26000	--	930	.2	--	--	--	1.6
	77-07-26	--	13	--	--	40	<0.05	17	--
474253091574101	76-11-30	0	--	30	.0	--	--	--	.3

☆U.S. GOVERNMENT PRINTING OFFICE: 1978-768-996/89 REG.#6

October 13, 1977

FACTORS FOR CONVERTING U.S. CUSTOMARY UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

The following factors may be used to convert the U.S. customary units published herein to the International System of Units (SI). Subsequent reports will contain both the U.S. customary and SI unit equivalents in the station manuscript descriptions until such time that all data will be published in SI units.

Multiply U.S. customary 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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