Water Resources Data
Michigan
Water Year 1984

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MI-84-1

Prepared in cooperation with the State of Michigan
and with other agencies

CALENDAR FOR WATER YEAR 1984

1983

OCTOBER

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

NOVEMBER

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

DECEMBER

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

1984

JANUARY

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

FEBRUARY

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

MARCH

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

APRIL

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

MAY

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

JUNE

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

JULY

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

AUGUST

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

SEPTEMBER

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

Water Resources Data
Michigan
Water Year 1984

by John B. Miller, John L. Oberg, and Theodore Sieger Jr.

U.S.GEOLOGICAL SURVEY WATER-DATA REPORT MI-84-1
Prepared in cooperation with the State of Michigan
and with other agencies

UNITED STATES DEPARTMENT OF THE INTERIOR

DONALD PAUL HODEL, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

For information on the water program in Michigan write to
District Chief, Water Resources Division
U.S. Geological Survey
6520 Mercantile Way, Suite 5
Lansing, Michigan 48910

1985

PREFACE

This volume of the annual hydrologic data report of Michigan is one of a series of annual reports that document hydrologic data gathered from the U.S. Geological Survey's surface- and ground-water data-collection networks in each State, Puerto Rico, and the Trust Territories. These records of streamflow, ground-water levels, and quality of water provide the hydrologic information needed by State, local, and Federal agencies, and the private sector for developing and managing our Nation's land and water resources. Hydrologic data for Michigan are contained in volume 1.

This report is the culmination of a concerted effort by dedicated personnel of the U.S. Geological Survey who collected, compiled, analyzed, verified, and organized the data, and who typed, edited, and assembled the report. In addition to the authors, who had primary responsibility for assuring that the information contained herein is accurate, complete, and adheres to Geological Survey policy and established guidelines, the following individuals contributed significantly to the collection, processing, and tabulation of the data:

S.M. Beall	C.L. Ebsch	V.D. Herreid	P.J. Klimek	R.G. Nettleton
R.J. Coleman	J.M. Ellis	L.B. Hough	R.L. LeuVoy	C.E. Oberst
D.V. Eagle	J.C. Failing	G.C. Huffman	G. Lansky	T.J. Spicer
R.R. Eagle	W.G. Fazer	D.A. James	R.J. Minnerick	C.R. Whited

This report was prepared in cooperation with the State of Michigan and with other agencies under the general supervision of T.R. Cummings, District Chief, Michigan, and S. P. Sauer, Regional Hydrologist, Northeast Region.

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. USGS/WRD/HD-85-229	2.	3. Recipient's Accession No.
4. Title and Subtitle: Water Resources Data for Michigan, Water Year 1984			5. Report Date: May 1985 6.
7. Author(s): J.B. Miller, J.L. Oberg, and T. Sieger, Jr.			8. Performing Organization Rept. No. USGS-WDR-MI-84-1
9. Performing Organization Name and Address: U.S. Geological Survey, Water Resources Division 6520 Mercantile Way, Suite 5 Lansing, Michigan 48910			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address: U.S. Geological Survey, Water Resources Division 6520 Mercantile Way, Suite 5 Lansing, Michigan 48910			13. Type of Report & Period Covered: Annual - Oct. 1, 1983 to Sept. 30, 1984 14.

15. Supplementary Notes

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

16. Abstract (Limit: 200 words)

Water resources data for the 1984 water year for Michigan 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 temperature of ground water. This report contains discharge records for 142 gaging stations; stage only records for 2 gaging stations; stage and contents for 5 lakes and reservoirs; water quality for 27 continuous-record stations; and water levels for 53 observation wells. Also included are 56 crest-stage partial-record stations and 22 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 Michigan.

17. Document Analysis a. Descriptors

*Michigan, *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.

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement: No restriction on distribution. This report may be purchased from: National Technical Information Service Springfield, Virginia 22161	19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 276
	20. Security Class (This Page) UNCLASSIFIED	22. Price

(See ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

CONTENTS

ILLUSTRATIONS

GAGING STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED

Letter after station name designates type of data: (d) discharge, (c) chemical, (g) gage height, (m) microbiological, (p) pesticide, (r) radio-chemical, (t) water temperature, (s) sediment

WATER RESOURCES DATA FOR MICHIGAN, 1984

INTRODUCTION

Water resources data for the 1984 water year for Michigan 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 temperature of ground-water wells. This volume contains records for water discharge at 142 gaging stations; stage only at 2 gaging stations; stage and contents at 5 lakes and reservoirs; water quality at 27 gaging stations; and water levels at 53 observation wells. Locations of these sites are shown on figures 4-9. Also included are data for 56 crest-stage partial-record stations and 22 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 and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State, local, and Federal agencies in Michigan.

Records of discharge and 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, VA 22304.

For water years 1961 through 1974, streamflow data was 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. Ground-water records beginning with the 1956 calendar year and continuing through calendar year 1983 have been released by the Geological Survey in annual reports on a State-boundary basis.

Beginning with the 1975 water year, water data for streamflow, water quality, and ground water are published in official Survey reports 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 volume number. For example, this volume is identified as "U.S. Geological Survey Water-Data Report MI-84-1." These water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

Additional information, including current prices, for ordering specific reports may be obtained from the district chief at the address given on the back of the title page or by telephone, 517-377-1608.

COOPERATION

The U.S. Geological Survey and organizations of the State of Michigan have had cooperative agreements for the systematic collection of streamflow records since 1930, for ground-water levels since 1932, and for water-quality records since 1951. Organizations that assisted in collecting data through cooperative agreement with the Survey are:

State Department of Natural Resources, R. O. Skoog, director, through Water Management Division, L. N. Witte, Chief, and Geological Survey Division, T.R. Segall, Chief.

State Department of State Highways, J. P. Pitz, director.

Assistance in the form of funds or services was given by the Corps of Engineers, U.S. Army, in collecting records for 16 gaging stations published in this report. Assistance was also furnished by the National Weather Service, National Oceanic Atmospheric Administration, U.S. Department of Commerce, U.S. Environmental Protection Agency, and the National Park Service.

The following organizations aided in collecting records:

Macomb County Board of Supervisors; Oakland County Drain Commission; Genesee County Drain Commission; Huron-Clinton Metropolitan Authority; Cities of Ann Arbor, Clare, Coldwater, Flint, Imlay City, Kalamazoo, Lansing, Mason, Portage, St. Johns, and Ypsilanti; Allied Paper Inc.; American Aggregate Corp; Consumers Power Co.; Cleveland Cliffs Iron Co.; Fisher Body Division of General Motors Corp.; Michigan Power Co.; Michigan Sugar Co.; Peter Eckrich and Sons, Inc.; Upper Peninsula Power Co.; and Wisconsin-Electric Power Co.

Organizations that supplied data are acknowledged in station descriptions.

SUMMARY OF HYDROLOGIC CONDITIONS

Streamflow was normal for the 1984 water year in both the Upper and Lower Peninsulas. However, extreme high flows and deficient flows occurred in both Peninsulas. Figure 1 compares mean discharges in 1984 water year to median discharges during 1951-80 at three index stations.

In the Upper Peninsula, runoff was excessive in October, November, December, and February. The monthly mean discharge for February--191 cubic feet per second--was a new maximum at index station Sturgeon River near Sidnaw. Temperatures near 60°F caused excessive runoff from snowmelt. Runoff during June and July was deficient because of below-normal precipitation.

In the northern part of the Lower Peninsula, annual runoff at index station Muskegon River at Evart was 142 percent of median for the period October through February and 82 percent of median for the period March through September. Runoff during April and May was deficient.

In the southern part of the Lower Peninsula, runoff at index station Red Cedar River at East Lansing was in the normal range for the period October to June. The National Weather Service reported that Lansing experienced the driest June since 1864. Total rainfall during June was 0.32 inches, well below the normal 3.5 inches. Lack of precipitation led to deficient runoff for Red Cedar River during July, August, and September.

Ice jams on St. Clair River in early April caused flooding along shoreline communities. The river was closed to navigation for several weeks.

Ground-water levels followed near normal seasonal trends throughout the 1984 water year. In the western part of the Upper Peninsula, levels were above normal for the first 8 months and near normal the rest of the year. In the eastern part, levels were below normal throughout the year.

In the northern part of the Lower Peninsula, ground-water levels were above normal. Some record levels were recorded. In the southern part, levels were below normal in the southeast and near normal in the southwest and southcentral areas.

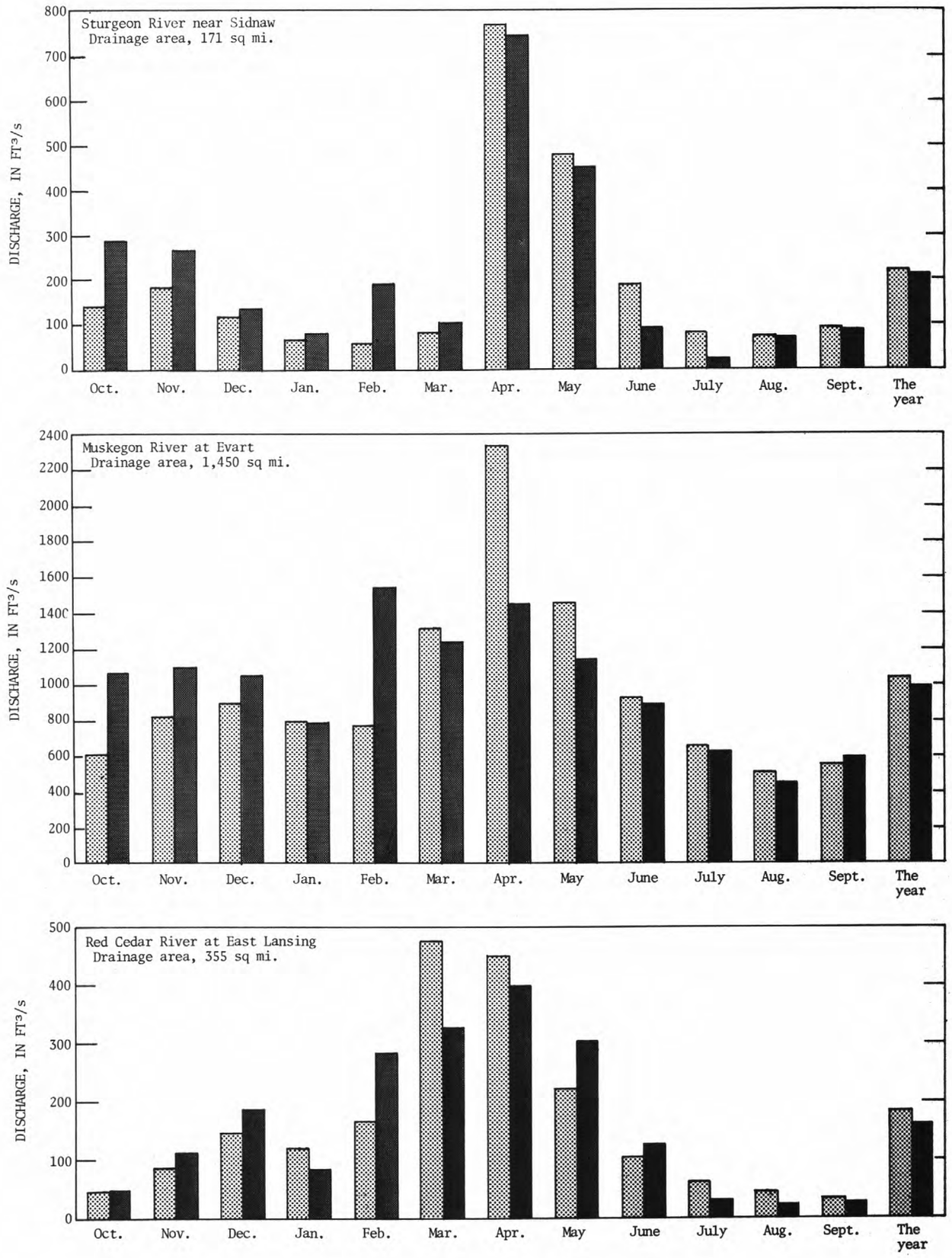
Dissolved-solids concentrations at NASQAN stations compare closely with average concentrations at respective sites. No unusually high concentrations of inorganic constituents or trace constituents were found.

DEFINITION OF TERMS

Terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. See also the 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 sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter of the original water sample.



Median of monthly and yearly mean discharge for period 1951-80.

Monthly and yearly mean discharge during 1984 water year.

Figure 1. Discharge during 1984 water year compared with median discharge for period 1951-80 for three representative stations.

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 sample.

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

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

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. They are characterized as aerobic or facultative anaerobic, gram-negative nonspore-forming, rod-shaped bacteria which ferment lactose with gas formation within 48 hours at 35°C. In the laboratory these bacteria are defined as the organisms which produce colonies 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 intestines 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 intestines of warm-blooded 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-enterrococcus 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 of 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 mass 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 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 of 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 flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, approximately 1.9835 acre-feet, 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.

Control structure as used in this report is a structure on a stream or canal that is used to regulate the flow or stage of the stream or to prevent the intrusion of salt water.

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:

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

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 specific 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 noncontribution 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 alkalined 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 any 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 (µg/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 (µG/L, µg/L) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Concentration of suspended sediment also is expressed in mg/L, and is based on the mass of sediment per liter of water-sediment mixture.

National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first order level nets of both the United States and Canada. It was formerly called "Sea Level Datum of 1929" or "mean sea level" in this series of reports. Although the datum was derived from the average sea level over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific Coasts, it does not necessarily represent local mean sea level at any particular place.

Organism is any living entity, such as an insect, phytoplankter, or zooplankter.

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meters (m^2), acres, or hectares. Periphyton benethic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number or organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliliters (mL) or liters (L). Numbers of planktonic organisms can be expressed in these terms.

Total organism count is the total number of organisms collected and enumerated in any particular sample.

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 analyses
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 (disintegrataions per minute).

Plankton is a 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 the surrounding water, the phytoplankton have a profound effect upon the quality of water. They are the primary food producers in the aquatic environment, and are commonly known as algae.

Blue-green algae are a group of phytoplankton organisms having a blue pigment, in addition to the green pigment called chlorophyll. Blue-green algae often cause nuisance conditions in water.

Diatoms are the unicellular or colonial algae having a siliceous shell. Their concentrations are expressed as number of cells/mL of sample.

Green algae have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algall 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 macrophtes 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 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 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. It is computed by multiplying discharge times mg/L times 0.0027.

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 multi-plate 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 .....Insecta
Order .....Ephemeroptera
Family.....Ephemeridae
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 concentrataion 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 discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

WDR is used as an abbreviation for "Water-Data Report" in reference to published reports beginning in 1975.

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

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

DOWNSTREAM ORDER AND STATION NUMBER

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

As an added means of identification, each hydrologic station, and partial-record station has been assigned a station number. These are in the same downstream order used in this report. In assigning station numbers, no distinction is made between partial-record and continuous-record stations; therefore, the station number for 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 04058500. which appears just to the left of the station name, includes the 2-digit part number "04" plus the 6-digit downstream order number "058500".

NUMBERING SYSTEM FOR WELLS

Each well is identified by means of (1) a 15-digit number that is based on the grid system of latitude and longitude followed by (2) a local number that is provided for continuity with older reports and for other use as dictated by local needs.

Each well is located as a point on a map by a number based on the universal system of latitude and longitude. In this report, this is the first set of numbers shown for each well. For maximum utility. latitude and longitude numbers are determined to seconds. The first six digits denote degrees. minutes and seconds of north latitude; the next seven digits denote degrees, minutes, and seconds of west longitude. The last to numbers are sequential numbers assigned in the order that the wells were recorded within a designated latitude-longitude grid.

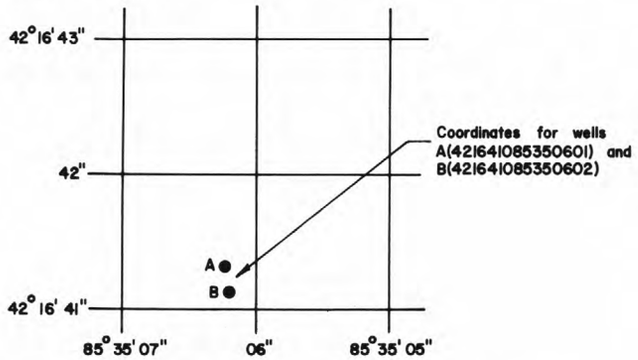


Figure 2. System for numbering wells (latitude and longitude).

The local well number indicates the location of wells within the rectangular subdivision of land with reference to the Michigan meridian and base line. The first two segments of the well number designate township and range, the third segment of the number designates the section and the letters A through D designate successively smaller subdivisions of the section as shown in figure 3. Thus. a well designated as 32N 6E 16CCCB would be located to the nearest 2.5 acres (1 hectare) and would be within the shaded area in section 16. In the event that two or more wells are located in the same 2.5 acre (1 hectare) tract, a sequential number designation follows the letter designations--for example, 16CCCB1, 16CCCB2, 16CCCB3, etc.

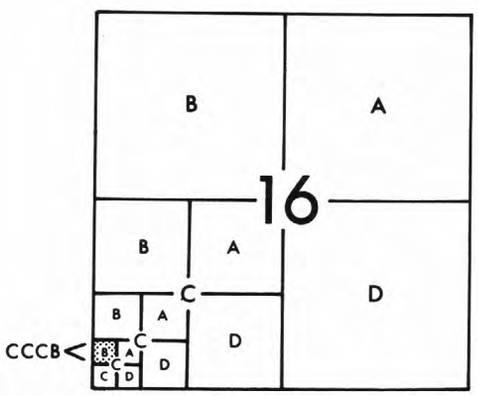


Figure 3. Well numbering system in Michigan.

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 designated 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 anad management. Both accounting and broad-scale monitoring objectives have been incorporated in 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 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

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 allotted by the Geological Survey. These methods are described in standard text-books, in Water-Supply Paper 888, and in U.S. Geological Survey Techniques of Water Resources Investigations, book 3, chapter A6.

For stream-gaging stations, rating tables giving the discharge for any stage are prepared from stage-discharge relation curves. If extensions to the rating curves are necessary to express discharge greater than measured, they are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, computation of flow over dams or weirs), step-backwater techniques, velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean 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 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 the 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 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 discharges 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 stations 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 the 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, if a significant error in published records was discovered, a revision was published in the first report following discovery of the error. A paragraph headed "REVISED RECORDS" then served to document for users all the reports in which revisions had been published for the station and the water years to which the revisions applied. However, beginning with the 1984 water year, revisions will no longer be published but appropriate changes will be made in WATSTORE files. All previous revisions are, of course, in WATSTORE, and users are encouraged to obtain all required data from the WATSTORE computer files (see the section, "Access to WATSTORE Data"). Under "REVISED RECORDS," a year listed without qualification indicates that daily, monthly, or annual discharges were revised. The qualifications (M), (m), and (P) mean that only the instantaneous maximum, the instantaneous or daily minimum, and flood peaks above the base, respectively, have been revised. A "W" for "WATSTORE" will be shown, replacing the name of the data report in which the revised values would previously have been published, for all revisions made after 1983. For example, the notation for indicating that the 1979 water-year daily values for a particular station in Michigan have been revised during the 1984 water year would no longer be "WDR MI-84-1: 1979," but "W 1984: 1979." If the drainage area has been revised, the report in which the most recently revised figure was first published is given. It should be noted that for all stations for which cubic feet per second per square mile (CFSM) and runoff in inches (IN) are published, a revision of the drainage area necessitates corresponding revision of all figures based on the drainage area. Revised figures of CFSM and IN resulting from a revision of the drainage area only, are usually not published in the annual series of reports.

The type of gage currently in use; the datum of the present gage referred to National Geodetic Vertical Datum; and a condensed history of the types, locations, and datums of previous gages used during the period of record are given under "GAGE". National Geodetic Vertical Datum is explained in "DEFINITION OF TERMS" on page 5.

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, 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. 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 above the selected base are published in tabular format with the time of occurrence and corresponding gage heights including the maximum for the year. The base discharge, which is given in the table heading, is selected so that an average of about three peaks a year will be presented. Peak discharges are not published for any canals, ditches, drains, or for any stream for which the peaks are subject to substantial control by man. Time of day is expressed in 24-hour local standard time; for example, 12:30 a.m. is 0030, 1:30 p.m. is 1330. The minimums for these stations are published in a separate paragraph following the table of peaks.

The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries. In the monthly summary below the daily table, the line headed "TOTAL" gives the sum of the daily figures. The line headed "MEAN" gives the average flow in cubic feet per second during the month. The lines headed "MAX" and "MIN" give the maximum and minimum daily discharges, respectively, for the month. Discharge for the month also may be expressed in cubic feet per second per square mile (line headed "CFSM"), or in inches (line headed "IN."), or in acre-feet (line headed "AC-FT"). Figures for cubic feet per second per square mile and runoff in inches are omitted if there is extensive regulation or diversion, if the drainage area includes large noncontributing areas, or if the average annual rainfall over the drainage basin is usually less than 20 inches. In the yearly summary below the monthly summary, the figures shown are the appropriate daily discharges for the calendar and water years.

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

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

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 interpretation 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 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-qualilty 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 period of daily record; extremes for the current year; and general remarks.

Information pertaining to the accucracy of some water-quality records are preceeded by a "remark code." The following are explanations of "remark codes" found accompanying water-quality records: "E" estimated; "K" results based on colony outside the acceptable range (NON-IDEAL COLONY COUNT); "ND" not detected.

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.

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

Water analysis

Most methods for collecting and analyzing water sample are described in the U.S. Geological Survey Techniques for 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 thoughout 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 discharge.

At stations where recording instruments are used, either mean temperatures or maximum and minimum temperatures for each day are published.

Sediment

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

During periods of rapidly changing flow or rapidly changing concentration. samples may have been collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided day method. For periods when no samples are 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 are collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observation, such data are useful in estblishing 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 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 national network of observation wells are published herein. This basic network contains observation wells so located (figure 9) 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 figures 2 and 3.

Measurements are made in many types of wells under varying conditions of access and of 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 insure 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 of 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.

ACCESS TO WATSTORE DATA

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

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

General inquires about WATSTORE may be directed to:

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

Thirty-seven 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, 604 South Pickett St., Alexandria, VA 22304 (authorized agent of the Superintendent of Documents, Government Printing Office).

NOTE: When ordering any of these publications, please give the title, book number, chapter number, and "U.S. Geological Survey Techniques of Water-Resources Investigations".

1-D1. *Water temperature--influential factors, field measurement, and data presentation,* by H. H. Stevens, Jr., J. F. Ficke, and G. F. Smoot: USGS--TWRI Book 1, Chapter D1. 1975. 65 pages.

1-D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents,* by W. W. Wood: USGS--TWRI Book 1, Chapter D2. 1976. 24 pages.

2-D1. *Application of surface geophysics to ground-water investigations,* by A. A. R. Zohdy, G. P. Eaton, and D. R. Mabey: USGS--TWRI Book 2, Chapter D1. 1974. 116 pages.

2-E1. *Application of borehole geophysics to water-resources investigations,* by W. S. Keys and L. M. MacCary: USGS--TWRI Book 2, Chapter E1. 1971. 126 pages.

3-A1. *General field and office procedures for indirect discharge measurements,* by M. A. Benson and Tate Dalrymple: USGS--TWRI Book 3, Chapter A1. 1967. 30 pages.

3-A2. *Measurement of peak discharge by the slope-area method,* by Tate Dalrymple and M. A. Benson: USGS--TWRI Book 3, Chapter A2. 1967. 12 pages.

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

3-A4. *Measurement of peak discharge at width contractions by indirect methods,* by H. F. Matthai: USGS--TWRI Book 3, Chapter A4. 1967. 44 pages.

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

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

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

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

3-A9. *Measurement of time of travel and dispersion in streams by dye tracing,* by E. F. Hubbard, F. A. Kilpatrick, L. A. Martens, and J. F. Wilson, Jr.: USGS--TWRI Book 3, Chapter A9. 1982. 44 pages.

3-A11. *Measurement of discharge by moving-boat method,* by G. F. Smoot and C. E. Novak: USGS--TWRI Book 3, Chapter A11. 1969. 22 pages.

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

3-B2. *Introduction to ground-water hydraulics, a programed text for self-instruction,* by G. D. Bennett: USGS--TWRI Book 3, Chapter B2. 1976. 172 pages.

3-B3. *Type curves for selected problems of flow to wells in confined aquifers,* by J. E. Reed: USGS--TWRI Book 3, Chapter B3. 1980. 106 pages.

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

3-C2. *Field methods for measurement of fluvial sediment,* by H. P. Guy and V. W. Norman: USGS--TWRI Book 3, Chapter C2. 1970. 59 pages.

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

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

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

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

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

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

4-D1. *Computation of rate and volume of stream depletion by wells,* by C. T. Jenkins: USGS--TWRI Book 4, Chapter D1. 1970. 17 pages.

5-A1. *Methods for determination of inorganic substances in water and fluvial sediments,* by M. W. Skougstad and others, editors: USGS--TWRI Book 5, Chapter A1. 1979. 626 pages.

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

5-A3. *Methods for analysis of organic substances in water,* by D. F. Goerlitz and Eugene Brown: USGS--TWRI Book 5, Chapter A3. 1972. 40 pages.

5-A4. *Methods for collection and analysis of aquatic biological and microbiological samples,* edited by P. E. Greeson, T. A. Ehlke, G. A. Irwin, B. W. Lium, and K. V. Slack: USGS--TWRI Book 5, Chapter A4. 1977. 332 pages.

5-A5. *Methods for determination of radioactive substances in water and fluvial sediments,* by L. L. Thatcher, V. J. Janzer, and K. W. Edwards: USGS--TWRI Book 5, Chapter A5. 1977. 95 pages.

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

7-C1. *Finite difference model for aquifer simulation in two dimensions with results of numerical experiments,* by P. C. Trescott, G. F. Pinder, and S. P. Larson: USGS--TWRI Book 7, Chapter C1. 1976. 116 pages.

7-C2. *Computer model of two-dimensional solute transport and dispersion in ground water,* by L. F. Konikow and J. D. Bredehoeft: USGS--TWRI Book 7, Chapter C2. 1978. 90 pages.

7-C3. *A model for simulation of flow in singular and interconnected channels,* by R. W. Schaffranek, R. A. Baltzer, and D. E. Goldberg: USGS--TWRI Book 7, Chapter C3. 1981. 110 pages.

8-A1. *Methods of measuring water levels in deep wells,* by M. S. Garber and F. C. Koopman: USGS--TWRI Book 8, Chapter A1. 1968. 23 pages

8-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.

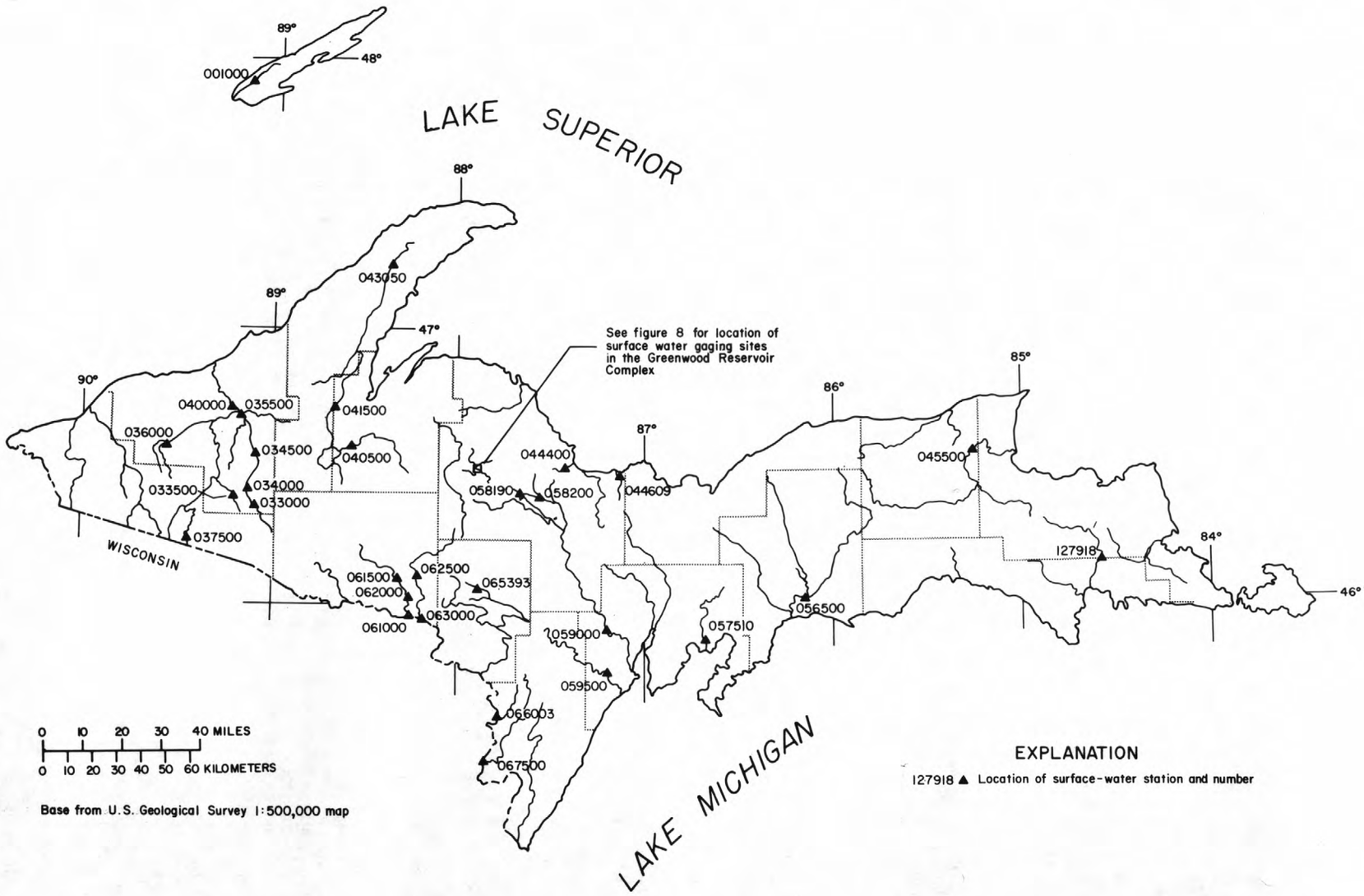


Figure 4.--Map showing identification number and location of gaging stations in Upper Peninsula of Michigan. (Prefix 04 to all station numbers)

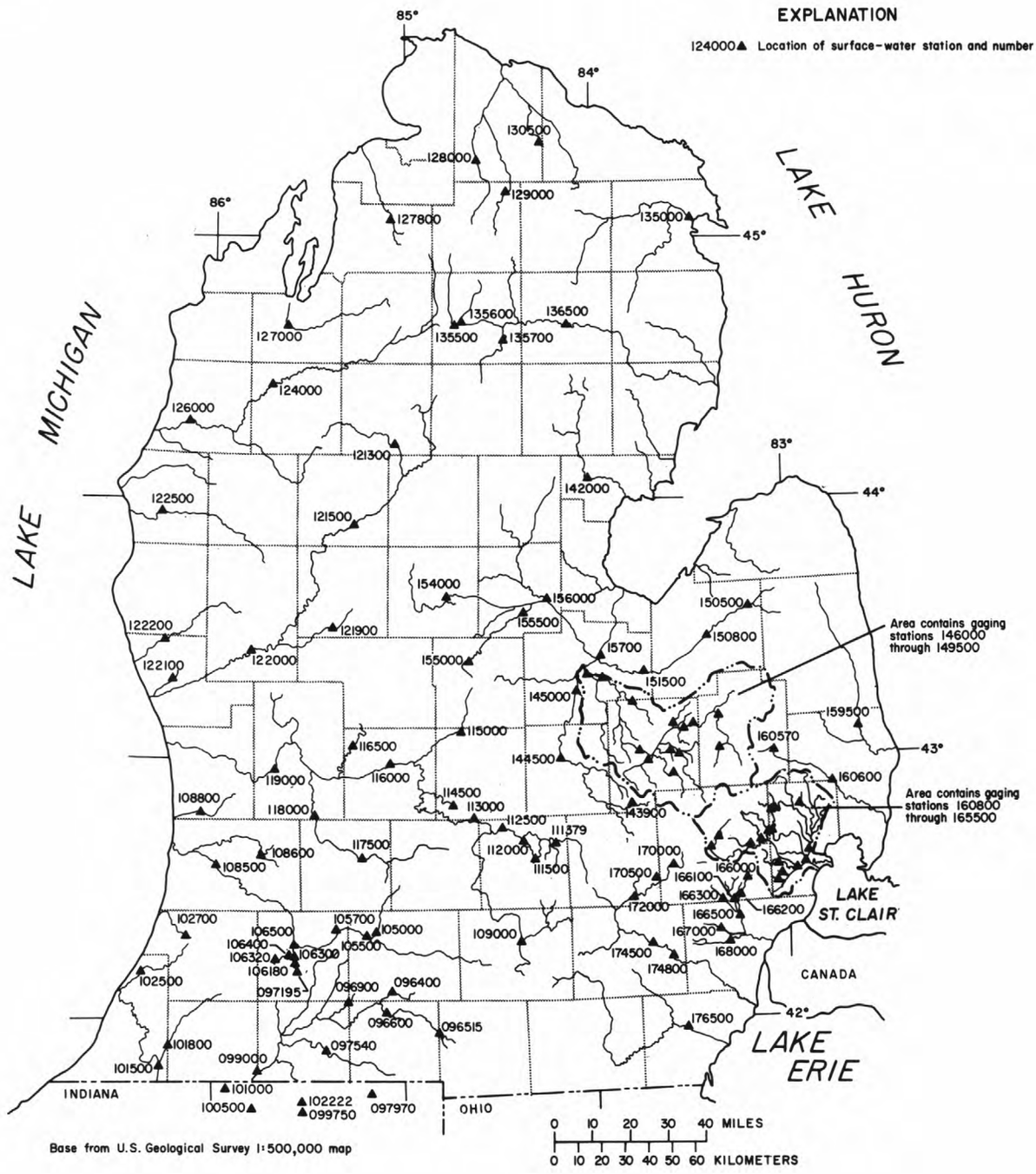


Figure 5.--Map showing identification number and location of gaging stations in Lower Peninsula of Michigan. (Prefix 04 to all station numbers)

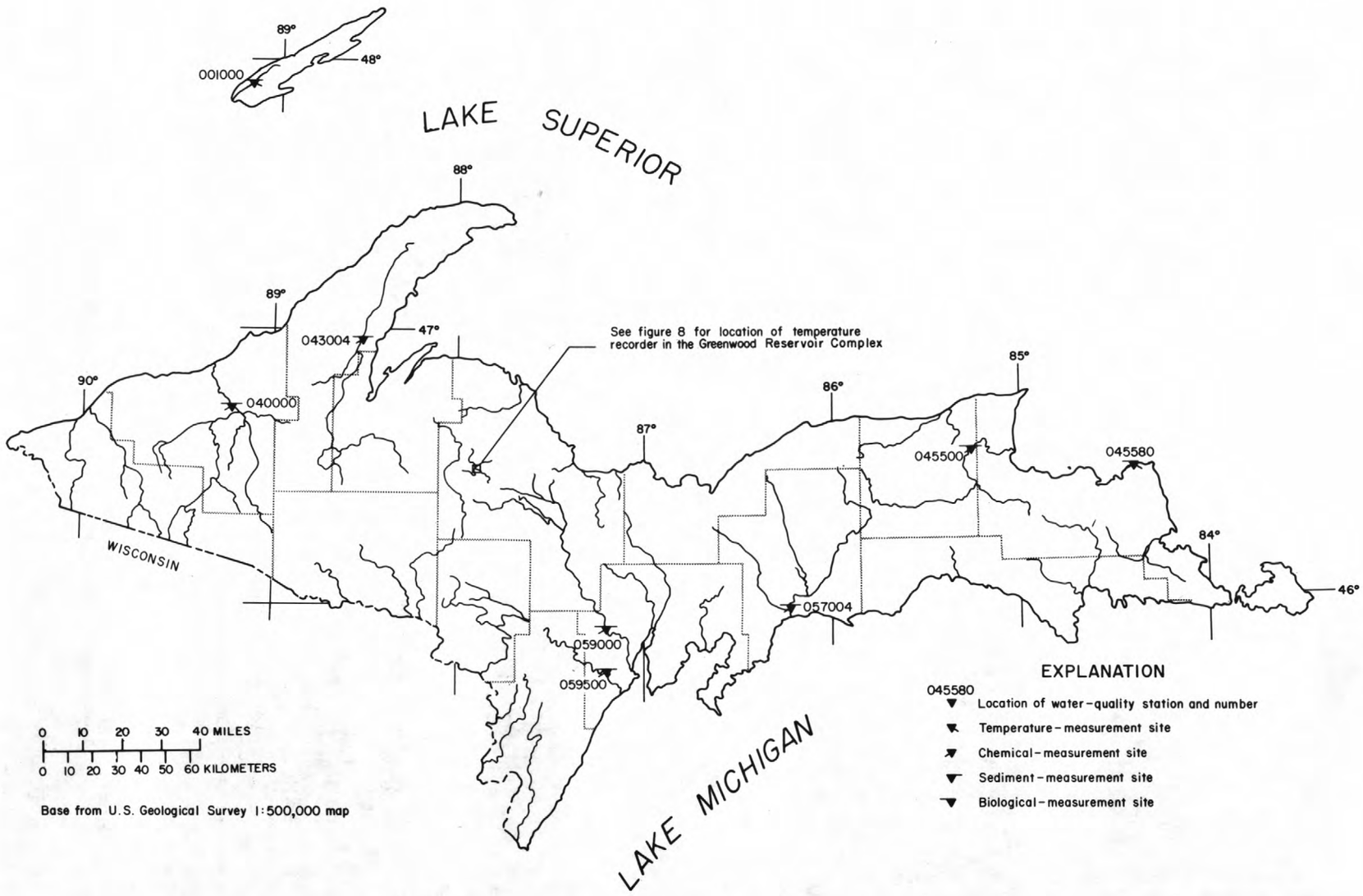


Figure 6.--Map showing identification number and location of water-quality stations in Upper Peninsula of Michigan. (Prefix 04 to all station numbers)

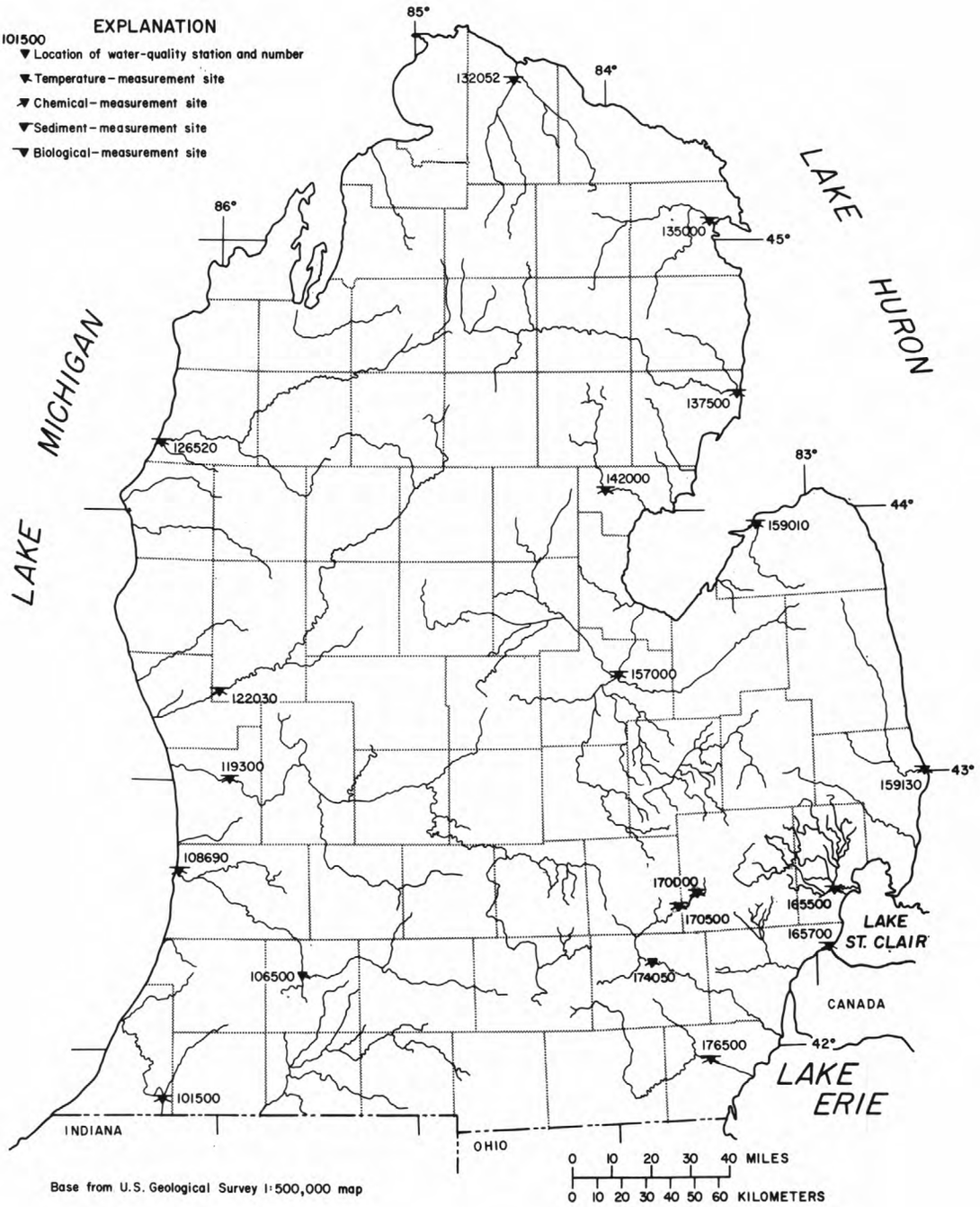


Figure 7.--Map showing identification number and location of water-quality stations in Lower Peninsula of Michigan. (Prefix 04 to all station numbers)

04001000 WASHINGTON CREEK AT WINDIGO, MI
(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'23", long 89°08'42", in NW1/4 sec.28, T.64 N., R.38 W., Keweenaw County, Isle Royale National Park, Hydrologic Unit 04020300, on left bank 0.8 mi northeast of Windigo, and 35 mi southwest of Rock Harbor.

DRAINAGE AREA.--13.2 mi^2.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 605 ft, from topographic map (nearest 5 ft).

REMARKS.--Water-discharge records good except those above 80 ft^3/s, which are fair, and those for the winter period, which are poor. Recording rain gage at station and capacity rain gage located near mouth.

AVERAGE DISCHARGE.--20 years, 17.5 ft^3/s, 18.00 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 480 ft^3/s May 1, 1972, gage height, 6.82 ft, from rating curve extended above 160 ft^3/s based on runoff characteristics of nearby stations; maximum gage height, 6.88 ft Jan. 13, 1975, backwater from ice; minimum daily discharge, 0.44 ft^3/s Aug. 25, 1977; minimum gage height, 2.55 ft Aug. 29, 30, 31, Sept. 2, 3, 7, 9, 10, 11, 12, 1976.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 110 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct. 14	unknown	122	4.72	Nov. 24	0100	*314	*6.02
Nov. 21	0500	158	5.08	Apr. 14	2300	114	4.64

Minimum discharge, 2.0 ft^3/s Aug. 5, gage height, 2.86 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.3	9.8	31	7.6	5.7	7.7	7.0	43	10	9.1	3.0	2.7
2	6.3	9.5	27	7.3	5.6	7.2	8.0	40	27	8.0	2.6	2.6
3	7.0	9.2	24	7.3	5.5	6.9	10	47	22	9.0	2.4	2.6
4	7.7	8.6	22	7.2	5.5	6.7	15	58	18	7.7	2.2	3.8
5	7.2	8.1	21	7.1	5.4	6.6	20	67	42	6.7	2.1	4.2
6	7.0	8.4	19	7.0	5.4	6.5	25	64	40	6.8	2.2	3.1
7	6.8	8.1	18	7.0	5.4	6.4	26	60	34	6.2	2.6	2.7
8	8.0	8.1	17	6.9	5.4	6.2	28	81	43	5.5	25	2.9
9	8.6	8.1	16	6.8	5.2	6.0	32	82	42	5.2	37	3.4
10	8.0	8.9	15	6.8	5.2	6.0	35	63	65	5.1	49	2.7
11	9.0	8.1	15	6.7	5.2	6.0	50	50	80	4.7	31	2.8
12	65	8.1	14	6.7	5.7	6.1	67	41	75	4.6	19	3.0
13	60	7.1	14	6.6	12	6.4	86	34	71	5.4	11	4.0
14	110	7.1	13	6.6	18	6.8	101	30	55	5.3	8.9	3.4
15	100	7.8	13	6.6	30	6.8	103	25	41	4.8	9.7	3.2
16	96	9.5	12	6.5	25	6.4	91	23	33	4.5	8.4	2.9
17	76	9.2	12	6.4	22	5.9	76	20	29	6.2	7.2	2.5
18	57	8.6	11	6.4	20	6.4	66	18	25	6.5	6.6	2.4
19	43	9.2	11	6.3	18	6.6	59	16	20	5.3	5.8	2.3
20	34	67	11	6.3	17	8.1	57	18	16	4.6	5.2	2.2
21	28	134	10	6.3	15	6.6	53	17	14	4.0	5.7	2.2
22	23	78	10	6.2	13	6.4	46	47	13	3.7	5.4	2.5
23	20	103	9.8	6.2	12	6.3	41	40	13	3.6	4.9	2.8
24	18	233	9.6	6.2	10	5.9	39	32	12	3.2	4.5	9.5
25	18	109	9.4	6.1	9.5	6.3	37	28	9.8	3.0	4.1	19
26	17	72	9.2	6.1	9.0	6.3	35	23	9.8	4.2	3.9	20
27	15	54	8.9	6.0	8.6	6.4	46	20	17	3.4	4.2	14
28	14	44	8.9	5.9	8.4	6.3	61	16	16	2.9	3.8	11
29	12	39	8.6	5.8	8.0	6.1	47	14	14	2.6	3.9	9.2
30	11	34	8.1	5.8	---	6.1	45	12	11	2.5	3.6	8.2
31	11	---	7.6	5.7	---	6.3	---	11	---	3.2	3.1	---
TOTAL	909.9	1128.5	436.1	202.4	320.7	200.7	1412.0	1140	917.6	157.5	288.0	157.8
MEAN	29.4	37.6	14.1	6.53	11.1	6.47	47.1	36.8	30.6	5.08	9.29	5.26
MAX	110	233	31	7.6	30	8.1	103	82	80	9.1	49	20
MIN	6.3	7.1	7.6	5.7	5.2	5.9	7.0	11	9.8	2.5	2.1	2.2
CFSM	2.23	2.85	1.07	.50	.84	.49	3.57	2.79	2.32	.39	.70	.40
IN.	2.56	3.18	1.23	.57	.90	.57	3.98	3.21	2.59	.44	.81	.44

CAL YR 1983 TOTAL 7218.6 MEAN 19.8 MAX 233 MIN 1.1 CFSM 1.50 IN 20.34
WTR YR 1984 TOTAL 7271.2 MEAN 19.9 MAX 233 MIN 2.1 CFSM 1.51 IN 20.49

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1965 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1964 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 20, 1964.

REMARKS.--In addition to the daily-temperature record, quarterly samples were collected during the year. No daily-temperature record Oct. 1-26, when recorder malfunctioned.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 22.5°C July 29, Aug. 6, 1983; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 21.5°C Aug. 28; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
26...	1345	16	84	7.6	6.0	14	11.9	98	K15	76
FEB										
07...	1500	5.4	122	7.6	.0	1.6	--	--	10	K2
MAY										
02...	1430	39	58	7.6	1.5	1.7	13.4	98	K2	K13
JUL										
11...	1400	4.7	128	7.9	17.0	1.6	9.1	96	47	19

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT										
26...	45	7	12	3.7	2.1	9	.1	.30	38	1.8
FEB										
07...	57	3	15	4.8	3.0	10	.2	.40	54	2.6
MAY										
02...	32	6	8.4	2.6	1.6	10	.1	.30	26	1.3
JUL										
11...	69	6	19	5.2	3.0	9	.2	.30	63	1.5

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT									
26...	9.2	2.1	<.10	11	92	64	.13	4.0	<.10
FEB									
07...	7.3	4.0	.10	13	96	80	.13	1.4	<.10
MAY									
02...	6.8	1.3	<.10	7.9	56	45	.08	5.9	<.10
JUL									
11...	--	3.1	<.10	11	102	--	.14	1.3	<.10

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 26...	<.010	.60	<.010	--	<.010	<.010	2	.09	100
FEB 07...	<.010	.70	.020	.06	.010	<.010	2	.03	100
MAY 02...	<.010	--	.010	.03	<.010	<.010	6	.63	100
JUL 11...	<.010	.50	.010	--	.010	<.010	10	.13	100

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT 26...	1345	50	1	16	<.5	<1	<1	<3	3	280	1
MAY 02...	1430	40	1	11	<1	<1	<1	<3	2	130	1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 26...	<4	9	<.1	<10	1	<1	<1	23	<6	9
MAY 02...	18	6	.3	<10	1	<1	<1	16	<6	10

DATE	TIME	GROSS ALPHA, DISSOLVED (PCI/L AS U-NAT)	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT)	GROSS BETA, DISSOLVED (PCI/L AS CS-137)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L)	URANIUM DISSOLVED, EXTRACTION (UG/L)
OCT 26...	1345	1.3	1.9	<.4	2.3	<.4	2.0	<.4	.04	.26

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

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

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

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	15.5	10.5	13.0	17.5	13.0	15.5	18.5	16.0	17.0	14.5	12.0	13.0
2	14.5	12.0	13.0	19.0	15.5	17.0	18.5	15.0	16.5	13.5	13.0	13.0
3	15.5	10.5	13.0	19.0	16.0	17.5	18.0	14.5	16.5	13.5	12.5	13.0
4	14.5	11.5	13.0	17.5	14.5	16.0	18.5	15.0	17.0	13.0	11.5	12.0
5	14.5	12.0	13.0	17.0	13.5	15.5	17.5	16.0	17.0	12.0	9.5	11.0
6	16.5	13.0	14.5	15.5	13.0	14.0	20.0	17.0	18.0	12.5	9.0	11.0
7	18.0	15.0	16.0	15.5	10.5	13.0	20.5	17.5	19.0	15.0	12.0	13.0
8	17.0	14.0	15.5	14.0	12.0	13.0	19.0	16.5	18.0	15.5	13.5	14.5
9	14.0	13.0	13.5	15.5	13.5	14.5	18.0	17.0	17.5	14.5	12.5	13.5
10	13.0	10.5	11.5	16.0	14.0	15.0	17.5	16.0	17.0	14.0	12.0	13.0
11	13.0	9.0	11.0	17.5	13.0	15.0	17.5	16.5	17.0	13.5	12.0	13.0
12	13.0	12.0	12.0	18.5	14.0	16.0	17.5	14.5	16.0	13.0	11.5	12.5
13	12.5	11.0	12.0	18.0	15.5	16.5	18.5	15.0	16.5	13.5	12.5	13.0
14	13.0	10.5	12.0	17.0	15.0	16.0	17.5	16.5	17.0	13.0	11.5	12.0
15	13.0	11.0	12.0	16.0	13.0	14.5	20.5	17.0	18.5	11.0	9.5	10.0
16	14.0	12.0	13.0	16.5	14.0	15.0	19.0	16.0	17.0	11.5	9.0	10.0
17	14.5	13.5	14.0	15.0	13.5	14.0	16.0	14.5	15.5	11.5	9.5	10.5
18	17.5	13.0	15.0	16.0	11.5	13.5	18.5	15.5	16.5	13.5	11.5	12.0
19	16.0	13.0	14.5	17.5	13.0	15.0	17.5	14.5	16.0	13.0	10.5	12.0
20	15.5	11.0	13.0	17.5	13.0	15.5	18.0	14.5	16.5	13.0	11.0	12.0
21	15.5	11.5	13.5	17.5	13.5	15.5	19.5	17.0	17.5	12.0	10.0	11.0
22	14.5	13.0	13.5	19.0	16.0	17.5	18.0	16.0	17.0	13.5	11.5	12.5
23	14.0	13.0	13.0	20.0	16.0	18.0	16.5	13.5	15.0	13.0	11.5	12.0
24	15.0	12.5	13.5	18.0	14.5	16.5	15.5	11.5	14.0	11.5	9.5	10.0
25	15.5	11.5	13.5	17.0	13.5	15.5	16.5	13.0	15.0	9.5	7.5	8.5
26	16.0	13.0	14.5	18.0	14.5	16.5	17.5	15.5	16.5	8.0	6.5	7.5
27	16.0	13.0	14.5	17.0	13.0	15.0	20.0	17.0	18.5	8.0	7.0	7.5
28	16.0	13.0	14.5	16.5	12.5	14.5	21.5	17.5	19.5	7.5	6.0	7.0
29	17.5	13.5	15.5	17.0	13.0	15.0	20.0	17.5	19.0	7.5	5.5	6.5
30	17.5	13.0	15.5	17.0	14.0	15.5	17.5	15.5	16.5	7.5	5.0	6.0
31	---	---	---	18.5	15.5	17.0	16.0	13.5	15.0	---	---	---
MONTH	18.0	9.0	13.5	20.0	10.5	15.5	21.5	11.5	17.0	15.5	5.0	11.0

04033000 MIDDLE BRANCH ONTONAGON RIVER NEAR PAULDING, MI

LOCATION.--Lat 46°21'25", long 89°04'38", in SE1/4 NE1/4 sec.29, T.46 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, Ottawa National Forest, on right bank 25 ft downstream from bridge on Forest Service Road 172, 2.4 mi upstream from Bond Falls Reservoir, and 5.7 mi southeast of Paulding.

DRAINAGE AREA.--164 mi^2.

PERIOD OF RECORD.--June 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,485.66 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Sept. 28, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 174 ft^3/s, 14.41 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,050 ft^3/s Apr. 30, 1951, gage height, 10.0 ft, from high-water mark; minimum, 27 ft^3/s Nov. 22, 1946, result of freezeup; minimum gage height, 2.96 ft Nov. 26, 1942, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 716 ft^3/s Apr. 15, gage height, 6.74 ft; minimum, 77 ft^3/s July 30, 31, gage height, 3.59 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	132	139	215	150	125	135	140	597	127	128	106	103
2	128	138	195	150	120	130	148	545	152	120	186	142
3	128	137	185	150	120	130	162	513	154	119	149	259
4	132	136	210	145	120	125	169	510	135	117	127	222
5	136	132	220	145	120	125	191	468	135	112	128	177
6	134	131	210	145	120	125	221	417	141	117	162	158
7	137	132	200	145	120	120	237	386	135	117	162	147
8	178	130	190	145	125	120	259	395	200	110	158	138
9	170	133	185	145	130	120	288	449	213	106	158	139
10	148	153	175	140	135	120	331	466	163	107	139	134
11	156	159	170	140	140	120	390	437	160	109	128	127
12	317	140	175	140	160	125	468	375	186	104	119	130
13	399	135	180	135	190	135	570	336	215	99	112	161
14	395	141	190	135	270	145	687	319	168	100	114	152
15	351	148	190	135	330	145	712	295	146	103	145	145
16	330	161	185	135	300	140	669	261	142	100	141	129
17	307	163	180	130	280	130	588	237	138	102	126	120
18	268	154	175	130	250	130	501	222	133	103	131	115
19	241	151	170	130	240	125	448	202	127	100	135	112
20	221	218	170	130	220	120	413	186	119	96	121	108
21	200	327	165	130	210	120	382	181	116	93	117	105
22	191	290	165	130	190	120	348	198	119	91	123	104
23	182	286	160	130	179	125	322	205	119	93	122	105
24	177	415	160	125	170	130	295	183	121	92	117	132
25	166	386	160	125	160	135	272	166	117	87	110	215
26	160	337	155	125	148	145	242	160	119	84	107	204
27	155	300	155	125	145	145	234	154	179	83	135	181
28	153	257	155	125	140	140	291	147	191	83	136	159
29	149	251	150	125	140	135	294	140	159	81	121	144
30	142	240	150	125	---	135	444	134	139	80	113	137
31	140	---	150	125	---	136	---	131	---	81	107	---
TOTAL	6223	6020	5495	4190	5097	4031	10716	9415	4468	3117	4055	4404
MEAN	201	201	177	135	176	130	357	304	149	101	131	147
MAX	399	415	220	150	330	145	712	597	215	128	186	259
MIN	128	130	150	125	120	120	140	131	116	80	106	103
CFSM	1.23	1.23	1.08	.82	1.07	.79	2.18	1.85	.91	62	80	.90
IN.	1.41	1.37	1.25	.95	1.16	.91	2.43	2.14	1.01	71	92	1.00

CAL YR 1983 TOTAL 71105 MEAN 195 MAX 573 MIN 97 CFSM 1.19 IN 16.13
WTR YR 1984 TOTAL 67231 MEAN 184 MAX 712 MIN 80 CFSM 1.12 IN 15.25

04033500 BOND FALLS CANAL NEAR PAULDING, MI

LOCATION.--Lat 46°23'57", long 89°08'47", in SW1/4 NE1/4 sec.11, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 40 ft upstream from intake to pipeline No. 2, 0.8 mi downstream from Bond Falls Reservoir on Middle Branch Ontonagon River, and 1.6 mi east of Paulding.

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

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,441.59 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, nonrecording gage at datum 3.00 ft higher.

REMARKS.--Records excellent except those for period of no gage height record, Dec. 22 to Feb. 8, which are good, and those below 10 ft^3/s, which are poor. Canal diverts water from Bond Falls Reservoir (station 04034000) to South Branch Ontonagon River; water is used for power production at Victoria Dam near Rockland. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 142 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 368 ft^3/s May 5, 1960; no flow at times each year since 1961; minimum gage height observed, -0.03 ft Apr. 17, 1963, present datum (two drain holes in weir open and canal gate closed).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	58	174	45	200	300	113	282	131	309	310	96	6.1
2	58	173	135	200	300	175	280	71	308	308	96	6.6
3	44	173	207	204	300	260	260	9.3	307	307	96	6.2
4	7.6	173	207	204	300	282	149	8.8	307	305	51	6.1
5	8.0	244	185	203	300	312	7.5	8.5	306	302	7.4	6.0
6	9.5	300	162	267	300	311	6.4	8.5	306	301	6.9	6.0
7	9.7	298	162	267	300	309	6.0	8.9	305	299	6.5	6.0
8	9.5	297	160	267	300	308	5.8	8.9	305	297	6.5	6.0
9	9.5	297	177	260	297	305	5.7	9.3	303	295	6.1	6.0
10	9.6	270	210	300	298	305	5.5	9.1	303	293	6.0	6.0
11	10	210	211	300	296	303	5.6	9.1	301	294	6.0	6.0
12	10	210	211	300	295	300	5.6	9.3	301	295	6.0	6.4
13	10	210	212	300	294	299	5.7	9.4	300	293	6.0	6.2
14	10	207	192	300	28	298	6.0	9.5	299	292	6.1	47
15	10	207	164	300	8.1	300	6.0	85	299	290	6.0	100
16	10	142	163	300	7.6	301	6.0	250	298	288	6.0	100
17	10	10	163	300	7.3	305	5.3	320	297	287	6.0	100
18	11	10	161	300	7.2	303	4.4	322	296	284	5.9	149
19	11	44	159	300	7.2	300	4.1	322	294	195	5.8	199
20	11	100	158	300	7.2	299	1.9	321	293	111	6.0	251
21	11	107	166	300	6.9	298	.70	321	292	97	6.2	307
22	11	9.0	214	300	6.3	296	.70	320	292	97	6.0	302
23	11	9.3	214	300	6.1	295	.70	319	290	97	6.0	297
24	45	8.9	214	300	6.3	293	55	273	288	97	5.9	289
25	72	8.7	214	300	6.1	292	186	214	306	96	5.7	222
26	61	9.0	214	300	6.0	291	259	213	319	96	6.2	123
27	61	9.0	214	300	6.0	290	345	212	312	96	6.4	82
28	90	9.5	210	300	32	288	229	212	314	96	6.0	116
29	115	9.5	210	300	97	287	130	261	312	95	6.0	159
30	115	9.5	200	300	---	285	132	310	311	95	5.9	159
31	143	---	200	300	---	283	---	310	---	96	6.0	---
TOTAL	1061.4	3938.4	5714	8672	4125.3	8886	2396.60	4895.6	9073	6704	504.5	3081.6
MEAN	34.2	131	184	280	142	287	79.9	158	302	216	16.3	103
MAX	143	300	214	300	300	312	345	322	319	310	96	307
MIN	7.6	8.7	45	200	6.0	113	.70	8.5	288	95	5.7	6.0

CAL YR 1983 TOTAL 67766.40 MEAN 186 MAX 336 MIN 2.5
WTR YR 1984 TOTAL 59052.40 MEAN 161 MAX 345 MIN .70

04034000 BOND FALLS RESERVOIR NEAR PAULDING, MI

LOCATION.--Lat 46°24'29", long 89°07'42", in SW1/4 sec.1, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, at Bond Falls Dam on Middle Branch Ontonagon River, 2.5 mi east of Paulding.

DRAINAGE AREA.--190 mi^2.

PERIOD OF RECORD.--June 1942 to current year. Prior to October 1950, monthend contents only published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,335.59 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Reservoir is formed by earthfill and concrete dam with one taintor gate; dam completed 1937. Usable capacity, 41,300 acre-ft between gage heights of 120 ft (maximum drawdown) and 141 ft (full pond). Dead storage unknown. Water diverted to South Branch Ontonagon River through Bond Falls Canal (station 04033500); water used for power production at Victoria Dam near Rockland.

COOPERATION.--Gage-height record furnished by Upper Peninsula Power Co. and converted to acre-feet by Geological Survey.

EXTREMES FOR PERIOD OF RECORD (SINCE 1947).--Maximum contents observed, 42,980 acre-ft July 3, 1953, gage height, 141.7 ft, of which 1,680 acre-ft was uncontrolled storage; no usable storage at times; minimum gage height observed, 116.0 ft Mar. 21, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 38,900 acre-ft May 15-17, gage height, 140.0 ft; minimum, 10,000 acre-ft Apr. 3, gage height, 126.0 ft.

MONTHEND GAGE HEIGHT AND CONTENTS AT 1200, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft^3/s)
Sept. 30	130.7	18930	--	--
Oct. 31	135.4	28480	+9550	+155
Nov. 30	137.1	32230	+3750	+63.0
Dec. 31	136.1	30020	-2210	-35.9
CAL YR 1983	--	--	-5430	-7.5
Jan. 31	131.3	20100	-9920	-161
Feb. 29	132.0	21500	+1400	+24.3
Mar. 31	126.4	10760	-10740	-175
Apr. 30	134.6	26760	+16000	+269
May 31	138.2	34760	+8000	+130
June 30	133.2	23900	-10860	-183
July 31	128.3	14370	-9530	-155
Aug. 31	131.5	20500	+6130	+99.7
Sept. 30	132.7	22900	+2400	+40.3
WTR YR 1984	--	--	+3970	+5.5

04034500 MIDDLE BRANCH ONTONAGON RIVER NEAR TROUT CREEK, MI

LOCATION.--Lat 46°28'40", long 89°05'25", in SW1/4 sec.8, T.47 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.1 mi upstream from State Highway 28, 3.8 mi west of village of Trout Creek, and 7.5 mi downstream from Bond Falls Reservoir.

DRAINAGE AREA.--203 mi^2.

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

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,132.03 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 4, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good. Flow regulated by Bond Falls Reservoir (station 04034000) 7.5 mi upstream. Diversion to South Branch Ontonagon River 8.5 mi upstream by Bond Falls Canal (station 04033500). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 66.7 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,750 ft^3/s Nov. 7, 1951, gage height, 5.05 ft; minimum, 14 ft^3/s sometime during period Jan. 23 to Feb. 13, 1947, gage height, 1.14 ft, from recorded range in stage, caused by ice jams upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 165 ft^3/s June 26, gage height, 2.22 ft; minimum daily, 41 ft^3/s Feb. 5-7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	49	49	45	43	46	43	70	50	54	60	65
2	49	48	45	45	43	46	44	65	58	53	62	75
3	48	46	48	45	43	46	45	70	56	56	62	72
4	48	46	51	46	42	45	46	65	57	54	62	67
5	49	46	50	46	41	45	50	57	59	53	64	51
6	48	46	48	45	41	45	53	53	57	54	65	50
7	51	46	47	45	41	45	54	56	57	53	63	50
8	51	46	47	44	42	44	58	58	64	53	65	51
9	50	49	47	44	42	44	63	73	57	54	63	50
10	48	48	47	45	43	43	69	60	59	60	63	50
11	54	47	48	45	42	43	76	55	58	59	63	50
12	77	46	49	45	49	43	83	53	61	58	63	54
13	61	46	48	45	51	44	91	53	58	60	63	53
14	69	47	48	45	47	44	75	51	56	59	65	51
15	58	50	46	45	46	45	65	51	55	60	64	52
16	56	51	46	45	46	43	60	51	57	59	64	51
17	53	50	45	45	47	44	67	50	56	59	65	50
18	52	48	45	45	47	45	84	50	56	59	72	50
19	51	50	48	45	46	43	84	50	55	58	65	50
20	51	59	48	45	46	43	84	50	55	58	64	50
21	50	60	47	45	45	43	84	50	55	58	68	50
22	50	52	47	44	46	43	84	53	56	58	67	50
23	50	61	47	44	47	44	84	51	55	58	65	49
24	50	69	47	44	48	44	84	50	54	58	64	69
25	50	54	46	43	47	44	76	50	54	58	64	59
26	50	50	46	43	46	43	48	49	76	58	65	55
27	50	50	46	42	47	43	52	48	87	58	81	51
28	50	49	46	43	46	43	54	48	64	58	67	51
29	50	52	46	42	45	42	49	48	58	58	65	50
30	50	50	45	42	---	42	99	48	56	58	65	50
31	50	---	45	43	---	43	---	48	---	59	64	---
TOTAL	1622	1511	1458	1375	1305	1360	2008	1684	1756	1772	2012	1626
MEAN	52.3	50.4	47.0	44.4	45.0	43.9	66.9	54.3	58.5	57.2	64.9	54.2
MAX	77	69	51	46	51	46	99	73	87	60	81	75
MIN	48	46	45	42	41	42	43	48	50	53	60	49

CAL YR 1983 TOTAL 22338 MEAN 61.2 MAX 370 MIN 45
WTR YR 1984 TOTAL 19489 MEAN 53.2 MAX 99 MIN 41

04035500 MIDDLE BRANCH ONTONAGON RIVER NEAR ROCKLAND, MI

LOCATION.--Lat 46°41'57", long 89°09'36", in SE1/4 sec.27, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 10 ft upstream from bridge on U.S. Highway 45, 700 ft downstream from East Branch, and 2.8 mi southeast of Rockland.

DRAINAGE AREA.--671 mi^2.

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

GAGE.--Water-stage recorder. Datum of gage is 661.1 ft National Geodetic Vertical Datum of 1929. Prior to Apr. 1, 1959, nonrecording gage at site 400 ft upstream at same datum. Apr. 1, 1959 to Oct. 21, 1968, nonrecording gage at present site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Regulation by Bond Falls Reservoir (station 04034000) 30.0 mi upstream. Diversion to South Branch Ontonagon River by Bond Falls Canal (station 04033500) 31.0 mi upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 533 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 27,000 ft^3/s Aug. 22, 1942, gage height, 21.2 ft, from floodmarks, from rating curve extended above 7,500 ft^3/s on basis of slope-area measurement of peak flow; minimum observed, 142 ft^3/s Dec. 3, 1963, discharge measurement; minimum daily, 145 ft^3/s Dec. 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,540 ft^3/s Apr. 12, gage height, 8.05 ft; minimum, 185 ft^3/s July 29; minimum daily, 194 ft^3/s July 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	252	298	477	340	275	500	557	2460	267	315	264	254
2	256	295	460	335	270	470	705	1870	278	282	324	309
3	278	295	430	330	270	430	981	2690	293	316	317	568
4	282	295	470	330	270	400	1150	2230	321	299	295	485
5	291	289	500	330	270	360	1770	1410	304	268	277	390
6	299	287	487	330	270	345	2340	1050	298	254	326	316
7	292	290	462	325	275	320	2210	950	283	250	328	278
8	382	290	460	325	280	300	2390	1320	369	242	470	265
9	392	305	440	320	290	280	2750	2620	378	240	510	261
10	335	349	430	320	300	265	2890	1470	336	245	441	255
11	365	359	430	315	330	255	3230	953	325	252	361	250
12	2540	332	425	310	390	250	3590	713	379	256	324	259
13	2280	326	420	310	580	255	3850	587	451	262	289	295
14	2820	346	420	305	900	260	2830	523	399	264	274	304
15	1980	371	415	300	1400	270	2220	469	329	273	334	296
16	1330	644	410	300	1300	280	1790	425	307	267	334	290
17	940	650	405	295	1200	290	1360	404	305	252	299	275
18	666	526	400	295	1100	285	1140	388	302	250	355	260
19	543	480	390	295	1050	275	1000	365	282	250	320	250
20	474	986	385	290	1000	270	877	349	271	244	280	240
21	422	1620	380	290	900	280	715	336	266	225	273	230
22	390	960	375	290	850	290	609	391	284	220	309	230
23	372	1040	370	285	900	310	552	425	293	220	321	230
24	364	2250	365	285	800	325	519	369	271	220	295	360
25	350	1110	360	280	720	340	501	348	248	205	269	820
26	338	708	360	280	620	360	460	327	249	205	249	881
27	332	660	355	280	580	380	475	303	1360	201	358	649
28	324	568	350	280	550	390	700	286	827	201	410	496
29	314	472	350	275	450	370	584	271	488	194	354	426
30	310	493	345	275	---	390	2780	267	370	195	306	388
31	307	---	340	275	---	450	---	262	---	214	273	---
TOTAL	20820	17894	12666	9395	18390	10245	47525	26831	11133	7581	10139	10810
MEAN	672	596	409	303	634	330	1584	866	371	245	327	360
MAX	2820	2250	500	340	1400	500	3850	2690	1360	316	510	881
MIN	252	287	340	275	270	250	460	262	248	194	249	230

CAL YR 1983 TOTAL 219658 MEAN 602 MAX 4420 MIN 217
WTR YR 1984 TOTAL 203429 MEAN 556 MAX 3850 MIN 194

04036000 WEST BRANCH ONTONAGON RIVER NEAR BERGLAND, MI

LOCATION.--Lat 46°35'15", long 89°32'30", in SW1/4 NE1/4 sec.3, T.48 N., R.42 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.4 mi downstream from dam at outlet of Gogebic Lake, and 1.5 mi east of Bergland.

DRAINAGE AREA.--162 mi^2.

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

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,290.81 ft National Geodetic Vertical Datum of 1929. Prior to Nov. 5, 1942, nonrecording gage 0.4 mi upstream at different datum.

REMARKS.--Records good. Flow regulated by Gogebic Lake, usable capacity, 35,200 acre-ft. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 176 ft^3/s, 14.75 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,400 ft^3/s Apr. 26, 1960, gage height, 5.98 ft; minimum daily, 0.70 ft^3/s Sept. 26 to Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 940 ft^3/s May 11, gage height, 4.90 ft; minimum daily, 20 ft^3/s Sept. 1, 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	178	250	309	198	206	171	135	70	49	36	25	20
2	170	233	300	194	202	169	134	68	47	36	23	20
3	163	216	292	190	201	169	135	58	48	36	23	88
4	161	219	290	186	194	164	136	60	46	36	22	226
5	162	213	231	182	189	167	140	112	46	36	24	273
6	160	158	180	154	188	162	145	206	44	35	23	273
7	148	110	118	140	184	161	152	357	46	35	24	271
8	147	144	182	137	181	160	162	801	117	35	24	265
9	148	133	277	133	179	156	173	873	190	36	22	257
10	153	134	292	133	176	155	191	891	178	36	22	250
11	150	136	292	131	172	151	213	884	142	36	22	242
12	158	141	290	130	172	146	242	850	113	36	22	240
13	168	141	248	147	179	146	289	825	114	36	22	240
14	184	136	222	155	180	145	342	796	110	36	22	280
15	187	132	226	152	179	146	387	504	111	35	22	330
16	203	132	229	152	178	144	420	282	111	35	22	316
17	201	134	243	153	179	141	443	329	109	35	22	314
18	191	137	253	151	178	141	453	337	109	34	22	233
19	191	133	243	148	180	138	466	236	105	34	22	186
20	217	143	236	145	181	137	468	77	85	34	22	174
21	253	174	231	143	182	140	459	76	44	34	22	175
22	246	157	234	138	181	147	453	77	44	35	22	176
23	240	173	229	135	181	149	378	77	43	35	22	163
24	275	202	222	135	180	146	191	165	41	35	22	168
25	298	194	217	134	180	143	99	192	39	34	22	181
26	302	202	213	130	179	142	63	192	40	34	22	200
27	318	202	206	180	177	141	60	185	40	34	24	202
28	289	206	210	222	175	139	66	116	39	32	24	208
29	276	261	206	219	174	137	52	63	36	32	24	204
30	270	312	206	216	---	136	59	63	36	28	23	204
31	262	---	204	212	---	136	---	58	---	24	21	---
TOTAL	6469	5258	7331	4975	5287	4625	7106	9880	2322	1065	700	6379
MEAN	209	175	236	160	182	149	237	319	77.4	34.4	22.6	213
MAX	318	312	309	222	206	171	468	891	190	36	25	330
MIN	147	110	118	130	172	136	52	58	36	24	21	20

CAL YR 1983 TOTAL 70160.2 MEAN 192 MAX 708 MIN 1.8 CFSM 1.19 IN 16.11
WTR YR 1984 TOTAL 61397.0 MEAN 168 MAX 891 MIN 20 CFSM 1.04 IN 14.09

04037500 CISCO BRANCH ONTONAGON RIVER AT CISCO LAKE OUTLET, MI

LOCATION.--Lat 46°15'12", long 89°27'05", in NE1/4 sec.32, T.45 N., R.41 W., Gogebic County, Hydrologic Unit 04020102, on left bank 80 ft downstream from Cisco Lake Dam, 2.5 mi upstream from Langford Creek, 5.0 mi upstream from U.S. Highway 2, and 13 mi west of Watersmeet.

DRAINAGE AREA.--50.7 mi^2.

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

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,672.69 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, nonrecording gage at same site and at datum 4.00 ft higher.

REMARKS.--Records good except those below 10.0 ft^3/s, which are poor. Flow completely regulated by Cisco Lake, usable capacity, 15,600 acre-ft. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 47.6 ft^3/s, 12.75 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 288 ft^3/s May 1-4, 1951, gage height, 6.10 ft, present datum; minimum daily, 0.09 ft^3/s June 4-23, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 178 ft^3/s Oct. 12, gage height, 5.55 ft; minimum daily, 0.16 ft^3/s July 30, 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.5	101	72	33	12	48	51	3.9	.42	.56	.19	.24
2	1.4	98	71	33	12	48	51	3.6	.36	.70	15	.32
3	1.2	95	71	33	13	48	51	3.0	.35	19	28	.38
4	.64	93	70	33	14	48	51	2.5	.36	29	28	74
5	.65	91	70	34	15	48	51	2.3	.71	28	31	135
6	.63	88	69	34	15	49	51	2.1	17	27	44	132
7	41	86	69	34	32	50	50	2.3	30	26	74	130
8	76	84	82	34	59	49	50	2.5	53	27	97	125
9	75	84	100	35	65	48	51	3.2	73	26	121	119
10	104	84	98	35	66	49	51	3.1	72	26	98	45
11	126	83	97	44	65	49	53	2.9	70	20	68	.69
12	155	83	96	52	68	49	72	2.3	72	13	66	.69
13	173	82	95	53	70	49	87	2.0	69	14	25	.40
14	167	80	94	53	78	49	89	1.8	68	14	.78	.29
15	167	64	95	53	83	49	91	1.5	67	13	16	.26
16	163	51	94	53	83	49	90	.64	66	5.6	31	.25
17	157	51	93	53	82	49	90	27	64	.30	32	.25
18	152	51	92	52	80	48	89	60	33	.31	31	.25
19	148	51	90	50	81	48	89	67	.89	.31	31	.25
20	143	54	87	51	80	48	86	67	.46	.29	44	.25
21	139	55	86	51	80	49	72	66	.38	.30	55	.26
22	134	56	86	51	65	52	70	66	.34	.34	54	21
23	129	62	84	50	49	52	74	65	.34	.28	53	39
24	121	66	83	49	49	52	73	65	.34	.24	52	79
25	120	67	83	49	49	52	68	63	.34	.22	51	107
26	120	67	78	49	49	52	28	36	.36	.19	51	105
27	118	67	53	49	49	52	1.4	1.5	.54	.19	53	104
28	111	69	53	48	48	51	1.2	.95	.44	.19	52	100
29	109	72	53	48	48	51	1.2	.68	.47	.19	51	98
30	107	72	53	41	---	51	3.6	.58	.60	.16	24	95
31	104	---	43	20	---	51	---	.42	---	.16	.28	---
TOTAL	3165.02	2207	2460	1357	1559	1537	1736.4	625.77	761.70	292.53	1377.25	1512.78
MEAN	102	73.6	79.4	43.8	53.8	49.6	57.9	20.2	25.4	9.44	44.4	50.4
MAX	173	101	100	53	83	52	91	67	73	29	121	135
MIN	.63	51	43	20	12	48	1.2	42	.34	.16	.19	.24

CAL YR 1983 TOTAL 20859.55 MEAN 57.1 MAX 188 MIN .25 CFSM 1.13 IN 15.30
WTR YR 1984 TOTAL 18591.45 MEAN 50.8 MAX 173 MIN .16 CFSM 1.00 IN 13.64

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°43'15", long 89°12'25", in NE1/4 sec.20, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 50 ft downstream from bridge on Victoria Road, 1.8 mi southwest of Rockland, and 2.4 mi downstream from confluence of Middle and West Branches.

DRAINAGE AREA.--1,340 mi^2.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS.--WSP 1387: 1943, 1946-47. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 638.72 ft National Geodetic Vertical Datum of 1929. Prior to Nov. 23, 1943, nonrecording gage and Nov. 23, 1943 to Oct. 17, 1967, water-stage recorder at site 50 ft upstream at same datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Flow regulated by Victoria powerplant on West Branch 5 mi upstream; Bond Falls Reservoir (station 04034000) 34 mi upstream; Gogebic and Cisco Lakes, combined usable capacity, 50,800 acre-ft, in headwaters.

AVERAGE DISCHARGE.--42 years, 1,426 ft^3/s, 14.45 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 42,000 ft^3/s Aug. 22, 1942, gage height, 28.6 ft, from floodmark, from rating curve extended above 14,000 ft^3/s on basis of slope-area measurement of peak flow; minimum daily, 192 ft^3/s July 28, 29, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 9,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 13	0400	*10,300	*13.15	May 9	1100	9,390	12.68

Minimum daily discharge, 318 ft^3/s Aug. 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	704	957	1330	1000	900	1100	1300	4540	760	849	602	548
2	662	1080	1300	1000	950	1050	1600	3840	800	747	542	572
3	674	1050	1250	1000	860	1100	2000	5140	697	878	450	885
4	768	929	1350	1000	920	1050	2520	5760	841	768	525	1150
5	734	894	1450	1000	900	1100	3100	4800	734	768	560	1270
6	716	1010	1520	1000	900	1000	4260	3910	848	734	420	1040
7	768	1040	1310	1000	900	1050	4590	2980	690	747	318	1070
8	887	936	1170	1000	900	1050	5200	4280	859	722	465	957
9	883	992	1150	950	950	1050	5860	7480	1010	775	602	951
10	831	1230	1280	900	1000	1050	6420	5400	1120	722	548	941
11	904	1080	1540	920	1050	1000	7200	3790	1070	722	506	921
12	4370	929	1400	940	1100	980	8410	2900	1080	761	614	851
13	4780	922	1350	960	2100	940	9860	2420	1080	680	519	875
14	6200	1010	1350	980	2700	920	8300	1940	1170	740	430	734
15	4930	1030	1300	980	3500	920	6780	1880	983	704	578	754
16	3490	1440	1200	980	2500	920	5300	1440	859	754	644	925
17	2630	1770	1100	960	2400	900	4350	1150	968	747	608	899
18	2140	1530	1100	960	2200	900	3150	1270	925	740	662	873
19	1670	1150	1100	980	2000	900	2740	1320	810	974	542	728
20	1260	1940	1000	950	1800	900	2620	1280	835	959	425	728
21	1180	4000	1000	900	1700	900	2210	1190	680	761	430	859
22	978	3070	1100	860	1600	900	2000	1020	845	575	460	817
23	845	2850	1150	900	1650	940	1900	1220	734	512	536	817
24	698	4810	1100	950	1700	1000	1600	1310	668	716	560	1010
25	1000	3540	1050	900	1900	1050	1210	1250	803	710	536	1920
26	1200	2390	1050	950	1400	1050	1160	1250	644	500	518	2210
27	1140	1530	1100	850	1300	1050	1280	1030	2140	505	626	1940
28	950	1550	1100	950	1250	1100	1800	958	2060	439	912	1620
29	971	1350	1050	960	1200	1050	1800	834	1230	464	849	1440
30	1120	1370	1000	1000	---	1150	3680	624	839	475	614	1290
31	964	---	1000	1000	---	1200	---	753	---	476	524	---
TOTAL	51047	49379	37250	29680	44230	31270	114200	78959	28782	21624	17125	31595
MEAN	1647	1646	1202	957	1525	1009	3807	2547	959	698	552	1053
MAX	6200	4810	1540	1000	3500	1200	9860	7480	2140	974	912	2210
MIN	662	894	1000	850	860	900	1160	624	644	439	318	548

CAL YR 1983	TOTAL	619843	MEAN	1698	MAX	10600	MIN 375	CFSM	1.27	IN	17.21
WTR YR 1984	TOTAL	535141	MEAN	1462	MAX	9860	MIN 318	CFSM	1.09	IN	14.86

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1972 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURES: October 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1977.

REMARKS.--Quarterly samples were collected during the year as a cross-section sample at upstream side of bridge on Victoria Road. Complete ice cover during winter period. Daily record for water years 1975, 1978-81 is from once-daily observer samples.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1975-80), 192 micromhos Mar. 26, 1977, May 28, 1978; minimum (water years 1975-76, 1979-80), 45 micromhos Dec. 2, 1975.
WATER TEMPERATURES: Maximum (water years 1975-80), 28.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
18...	1500	2340	80	7.7	6.5	34	11.8	98	160	400
JAN										
26...	1015	925	126	7.4	.0	9.4	12.5	87	K7	K900
APR										
17...	1545	3880	62	7.7	6.0	40	12.1	100	K5	K30
JUL										
25...	1115	270	137	8.1	23.0	7.1	8.1	96	K9	K18

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT										
18...	42	6	12	2.9	1.7	8	.1	1.0	36	1.4
JAN										
26...	70	7	19	5.5	2.6	7	.1	.80	63	4.9
APR										
17...	31	1	9.1	2.1	1.4	9	.1	.90	30	1.2
JUL										
25...	72	0	20	5.3	2.4	7	.1	.90	71	1.1

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT									
18...	8.8	2.2	<.10	9.1	79	60	.11	499	.10
JAN									
26...	10	2.6	<.10	11	93	90	.13	232	<.10
APR									
17...	5.0	1.4	<.10	6.7	47	45	.06	492	<.10
JUL									
25...	4.1	2.5	<.10	7.9	109	86	.15	79	<.10

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 18...	.060	.70	.050	.15	.020	<.010	74	468	88
JAN 26...	.140	.60	.030	.09	.030	<.010	--	--	--
APR 17...	.040	--	.060	.18	.010	.030	128	1340	81
JUL 25...	<.010	.20	.030	--	<.010	<.010	20	15	95

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT 18...	1500	120	1	32	<.5	<1	<1	<3	3	270	1
JAN 26...	1015	40	1	43	<.5	<1	8	<3	1	260	2
APR 17...	1545	170	<1	24	<.5	<1	7	<3	5	250	1
JUL 25...	1115	30	<1	36	1	<1	<1	<3	2	74	4

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 18...	<4	15	<.1	<10	1	<1	<1	28	<6	8
JAN 26...	4	20	.1	<10	6	<1	<1	47	<6	10
APR 17...	<4	15	<.1	<10	3	<1	<1	22	<6	8
JUL 25...	<4	14	3	<10	<1	<1	<1	48	<6	8

04040500 STURGEON RIVER NEAR SIDNAW, MI

LOCATION.--Lat 46°35'03", long 88°34'33", in NE1/4 SE1/4 sec.5, T.48 N., R.34 W., Baraga County, Hydrologic Unit 04020104, on right bank 30 ft downstream from highway bridge, 3.0 mi downstream from Rock River, 3.5 mi northwest of Covington, 6.5 mi upstream from Perch River, 8.5 mi northeast of Sidnaw, and at mile 71.

DRAINAGE AREA.--171 mi^2.

PERIOD OF RECORD.--October 1912 to September 1915, April 1943 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1507: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,214.40 ft National Geodetic Vertical Datum of 1929. October 1912 to September 1915, nonrecording gage at site 200 ft upstream at different datum. Apr. 2, 1943 to Oct. 1, 1946, nonrecording gage at present site and datum.

REMARKS.--Records excellent except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--44 years, 216 ft^3/s, 17.15 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,630 ft^3/s Apr. 24, 1960, gage height, 11.63 ft; minimum, 2.7 ft^3/s Sept. 13, 1976, gage height, 3.17 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,750 ft^3/s Apr. 15, gage height, 7.72 ft; minimum, 9.2 ft^3/s July 31, gage height, 3.18 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	122	240	100	64	160	105	1090	87	48	14	40
2	93	119	220	100	64	150	115	997	95	41	15	40
3	87	120	200	100	64	145	140	896	124	41	18	86
4	84	117	190	100	64	140	160	860	130	38	21	114
5	85	111	180	100	64	130	190	780	113	34	24	113
6	87	108	170	100	64	120	220	690	103	32	39	93
7	85	106	160	98	64	110	270	620	98	31	138	79
8	128	104	150	96	64	105	320	590	111	28	205	70
9	148	106	145	94	65	100	480	855	115	28	203	70
10	138	122	140	92	65	92	580	908	108	27	169	65
11	128	128	135	90	67	86	755	775	117	26	140	62
12	354	111	130	88	90	82	955	625	140	24	121	59
13	580	120	130	86	200	80	1380	515	168	22	102	67
14	790	120	125	84	400	80	1670	428	146	24	87	73
15	795	124	120	82	380	82	1710	372	122	31	78	82
16	740	166	120	80	350	85	1660	330	106	29	65	82
17	685	183	120	78	340	88	1500	294	100	29	55	70
18	600	171	120	76	330	88	1300	264	96	39	49	65
19	495	178	120	72	320	82	1130	237	84	36	49	58
20	399	372	115	70	300	80	1000	212	70	32	48	50
21	345	565	115	68	270	83	908	195	60	26	44	43
22	297	520	115	66	260	88	805	190	53	23	44	39
23	261	615	110	66	280	96	715	185	49	22	51	37
24	227	830	110	66	270	105	625	171	43	20	49	48
25	209	700	110	66	250	110	565	164	38	18	43	150
26	195	550	105	68	230	110	520	151	35	16	39	223
27	180	430	105	68	210	105	495	138	46	14	57	232
28	166	350	105	68	190	98	585	124	56	12	66	205
29	151	300	105	66	170	96	530	111	63	12	62	181
30	138	270	105	66	---	96	920	103	58	11	60	158
31	130	---	100	64	---	100	---	95	---	10	49	---
TOTAL	8900	7938	4215	2518	5549	3172	22308	13965	2734	824	2204	2754
MEAN	287	265	136	81.2	191	102	744	450	91.1	26.6	71.1	91.8
MAX	795	830	240	100	400	160	1710	1090	168	48	205	232
MIN	84	104	100	64	64	80	105	95	35	10	14	37
CFSM	1.68	1.55	.80	.48	1.12	.60	4.35	2.63	.53	.16	.42	.54
IN.	1.94	1.73	.92	.55	1.21	.69	4.85	3.04	.59	.18	.48	.60

CAL YR 1983 TOTAL 95835 MEAN 263 MAX 1790 MIN 13 CFSM 1.54 IN 20.85
WTR YR 1984 TOTAL 77081 MEAN 211 MAX 1710 MIN 10 CFSM 1.23 IN 16.77

04041500 STURGEON RIVER NEAR ALSTON, MI

LOCATION.--Lat 46°43'35", long 88°39'43", in SE1/4 sec.15, T.50 N., R.35 W., Baraga County, Hydrologic Unit 04020104, on right bank in powerhouse of Upper Peninsula Power Co. at Prickett Dam, 4.0 mi upstream from Clear Creek, 5.0 mi southeast of Alston, and at mile 45.

DRAINAGE AREA.--346 mi^2.

PERIOD OF RECORD.--February 1932 to June 1941, October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 710.3 ft mean tide at New York City datum (levels by Corps of Engineers). Prior to Jan. 5, 1948, nonrecording gage and Jan. 5, 1948 to Sept. 30, 1963, water-stage recorder at same site at datum 40.00 ft lower.

REMARKS.--Records good. Flow regulated by powerplant at station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--50 years (water years 1933-40, 1943-84), 422 ft^3/s, 16.56 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,360 ft^3/s Apr. 24, 1960, gage height, 13.09 ft, present datum; minimum daily, 1 ft^3/s Aug. 14-19, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,570 ft^3/s Apr. 14, gage height, 7.48 ft; minimum daily, 14 ft^3/s July 21, 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	278	241	415	265	204	389	305	1560	265	16	100	220
2	268	192	540	265	207	413	305	1310	262	213	101	17
3	263	192	602	265	168	407	304	1360	15	214	100	220
4	256	188	606	265	208	367	390	1450	262	215	16	220
5	251	96	592	263	203	263	404	1150	267	212	16	219
6	247	80	359	263	205	218	430	1110	310	189	155	219
7	244	146	357	265	206	263	824	918	307	214	157	219
8	260	173	358	262	206	262	784	1080	307	215	157	219
9	287	158	335	261	205	262	794	979	314	213	157	219
10	304	94	312	263	206	131	899	1390	265	211	173	219
11	306	167	309	263	208	262	1020	1190	267	213	222	219
12	403	167	258	188	211	262	1280	1020	314	212	221	219
13	792	167	307	264	210	317	2070	872	308	214	219	219
14	1000	167	307	265	427	318	2470	740	308	214	156	219
15	1190	167	307	264	615	309	2300	625	311	18	220	219
16	1080	248	308	215	616	313	2210	630	310	213	225	18
17	1010	206	307	215	610	313	1810	625	307	211	219	220
18	928	220	309	217	605	312	1580	630	286	190	219	219
19	834	322	311	204	607	216	1550	630	254	164	16	194
20	725	504	260	212	605	302	1230	317	214	159	219	219
21	640	611	260	217	601	206	1120	309	210	14	193	219
22	565	615	262	216	605	266	999	309	209	14	219	16
23	509	885	262	198	605	260	1020	313	214	161	219	16
24	464	1540	262	201	605	308	1000	289	213	161	219	320
25	269	1060	274	213	608	307	896	316	213	164	219	422
26	118	942	266	216	607	307	722	311	215	156	16	473
27	60	867	265	217	582	258	620	311	213	153	219	270
28	60	710	265	214	415	259	630	314	214	16	219	270
29	64	614	265	212	601	259	630	266	217	16	220	270
30	227	616	265	215	---	256	1640	240	16	100	220	270
31	269	---	265	210	---	256	---	262	---	101	219	---
TOTAL	14171	12355	10370	7273	11961	8841	32236	22826	7387	4776	5250	6502
MEAN	457	412	335	235	412	285	1075	736	246	154	169	217
MAX	1190	1540	606	265	616	413	2470	1560	314	215	225	473
MIN	60	80	258	188	168	131	304	240	15	14	16	16
CFSM	1.32	1.19	.97	.68	1.19	.82	3.11	2.13	.71	.45	.49	.63
IN.	1.52	1.33	1.11	.78	1.29	.95	3.47	2.45	.79	.51	.56	.70

CAL YR 1983 TOTAL 175747 MEAN 481 MAX 2330 MIN 18 CFSM 1.39 IN 18.90
WTR YR 1984 TOTAL 143948 MEAN 393 MAX 2470 MIN 14 CFSM 1.14 IN 15.48

04043004 STURGEON RIVER NEAR CHASSELL, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°58'28", long 88°31'21", in NE1/4 SW1/4 sec.20, T.53 N., R.33 W., Houghton County, Hydrologic Unit 04020104, 2.2 mi upstream from bridge on county road, 3.5 mi south of Chassell, and at mile 5.2.

DRAINAGE AREA.--723 mi^2.

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: March 1978 to September 1981.
WATER TEMPERATURES: March 1978 to September 1981.

REMARKS.--Quarterly samples were collected during the year as a cross-section sample at bridge 2.2 mi downstream from gage, or in the winter through the ice in the vicinity of the gage site. Diurnal fluctuation and occasional slight regulation by powerplant at Prickett Dam at mile 45. Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 267 micromhos Feb. 19, 1980; minimum daily, 46 micromhos Apr. 26, 27, 29, 1979.
WATER TEMPERATURES: Maximum daily, 26.0°C July 26, 1978, July 13, 1979; minimum daily, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT 19...	1100	1750	90	7.3	7.0	7.2	11.0	91	76	210
JAN 26...	1530	547	133	7.4	.0	3.5	10.8	76	K3	190
APR 18...	1200	4110	53	7.3	4.0	16	11.6	90	K2	37
JUL 10...	1230	500	136	7.9	21.5	6.0	7.7	89	93	100

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT 19...	46	8	13	3.3	1.9	8	.1	1.0	38	3.7
JAN 26...	65	0	18	4.9	2.4	7	.1	.80	69	5.3
APR 18...	28	4	7.7	2.0	1.3	9	.1	.70	24	2.3
JUL 10...	71	3	20	5.2	2.4	7	.1	1.0	69	1.7

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT 19...	8.8	2.6	<.10	8.3	88	62	.12	416	.13
JAN 26...	8.0	2.6	<.10	9.7	95	88	.13	140	<.10
APR 18...	5.0	1.4	<.10	6.5	40	39	.05	444	<.10
JUL 10...	4.5	1.9	<.10	7.4	100	84	.14	135	<.10

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 19...	.050	.60	.070	.21	.010	<.010	42	198	80
JAN 26...	.010	.30	.020	.06	<.010	<.010	7	10	97
APR 18...	.030	--	.080	.25	<.010	<.010	252	2800	28
JUL 10...	.030	.30	.030	--	<.010	<.010	16	22	92

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT 19...	1100	60	1	35	<.5	<1	20	<3	2	320	1
JAN 26...	1530	50	1	37	<.5	<1	9	<3	3	150	2
APR 18...	1200	80	1	27	<.5	<1	20	<3	2	220	<1
JUL 10...	1230	<10	1	38	<.5	<1	<1	<3	3	180	<1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 19...	<4	17	.1	<10	1	<1	<1	32	<6	15
JAN 26...	<4	6	.1	<10	5	<1	<1	38	<6	17
APR 18...	<4	16	<.1	<10	1	<1	<1	20	<6	6
JUL 10...	6	12	.2	<10	3	<1	2	52	<6	12

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI

LOCATION.--Lat 47°13'43", long 88°23'07", in SE1/4 SE1/4 sec.20, T.56 N., R.32 W., Houghton County, Hydrologic Unit 04020103, on right bank 20 ft upstream from bridge on county highway, 2.0 mi northeast of Lake Linden, and 3.0 mi upstream from mouth.

DRAINAGE AREA.--28.0 mi^2.

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 621.7 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. From April 1973 to December 1977, flow includes about 0.1 ft^3/s mine pumpage. Small diversions for sprinkler irrigation. Discontinued publication of daily water temperature record September 30, 1983. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 46.0 ft^3/s, 22.31 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,590 ft^3/s May 10, 1979, gage height, 10.72 ft; minimum daily, 6.8 ft^3/s Oct. 3, 1976; minimum gage height, 3.85 ft June 23, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 380 ft^3/s and maximum(*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Nov. 23	--	534	7.35	May 9	0600	410	6.73
Apr. 16	0200	*602	*7.69				

Minimum discharge, 11 ft^3/s Sept. 20, 24, gage height, 3.88 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	25	60	30	23	31	28	166	30	31	15	15
2	18	25	56	30	23	29	33	130	69	27	15	15
3	22	24	52	30	23	27	41	148	62	53	15	15
4	22	23	50	30	23	27	51	152	41	39	15	15
5	20	24	47	29	23	26	68	117	34	30	15	14
6	20	23	44	28	25	26	89	100	53	28	16	14
7	19	23	41	27	24	24	91	106	47	27	19	14
8	25	23	39	27	24	24	97	224	92	25	19	15
9	24	23	37	27	24	23	111	318	67	24	20	16
10	22	27	36	27	24	22	122	149	59	23	18	15
11	28	26	35	27	24	22	170	111	81	22	17	14
12	115	24	36	27	28	22	233	88	93	21	16	14
13	106	35	36	27	58	22	394	73	118	21	15	14
14	286	23	37	26	76	23	439	64	84	22	14	14
15	195	24	38	25	84	23	496	56	57	21	14	14
16	180	36	35	25	81	22	498	52	46	20	14	14
17	113	36	34	25	75	21	372	48	40	20	14	13
18	77	31	34	25	72	21	320	45	37	21	14	13
19	58	30	33	25	65	21	359	42	32	20	14	13
20	48	116	33	25	58	21	389	39	30	19	13	12
21	43	239	33	25	52	22	321	39	27	18	14	12
22	38	116	33	24	48	24	223	66	26	17	14	12
23	35	238	33	24	53	27	190	58	26	17	14	12
24	32	336	32	24	48	24	221	54	25	16	13	60
25	31	136	32	23	42	25	225	62	24	16	13	105
26	31	100	32	23	39	26	208	48	28	16	14	71
27	29	81	31	23	36	26	178	40	117	16	47	41
28	28	74	31	23	34	26	230	36	90	16	32	36
29	27	71	30	23	33	25	125	33	54	15	24	29
30	26	65	30	23	---	25	197	32	38	15	19	24
31	25	---	30	23	---	26	---	30	---	15	16	---
TOTAL	1761	2077	1160	800	1242	753	6519	2726	1627	691	532	685
MEAN	56.8	69.2	37.4	25.8	42.8	24.3	217	87.9	54.2	22.3	17.2	22.8
MAX	286	336	60	30	84	31	498	318	118	53	47	105
MIN	18	23	30	23	23	21	28	30	24	15	13	12
CFSM	2.03	2.47	1.34	.92	1.53	.87	7.75	3.14	1.94	.80	.61	.81
IN.	2.34	2.76	1.54	1.06	1.65	1.00	8.66	3.62	2.16	.92	.71	.91

CAL YR 1983 TOTAL 18398 MEAN 50.4 MAX 416 MIN 12 CFSM 1.80 IN 24.44
WTR YR 1984 TOTAL 20573 MEAN 56.2 MAX 498 MIN 12 CFSM 2.01 IN 27.33

04044400 CARP RIVER NEAR NEGAUNEE, MI

LOCATION.--Lat 46°31'29", long 87°34'25", in SE1/4 sec.29, T.48 N., R.26 W., Marquette County, Hyrologic Unit 04020105, on right bank 30 ft downstream from bridge on U.S. Highway 41, and 2.0 mi northeast of Negaunee.

DRAINAGE AREA.--51.4 mi^2.

PERIOD OF RECORD.--July 1961 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,319.90 ft National Geodetic Vertical Datum of 1929 (Michigan Department of Highway and Transportation benchmark). Prior to Aug. 24, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by Deer Lake storage reservoir (capacity, 22,500 acre-ft) 5 mi upstream. The city of Ishpeming diverted an average of 2.2 ft^3/s into basin as waste effluent (station 04058200). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 61.5 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 545 ft^3/s May 30, 1983, gage height, 5.46 ft; minimum, 3.7 ft^3/s July 29, 1965; minimum gage height, 1.94 ft Aug. 1, 1962; minimum daily discharge, 3.9 ft^3/s July 29, 30, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 216 ft^3/s Apr. 30, gage height, 4.00 ft; minimum, 15 ft^3/s Mar. 21, gage height, 2.32 ft, storage behind ice jam.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	55	58	74	55	50	58	57	152	57	47	48	47
2	56	60	68	56	49	56	59	98	59	46	47	56
3	58	62	66	57	49	53	61	87	59	46	47	72
4	59	61	64	58	49	52	61	80	55	46	46	57
5	60	58	62	57	49	52	65	76	49	46	51	50
6	60	58	61	56	48	51	67	75	49	51	73	48
7	61	58	60	54	47	50	68	76	51	49	80	46
8	73	57	60	54	49	48	72	77	58	47	71	48
9	71	64	59	54	49	46	79	87	54	47	61	53
10	65	74	58	54	47	44	87	80	55	47	52	55
11	65	68	56	54	50	44	100	73	56	48	49	54
12	122	63	56	52	60	43	117	70	55	46	49	54
13	148	61	59	51	100	43	158	68	54	46	48	59
14	119	60	60	50	94	44	156	66	50	48	47	53
15	111	64	55	52	88	46	143	65	49	52	47	52
16	97	72	58	52	84	48	142	64	49	48	46	50
17	88	71	60	52	79	47	121	63	49	48	47	48
18	75	65	59	52	73	46	105	63	49	48	87	42
19	71	64	59	52	71	45	103	61	47	49	66	42
20	67	95	58	52	70	46	111	60	47	47	52	47
21	65	145	58	51	66	47	118	61	46	46	50	79
22	62	102	57	51	65	47	103	62	46	46	51	91
23	61	86	56	51	70	89	91	60	46	45	49	92
24	60	113	56	51	71	101	94	59	45	45	48	98
25	62	96	56	51	67	63	98	59	44	44	47	115
26	60	74	56	51	64	60	100	59	48	45	47	106
27	59	69	58	51	62	59	102	58	63	45	55	98
28	59	43	59	50	61	58	102	58	54	44	52	95
29	58	51	60	50	60	57	84	58	51	44	48	92
30	57	60	58	50	---	56	170	58	48	44	48	91
31	57	---	56	50	---	56	---	57	---	45	46	---
TOTAL	2241	2132	1842	1631	1841	1655	2994	2190	1542	1445	1655	1990
MEAN	72.3	71.1	59.4	52.6	63.5	53.4	99.8	70.6	51.4	46.6	53.4	66.3
MAX	148	145	74	58	100	101	170	152	63	52	87	115
MIN	55	43	55	50	47	43	57	57	44	44	46	42

CAL YR 1983 TOTAL 26187 MEAN 71.7 MAX 430 MIN 35
WTR YR 1984 TOTAL 23158 MEAN 63.3 MAX 170 MIN 42

04044609 SAND RIVER WILDLIFE FLOODING AT SAND RIVER, MI

LOCATION.--Lat 46°29'14", long 87°07'30", in SW¼ NE¼ sec.12, T.47 N., R.23 W., Marquette County, Hydrologic Unit 04020201, on right bank at dam at Sand River, and 1.2 miles upstream from mouth.

DRAINAGE AREA.--28.6 mi^2. Area of Sand River Wildlife Flooding is 0.6 mi^2.

PERIOD OF RECORD.--October 1983 to September 1984 (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 600.0 ft National Geodetic Vertical Datum of 1929 (Michigan Department of Natural Resources benchmark).

REMARKS.--Pond level regulated by concrete dam with two 20-foot stop-log bays and a 20-foot radial gate. Gage-height telemark at station.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 10.36 ft Oct. 15; minimum, 7.25 ft Apr. 24.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	9.46	8.02	7.40	7.31	8.06	7.70	9.00	9.18	9.30	8.68	8.92
2	---	9.47	7.94	7.40	7.31	8.00	7.75	8.44	9.15	9.27	8.72	8.93
3	---	9.45	7.89	7.39	7.31	7.94	7.83	8.11	9.15	9.23	8.75	9.00
4	---	9.45	7.84	7.39	7.31	7.89	7.91	8.41	9.14	9.20	8.77	9.05
5	---	9.45	7.80	7.39	7.32	7.85	8.00	8.47	9.13	9.16	8.79	9.06
6	---	9.45	7.75	7.39	7.32	7.79	8.10	8.42	9.11	9.16	8.91	9.07
7	---	9.44	7.69	7.39	7.32	7.72	8.18	8.36	9.10	9.13	9.04	9.08
8	---	9.43	7.65	7.40	7.32	7.66	8.28	8.33	9.14	9.10	9.14	9.06
9	---	9.47	7.60	7.40	7.32	7.59	8.43	8.33	9.14	9.07	9.26	9.06
10	---	9.80	7.55	7.40	7.33	7.54	8.59	8.43	9.14	9.04	9.33	9.05
11	---	10.01	7.51	7.38	7.36	7.50	8.80	8.81	9.14	9.02	9.35	9.04
12	---	10.00	7.51	7.38	7.48	7.46	9.09	9.10	9.16	9.00	9.34	9.04
13	10.21	9.93	7.51	7.38	7.93	7.44	9.53	9.30	9.19	8.97	9.30	9.12
14	10.25	9.87	7.50	7.37	8.54	7.43	9.48	9.42	9.19	8.94	9.26	9.17
15	10.29	9.83	7.51	7.36	8.81	7.46	9.21	9.47	9.17	8.96	9.21	9.25
16	10.01	9.79	7.51	7.36	8.93	7.50	8.98	9.50	9.16	8.94	9.17	9.33
17	9.66	9.75	7.51	7.36	8.93	7.49	8.71	9.54	9.14	8.95	9.12	9.36
18	9.29	9.72	7.48	7.36	8.86	7.47	8.34	9.55	9.12	8.98	9.18	9.36
19	9.37	9.70	7.47	7.34	8.76	7.45	8.16	9.54	9.09	9.00	9.18	9.33
20	9.45	9.72	7.44	7.32	8.62	7.45	8.00	9.50	9.06	9.01	9.17	9.28
21	9.59	9.46	7.43	7.32	8.54	7.49	7.87	9.48	9.03	8.99	9.14	9.24
22	9.65	9.05	7.43	7.30	8.47	7.56	7.71	9.46	9.01	8.97	9.12	9.21
23	9.64	8.65	7.43	7.30	8.46	7.57	7.48	9.43	8.98	8.94	9.09	9.17
24	9.67	8.49	7.42	7.30	8.49	7.57	7.41	9.40	8.96	8.90	9.07	9.17
25	9.64	8.41	7.41	7.32	8.46	7.60	8.01	9.36	8.92	8.87	9.04	9.30
26	9.43	8.31	7.41	7.31	8.38	7.67	8.33	9.33	8.92	8.82	9.02	9.46
27	9.25	8.22	7.41	7.31	8.28	7.72	8.48	9.29	9.05	8.79	9.02	9.53
28	9.30	8.16	7.40	7.31	8.22	7.73	8.79	9.27	9.18	8.75	8.99	9.55
29	9.36	8.12	7.39	7.31	8.13	7.74	8.81	9.24	9.27	8.72	8.97	9.53
30	9.41	8.06	7.38	7.31	---	7.73	9.03	9.22	9.30	8.68	8.97	9.49
31	9.44	---	7.40	7.31	---	7.69	---	9.20	---	8.65	8.95	---
MEAN	---	9.27	7.55	7.35	8.03	7.64	8.37	9.06	9.11	8.98	9.07	9.21
MAX	---	10.01	8.02	7.40	8.93	8.06	9.53	9.55	9.30	9.30	9.35	9.55
MIN	---	8.06	7.38	7.30	7.31	7.43	7.41	8.11	8.92	8.65	8.68	8.92

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°34'30", long 85°16'10", in NE1/4 sec.11, T.48 N., R.8 W., Luce County, Hydrologic Unit 04020202, on left bank 0.7 mi upstream from Tahquamenon (Big) Falls, 11.5 mi west of Tahquamenon Paradise, and 19 mi northeast of Newberry.

DRAINAGE AREA.--790 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1953 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 697 ft from river-profile map (nearest ft).

REMARKS.--Water-discharge records good.

AVERAGE DISCHARGE.--31 years, 936 ft^3/s, 16.09 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,990 ft^3/s May 10, 1960, gage height, 10.26 ft; minimum, 157 ft^3/s July 26, 1955; minimum gage height, 2.86 ft July 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,480 ft^3/s Apr. 18, gage height, 7.77 ft; minimum, 242 ft^3/s Aug. 23, 26, gage height, 3.23 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	508	692	1120	472	467	1180	1440	1590	394	1470	257	324
2	493	646	1090	478	467	1130	1560	1640	374	1470	272	308
3	505	606	1030	485	465	1070	1680	1690	371	1390	278	314
4	545	594	962	478	454	985	1800	1690	378	1260	282	326
5	590	574	896	480	452	903	1950	1680	366	1140	279	333
6	625	551	836	482	452	831	2110	1610	352	1010	283	333
7	656	538	768	483	452	765	2320	1530	349	888	301	322
8	714	521	711	493	452	693	2490	1500	413	785	319	321
9	774	516	665	494	448	631	2620	1440	441	669	339	339
10	792	590	640	494	446	571	2730	1410	464	578	342	381
11	784	684	609	494	443	516	2840	1330	453	509	340	422
12	757	750	578	494	449	477	2940	1240	459	458	327	469
13	796	751	557	494	508	444	3040	1170	499	416	311	772
14	1060	724	546	494	625	424	3150	1070	548	382	298	1020
15	1320	702	543	494	723	414	3200	982	569	376	282	1160
16	1500	678	532	494	805	410	3400	888	539	383	277	1250
17	1610	679	528	494	879	417	3440	804	494	417	290	1290
18	1670	664	528	494	953	416	3450	707	468	495	280	1270
19	1690	639	526	500	1040	412	3390	630	445	527	275	1190
20	1650	727	519	512	1110	414	3250	589	430	534	270	1090
21	1580	955	510	519	1150	448	3100	555	396	520	260	996
22	1490	1110	506	517	1190	587	2940	510	368	475	253	880
23	1390	1210	504	501	1240	700	2760	491	334	419	251	750
24	1290	1340	498	492	1310	791	2570	504	314	385	258	658
25	1190	1380	487	482	1320	880	2370	482	308	357	254	763
26	1100	1400	485	472	1330	977	2170	480	323	326	251	939
27	1040	1380	475	467	1320	1060	1980	482	652	304	288	1080
28	923	1280	475	467	1280	1130	1850	460	1070	288	323	1150
29	855	1190	479	467	1230	1190	1620	436	1250	276	344	1200
30	801	1150	479	467	---	1250	1560	415	1400	260	346	1200
31	740	---	473	467	---	1330	---	404	---	251	336	---
TOTAL	31438	25221	19555	15121	23460	23446	75720	30409	15221	19018	9066	22850
MEAN	1014	841	631	488	809	756	2524	981	507	613	292	762
MAX	1690	1400	1120	519	1330	1330	3450	1690	1400	1470	346	1290
MIN	493	516	473	467	443	410	1440	404	308	251	251	308
CFSM	1.28	1.07	.80	.62	1.02	.96	3.20	1.24	.64	.78	.37	.97
IN.	1.48	1.19	.92	.71	1.10	1.10	3.57	1.43	.72	.90	.43	1.08

CAL YR 1983 TOTAL 315457 MEAN 864 MAX 3040 MIN 198 CFSM 1.09 IN 14.85
WTR YR 1984 TOTAL 310525 MEAN 848 MAX 3450 MIN 251 CFSM 1.07 IN 14.62

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1973 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURES: October 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1981.

REMARKS.--Quarterly samples were collected during the year as a cross-section sample at cableway 40 ft downstream from gage. Complete ice cover during the winter period at gage. Beginning 300 ft downstream, no significant ice cover.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1976-81), 238 micromhos Jan. 24, 1977; minimum (water years 1976, 1978-81), 34 micromhos Apr. 17, 18, 1976.
WATER TEMPERATURES (water years 1976-81): Maximum, 26.5°C May 21, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT 04	1330	544	157	7.8	15.0	1.4	8.0	82	K6	22
JAN 17	1345	494	149	7.2	.0	2.8	6.7	47	K10	38
APR 09	1350	2540	66	7.3	4.0	1.5	10.3	80	K2	K10
JUL 10	1315	561	130	7.5	18.0	2.3	6.0	65	K12	K12

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT 04	81	17	22	6.2	1.9	5	.0	.60	64	2.0
JAN 17	76	16	21	5.8	2.0	5	.1	.60	60	7.3
APR 09	33	11	9.0	2.5	1.0	6	.0	.50	22	2.1
JUL 10	73	15	21	5.0	1.5	4	.0	.40	58	3.5

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT 04	19	1.9	<.10	8.3	124	99	.17	182	<.10
JAN 17	19	2.2	<.10	9.3	93	96	.13	124	.12
APR 09	9.0	2.4	<.10	5.1	62	43	.08	425	<.10
JUL 10	9.9	2.3	<.10	6.3	119	82	.16	180	<.10

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 04...	.040	.40	.020	.06	.010	<.010	9	13	100
JAN 17...	<.010	.90	.020	.06	.010	<.010	6	8.0	97
APR 09...	<.010	.40	.040	.12	.020	<.010	8	55	92
JUL 10...	.060	1.3	.030	--	.030	<.010	10	15	91

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT 04...	1330	30	1	30	<.5	<1	<1	4	1	230	3
JAN 17...	1345	70	1	33	<.5	<1	10	<3	1	310	3
APR 09...	1350	110	1	18	<.5	1	<1	<3	2	240	1
JUL 10...	1315	<10	1	30	<.5	<1	5	<3	2	610	<1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 04...	<4	7	.1	<10	1	<1	<1	54	<6	<3
JAN 17...	<4	38	<.1	<10	2	<1	<1	48	<6	7
APR 09...	<4	12	<.1	<10	1	<1	<1	22	<6	14
JUL 10...	<4	40	.4	<10	10	<1	<1	51	<6	8

04045580 ST. MARYS RIVER ABOVE SAULT STE. MARIE, MI
(National stream-quality accounting network and radiochemical station)

LOCATION.--Lat 46°29'29", long 84°25'17", in NW1/4 sec.10, T.47 N., R.1 W., Chippewa County, Hydrologic Unit 04020300, at Sault Ste. Marie municipal raw-water intake at Big Point, 2.6 mi west of the International Bridge, at Sault Ste. Marie.

DRAINAGE AREA.--80,900 mi^2, approximately.

PERIOD OF RECORD.--Water years 1970 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: March 1974 to September 1981.
WATER TEMPERATURES: March 1974 to September 1981.

REMARKS.--Quarterly samples were collected during the year at the raw-water tap in Sault Ste. Marie municipal water plant at Big Point. In addition, one depth integrated, cross-section sample was collected near the water plant simultaneous with the quarterly sampling in July. Intake is 1,500 ft out from water plant at a depth of 30 ft, 10 ft above bottom of channel.

COOPERATION.--Discharge figures are monthly means furnished by U.S. Army Corps of Engineers, Sault Ste. Marie.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 113 micromhos Oct. 26, 1980; minimum daily, 76 micromhos Apr. 24, 1975.
WATER TEMPERATURES: Maximum daily, 24.0°C July 25, 1979; minimum daily, 0.0°C Mar. 14, 15, 1974, Feb. 1, 1979.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	DISCHARGE, IN CUBIC FEET PER SECOND	SPECIFIC CONDUCTANCE (UMHOS)	PH (STANDARD UNITS)	TEMPERATURE (DEG C)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
05...	0915	61600	90	7.4	12.0	<1.0	10.4	99	<1	16
JAN										
18...	1000	75400	93	7.7	.0	<1.0	13.8	96	<1	<1
APR										
10...	0900	81600	87	7.6	3.0	1.4	13.0	98	<1	<1
JUL										
11...	1300	107000	100	7.9	20.5	<1.0	9.0	103	K5	K1
11...	1345	107000	93	8.1	13.5	<1.0	--	--	K2	K1

DATE	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)
OCT										
05...	44	0	13	2.9	1.4	6	.0	.50	44	3.4
JAN										
18...	47	3	14	2.8	1.4	6	.0	.50	44	1.7
APR										
10...	44	2	13	2.7	1.3	6	.0	.50	42	2.0
JUL										
11...	44	3	13	2.7	1.3	6	.0	.50	41	1.0
11...	44	2	13	2.7	1.5	7	.1	.50	42	.6

DATE	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)
OCT									
05...	3.8	1.4	<.10	2.3	58	52	.08	9650	.24
JAN									
18...	3.7	1.4	<.10	2.3	60	53	.08	12200	.27
APR									
10...	--	--	<.10	2.4	57	--	.08	12600	.29
JUL									
11...	3.8	1.6	.10	2.2	62	50	.08	17900	.24
11...	3.6	1.7	<.10	2.2	64	50	.09	18500	.22

04045580 ST. MARYS RIVER ABOVE SAULT STE. MARIE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 05...	.010	.20	<.010	--	<.010	<.010	--	--	--
JAN 18...	<.010	.80	.010	.03	.010	<.010	--	--	--
APR 10...	<.010	.10	<.010	--	<.010	<.010	--	--	--
JUL 11...	<.010	.40	.020	--	.010	<.010	--	--	--
11...	.020	.30	<.010	--	<.010	<.010	10	2890	68

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT 05...	0915	10	1	16	<.5	<1	<1	<3	1	14	1
JAN 18...	1000	10	1	18	<.5	<1	20	<3	4	<3	3
APR 10...	0900	30	1	18	<.5	1	<1	<3	3	14	2
JUL 11...	1300	<10	1	14	1	<1	<1	<3	1	4	1
11...	1345	<10	1	19	<.5	<1	9	<3	2	<3	<1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 05...	<4	1	<.1	<10	1	<1	<1	22	7	110
JAN 18...	<4	<1	<.1	<10	1	<1	<1	23	<6	58
APR 10...	6	2	<.1	<10	<1	<1	<1	22	<6	52
JUL 11...	4	<1	<.1	<10	6	<1	1	23	<6	34
11...	<4	<1	.1	<10	9	<1	<1	23	<6	9

DATE	TIME	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT)	GROSS BETA, DISSOLVED (PCI/L AS CS-137)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L)	URANIUM DISSOLVED, EXTRACTION (UG/L)
OCT 05...	0915	<1.5	<.4	1.3	<.4	1.1	<.4	.06	.05
APR 10...	0900	<.9	<.4	1.7	<.4	1.4	<.4	.05	.09

04056500 MANISTIQUE RIVER NEAR MANISTIQUE, MI

LOCATION.--Lat 46°01'50", long 86°09'40", in SE1/4 sec.15, T.42 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, on left bank 1.0 mi downstream from West Branch, 6.0 mi northeast of Manistique, and at mile 19.5.

DRAINAGE AREA.--1,100 mi^2, approximately.

PERIOD OF RECORD.--March 1938 to current year.

REVISED RECORDS.--WSP 1387: 1940-42(M), 1943, 1945. WSP 1627, 1727: 1938, 1939.

GAGE.--Water-stage recorder. Altitude of gage is 608 ft,from river-profile map (nearest ft). Prior to July 15, 1939, non-recording gage at site 1,600 ft upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Since July 1948, slight regulation by dam on outlet of Manistique Lake. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--46 years, 1,443 ft^3/s, 17.81 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,900 ft^3/s May 11, 1960, gage height, 12.85 ft; minimum, 288 ft^3/s Oct. 4, 1948; minimum gage height, 1.01 ft Aug. 23, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,890 ft^3/s Apr. 18, gage height, 9.86 ft; minimum, 529 ft^3/s Aug. 26, 27, gage height, 2.68 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	643	1170	1700	880	860	2000	2060	2730	927	1830	691	558
2	622	1140	1600	880	850	1920	2150	3070	899	1580	729	569
3	628	1120	1500	880	850	1850	2320	3290	882	1330	759	608
4	643	1080	1450	880	840	1720	2520	3390	861	1190	753	642
5	679	1060	1380	880	840	1580	2730	3350	851	1160	683	639
6	709	1030	1300	880	830	1480	2980	3180	856	1100	698	616
7	734	1010	1250	880	830	1350	3200	2950	869	1050	763	589
8	777	991	1180	880	830	1300	3360	2790	966	993	793	574
9	816	973	1150	880	830	1200	3500	2670	1040	950	797	574
10	850	996	1100	880	830	1120	3620	2510	1040	923	784	570
11	847	1110	1030	880	830	1040	3700	2370	1010	901	761	567
12	832	1220	1000	880	840	1000	3750	2220	959	855	727	611
13	907	1240	980	880	900	980	3880	2070	973	825	694	710
14	1140	1230	960	880	1050	980	4090	1960	1100	789	663	907
15	1510	1190	960	880	1220	980	4320	1820	1160	806	638	1000
16	1800	1170	960	880	1400	980	4580	1670	1110	845	651	1010
17	2020	1160	950	880	1520	980	4790	1580	1030	862	638	988
18	2170	1130	940	880	1680	980	4820	1520	1030	953	612	964
19	2190	1110	930	880	1800	980	4720	1450	1030	998	591	884
20	2120	1150	930	880	1900	990	4490	1370	983	985	572	827
21	2000	1300	930	880	2000	1020	4150	1290	902	949	560	783
22	1880	1450	920	870	2100	1120	3800	1250	846	902	561	750
23	1770	1650	920	870	2150	1220	3450	1240	809	858	563	731
24	1640	1800	920	870	2250	1320	3120	1220	800	825	555	719
25	1500	1950	920	870	2300	1420	2800	1200	779	787	542	899
26	1400	2000	900	870	2300	1520	2540	1160	752	764	533	1320
27	1360	2000	890	870	2250	1600	2340	1140	1000	744	531	1550
28	1340	1950	880	860	2200	1700	2260	1110	1730	725	538	1590
29	1290	1900	880	860	2150	1780	2190	1060	1950	706	553	1550
30	1250	1750	880	860	---	1900	2320	1010	1940	691	567	1490
31	1210	---	880	860	---	1980	---	970	---	676	571	---
TOTAL	39277	40030	33170	27140	41230	41990	100550	60610	31084	29552	20071	25789
MEAN	1267	1334	1070	875	1422	1355	3352	1955	1036	953	647	860
MAX	2190	2000	1700	880	2300	2000	4820	3390	1950	1830	797	1590
MIN	622	973	880	860	830	980	2060	970	752	676	531	558
CFSM	1.15	1.21	.97	.80	1.29	1.23	3.05	1.78	.94	.87	.59	.78
IN.	1.33	1.35	1.12	.92	1.39	1.42	3.40	2.05	1.05	1.00	.68	.87

CAL YR 1983 TOTAL 518520 MEAN 1421 MAX 5300 MIN 410 CFSM 1.29 IN 17.54
WTR YR 1984 TOTAL 490493 MEAN 1340 MAX 4820 MIN 531 CFSM 1.22 IN 16.59

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°58'18", long 86°14'35", in SE1/4 SE1/4 sec.1, T.41 N., R.16 W., Schoolcraft County, Hydrologic Unit 04060106, at Wyman State Nursery, 0.7 mi downstream from Indian River, 0.8 mi upstream from U.S. Highway 2, and 1.8 mi upstream from mouth.

DRAINAGE AREA.--1,445 mi^2, approximately.

PERIOD OF RECORD.--Water years 1976 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1975 to September 1981.
WATER TEMPERATURES: October 1975 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1981.

REMARKS.--Bimonthly samples were collected during the year as a cross-section sample at railroad bridge 1,200 ft downstream. Occasional regulation by dam 0.4 mi downstream. Intermittent ice cover during the winter period. Prior to Oct. 1, 1975, water-quality data collected at station 04057005 Manistique River at Manistique, MI, 1.5 mi downstream.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 254 micromhos Nov. 24, 1977; minimum (water years 1976, 1979-81), 57 micromhos Apr. 25, 1979.
WATER TEMPERATURES: Maximum (water years 1976-80), 26.5°C July 15, 23, 1979; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
26...	1045	2030	178	7.6	7.0	2.7	10.3	87	K9	K10
JAN										
05...	1115	1300	200	7.5	.0	2.9	9.6	68	<1	K6
MAR										
07...	1100	1740	160	7.3	.0	3.0	11.9	82	K2	K5
MAY										
01...	1210	4190	116	7.7	7.5	2.5	10.4	89	K2	K4
JUN										
27...	1150	964	175	7.9	18.0	3.4	7.6	84	K15	38
AUG										
29...	1130	E700	185	8.0	21.0	1.0	8.0	93	K15	K4

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT										
26...	88	32	26	5.5	1.4	3	.0	.60	56	2.7
JAN										
05...	98	28	29	6.2	1.6	3	.0	.60	70	4.3
MAR										
07...	76	19	22	5.1	1.8	5	.0	.60	57	5.5
MAY										
01...	59	17	17	4.0	1.2	4	.0	.50	42	1.6
JUN										
27...	91	24	27	5.7	1.4	3	.0	.50	67	1.6
AUG										
29...	92	17	27	6.0	1.5	3	.0	.60	75	1.4

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT									
26...	31	1.9	10	5.9	119	110	.16	652	<.10
JAN									
05...	27	1.8	<.10	6.6	134	120	.18	470	.12
MAR									
07...	20	2.1	<.10	6.4	110	92	.15	517	.15
MAY									
01...	17	1.7	<.10	4.0	92	71	.13	1040	<.10
JUN									
27...	22	1.8	<.10	5.0	129	100	.18	336	<.10
AUG									
29...	23	1.8	<.10	6.3	132	110	.18	--	<.10

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT									
26...	.250	.70	.030	.09	.030	<.010	10	55	91
JAN									
05...	.260	.70	.020	.06	.020	<.010	--	--	--
MAR									
07...	<.010	.60	.010	.03	<.010	<.010	8	38	97
MAY									
01...	<.010	.50	.030	.09	<.010	<.010	12	136	94
JUN									
27...	.010	.50	<.010	--	<.010	<.010	5	13	100
AUG									
29...	<.010	.50	<.010	--	<.010	<.010	7	--	100

DATE	TIME	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
OCT											
26...	1045	10	1	21	<.5	<1	10	<3	1	300	1
JAN											
05...	1115	30	1	26	<.5	<1	10	<3	2	360	4
MAY											
01...	1210	10	1	20	<1	<1	5	<3	2	380	3
JUN											
27...	1150	50	<1	23	<.5	<1	6	<3	<1	560	<1

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
OCT										
26...	<4	14	<.1	<10	2	<1	1	70	<6	10
JAN										
05...	<4	21	<.1	<10	1	<1	<1	78	<6	16
MAY										
01...	<4	15	<.1	<10	1	<1	<1	45	<6	11
JUN										
27...	7	24	<.1	<10	1	<1	2	77	<6	5

04057510 STURGEON RIVER NEAR NAHMA JUNCTION, MI

LOCATION.--Lat 45°56'35", long 86°42'20", in SW1/4 SE1/4 sec.17, T.41 N., R.19 W., Delta County, Hydrologic Unit 04030112, Hiawatha National Forest, on left bank 30 ft upstream from bridge on Forest Service Road 2231, 500 ft downstream from Mormon Creek, 0.1 mi east of Federal Forest Highway 13, and 3.2 mi north of Nahma Junction.

DRAINAGE AREA.--183 mi^2.

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 610.99 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 209 ft^3/s, 15.51 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft^3/s Apr. 18, 1971, Apr. 30, 1972, gage height, 9.85 ft; minimum, 35 ft^3/s Sept. 11, 12, 13, 14, 1976, gage height, 3.58 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 860 ft^3/s Apr. 14, gage height, 7.34 ft; minimum, 66 ft^3/s July 31, gage height, 3.89 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	102	164	284	115	100	180	150	744	112	257	73	79
2	103	160	277	115	99	170	165	636	109	199	178	106
3	112	154	260	110	99	160	185	555	107	162	182	175
4	122	146	245	110	98	150	210	494	102	145	150	162
5	120	140	235	110	96	145	240	428	99	133	127	135
6	121	135	225	110	96	140	280	369	103	132	204	118
7	118	133	215	110	96	140	330	346	113	124	257	109
8	161	131	205	110	96	135	370	368	185	115	238	108
9	166	137	195	110	96	130	440	351	164	110	268	105
10	151	229	185	105	96	130	500	324	146	106	235	99
11	137	259	175	105	98	125	580	295	131	104	184	94
12	270	239	165	105	100	120	596	269	140	98	157	108
13	642	214	160	105	170	120	687	250	175	92	138	272
14	727	200	155	105	230	115	836	237	161	91	124	248
15	762	210	150	105	310	115	845	215	139	104	116	198
16	698	207	145	105	300	110	839	195	123	95	118	172
17	642	195	145	105	280	110	819	193	130	108	111	146
18	576	182	140	105	270	110	723	200	161	138	110	128
19	501	173	140	105	260	115	632	189	148	128	105	115
20	435	290	140	105	250	115	558	175	127	149	99	108
21	382	496	135	100	240	120	493	164	114	126	95	103
22	333	456	135	100	240	120	437	156	105	108	98	98
23	296	441	130	100	240	130	388	166	98	101	96	94
24	266	616	130	100	240	140	352	176	92	93	89	104
25	250	576	125	100	230	150	321	164	88	85	85	322
26	237	473	125	100	215	150	295	155	89	80	83	386
27	217	413	120	100	205	140	276	145	296	78	85	321
28	204	362	120	100	195	140	278	136	495	74	85	269
29	196	345	120	100	190	135	260	128	416	71	82	230
30	183	314	120	100	---	135	572	121	330	69	84	199
31	172	---	115	100	---	140	---	116	---	67	82	---
TOTAL	9402	8190	5216	3255	5235	4135	13657	8460	4798	3542	4138	4911
MEAN	303	273	168	105	181	133	455	273	160	114	133	164
MAX	762	616	284	115	310	180	845	744	495	257	268	386
MIN	102	131	115	100	96	110	150	116	88	67	73	79
CFSM	1.66	1.49	.92	.57	.99	.73	2.49	1.49	.87	.62	.73	.90
IN.	1.91	1.66	1.06	.66	1.06	.84	2.78	1.72	.98	.72	.84	1.00

CAL YR 1983 TOTAL 80776 MEAN 221 MAX 1440 MIN 49 CFSM 1.21 IN 16.42
WTR YR 1984 TOTAL 74939 MEAN 205 MAX 845 MIN 67 CFSM 1.12 IN 15.23

04057800 MIDDLE BRANCH ESCANABA RIVER AT HUMBOLDT, MI

LOCATION.--Lat 46°29'57", long 87°53'11", in SW1/4 sec.1, T.47 N., R.29 W., Marquette County, Hydrologic Unit 04030110, on left bank 15 ft upstream from county highway, 1.5 mi downstream from Halfway Creek, and 0.3 mi north of Humboldt.

DRAINAGE AREA.--46.0 mi^2.

PERIOD OF RECORD.--June 1959 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. V-notch sharp-crested weir since Oct. 3, 1960. Datum of gage is 1,521.20 ft National Geodetic Vertical Datum of 1929 (Cleveland-Cliffs Iron Co. benchmark). Prior to Sept. 1, 1960, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. From July 1960 to June 1972, some diversion 100 ft upstream by industry for iron ore processing; figures of runoff adjusted. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 61.5 ft^3/s, 18.16 in/yr, adjusted for diversion 1960 to 1972.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,640 ft^3/s Apr. 24, 1960, gage height, 8.30 ft, from floodmark; minimum, 4.0 ft^3/s Sept. 12, 1976; minimum gage height, 1.07 ft Aug. 24, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 385 ft^3/s Apr. 16, gage height, 5.00 ft; minimum, 8.3 ft^3/s July 29, 30, gage height, 1.60 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	38	141	45	29	49	38	334	25	19	19	13
2	23	36	114	43	29	47	41	281	26	16	16	19
3	31	36	92	43	29	44	44	211	30	19	14	39
4	35	35	82	42	28	42	48	176	28	22	12	37
5	33	33	74	40	28	42	57	150	26	21	26	28
6	31	33	67	40	28	43	60	133	26	22	52	22
7	31	33	65	39	27	40	68	124	27	20	44	20
8	46	35	60	38	27	39	78	132	31	16	38	21
9	43	35	57	38	27	37	95	140	27	15	36	36
10	38	43	54	38	27	36	111	137	26	14	27	38
11	37	44	54	38	26	34	141	117	29	17	22	32
12	119	40	60	37	34	34	173	102	32	16	19	31
13	206	38	60	37	50	33	244	92	35	14	18	46
14	222	37	58	36	76	33	338	82	29	14	16	40
15	228	40	57	36	110	35	370	71	25	19	14	33
16	212	45	60	36	105	36	379	61	26	17	13	28
17	198	47	58	35	100	33	350	54	25	16	13	24
18	159	45	54	35	94	34	296	51	23	16	33	21
19	124	44	56	34	89	33	260	46	22	16	33	19
20	94	104	58	33	82	32	241	43	19	14	24	17
21	84	215	56	33	74	33	236	41	17	13	21	16
22	69	238	56	32	69	39	229	40	16	14	21	15
23	63	192	54	32	70	42	206	40	16	15	20	14
24	58	262	53	32	70	40	184	36	15	12	17	27
25	54	313	50	32	66	40	171	37	14	11	15	62
26	50	228	48	31	60	41	161	35	17	11	14	57
27	46	163	47	31	61	40	157	33	39	11	17	45
28	44	137	47	31	53	40	160	31	33	9.8	22	38
29	42	171	47	31	52	37	144	29	27	9.0	18	35
30	40	182	48	31	---	35	195	28	24	8.7	16	31
31	40	---	47	29	---	35	---	26	---	9.8	14	---
TOTAL	2521	2942	1934	1108	1620	1178	5275	2913	755	467.3	684	904
MEAN	81.3	98.1	62.4	35.7	55.9	38.0	176	94.0	25.2	15.1	22.1	30.1
MAX	228	313	141	45	110	49	379	334	39	22	52	62
MIN	21	33	47	29	26	32	38	26	14	8.7	12	13
CFSM	1.77	2.13	1.36	.78	1.22	.83	3.83	2.04	.55	.33	.48	.65
IN.	2.04	2.38	1.56	.90	1.31	.95	4.27	2.36	.61	.38	.55	.73

CAL YR 1983 TOTAL 27865.2 MEAN 76.3 MAX 794 MIN 6.5 CFSM 1.66 IN 22.53
WTR YR 1984 TOTAL 22301.3 MEAN 60.9 MAX 379 MIN 8.7 CFSM 1.32 IN 18.03

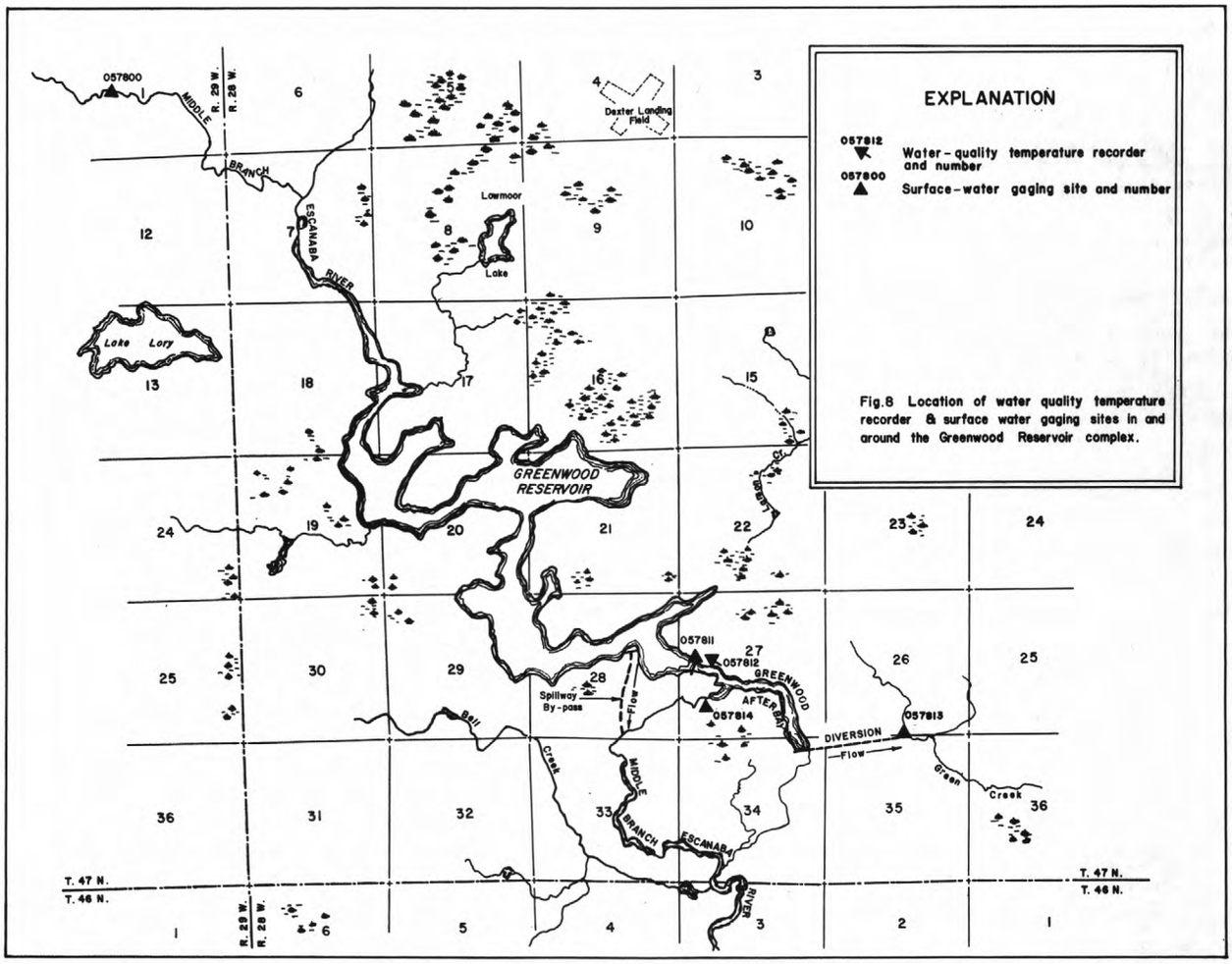


Fig.8 Location of water quality temperature recorder & surface water gaging sites in and around the Greenwood Reservoir complex.

Greenwood Reservoir is formed by an earth/rockfill main dam (Greenwood Dam) and several earthfill dikes surrounding the storage area. Storage began Dec. 22, 1972, and the fixed-crest concrete spillway was completed in September 1973. The usable capacity of the reservoir is 23,300 acre-ft at a spillway elevation of 1,515 ft. At pool elevation exceeding 1,515 ft, water flows over the spillway into the Middle Branch Escanaba River below Greenwood Release (04057814). At lower pool elevations, outflow from Greenwood Reservoir into Greenwood Afterbay is completely regulated by the multiport outlet of Greenwood Dam. Greenwood Afterbay has two outlets; one for diversion by pipeline into Green Creek and the second for releasing flows to Middle Branch Escanaba River. Water temperatures are measured directly below Greenwood Dam (Greenwood Afterbay, 04057812).

04057811 GREENWOOD RESERVOIR NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW1/4 SW1/4 sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at downstream side of dam, on Middle Branch Escanaba River, 3.7 mi southwest of Greenwood.

DRAINAGE AREA.--67.4 mi^2.

PERIOD OF RECORD.--December 1972 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft National Geodetic Vertical Datum of 1929 (levels by Cleveland-Cliffs Iron Co.); gage readings have been reduced to elevations NGVD. Prior to Feb. 20, 1973, nonrecording gage at same site and datum.

REMARKS.--The reservoir is formed by an earth/rockfill main dam and several earthfill dykes surrounding the storage area. Storage began Dec. 22, 1972. The fixed-crest concrete spillway was completed in September 1973. The usable capacity of the reservoir is 23,300 acre-ft at spillway elevation 1,515 ft. Above elevation 1,515 ft. water flows over concrete spillway into Middle Branch Escanaba River about 2,000 ft below Greenwood Release (station 04057814). The main dam is equipped with an outlet structure with 4 valves to control flow to afterbay (conservation pool) which has a capacity of 420 acre-ft at elevation 1,480 ft. Two outlet systems from the afterbay provide for diversion and release flow. Diverted flow to Green Creek gaged at Greenwood Diversion (station 04057813); released flow to Middle Branch Escanaba River gaged at Greenwood Release (station 04057814). Reservoir impounds water for diversion to Schweitzer Reservoir (station 04058190), for use in iron ore processing.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 25,400 acre-ft Apr. 26, 27, 1979, elevation, 1,516.5 ft; minimum since first filling, 3,240 acre-ft Mar. 12, 1977, elevation, 1,491.1 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 24,420 acre-ft Apr. 15, 16, 17, 18, elevation, 1,515.8 ft; minimum, 18,540 acre-ft Sept. 24, elevation, 1,511.2 ft.

MONTHEND ELEVATION, IN FEET NGVD, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft^3/s)
Sept. 30	1512.9	20580	--	--
Oct. 31	1515.0	23300	+2720	+44.2
Nov. 30	1515.3	23720	+420	+7.1
Dec. 31	1515.0	23300	-420	-6.8
CAL YR 1983	--	--	-140	-0.2
Jan. 31	1514.8	23040	-260	-4.2
Feb. 29	1515.2	23580	+540	+9.4
Mar. 31	1515.0	23300	-280	-4.6
Apr. 30	1515.5	24000	+700	+11.8
May 31	1515.0	23300	-700	-11.4
June 30	1514.3	22390	-910	-15.3
July 31	1512.4	19980	-2410	-39.2
Aug. 31	1511.5	18900	-1080	-17.6
Sept. 30	1511.5	18900	0	0
WTR YR 1984	--	--	-1680	-2.3

04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW1/4 SW1/4 sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, in control house on downstream side of Greenwood Dam on the Middle Branch Escanaba River, 3.5 mi southwest of Greenwood.

DRAINAGE AREA.--67.4 mi^2.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: January 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Jan. 31, 1973.

REMARKS.--Flow regulated by the multi-port outlets of Greenwood Reservoir. Elevations of outlets are: (No. 1) 1,505 ft, (No. 2) 1,495 ft, (No. 3) 1,485 ft, (No. 4) 1,478 ft, National Geodetic Vertical Datum of 1929. Outlet No.3 was open Oct. 1 to Sept. 30.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.5°C July 14, 15, 1974; minimum, 0.0°C on many days during January to March 1973.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 19.0°C Aug. 11-28, Aug. 30 to Sept. 1; minimum, 0.5°C Jan. 20 to Feb. 27.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

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

04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

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

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'04", long 87°46'10", in NW1/4 NE1/4 sec.35, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at downstream end of pipeline, 200 ft upstream from Green Creek, 0.7 mi downstream from Greenwood Afterbay, and 3.6 mi south of Greenwood.

PERIOD OF RECORD.--December 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Datum of gage is 1,454.57 ft National Geodetic Vertical Datum of 1929 (Cleveland-Cliffs Iron Co. benchmark). Prior to Aug. 22, 1973, nonrecording gage at same site and datum.

REMARKS.--Records excellent. Flow completely regulated. A pipeline, 0.7 mi long, diverts water from Greenwood Reservoir (station 04057811) into Green Creek, tributary to Schweitzer Reservoir (station 04058190). Water is used for iron ore processing; some returned to Middle Branch Escanaba River 27 mi downstream via another Green Creek; some returned 31 mi downstream via Goose Lake Outlet and East Branch Escanaba River. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 30 ft^3/s June 25-28, 1977, Nov. 9, 1979; no flow Dec. 27, 1972 to Jan. 6, 1973; minimum daily discharge since diversion began, 0.02 ft^3/s Nov. 3-22, 1977.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	18	17	16	17	17	17	17	21	25	26	21
2	23	18	17	16	17	17	17	17	21	25	26	21
3	22	18	17	16	17	17	17	17	21	25	26	21
4	21	18	17	16	17	17	17	16	21	25	26	20
5	21	18	17	16	17	17	17	16	21	25	26	18
6	21	18	17	17	17	17	17	16	21	25	26	14
7	21	18	17	17	17	17	17	16	21	26	26	11
8	21	18	17	17	17	17	18	17	21	26	26	11
9	21	18	17	16	17	17	18	17	21	26	26	11
10	21	18	17	16	17	17	18	17	21	26	25	11
11	21	18	17	16	17	17	18	17	21	26	25	9.9
12	22	18	17	16	17	17	18	17	21	26	25	8.2
13	22	18	17	16	17	17	18	17	21	26	25	8.4
14	22	18	17	16	17	17	18	17	21	26	25	8.4
15	22	18	17	16	17	17	18	17	21	26	25	8.4
16	22	18	17	17	17	17	18	17	21	26	25	8.4
17	22	18	17	17	17	17	18	17	21	26	25	8.4
18	22	18	17	17	17	17	17	17	21	26	25	8.4
19	22	17	17	17	17	17	17	17	21	26	25	6.6
20	22	18	16	17	17	17	17	17	21	26	25	4.3
21	22	18	16	17	17	17	17	17	21	26	24	4.3
22	22	18	16	17	17	17	17	17	21	26	24	4.4
23	22	18	16	17	17	17	16	17	21	26	23	4.4
24	19	18	16	17	17	17	17	17	21	26	22	4.4
25	18	18	16	17	17	17	17	17	21	26	20	4.5
26	18	18	16	17	17	17	17	17	22	26	20	4.5
27	18	17	16	17	17	17	16	17	24	26	20	4.5
28	18	17	16	17	17	17	16	17	24	26	21	4.6
29	18	17	16	17	17	17	16	17	24	26	21	4.6
30	18	17	16	17	---	17	17	20	24	26	21	4.6
31	18	---	16	17	---	17	---	21	---	26	21	---
TOTAL	645	535	515	515	493	527	516	530	643	800	746	283.2
MEAN	20.8	17.8	16.6	16.6	17.0	17.0	17.2	17.1	21.4	25.8	24.1	9.44
MAX	23	18	17	17	17	17	18	21	24	26	26	21
MIN	18	17	16	16	17	17	16	16	21	25	20	4.3

CAL YR 1983 TOTAL 4727.0 MEAN 13.0 MAX 27 MIN 1.7
WTR YR 1984 TOTAL 6748.2 MEAN 18.4 MAX 26 MIN 4.3

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'22", long 87°47'52", in NW1/4 SW1/4 sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at outlet of Greenwood Afterbay releasing to Middle Branch Escanaba River, 2.6 mi upstream from Bell Creek and 3.8 mi southwest of Greenwood.

DRAINAGE AREA.--67.4 mi^2.

PERIOD OF RECORD.--October 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Datum of gage is 1,473.77 ft National Geodetic Vertical Datum of 1929 (Cleveland-Cliffs Iron Co. benchmark). Prior to Nov. 7, 1973, nonrecording gage at same site and different datum.

REMARKS.--Records excellent. Since December 1972, flow from Greenwood Reservoir (station 04057811) below spillway elevation 1,515 ft is completely regulated by the afterbay release structure into the Middle Branch Escanaba River. Since January 1973, water diverted immediately above this station via Greenwood Diversion (station 04057813) to Green Creek for iron ore processing and some returned to Middle Branch Escanaba River 27mi downstream via another Green Creek. Since October 1979, some of the diversion returned 31 mi downstream via Goose Lake Outlet and East Branch Escanaba River. Overflow from the reservoir spillway bypasses and returns to the Middle Branch Escanaba River 0.5 mi downstream from this station. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge (prior to regulation), 290 ft^3/s Oct. 1, 1972; (since regulation began), 63 ft^3/s July 10, 11, 1974; minimum daily, 10 ft^3/s Dec. 29, 30, 1972, result of construction.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26	27	26	24	25	25	25	25	24	27	28	27
2	26	27	26	24	25	25	25	25	24	27	28	27
3	26	27	26	24	25	25	25	25	24	27	27	27
4	26	27	26	24	25	25	25	25	24	28	27	27
5	26	27	26	24	25	25	25	24	24	28	27	27
6	26	27	26	24	25	24	25	24	24	28	28	30
7	26	27	26	24	25	24	25	25	24	28	28	31
8	27	27	25	24	25	24	25	25	25	28	28	30
9	27	27	25	24	25	25	25	25	25	28	28	29
10	27	27	25	24	25	25	25	25	25	28	28	29
11	27	27	25	24	25	25	25	25	25	28	28	29
12	28	27	25	24	25	25	25	25	24	28	27	29
13	28	27	25	24	26	25	26	25	24	28	27	30
14	28	27	25	24	26	25	26	25	24	28	27	30
15	28	26	25	25	26	25	26	25	24	28	27	30
16	28	26	25	25	25	25	26	25	24	28	27	30
17	28	26	25	25	25	25	25	25	24	28	27	30
18	28	26	25	25	25	25	25	25	24	28	27	30
19	28	26	25	25	25	25	24	25	24	28	27	30
20	28	27	25	25	25	25	24	25	24	28	27	30
21	28	27	24	25	25	25	23	25	24	28	26	31
22	27	27	24	25	25	25	23	25	24	28	26	31
23	27	27	24	25	25	25	23	25	24	28	26	32
24	27	27	24	25	25	25	23	25	24	28	26	32
25	27	26	24	25	25	25	23	25	24	28	26	33
26	27	26	24	25	25	25	24	25	25	27	26	33
27	27	26	24	25	25	25	25	25	26	27	27	33
28	27	26	24	25	25	25	24	25	26	27	27	33
29	27	26	24	25	25	25	24	25	26	27	27	33
30	27	26	24	25	---	25	25	25	26	27	27	33
31	27	---	24	25	---	25	---	25	---	27	27	---
TOTAL	840	799	771	761	728	772	739	773	733	859	839	906
MEAN	27.1	26.6	24.9	24.5	25.1	24.9	24.6	24.9	24.4	27.7	27.1	30.2
MAX	28	27	26	25	26	25	26	25	26	28	28	33
MIN	26	26	24	24	25	24	23	24	24	27	26	27

CAL YR 1983 TOTAL 9738 MEAN 26.7 MAX 33 MIN 24
WTR YR 1984 TOTAL 9520 MEAN 26.0 MAX 33 MIN 23

04058190 SCHWEITZER RESERVOIR NEAR PALMER, MI

LOCATION.--Lat 46°25'00", long 87°38'48", in SE1/4 NW1/4 sec.2, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on left bank 120 ft upstream from dam on Schweitzer Creek, and 3.0 mi southwest of Palmer.

DRAINAGE AREA.--23.1 mi^2.

PERIOD OF RECORD.--January 1963 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,300.00 ft National Geodetic Vertical Datum of 1929 (Cleveland-Cliffs Iron Co. reference mark); gage readings have been reduced to elevations NGVD. Prior to Oct. 25, 1967, nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by an earthfill dam with fixed crest concrete spillway completed in 1963. Usable capacity of reservoir is 5,300 acre-ft at spillway elevation, 1,338.00 ft. The dam includes a discharge pipe equipped with valve to control release flow to Schweitzer Creek (station 04058200). An average of 2.2 ft^3/s was diverted from the headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 27 ft^3/s was diverted from reservoir for iron ore processing, some returned to Middle Branch Escanaba River basin via Green Creek and some returned to the East Branch Escanaba River basin via Goose Lake Outlet. Since January 1973, controlled diversion from Greenwood Reservoir (station 04057811) via Greenwood Diversion (station 04057813) into Schweitzer Reservoir. Controlled inflow averaged 19.4 ft^3/s for the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents recorded, 5,900 acre-ft May 31, 1970, elevation, 1,339.5 ft; minimum recorded since first filling, 2,920 acre-ft Apr. 10, 1974, elevation, 1,329.7 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 5,540 acre-ft Apr. 13, 14, 15, 30, May 1, elevation, 1,338.6 ft; minimum, 3,600 acre-ft July 14, elevation, 1,332.4 ft.

MONTHEND ELEVATION, IN FEET NGVD, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

Date	Elevation (feet)	Contents acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft^3/s)
Sept. 30	1336.0	4650	--	--
Oct. 31	1338.0	5300	+650	+10.6
Nov. 30	1338.1	5340	+40	+0.7
Dec. 31	1338.0	5300	-40	-0.7
CAL YR 1983	--	--	+350	+0.5
Jan. 31	1336.6	4830	-470	-7.6
Feb. 29	1338.1	5340	+510	+8.9
Mar. 31	1338.1	5340	0	0
Apr. 30	1338.6	5540	+200	+3.4
May 31	1336.7	4860	-680	-11.1
June 30	1333.1	3780	-1080	-18.1
July 31	1333.6	3930	+150	+2.4
Aug. 31	1337.9	5260	+1330	+21.6
Sept. 30	1337.2	5020	-240	-4.0
WTR YR 1984	--	--	+370	+0.5

04058200 SCHWEITZER CREEK NEAR PALMER, MI

LOCATION.--Lat 46°24'40", long 87°37'27", in SW1/4 sec.1, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft upstream from highway bridge, and 2.5 mi southwest of Palmer.

DRAINAGE AREA.--23.6 mi^2.

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Concrete control since Oct. 1, 1963. Altitude of gage is 1,270 ft from topographic map (nearest 10 ft). Prior to Aug. 21, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good except those for period of no gage-height record, Apr. 14-17, which are fair. Since August 1962, flow completely regulated by Schweitzer Reservoir (station 04058190) 1.0 mi upstream. An average of 2.2 ft^3/s was diverted from headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 27 ft^3/s was diverted from Schweitzer Reservoir by industry for iron ore processing, some returned to the Middle Branch Escanaba River via Green Creek and some returned via Goose Lake Outlet and East Branch Escanaba River. Diversion into Schweitzer Reservoir from Greenwood Reservoir via Greenwood Diversion (station 04057813). Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 860 ft^3/s May 31, 1970, gage height, 6.50 ft; minimum, 0.4 ft^3/s Sept. 6, 1962, gage height, 1.22 ft; minimum daily, 1.0 ft^3/s Apr. 9-18, May 5, 6, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 179 ft^3/s Apr. 14; minimum daily, 5.0 ft^3/s July 12, 13, 24-30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.6	7.1	24	7.4	5.4	11	16	139	5.9	5.3	5.7	5.6
2	5.7	7.5	21	7.5	5.4	9.2	19	91	5.9	5.2	5.2	6.7
3	5.6	7.8	16	7.2	5.4	11	23	65	5.8	5.5	5.2	18
4	5.7	6.8	16	6.8	5.4	12	28	44	5.8	5.2	5.1	23
5	5.6	6.4	16	6.7	5.4	15	36	32	5.9	5.7	5.3	16
6	5.6	6.2	16	7.0	5.4	12	43	27	5.8	5.4	5.5	11
7	5.9	6.2	15	6.6	5.3	11	46	24	6.0	5.2	5.5	8.0
8	5.9	6.2	12	6.4	5.4	10	50	26	6.0	5.1	5.8	6.7
9	5.7	8.2	12	5.8	5.4	9.6	58	30	5.8	5.1	5.4	6.6
10	5.6	18	11	5.6	5.4	9.0	67	29	5.8	5.1	5.2	7.0
11	6.4	18	13	5.6	5.4	8.4	80	23	5.7	5.1	5.3	6.2
12	10	13	15	5.6	6.8	8.4	92	17	5.9	5.0	5.2	6.1
13	6.9	11	13	5.6	8.5	8.4	130	14	5.8	5.0	5.1	12
14	43	10	15	5.6	7.0	9.3	179	15	5.6	5.4	5.2	13
15	70	12	19	5.6	6.5	11	157	16	5.6	5.5	5.2	9.6
16	71	17	16	5.6	6.4	11	131	10	5.7	5.2	5.2	6.5
17	59	20	12	5.6	6.3	11	98	8.0	5.7	5.5	5.3	5.6
18	40	17	12	5.6	6.3	11	75	6.7	5.4	5.3	7.9	5.5
19	28	15	11	5.6	6.3	10	67	6.3	5.5	5.2	5.6	5.5
20	22	37	10	5.6	6.1	12	60	6.3	5.5	5.2	5.5	5.4
21	20	98	9.4	5.6	7.0	15	59	6.2	5.3	5.1	5.6	5.4
22	20	77	8.6	5.6	12	18	51	6.2	5.2	5.2	5.7	5.4
23	17	57	8.5	5.6	19	12	39	6.1	5.1	5.1	5.5	5.4
24	15	70	7.7	5.6	24	11	32	6.1	5.2	5.0	5.5	6.0
25	14	64	7.2	5.6	23	14	34	6.1	5.1	5.0	5.4	5.8
26	11	44	7.7	5.6	19	16	35	6.1	7.6	5.0	5.4	5.5
27	9.6	33	8.0	5.6	16	17	36	6.0	6.6	5.0	5.6	5.5
28	9.9	33	8.6	5.6	17	17	36	6.0	5.7	5.0	5.4	5.4
29	8.2	33	7.2	5.6	15	16	30	5.9	5.4	5.0	5.5	5.5
30	7.5	28	6.2	5.6	---	16	95	5.9	5.3	5.0	5.5	5.4
31	7.2	---	7.5	5.5	---	15	---	5.9	---	5.3	5.5	---
TOTAL	552.6	787.4	381.6	184.5	271.5	377.3	1902	695.8	171.6	160.9	170.0	239.3
MEAN	17.8	26.2	12.3	5.95	9.36	12.2	63.4	22.4	5.72	5.19	5.48	7.98
MAX	71	98	24	7.5	24	18	179	139	7.6	5.7	7.9	23
MIN	5.6	6.2	6.2	5.5	5.3	8.4	16	5.9	5.1	5.0	5.1	5.4

CAL YR 1983 TOTAL 6609.1 MEAN 18.1 MAX 252 MIN 5.2
WTR YR 1984 TOTAL 5894.5 MEAN 16.1 MAX 179 MIN 5.0

04059000 ESCANABA RIVER AT CORNELL, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°54'31", long 87°12'49", in NW1/4 sec.32, T.41 N., R.23 W., Delta County, Hydrologic Unit 04030110, on right bank 50 ft downstream from bridge on County Road 519, 0.4 mi downstream from Bobs Creek, 0.7 mi northeast of Cornell, and 16 mi upstream from mouth.

DRAINAGE AREA.--870 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1903 to December 1912, January 1913 to November 1915 (gage heights only), October 1950 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Escanaba" 1903-15.

REVISED RECORDS.--WSP 1387: 1904. W 1984: 1970 (M).

GAGE.--Water-stage recorder. Datum of gage is 749.26 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). August 1903 to November 1915, nonrecording gage at site 10 mi downstream at different datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Since 1950, diurnal fluctuation and occasional slight regulation by Boney Falls powerplant 7 mi upstream. Since August 1962, some regulation by Schweitzer Reservoir (station 04058190) about 50 mi upstream. Since December 1972, some regulation by Greenwood Reservoir (station 04057811) about 60 mi upstream.

AVERAGE DISCHARGE.--43 years (water years 1904-12, 1951-84), 892 ft^3/s, 13.92 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft^3/s Apr. 26, 1979, gage height, 5.00 ft; maximum gage height, 6.40 ft Apr. 9, 1971, backwater from ice; minimum discharge observed, 90 ft^3/s July 5, 1910, gage height, 1.5 ft, site and datum then in use, but may have been less during extended periods of no gage-height record during winter periods of 1903-12, or periods of ice effect in 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,630 ft^3/s Apr. 16, gage height, 3.10 ft; maximum gage height, 5.62 ft Feb. 18, backwater from ice; minimum daily discharge, 280 ft^3/s Jan. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	434	642	1030	550	400	950	1000	3600	454	783	318	503
2	430	592	1010	550	450	850	1160	3600	425	674	442	718
3	431	593	880	560	550	800	1180	3520	396	520	515	1370
4	447	546	979	560	430	760	1240	3460	396	479	453	1470
5	466	516	892	500	400	700	1380	2780	388	475	409	1450
6	532	520	942	450	380	650	1570	2330	396	530	771	1040
7	494	525	857	400	390	600	1660	2050	396	560	978	891
8	568	523	792	430	430	610	1550	1960	565	486	971	761
9	723	521	817	450	470	620	1640	1940	662	461	1170	741
10	709	700	825	450	440	560	1840	1860	585	431	1080	717
11	672	868	840	450	420	500	2070	1750	555	454	877	669
12	1250	849	883	470	550	400	2290	1600	575	442	735	806
13	2710	741	996	450	890	340	3000	1500	720	409	600	1120
14	3200	721	960	440	1000	620	4030	1350	708	395	539	1290
15	3230	716	900	430	1000	470	4460	1220	585	385	485	1160
16	3000	753	840	350	1000	490	4530	1060	555	441	459	979
17	2670	962	780	280	1100	500	4290	1000	515	503	433	887
18	2290	843	720	600	1400	520	3660	895	535	643	1170	753
19	1980	724	800	400	1600	530	3100	785	465	591	1670	710
20	1590	908	900	350	1650	500	2610	742	415	587	1190	603
21	1410	1460	1000	430	1700	550	2350	695	405	485	1060	574
22	1150	1770	800	380	1650	500	2070	692	362	428	828	525
23	1040	1810	650	370	1600	550	1760	644	337	408	779	500
24	968	1990	600	360	1550	600	1640	608	337	396	705	538
25	990	1920	560	350	1650	630	1510	578	337	352	607	1320
26	894	1780	550	370	1350	660	1470	570	332	340	552	1610
27	774	1600	550	380	1200	700	1440	544	916	319	604	1510
28	740	1370	550	390	1100	750	1640	531	1360	320	713	1490
29	719	1210	680	400	1050	800	1570	524	1130	317	663	1040
30	674	1140	600	400	---	840	2560	495	866	288	606	885
31	693	---	540	390	---	900	---	472	---	296	534	---
TOTAL	37878	29813	24723	13340	27800	19450	66270	45355	16673	14198	22916	28630
MEAN	1222	994	798	430	959	627	2209	1463	556	458	739	954
MAX	3230	1990	1030	600	1700	950	4530	3600	1360	783	1670	1610
MIN	430	516	540	280	380	340	1000	472	332	288	318	500
CFSM	1.41	1.14	.92	.49	1.10	.72	2.54	1.68	.64	.53	.85	1.10
IN.	1.62	1.27	1.06	.57	1.19	.83	2.83	1.94	.71	.61	.98	1.22

CAL YR 1983 TOTAL 369612 MEAN 1013 MAX 4720 MIN 311 CFSM 1.16 IN 15.80
WTR YR 1984 TOTAL 347046 MEAN 948 MAX 4530 MIN 280 CFSM 1.09 IN 14.84

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969-73, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1975 to September 1981. From October 1975 to September 1981, daily figures of instrument-recorded conductance below 200 micromhos are not representative because of variability within the stream cross section. Results of a study of this variance are available in the District files.
WATER TEMPERATURES: February 1975 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1981.

REMARKS.--Bimonthly samples were collected during the year as a cross-section sample in the reach of stream from the bridge on County Road 519 to a point 200 ft downstream. The March and May samples were collected at a site 1.2 mi downstream due to bridge construction at the gage. Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily (water years 1975-76, 1978-80), 360 micromhos Sept. 10, 1975; minimum observed (water years 1975-76, 1978-81), 114 micromhos Apr. 15, 1981.
WATER TEMPERATURES: Maximum daily, 35.0°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance of 84 micromhos was observed Apr. 28, 1982.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
25...	1050	1020	145	8.1	6.5	2.3	12.1	101	--	--
JAN										
04...	1045	580	218	8.0	.0	6.8	12.8	91	12	K5
MAR										
06...	1115	650	204	7.9	.0	2.7	16.4	115	K1	K1
MAY										
02...	1400	3680	108	7.9	5.0	<1.0	12.4	100	K8	K15
JUN										
26...	1145	286	275	8.5	19.0	1.6	9.5	107	K2	K9
AUG										
28...	1300	721	231	8.4	20.5	1.4	9.4	108	K11	K24

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT										
25...	71	14	17	6.9	3.0	8	.2	.50	57	.9
JAN										
04...	89	0	21	8.8	14	25	.7	1.0	90	1.7
MAR										
06...	84	0	20	8.3	14	26	.7	.80	84	2.0
MAY										
02...	51	8	12	5.0	3.9	14	.2	.50	43	1.0
JUN										
26...	96	0	23	9.3	24	35	1	1.1	113	.7
AUG										
28...	88	0	21	8.6	18	31	.9	1.0	103	.8

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT 25...	18	3.3	.10	6.9	106	90	.14	292	.18
JAN 04...	20	5.2	<.10	10	132	130	.18	207	.27
MAR 06...	20	5.5	<.10	9.4	143	130	.19	251	.31
MAY 02...	11	2.7	<.10	4.6	90	66	.12	894	<.10
JUN 26...	26	7.0	.10	7.9	189	170	.26	146	<.10
AUG 28...	19	6.1	.10	8.7	108	140	.15	210	<.10

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 25...	.030	.60	.050	.15	.050	<.010	15	41	94
JAN 04...	.070	.70	.050	.15	.010	<.010	2	3.1	100
MAR 06...	<.010	.60	<.010	--	<.010	<.010	4	7.0	100
MAY 02...	<.010	1.0	.010	.03	<.010	<.010	6	60	88
JUN 26...	.020	.80	<.010	--	<.010	<.010	8	6.2	86
AUG 28...	<.010	.50	.010	--	<.010	<.010	6	12	100

DATE	TIME	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
OCT 25...	1050	30	1	23	<.5	<1	<1	<3	3	430	2
JAN 04...	1045	100	<1	30	<.5	1	20	<3	1	350	1
MAY 02...	1400	30	1	14	<1	<1	6	<3	4	230	2
JUN 26...	1145	30	1	18	<.5	<1	7	<3	8	180	2

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
OCT 25...	<4	20	.1	<10	1	<1	1	36	<6	24
JAN 04...	<4	5	<.1	<10	1	<1	1	42	<6	5
MAY 02...	<4	9	<.1	<10	1	<1	<1	25	<6	20
JUN 26...	5	17	.1	<10	7	<1	<1	47	<6	11

04059500 FORD RIVER NEAR HYDE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°45'20", long 87°12'05", in SW1/4 sec.19, T.39 N., R.23 W., Delta County, Hydrologic Unit 04030109, on right bank 40 ft downstream from bridge on County Road 533, 1.4 mi downstream from Tenmile Creek, and 1.5 mi north of Hyde.

DRAINAGE AREA.--450 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to current year.

GAGE.--Water-stage recorder. Datum of gage is 681.77 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period and those for period of no gage-height record, Aug. 28 to Sept. 26, which are fair.

AVERAGE DISCHARGE.--30 years, 389 ft^3/s, 11.74 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,590 ft^3/s May 7, 1960, gage height, 8.27 ft; minimum, 18 ft^3/s Aug. 30, 1976, gage height, 1.33 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,740 ft^3/s May 2, gage height, 4.59 ft; maximum gage height, 6.18 ft Feb. 23, backwater from ice; minimum discharge, 56 ft^3/s Aug. 1, gage height, 1.64 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	184	262	656	200	115	560	592	1720	124	388	61	100
2	174	250	573	200	115	520	624	1720	123	302	69	170
3	183	241	510	195	115	460	681	1640	116	234	74	400
4	178	233	480	190	115	420	756	1560	109	193	80	370
5	180	222	460	190	115	380	834	1400	113	168	95	330
6	209	207	440	180	120	350	999	1200	119	158	124	280
7	234	200	410	180	120	320	1010	1070	147	160	161	240
8	361	196	390	170	125	290	1040	979	207	155	354	215
9	403	204	380	165	130	270	1070	934	239	144	462	200
10	411	327	360	160	135	240	1100	868	263	131	481	175
11	402	435	340	155	140	220	1130	797	263	128	414	160
12	604	456	330	150	145	200	1130	719	265	129	326	240
13	1150	415	350	140	200	190	1320	671	319	126	245	350
14	1360	406	370	130	350	184	1580	644	332	121	189	460
15	1480	426	350	125	550	181	1610	575	316	120	161	400
16	1630	438	330	120	750	180	1640	503	269	110	139	350
17	1650	445	300	115	1200	180	1600	449	245	138	118	300
18	1510	448	280	110	1150	180	1480	401	235	160	189	260
19	1310	442	260	110	1100	180	1320	353	210	193	166	220
20	1120	616	250	110	1000	184	1160	316	182	208	150	190
21	926	990	240	110	940	203	999	288	157	187	125	165
22	749	1060	230	110	840	228	858	275	136	151	124	140
23	610	1130	220	110	760	240	756	254	117	127	149	120
24	516	1420	215	110	700	250	693	230	101	107	147	140
25	466	1380	210	110	680	353	635	209	90	92	133	900
26	433	1160	205	115	680	416	587	193	95	82	115	760
27	393	1080	200	115	680	444	563	179	313	76	112	748
28	356	864	200	115	640	498	652	167	459	68	130	748
29	325	772	200	115	600	568	668	162	500	65	140	750
30	303	699	200	115	---	519	1320	143	477	61	120	700
31	283	---	200	115	---	563	---	133	---	59	110	---
TOTAL	20093	17424	10139	4335	14310	9971	30407	20752	6641	4541	5463	10581
MEAN	648	581	327	140	493	322	1014	669	221	146	176	353
MAX	1650	1420	656	200	1200	568	1640	1720	500	388	481	900
MIN	174	196	200	110	115	180	563	133	90	59	61	100
CFSM	1.44	1.29	.73	.31	1.10	.72	2.25	1.49	.49	.32	.39	.78
IN.	1.66	1.44	.84	.36	1.18	.82	2.51	1.72	.55	.38	.45	.87

CAL YR 1983 TOTAL 181225 MEAN 497 MAX 3120 MIN 44 CFSM 1.10 IN 14.98
WTR YR 1984 TOTAL 154657 MEAN 423 MAX 1720 MIN 59 CFSM .94 IN 12.78

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: December 1974 to September 1981.
WATER TEMPERATURES: July 1956 to September 1981.

INSTRUMENTATION.--Temperature recorder July 1956 to September 1975. Water-quality monitor October 1975 to September 1981.

REMARKS.--Quarterly samples were collected during the year as a cross-section sample in reach of stream 75 ft upstream to 75 ft downstream from gage. Complete ice cover during winter period. Daily record of specific conductance for water year 1975 is from once-daily observer samples.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 482 micromhos Dec. 2, 1976; minimum recorded, 131 micromhos May 22, 1976.
WATER TEMPERATURES: Maximum, 31.0°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
17...	1240	1620	204	8.1	7.0	2.1	11.4	95	110	160
JAN										
23...	1200	111	336	7.8	.0	1.4	9.8	68	K3	K4
APR										
23...	1300	752	204	8.2	6.5	2.0	12.1	102	K3	36
JUL										
23...	1300	131	278	8.4	24.5	.50	9.3	114	K14	K15

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT										
17...	120	33	27	12	1.2	2	.0	.50	84	1.3
JAN										
23...	190	20	44	20	1.7	2	.0	.70	173	5.3
APR										
23...	110	11	27	11	.90	2	.0	.50	102	1.2
JUL										
23...	160	11	37	17	1.4	2	.0	.60	152	1.2

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT									
17...	25	2.7	<.10	7.2	155	130	.21	678	<.10
JAN									
23...	16	3.4	<.10	10	209	200	.28	63	.31
APR									
23...	9.3	1.8	<.10	3.4	132	120	.18	268	<.10
JUL									
23...	9.6	2.4	<.10	7.0	194	170	.26	69	<.10

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 17...	.010	.80	--	.06	.030	<.010	44	192	34
JAN 23...	.030	.80	.690	2.1	<.010	<.010	3	.90	100
APR 23...	.040	--	<.010	--	<.010	<.010	12	24	87
JUL 23...	<.010	.90	<.010	--	<.010	.010	10	3.5	89

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT 17...	1240	<10	1	25	<.5	<1	<1	<3	2	140	<1
JAN 23...	1200	30	1	20	<.5	<1	7	<3	1	140	<1
APR 23...	1300	<10	<1	15	1	1	5	<3	1	60	1
JUL 23...	1300	10	2	16	<.5	<1	<1	<3	2	53	2

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 17...	<4	7	.1	<10	1	<1	<1	31	<6	7
JAN 23...	<4	10	<.1	<10	1	<1	<1	55	<6	21
APR 23...	5	9	<.1	<10	1	<1	<1	31	<6	10
JUL 23...	<4	17	.2	<10	1	<1	2	54	<6	7

04061000 BRULE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'31", long 88°15'57", in SE1/4 SE1/4 sec.11, T.41 N., R.32 W., Michigan Meridian, Iron County, Hydrologic Unit 04030106, on left bank 40 ft upstream from highway bridge, 1.0 mi upstream from Paint River, 2.5 mi north of Florence, and 5.0 mi upstream from confluence with Michigamme River.

DRAINAGE AREA.--389 mi^2.

PERIOD OF RECORD.--January 1914 to February 1916, June 1944 to current year.

REVISED RECORDS.--WSP 1387: 1914-16. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,200.55 ft National Geodetic Vertical Datum of 1929 (levels by Owen Ayres Associates). Prior to Aug. 29, 1944, nonrecording gage at bridge 40 ft downstream at same datum.

REMARKS.--Records excellent except those for the winter period, which are fair. Discharge includes some mine pumpage prior to August 1977. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--41 years (water years 1915, 1945-84), 364 ft^3/s, 12.71 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,700 ft^3/s July 2, 1953, gage height, 6.57 ft; maximum gage height, 8.60 ft Dec.20, 1983, backwater from ice; minimum discharge, 118 ft^3/s Dec. 2, 1963 (discharge measurement); minimum gage height, 1.79 ft July 24, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,160 ft^3/s May 1, gage height, 3.54 ft; maximum gage height, 8.60 ft Dec. 20, backwater from ice; minimum discharge, 244 ft^3/s July 31, Aug. 1, 26; minimum gage height, 2.09 ft July 25, 26, 27, 31, Aug. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	321	350	500	360	325	350	400	1150	322	295	267	286
2	335	343	480	370	325	350	430	1060	328	278	363	562
3	365	339	460	370	325	340	470	868	330	273	387	769
4	348	331	450	370	315	340	500	773	326	288	339	595
5	341	326	440	370	325	330	538	687	327	288	321	469
6	338	326	430	370	325	320	631	616	346	285	317	393
7	345	331	420	370	325	310	663	594	336	279	326	349
8	470	332	410	360	325	310	691	629	443	272	424	330
9	461	357	410	360	325	300	713	630	480	276	344	341
10	410	417	400	350	325	300	741	638	422	278	317	319
11	392	412	400	350	330	300	775	574	391	295	291	295
12	668	370	400	350	340	300	812	530	414	304	275	332
13	818	365	400	350	580	300	889	517	438	330	263	497
14	722	376	400	350	580	300	964	526	393	304	263	450
15	626	396	400	350	570	310	938	479	369	353	408	376
16	605	423	400	340	550	320	843	442	367	326	387	335
17	575	433	400	340	530	330	752	428	348	368	326	315
18	507	407	400	330	500	330	646	418	332	377	330	287
19	457	403	400	320	460	320	583	408	305	344	291	267
20	429	572	390	320	460	320	552	421	291	368	267	257
21	400	816	390	310	460	320	529	426	294	317	263	257
22	382	760	390	310	440	320	490	413	286	283	275	254
23	378	733	380	310	430	330	466	399	286	271	267	258
24	385	983	370	320	420	340	452	379	291	259	259	307
25	413	1020	360	330	400	350	451	372	281	251	251	441
26	382	857	350	330	390	360	449	363	289	251	248	459
27	365	725	350	330	375	370	446	351	456	251	295	396
28	356	700	350	330	370	370	492	342	449	295	308	344
29	346	560	350	330	360	370	477	331	371	271	279	327
30	336	520	350	330	---	380	825	324	322	255	298	357
31	333	---	350	330	---	390	---	322	---	244	275	---
TOTAL	13609	15283	12380	10610	11785	10280	18608	16410	10633	9129	9524	11224
MEAN	439	509	399	342	406	332	620	529	354	294	307	374
MAX	818	1020	500	370	580	390	964	1150	480	377	424	769
MIN	321	326	350	310	315	300	400	322	281	244	248	254
CFSM	1.13	1.31	1.03	.88	1.04	.85	1.59	1.36	.91	.76	.79	.96
IN.	1.30	1.46	1.18	1.01	1.13	.98	1.78	1.57	1.02	.87	.91	1.07

CAL YR 1983 TOTAL 174206 MEAN 477 MAX 1560 MIN 268 CFSM 1.23 IN 16.66
WTR YR 1984 TOTAL 149475 MEAN 408 MAX 1150 MIN 244 CFSM 1.05 IN 14.29

04061500 PAINT RIVER AT CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'21", long 88°20'05", in SE1/4 sec.20, T.43 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 150 ft downstream from municipal powerplant at Crystal Falls, and 14.5 mi upstream from mouth.

DRAINAGE AREA.--597 mi^2.

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

REVISED RECORDS.--WSP 1174: 1947-48(m). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,306.1 ft National Geodetic Vertical Datum of 1929 (Wisconsin Electric Power Co. benchmark).

REMARKS.--Records excellent except those for the winter period, which are fair. Diurnal fluctuation caused by powerplant immediately upstream; since storage capacity is small, daily flows are not affected appreciably. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 603 ft^3/s, 13.72 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,900 ft^3/s Apr. 25, 1960, gage height, 9.82 ft; minimum, 7.7 ft^3/s Sept. 17, 1950, gage height, 0.89 ft; minimum daily, 81 ft^3/s Nov. 1, 1947.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,990 ft^3/s Apr. 14, gage height, 5.12 ft; minimum, 128 ft^3/s July 31, gage height, 1.73 ft; minimum daily, 202 ft^3/s July 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	481	476	1040	470	390	526	550	2530	416	381	251	289
2	460	474	861	455	400	517	593	2560	396	393	427	446
3	493	477	764	480	400	507	644	2280	412	352	470	664
4	468	468	781	480	400	496	687	2140	441	283	443	708
5	484	437	850	470	390	474	785	1900	417	387	338	627
6	493	439	781	460	400	470	999	1700	446	323	507	490
7	505	447	664	440	390	452	1150	1600	433	301	517	452
8	568	453	622	440	400	447	1310	1510	513	278	524	418
9	580	492	606	445	390	449	1530	1490	506	344	564	392
10	582	542	578	450	390	427	1720	1590	497	303	524	444
11	551	541	564	450	390	408	1930	1530	521	296	462	405
12	742	491	567	420	460	409	2190	1390	484	291	376	425
13	1500	498	600	415	580	406	2500	1250	498	321	423	510
14	1550	516	590	425	800	416	2880	1160	484	283	357	578
15	1530	518	580	415	1000	446	2930	1050	461	362	364	494
16	1520	562	560	415	983	458	2760	916	431	425	377	452
17	1480	595	550	430	956	443	2480	807	387	389	366	460
18	1360	591	540	410	932	424	2170	753	431	365	280	408
19	1180	585	530	425	840	429	1870	691	387	358	298	385
20	1020	743	530	410	785	428	1650	624	375	346	354	360
21	883	1300	540	400	759	437	1490	584	352	283	274	354
22	792	1470	540	390	749	426	1320	553	350	273	262	321
23	739	1520	530	390	750	421	1160	587	286	319	288	275
24	700	2280	520	380	756	441	1060	565	328	269	320	427
25	662	2300	520	400	728	466	967	557	383	267	301	689
26	615	1810	450	405	666	480	910	503	338	255	233	848
27	605	1690	490	395	615	493	868	489	591	275	350	781
28	579	1210	500	400	599	515	871	473	655	238	361	708
29	516	1140	510	400	576	519	929	437	601	202	354	651
30	468	1130	480	410	---	525	1530	419	467	293	330	564
31	521	---	470	400	---	516	---	403	---	222	323	---
TOTAL	24627	26195	18708	13175	17874	14271	44433	35041	13287	9677	11618	15025
MEAN	794	873	603	425	616	460	1481	1130	443	312	375	501
MAX	1550	2300	1040	480	1000	526	2930	2560	655	425	564	848
MIN	460	437	450	380	390	406	550	403	286	202	233	275
CFSM	1.33	1.46	1.01	.71	1.03	.77	2.48	1.89	.74	.52	.63	.84
IN.	1.53	1.63	1.17	.82	1.11	.89	2.77	2.18	.83	.60	.72	.94

CAL YR 1983 TOTAL 298366 MEAN 817 MAX 3460 MIN 275 CFSM 1.37 IN 18.59
WTR YR 1984 TOTAL 243931 MEAN 666 MAX 2930 MIN 202 CFSM 1.12 IN 15.20

04062000 PAINT RIVER NEAR ALPHA, MI

LOCATION.--Lat 46°00'40", long 88°15'30", in NW1/4 NW1/4 sec.25, T.42 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 0.6 mi downstream from Lower Paint Dam, 5.5 mi upstream from Brule River, and 6.0 mi southeast of Alpha.

DRAINAGE AREA.--631 mi^2.

PERIOD OF RECORD.--June 1952 to current year. Monthly discharge only for period October 1953 to September 1960, published in WSP 1727.

REVISED RECORDS.--WSP 1727: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,260 ft from topographic map (nearest 10 ft).

REMARKS.--Records good except those for period of no gage-height record, Dec. 18 to Jan. 31, which are fair. Flow completely regulated by powerplant and Lower Paint Dam, 0.6 mi upstream. Records not adjusted for diversion to Michigamme River by Paint River diversion canal. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 174 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,050 ft^3/s July 2, 1953, gage height, 10.50 ft; minimum daily, 62 ft^3/s Mar. 22, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,380 ft^3/s Nov. 25, gage height, 5.33 ft; minimum daily, 78 ft^3/s Nov. 10, when power failure caused automatic shut-down of generator at Lower Paint Dam.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	89	91	100	90	90	600	88	150	88	95	104	103
2	89	92	90	90	90	701	88	265	88	96	103	106
3	88	91	90	90	90	725	89	146	88	96	104	105
4	88	92	90	90	90	658	88	99	88	96	105	103
5	88	91	90	90	90	391	88	284	88	97	105	100
6	88	91	90	90	90	140	88	464	88	98	105	100
7	89	91	90	90	90	100	89	462	89	98	105	100
8	88	91	90	90	90	95	90	461	126	98	105	98
9	88	92	90	90	90	95	91	457	91	98	105	98
10	91	78	90	90	92	95	91	391	91	95	104	98
11	92	93	90	90	94	95	91	493	91	98	105	93
12	95	93	90	90	100	95	92	612	92	98	105	87
13	94	93	90	90	110	95	236	609	91	98	105	85
14	95	93	90	90	110	95	603	371	91	98	105	91
15	95	93	90	90	105	95	670	89	91	98	105	93
16	95	93	90	90	105	95	603	88	91	97	105	95
17	94	92	90	90	100	95	361	88	91	127	110	95
18	93	91	90	90	100	95	108	88	91	130	107	94
19	92	91	90	90	100	95	89	88	91	132	108	94
20	91	95	90	90	220	95	88	88	91	120	108	93
21	91	157	90	90	440	95	88	88	91	101	108	94
22	93	390	90	90	440	95	88	88	91	101	107	93
23	92	502	90	90	440	95	86	88	92	101	105	93
24	92	1010	90	90	440	95	86	88	91	101	105	94
25	93	1270	90	90	440	95	86	88	92	102	103	95
26	93	889	90	90	520	95	86	88	94	103	103	95
27	93	595	90	90	590	95	86	88	96	103	114	95
28	91	280	90	90	590	92	87	88	94	103	108	95
29	91	183	90	90	590	92	86	88	93	103	111	95
30	91	130	90	90	---	88	92	88	95	103	143	98
31	91	---	90	90	---	88	---	88	---	103	124	---
TOTAL	2833	7233	2800	2790	6536	5575	4702	6761	2765	3187	3339	2878
MEAN	91.4	241	90.3	90.0	225	180	157	218	92.2	103	108	95.9
MAX	95	1270	100	90	590	725	670	612	126	132	143	106
MIN	88	78	90	90	90	88	86	88	88	95	103	85

CAL YR 1983 TOTAL 87882 MEAN 241 MAX 3380 MIN 78
WTR YR 1984 TOTAL 51399 MEAN 140 MAX 1270 MIN 78

04062500 MICHIGAMME RIVER NEAR CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'50", long 88°12'57", in NW1/4 sec.20, T.43 N., R.31 W., Iron County, Hydrologic Unit 04030107, on right bank 400 ft upstream from highway bridge, 5.0 mi downstream from Michigamme Reservoir, 6.0 mi east of Crystal Falls, and 15 mi upstream from confluence with Brule River.

DRAINAGE AREA.--656 mi^2.

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

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,300 ft from topographic map (nearest 10 ft).

REMARKS.--Records excellent. Flow regulated by powerplant and by Michigamme Reservoir, capacity, 119,950 acre-ft, 5 mi upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 713 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,260 ft^3/s Apr. 28, 1960, gage height, 10.73 ft; minimum daily, 71 ft^3/s Nov. 26, 1950.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,080 ft^3/s Feb. 29, gage height, 6.17 ft; minimum daily, 150 ft^3/s Apr. 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	153	701	1160	1200	1170	2010	1170	221	600	201	669	571
2	157	703	1200	1200	1170	1900	1180	199	602	198	572	527
3	406	700	1200	1190	1160	1800	1170	719	601	199	664	178
4	594	699	1160	1190	1150	1680	1000	1140	599	198	662	177
5	528	701	1170	1190	1140	1530	984	1160	600	457	663	175
6	598	701	1180	1180	1150	1350	553	1160	600	606	665	421
7	490	701	1170	1180	1140	1010	192	1170	600	603	667	578
8	202	700	1170	1180	1150	760	194	1180	609	603	528	576
9	193	712	1210	1170	996	418	196	1460	601	603	587	576
10	196	525	1380	1040	864	188	197	1710	606	648	584	573
11	206	409	1380	930	860	174	206	1720	601	679	581	570
12	238	705	1470	927	875	206	213	1710	509	677	583	577
13	269	704	1590	925	734	411	222	1710	203	677	581	319
14	257	896	1610	925	184	1100	225	1460	198	678	583	176
15	235	1120	1610	925	182	770	216	1190	194	677	581	178
16	236	1120	1600	919	186	157	200	1180	192	675	579	176
17	524	1120	1590	915	608	175	193	1180	193	686	577	440
18	735	1140	1590	914	1190	162	186	1070	453	679	577	592
19	730	1150	1580	911	1190	165	182	695	600	679	576	587
20	940	933	1580	909	1180	169	180	694	599	676	577	584
21	1190	785	1420	906	1320	166	178	692	598	673	580	582
22	1190	962	1190	904	1530	157	170	693	598	674	577	583
23	1180	1380	1190	901	1530	166	159	691	485	671	574	584
24	1180	1690	1180	899	1530	162	155	690	208	671	573	614
25	1180	1660	1190	975	1540	321	150	690	458	670	571	402
26	1170	1650	1220	1180	1760	1130	151	687	611	672	574	261
27	920	1640	1220	1180	2000	1110	167	688	618	672	579	220
28	704	1640	1220	1180	2000	1110	172	685	496	668	574	203
29	702	1630	1210	1180	2040	1120	171	647	605	667	573	460
30	703	1430	1210	1170	---	1120	215	600	384	665	572	608
31	702	---	1210	1170	---	1140	---	600	---	665	569	---
TOTAL	18708	30607	41060	32565	33529	23837	10547	30091	14821	18467	18372	13068
MEAN	603	1020	1325	1050	1156	769	352	971	494	596	593	436
MAX	1190	1690	1610	1200	2040	2010	1180	1720	618	686	669	614
MIN	153	409	1160	899	182	157	150	199	192	198	528	175

CAL YR 1983 TOTAL 352028 MEAN 964 MAX 3100 MIN 148
WTR YR 1984 TOTAL 285672 MEAN 781 MAX 2040 MIN 150

04063000 MENOMINEE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'04", long 88°11'13", in NE1/4 sec.16, T.41 N., R.31 W., Michigan Meridian, Iron County, Hydrologic Unit 04030108, on left bank 0.5 mi downstream from confluence of Brule and Michigamme Rivers, 3.5 mi northeast of Florence, and at mile 117.

DRAINAGE AREA.--1,780 mi^2.

PERIOD OF RECORD.--January 1914 to current year. Published as "at Twin Falls near Iron Mountain, MI" 1914-57. Records published for both sites July 1950 to September 1957.

REVISED RECORDS.--WSP 1707: 1953(M). WSP 1911: Drainage area of former site.

GAGE.--Water-stage recorder. Datum of gage is 1,119.23 ft National Geodetic Vertical Datum of 1929 (levels by Owen Ayres Associates). Prior to July 1950, headwater and tailwater gages and generation data entered hourly in daily log sheets by company employees at the Twin Falls Powerplant of Wisconsin Electric Power Co., 10.4 mi downstream.

REMARKS.--Records excellent except those for period Jan. 7 to Feb. 13, which are good. Prior to July 1950, discharge determined from powerplant records computed on basis of load-discharge rating of hydroelectric units and rating for tailwater gage during periods of spill. Rating developed by Geological Survey. Flow regulated by powerplants, Michigamme Reservoir, capacity, 119,950 acre-ft, and Peavy Pond, capacity, 33,860 acre-ft, on Michigamme River, and by many smaller reservoirs above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--70 years, 1,820 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,500 ft^3/s Apr. 26, 1960, gage height, 14.15 ft; minimum, 38 ft^3/s Aug. 21, 1962, Sept. 26, 1975; minimum gage height, 1.18 ft Aug. 21, 1962, Nov. 4, 1965; minimum daily discharge, 57 ft^3/s Sept. 26, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,120 ft^3/s Nov. 25, gage height, 6.93 ft; minimum, 290 ft^3/s Oct. 6, Mar. 15, gage height, 2.05 ft; minimum daily, 682 ft^3/s Sept. 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1210	1640	3130	1850	1900	3360	1980	3690	1630	928	1290	1280
2	1120	1610	3100	2340	1850	3370	2040	4050	1560	688	1360	1430
3	1210	1990	2660	2080	1900	3280	2010	3790	1380	986	1300	1900
4	1160	1710	2040	2230	1900	3190	1990	3520	1350	902	1110	1850
5	1050	1580	2510	2140	1900	3200	1990	3510	1320	1000	1230	1780
6	1220	1450	2480	1850	1850	2700	1780	3710	1210	1320	1360	1740
7	1510	1550	3000	2100	1750	2400	1550	3730	1270	1410	1380	1750
8	1490	1540	2870	2100	1850	1470	1510	3790	1390	1330	1280	1380
9	1430	1660	2840	1860	1950	1740	1860	3770	1350	1520	1490	1360
10	1550	1910	2760	1950	1850	1590	1810	3760	1420	1870	1620	1540
11	1300	2090	2740	1820	1750	1550	1850	3790	1760	2080	1560	1560
12	2470	1670	2960	1820	1850	1690	2440	3800	1730	2130	1560	1580
13	3470	2240	2980	1930	2100	1440	3240	3730	1680	2330	1370	1770
14	3230	2120	2910	1650	2060	1440	4160	3640	1510	2040	1400	1430
15	2900	1850	2730	2000	2010	1600	4250	3120	1340	1720	1420	1510
16	2640	2260	2730	1720	2180	1530	4230	2900	1190	1180	1410	1320
17	2700	2250	2740	2100	2870	1720	3700	2530	1060	1150	1390	1660
18	2890	2100	2770	1950	3010	1270	3210	2610	1440	1390	1320	1580
19	2700	2050	2910	1850	3060	1570	2920	1790	1450	1190	1310	1520
20	2550	2320	2750	1750	3020	1490	2640	2040	1350	1400	1390	1460
21	2360	3340	2650	1800	3310	1560	2580	2250	1480	1200	1450	1430
22	2510	3900	2130	1850	3250	1830	1840	2010	1480	1220	1390	682
23	2030	4090	2400	1630	3420	1900	1860	1830	1080	1520	1310	980
24	1950	4390	2440	1500	3250	1930	1500	1690	713	1330	1360	1540
25	1960	5100	2590	1690	3320	1660	1450	1660	1320	1290	1240	1590
26	1800	4660	2290	1840	3420	2100	1530	1550	1370	1170	1360	1630
27	1820	3980	2430	1900	3450	1390	1860	1560	1930	1450	1220	1450
28	1910	3650	2400	2020	3450	2090	1820	1400	1960	1330	1180	1640
29	1820	3210	2430	1720	3420	2150	1610	1560	1500	1350	1430	1690
30	1660	3040	2380	1850	---	1960	2650	1760	935	1390	1040	1810
31	1770	---	2090	1850	---	2080	---	1390	---	1410	1300	---
TOTAL	61390	76950	81840	58740	72900	62250	69860	85930	42158	43224	41830	45842
MEAN	1980	2565	2640	1895	2514	2008	2329	2772	1405	1394	1349	1528
MAX	3470	5100	3130	2340	3450	3370	4250	4050	1960	2330	1620	1900
MIN	1050	1450	2040	1500	1750	1270	1450	1390	713	688	1040	682

CAL YR 1983 TOTAL 898720 MEAN 2462 MAX 8090 MIN 1020
WTR YR 1984 TOTAL 742914 MEAN 2030 MAX 5100 MIN 682

04065393 EAST BRANCH STURGEON RIVER BELOW SKUNK CREEK, NEAR FELCH, MI

LOCATION.--Lat 46°01'34", long 87°49'56", in NW1/4 NE1/4 sec.20, T.42 N., R.28 W., Dickinson County, Hydrologic Unit 04030108, on right bank 50 ft downstream from Skunk Creek, and 2.2 mi north of Felch.

DRAINAGE AREA.--61.8 mi^2.

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1972, 1973. October 1973 to September 1984 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 1,067.53 ft National Geodetic Vertical Datum of 1929. Prior to Dec. 20, 1973, nonrecording gage, and Dec. 20, 1973 to Sept. 30, 1980, water-stage recorder at present site at datum 2.00 ft higher.

REMARKS.--Records good except those for the winter period, which are fair. Since June 1975, occasional regulation during low flows by Gene Lake Reservoir, usable capacity, 3,990 acre-ft, 3 mi upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--11 years, 54.8 ft^3/s, 12.04 in/yr, adjusted for initial storage.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 628 ft^3/s Apr. 26, 1979, gage height, 6.28 ft, present datum; minimum, 3.4 ft^3/s Sept. 7, 8, 9, 13, 1976, July 7, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 293 ft^3/s Oct. 14, gage height, 5.81 ft; minimum, 9.0 ft^3/s July 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	29	33	78	29	25	52	56	180	19	38	11	14
2	30	33	75	29	25	50	64	194	19	34	16	45
3	31	32	70	29	25	46	76	171	20	30	17	72
4	31	31	65	28	25	42	84	140	18	28	15	67
5	30	31	60	28	25	40	93	117	20	24	15	58
6	28	30	57	28	25	38	107	100	24	23	29	51
7	28	30	54	28	25	37	113	93	25	19	57	53
8	43	30	52	28	25	36	118	96	40	17	60	44
9	41	34	50	28	25	35	121	96	39	15	51	42
10	38	59	47	27	25	34	124	89	37	16	42	36
11	38	62	45	27	25	33	126	81	34	19	36	33
12	117	57	43	27	25	33	129	73	38	17	31	38
13	222	52	42	27	34	33	142	69	46	15	26	68
14	290	50	41	27	50	34	168	70	41	14	22	67
15	256	55	40	27	130	35	174	65	34	19	20	62
16	208	60	39	27	125	36	167	58	29	16	17	54
17	173	62	38	27	115	36	151	52	28	28	15	47
18	141	60	37	27	110	34	128	50	28	33	15	40
19	116	58	36	27	94	35	110	46	24	28	13	35
20	99	83	35	27	84	30	99	41	20	28	12	30
21	83	130	35	26	83	32	88	38	18	24	13	25
22	71	152	34	26	82	33	78	37	16	21	20	21
23	63	151	34	26	82	36	71	36	15	21	20	19
24	57	160	33	26	74	32	67	32	14	18	16	24
25	52	157	32	26	70	37	63	30	13	15	13	82
26	49	136	32	26	64	40	60	28	15	14	12	94
27	44	117	31	25	60	42	60	26	64	15	19	82
28	41	100	30	25	58	46	63	23	65	13	18	70
29	39	88	30	25	56	48	61	20	54	12	15	60
30	36	82	29	25	---	50	114	20	45	11	15	52
31	34	---	29	25	---	51	---	19	---	10	14	---
TOTAL	2558	2215	1353	833	1671	1196	3075	2190	902	635	695	1485
MEAN	82.5	73.8	43.6	26.9	57.6	38.6	103	70.6	30.1	20.5	22.4	49.5
MAX	290	160	78	29	130	52	174	194	65	38	60	94
MIN	28	30	29	25	25	30	56	19	13	10	11	14
CFSM	1.34	1.19	.71	.44	.93	.63	1.67	1.14	.49	.33	.36	.80
IN.	1.54	1.33	.81	.50	1.01	.72	1.85	1.32	.54	.38	.42	.89

CAL YR 1983 TOTAL 22890.7 MEAN 62.7 MAX 418 MIN 6.5 CFSM 1.02 IN 13.78
WTR YR 1984 TOTAL 18808.0 MEAN 51.4 MAX 290 MIN 10 CFSM .83 IN 11.32

04066003 MENOMINEE RIVER BELOW PEMENE CREEK NEAR PEMBINE, WI

LOCATION.--Lat 45°34'46", long 87°47'13", in NE1/4 sec.29, T.37 N., R.28 W., Michigan Meridian, Menominee County, Hydrologic Unit 04030108, on left bank 40 ft downstream from County Trunk Z bridge, 0.9 mi downstream from Pemene Creek, 3.9 mi west of Nathan, MI, 10.6 mi southeast of Pembine, and at mile 64.3.

DRAINAGE AREA.--3,140 mi^2.

PERIOD OF RECORD.--October 1949 to current year. Published as "near Pembine" prior to August 1982. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Altitude of gage is 740 ft, from topographic map. October 1949 to Oct. 27, 1972, water-stage recorder at site 1.0 mi upstream at different datum, and Oct. 28, 1972, to August 1982, water-stage recorder at site 1.5 mi upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by powerplants and by Michigamme Reservoir, capacity, 119,950 acre-ft, and Peavy Pond, capacity, 33,860 acre-ft, on the Michigamme River, and by many smaller reservoirs above station.

AVERAGE DISCHARGE.--35 years, 3,015 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26,900 ft^3/s May 8, 1960, gage height, 13.90 ft, site and datum then in use; minimum, 694 ft^3/s Sept. 3, 1969, gage height, 1.66 ft, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,990 ft^3/s Nov. 26, gage height, 11.16 ft; maximum gage height, 17.36 ft Dec. 20, backwater from ice; minimum daily discharge, 1,340 ft^3/s July 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1990	2480	4300	3000	2500	4300	2900	7080	2100	1940	1690	1600
2	1910	2430	3700	3000	2400	4100	3250	7550	2180	1760	1700	1970
3	1830	2420	3400	2800	2400	4100	3370	7280	2190	1480	1680	3150
4	1930	2380	3400	2800	2400	3600	3470	6900	2030	1340	1790	3390
5	2060	2450	3700	2900	2500	3500	3610	5950	1900	1620	1540	3470
6	1850	2460	3400	2900	2600	3500	3830	5470	1990	1660	1800	3060
7	1690	2220	3500	2800	2600	3500	3700	6330	2170	1870	1940	3470
8	2550	2270	3600	2800	2500	2500	3670	5790	2520	1890	1900	2640
9	2770	2330	3600	2900	2500	2200	3750	5720	2720	1960	1740	2390
10	3270	2600	3600	2900	2500	2000	3610	5710	2760	2140	2050	2270
11	2400	3270	3300	2600	2600	2200	3690	5510	2840	2440	2330	2300
12	4120	3240	4000	2500	3000	2400	3900	5530	2960	2480	1900	2520
13	6760	3080	4000	2400	3800	2400	5480	5450	3000	2540	1820	3410
14	7070	2930	3500	2400	4000	2500	6400	5460	3120	2560	1850	3170
15	6640	3140	3500	2600	3800	2600	6700	4820	2620	2670	1880	2970
16	5680	3330	3600	2500	4500	2600	7110	4630	2320	1930	1780	2720
17	5400	3330	3600	2500	4500	2200	6750	4200	2300	1860	1760	2590
18	5590	3340	3400	2400	5000	2500	5350	3720	2110	1700	1780	2620
19	5110	3430	3400	2300	4800	2400	5090	3480	2280	2000	1550	2500
20	4430	3660	3600	2300	4900	2400	4950	3040	2450	2330	1670	2170
21	4040	5140	3600	2300	4900	2500	4360	3120	2070	2250	1720	2190
22	4180	6690	3400	2300	5000	2600	3830	3060	1940	1910	1790	2000
23	3510	6620	3300	2500	5000	2600	3300	2840	2060	1770	1650	1360
24	3400	6560	3200	2400	5200	2600	2820	2620	1500	1900	1670	1570
25	2820	7240	3200	2100	5200	3100	2990	2360	1600	1810	1720	2620
26	3070	7920	3300	2100	5200	4000	2660	2440	1710	1700	1650	2540
27	3080	6430	3300	2300	5000	3400	3120	2190	2830	1800	1560	2440
28	2720	5060	3200	2400	4700	3000	3240	2270	3250	1790	1630	2450
29	3090	5610	3000	2400	4500	3500	2740	2160	3060	1570	1590	2670
30	2300	4950	3000	2400	---	3100	4170	2200	2620	1610	1700	2360
31	2520	---	3000	2400	---	2900	---	2140	---	1660	1680	---
TOTAL	109780	119010	107600	78900	110500	90800	123810	137020	71200	59940	54510	76580
MEAN	3541	3967	3471	2545	3810	2929	4127	4420	2373	1934	1758	2553
MAX	7070	7920	4300	3000	5200	4300	7110	7550	3250	2670	2330	3470
MIN	1690	2220	3000	2100	2400	2000	2660	2140	1500	1340	1540	1360

CAL YR 1983 TOTAL 1377700 MEAN 3775 MAX 11200 MIN 1690
WTR YR 1984 TOTAL 1139650 MEAN 3114 MAX 7920 MIN 1340

04067500 MENOMINEE RIVER NEAR McALLISTER, WI

LOCATION.--Lat 45°19'33", long 87°39'48", in SW1/4 SE1/4 sec.17, T.33 N., R.23 E., Marinette County, Hydrologic Unit 04030108, on right bank 85 ft downstream from bridge on County Highway JJ, 2.9 mi downstream from Grand Rapids Dam, 2.6 mi east of McAllister, 1.9 mi downstream from Little Cedar River, and at mile 22.6.

DRAINAGE AREA.--3,930 mi^2.

PERIOD OF RECORD.--March 1945 to September 1961; October 1961 to September 1979, miscellaneous measurements and peaks only; October 1979 to current year.

REVISED RECORDS.--WDR WI-80-1: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 622.20 ft National Geodetic Vertical Datum of 1929 (Michigan Department of Transportation reference mark). Prior to May 15, 1945, nonrecording gage 1,400 ft downstream at same datum; May 16, 1945, to September 1961, water-stage recorder 1,000 ft downstream at same datum; October 1961 to September 1979, crest-stage gage 1,100 ft downstream at same datum.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft, and Peavy Pond, capacity, 33,860 acre-ft, on the Michigamme River, and by many smaller reservoirs above station.

AVERAGE DISCHARGE.--21 years (water years 1946-61, 1980-84), 3,524 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 32,500 ft^3/s May 9, 1960, gage height, 20.0 ft, from graph based on gage readings; minimum observed, 538 ft^3/s Oct. 6, 1946, gage height, 7.29 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 9,550 ft^3/s May 3, gage height, 13.62 ft; maximum gage height, 14.22 ft Dec. 31, backwater from ice ; minimum daily discharge, 1,580 ft^3/s July 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2640	2920	6060	3800	3000	6000	4280	6790	2410	2640	2060	1980
2	2640	2920	5340	3800	3100	5400	4570	9000	2540	2150	2110	1990
3	2400	2910	4630	3700	3000	5200	4900	9510	2660	2130	1970	3070
4	2460	2870	4070	3500	3000	5200	4640	9220	2480	1890	2010	3980
5	2380	3050	4130	3600	3000	4500	4620	8220	2530	1580	1940	4030
6	2570	2850	4500	3700	3100	4400	5130	7450	2290	2010	2010	3690
7	2450	2850	4200	3600	3200	4400	5580	6800	2550	1870	2290	3390
8	3060	2620	4520	3500	3200	4000	5540	7530	3000	2390	2320	3320
9	3530	2920	4630	3500	3100	3000	5600	7360	3560	2530	2300	2910
10	4230	3020	4630	3600	3200	2700	5520	7020	3540	2900	2190	2730
11	4110	3580	4340	3500	3200	2300	4810	6630	3450	3050	2420	2620
12	3800	4190	4020	3100	3200	2800	5150	6680	3460	3110	2360	2630
13	6500	4250	4990	3000	3700	2700	5370	6780	4140	2900	2160	3520
14	8580	4010	5020	2900	4800	2800	7400	6640	3680	2880	2280	3980
15	8940	3910	4320	3000	4900	2900	8030	6650	3640	2530	2130	3750
16	8450	3570	4350	3300	4700	3000	8160	6070	3040	2160	2160	3550
17	7000	4130	4600	3200	5600	3000	8800	5210	3020	2390	2180	3200
18	6620	3930	4500	3200	5600	2600	8110	5150	2940	2110	2110	3090
19	6660	3880	4200	3000	6400	2900	6600	4520	2910	1970	2070	3010
20	6270	4460	4200	2900	6000	2800	5960	4160	2840	2340	1950	2950
21	5010	5310	4500	2900	6200	2800	6210	3850	2900	2810	1850	2610
22	4860	7140	4500	2900	6200	3000	5790	3750	2550	2530	2100	2530
23	4980	8050	4200	2900	6400	3100	4640	3630	2110	2430	2120	2160
24	4050	8210	4100	3200	6400	3100	4030	3500	2450	2110	1840	1760
25	4050	8060	4000	3000	6600	3200	3750	3040	1730	2390	1820	2460
26	3480	8170	4000	2600	6600	4200	3800	2980	2160	2040	2030	3630
27	3550	8600	4100	2600	6600	4870	3670	2930	2760	1960	1890	2840
28	3660	7180	4100	2900	6400	4300	4270	2650	3410	2150	1910	2920
29	3260	5940	4000	3000	6200	3640	3760	2930	3490	1920	2070	3020
30	3520	6450	3800	3000	---	4420	4960	2560	3340	1750	2030	3170
31	2980	---	3800	3100	---	4550	---	2760	---	2040	1810	---
TOTAL	138690	141950	136350	99500	136600	113780	163650	171970	87580	71660	64490	90490
MEAN	4474	4732	4398	3210	4710	3670	5455	5547	2919	2312	2080	3016
MAX	8940	8600	6060	3800	6600	6000	8800	9510	4140	3110	2420	4030
MIN	2380	2620	3800	2600	3000	2300	3670	2560	1730	1580	1810	1760

CAL YR 1983 TOTAL 1709360 MEAN 4683 MAX 14100 MIN 1830
WTR YR 1984 TOTAL 1416710 MEAN 3871 MAX 9510 MIN 1580

04096400 ST. JOSEPH RIVER NEAR BURLINGTON, MI

LOCATION.--Lat 42°06'10", long 85°02'25", in SW1/4 SW1/4 sec.20, T.4 S., R.6 W., Calhoun County, Hydrologic Unit 04050001, on right bank 10 ft upstream from bridge on 13 Mile Road, 2.0 mi east of Burlington, 4.0 mi downstream from Tekonsha Creek, and at mile 164.

DRAINAGE AREA.--201 mi^2.

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Datum of gage is 916.21 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 172 ft^3/s, 11.62 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,340 ft^3/s Mar. 21, 1982, gage height, 5.78 ft; minimum, 8.0 ft^3/s Aug. 9, 10, 11, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 527 ft^3/s Mar. 17, gage height, 4.35 ft; minimum daily, 30 ft^3/s Aug. 27, 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	54	70	187	125	105	200	294	247	413	98	56	49
2	53	70	178	125	105	190	279	238	392	94	55	50
3	50	70	168	125	105	180	268	230	360	91	52	50
4	48	72	165	130	110	170	266	224	322	90	52	50
5	49	72	167	130	120	167	274	219	297	90	56	49
6	48	71	191	130	120	161	302	212	284	87	54	46
7	46	68	207	125	110	155	298	203	271	83	50	47
8	46	67	203	120	110	149	290	194	258	78	48	47
9	47	66	222	115	110	141	285	190	281	83	50	51
10	47	64	221	110	120	130	281	185	246	92	51	57
11	46	67	216	105	160	120	272	181	213	94	52	72
12	47	67	253	100	212	130	261	175	191	92	47	69
13	59	67	284	105	349	134	261	171	178	86	44	63
14	70	69	285	105	395	142	255	171	172	83	42	61
15	76	70	289	105	376	145	269	168	175	78	39	63
16	73	84	250	105	367	395	298	163	175	76	39	62
17	68	91	200	105	367	515	313	158	168	71	38	62
18	63	99	160	105	373	452	332	153	161	67	37	59
19	71	101	150	105	380	413	330	177	154	63	36	56
20	81	107	150	105	378	413	322	200	147	60	35	52
21	74	113	165	105	362	448	315	216	139	57	34	49
22	78	118	165	100	336	452	308	264	131	55	33	47
23	92	126	150	100	310	430	313	380	130	54	32	47
24	99	139	160	105	289	421	305	364	127	57	32	49
25	101	143	170	105	266	419	295	336	119	62	31	64
26	93	143	165	110	244	402	285	461	113	62	31	89
27	87	139	155	110	227	385	281	500	109	67	30	82
28	81	168	140	110	210	369	272	442	107	68	30	79
29	77	190	135	110	197	347	263	433	103	64	36	72
30	72	193	130	110	---	322	260	433	101	61	39	67
31	70	---	130	108	---	307	---	424	---	59	42	---
TOTAL	2066	2984	5811	3453	6913	8804	8647	8112	6037	2322	1303	1760
MEAN	66.6	99.5	187	111	238	284	288	262	201	74.9	42.0	58.7
MAX	101	193	289	130	395	515	332	500	413	98	56	89
MIN	46	64	130	100	105	120	255	153	101	54	30	46
CFSM	.33	.50	.93	.55	1.18	1.41	1.43	1.30	1.00	.37	.21	.29
IN.	.38	.55	1.08	.64	1.28	1.63	1.60	1.50	1.12	.43	.24	.33

CAL YR 1983 TOTAL 67592 MEAN 185 MAX 679 MIN 46 CFSM .92 IN 12.51
WTR YR 1984 TOTAL 58212 MEAN 159 MAX 515 MIN 30 CFSM .79 IN 10.77

04096515 HOG CREEK NEAR ALLEN, MI

LOCATION.--Lat 41°56'55", long 84°49'40", in NE1/4 SE1/4 sec.13, T.6 S., R.5 W., Branch County, Hydrologic Unit 04050001, on left bank 12 ft downstream from bridge on U.S. Highway 12, 1.0 mi downstream from Little Hog Creek, and 3.1 mi west of Allen.

DRAINAGE AREA.--48.7 mi^2.

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,010 ft from topographic map. Prior to May 23, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 43.4 ft^3/s, 12.10 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 524 ft^3/s Mar. 17, 1982, gage height, 5.63 ft; maximum gage height, 5.78 ft June 28, 1978; minimum discharge, 1.2 ft^3/s Aug. 20, 21, 1971; minimum gage height, 1.32 ft Aug. 25, 26, 27, 28, 1984.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 205 ft^3/s Feb. 14, gage height, 4.23 ft; minimum, 3.4 ft^3/s Aug. 25, 26, 27, 28, gage height, 1.32 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.9	12	57	28	22	47	76	57	81	14	7.0	4.8
2	7.8	14	52	28	23	43	70	51	73	13	7.0	5.4
3	7.6	17	47	27	24	38	66	48	87	13	7.0	5.0
4	7.5	14	47	27	25	35	66	47	91	14	6.8	5.0
5	7.6	13	50	27	27	33	72	46	75	14	7.0	4.9
6	7.3	13	66	26	26	32	84	44	61	13	6.7	4.5
7	6.8	12	78	26	25	31	89	42	52	12	7.3	5.0
8	6.6	12	75	25	24	30	85	39	45	11	7.5	5.3
9	6.6	11	72	25	25	29	78	38	40	13	10	5.6
10	6.5	11	70	24	32	28	71	37	36	16	8.4	9.7
11	6.3	13	68	24	45	27	64	36	32	15	6.6	8.2
12	6.6	13	87	23	65	26	60	35	29	15	5.9	7.1
13	15	12	119	23	120	26	64	35	32	13	6.4	7.1
14	17	12	135	22	190	26	66	39	56	12	6.1	9.4
15	12	13	134	22	199	29	74	34	50	11	5.6	8.5
16	11	21	110	22	180	105	91	31	36	11	5.1	7.4
17	10	21	90	21	156	158	106	29	31	9.9	5.0	6.6
18	9.4	19	80	21	136	151	111	28	28	9.7	5.2	6.5
19	9.2	22	74	21	122	129	111	39	27	9.0	5.0	6.4
20	9.4	29	52	21	109	115	102	53	24	8.4	4.6	6.1
21	9.7	32	45	20	95	136	90	61	23	8.3	4.3	5.7
22	15	29	42	20	83	154	81	63	21	8.0	4.1	5.3
23	22	32	37	20	75	148	82	94	23	7.5	3.9	5.4
24	18	43	35	20	69	136	84	97	23	9.5	3.8	6.0
25	16	41	33	20	63	125	81	82	20	9.5	3.7	7.2
26	15	37	32	20	57	115	77	121	18	8.6	3.7	11
27	14	35	32	20	52	106	75	163	18	10	3.6	7.9
28	13	55	31	20	51	101	72	159	17	8.8	3.6	6.9
29	13	66	30	21	50	97	65	136	16	8.0	3.7	6.5
30	12	63	29	21	---	90	60	114	15	7.3	5.2	6.1
31	12	---	28	21	---	83	---	96	---	7.1	5.4	---
TOTAL	337.8	737	1937	706	2170	2429	2373	1994	1180	339.6	175.2	196.5
MEAN	10.9	24.6	62.5	22.8	74.8	78.4	79.1	64.3	39.3	11.0	5.65	6.55
MAX	22	66	135	28	199	158	111	163	91	16	10	11
MIN	6.3	11	28	20	22	26	60	28	15	7.1	3.6	4.5
CFSM	.22	.51	1.28	.47	1.54	1.61	1.62	1.32	.81	.23	.12	.13
IN.	.26	.56	1.48	.54	1.66	1.86	1.81	1.52	.90	.26	.13	.15

CAL YR 1983 TOTAL 16673.3 MEAN 45.7 MAX 262 MIN 6.3 CFSM .94 IN 12.74
WTR YR 1984 TOTAL 14575.1 MEAN 39.8 MAX 199 MIN 3.6 CFSM .82 IN 11.13

04096600 COLDWATER RIVER NEAR HODUNK, MI

LOCATION.--Lat 42°01'45", long 85°06'25", in NW1/4 NE1/4 sec.22, T.5 S., R.7 W., Branch County, Hydrologic Unit 04050001, on downstream side of bridge on Girard Road , 2.5 mi northwest of Hodunk, and 3.5 mi upstream from mouth.

DRAINAGE AREA.--293 mi^2.

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WDR MI-76-1: 1974.

GAGE.--Water-stage recorder. Altitude of gage is 900 ft from topographic map (nearest 10 ft). Prior to July 26, 1963, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Nov. 11 to Dec. 18, which are fair. Diurnal fluctuation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 252 ft^3/s, 11.68 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,260 ft^3/s Mar. 18, 1982, gage height, 8.25 ft; minimum, 6.2 ft^3/s Sept. 26, 1964; minimum gage height, 2.28 ft Oct. 4-14, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 985 ft^3/s Mar. 17, gage height, 6.01 ft; maximum gage height, 6.16 ft May 27; minimum discharge, 20 ft^3/s Aug. 25, 26, gage height, 2.49 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	57	195	280	190	150	319	510	411	643	124	34	37
2	56	185	270	190	159	313	480	380	575	122	35	39
3	53	171	260	185	166	300	450	360	554	116	38	41
4	51	163	250	185	173	295	450	340	602	119	39	41
5	51	154	250	185	177	278	490	320	573	115	39	40
6	50	147	270	185	177	240	540	300	523	109	36	39
7	50	141	290	185	180	200	590	290	441	105	36	43
8	49	135	310	185	188	196	560	280	368	101	39	44
9	48	131	330	185	176	200	510	270	346	105	42	47
10	48	127	360	180	178	208	470	260	322	111	40	89
11	49	125	400	175	195	202	440	250	295	111	38	134
12	49	125	450	170	259	200	410	245	250	107	35	124
13	56	125	500	165	433	200	420	240	148	104	34	118
14	67	125	540	160	642	207	430	230	179	101	31	119
15	69	130	540	155	698	216	470	225	193	94	29	115
16	65	130	450	150	740	584	540	220	187	88	30	108
17	61	135	400	150	692	945	628	210	173	82	30	92
18	58	140	340	150	637	937	652	200	165	76	29	33
19	57	150	285	150	591	814	676	210	159	74	29	30
20	56	160	265	150	549	768	664	220	150	71	30	29
21	55	170	250	150	516	772	636	240	146	67	27	27
22	66	180	245	150	484	829	616	280	142	65	26	26
23	82	190	235	150	453	801	604	450	143	53	24	26
24	89	200	230	155	424	767	604	742	144	40	24	27
25	89	200	225	155	396	742	600	657	139	42	23	33
26	91	210	220	155	375	710	571	808	136	42	22	38
27	95	220	215	150	357	669	538	945	133	44	23	40
28	100	240	210	150	330	633	493	945	133	47	23	35
29	103	260	205	150	302	599	472	853	129	43	24	33
30	105	270	200	145	---	579	449	787	126	40	30	32
31	143	---	195	140	---	550	---	714	---	36	34	---
TOTAL	2118	5034	9470	5080	10797	15273	15963	12882	8217	2554	973	1679
MEAN	68.3	168	305	164	372	493	532	416	274	82.4	31.4	56.0
MAX	143	270	540	190	740	945	676	945	643	124	42	134
MIN	48	125	195	140	150	196	410	200	126	36	22	26
CFSM	.23	.57	1.04	.56	1.27	1.68	1.82	1.42	.94	.28	.11	.19
IN.	.27	.64	1.20	.64	1.37	1.94	2.03	1.64	1.04	.32	.12	.21

CAL YR 1983 TOTAL 109361 MEAN 300 MAX 1470 MIN 45 CFSM 1.02 IN 13.88
WTR YR 1984 TOTAL 90040 MEAN 246 MAX 945 MIN 22 CFSM 84 IN 11.43

04096900 NOTTAWA CREEK NEAR ATHENS, MI

LOCATION.--Lat 42°03'20", long 85°18'30", in NW1/4 sec.12, T.5 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on Shorts Road, 4.2 mi southwest of Athens, and 5.0 mi downstream from Pine Creek.

DRAINAGE AREA.--162 mi^2.

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 145 ft^3/s, 12.15 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,120 ft^3/s June 29, 1978, gage height, 6.47 ft; minimum, 21 ft^3/s July 28, 29, 30, Aug. 4, 6, 1977; minimum gage height, 0.37 ft Oct. 16, 18, 20, 21, Nov. 8, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 430 ft^3/s Feb. 15, gage height, 3.20 ft; minimum daily, 34 ft^3/s Sept. 22; minimum gage height, 0.73 ft Oct. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	59	67	137	98	77	115	183	142	204	64	38	58
2	57	68	122	98	77	110	172	132	173	62	37	59
3	55	76	114	98	78	105	164	124	151	59	43	61
4	54	74	109	96	82	105	166	123	135	57	49	58
5	52	71	112	96	86	100	178	126	123	56	74	55
6	52	70	136	94	86	98	191	125	115	54	78	53
7	50	69	148	92	86	96	195	119	108	51	69	54
8	51	71	150	90	84	96	183	115	106	51	61	54
9	50	66	148	90	84	95	166	112	123	59	56	53
10	51	67	127	88	90	94	153	113	113	72	54	51
11	50	70	127	88	110	94	143	110	102	71	54	55
12	51	71	167	86	161	92	138	107	96	69	51	57
13	59	71	224	84	285	92	150	106	95	60	51	54
14	70	69	247	82	395	96	161	115	93	51	46	53
15	73	73	244	80	427	102	189	115	89	48	42	52
16	67	88	210	80	419	223	240	105	87	45	41	48
17	62	101	190	79	383	354	279	99	88	43	47	45
18	58	101	160	78	336	382	292	97	90	42	50	42
19	56	96	130	78	290	364	290	114	97	43	47	40
20	56	95	108	78	259	334	266	154	93	41	47	38
21	54	97	105	78	235	349	234	179	88	41	45	36
22	61	94	105	78	213	369	205	190	85	41	44	34
23	76	96	105	78	193	346	199	261	86	42	44	36
24	88	114	105	78	175	318	211	332	84	44	46	42
25	90	126	105	79	149	300	207	333	80	50	45	51
26	83	118	105	80	139	285	192	340	76	50	41	76
27	76	106	105	80	131	269	175	361	75	52	41	88
28	72	123	105	79	117	253	162	346	73	62	43	89
29	70	155	100	78	129	232	146	309	69	54	48	77
30	67	161	100	78	---	211	141	274	65	48	52	59
31	65	---	98	77	---	195	---	238	---	43	57	---
TOTAL	1935	2724	4248	2616	5376	6274	5771	5516	3062	1625	1541	1628
MEAN	62.4	90.8	137	84.4	185	202	192	178	102	52.4	49.7	54.3
MAX	90	161	247	98	427	382	292	361	204	72	78	89
MIN	50	66	98	77	77	92	138	97	65	41	37	34
CFSM	.39	.56	.85	.52	1.14	1.25	1.19	1.10	.63	.32	.31	.34
IN.	.44	.63	.98	.60	1.23	1.44	1.33	1.27	.70	.37	.35	.37

CAL YR 1983 TOTAL 58217 MEAN 159 MAX 559 MIN 50 CFSM .98 IN 13.37
WTR YR 1984 TOTAL 42316 MEAN 116 MAX 427 MIN 34 CFSM .72 IN 9.72

04097195 GOURDNECK CANAL NEAR SCHOOLCRAFT, MI

LOCATION.--Lat 42°09'54", long 85°36'15", in NW1/4 sec.33, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050001, on right bank at downstream end of culvert on Osterhout Avenue, 3.8 mi northeast of Schoolcraft.

DRAINAGE AREA.--Indeterminate.

PERIOD OF RECORD.--October 1965 to December 1972, October 1982 to current year.

GAGE.--Water-stage recorder. Metal V-notch weir Aug. 4, 1969 to Dec. 31, 1972. Datum of gage is 854.98 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. Canal diverts water from Gourdneck Creek to West Lake to sustain lake levels. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--9 years, 3.46 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 16 ft^3/s Dec. 10-12, 1966, Apr. 22-24, 1967; no flow on many days during November, December, 1970, January, February, 1971.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.0	.49	.63	.34	.63	.43	.55	.16	8.0	.45	.71	.76
2	2.1	.52	.64	.37	.62	.42	.52	.14	7.8	.46	.76	.76
3	2.0	.59	.60	.37	.64	.41	.53	.18	7.5	.47	.73	.77
4	2.0	.63	.59	.37	.63	.42	.55	.22	7.2	.46	.87	.75
5	1.8	.59	.53	.37	.63	.42	.56	.20	6.8	.51	.86	.77
6	1.6	.55	.60	.40	.63	.41	.53	.18	6.2	.52	.92	.85
7	3.5	.49	.62	.37	.63	.37	.40	.19	2.5	.51	.88	.85
8	6.8	.49	.58	.37	.59	.37	.41	.20	.46	.49	.89	.81
9	6.5	.48	.57	.37	.55	.36	.41	.19	.26	.55	.85	.84
10	6.5	.43	.54	.37	.56	.32	.43	.18	.26	.61	.86	.81
11	6.8	.44	.57	.39	.59	.29	.43	.18	.37	.62	.85	.82
12	5.8	.46	.75	.42	.61	.26	.45	.19	.37	.65	.83	.77
13	1.8	.43	.76	.43	.71	.25	.46	.20	.32	.66	.86	.78
14	2.0	.38	.75	.43	.72	.24	.45	.15	.30	.64	.85	.76
15	1.2	.37	.74	.40	.70	.30	.48	.15	.28	.58	.81	.76
16	1.1	.51	.70	.30	.67	.52	.55	.16	.28	.55	.80	.73
17	2.0	.49	.66	.49	.71	.43	.57	.15	.30	.55	.77	.71
18	1.8	.47	.62	.39	.71	.37	.58	.13	.40	.52	.76	.71
19	.98	.50	.58	.25	.74	.34	.54	.17	.40	.51	.71	.71
20	.86	.52	.54	.14	.74	.40	.50	.16	.40	.51	.66	.71
21	.86	.52	.80	.29	.68	.43	.45	.16	.43	.61	.64	.69
22	.86	.50	.53	.67	.59	.46	.39	.22	.46	.60	.60	.67
23	.81	.56	.37	.63	.56	.40	.46	.44	.49	.58	.56	.76
24	.76	.62	.31	.63	.55	.46	.45	.57	.49	.69	.56	.72
25	.76	.55	.28	.65	.52	.43	.40	.77	.51	.70	.55	.85
26	.71	.51	.28	.81	.48	.43	.31	2.5	.50	.73	.54	.74
27	.67	.49	.28	.63	.46	.46	.30	3.8	.49	.73	.54	.68
28	.67	.74	.31	.63	.46	.52	.34	5.2	.45	.75	.64	.64
29	.59	.78	.31	.63	.44	.49	.29	7.5	.44	.76	.67	.64
30	.59	.47	.33	.63	---	.49	.28	8.0	.45	.75	.75	.65
31	.55	---	.34	.61	---	.49	---	8.0	---	.71	.71	---
TOTAL	66.97	15.57	16.71	14.15	17.75	12.39	13.57	40.64	55.11	18.43	22.99	22.47
MEAN	2.16	.52	.54	.46	.61	.40	.45	1.31	1.84	.59	.74	.75
MAX	6.8	.78	.80	.81	.74	.52	.58	8.0	8.0	.76	.92	.85
MIN	.55	.37	.28	.14	.44	.24	.28	.13	.26	.45	.54	.64

CAL YR 1983 TOTAL 715.45 MEAN 1.96 MAX 6.8 MIN .28
WTR YR 1984 TOTAL 316.75 MEAN .87 MAX 8.0 MIN .13

04097540 PRAIRIE RIVER NEAR NOTTAWA, MI

LOCATION.--Lat 41°53'18", long 85°24'34", in NW1/4 SW1/4 sec.6, T.7 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on left bank 10 ft upstream from bridge on State Highway 66, 3.0 mi upstream from unnamed tributary, and 3.0 mi southeast of Nottawa.

DRAINAGE AREA.--106 mi^2.

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 93.0 ft^3/s, 11.91 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 698 ft^3/s Mar. 20, 1982, gage height, 6.12 ft; minimum, 11 ft^3/s Aug. 9, 10, Sept. 8, 9, 10, 1964; minimum gage height, 1.77 ft Aug. 9, 10, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 258 ft^3/s Apr. 19, gage height, 4.67 ft; minimum, 20 ft^3/s Aug. 26, 27, 28; minimum gage height, 1.95 ft Aug. 26, 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40	54	93	78	68	115	161	153	197	62	44	39
2	40	54	90	78	66	112	153	147	180	58	41	41
3	39	54	88	79	66	109	148	143	191	55	38	41
4	39	54	90	82	68	106	149	140	188	56	37	40
5	39	53	93	84	72	104	151	140	173	54	37	38
6	37	52	110	84	72	100	151	136	158	52	38	36
7	37	51	126	83	70	95	149	132	146	50	38	37
8	36	50	134	79	68	92	146	127	135	48	36	38
9	35	50	134	74	68	90	141	123	129	51	35	39
10	35	49	130	70	74	88	136	121	125	55	32	45
11	35	49	129	64	90	87	130	119	116	63	31	48
12	36	50	143	64	113	87	128	115	109	64	33	48
13	41	50	158	67	152	87	133	115	108	62	38	49
14	47	49	169	70	191	90	141	114	108	58	39	51
15	49	50	173	66	211	95	172	110	106	55	38	53
16	47	57	160	60	217	162	204	107	103	50	35	52
17	45	59	130	62	210	207	229	103	100	45	32	49
18	42	60	110	66	196	237	250	97	98	41	30	46
19	41	60	95	66	183	242	256	103	96	37	29	44
20	41	61	92	63	173	239	247	116	92	35	28	41
21	40	61	92	60	165	234	231	127	88	34	26	39
22	47	60	95	59	157	240	218	140	84	34	25	38
23	58	63	95	60	150	239	213	166	84	33	23	37
24	65	67	92	62	143	229	207	175	83	44	22	38
25	67	67	90	64	138	217	203	184	81	48	21	43
26	66	66	90	67	131	206	195	227	77	52	21	55
27	63	65	88	70	126	197	186	235	74	54	20	57
28	61	80	86	68	123	190	175	246	71	54	21	55
29	59	91	82	66	118	182	165	251	69	52	23	52
30	57	94	81	68	---	175	160	239	66	50	30	51
31	54	---	80	70	---	168	---	218	---	48	35	---
TOTAL	1438	1780	3418	2153	3679	4821	5328	4669	3435	1554	976	1340
MEAN	46.4	59.3	110	69.5	127	156	178	151	115	50.1	31.5	44.7
MAX	67	94	173	84	217	242	256	251	197	64	44	57
MIN	35	49	80	59	66	87	128	97	66	33	20	36
CFSM	.44	.56	1.04	.66	1.20	1.47	1.68	1.43	1.09	.47	.30	.42
IN.	.50	.62	1.20	.76	1.29	1.69	1.87	1.64	1.21	.55	.34	.47

CAL YR 1983 TOTAL 37915 MEAN 104 MAX 363 MIN 32 CFSM .98 IN 13.31
WTR YR 1984 TOTAL 34591 MEAN 94.5 MAX 256 MIN 20 CFSM .89 IN 12.14

04097970 LIME LAKE OUTLET AT PANAMA, IN

LOCATION.--Lat 41°42'46", long 85°07'10", in NW1/4 NW1/4 sec.35, T.38 N., R.12 E., Steuben County, Hydrologic Unit 04050001, on right bank 10 ft downstream from dam for Lime Lake, 30 ft upstream from bridge on Orland Road, and 0.7 mi northwest of Panama.

DRAINAGE AREA.--17.5 mi^2, of which 3.68 mi^2 does not contribute directly to surface runoff.

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is 950.00 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Occasional regulation by control structure for Lime Lake.

AVERAGE DISCHARGE.--15 years, 7.68 ft^3/s, 5.96 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 46 ft^3/s Apr. 3, 1982, gage height, 4.85 ft; no flow at times during 1971, 1972, and 1984.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 23 ft^3/s Apr. 30, gage height, 4.18 ft; no flow Oct. 25, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	.05	12	11	7.6	10	15	17	5.3	1.2	1.6	.45
2	9.3	.06	11	11	7.5	10	15	17	6.3	1.1	1.6	.49
3	8.7	.10	11	11	7.7	10	15	16	6.7	1.1	1.6	.57
4	8.1	.10	10	11	7.7	9.9	15	16	7.1	1.1	1.6	.49
5	7.5	.10	10	11	7.7	9.7	16	16	7.3	1.1	1.6	.45
6	6.9	.15	12	11	7.7	9.7	16	16	7.5	1.1	1.6	.45
7	6.5	.19	13	10	7.5	9.6	16	16	7.5	1.0	1.5	.65
8	6.0	.19	12	10	7.5	9.5	16	14	7.5	1.0	1.5	.70
9	2.8	.22	12	10	7.4	9.3	16	14	7.3	1.1	1.5	.90
10	.19	.24	12	10	7.4	9.2	15	14	7.1	1.3	1.3	1.5
11	.15	.32	12	10	7.5	9.2	15	13	6.0	1.6	1.8	1.5
12	.09	.32	13	9.8	7.8	9.1	15	13	5.5	1.5	1.6	1.7
13	.08	.35	13	9.6	8.2	9.4	16	12	5.3	1.5	1.5	2.1
14	.06	.38	13	9.4	8.5	9.3	15	12	5.8	1.5	1.3	2.7
15	.06	.45	13	9.1	8.7	9.4	17	11	5.0	1.4	1.2	2.6
16	.05	.57	13	9.0	8.8	12	18	11	4.3	1.3	1.1	2.3
17	.05	.61	13	8.8	9.1	12	19	10	4.2	1.2	1.0	2.1
18	.04	.70	13	8.6	9.4	13	19	9.8	3.8	1.1	.90	2.0
19	.03	.90	13	8.5	9.7	13	19	9.8	3.4	1.0	.80	1.8
20	.03	1.3	12	8.3	9.8	14	18	10	3.2	.98	.65	1.7
21	.02	1.3	12	8.4	9.9	14	18	11	2.7	.93	.61	1.6
22	.02	5.8	12	8.2	10	15	19	11	2.4	.95	.49	1.5
23	.02	17	12	8.1	10	15	20	11	2.4	1.0	.45	1.5
24	.01	15	12	8.0	10	16	20	11	2.4	1.3	.38	1.5
25	.00	14	11	7.9	9.9	16	20	11	2.0	1.3	.35	2.7
26	.00	13	11	7.7	9.9	16	20	6.3	1.9	1.5	.32	3.1
27	.04	13	11	7.6	10	16	20	1.6	1.5	1.8	.32	2.7
28	.05	14	11	7.5	10	16	19	2.3	1.4	2.1	.27	2.5
29	.03	13	11	7.5	10	16	19	2.9	1.3	1.9	.29	2.2
30	.04	12	11	7.7	---	16	19	3.6	1.2	1.8	.35	2.0
31	.04	---	11	7.7	---	16	---	4.4	---	1.7	.32	---
TOTAL	66.90	125.40	368	283.4	252.9	379.3	520	343.7	135.3	40.46	31.40	48.45
MEAN	2.16	4.18	11.9	9.14	8.72	12.2	17.3	11.1	4.51	1.31	1.01	1.62
MAX	10	17	13	11	10	16	20	17	7.5	2.1	1.8	3.1
MIN	.00	.05	10	7.5	7.4	9.1	15	1.6	1.2	.93	.27	.45
CFSM	.12	.24	.68	.52	.50	.70	.99	.63	.26	.08	.06	.09
IN.	.14	.27	.78	.60	.54	.81	1.11	.73	.29	.09	.07	.10

CAL YR 1983 TOTAL 3479.27 MEAN 9.53 MAX 33 MIN .00 CFSM .55 IN 7.40
WTR YR 1984 TOTAL 2595.21 MEAN 7.09 MAX 20 MIN .00 CFSM .41 IN 5.52

04099000 ST. JOSEPH RIVER AT MOTTVILLE, MI

LOCATION.--Lat 41°48'03", long 85°45'22", in SW1/4 sec.6, T.8 S., R.12 W., Michigan Meridian, St. Joseph County, Hydrologic Unit 04050001, on right bank 500 ft upstream from bridge on U.S. Highway 12 at Mottville, 0.4 mi downstream from Michigan Power Co. hydroelectric plant, 4 mi upstream from Pigeon River, and at mile 96.

DRAINAGE AREA.--1,866 mi^2.

PERIOD OF RECORD.--October 1923 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1930, 1932, 1938, 1940-42, 1945. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.3 ft Michigan Power Co. datum. Prior to Oct. 1, 1951, at site 0.4 mi upstream at datum 4.2 ft higher.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--61 years, 1,585 ft^3/s, 11.53 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft^3/s Apr. 27, 1950, gage height, 10.76 ft, present datum; minimum daily, 39 ft^3/s Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,230 ft^3/s Mar. 21, gage height, 5.94 ft; maximum gage height, 6.22 ft Dec. 27, backwater from ice; minimum discharge, 310 ft^3/s Aug. 24, gage height, 1.74 ft; minimum daily, 319 ft^3/s Aug. 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	706	1040	1740	1800	1300	1900	2810	2580	3640	816	768	510
2	721	858	1760	1700	1250	1920	2610	2430	3460	1240	685	507
3	1050	906	1710	1800	1300	1910	2580	2360	2970	906	746	514
4	953	953	1640	1900	1350	1880	2570	2340	2870	727	541	770
5	967	958	1600	1800	1400	1790	2470	2300	2740	941	542	863
6	879	1020	1520	1700	1500	1800	2510	2080	2540	949	907	746
7	744	1320	1720	1700	1500	1830	2480	2240	2540	718	962	638
8	770	1120	1690	1600	1400	1800	2460	2170	2260	758	910	550
9	735	1060	1680	1700	1450	1570	2370	2080	2330	1010	841	553
10	755	1450	1750	1800	1550	1340	2370	1940	2230	1210	803	940
11	766	876	1760	1700	1650	1410	2320	1960	2110	1020	518	904
12	1020	869	1840	1500	1680	1730	2210	1810	2070	1020	515	626
13	954	864	1990	1700	1960	1600	2260	1820	1960	1100	568	662
14	961	1060	2100	1500	2620	1380	2300	1960	1810	720	607	1010
15	820	1100	2160	1400	3240	1460	2570	1930	1800	765	579	880
16	876	1300	2220	1400	3320	2000	2850	1900	1740	1040	496	957
17	936	1100	2250	1600	3210	2380	2990	1890	1470	999	508	1110
18	1190	1140	2250	1500	3540	2950	3090	1650	1600	747	521	807
19	1120	837	1990	1400	3010	3640	3290	1490	1750	746	516	1000
20	878	1030	1870	1300	3230	3600	3310	1920	1350	735	500	810
21	851	1490	1790	1200	3050	3950	3360	2020	1420	646	491	843
22	873	1610	1850	1200	2660	3710	3370	2210	1270	587	487	675
23	950	1480	1700	1300	2800	3990	3230	2460	1260	529	474	594
24	1200	1270	1600	1500	2690	3770	3080	2550	1180	580	374	850
25	1360	1260	1500	1400	2460	3870	3120	2840	1510	820	319	1100
26	1330	1370	1500	1300	2350	3520	3090	3620	1380	756	329	1000
27	1310	1420	1600	1300	2350	3430	2970	3710	1080	747	348	1050
28	1320	1520	1800	1250	2320	3290	2750	3830	1110	561	355	1090
29	1210	1620	1850	1150	2060	3160	2610	3900	1250	665	482	828
30	901	1620	1800	1200	---	2900	2540	3880	1110	1270	505	897
31	1230	---	1900	1500	---	2870	---	3810	---	830	500	---
TOTAL	30336	35521	56130	46800	64200	78350	82540	75680	57810	26158	17697	24284
MEAN	979	1184	1811	1510	2214	2527	2751	2441	1927	844	571	809
MAX	1360	1620	2250	1900	3540	3990	3370	3900	3640	1270	962	1110
MIN	706	837	1500	1150	1250	1340	2210	1490	1080	529	319	507
CFSM	.53	.64	.97	.81	1.19	1.35	1.47	1.31	1.03	.45	.31	.43
IN.	.60	.71	1.12	.93	1.28	1.56	1.65	1.51	1.15	.52	.35	.48

CAL YR 1983 TOTAL 708667 MEAN 1942 MAX 5220 MIN 557 CFSM 1.04 IN 14.13
WTR YR 1984 TOTAL 595506 MEAN 1627 MAX 3990 MIN 319 CFSM .87 IN 11.87

STREAMS TRIBUTARY TO LAKE MICHIGAN

04099750 PIGEON RIVER NEAR SCOTT, IN

LOCATION.--Lat 41°44'56", long 85°34'35", in SE1/4 NW1/4 sec.14, T.38 N., R.8 E., Lagrange County, Hydrologic Unit 04050001, on right bank 20 ft downstream from bridge on County Road 750 North, 1,200 ft downstream from Page ditch, 0.7 mi south of Indiana-Michigan State line, and 1.2 mi northwest of Scott.

DRAINAGE AREA.--361 mi^2, of which 53.9 mi^2 does not contribute directly to surface runoff.

PERIOD OF RECORD.--June 1968 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 815.00 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good.

AVERAGE DISCHARGE.--16 years, 361 ft^3/s, 13.58 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,370 ft^3/s Mar. 21, 1982, gage height, 7.85 ft; minimum daily, 42 ft^3/s Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,080 ft^3/s Mar. 22, gage height, 5.53 ft; minimum daily, 100 ft^3/s Aug. 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	137	168	274	270	216	428	694	714	798	234	150	117
2	135	169	269	265	213	390	644	658	763	226	156	138
3	131	177	269	262	208	366	606	601	714	222	162	138
4	131	178	278	264	205	348	601	566	653	220	163	138
5	132	170	290	266	210	335	592	543	597	220	172	134
6	130	168	351	262	212	323	574	516	553	220	170	132
7	128	169	422	258	214	315	543	462	493	221	170	140
8	127	170	403	255	212	299	540	460	431	211	173	148
9	132	168	395	252	214	285	545	448	405	207	174	150
10	133	170	398	249	220	280	543	435	374	219	184	189
11	146	170	423	244	246	276	529	420	344	219	191	200
12	149	169	503	240	342	267	513	405	324	221	206	172
13	165	166	618	236	534	266	532	393	323	199	195	187
14	187	162	654	228	680	261	531	384	383	183	176	252
15	171	169	641	224	704	270	580	367	363	182	166	267
16	156	204	656	220	739	455	725	348	327	175	156	222
17	153	211	677	216	793	675	828	335	312	167	148	195
18	152	199	652	212	838	702	853	325	311	165	146	181
19	151	197	578	207	860	714	887	321	298	154	140	172
20	150	211	472	201	846	819	904	355	284	150	134	168
21	150	209	418	198	808	969	902	398	271	151	128	164
22	172	204	378	194	760	1080	909	429	262	155	124	160
23	216	210	360	192	707	1070	952	499	276	152	113	156
24	208	228	344	190	651	1050	1010	499	282	148	108	158
25	192	221	327	190	597	1030	978	475	267	192	107	213
26	184	219	317	192	542	1000	942	616	246	194	107	384
27	178	221	304	196	500	950	911	792	241	207	113	349
28	173	285	293	202	471	905	872	792	243	199	110	305
29	169	321	285	209	433	858	821	780	241	186	104	289
30	168	292	278	214	---	798	774	815	237	176	104	274
31	167	---	272	218	---	747	---	817	---	160	100	---
TOTAL	4873	5975	12799	7026	14175	18531	21835	15968	11616	5935	4550	5892
MEAN	157	199	413	227	489	598	728	515	387	191	147	196
MAX	216	321	677	270	860	1080	1010	817	798	234	206	384
MIN	127	162	269	190	205	261	513	321	237	148	100	117
CFSM	.44	.55	1.14	.63	1.36	1.66	2.02	1.43	1.07	.53	.41	.54
IN.	.50	.62	1.32	.72	1.46	1.91	2.25	1.65	1.20	.61	.47	.61

CAL YR 1983 TOTAL 131403 MEAN 360 MAX 1310 MIN 115 CFSM 1.00 IN 13.54
WTR YR 1984 TOTAL 129175 MEAN 353 MAX 1080 MIN 100 CFSM .98 IN 13.31

04100222 NORTH BRANCH ELKHART RIVER AT COSPERVILLE, IN

LOCATION.--Lat 41°28'54", long 85°28'32", in NE1/4 NW1/4 sec.22, T.35 N., R.9 E., Noble County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on County Road 900 North, 1,300 ft downstream from Boyd ditch, 1.7 mi upstream from Hustin ditch, and 3.1 mi downstream from Waldron Lake.

DRAINAGE AREA.--142 mi^2.

PERIOD OF RECORD.--October 1971 to current year. October 1950 to September 1971 at site 3.1 mi upstream, published as North Branch Elkhart River near Cosperville. Records may not be equivalent.

GAGE.--Water-stage recorder. Datum of gage is 880.12 ft National Geodetic Vertical Datum of 1929 (levels by Indiana Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated at times by dam at Waldron Lake.

AVERAGE DISCHARGE.--13 years, 137 ft^3/s, 13.10 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 919 ft^3/s Mar. 23, 1982, gage height, 8.12 ft; minimum daily, 2.4 ft^3/s Nov. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 357 ft^3/s Mar. 22, gage height, 5.58 ft; minimum daily, 20 ft^3/s Oct. 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	39	138	135	64	164	336	245	310	61	43	95
2	31	56	122	135	66	158	327	238	293	59	68	96
3	28	86	108	130	74	152	312	227	275	56	107	88
4	27	96	105	130	81	145	286	219	253	55	131	81
5	26	98	108	125	86	137	260	211	233	53	153	74
6	23	97	146	120	83	132	240	202	214	49	152	69
7	23	96	171	115	81	126	226	190	196	47	143	68
8	21	92	168	108	78	118	208	176	178	47	137	67
9	22	88	159	104	75	110	191	152	160	46	127	68
10	21	91	150	103	77	106	173	157	143	47	117	72
11	20	101	152	99	87	101	156	145	129	56	110	75
12	22	100	205	97	127	100	142	133	117	55	106	74
13	32	97	238	95	233	99	139	127	106	53	96	74
14	37	91	248	93	286	97	139	120	137	49	92	78
15	39	88	243	91	292	100	156	113	137	42	101	76
16	37	96	231	88	281	221	186	105	130	34	105	73
17	34	94	217	87	268	292	210	99	123	34	106	69
18	34	89	200	86	253	300	225	92	116	34	111	66
19	33	90	190	85	245	287	226	90	109	32	114	61
20	34	93	185	85	235	307	224	113	102	31	113	43
21	33	88	180	84	228	342	222	138	95	31	111	40
22	49	85	175	84	224	354	236	145	89	30	117	36
23	61	91	170	83	224	354	263	159	97	29	120	35
24	61	110	165	85	221	354	279	161	95	57	120	34
25	57	123	160	86	210	354	285	168	89	86	117	67
26	53	129	155	76	201	350	286	261	82	87	113	122
27	49	132	150	69	194	349	285	309	76	85	107	114
28	44	158	150	67	188	352	277	329	73	81	104	88
29	44	159	145	66	171	350	269	334	70	69	108	71
30	41	152	140	64	---	347	249	333	65	57	105	59
31	40	---	140	63	---	344	---	325	---	48	97	---
TOTAL	1110	3005	5214	2938	4933	7102	7013	5816	4292	1600	3451	2133
MEAN	35.8	100	168	94.8	170	229	234	188	143	51.6	111	71.1
MAX	61	159	248	135	292	354	336	334	310	87	153	122
MIN	20	39	105	63	64	97	139	90	65	29	43	34
CFSM	.25	.70	1.18	.67	1.20	1.61	1.65	1.32	1.01	.36	.78	.50
IN.	.29	.79	1.37	.77	1.29	1.86	1.84	1.52	1.12	.42	.90	.56

CAL YR 1983 TOTAL 47451.1 MEAN 130 MAX 474 MIN 7.8 CFSM .92 IN 12.43
WTR YR 1984 TOTAL 48607.0 MEAN 133 MAX 354 MIN 20 CFSM .94 IN 12.73

04100500 ELKHART RIVER AT GOSHEN, IN

LOCATION.--Lat 41°35'36", long 85°50'55", in NE1/4 NE1/4 sec.8, T.36 N., R.6 E., Elkhart County, Hydrologic Unit 04050001, on right bank 20 ft downstream from River Avenue bridge at Goshen, 0.4 mi upstream from Rock Run, and at mile 16.1.

DRAINAGE AREA.--594 mi^2.

PERIOD OF RECORD.--April 1931 to current year.

REVISED RECORDS.--WSP 1337: 1939(M). WSP 1557: 1954. WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 769.43 ft National Geodetic Vertical Datum of 1929. Prior to Nov. 20, 1931, nonrecording gage at same site and datum.

REMARKS.--Records good.

AVERAGE DISCHARGE.--53 years, 514 ft^3/s, 11.75 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,180 ft^3/s Mar. 14, 1982, gage height, 11.94 ft; minimum daily, 7.0 ft^3/s Aug. 11, 1964, result of extreme regulation.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,800 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 14	0400	*2,400	*6.44	Mar. 22	0100	1,840	5.50

Minimum daily discharge, 145 ft^3/s Oct. 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	160	189	448	497	276	602	1060	854	1100	343	253	229
2	158	188	426	497	288	575	1010	805	1060	328	246	233
3	153	190	413	493	371	544	974	775	996	312	272	241
4	147	205	413	479	404	521	976	768	928	308	355	232
5	162	230	417	470	410	497	958	741	856	295	400	221
6	158	236	507	461	370	479	919	707	787	288	421	211
7	145	243	662	450	350	452	870	683	717	284	439	221
8	157	243	634	439	390	430	818	662	660	264	456	215
9	152	240	606	434	417	379	778	638	612	264	439	224
10	157	235	592	426	417	320	749	615	564	257	421	311
11	154	238	611	410	443	320	715	598	525	280	404	278
12	154	249	844	400	690	379	694	559	493	276	379	248
13	171	257	1280	390	1780	379	705	537	539	264	363	265
14	183	261	1280	390	2300	371	714	521	676	246	335	287
15	190	264	1140	390	1900	400	793	506	583	231	308	274
16	191	288	1060	400	1660	808	1040	491	502	228	295	256
17	191	304	929	380	1520	1460	1170	486	479	210	288	256
18	185	300	824	370	1420	1310	1160	479	479	197	283	241
19	179	300	790	360	1330	1150	1100	475	456	194	281	223
20	181	304	750	350	1260	1290	1050	546	426	190	289	214
21	182	312	720	350	1160	1700	993	618	404	190	278	194
22	226	304	690	340	1080	1770	1030	670	396	194	268	177
23	292	312	660	340	990	1590	1210	679	552	187	269	171
24	302	312	640	343	914	1550	1270	666	592	187	267	169
25	280	324	610	355	844	1560	1160	623	507	228	263	306
26	260	335	590	355	778	1540	1080	879	448	284	259	388
27	250	351	580	320	734	1490	1030	1240	413	312	256	386
28	222	426	560	310	700	1430	989	1130	392	308	248	349
29	209	497	550	295	602	1350	940	1090	371	291	238	312
30	195	484	530	280	---	1230	900	1120	355	288	230	280
31	193	---	520	270	---	1130	---	1120	---	264	226	---
TOTAL	5939	8621	21276	12044	25798	29006	28855	22281	17868	7992	9729	7612
MEAN	192	287	686	389	890	936	962	719	596	258	314	254
MAX	302	497	1280	497	2300	1770	1270	1240	1100	343	456	388
MIN	145	188	413	270	276	320	694	475	355	187	226	169
CFSM	.32	.48	1.16	.66	1.50	1.58	1.62	1.21	1.00	.43	.53	.43
IN.	.37	.54	1.33	.75	1.62	1.82	1.81	1.40	1.12	.50	.61	.48

CAL YR 1983 TOTAL 203716 MEAN 558 MAX 2800 MIN 108 CFSM .94 IN 12.76
WTR YR 1984 TOTAL 197021 MEAN 538 MAX 2300 MIN 145 CFSM .91 IN 12.34

04101000 ST. JOSEPH RIVER AT ELKHART, IN

LOCATION.--Lat 41°41'30", long 85°58'30", in SW1/4 NE1/4 sec.5, T.37 N., R.5 E., Elkhart County, Hydrologic Unit 04050001, on left bank 200 ft downstream from Elkhart River, 200 ft upstream from Main Street bridge in Elkhart, 2,000 ft downstream from Christiana Creek, 0.5 mi downstream from Elkhart Hydroelectric Plant, and at mile 76.5.

DRAINAGE AREA.--3,370 mi^2.

PERIOD OF RECORD.--August 1947 to current year. Gage heights at site 0.8 mile downstream at different datum from September 1924 to March 1926 are available from the district office.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 700.00 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by Elkhart Hydroelectric Plant.

AVERAGE DISCHARGE.--37 years, 3,176 ft^3/s, 12.80 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 18,600 ft^3/s Mar. 21, 1982, gage height, 27.91 ft; minimum daily, 336 ft^3/s Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,970 ft^3/s Mar. 21, gage height, 22.31 ft; minimum daily, 1,020 ft^3/s Aug. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1400	1960	2950	3150	2500	3750	5560	5060	6320	1960	1460	1210
2	1380	1640	3010	2950	2340	3740	5200	4900	6050	2130	1490	1260
3	1650	1690	2830	3200	2570	3690	5030	4660	5610	2120	1590	1300
4	1670	1690	2910	3400	2600	3670	5170	4650	5170	1730	1490	1420
5	1580	1700	2810	3400	2750	3400	4860	4510	5000	1930	1520	1590
6	1530	1850	2920	3200	2880	3200	4950	4250	4630	1950	1920	1450
7	1350	2160	3390	3100	2850	3000	4830	4190	4430	1880	2240	1440
8	1430	1930	3280	2900	2630	2900	4700	4270	4220	1870	2070	1280
9	1360	1890	3310	2750	2810	2800	4560	3940	4030	1920	1930	1290
10	1400	2200	3400	2800	2820	2670	4480	3970	4030	2010	1910	1670
11	1420	1960	3360	2800	3040	2820	4400	3750	3670	2240	1600	1960
12	1690	1440	4020	2750	3690	2980	4280	3580	3660	1970	1520	1450
13	1680	1670	4450	2700	4950	2970	4320	3540	3660	2050	1500	1510
14	1760	1850	4810	2600	6500	2810	4430	3670	4240	1620	1520	1920
15	1710	1850	4610	2540	6860	2760	5030	3610	3310	1580	1470	1840
16	1820	2180	4600	2450	6720	4410	5930	3480	3360	1850	1370	1900
17	1670	2000	4280	2400	6390	5420	6140	3420	3190	1840	1320	2070
18	1740	2060	4050	2550	6540	5820	6210	3270	2910	1530	1340	1670
19	1950	1890	3840	2400	6160	6280	6370	2880	3150	1460	1320	1770
20	1570	1870	3490	2350	6140	6610	6200	3420	2820	1500	1290	1590
21	1520	2380	3250	2350	5970	7460	6140	3860	2760	1430	1250	1580
22	1670	2600	3050	2400	5550	7420	6340	3880	2630	1380	1230	1410
23	1910	2500	2850	2500	5390	7440	6770	4630	2920	1280	1210	1320
24	1900	2270	2600	2700	5240	7320	6520	4530	2880	1490	1160	1510
25	1930	2240	2550	2600	4930	7280	6360	4760	2880	1700	1030	2140
26	2210	2300	2700	2400	4560	7060	6210	6200	2830	1710	1020	2180
27	2140	2500	2900	2540	4480	6850	5980	6770	2440	1770	1040	2180
28	2140	2760	3150	2430	4410	6650	5700	6610	2210	1580	1040	2330
29	2050	3040	3300	2030	4080	6360	5340	6650	2380	1540	1110	1900
30	1770	3030	3300	2200	---	5970	5220	6590	2200	2100	1170	1890
31	1860	---	3300	2350	---	5770	---	6520	---	2010	1150	---
TOTAL	52860	63100	105270	82890	128350	151280	163230	140020	109590	55130	44280	50030
MEAN	1705	2103	3396	2674	4426	4880	5441	4517	3653	1778	1428	1668
MAX	2210	3040	4810	3400	6860	7460	6770	6770	6320	2240	2240	2330
MIN	1350	1440	2550	2030	2340	2670	4280	2880	2200	1280	1020	1210
CFSM	.51	.62	1.01	.79	1.31	1.45	1.62	1.34	1.08	.53	.42	.50
IN.	.58	.70	1.16	.91	1.42	1.67	1.80	1.55	1.21	.61	.49	.55

CAL YR 1983 TOTAL 1246880 MEAN 3416 MAX 9600 MIN 1010 CFSM 1.01 IN 13.76
WTR YR 1984 TOTAL 1146030 MEAN 3131 MAX 7460 MIN 1020 CFSM .93 IN 12.65

04101500 ST. JOSEPH RIVER AT NILES, MI
(National stream-quality accounting network station)

LOCATION.--Lat 41°49'45", long 86°15'35", in SW1/4 sec.26, T.7 S., R.17 W., Berrien County, Hydrologic Unit 04050001, on right bank 100 ft upstream from Main Street Bridge at Niles, 0.6 mi downstream from dam at French Paper Co., 1 mi upstream from Dowagiac River, and at mile 44.

DRAINAGE AREA.--3,666 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1933-36, 1940-43, 1945-46(M). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 633.02 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, at datum 2.00 ft higher. Oct. 1, 1930 to Feb. 11, 1931, nonrecording gage on Main Street Bridge, and Feb. 12 to June 30, 1931, nonrecording gage 50 ft upstream from present site (gage heights referred to NGVD). Since Apr. 13, 1970, auxiliary water-stage recorder at sewage-treatment plant, 1.1 mi downstream from base gage at same datum. Oct. 1, 1943 to Apr. 12, 1970, auxiliary gage was headwater gage at hydroelectric plant at Buchanan Dam, 8 mi downstream from base gage at different datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Flow regulated by powerplants above station.

AVERAGE DISCHARGE.--54 years, 3,262 ft^3/s, 12.08 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 20,200 ft^3/s Apr. 5, 1950, gage height, 15.10 ft, present datum; minimum daily, 420 ft^3/s Aug. 30, 1931.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 8,820 ft^3/s Feb. 13, gage height, 9.29 ft; minimum daily, 1,050 ft^3/s Aug. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1690	2030	3210	3500	2710	3950	6300	5720	6700	2340	2260	1370
2	1700	2000	3240	3200	2500	3930	5860	4900	6550	2220	1790	1350
3	1610	1760	2890	3400	2650	3870	5600	5170	6290	2300	1880	1480
4	1580	1970	3170	3800	2740	3780	4640	5060	6060	2520	2130	1700
5	1850	1750	2850	3800	2840	3750	6090	4930	4810	2270	2020	1810
6	1730	1880	3180	3470	2890	3320	4380	4740	5660	2250	1880	1570
7	1810	2050	3450	3300	3030	3540	5250	4680	4340	2230	2670	1910
8	1490	2410	3390	3210	2710	3630	5010	4070	4720	2130	2670	1700
9	1550	2140	3520	2870	2930	3350	4720	4300	4510	2260	2330	1590
10	1480	1940	3450	2960	2990	2880	4950	4290	4400	2130	2360	1580
11	1690	3030	3600	3070	3180	2900	4390	4100	4040	2710	2330	1900
12	1700	1600	3940	2950	3510	3240	5120	4010	3980	2620	2000	2220
13	1920	1660	5070	2630	6780	3010	4110	3870	3970	2290	1930	1670
14	2040	1850	5120	2840	7060	2940	4580	3730	5580	2340	1780	1930
15	2020	1930	4790	2690	7640	2970	5210	3860	3610	2110	1780	2050
16	1990	2230	4760	2640	7390	4970	5820	3800	3660	1900	1640	2020
17	1920	2250	4550	2500	6940	6060	6980	3610	3600	2010	1810	2120
18	1700	2320	4110	2800	6740	6420	6520	3710	3840	2280	1640	2250
19	2120	2180	4000	2540	6820	6410	6680	3430	3570	2080	1620	1900
20	2120	1950	3900	2500	6230	6860	6830	3440	3080	1680	1620	1960
21	1710	2090	3800	2500	6290	7770	6490	3930	3070	1810	1560	1750
22	1800	2730	3300	2600	5810	8380	6820	4400	3010	1770	1490	1750
23	1810	2730	3100	2700	5520	7910	7310	5130	3560	1740	1580	1700
24	2070	2540	2800	2870	5640	7940	7140	4950	3490	1790	1500	1460
25	2050	2350	2800	2870	5310	7800	6820	5070	3340	1910	1630	2820
26	2260	2390	2800	2510	4940	7730	6540	6330	3580	2220	1050	2520
27	2410	2640	3100	2500	4610	7280	6350	7300	2960	2090	1160	2510
28	2250	2910	3500	2440	4730	7180	6060	7300	2570	2130	1250	2340
29	2150	2890	3700	2330	4370	7470	5770	7060	3260	2020	1350	2410
30	2090	3240	3500	2300	---	5720	5380	6980	2930	1990	1340	2110
31	1960	---	3800	2430	---	5880	---	6830	---	2510	1440	---
TOTAL	58270	67440	112390	88720	137500	162840	173720	150700	124740	66650	55490	57450
MEAN	1880	2248	3625	2862	4741	5253	5791	4861	4158	2150	1790	1915
MAX	2410	3240	5120	3800	7640	8380	7310	7300	6700	2710	2670	2820
MIN	1480	1600	2800	2300	2500	2880	4110	3430	2570	1680	1050	1350
CFSM	.51	.61	.99	.78	1.29	1.43	1.58	1.33	1.13	.59	.49	.52
IN.	.59	.68	1.14	.90	1.40	1.65	1.76	1.53	1.27	.68	.56	.58

CAL YR 1983 TOTAL 1399510 MEAN 3834 MAX 12100 MIN 1230 CFSM 1.05 IN 14.20
WTR YR 1984 TOTAL 1255910 MEAN 3431 MAX 8380 MIN 1050 CFSM .94 IN 12.74

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1979 to September 1984.
WATER TEMPERATURE: February 1979 to September 1984.

INSTRUMENTATION.--Water-quality monitor October 1980 to September 1984 (discontinued).

REMARKS.--Bimonthly samples collected at Grant Street bridge 0.2 mi upstream from gage. Interruptions in the daily record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum (water years 1979, 1982, 1984), 678 micromhos Feb. 16, 1982; minimum (water years 1979, 1982, 1984), 278 micromhos Mar. 19, 1982.
WATER TEMPERATURES: Maximum daily recorded (water years 1980, 1982-84), 29.0°C July 20, 21, 1980; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 26.5°C Aug. 9, 10, 12; minimum, 0.0°C on many days during winter period.
SPECIFIC CONDUCTANCE: Maximum, 673 micromhos Mar. 15; minimum, 432 micromhos Sept. 25.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV										
16...	1330	2300	585	8.1	6.5	1.6	11.1	94	2700	530
DEC										
21...	1230	4100	616	8.1	.5	2.8	13.6	97	K12000	K22000
MAR										
13...	1400	2910	593	8.2	1.0	1.5	14.2	102	200	330
APR										
17...	1200	7050	515	8.1	10.0	5.0	10.6	98	1700	K8800
JUL										
11...	1130	2620	536	8.1	23.5	5.0	--	--	2400	460
AUG										
21...	1230	1600	515	8.1	24.0	8.0	9.0	109	K3400	K4

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
NOV										
16...	270	92	71	22	14	10	.4	2.0	176	2.7
DEC										
21...	280	77	79	21	12	8	.3	2.1	207	3.2
MAR										
13...	280	69	77	21	13	9	.4	1.8	210	2.5
APR										
17...	240	58	66	18	8.8	7	.3	2.0	181	2.8
JUL										
11...	260	56	69	21	12	9	.3	1.7	203	3.1
AUG										
21...	240	50	60	21	14	11	.4	1.8	187	2.9

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV 16...	48	29	.20	7.7	339	300	.46	2110	1.3
DEC 21...	65	26	.20	8.2	367	340	.50	4060	2.5
MAR 13...	54	26	<.10	7.0	350	330	.48	2750	2.0
APR 17...	52	21	<.10	4.7	342	280	.47	6510	1.8
JUL 11...	50	26	.10	2.2	383	300	.52	2710	1.0
AUG 21...	52	27	.20	2.4	293	290	.40	1270	.67

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 16...	.500	1.3	.050	.15	.020	.020	8	50	--
DEC 21...	.390	1.5	.080	.25	.030	<.010	4	44	--
MAR 13...	.360	1.0	.020	.06	<.010	.020	18	141	--
APR 17...	.190	1.2	.070	.21	.050	.020	20	381	89
JUL 11...	.030	1.1	.130	--	.010	<.010	32	226	--
AUG 21...	.130	1.1	.090	--	<.010	<.010	22	95	--

DATE	TIME	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
NOV 16...	1330	<10	1	76	<.5	<1	<1	<3	2	9	3
MAR 13...	1400	<10	1	62	<.5	<1	<1	<3	<1	9	<1
APR 17...	1200	<10	1	61	<.5	<1	<1	<3	1	19	1
AUG 21...	1230	10	2	67	<.5	<1	2	<3	3	10	4

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV 16...	<4	16	<.1	<10	6	<1	<1	130	<6	7
MAR 13...	<4	30	<.1	<10	4	<1	<1	140	<6	13
APR 17...	7	8	.1	<10	3	<1	<1	120	<6	7
AUG 21...	5	3	<.1	<10	2	<1	<1	140	<6	8

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	533	519	523	539	534	537	551	547	550	614	612	613
2	531	522	526	539	527	533	557	551	554	615	613	614
3	536	519	524	545	536	543	558	555	557	612	591	609
4	---	---	---	545	540	542	562	559	560	614	610	612
5	534	527	529	544	539	542	562	559	561	615	613	614
6	535	529	533	547	544	546	566	559	562	613	608	610
7	538	527	531	548	546	547	580	561	572	608	604	605
8	534	528	532	547	546	547	586	581	583	604	600	602
9	540	532	536	549	547	548	588	584	586	604	602	603
10	534	529	531	553	549	551	591	587	589	607	604	605
11	536	531	534	555	543	549	603	589	594	608	605	606
12	538	525	530	553	543	549	613	587	602	608	605	607
13	540	526	532	558	554	557	587	575	582	607	605	606
14	530	525	527	557	549	552	575	568	571	608	606	607
15	530	526	528	555	550	554	569	561	564	611	607	609
16	531	526	529	558	554	556	576	563	569	614	610	612
17	528	526	527	555	553	554	585	575	580	613	610	612
18	531	528	530	557	554	555	593	583	589	614	612	613
19	533	527	530	557	552	555	608	586	593	618	612	615
20	528	523	526	557	552	554	609	592	600	620	611	615
21	541	527	535	554	551	553	615	605	608	623	615	620
22	534	510	526	555	553	554	622	614	617	627	619	624
23	526	518	521	558	552	555	---	---	---	627	624	625
24	528	521	523	558	547	551	629	616	620	641	626	633
25	533	528	531	550	549	550	616	614	615	640	634	637
26	534	526	531	552	550	551	617	615	616	642	636	638
27	529	525	527	553	541	550	617	615	616	---	---	---
28	533	530	532	549	535	541	617	616	617	645	636	641
29	533	529	532	545	539	543	618	616	617	643	634	638
30	531	529	530	546	544	545	616	614	615	637	635	636
31	533	530	532	---	---	---	615	610	614	635	632	633
MONTH				558	527	549						

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	642	634	637	590	585	587	550	547	548	535	526	529
2	652	634	639	590	584	586	558	548	553	538	526	528
3	---	---	---	588	586	587	561	551	556	528	521	523
4	641	632	636	591	588	590	561	554	557	524	516	519
5	644	634	639	595	591	594	557	554	555	523	513	518
6	637	632	634	608	597	602	566	554	561	522	516	520
7	632	621	625	605	601	602	562	555	559	524	518	521
8	623	619	621	608	601	604	560	556	559	530	518	523
9	624	618	621	613	605	609	---	---	---	528	518	523
10	631	619	624	617	611	615	560	554	557	522	514	518
11	633	625	629	619	615	617	---	---	---	---	---	---
12	627	618	622	621	619	620	571	549	559	---	---	---
13	618	553	593	667	619	629	---	---	---	---	---	---
14	549	514	528	649	631	641	575	558	563	---	---	---
15	514	506	510	673	595	637	563	552	558	---	---	---
16	536	512	526	620	592	603	554	548	551	---	---	---
17	548	535	541	602	551	579	548	530	538	---	---	---
18	551	548	549	550	539	545	531	523	526	---	---	---
19	552	549	550	540	532	536	535	529	532	---	---	---
20	555	549	551	547	535	544	540	534	537	---	---	---
21	561	555	558	546	524	539	542	539	540	---	---	---
22	564	560	561	525	519	522	542	508	529	---	---	---
23	568	563	565	525	520	522	532	525	529	---	---	---
24	573	568	570	523	520	522	526	519	523	---	---	---
25	575	572	573	527	521	523	531	523	527	529	524	526
26	577	576	576	531	526	528	538	530	534	524	501	513
27	578	576	577	535	530	532	540	533	538	518	516	517
28	583	577	579	538	535	536	538	532	536	519	515	517
29	589	579	584	541	538	539	538	533	536	525	516	519
30	---	---	---	551	540	545	537	533	536	536	525	530
31	---	---	---	548	544	545	---	---	---	545	534	539
MONTH				673	519	574						

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	552	544	549	---	---	---	508	498	500	510	497	502
2	555	548	551	---	---	---	513	507	511	512	495	503
3	568	555	562	---	---	---	514	500	510	507	491	500
4	568	565	566	---	---	---	509	498	502	493	486	489
5	565	555	561	---	---	---	502	479	489	494	488	490
6	553	551	552	---	---	---	510	467	500	503	491	499
7	552	546	548	---	---	---	514	488	507	503	481	495
8	564	543	550	---	---	---	514	500	508	505	491	496
9	548	536	543	---	---	---	514	500	508	507	489	498
10	549	541	546	---	---	---	502	489	496	504	496	501
11	547	537	544	---	---	---	491	486	490	499	491	496
12	536	532	534	538	530	533	505	489	498	494	489	492
13	536	520	530	---	---	---	509	502	506	505	492	499
14	538	515	529	---	---	---	511	500	504	504	486	495
15	545	522	533	537	532	535	507	500	504	497	485	492
16	534	514	522	535	520	530	515	502	511	495	490	492
17	527	523	525	534	520	520	508	500	504	494	484	489
18	537	521	529	539	534	536	519	508	514	486	479	482
19	539	532	535	539	535	537	514	509	512	490	484	488
20	547	533	538	---	---	---	520	512	515	495	487	491
21	540	533	535	---	---	---	523	515	520	497	488	493
22	540	521	530	---	---	---	530	519	524	501	495	498
23	532	505	519	532	519	524	528	509	523	500	470	494
24	544	526	538	533	507	521	525	518	521	505	496	502
25	544	536	540	522	507	517	527	518	522	503	432	473
26	---	---	---	512	502	507	533	511	518	488	467	480
27	---	---	---	521	494	511	---	---	---	498	487	493
28	552	545	549	505	499	501	536	525	531	491	485	489
29	---	---	---	502	498	500	535	508	527	495	484	491
30	---	---	---	502	498	500	508	500	504	499	492	496
31	---	---	---	500	497	499	509	499	505	---	---	---
MONTH										512	432	493

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

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

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.0	.5	1.0	2.5	1.5	2.0	8.5	6.5	7.5	14.5	13.5	14.0
2	1.5	.5	1.0	2.0	1.5	2.0	8.5	7.5	8.0	13.5	12.5	13.0
3	2.0	1.0	1.5	2.5	1.5	2.0	8.0	7.5	7.5	13.0	12.5	12.5
4	1.5	1.0	1.0	2.5	2.0	2.0	8.0	7.5	7.5	12.5	12.0	12.0
5	1.0	1.0	1.0	2.0	2.0	2.0	7.5	7.5	7.5	13.5	11.5	12.5
6	1.0	.5	.5	2.5	2.0	2.0	7.5	7.0	7.0	14.0	12.0	13.0
7	.5	.0	.5	2.5	1.5	2.0	8.0	6.0	7.0	14.5	13.0	14.0
8	.5	.0	.5	2.0	1.5	1.5	7.5	6.5	7.5	14.5	13.5	14.0
9	1.5	.5	1.0	2.0	1.0	1.5	8.0	7.0	7.5	14.0	13.0	13.5
10	1.5	1.0	1.5	2.0	1.0	1.5	9.5	7.5	8.5	14.0	13.0	13.5
11	2.0	1.5	1.5	2.0	1.0	1.5	10.5	7.5	9.0	---	---	---
12	3.0	1.5	2.0	1.0	.5	1.0	10.5	9.0	9.5	---	---	---
13	3.0	2.0	2.5	2.0	1.0	1.0	11.5	9.5	10.5	---	---	---
14	4.0	2.0	3.0	2.5	1.5	2.0	12.0	10.5	11.5	---	---	---
15	3.5	3.0	3.5	4.0	2.5	3.0	12.0	11.5	11.5	---	---	---
16	4.0	3.5	4.0	4.0	3.5	3.5	11.5	11.0	11.5	---	---	---
17	4.0	4.0	4.0	4.0	3.5	3.5	11.0	9.5	10.0	---	---	---
18	4.0	4.0	4.0	3.5	2.0	3.5	9.5	8.5	9.0	---	---	---
19	4.0	4.0	4.0	3.0	2.5	3.0	8.5	8.0	8.5	---	---	---
20	4.5	4.0	4.0	3.0	2.0	3.0	9.5	8.0	8.5	---	---	---
21	5.0	4.0	4.5	3.0	3.0	3.0	10.0	8.5	9.5	---	---	---
22	6.0	4.5	5.0	3.0	2.5	2.5	9.5	9.0	9.0	---	---	---
23	6.5	5.0	5.5	3.5	2.0	2.5	9.0	8.5	9.0	---	---	---
24	6.5	6.0	6.0	4.0	2.5	3.5	8.5	8.0	8.5	---	---	---
25	6.5	6.0	6.0	4.0	4.0	4.0	10.0	8.0	9.0	20.0	18.5	19.0
26	6.0	5.5	6.0	5.0	4.0	4.5	12.0	9.0	10.5	19.5	18.0	18.5
27	6.0	4.0	5.0	5.0	4.5	5.0	14.5	12.0	13.0	19.0	17.5	18.5
28	4.0	3.0	3.5	6.0	5.0	5.5	16.5	14.5	15.5	18.5	16.5	17.5
29	3.0	2.5	2.5	6.5	5.0	6.0	16.0	15.5	16.0	16.5	15.5	16.0
30	---	---	---	7.0	6.0	6.5	16.0	14.5	15.5	15.5	14.5	15.0
31	---	---	---	8.0	6.0	7.0	---	---	---	16.0	14.0	15.0
MONTH	6.5	.0	3.0	8.0	.5	3.0	16.5	6.0	9.5			

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

04101800 DOWAGIAC RIVER AT SUMNERVILLE, MI

LOCATION.--Lat 41°54'57", long 86°12'47", in SE1/4 sec.30, T.6 S., R.16 W., Cass County, Hydrologic Unit 04050001, on right bank 30 ft upstream from bridge on Indian Lake Road, 0.3 mi west of Sumnerville.

DRAINAGE AREA.--255 mi^2.

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Datum of gage is 692.62 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by millpond and lake-level control dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 285 ft^3/s, 15.18 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft^3/s June 26, 1968, gage height, 8.78 ft; minimum, 86 ft^3/s Sept.10, 1964; minimum gage height, 2.57 ft Aug. 8, 9, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 855 ft^3/s Feb. 13, gage height, 6.90 ft; minimum, 136 ft^3/s Aug. 26, 27, gage height, 2.90 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	195	216	310	255	229	311	328	351	366	175	159	174
2	188	242	291	259	230	306	322	332	341	173	158	184
3	183	279	279	260	286	299	320	323	321	169	164	175
4	181	260	277	260	300	295	355	342	305	167	166	174
5	180	248	289	262	296	291	344	367	289	169	176	168
6	175	240	351	260	288	288	338	342	281	167	172	165
7	172	236	362	253	280	280	327	325	273	165	309	174
8	172	230	332	254	269	274	315	311	262	161	307	174
9	177	226	316	251	273	265	307	307	268	207	276	168
10	175	225	300	250	273	270	298	309	251	241	240	170
11	175	225	305	242	308	264	287	303	241	230	221	172
12	179	224	436	237	422	258	290	294	234	220	191	173
13	196	221	448	233	773	264	346	296	226	204	180	172
14	204	220	412	244	793	265	336	303	225	191	172	186
15	201	219	402	207	657	297	375	287	218	182	166	184
16	198	233	364	228	564	734	440	276	214	176	159	177
17	194	237	333	242	512	661	447	269	214	169	154	174
18	190	236	312	234	476	530	433	263	206	165	152	170
19	187	257	295	211	465	463	416	294	204	160	150	168
20	188	298	284	222	446	475	406	334	196	157	146	166
21	195	288	281	213	416	480	374	340	192	156	143	163
22	209	270	287	217	392	473	423	375	189	155	143	161
23	241	288	245	221	374	447	537	666	211	153	141	186
24	254	320	251	233	358	443	468	562	210	189	140	224
25	248	293	247	232	342	447	419	470	200	210	138	285
26	242	275	245	230	328	424	388	533	192	180	137	474
27	234	267	262	233	323	406	366	480	189	180	137	394
28	227	374	262	229	323	391	379	428	183	187	154	321
29	220	369	262	235	315	370	370	464	179	180	150	295
30	215	328	249	234	---	351	368	434	178	167	156	272
31	214	---	254	232	---	338	---	393	---	164	165	---
TOTAL	6209	7844	9543	7373	11311	11660	11122	11373	7058	5569	5422	6243
MEAN	200	261	308	238	390	376	371	367	235	180	175	208
MAX	254	374	448	262	793	734	537	666	366	241	309	474
MIN	172	216	245	207	229	258	287	263	178	153	137	161
CFSM	.78	1.02	1.21	.93	1.53	1.48	1.46	1.44	.92	.71	.69	.82
IN.	.91	1.14	1.39	1.08	1.65	1.70	1.62	1.66	1.03	.81	.79	.91

CAL YR 1983 TOTAL 104495 MEAN 286 MAX 852 MIN 127 CFSM 1.12 IN 15.24
WTR YR 1984 TOTAL 100727 MEAN 275 MAX 793 MIN 137 CFSM 1.08 IN 14.69

04102500 PAW PAW RIVER AT RIVERSIDE, MI

LOCATION.--Lat 42°11'10", long 86°22'06", in SW1/4 SE1/4 sec.23, T.3 S., R.18 W., Berrien County, Hydrologic Unit 04050001, on left bank 40 ft upstream from bridge on Coloma Road, 0.8 mi east of Riverside.

DRAINAGE AREA.--390 mi^2.

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 1337: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 588.80 ft National Geodetic Vertical Datum of 1929. May 10, 1966, to July 11, 1967, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation, principally during low flow, caused by paper mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 444 ft^3/s, 15.46 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,830 ft^3/s Mar. 9, 1979; maximum gage height, 10.11 ft Mar. 9, 1979, Mar. 18, 1982; minimum discharge, 99 ft^3/s July 5, 1964, gage height, 2.66 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,200 ft^3/s Feb. 17, gage height, 8.57 ft; minimum, 195 ft^3/s Aug. 25, gage height, 3.53 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	293	314	452	380	360	552	607	654	878	294	249	262
2	297	324	446	380	360	522	575	626	846	284	251	280
3	297	344	445	380	390	491	546	600	813	274	249	300
4	286	363	443	390	450	467	529	592	751	277	244	293
5	280	373	435	400	450	459	521	591	674	283	244	265
6	287	373	438	400	450	453	515	591	601	282	243	254
7	283	374	451	400	440	441	512	574	536	276	234	260
8	275	369	459	390	430	426	509	556	487	273	245	265
9	273	350	461	380	420	411	503	542	452	310	266	267
10	275	340	465	380	420	398	491	531	427	364	261	266
11	276	337	473	380	450	388	476	519	406	354	262	304
12	279	330	503	370	519	378	460	497	387	364	252	328
13	293	323	558	370	686	375	466	475	364	344	242	325
14	302	319	589	360	1120	369	496	467	355	325	234	340
15	310	316	589	350	1010	386	518	457	354	311	224	337
16	320	315	580	340	936	488	563	442	343	294	216	319
17	321	320	540	340	1140	699	612	431	338	276	217	292
18	311	328	500	340	1190	718	649	422	330	259	218	282
19	303	340	430	330	1170	691	680	436	330	260	220	276
20	300	358	400	330	1130	749	704	478	328	263	219	263
21	298	373	390	330	1040	827	709	515	321	265	215	257
22	304	377	390	330	954	843	716	551	318	259	209	256
23	327	388	390	340	897	811	792	626	328	247	200	274
24	340	402	380	350	842	781	827	785	326	257	197	311
25	353	411	380	350	785	776	755	750	314	264	197	341
26	354	410	390	350	722	772	707	762	312	275	203	439
27	352	408	390	350	671	746	676	823	308	293	202	469
28	351	428	390	360	627	723	667	823	304	279	198	453
29	347	451	380	360	587	701	710	925	299	264	201	437
30	333	460	380	360	---	670	691	963	296	257	241	436
31	320	---	380	360	---	639	---	907	---	251	271	---
TOTAL	9540	10918	13897	11230	20646	18150	18182	18911	13126	8878	7124	9451
MEAN	308	364	448	362	712	585	606	610	438	286	230	315
MAX	354	460	589	400	1190	843	827	963	878	364	271	469
MIN	273	314	380	330	360	369	460	422	296	247	197	254
CFSM	.79	.93	1.15	.93	1.83	1.50	1.55	1.56	1.12	.73	.59	.81
IN.	.91	1.04	1.33	1.07	1.97	1.73	1.73	1.80	1.25	.85	.68	.90

CAL YR 1983 TOTAL 168036 MEAN 460 MAX 1110 MIN 223 CFSM 1.18 IN 16.03
WTR YR 1984 TOTAL 160053 MEAN 437 MAX 1190 MIN 197 CFSM 1.12 IN 15.27

04102700 SOUTH BRANCH BLACK RIVER NEAR BANGOR, MI

LOCATION.--Lat 42°21'15", long 86°11'15", in NW1/4 sec.28, T.1 S., R.16 W., Van Buren County, Hydrologic Unit 04050002, on left bank 50 ft upstream from bridge on 66th Street, 4.9 mi northwest of Bangor.

DRAINAGE AREA.--83.6 mi^2.

PERIOD OF RECORD.--June 1966 to current year. Prior to October 1981, published as Black River near Bangor.

REVISED RECORDS.--WDR MI-81: 1973-75(M), 1979(M).

GAGE.--Water-stage recorder. Altitude of gage is 610 ft from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 105 ft^3/s, 17.06 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,680 ft^3/s Apr. 19, 1975, gage height, 13.16 ft; minimum, 20 ft^3/s Sept. 28, 1966, Aug. 18, 19, 1984; minimum gage height, 1.79 ft Aug. 18, 19, 1984.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 14	0200	*875	*10.46	May 30	0500	461	8.08

Minimum discharge, 20 ft^3/s Aug. 18, 19, gage height, 1.79 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	41	46	82	66	74	112	117	111	215	38	32	37
2	40	52	73	67	75	106	111	103	172	37	31	37
3	39	67	69	68	80	100	105	97	145	36	30	33
4	39	63	66	70	85	96	111	103	127	36	30	31
5	39	57	69	75	95	90	112	124	113	35	43	30
6	38	53	93	76	100	85	111	116	101	36	32	28
7	37	51	105	73	100	80	107	104	93	35	38	30
8	37	49	92	70	100	76	100	95	85	35	37	30
9	39	48	81	67	95	73	95	93	80	44	35	30
10	37	47	76	64	112	70	90	95	76	49	33	30
11	37	47	77	61	125	68	86	91	71	49	31	47
12	37	46	171	60	203	66	83	87	66	47	30	44
13	42	45	215	60	604	64	103	85	62	42	29	37
14	47	45	183	60	807	62	117	91	59	40	29	40
15	49	46	176	60	612	79	153	86	57	38	28	35
16	46	47	158	60	442	208	178	80	54	37	27	33
17	43	50	130	60	361	276	168	76	55	36	27	31
18	41	49	110	60	338	211	172	73	53	35	24	30
19	40	50	95	60	338	169	162	85	50	34	21	29
20	39	58	80	60	333	172	153	100	48	33	25	28
21	39	63	76	60	284	200	140	101	46	33	25	28
22	44	58	74	60	241	200	139	111	44	33	24	27
23	65	64	72	60	215	184	224	272	46	32	25	30
24	77	84	71	62	189	184	205	348	45	47	25	34
25	67	80	70	66	169	197	167	248	43	41	25	45
26	59	70	69	70	151	198	143	280	41	37	25	101
27	54	64	68	73	139	184	127	301	41	38	25	67
28	51	91	68	76	126	167	118	250	40	35	29	54
29	48	112	67	78	119	151	113	389	39	33	27	50
30	47	96	67	80	---	139	111	431	38	33	48	46
31	46	---	66	77	---	127	---	296	---	33	40	---
TOTAL	1404	1798	2969	2059	6712	4194	3921	4922	2205	1167	930	1152
MEAN	45.3	59.9	95.8	66.4	231	135	131	159	73.5	37.6	30.0	38.4
MAX	77	112	215	80	807	276	224	431	215	49	48	101
MIN	37	45	66	60	74	62	83	73	38	32	21	27
CFSM	.54	.72	1.15	.79	2.76	1.62	1.57	1.90	.88	.45	.36	.46
IN.	.62	.80	1.32	.92	2.99	1.87	1.74	2.19	.98	.52	.41	.51

CAL YR 1983 TOTAL 34601 MEAN 94.8 MAX 700 MIN 32 CFSM 1.13 IN 15.40
WTR YR 1984 TOTAL 33433 MEAN 91.3 MAX 807 MIN 21 CFSM 1.09 IN 14.88

04105000 BATTLE CREEK AT BATTLE CREEK, MI

LOCATION.--Lat 42°19'55", long 85°09'15", in NW1/4 sec.5, T.2 S., R.7 W., Calhoun County, Hydrologic Unit 04050003, on right bank 350 ft upstream from Emmett Street Bridge at Battle Creek, and 3.0 mi upstream from mouth.

DRAINAGE AREA.--241 mi^2.

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to July 1933, January 1934 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1944. WSP 1507: 1956.

GAGE.--Water-stage recorder. Datum of gage is 823.24 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to May 14, 1951, nonrecording gage at same site and datum.

REMARKS.--Records good. Occasional slight regulation prior to November 1943. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--51 years (water years 1931, 1935-84), 199 ft^3/s, 11.21 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,640 ft^3/s Apr. 7, 1947, gage height, 4.48 ft, from floodmark; minimum, 22 ft^3/s Aug. 14, 1934; minimum gage height, about -0.5 ft in July 1936 and on Aug. 31, 1939, due to opening of gates at dam forming control.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 865 ft^3/s Feb. 15, gage height, 1.95 ft; minimum, 36 ft^3/s Aug. 18, 19, 23, 24, 25, 27, gage height, 0.52 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	70	76	229	151	113	150	377	207	434	66	48	48
2	68	84	231	148	114	150	346	198	399	63	52	48
3	65	90	209	138	126	152	319	198	354	65	55	47
4	69	98	184	131	142	151	301	209	304	64	54	44
5	68	90	174	122	158	135	290	196	252	57	59	45
6	66	91	169	130	168	140	292	185	213	58	61	46
7	62	90	168	139	174	117	298	179	172	71	56	47
8	62	84	171	127	181	112	308	163	154	74	51	49
9	61	83	167	125	172	117	315	167	150	68	53	50
10	61	88	162	122	164	118	304	163	142	72	50	50
11	65	87	175	122	174	116	282	165	138	89	41	51
12	67	94	190	128	214	104	261	159	122	104	43	50
13	81	92	233	136	314	107	251	153	115	107	52	52
14	99	87	267	135	451	119	244	172	104	93	47	53
15	108	92	321	127	752	124	250	171	101	77	45	58
16	101	106	351	116	836	218	268	164	94	60	40	58
17	90	114	307	112	724	285	285	152	94	62	46	55
18	85	131	274	115	612	332	314	138	91	62	44	57
19	84	133	216	116	523	403	347	153	91	59	39	60
20	72	142	200	114	456	439	370	171	84	57	41	55
21	76	159	199	104	404	434	378	191	81	56	46	57
22	78	159	171	100	362	448	363	201	75	54	45	53
23	80	164	170	98	328	500	343	247	78	52	39	59
24	98	182	188	101	299	539	326	293	75	59	41	66
25	105	201	169	108	268	509	317	328	81	61	38	86
26	93	205	159	110	244	470	314	400	77	54	42	115
27	92	205	158	110	227	449	305	436	72	55	38	146
28	83	213	152	108	202	448	293	440	68	51	43	150
29	81	220	135	108	169	443	261	460	64	50	39	117
30	90	222	130	111	---	429	220	470	71	53	43	96
31	85	---	140	110	---	404	---	458	---	49	49	---
TOTAL	2465	3882	6169	3722	9071	8662	9142	7387	4350	2022	1440	1968
MEAN	79.5	129	199	120	313	279	305	238	145	65.2	46.5	65.6
MAX	108	222	351	151	836	539	378	470	434	107	61	150
MIN	61	76	130	98	113	104	220	138	64	49	38	44
CFSM	.33	.54	.83	.50	1.30	1.16	1.27	.99	.60	.27	.19	.27
IN.	.38	.60	.95	.57	1.40	1.34	1.41	1.14	.67	.31	.22	.30

CAL YR 1983 TOTAL 82271 MEAN 225 MAX 1100 MIN 50 CFSM .93 IN 12.70
WTR YR 1984 TOTAL 60280 MEAN 165 MAX 836 MIN 38 CFSM .69 IN 9.30

04105500 KALAMAZOO RIVER NEAR BATTLE CREEK, MI

LOCATION.--Lat 42°19'26", long 85°11'51", in SW1/4 sec.1, T.2 S., R.8 W., Calhoun County, Hydrologic Unit 04050003, on left bank 20 ft upstream from bridge on Kendall Street in Battle Creek.

DRAINAGE AREA.--824 mi^2.

PERIOD OF RECORD.--July 1937 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1938-39. WSP 1387: 1938, 1945-46, 1948.

GAGE.--Water-stage recorder. Altitude of gage is 815 ft from topographic map (nearest 5 ft). Prior to Oct. 1, 1957, water-stage recorder at site 4.7 mi downstream at different datum. Oct. 1, 1957, to June 15, 1959, nonrecording gage at bridge 1,800 ft upstream at different datum. June 16, 1959, to Oct. 13, 1960, nonrecording gage at same site and datum.

REMARKS.--Records fair except those for period of no gage-height record, Dec. 20 to Feb. 1, which are poor. Diurnal fluctuation below 1,500 ft^3/s caused by powerplants above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--47 years, 660 ft^3/s, 10.88 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,290 ft^3/s Apr. 7, 1947, gage height, 9.13 ft, site and datum then in use; minimum, 50 ft^3/s Sept. 22, 1939, site then in use; minimum daily, 86 ft^3/s Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,900 ft^3/s Feb. 16, gage height, 4.98 ft; minimum, 206 ft^3/s Aug. 21, gage height, 2.89 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	359	511	849	600	505	583	963	690	1190	390	320	358
2	417	422	775	610	518	569	936	735	1080	384	250	270
3	369	505	799	630	583	569	963	675	991	406	270	400
4	417	569	767	660	576	569	945	660	824	369	350	354
5	384	543	690	700	576	550	849	751	775	374	560	354
6	359	524	712	720	597	556	1000	631	668	422	560	348
7	384	639	603	700	597	530	1020	638	638	428	450	384
8	493	556	799	680	576	505	1010	596	638	344	334	354
9	359	451	743	650	569	511	991	583	590	428	359	374
10	353	422	783	620	556	457	936	675	624	487	329	379
11	359	445	807	600	617	475	841	576	556	524	340	556
12	369	524	841	600	751	499	832	570	475	505	358	439
13	524	445	918	600	1150	505	841	603	576	499	329	570
14	481	563	1100	600	1420	518	832	682	556	463	315	469
15	530	505	1120	600	1780	543	849	617	457	457	310	537
16	524	550	1140	600	1850	1030	954	596	505	417	305	511
17	505	569	1040	600	1670	1320	954	668	530	406	315	463
18	511	597	981	600	1470	1470	1020	530	570	406	310	253
19	374	667	849	600	1320	1470	927	675	493	379	296	222
20	417	667	780	600	1220	1480	1050	638	481	379	301	287
21	434	667	700	590	1110	1440	1090	720	481	360	233	324
22	569	624	650	590	936	1430	1070	874	434	350	261	317
23	576	712	600	580	954	1460	1050	1100	499	350	296	375
24	653	841	580	590	849	1480	991	1200	445	350	301	365
25	639	735	570	600	799	1420	874	1210	439	350	296	521
26	556	799	570	620	712	1360	963	1360	434	350	301	662
27	631	791	570	610	759	1290	963	1460	395	350	315	655
28	543	857	570	580	653	1250	909	1470	406	350	241	610
29	463	783	580	560	610	1210	783	1470	406	350	249	547
30	603	816	590	530	---	1180	816	1410	390	350	395	496
31	631	---	600	510	---	1130	---	1290	---	350	384	---
TOTAL	14786	18299	23676	18930	26283	29359	28222	26353	17546	12327	10233	12754
MEAN	477	610	764	611	906	947	941	850	585	398	330	425
MAX	653	857	1140	720	1850	1480	1090	1470	1190	524	560	662
MIN	353	422	570	510	505	457	783	530	390	344	233	222
CFSM	.58	.74	.93	.74	1.10	1.15	1.14	1.03	.71	.48	.40	.52
IN.	.67	.83	1.07	.85	1.19	1.33	1.27	1.19	.79	.56	.46	.58

CAL YR 1983 TOTAL 297560 MEAN 815 MAX 2430 MIN 255 CFSM .99 IN 13.43
WTR YR 1984 TOTAL 238768 MEAN 652 MAX 1850 MIN 222 CFSM .79 IN 10.78

04105700 AUGUSTA CREEK NEAR AUGUSTA, MI

LOCATION.--Lat 42°21'12", long 85°21'14", in SW1/4 sec.27, T.1 S., R.9 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 15 ft downstream from bridge on EF Road, and 1.3 mi north of Augusta.

DRAINAGE AREA.--38.9 mi^2.

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

GAGE.--Water-stage recorder. Altitude of gage is 815 ft from topographic map. Prior to June 15, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 43.0 ft^3/s, 15.01 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 560 ft^3/s June 27, 1978, gage height, 3.41 ft; minimum, 8.9 ft^3/s Jan. 26, 1978, result of freezeup; minimum gage height, 0.65 ft Jan. 19, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 97 ft^3/s Feb. 14, gage height, 1.83 ft; minimum, 13 ft^3/s Aug. 27, gage height, 0.71 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33	32	49	39	35	46	49	44	50	23	19	21
2	32	38	46	39	36	44	48	41	45	22	20	22
3	31	45	44	40	48	43	48	40	42	22	21	21
4	30	42	43	41	47	43	55	40	40	22	21	21
5	30	38	45	41	46	42	55	41	39	21	21	22
6	29	37	49	42	43	42	50	40	38	19	20	21
7	29	36	50	37	42	40	48	39	36	18	19	24
8	30	35	46	42	40	39	49	38	34	17	20	23
9	31	34	45	39	41	38	47	38	35	29	22	29
10	31	34	44	35	40	39	47	38	33	42	24	29
11	30	35	45	38	45	38	45	38	31	51	21	36
12	31	35	62	39	59	36	44	37	29	47	20	32
13	42	35	64	37	88	39	50	39	29	39	19	31
14	49	35	61	36	97	41	50	41	28	33	18	34
15	45	36	58	35	89	45	53	38	26	30	17	32
16	40	46	54	35	78	79	55	36	26	29	17	29
17	37	46	49	35	71	79	54	35	27	26	16	27
18	34	42	46	35	68	70	55	36	26	25	16	26
19	32	46	43	35	69	61	55	45	27	24	16	25
20	32	50	45	35	68	66	53	47	27	23	16	24
21	32	50	42	35	64	73	50	44	26	23	15	23
22	35	46	44	35	61	72	49	53	25	23	15	21
23	43	52	43	35	58	67	52	79	27	22	15	26
24	46	60	41	35	56	64	50	73	26	27	14	30
25	43	56	40	35	54	63	48	61	25	27	14	44
26	40	50	39	34	51	61	46	66	23	25	14	63
27	38	47	39	36	50	59	44	61	24	25	14	60
28	36	57	39	35	47	57	46	57	24	24	15	46
29	35	57	39	35	44	55	43	65	23	22	16	37
30	34	53	39	34	---	54	45	61	23	21	20	34
31	32	---	39	34	---	51	---	55	---	20	20	---
TOTAL	1092	1305	1432	1138	1635	1646	1483	1466	914	821	555	913
MEAN	35.2	43.5	46.2	36.7	56.4	53.1	49.4	47.3	30.5	26.5	17.9	30.4
MAX	49	60	64	42	97	79	55	79	50	51	24	63
MIN	29	32	39	34	35	36	43	35	23	17	14	21
CFSM	.91	1.12	1.19	.94	1.45	1.37	1.27	1.22	.78	.68	.46	.78
IN.	1.04	1.25	1.37	1.09	1.56	1.57	1.42	1.40	.87	.79	.53	.87

CAL YR 1983 TOTAL 16182 MEAN 44.3 MAX 103 MIN 22 CFSM 1.14 IN 15.47
WTR YR 1984 TOTAL 14400 MEAN 39.3 MAX 97 MIN 14 CFSM 1.01 IN 13.77

04106180 PORTAGE CREEK AT PORTAGE, MI

LOCATION.--Lat 42°12'21", long 85°35'23", in SE1/4 sec.16, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank 750 ft upstream from bridge on Westnedge Avenue in Portage.

DRAINAGE AREA.--16.5 mi^2.

PERIOD OF RECORD.--October 1982 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft from topographic map.

REMARKS.--Records fair. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 52 ft^3/s May 1, 1983, Sept. 25, 1984; maximum gage height, 3.44 ft Sept. 25, 1984; minimum discharge, 11 ft^3/s Aug. 26, 1984; minimum gage height, 1.83 ft Sept. 14, 1983.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 52 ft^3/s Sept. 25, gage height, 3.44 ft; minimum, 11 ft^3/s Aug. 26; minimum gage height, 1.90 ft Oct. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	16	18	15	15	15	17	23	20	15	14	17
2	15	19	18	15	16	15	17	22	19	14	15	16
3	15	19	17	15	18	15	17	23	19	15	15	16
4	15	18	16	16	17	15	18	23	18	15	21	16
5	15	17	18	15	16	15	18	23	18	15	19	15
6	15	16	21	15	16	15	18	22	18	15	17	15
7	15	16	20	15	16	15	18	22	17	15	16	16
8	15	16	18	15	16	15	17	22	18	14	15	15
9	15	15	18	16	16	15	17	22	19	18	15	19
10	15	16	17	16	16	15	17	22	18	17	15	17
11	15	16	19	16	17	15	16	22	17	18	15	19
12	15	15	26	16	20	15	17	21	17	16	15	17
13	18	15	23	16	30	15	18	22	17	15	14	17
14	18	15	21	16	25	15	23	22	17	15	14	17
15	17	16	20	16	21	19	30	21	16	15	14	16
16	16	18	18	16	20	38	29	21	16	14	14	16
17	16	17	17	15	20	24	25	20	16	15	14	15
18	15	17	17	15	19	20	24	21	15	14	14	15
19	15	18	16	15	20	18	23	29	15	14	14	14
20	15	19	16	15	19	21	21	27	15	14	13	14
21	15	18	16	15	17	20	20	25	15	14	13	14
22	18	17	17	15	16	19	22	29	15	14	13	14
23	20	19	18	15	16	19	24	34	15	14	13	16
24	19	20	17	15	16	18	22	25	15	18	12	16
25	18	19	16	15	15	19	21	24	15	17	12	30
26	17	18	19	15	15	19	20	27	14	16	12	32
27	16	18	16	15	15	19	20	23	15	16	12	21
28	16	25	17	15	15	18	24	24	15	16	13	18
29	16	22	17	16	15	17	22	27	15	15	12	17
30	16	19	16	15	---	17	25	24	15	14	17	16
31	16	---	16	15	---	17	---	21	---	14	16	---
TOTAL	498	529	559	475	513	552	620	733	494	471	448	516
MEAN	16.1	17.6	18.0	15.3	17.7	17.8	20.7	23.6	16.5	15.2	14.5	17.2
MAX	20	25	26	16	30	38	30	34	20	18	21	32
MIN	15	15	16	15	15	15	16	20	14	14	12	14
CFSM	.98	1.07	1.09	.93	1.07	1.08	1.26	1.43	1.00	.92	.88	1.04
IN.	1.12	1.19	1.26	1.07	1.16	1.24	1.40	1.65	1.11	1.06	1.01	1.16

CAL YR 1983 TOTAL 6770 MEAN 18.5 MAX 45 MIN 14 CFSM 1.12 IN 15.26
WTR YR 1984 TOTAL 6408 MEAN 17.5 MAX 38 MIN 12 CFSM 1.06 IN 14.45

04106300 PORTAGE CREEK NEAR KALAMAZOO, MI

LOCATION.--Lat 42°14'46", long 85°34'33", in SE1/4 sec.34, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 5 ft upstream from bridge on Lovers Lane, and 3.0 mi south of Kalamazoo.

DRAINAGE AREA.--22.4 mi^2.

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

GAGE.--Water-stage recorder. Datum of gage is 814.88 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 2.0 mi upstream from station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 40.3 ft^3/s, 24.43 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 290 ft^3/s June 26, 1978, gage height, 4.49 ft; minimum, 8.0 ft^3/s Jan. 19, 1965, gage height, 0.88 ft, result of bridge construction upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 16	0300	*178	*2.16	Sept. 25	2100	119	2.01
May 22	2100	135	1.97				

Minimum discharge, 20 ft^3/s Aug. 11, 27; minimum gage height, 1.28 ft Dec. 26, Mar. 9, 11, 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	34	33	35	38	41	40	44	39	31	28	33
2	31	44	33	36	41	41	42	43	38	32	28	28
3	33	38	32	37	47	41	44	44	34	33	26	29
4	32	34	32	39	41	39	45	45	34	32	41	33
5	33	33	35	39	39	42	44	43	36	36	30	30
6	31	32	41	40	39	43	44	41	34	34	26	29
7	31	34	35	37	40	39	42	41	34	32	23	35
8	29	36	34	36	40	35	41	41	35	30	23	29
9	26	34	33	37	42	35	37	43	36	47	24	42
10	29	38	32	38	42	34	34	41	32	35	26	32
11	33	38	39	37	43	33	36	40	31	42	22	45
12	29	35	49	36	50	35	43	38	32	36	22	29
13	38	33	41	36	77	37	44	44	32	34	24	32
14	38	36	41	34	63	37	52	43	32	27	27	31
15	36	39	39	34	54	47	63	40	32	27	25	27
16	34	42	35	36	51	113	58	38	30	27	25	26
17	34	34	31	36	51	59	53	38	29	29	27	28
18	33	33	30	36	46	50	47	40	31	28	25	27
19	31	40	32	37	46	49	48	60	30	27	24	28
20	32	34	33	33	46	58	46	46	32	27	26	28
21	32	33	35	33	44	53	43	43	33	28	28	26
22	37	34	38	34	44	50	48	65	35	26	28	25
23	41	41	34	36	43	48	48	63	34	28	28	36
24	37	35	33	40	42	46	44	46	32	42	28	32
25	34	34	31	38	39	45	43	47	34	31	27	70
26	34	33	31	38	39	46	42	51	34	30	22	60
27	34	34	32	40	41	46	41	39	35	30	24	39
28	34	50	34	38	43	44	49	44	33	28	29	33
29	32	38	34	37	41	43	38	51	31	26	26	30
30	31	36	33	38	---	43	50	44	31	27	41	30
31	33	---	32	38	---	41	---	40	---	29	30	---
TOTAL	1026	1089	1077	1139	1312	1413	1349	1386	995	971	833	1002
MEAN	33.1	36.3	34.7	36.7	45.2	45.6	45.0	44.7	33.2	31.3	26.9	33.4
MAX	41	50	49	40	77	113	63	65	39	47	41	70
MIN	26	32	30	33	38	33	34	38	29	26	22	25

CAL YR 1983 TOTAL 14555 MEAN 39.9 MAX 117 MIN 26
WTR YR 1984 TOTAL 13592 MEAN 37.1 MAX 113 MIN 22

04106320 WEST FORK PORTAGE CREEK NEAR OSHTEMO, MI

LOCATION.--Lat 42°14'07", long 85°38'54", in SE1/4 sec.1, T.3 S., R.12 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank at upstream side of culvert on 12th Street, 2.1 mi southeast of Oshtemo.

DRAINAGE AREA.--13.0 mi^2.

PERIOD OF RECORD.--May 1972 to current year.

GAGE.--Water-stage recorder. Datum of gage is 868.86 ft Kalamazoo County Road Commission datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--12 years, 7.03 ft^3/s, 7.34 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26 ft^3/s Aug. 31, 1975, gage height, 2.15 ft; minimum, 1.4 ft^3/s Aug. 25, 26, 1984, gage height, 0.98 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 10 ft^3/s Mar. 16, 17, gage height, 1.60 ft; minimum, 1.4 ft^3/s Aug. 25, 26, gage height, 0.98 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.8	5.3	6.5	5.8	6.2	5.0	4.5	4.6	4.9	2.4	2.2	2.8
2	4.6	6.2	6.2	5.8	6.2	4.9	4.3	4.0	4.5	2.3	2.2	3.1
3	4.5	7.1	6.0	6.2	7.1	4.8	4.1	3.8	4.1	2.1	2.2	3.2
4	4.5	6.9	6.2	6.5	7.1	4.8	4.5	4.1	3.6	2.1	2.4	3.2
5	4.5	6.4	6.3	6.6	6.8	4.9	4.8	4.3	3.3	2.1	2.6	3.0
6	4.5	6.2	7.0	6.5	6.4	4.7	4.8	4.3	3.0	2.2	2.5	2.8
7	4.3	5.9	7.1	6.4	6.0	4.5	4.7	4.3	2.9	2.2	2.5	2.9
8	4.4	5.8	6.8	6.2	5.9	4.5	4.3	4.3	2.9	2.3	2.5	2.9
9	4.6	5.7	6.7	6.2	5.9	4.5	4.0	4.3	2.7	2.4	2.4	3.2
10	4.8	5.6	6.6	6.2	5.9	4.6	3.9	4.5	2.5	2.8	2.3	3.2
11	4.8	5.7	6.8	6.2	6.2	4.6	3.8	4.5	2.2	3.2	2.2	4.4
12	4.9	5.7	8.3	6.2	6.7	4.5	3.9	4.3	2.2	3.3	2.1	4.5
13	5.7	5.5	8.5	6.0	8.6	4.7	4.8	4.4	2.1	3.3	2.0	4.6
14	6.4	5.5	8.3	6.0	9.1	4.7	5.7	4.6	2.0	3.1	2.1	4.7
15	6.2	5.6	7.5	6.0	8.6	5.4	7.6	4.5	1.9	2.9	2.1	4.5
16	5.8	6.3	7.0	5.8	7.8	10	8.2	4.4	1.9	2.6	2.1	4.1
17	5.6	6.3	6.5	5.8	7.8	10	7.9	4.2	2.0	2.4	2.1	3.7
18	5.4	6.0	6.0	5.8	7.7	8.8	7.3	4.2	2.0	2.3	2.1	3.5
19	5.2	6.4	6.0	5.8	7.8	7.5	6.7	5.3	2.0	2.1	2.0	3.2
20	5.2	7.3	6.0	5.6	7.7	7.3	6.0	5.9	2.0	2.0	1.9	3.1
21	5.0	7.2	6.0	5.6	7.1	7.3	5.3	5.8	2.1	2.0	1.8	3.0
22	5.7	6.5	6.0	5.6	6.6	7.2	5.3	6.3	2.3	1.9	1.6	2.9
23	7.1	6.8	6.0	5.6	6.1	6.5	6.2	7.9	2.5	1.8	1.6	3.4
24	7.2	7.1	5.8	5.6	5.8	6.0	6.1	7.6	2.6	2.4	1.5	4.0
25	6.8	6.7	5.6	5.6	5.5	5.7	5.5	6.8	2.7	2.6	1.5	5.3
26	6.2	6.2	5.6	5.8	5.3	5.6	4.9	6.9	2.7	2.8	1.5	5.9
27	5.8	6.0	5.6	5.8	5.0	5.4	4.5	6.1	2.7	2.9	1.5	6.0
28	5.6	7.6	5.6	5.8	4.9	5.2	5.5	5.7	2.7	2.7	1.8	5.3
29	5.3	7.9	5.6	5.8	5.0	4.9	5.2	6.2	2.6	2.5	1.9	4.4
30	5.2	7.0	5.6	5.8	---	4.8	5.6	6.1	2.5	2.4	2.5	3.8
31	5.3	---	5.6	6.0	---	4.6	---	5.5	---	2.3	2.5	---
TOTAL	165.9	190.4	199.3	184.6	192.8	177.9	159.9	159.7	80.1	76.4	64.2	114.6
MEAN	5.35	6.35	6.43	5.95	6.65	5.74	5.33	5.15	2.67	2.46	2.07	3.82
MAX	7.2	7.9	8.5	6.6	9.1	10	8.2	7.9	4.9	3.3	2.6	6.0
MIN	4.3	5.3	5.6	5.6	4.9	4.5	3.8	3.8	1.9	1.8	1.5	2.8
CFSM	.41	.49	.50	.46	.51	.44	.41	.40	.21	.19	.16	.29
IN.	.47	.54	.57	.53	.55	.51	.46	.46	.23	.22	.18	.33

CAL YR 1983 TOTAL 2115.6 MEAN 5.80 MAX 10 MIN 2.8 CFSM .45 IN 6.05
WTR YR 1984 TOTAL 1765.8 MEAN 4.82 MAX 10 MIN 1.5 CFSM .37 IN 5.05

04106400 WEST FORK PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°14'40", long 85°36'50", in NE1/4 sec.5, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank 30 ft upstream from culvert on Oakland Drive, 2.5 mi upstream from mouth, and 3.7 mi southwest of main business district of Kalamazoo.

DRAINAGE AREA.--18.7 mi^2.

PERIOD OF RECORD.--September 1959 to current year.

GAGE.--Water-stage recorder and V-notch sharp-crested weir. Datum of gage is 858.09 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. At times, flow is affected by ground-water withdrawals. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 9.88 ft^3/s, 7.17 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 41 ft^3/s Apr. 19, 1975, gage height, 3.32 ft; minimum, 1.0 ft^3/s Aug. 9, 1964; minimum gage height, 0.88 ft July 30, 1963, caused by construction.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 26 ft^3/s Mar. 16, gage height, 2.97 ft; minimum, 3.0 ft^3/s Aug. 27, gage height, 2.25 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.4	7.8	11	8.8	9.0	7.5	8.2	8.6	9.8	4.6	4.1	4.1
2	8.1	8.7	11	9.0	9.3	7.5	7.9	8.0	8.9	4.4	4.1	4.1
3	7.7	9.4	10	9.6	9.5	7.5	7.8	7.9	8.2	4.0	4.0	4.1
4	7.8	9.4	10	10	10	7.4	8.1	11	7.7	3.9	5.5	4.1
5	8.0	9.4	10	10	9.6	7.3	8.2	12	7.2	4.1	6.9	4.3
6	7.8	9.2	11	10	9.2	7.3	8.6	12	6.5	4.3	5.6	4.2
7	7.3	8.9	11	9.8	9.0	7.3	8.5	11	6.1	4.3	4.8	4.7
8	7.5	8.6	10	9.5	9.0	7.3	8.0	10	5.7	4.2	4.5	4.4
9	7.8	8.4	10	9.5	9.4	7.3	7.7	10	5.8	5.2	4.4	4.7
10	7.6	8.3	9.9	9.5	9.8	7.4	7.3	9.9	6.0	5.8	4.4	4.6
11	7.4	8.1	10	9.5	11	7.5	7.2	9.4	5.8	6.5	4.3	6.4
12	7.5	8.1	13	9.5	11	7.5	7.2	8.9	5.6	6.4	4.1	6.4
13	8.8	8.1	13	9.0	16	7.5	8.1	9.0	5.4	6.2	3.9	6.2
14	9.8	8.1	12	9.0	16	7.8	10	9.1	5.0	5.9	3.9	6.1
15	9.6	8.2	12	9.0	15	9.0	15	8.6	4.8	5.6	3.8	6.0
16	9.5	8.6	11	9.0	14	23	16	8.3	4.8	5.2	3.7	5.7
17	9.1	8.6	9.5	9.0	13	20	15	8.0	5.0	4.9	3.6	5.3
18	8.7	8.6	9.0	9.0	13	17	14	8.0	5.1	4.6	3.7	4.8
19	8.5	9.7	9.0	8.8	13	15	13	10	4.9	4.4	3.6	4.5
20	8.3	10	9.0	8.8	12	14	12	11	4.7	4.2	3.5	4.3
21	8.1	10	9.8	8.8	11	14	11	11	4.2	4.2	3.4	4.3
22	9.0	9.6	9.5	8.8	11	14	10	13	4.1	4.1	3.2	4.4
23	11	9.7	9.0	8.8	9.9	12	11	17	4.4	4.0	3.2	5.5
24	11	10	8.8	8.8	9.3	12	11	15	4.5	4.7	3.3	6.3
25	11	9.4	8.6	9.0	8.8	11	11	13	4.5	5.0	3.3	9.5
26	10	8.9	8.6	9.2	8.3	11	9.8	14	4.4	4.9	3.2	12
27	9.5	8.3	8.6	9.2	7.7	10	9.1	13	4.7	4.8	3.1	11
28	8.7	11	8.6	9.0	7.4	9.7	11	13	4.7	4.6	3.3	10
29	8.2	11	8.6	9.0	7.6	8.9	10	13	4.6	4.4	3.4	9.6
30	8.0	11	8.6	9.0	---	8.9	9.5	12	4.5	4.2	4.1	9.1
31	7.8	---	8.6	9.0	---	8.6	---	11	---	4.2	4.1	---
TOTAL	267.5	273.1	308.7	284.9	308.8	322.2	301.2	335.7	167.6	147.8	124.0	180.7
MEAN	8.63	9.10	9.96	9.19	10.6	10.4	10.0	10.8	5.59	4.77	4.00	6.02
MAX	11	11	13	10	16	23	16	17	9.8	6.5	6.9	12
MIN	7.3	7.8	8.6	8.8	7.4	7.3	7.2	7.9	4.1	3.9	3.1	4.1
CFSM	.46	.49	.53	.49	.57	.56	.54	.58	.30	.26	.21	.32
IN.	.53	.54	.61	.57	.61	.64	.60	.67	.33	.29	.25	.36

CAL YR 1983 TOTAL 3558.1 MEAN 9.75 MAX 29 MIN 4.5 CFSM .52 IN 7.08
WTR YR 1984 TOTAL 3022.2 MEAN 8.26 MAX 23 MIN 3.1 CFSM .44 IN 6.01

04106500 PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°16'27", long 85°34'35", in NW1/4 NE1/4 sec.27, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 50 ft upstream from bridge on Reed Avenue in Kalamazoo, and 1.5 mi upstream from mouth.

DRAINAGE AREA.--46.8 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1947 to September 1958, June 1975 to current year. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 761.50 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Dec. 15, 1947, to Dec. 7, 1955, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good. Some regulation by millponds upstream from station. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 5.0 mi upstream from station.

AVERAGE DISCHARGE.--20 years, 53.8 ft^3/s, 15.61 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 580 ft^3/s sometime in July 1954, from rating curve extended above 165 ft^3/s, gage height, 5.25 ft, caused by momentary gate opening of millpond; maximum gage height, 5.44 ft June 26, 1978; minimum discharge, 2.0 ft^3/s May 8, 1956, gage height, 1.50 ft; minimum gage height, 1.41 ft May 12, 13, 1980, Aug. 16, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 186 ft^3/s Aug. 4, gage height, 3.83 ft; minimum, 2.7 ft^3/s Apr. 4, 5; minimum gage height, 1.43 ft Oct. 1; minimum daily discharge, 24 ft^3/s Aug. 26, 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	48	44	44	48	46	47	51	52	40	30	35
2	38	67	45	46	50	45	47	49	51	41	30	30
3	38	57	44	47	60	45	50	49	47	41	28	29
4	37	51	45	48	51	45	50	52	45	43	61	33
5	37	50	46	59	48	46	48	53	45	43	55	35
6	36	46	56	53	47	47	33	51	45	41	31	31
7	37	48	51	50	47	44	71	50	45	39	29	39
8	39	49	46	49	46	40	48	49	43	37	28	32
9	36	48	45	49	48	40	44	51	42	65	28	51
10	36	48	46	50	49	40	40	50	43	49	29	33
11	42	42	50	48	52	40	42	49	42	60	27	60
12	41	37	70	47	58	38	51	47	43	48	26	35
13	54	36	63	48	88	41	55	54	43	45	26	38
14	49	38	60	46	80	44	63	50	42	39	27	39
15	42	42	61	45	65	53	90	48	42	37	26	36
16	41	48	56	45	61	141	73	46	42	36	27	33
17	41	41	48	47	64	98	62	46	41	36	28	35
18	41	39	46	46	59	63	67	48	42	37	26	33
19	41	55	45	47	59	57	58	78	42	36	26	32
20	45	45	50	45	56	74	54	63	42	35	26	33
21	49	41	49	42	54	65	51	52	43	34	28	30
22	60	42	50	44	52	63	56	64	44	32	28	28
23	74	53	48	43	51	58	61	97	46	33	27	47
24	54	47	45	47	49	56	51	74	44	49	26	36
25	50	42	45	40	47	54	51	59	44	39	27	89
26	47	41	43	48	47	54	49	72	45	38	24	101
27	48	45	44	50	45	54	47	57	44	38	24	50
28	49	69	45	47	48	52	62	57	42	35	28	44
29	47	50	47	47	47	51	48	74	41	31	27	41
30	46	48	46	47	---	50	59	60	40	31	41	39
31	47	---	45	48	---	48	---	55	---	33	30	---
TOTAL	1381	1413	1524	1462	1576	1692	1628	1755	1312	1241	924	1227
MEAN	44.5	47.1	49.2	47.2	54.3	54.6	54.3	56.6	43.7	40.0	29.8	40.9
MAX	74	69	70	59	88	141	90	97	52	65	61	101
MIN	36	36	43	40	45	38	33	46	40	31	24	28

CAL YR 1983 TOTAL 18542 MEAN 50.8 MAX 154 MIN 34
WTR YR 1984 TOTAL 17135 MEAN 46.8 MAX 141 MIN 24

04106500 PORTAGE CREEK AT KALAMAZOO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: April 1972 to August 1974, August 1975 to current year.

INSTRUMENTATION.--Temperature recorder Apr. 13, 1972 to Aug. 8, 1974, and Aug. 6, 1975 to current year.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 32.5°C Mar. 4, 1981; minimum, 0.0°C Dec. 31, 1976, Jan. 1, 2, 1977.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 27.0° July 23, Aug. 29.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	19.5	15.5	17.5	13.0	12.0	12.5	5.5	5.0	5.0			
2	19.5	16.0	18.0	14.0	13.5	13.5	6.0	5.0	5.0			
3	19.5	17.0	18.5	14.0	11.5	13.5	6.0	5.5	6.0			
4	19.0	17.0	18.0	11.0	9.5	10.0	7.0	5.5	6.5			
5	17.0	15.0	16.0	11.0	9.0	10.0	7.5	7.0	7.0			
6	---	---	---	11.5	9.5	10.5	7.0	5.0	6.0			
7	17.0	13.5	15.0	12.5	11.5	12.0	5.5	5.0	5.0			
8	15.5	14.5	15.0	13.5	11.5	12.5	6.0	5.0	5.0			
9	14.0	12.0	13.0	13.0	12.0	12.5	5.5	5.0	5.0			
10	13.5	10.5	12.0	13.5	12.0	13.0	6.5	5.5	6.0			
11	17.0	13.0	14.5	12.0	7.0	9.0	6.0	5.5	6.0			
12	16.5	15.0	16.0	8.5	6.0	7.0	6.0	5.5	5.5			
13	15.0	12.5	13.5	8.5	7.0	8.0	6.0	6.0	6.0			
14	12.0	9.5	10.5	9.5	7.5	8.5	6.0	5.5	6.0			
15	13.0	10.0	11.5	10.0	9.0	9.5	6.0	4.5	5.0			
16	14.5	13.0	13.5	9.0	8.5	9.0	4.5	4.0	4.0			
17	15.0	12.5	14.0	8.5	8.0	8.5	4.0	3.0	3.5			
18	14.5	12.0	13.5	9.5	8.0	9.0	3.0	2.5	2.5			
19	13.5	11.5	12.0	11.5	9.5	10.5	2.5	1.5	2.0			
20	11.5	11.0	11.5	11.5	10.0	11.5	3.5	2.0	3.0			
21	12.5	11.5	12.0	10.5	9.0	9.5	3.0	2.0	2.5			
22	13.0	12.0	12.5	11.0	9.0	10.0	3.5	1.5	3.0			
23	13.5	13.0	13.0	12.0	11.0	11.5	1.5	.5	.5			
24	13.0	12.0	12.5	11.0	7.0	8.5	---	---	---			
25	13.0	12.0	13.0	7.0	6.5	6.5	---	---	---			
26	12.0	11.0	11.5	10.0	6.5	8.0	---	---	---			
27	12.5	10.0	11.0	9.5	7.0	8.5	---	---	---			
28	14.5	11.5	13.0	8.5	6.5	7.5	---	---	---			
29	13.0	11.5	12.5	7.5	5.0	6.0	---	---	---			
30	11.5	10.0	11.0	5.5	4.5	5.0	---	---	---			
31	12.0	9.5	10.5	---	---	---	---	---	---			
MONTH				14.0	4.5	9.5						

04106500 PORTAGE CREEK AT KALAMAZOO, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	---	---	---	14.5	9.5	12.0	15.0	9.5	12.0
2	---	---	---	---	---	---	14.5	10.5	12.5	14.0	11.5	12.5
3	7.0	6.0	6.5	---	---	---	13.5	10.5	11.5	15.5	11.5	13.0
4	7.0	6.5	7.0	---	---	---	13.0	6.0	10.0	13.5	11.5	12.5
5	7.0	6.0	6.5	---	---	---	12.0	7.5	10.5	16.0	11.5	13.5
6	---	---	---	---	---	---	10.5	9.0	10.0	19.0	13.5	16.5
7	---	---	---	---	---	---	14.5	8.5	10.5	18.5	14.5	16.5
8	---	---	---	---	---	---	14.5	11.0	13.0	17.5	13.5	14.5
9	---	---	---	---	---	---	14.5	12.0	13.0	13.5	11.0	12.5
10	---	---	---	---	---	---	15.5	10.0	13.0	16.0	11.5	13.5
11	---	---	---	---	---	---	16.5	11.0	14.0	17.5	14.0	15.5
12	---	---	---	---	---	---	15.0	12.5	14.0	20.0	14.0	17.0
13	---	---	---	---	---	---	17.0	13.0	15.0	18.0	13.5	15.0
14	---	---	---	---	---	---	15.5	12.5	13.5	18.5	11.5	14.5
15	---	---	---	---	---	---	12.5	11.0	12.0	19.0	13.0	16.0
16	---	---	---	8.0	6.0	6.5	12.0	11.0	11.5	20.0	13.5	16.5
17	---	---	---	7.0	5.5	6.0	11.5	7.5	10.5	19.0	14.5	17.0
18	---	---	---	8.5	6.5	7.5	10.5	10.0	10.0	23.5	16.0	19.5
19	---	---	---	7.5	7.0	7.5	12.5	10.5	11.0	22.0	18.5	19.0
20	---	---	---	9.0	7.0	8.0	15.0	10.0	12.5	19.5	17.0	18.0
21	---	---	---	9.5	6.5	8.0	14.5	11.0	12.5	19.5	16.0	18.0
22	---	---	---	6.5	5.5	6.0	12.0	8.5	9.5	21.5	18.5	20.0
23	---	---	---	11.0	5.5	8.0	11.0	8.5	9.0	21.5	18.5	19.5
24	---	---	---	12.0	7.0	9.5	11.0	7.0	10.0	21.0	16.5	18.5
25	---	---	---	10.5	9.0	10.0	17.5	9.0	12.5	20.0	17.0	18.0
26	---	---	---	12.0	7.5	9.5	20.0	14.0	16.5	19.5	15.5	17.5
27	---	---	---	11.5	9.5	10.5	20.0	15.0	18.0	20.0	14.5	17.5
28	---	---	---	12.0	8.0	10.5	19.5	15.5	17.5	18.5	11.5	14.5
29	---	---	---	12.5	8.0	10.5	17.5	13.5	15.0	13.0	10.5	11.5
30	---	---	---	12.0	10.0	11.0	15.0	11.0	13.0	18.0	12.0	14.5
31	---	---	---	14.0	9.0	11.5	---	---	---	20.0	13.5	16.5
MONTH							20.0	6.0	12.5	23.5	9.5	16.0

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

04108500 KALAMAZOO RIVER NEAR FENNVILLE, MI

LOCATION.--Lat 42°35'36", long 85°59'03", in NE1/4 sec.5, T.2 N., R.14 W., Allegan County, Hydrologic Unit 04050003, on left bank 40 ft upstream from bridge on State Highway 89, 2.1 mi downstream from Swan Creek, 4.0 mi downstream from Calkins Dam, and 6.1 mi east of Fennville.

DRAINAGE AREA.--1,600 mi^2, approximately.

PERIOD OF RECORD.--April 1929 to September 1936, October 1937 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Allegan" April 1929 to September 1932; as "at Calkins Bridge, near Allegan" October 1932 to September 1936, October 1937 to September 1938; as "at Calkins Dam, near Allgan" October 1938 to September 1950.

REVISED RECORDS.--WSP 1387: 1929(M), 1930, 1933, 1934-36(M), 1938(M), 1939-40, 1942.

GAGE.--Water-stage recorder. Datum of gage is 586.51 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). April 1929 to September 1936 at bridge and October 1937 to September 1950 in powerplant, 4.0 mi upstream at NGVD (levels by city of Allegan).

REMARKS.--Records good. Flow regulated at low and medium stages by powerplants upstream from station and since June 1936 by Calkins Dam and powerplant, 4.0 mi upstream from station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--54 years, 1,420 ft^3/s, 12.05 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,500 ft^3/s Apr. 11, 1947, gage height, 606.76 ft, site and datum then in use; minimum daily, 50 ft^3/s Aug. 19, 1976, caused by shutting off flow at Calkins Dam.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,460 ft^3/s Feb. 14, gage height, 11.81 ft; minimum daily, 542 ft^3/s Aug. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1080	1110	1840	1500	1650	1740	2300	1920	3090	826	820	685
2	1070	1340	1820	1700	1550	1730	2170	1940	3000	826	739	754
3	1140	1430	1800	1700	1320	1280	2160	1800	2050	827	542	733
4	1140	1550	1780	1700	1310	1310	2040	1560	2190	827	609	762
5	1100	1180	1640	1700	1770	1700	1570	1420	2370	1080	807	791
6	1080	1150	1180	1840	1830	1520	1890	1830	2180	629	1300	764
7	1000	1130	1560	1990	1310	1330	2160	1470	1740	791	1330	732
8	844	1100	1890	1910	1300	1530	1900	1140	1230	790	969	789
9	844	1120	1860	1850	1720	1340	1890	1420	1240	1030	961	796
10	1320	1190	1820	1370	1620	1370	2150	1820	1210	1220	910	805
11	1270	1140	1810	1100	1300	900	1700	1490	1190	834	734	1040
12	875	1140	1810	1200	1820	1280	1300	1150	1220	846	762	825
13	1050	1130	1900	1400	2650	1610	1650	1150	1220	836	794	1000
14	1080	1070	2030	1400	3840	1620	1890	1160	1440	1230	784	1300
15	1140	1080	2350	1500	3700	1180	1950	1500	1060	1060	712	1100
16	1510	1360	2250	1450	2540	1270	2060	1810	1200	1160	615	950
17	1270	1160	1990	1200	2720	2280	2280	1810	1190	900	607	1300
18	925	1300	1990	1300	3240	2660	2210	1470	1210	1180	689	1000
19	1030	1370	2020	1450	3190	2340	2110	1210	1500	895	734	800
20	1110	1370	2010	1450	3290	2410	2050	1210	1490	860	668	850
21	1170	1460	1840	1350	3050	2660	2240	1550	852	858	665	750
22	1170	1600	1360	1250	2770	2750	2050	1520	765	840	602	750
23	1180	1480	1300	1250	2400	2820	1950	1700	839	789	602	800
24	1400	1690	1500	1300	2340	2960	1950	2280	838	797	736	850
25	1460	1450	900	1350	2290	2670	2090	2330	948	790	712	900
26	1130	1750	1200	1430	1900	2730	2290	2630	1080	777	589	1300
27	1180	1640	1600	1600	1710	2780	2290	2910	1100	796	653	1900
28	1410	1480	1200	1450	1760	2390	1870	2730	1150	801	646	1600
29	1400	1790	1300	1380	1750	2370	1170	2930	832	815	593	1400
30	1380	1880	1500	1350	---	2360	1580	3210	829	809	649	900
31	1130	---	1700	1340	---	2360	---	3000	---	835	677	---
TOTAL	35888	40640	52750	45760	63640	61250	58910	57070	42253	27554	23210	28926
MEAN	1158	1355	1702	1476	2194	1976	1964	1841	1408	889	749	964
MAX	1510	1880	2350	1990	3840	2960	2300	3210	3090	1230	1330	1900
MIN	844	1070	900	1100	1300	900	1170	1140	765	629	542	685
CFSM	.72	.85	1.06	.92	1.37	1.24	1.23	1.15	.88	.56	.47	.60
IN.	.83	.94	1.23	1.06	1.48	1.42	1.37	1.33	.98	.64	.54	.67

CAL YR 1983 TOTAL 633239 MEAN 1735 MAX 4320 MIN 696 CFSM 1.08 IN 14.72
WTR YR 1984 TOTAL 537851 MEAN 1470 MAX 3840 MIN 542 CFSM .92 IN 12.51

04108600 RABBIT RIVER NEAR HOPKINS, MI

LOCATION.--Lat 42°38'32", long 85°43'19", in SE1/4 sec.16, T.3 N., R.12 W., Allegan County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on 18th Street, 2.5 mi northeast of Hopkins.

DRAINAGE AREA.--71.4 mi^2.

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 700 ft from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 56.4 ft^3/s, 10.73 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,180 ft^3/s June 26, 1978, gage height, 9.56 ft; minimum not determined; minimum daily, 9.2 ft^3/s Aug. 27, 28, 1970, Sept. 18, 1971; minimum gage height, 1.79 ft Aug. 28, 1984.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 13	0900	*522	*8.05

Minimum discharge, 11 ft^3/s Aug. 24-29; minimum gage height, 1.79 ft Aug. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26	30	52	30	35	50	62	47	86	23	16	14
2	25	32	48	30	39	45	59	44	69	23	16	14
3	25	47	45	31	45	43	57	44	60	21	16	13
4	25	42	43	32	55	41	58	45	54	21	18	14
5	25	37	44	35	55	40	58	48	49	21	18	15
6	25	35	68	34	52	38	62	45	45	22	17	14
7	25	34	64	32	50	37	59	42	41	22	16	14
8	26	33	50	30	50	36	54	41	39	21	16	15
9	27	32	45	29	55	34	51	41	37	27	18	14
10	27	31	41	28	69	33	48	41	37	34	17	14
11	25	30	43	27	91	32	46	40	34	46	16	15
12	25	30	127	26	186	31	46	39	32	40	16	17
13	27	29	140	25	465	31	52	38	31	29	15	17
14	35	28	96	25	384	31	54	44	30	26	14	24
15	35	29	91	25	264	43	65	40	29	24	14	20
16	31	34	68	26	173	215	72	37	28	23	13	18
17	30	37	55	27	136	234	71	36	29	22	13	17
18	28	34	43	28	123	122	80	36	28	21	14	16
19	27	34	35	29	165	87	70	42	28	21	14	16
20	27	43	33	30	147	97	66	44	26	20	13	15
21	26	43	32	30	111	113	60	41	25	20	12	15
22	27	39	31	31	91	100	57	45	24	19	12	14
23	46	49	31	32	81	86	72	93	25	19	12	15
24	50	74	31	33	72	91	69	73	25	23	11	16
25	43	57	30	35	66	112	61	61	25	21	11	20
26	39	48	30	35	62	135	54	107	24	19	11	38
27	36	42	30	35	58	115	50	84	24	20	11	29
28	34	71	30	35	54	97	46	93	24	19	11	25
29	32	77	30	35	52	84	42	259	23	18	11	24
30	30	61	30	35	---	73	47	230	24	18	13	23
31	30	---	30	34	---	67	---	128	---	17	14	---
TOTAL	939	1242	1566	949	3286	2393	1748	2048	1055	720	439	535
MEAN	30.3	41.4	50.5	30.6	113	77.2	58.3	66.1	35.2	23.2	14.2	17.8
MAX	50	77	140	35	465	234	80	259	86	46	18	38
MIN	25	28	30	25	35	31	42	36	23	17	11	13
CFSM	.42	.58	.71	.43	1.58	1.08	.82	.93	.49	.33	.20	.25
IN.	.49	.65	.82	.49	1.71	1.25	.91	1.07	.55	.38	.23	.28

CAL YR 1983 TOTAL 20988 MEAN 57.5 MAX 489 MIN 19 CFSM .81 IN 10.93
WTR YR 1984 TOTAL 16920 MEAN 46.2 MAX 465 MIN 11 CFSM .65 IN 8.82

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°38'50", long 86°11'53", in NE1/4 sec.16, T.3 N., R.16 W., Allegan County, Hydrologic Unit 04050003, at bridge on Old US-31 between Saugatuck and Douglas, 7.9 mi downstream from Rabbit River, 17.6 mi downstream from gaging station near Fennville (04108500), and 2.9 mi upstream from mouth.

DRAINAGE AREA.--2,020 mi^2, approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1974 to September 1981.
WATER TEMPERATURES: May 1975 to September 1981.

INSTRUMENTATION.--Nov. 1, 1975 to Sept. 30, 1981, water-quality monitor.

REMARKS.--Quarterly samples collected at bridge.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1974-75, 1979-81), 747 micromhos Apr. 30, 1980; minimum recorded (water years 1974-75, 1978-79, 1981), 172 micromhos Sept. 18, 1978.
WATER TEMPERATURES: Maximum recorded (water years 1975, 1977-81), 31.5°C July 20, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV										
15...	1115	572	607	8.3	5.0	4.4	12.1	99	K60	85
MAR										
15...	1400	1040	643	8.2	2.0	3.6	13.1	98	K20	1000
APR										
19...	1030	2880	564	8.0	8.0	3.0	10.3	89	K27	380
AUG										
23...	1230	359	515	8.4	24.0	2.5	10.4	126	K20	K20

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
NOV										
15...	280	54	73	23	24	16	.6	2.0	224	2.2
MAR										
15...	280	63	75	23	22	14	.6	2.0	220	2.7
APR										
19...	250	51	67	20	18	13	.5	2.0	199	3.8
AUG										
23...	220	43	50	22	26	21	.8	1.9	173	1.3

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV 15...	47	37	.30	7.5	366	350	.50	565	1.1
MAR 15...	52	38	.10	7.9	377	350	.51	1060	1.4
APR 19...	48	29	.10	4.7	368	310	.50	2860	.95
AUG 23...	48	42	.20	.6	299	290	.41	290	<.10

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 15...	.220	1.4	.100	.31	.050	.080	--	--	--
MAR 15...	.420	1.6	.090	.28	.030	.040	31	87	--
APR 19...	.180	.90	.090	.28	.030	.010	14	109	98
AUG 23...	<.010	1.4	.080	--	<.010	<.010	22	21	--

DATE	TIME	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
NOV 15...	1115	<10	1	83	<.5	<1	<1	<3	3	14	2
MAR 15...	1400	<10	1	70	<.5	<1	<1	<3	1	15	<1
APR 19...	1030	10	1	72	1.0	<1	<1	<3	1	27	2
AUG 23...	1230	40	3	68	<.5	<1	1	<3	2	7	2

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV 15...	6	14	<.1	<10	1	<1	<1	160	<6	19
MAR 15...	10	39	<.1	<10	3	<1	<1	150	<6	10
APR 19...	8	27	.1	<10	2	<1	<1	150	<6	7
AUG 23...	5	<1	<.1	<10	1	<1	<1	140	<6	<3

04108800 MACATAWA RIVER NEAR ZEELAND, MI

LOCATION.--Lat 42°46'40", long 86°01'06", in NW1/4 sec.31, T.5 N., R.14 W., Ottawa County, Hydrologic Unit 04050002, on left bank 20 ft upstream from bridge on State Road, 0.2 mi downstream from South Branch, and 2.5 mi south of Zeeland.

DRAINAGE AREA.--65.8 mi^2.

PERIOD OF RECORD.--October 1960 to current year. Prior to October 1978, published as Black River near Zeeland.

GAGE.--Water-stage recorder. Datum of gage is 585.7 ft National Geodetic Vertical Datum of 1929 (levels by Gove Associates, Inc.).

REMARKS.--Records good except those for the winter period and those for periods of no gage-height record, Feb. 16 to Mar. 14 and Mar. 17 to Apr. 18, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 65.3 ft^3/s, 13.48 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,220 ft^3/s May 11, 1981, gage height, 15.81 ft; minimum, 0.9 ft^3/s Aug. 24, 1962; minimum gage height, 1.61 ft Sept. 3, 1983.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 13	1600	*3,110	*13.06	May 29	0900	1,140	10.51
May 23	0700	960	10.02				

Minimum discharge, 1.1 ft^3/s Aug. 15, 20; minimum gage height, 1.70 ft Oct. 3, 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.6	9.8	38	27	32	29	43	21	45	5.1	1.7	2.4
2	3.5	12	33	27	30	27	41	18	30	5.2	1.7	2.4
3	3.3	15	30	27	50	25	41	19	22	4.4	1.8	2.2
4	4.1	13	27	27	64	23	40	70	17	4.0	1.8	2.4
5	4.1	11	38	30	68	22	40	77	15	4.1	5.8	2.9
6	3.7	10	186	32	72	21	54	36	12	6.4	2.5	2.3
7	3.3	9.7	103	32	70	20	50	26	11	5.7	2.1	2.5
8	4.1	9.0	59	31	70	19	40	22	9.2	4.6	2.4	2.4
9	4.2	8.6	33	29	69	18	33	22	8.5	5.6	3.6	2.4
10	3.4	8.6	27	27	80	18	27	21	8.7	23	2.4	2.5
11	3.4	8.2	31	26	130	17	22	20	7.4	47	1.8	2.2
12	3.8	7.7	339	25	417	17	20	19	6.4	13	1.7	2.0
13	4.1	7.2	316	25	2280	16	22	22	6.6	6.2	1.8	1.9
14	17	7.0	166	24	1800	16	28	25	6.6	4.5	1.6	2.2
15	12	6.6	182	23	740	46	36	20	5.5	3.5	1.6	2.1
16	7.7	6.8	86	23	400	634	45	18	5.0	3.0	1.5	2.1
17	6.2	6.7	65	22	350	400	58	17	5.2	2.8	1.7	1.8
18	6.9	6.3	56	21	300	200	72	18	5.7	2.7	1.8	1.8
19	7.4	7.5	52	21	500	110	46	31	5.4	2.3	1.9	1.7
20	7.1	11	48	20	250	250	36	25	4.7	1.9	1.5	1.7
21	7.1	13	44	20	150	400	29	21	4.6	1.7	1.8	1.6
22	10	11	40	20	80	300	28	241	4.7	1.7	1.7	1.6
23	39	63	37	20	60	200	78	801	5.4	2.0	1.8	2.6
24	35	93	34	21	50	150	59	244	5.4	3.7	1.7	2.8
25	21	30	33	22	43	100	37	205	5.3	3.6	1.6	4.8
26	15	17	32	23	38	80	28	357	5.2	3.2	1.5	8.8
27	13	14	30	28	34	70	24	92	6.4	3.3	1.4	3.5
28	12	182	29	33	31	60	21	232	6.2	2.8	1.6	3.1
29	11	131	29	42	30	55	19	951	5.4	2.2	1.6	3.6
30	10	48	28	38	---	50	23	395	5.3	2.2	3.0	3.3
31	9.8	---	27	35	---	45	---	93	---	2.0	2.9	---
TOTAL	295.8	783.7	2278	821	8288	3438	1140	4179	290.8	183.4	63.3	79.6
MEAN	9.54	26.1	73.5	26.5	286	111	38.0	135	9.69	5.92	2.04	2.65
MAX	39	182	339	42	2280	634	78	951	45	47	5.8	8.8
MIN	3.3	6.3	27	20	30	16	19	17	4.6	1.7	1.4	1.6
CFSM	.15	.40	1.12	.40	4.35	1.69	.58	2.05	.15	.09	.03	.04
IN.	.17	.44	1.29	.46	4.69	1.94	.64	2.36	.16	.10	.04	.05

CAL YR 1983 TOTAL 17851.2 MEAN 48.9 MAX 1070 MIN 2.9 CFSM .74 IN 10.09
WTR YR 1984 TOTAL 21840.6 MEAN 59.7 MAX 2280 MIN 1.4 CFSM .91 IN 12.35

04109000 GRAND RIVER AT JACKSON, MI

LOCATION.--Lat 42°17'05", long 84°24'30", in sec.22, T.2 S., R.1 W., Jackson County, Hydrologic Unit 04050004, on left bank of sewage-treatment plant, 1 mi north of Jackson, 2.2 mi upstream from Portage River, and at mile 216.

DRAINAGE AREA.--174 mi^2.

PERIOD OF RECORD.--April 1935 to current year.

REVISED RECORDS.--WSP 974: 1937(M). WSP 1387: 1936. WSP 1727: 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft Fargo Engineering Co. datum. Prior to Sept. 24,1935, nonrecording gage at same site and datum.

REMARKS.--Records good except those for period of no gage-height record, Aug. 21 to Sept. 10, which are fair. Slight regulation by mills above station. Flow includes about 17 ft^3/s as sewage effluent, which originates from ground-water sources, from the city of Jackson. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--49 years, 122 ft^3/s, 9.52 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,070 ft^3/s June 25, 1937, gage height, 13.50 ft; maximum gage height, 15.44 ft June 25, 1968; minimum discharge, 9.2 ft^3/s Aug. 22, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 601 ft^3/s May 26, gage height, 12.91 ft; minimum daily, 23 ft^3/s Aug. 24-29; minimum gage height recorded, 8.33 ft Aug. 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	72	227	85	76	105	258	184	367	47	43	24
2	43	84	200	87	79	98	245	122	352	52	41	25
3	48	79	148	90	100	93	237	114	311	53	46	25
4	52	80	127	93	146	87	268	178	281	47	43	26
5	97	129	126	95	148	97	309	166	294	51	38	26
6	59	132	144	100	141	148	277	160	262	59	41	27
7	50	84	152	99	143	146	242	153	224	47	43	28
8	50	72	228	99	88	141	238	149	199	42	51	30
9	45	72	272	95	80	137	236	147	174	62	49	34
10	48	71	264	96	95	87	268	101	113	59	46	48
11	49	81	262	142	108	71	275	95	98	122	42	82
12	59	125	225	160	129	70	266	93	94	116	37	47
13	107	129	181	153	233	72	240	102	89	57	41	56
14	129	83	185	145	268	83	217	115	86	46	40	47
15	126	90	274	130	314	110	212	158	89	43	41	47
16	124	109	311	136	331	345	221	158	136	48	39	38
17	119	99	269	88	341	333	244	155	133	46	39	42
18	67	97	233	77	343	353	243	161	128	46	35	44
19	63	171	201	74	340	359	280	157	80	45	32	43
20	61	202	208	75	315	418	250	161	72	44	30	42
21	59	193	202	69	284	459	218	165	73	39	28	40
22	71	189	187	65	271	466	222	222	69	35	26	36
23	73	235	119	70	257	430	233	281	66	40	24	57
24	62	213	96	113	246	400	271	265	56	43	23	49
25	69	193	100	136	232	396	280	284	59	45	23	123
26	75	192	95	140	215	390	274	410	59	46	23	133
27	76	195	90	131	200	403	234	378	65	45	23	114
28	124	255	88	80	187	379	214	373	62	40	23	64
29	135	268	87	70	156	350	199	384	59	35	23	55
30	127	276	86	73	---	307	195	386	51	39	24	46
31	82	---	85	73	---	274	---	378	---	42	24	---
TOTAL	2397	4270	5472	3139	5866	7607	7366	6355	4201	1581	1081	1498
MEAN	77.3	142	177	101	202	245	246	205	140	51.0	34.9	49.9
MAX	135	276	311	160	343	466	309	410	367	122	51	133
MIN	43	71	85	65	76	70	195	93	51	35	23	24
CFSM	.44	.82	1.02	.58	1.16	1.41	1.41	1.18	.81	.29	.20	.29
IN.	.51	.91	1.17	.67	1.25	1.63	1.57	1.36	.90	.34	.23	.32

CAL YR 1983 TOTAL 57313 MEAN 157 MAX 488 MIN 39 CFSM .90 IN 12.25
WTR YR 1984 TOTAL 50833 MEAN 139 MAX 466 MIN 23 CFSM .80 IN 10.87

04111379 RED CEDAR RIVER NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'59", long 84°13'09", in NE1/4 sec.4, T.3 N., R.2 E., Ingham County, Hydrologic Unit 04050004, on right bank 20 ft upstream from bridge on State Highway 52, 1.5 mi upstream from Squaw Creek, and 3.5 mi east of Williamston.

DRAINAGE AREA.--163 mi^2.

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

GAGE.--Water-stage recorder. Altitude of gage is 870 ft from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--9 years, 99.5 ft^3/s, 8.29 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,390 ft^3/s Mar. 15, 1982, gage height, 8.42 ft; minimum, 2.6 ft^3/s Aug. 24, 27, 1984, gage height, 1.96 ft.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1975, reached a gage height of 10.41 ft Apr. 19, and a discharge of 2,640 ft^3/s Apr. 20.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 360 ft^3/s May 29, gage height, 5.58 ft; minimum, 2.6 ft^3/s Aug. 24, 27, gage height, 1.96 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	30	104	44	35	78	182	155	273	23	10	7.6
2	16	35	89	43	36	74	153	129	230	21	11	7.9
3	16	45	79	44	38	63	133	113	183	21	11	7.7
4	16	45	73	45	41	58	123	104	124	21	14	8.1
5	17	41	72	47	45	58	132	98	94	20	14	7.3
6	17	38	80	48	47	56	170	93	82	21	13	8.8
7	17	36	81	48	45	51	188	89	72	21	12	8.6
8	18	35	88	47	43	64	182	86	64	19	12	7.9
9	20	35	86	46	42	70	164	82	59	19	14	8.0
10	19	34	82	44	47	55	139	79	55	20	16	10
11	20	35	75	40	105	52	120	76	50	29	14	12
12	19	37	128	40	219	61	109	74	47	28	12	13
13	28	37	220	39	288	52	111	74	44	25	11	14
14	35	35	233	39	312	42	119	88	42	22	10	21
15	33	37	226	38	298	45	145	89	40	20	7.9	21
16	29	58	180	38	279	131	178	83	39	19	8.2	18
17	27	74	150	38	261	199	207	75	38	18	7.1	15
18	25	71	110	38	245	189	255	70	36	17	7.7	14
19	24	66	75	38	227	170	277	68	35	16	7.7	13
20	23	72	75	37	205	152	276	68	33	15	6.5	12
21	23	78	80	37	177	211	260	67	32	15	6.8	12
22	23	73	70	37	149	296	238	76	30	15	5.8	11
23	33	79	65	37	129	288	245	153	29	13	6.2	11
24	35	108	60	37	116	296	268	208	29	15	5.3	12
25	35	108	55	36	106	318	276	227	28	14	6.0	15
26	33	97	50	36	96	332	269	284	27	13	5.9	22
27	33	85	47	35	87	317	254	326	26	14	5.1	27
28	32	101	46	35	74	297	230	335	24	14	6.1	28
29	30	127	45	35	74	273	204	354	23	12	5.9	24
30	30	121	45	35	---	245	180	345	23	10	7.5	21
31	30	---	45	35	---	215	---	311	---	11	7.8	---
TOTAL	772	1873	2914	1236	3866	4808	5787	4479	1911	561	287.5	417.9
MEAN	24.9	62.4	94.0	39.9	133	155	193	144	63.7	18.1	9.27	13.9
MAX	35	127	233	48	312	332	277	354	273	29	16	28
MIN	16	30	45	35	35	42	109	67	23	10	5.1	7.3
CFSM	.15	.38	.58	.25	.82	.95	1.18	88	.39	.11	.06	.09
IN.	.18	.43	.67	.28	.88	1.10	1.32	1.02	.44	.13	.07	.10

CAL YR 1983 TOTAL 39495.1 MEAN 108 MAX 498 MIN 9.1 CFSM .66 IN 9.01
WTR YR 1984 TOTAL 28912.4 MEAN 79.0 MAX 354 MIN 5.1 CFSM .49 IN 6.60

04111500 DEER CREEK NEAR DANSVILLE, MI

LOCATION.--Lat 42°36'30", long 84°19'15", in E1/2 sec.33, T.3 N., R.1 E., Ingham County, Hydrologic Unit 04050004, on right bank 15 ft upstream from bridge on Clark Road, 3.5 mi north of Dansville, and 7.2 mi upstream from mouth.

DRAINAGE AREA.--16.3 mi^2.

PERIOD OF RECORD.--May 1954 to current year.

REVISED RECORDS.--WSP 1727: 1954(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 889.08 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 10.5 ft^3/s, 8.75 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 962 ft^3/s Apr. 19, 1975, gage height, 12.18 ft, from flood mark, rating curve extended above 610 ft^3/s; minimum, 0.04 ft^3/s Sept. 8, 9, 12, 1978, gage height, 2.58 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 23	0700	*101	*4.36

Minimum discharge, 0.09 ft^3/s Aug. 26, 27, 28, 29, 30, gage height, 2.62 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.45	1.3	9.4	4.4	2.3	6.0	19	8.7	18	1.1	.26	.15
2	.43	1.6	7.9	4.4	2.5	5.4	17	7.9	14	.96	.27	.18
3	.39	2.4	6.9	4.4	4.5	5.0	16	7.9	11	.92	.34	.14
4	.40	2.3	6.7	4.5	6.0	4.6	15	7.5	9.0	.86	.47	.19
5	.50	2.0	6.5	4.5	6.8	4.7	23	7.1	7.7	.86	.42	.21
6	.51	1.9	8.5	4.5	5.5	4.5	34	7.1	6.6	.87	.28	.16
7	.50	1.8	8.9	4.3	4.5	3.9	26	6.7	5.6	.87	.25	.19
8	.55	1.7	8.7	4.0	4.0	3.6	20	6.3	4.9	.79	10	.20
9	.70	1.6	8.1	3.8	4.0	3.4	17	6.1	5.0	.85	3.4	.24
10	.63	1.6	7.7	3.5	8.0	3.4	14	5.7	4.3	.99	1.8	.35
11	.65	1.8	8.3	3.3	43	3.3	13	5.7	3.5	2.0	1.0	.41
12	.76	1.9	52	3.2	66	2.9	12	5.4	3.3	1.5	.82	.41
13	1.9	1.9	45	3.2	81	3.0	15	6.1	3.1	1.0	.70	2.2
14	2.1	1.8	28	3.2	54	3.4	16	8.3	3.0	.84	.61	3.4
15	1.7	2.0	23	3.1	34	4.2	20	6.8	2.7	.76	.54	2.0
16	1.3	4.0	17	3.0	26	61	21	5.9	2.5	.68	.40	1.4
17	1.1	5.4	13	2.9	26	39	28	5.3	2.5	.62	.34	1.1
18	.96	4.2	10	2.6	27	21	42	6.0	2.3	.61	.32	.90
19	.89	4.6	9.4	2.4	26	16	32	8.4	2.1	.59	.29	.78
20	.85	7.3	8.3	2.2	22	23	25	8.0	1.8	.55	.24	.67
21	.81	7.6	8.3	2.0	18	70	20	7.1	1.7	.54	.21	.56
22	.92	6.0	7.0	2.0	16	47	18	21	1.6	.52	.18	.50
23	1.8	9.4	6.3	2.2	14	31	25	88	1.6	.46	.16	.52
24	2.1	17	5.7	2.7	13	31	29	44	1.5	.40	.17	.71
25	1.8	11	5.1	2.8	11	46	24	26	1.3	.34	.15	1.5
26	1.7	8.1	4.7	2.8	9.7	55	19	81	1.3	.34	.13	5.7
27	1.7	6.8	5.0	2.7	8.7	44	16	49	1.2	.43	.10	3.4
28	1.5	18	5.5	2.6	7.4	35	14	30	1.2	.46	.10	2.2
29	1.4	19	5.1	2.5	6.6	31	11	36	1.1	.37	.10	1.8
30	1.3	12	4.7	2.4	---	26	11	31	1.1	.30	.26	1.5
31	1.3	---	4.4	2.3	---	22	---	23	---	.28	.24	---
TOTAL	33.60	168.0	355.1	98.4	557.5	659.3	612	573.0	126.5	22.66	24.55	33.67
MEAN	1.08	5.60	11.5	3.17	19.2	21.3	20.4	18.5	4.22	.73	.79	1.12
MAX	2.1	19	52	4.5	81	70	42	88	18	2.0	10	5.7
MIN	.39	1.3	4.4	2.0	2.3	2.9	11	5.3	1.1	.28	.10	.14
CFSM	.07	.34	.71	.19	1.18	1.31	1.25	1.14	.26	.05	.05	.07
IN.	.08	.38	.81	.22	1.27	1.50	1.40	1.31	.29	.05	.06	.08

CAL YR 1983 TOTAL 4666.89 MEAN 12.8 MAX 142 MIN .17 CFSM .79 IN 10.65
WTR YR 1984 TOTAL 3264.28 MEAN 8.92 MAX 88 MIN .10 CFSM .55 IN 7.45

04112000 SLOAN CREEK NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'33", long 84°21'50", in SE1/4 NE1/4 sec.1, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, on left bank 30 ft downstream from culvert on Meridian Road, 2.1 mi upstream from mouth, and 4.2 mi west of Williamston.

DRAINAGE AREA.--9.34 mi^2.

PERIOD OF RECORD.--June 1954 to current year.

GAGE.--Water-stage recorder and concrete control with V-notch sharp-crested weir. Datum of gage is 862.12 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 5.65 ft^3/s, 8.21 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft^3/s Apr. 18, 1975, gage height, 9.99 ft, from rating curve extended above 660 ft^3/s on basis of computation of peak flow through culvert and over road embankment; minimum, 0.01 ft^3/s Sept. 11, 1954, Jan. 18, 1957, gage height, 1.10 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 56 ft^3/s Feb. 12, gage height, 3.39 ft, no peak above base of 120 ft^3/s; minimum, 0.05 ft^3/s Aug. 31, Sept. 6, 7, 9; minimum gage height, 1.22 ft Aug. 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.22	.49	4.7	1.8	.90	2.9	8.2	3.9	6.9	.34	.13	.09
2	.21	.73	4.0	1.8	.97	2.7	7.1	3.5	5.5	.32	.12	.07
3	.17	1.2	3.5	1.8	2.0	2.4	6.2	3.5	4.4	.29	.15	.06
4	.18	.85	3.3	1.9	2.5	2.2	6.0	3.3	3.7	.30	.20	.08
5	.22	.75	3.1	1.9	2.8	2.4	8.9	3.0	3.2	.28	.18	.07
6	.22	.70	4.2	1.8	2.5	2.1	17	2.8	2.9	.34	.15	.06
7	.22	.72	4.6	1.6	1.9	1.8	12	2.7	2.4	.30	.14	.06
8	.24	.64	4.4	1.5	1.7	1.6	8.0	2.6	2.1	.27	1.6	.06
9	.30	.61	4.1	1.4	1.7	1.4	6.6	2.5	1.9	.28	.65	.08
10	.28	.63	3.9	1.3	2.2	1.5	5.6	2.2	1.6	.33	.50	.09
11	.28	.73	4.2	1.1	16	1.4	4.9	2.2	1.3	.51	.28	.10
12	.36	.62	35	1.1	37	1.2	4.5	2.0	1.2	.38	.21	.08
13	.53	.58	25	1.2	48	1.2	5.7	2.4	1.0	.29	.19	.11
14	.88	.59	17	1.2	30	1.3	5.9	2.7	.95	.25	.16	.15
15	.63	.66	14	1.1	19	1.7	9.6	2.4	.87	.23	.15	.15
16	.60	2.9	8.4	1.1	14	32	16	2.1	.83	.21	.18	.13
17	.54	3.6	6.3	1.1	15	17	25	1.9	.84	.20	.12	.12
18	.45	2.7	5.1	.88	15	8.1	32	1.9	.78	.20	.13	.11
19	.41	2.9	4.2	.84	15	5.9	20	1.9	.67	.19	.14	.10
20	.40	4.4	3.7	.96	12	10	14	1.9	.59	.17	.11	.11
21	.39	3.9	3.5	.72	8.6	41	9.9	1.7	.53	.18	.10	.17
22	.41	2.9	3.3	.82	7.1	26	8.5	2.8	.50	.17	.11	.16
23	.91	11	2.9	.89	6.3	16	13	15	.51	.14	.09	.16
24	.82	14	2.6	1.1	5.6	18	15	8.6	.49	.15	.10	.16
25	.70	6.8	2.2	1.1	4.8	31	12	5.8	.45	.14	.10	.29
26	.65	4.7	2.0	1.0	4.1	34	8.4	28	.42	.15	.07	.60
27	.61	3.8	2.1	1.0	3.8	26	7.0	15	.40	.18	.06	.28
28	.64	15	2.3	.99	3.7	20	5.8	9.2	.38	.15	.06	.23
29	.55	11	2.1	1.0	3.2	16	4.8	22	.36	.18	.06	.21
30	.49	6.4	1.9	.98	---	12	4.6	16	.37	.22	.07	.20
31	.48	---	1.8	.91	---	9.4	---	9.8	---	.15	.06	---
TOTAL	13.99	106.50	189.4	37.89	287.37	350.2	312.2	185.3	48.04	7.49	6.37	4.34
MEAN	.45	3.55	6.11	1.22	9.91	11.3	10.4	5.98	1.60	.24	.21	.14
MAX	.91	15	35	1.9	48	41	32	28	6.9	.51	1.6	.60
MIN	.17	.49	1.8	.72	.90	1.2	4.5	1.7	.36	.14	.06	.06
CFSM	.05	.38	.65	.13	1.06	1.21	1.11	.64	.17	.03	.02	.02
IN.	.06	.42	.75	.15	1.14	1.39	1.24	.74	.19	.03	.03	.02

CAL YR 1983 TOTAL 2523.17 MEAN 6.91 MAX 90 MIN .14 CFSM .74 IN 10.05
WTR YR 1984 TOTAL 1549.09 MEAN 4.23 MAX 48 MIN .06 CFSM .45 IN 6.17

04112500 RED CEDAR RIVER AT EAST LANSING, MI

LOCATION.--Lat 42°43'40", long 84°28'40", in SW1/4 sec.18, T.4 N., R.1 W., Ingham County, Hydrologic Unit 04050004, in left downstream bridge abutment of Farm Lane Bridge on Michigan State University Campus in East Lansing, 4.0 mi upstream from Sycamore Creek, and 5.6 mi upstream from mouth.

DRAINAGE AREA.--355 mi^2.

PERIOD OF RECORD.--August 1902 to December 1903, March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Red Cedar River at Agricultural College, August 1902 to December 1903 and as Cedar River at East Lansing, March 1931 to September 1965. Gage-height records collected in this vicinity 1911-19, and for flood seasons only 1920-28, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1936(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 824.39 ft National Geodetic Vertical Datum of 1929. August 1902 to December 1903 nonrecording gage at site 0.8 mi downstream at different datum. March 1931 to November 1940 water-stage recorder at site 250 ft upstream at present datum.

REMARKS.--Records good. Prior to April 1975, occasional regulation at low flow by mill at Williamston, 16 mi above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--54 years, 205 ft^3/s, 7.84 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,940 ft^3/s Apr. 20, 1975, gage height, 11.95 ft; minimum, 3 ft^3/s July 31, 1931.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 24, 1904, reached a stage of 13.4 ft, discharge, 8,000 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 950 ft^3/s Feb. 14, gage height, 5.44 ft; minimum, 12 ft^3/s Aug. 25, 26, 27, 29, 30; minimum gage height, 3.05 ft Aug. 27, 29, 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	47	208	92	74	132	399	291	540	34	23	16
2	34	53	174	92	74	146	351	250	448	34	23	16
3	32	65	149	95	82	132	307	230	379	34	38	16
4	32	67	135	97	92	123	279	212	303	32	26	17
5	34	65	129	102	102	123	299	205	230	32	24	18
6	34	62	142	105	105	120	379	191	191	36	24	17
7	34	60	156	105	97	97	419	180	166	34	40	21
8	38	55	117	100	92	79	387	177	142	32	91	20
9	38	55	149	100	89	100	347	174	129	31	38	20
10	38	55	149	92	89	102	307	166	120	34	38	21
11	36	62	156	89	126	89	268	163	108	65	31	28
12	38	62	268	84	323	79	247	160	95	49	26	24
13	62	62	466	84	645	87	254	177	87	44	23	38
14	74	60	476	84	905	92	268	194	79	36	21	34
15	72	62	431	82	720	102	343	198	77	34	20	49
16	60	87	375	79	555	323	411	188	72	31	18	38
17	53	114	315	79	495	530	471	174	67	28	18	34
18	51	117	219	79	480	431	610	166	65	26	20	29
19	47	111	142	79	462	347	645	163	62	26	18	28
20	44	120	163	84	431	323	585	166	60	26	16	26
21	44	129	180	87	383	525	515	174	57	24	15	26
22	51	126	152	92	335	705	458	214	53	24	15	24
23	60	177	135	87	295	660	466	331	51	24	14	23
24	65	244	126	77	268	565	520	435	49	23	14	23
25	62	226	114	69	240	610	540	448	49	24	14	36
26	57	191	100	72	216	730	505	640	44	24	12	40
27	55	163	97	77	194	730	453	715	42	26	13	49
28	51	208	97	77	174	650	411	680	40	26	14	51
29	49	268	100	77	123	570	363	695	38	28	14	47
30	47	247	97	77	---	510	327	700	34	28	15	42
31	44	---	95	74	---	444	---	635	---	24	15	---
TOTAL	1470	3420	5812	2669	8266	10256	12134	9492	3877	973	731	871
MEAN	47.4	114	187	86.1	285	331	404	306	129	31.4	23.6	29.0
MAX	74	268	476	105	905	730	645	715	540	65	91	51
MIN	32	47	95	69	74	79	247	160	34	23	12	16
CFSM	.13	.32	.53	.24	.80	.93	1.14	.86	.36	.09	.07	.08
IN.	.15	.36	.61	.28	.87	1.07	1.27	.99	.41	.10	.08	.09

CAL YR 1983 TOTAL 86956 MEAN 238 MAX 1260 MIN 26 CFSM .67 IN 9.11
WTR YR 1984 TOTAL 59971 MEAN 164 MAX 905 MIN 12 CFSM .46 IN 6.28

04113000 GRAND RIVER AT LANSING, MI

LOCATION.--Lat 42°45'02", long 84°33'19", in NW1/4 sec.9, T.4 N., R.2 W., Ingham County, Hydrologic Unit 04050004, on right bank 30 ft upstream from bridge on North Grand River Avenue in Lansing, 2.0 mi downstream from Red Cedar River, and at mile 152.

DRAINAGE AREA.--1,230 mi^2, approximately.

PERIOD OF RECORD.--March 1901 to September 1906, October 1934 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "at North Lansing" 1901-6. Gage-height records collected in this vicinity 1907-10 (flood seasons only), 1911-19, 1920-28 (flood seasons only), and since 1931 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1174: 1949. WSP 1387: 1901, 1903-4, 1935, 1937, 1942.

GAGE.--Water-stage recorder. Datum of gage is 805.53 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to August 1906, nonrecording gage at same site at different datum. November 1934 to June 1949 water-stage recorder at site 1.8 mi downstream at datum 2.42 ft lower.

REMARKS.--Records good. Large diurnal fluctuation at medium and low flows caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--55 years, 833 ft^3/s, 9.20 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 24,500 ft^3/s Mar. 26, 1904, gage height, 18.60 ft, datum then in use, from rating curve extended above 15,000 ft^3/s; minimum, 2.8 ft^3/s Sept. 9, 1963, gage height, 0.85 ft; minimum daily, 20 ft^3/s Aug. 25, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, that of Mar. 26, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,650 ft^3/s May 29, gage height, 6.87 ft; minimum daily, 95 ft^3/s Sept. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	256	352	1020	485	416	867	1820	1140	1960	227	183	113
2	263	436	982	447	408	840	1670	1120	1790	227	220	174
3	315	385	912	539	518	934	1560	1040	1560	264	243	95
4	281	352	879	489	474	850	1470	1020	1410	190	217	136
5	232	401	835	546	558	800	1530	938	1310	239	180	117
6	216	406	894	503	570	573	1680	861	1200	264	172	131
7	210	339	844	556	572	592	1750	846	1020	231	221	178
8	327	422	713	537	566	502	1750	872	1070	208	609	99
9	205	427	818	517	559	572	1630	758	953	260	190	156
10	237	449	773	494	546	525	1570	704	895	291	232	151
11	247	659	865	505	662	502	1400	723	822	512	231	238
12	202	282	1150	430	957	474	1300	657	808	412	166	146
13	387	292	1460	400	1820	536	1380	761	575	350	181	327
14	382	377	1580	456	2390	437	1360	725	542	363	186	256
15	295	347	1560	497	2390	581	1510	748	445	296	193	292
16	396	535	1490	509	2100	1290	1590	662	470	198	204	244
17	303	449	1320	497	2040	1670	1740	643	425	235	188	202
18	302	538	1070	436	1900	1650	1910	731	428	223	202	203
19	228	605	748	463	1870	1660	2010	664	394	156	146	170
20	310	645	781	453	1770	1900	1900	803	437	219	132	179
21	278	643	812	383	1650	2260	1780	716	412	243	145	182
22	376	594	781	364	1560	2560	1710	1120	314	201	129	164
23	336	865	768	370	1440	2540	1670	1650	268	194	123	193
24	325	915	743	371	1380	2430	1710	1820	363	162	98	180
25	399	1010	702	378	1280	2380	1720	1860	300	204	100	341
26	314	896	695	392	1130	2570	1650	2360	282	155	131	383
27	362	880	566	477	1140	2610	1570	2400	235	189	141	361
28	345	1100	592	428	1070	2460	1480	2350	278	185	98	402
29	315	1110	573	471	931	2310	1380	2600	296	198	124	383
30	325	1100	553	468	---	2120	1350	2440	286	190	110	256
31	351	---	492	409	---	1940	---	2280	---	145	120	---
TOTAL	9320	17811	27971	14270	34667	43935	48550	38012	21548	7431	5615	6452
MEAN	301	594	902	460	1195	1417	1618	1226	718	240	181	215
MAX	399	1110	1580	556	2390	2610	2010	2600	1960	512	609	402
MIN	202	282	492	364	408	437	1300	643	235	145	98	95
CFSM	.25	.48	.73	.37	.97	1.15	1.32	1.00	.58	.20	.15	.18
IN.	.28	.54	.85	.43	1.05	1.33	1.47	1.15	.65	.22	.17	.20

CAL YR 1983 TOTAL 361491 MEAN 990 MAX 3810 MIN 150 CFSM .81 IN 10.93
WTR YR 1984 TOTAL 275582 MEAN 753 MAX 2610 MIN 95 CFSM .61 IN 8.33

04114500 LOOKING GLASS RIVER NEAR EAGLE, MI

LOCATION.--Lat 42°49'45", long 84°46'40", in sec.10, T.5 N., R.4 W., Clinton County, Hydrologic Unit 04050004, on right bank at upstream side of former bridge site, 1.5 mi northeast of Eagle, and 10 mi upstream from mouth.

DRAINAGE AREA.--281 mi^2.

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

REVISED RECORDS.--WSP 1387: 1946-47.

GAGE.--Water-stage recorder. Datum of gage is 747.09 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to June 2, 1962, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Small intermittent diversion at times into Lake Geneva when discharge is above 50 ft^3/s. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 172 ft^3/s, 8.31 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,860 ft^3/s Apr. 5, 1947, gage height, 7.70 ft, from graph based on gage readings, from rating curve extended above 1,900 ft^3/s; maximum gage height, 9.9 ft Mar. 7, 1956, from high-water mark, backwater from ice; minimum discharge, 10 ft^3/s July 28, 1965, gage height, 1.01 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 640 ft^3/s Feb. 13; maximum gage height, 4.91 ft Dec. 22, backwater from ice; minimum discharge, 26 ft^3/s Aug. 28, 30, 31, Sept. 1, 2, 3, 4; minimum gage height, 1.27 ft Aug. 31, Sept. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	44	56	175	110	92	222	382	325	376	45	29	26
2	43	62	169	110	96	211	361	303	369	42	28	27
3	42	70	165	110	100	182	338	284	360	41	29	27
4	40	65	161	110	110	154	318	260	345	41	32	28
5	40	65	156	110	120	136	309	237	341	39	42	29
6	39	64	159	110	125	131	308	215	315	40	42	28
7	38	64	152	110	125	119	288	196	281	41	39	29
8	40	63	149	110	125	115	267	178	247	40	70	29
9	41	63	140	110	125	110	257	165	213	40	83	31
10	41	63	135	105	125	110	251	156	181	41	77	33
11	41	65	130	100	200	110	245	148	154	64	74	36
12	41	67	254	100	430	110	237	140	130	59	71	36
13	52	66	278	98	530	110	243	145	109	55	63	38
14	66	68	237	96	388	115	234	154	93	49	52	39
15	64	70	241	96	322	120	326	147	83	47	45	38
16	61	87	223	96	314	335	375	143	77	42	41	38
17	60	91	213	96	354	281	353	142	74	40	38	36
18	57	92	205	96	403	219	384	140	71	37	37	35
19	54	98	137	94	443	212	372	135	67	35	36	33
20	52	113	165	90	440	317	377	128	63	34	33	31
21	50	116	160	85	426	427	373	122	61	40	32	30
22	57	110	155	80	411	371	381	153	59	40	31	29
23	106	154	150	80	392	328	429	230	56	38	30	30
24	83	209	145	80	371	337	432	193	55	35	29	28
25	71	171	140	80	345	415	419	187	51	33	30	32
26	67	153	135	84	316	497	406	267	49	33	29	37
27	64	153	130	88	287	469	394	277	49	34	28	33
28	62	214	125	90	262	444	378	287	46	34	28	33
29	60	215	120	90	236	432	362	420	46	32	28	31
30	58	188	115	90	---	416	352	416	46	32	27	31
31	56	---	115	90	---	399	---	389	---	30	26	---
TOTAL	1690	3135	5134	2994	8013	7954	10151	6682	4467	1253	1279	961
MEAN	54.5	105	166	96.6	276	257	338	216	149	40.4	41.3	32.0
MAX	106	215	278	110	530	497	432	420	376	64	83	39
MIN	38	56	115	80	92	110	234	122	46	30	26	26
CFSM	.19	.37	.59	.34	.98	.92	1.20	.77	.53	.14	.15	.11
IN.	.22	.42	.68	.40	1.06	1.05	1.34	.88	.59	.17	.17	.13

CAL YR 1983 TOTAL 78290 MEAN 214 MAX 1080 MIN 34 CFSM .76 IN 10.36
WTR YR 1984 TOTAL 53713 MEAN 147 MAX 530 MIN 26 CFSM .52 IN 7.11

04115000 MAPLE RIVER AT MAPLE RAPIDS, MI

LOCATION.--Lat 43°06'35", long 84°41'35", in sec.5, T.8 N., R.3 W., Clinton County, Hydrologic Unit 04050005, on right bank at downstream side of bridge on Maple Road at Maple Rapids, 50 ft upstream from Pine Creek, and 0.8 mi upstream from Hayworth Creek. Records include flow of Pine Creek.

DRAINAGE AREA.--434 mi^2.

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

REVISED RECORDS.--WSP 1707: 1956.

GAGE.--Water-stage recorder. Datum of gage is 642.58 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 4, 1968, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for the period Aug. 21 to Sept. 6, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 256 ft^3/s, 8.01 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 6,500 ft^3/s Mar. 20, 1948; maximum gage height, 11.22 ft Mar. 20, 1948, from floodmark, backwater from ice; minimum discharge, 4.4 ft^3/s Aug. 13, 1965, gage height, 1.62 ft.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in March 1904 reached a stage of 13.8 ft, from information by local resident.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,370 ft^3/s Feb. 16, gage height, 8.17 ft; minimum daily, 14 ft^3/s Sept. 6-8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	45	104	476	150	90	420	687	488	756	42	24	18
2	43	97	451	145	92	379	622	455	744	40	21	17
3	41	101	420	140	95	342	569	413	694	36	19	17
4	44	103	389	130	100	308	519	364	626	37	20	16
5	45	99	361	125	105	275	479	330	561	37	22	16
6	42	95	343	120	110	247	457	294	504	41	27	14
7	40	91	329	115	115	216	445	256	451	44	28	14
8	41	86	309	110	110	185	430	229	399	44	30	14
9	41	82	291	105	110	156	408	213	359	41	34	20
10	41	79	278	105	115	136	379	197	322	37	45	24
11	42	76	265	100	127	120	349	182	294	58	55	25
12	40	74	309	100	201	106	324	166	265	114	56	26
13	47	83	449	98	470	94	306	160	241	116	49	26
14	74	118	553	96	787	93	295	168	214	91	43	26
15	109	139	629	94	1100	101	298	159	182	70	35	25
16	112	127	664	92	1340	305	338	154	145	56	30	26
17	102	132	649	90	1340	486	393	143	121	47	25	25
18	91	157	595	89	1270	587	494	124	115	43	22	21
19	80	161	540	88	1260	620	577	116	109	35	22	19
20	71	152	482	87	1260	617	631	110	95	31	20	20
21	65	159	434	86	1190	693	654	103	79	31	17	19
22	62	184	393	86	1060	840	650	97	67	35	17	16
23	115	197	350	86	953	954	650	116	61	44	19	18
24	230	318	310	86	859	1040	701	156	57	48	19	20
25	243	409	280	86	762	1150	747	177	56	41	17	21
26	234	444	250	87	680	1150	750	220	51	35	17	24
27	217	439	220	88	611	1080	718	279	45	32	17	25
28	193	437	200	88	542	1010	656	322	44	30	17	24
29	175	464	190	88	460	921	609	475	43	29	17	24
30	146	482	175	88	---	832	523	623	44	28	16	22
31	120	---	165	88	---	754	---	715	---	25	17	---
TOTAL	2991	5689	11749	3136	17314	16217	15658	8004	7744	1438	817	622
MEAN	96.5	190	379	101	597	523	522	258	258	46.4	26.4	20.7
MAX	243	482	664	150	1340	1150	750	715	756	116	56	26
MIN	40	74	165	86	90	93	295	97	43	25	16	14
CFSM	.22	.44	.87	.23	1.38	1.21	1.20	.59	.59	.11	.06	.05
IN.	.26	.49	1.01	.27	1.48	1.39	1.34	.69	.66	.12	.07	.05

CAL YR 1983 TOTAL 130740 MEAN 358 MAX 1940 MIN 13 CFSM .83 IN 11.21
WTR YR 1984 TOTAL 91379 MEAN 250 MAX 1340 MIN 14 CFSM .58 IN 7.83

04116000 GRAND RIVER AT IONIA, MI

LOCATION.--Lat 42°58'20", long 85°04'13", in NW1/4 sec.30, T.7 N., R.6 W., Ionia County, Hydrologic Unit 04050006, on left bank 15 ft downstream from bridge on State Highway 66 at Ionia, 2.7 mi downstream from Prairie Creek, and at mile 87.

DRAINAGE AREA.--2,840 mi^2, approximately.

PERIOD OF RECORD.--March to June 1931, July and September 1931 (fragmentary), July 1951 to current year. Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 615.38 ft National Geodetic Vertical Datum of 1929. Mar. 19 to Sept. 24, 1931, nonrecording gage at site 1.5 mi upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation below about 5,000 ft^3/s caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--33 years (water years 1952-84), 1,895 ft^3/s, 9.06 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,500 ft^3/s Apr. 1, 1960, gage height, 23.43 ft; minimum, 40 ft^3/s May 13, 1968, gage height, 5.61 ft; minimum daily, 109 ft^3/s July 16, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,080 ft^3/s Feb. 14, gage height, 16.85 ft; minimum, 209 ft^3/s Aug. 25, 26, gage height, 6.69 ft; minimum daily, 239 ft^3/s Aug. 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	521	767	2750	1400	1150	2430	4270	3560	4560	564	425	400
2	537	1050	2540	1400	1200	2180	3930	3270	4240	650	411	391
3	531	1120	2580	1400	1300	2120	3710	2250	3800	496	336	375
4	831	1140	2250	1400	1400	2030	3480	2100	3460	663	446	293
5	526	873	2200	1400	1500	1930	3310	2100	3220	445	485	334
6	532	1020	2190	1500	1550	1730	3270	2170	3010	470	531	392
7	827	925	2230	1500	1550	1480	3360	2010	2710	594	767	394
8	536	902	2110	1500	1550	1300	3330	1940	2520	526	970	364
9	510	871	1880	1400	1550	1410	3250	1890	2280	606	970	327
10	490	888	2030	1400	1500	1150	3080	1780	2370	556	783	404
11	598	964	1910	1300	1900	1360	2900	1640	2030	568	590	432
12	660	1090	2120	1200	2630	1070	2840	1570	1800	1120	563	463
13	710	1170	3600	1200	4520	1130	2630	1620	1670	981	479	574
14	788	826	3870	1200	6300	1140	2740	1690	1540	951	346	438
15	1000	666	3930	1100	6440	1170	2680	1760	1250	672	264	680
16	893	1030	3850	1100	6160	2340	3330	1570	1190	755	239	417
17	795	1090	3400	1100	5800	3970	3650	1560	1110	608	334	480
18	983	1140	2900	1200	5620	3650	3890	1440	1150	522	303	445
19	832	1240	2400	1200	5740	3580	4150	1500	991	448	313	598
20	698	1360	2000	1200	5750	3490	4180	1490	956	452	350	408
21	743	1430	1900	1100	5460	4730	4040	1400	932	427	371	375
22	744	1510	1800	1000	4950	5210	3790	1490	886	499	373	395
23	1020	1530	1700	900	4480	5180	3820	2060	852	589	299	367
24	1300	2250	1600	900	4150	5000	4040	2930	832	468	325	400
25	1360	2610	1600	950	3750	5040	3880	2930	692	445	336	462
26	1270	2290	1600	1000	3530	5610	3950	3260	823	483	307	472
27	1250	2350	1700	1050	3190	6130	3790	3840	652	464	320	746
28	966	2370	1700	1100	2790	5970	3640	3840	616	417	361	719
29	996	2860	1700	1150	2720	5550	3390	4480	628	381	306	448
30	991	3030	1600	1200	---	5090	3390	5040	513	366	306	741
31	1110	---	1400	1150	---	4660	---	4930	---	444	379	---
TOTAL	25548	42362	71040	37600	100130	98830	105710	75110	53283	17630	13588	13734
MEAN	824	1412	2292	1213	3453	3188	3524	2423	1776	569	438	458
MAX	1360	3030	3930	1500	6440	6130	4270	5040	4560	1120	970	746
MIN	490	666	1400	900	1150	1070	2630	1400	513	366	239	293
CFSM	.29	.50	.81	.43	1.22	1.12	1.24	.85	.63	.20	.15	.16
IN.	.33	.55	.93	.49	1.31	1.29	1.38	.98	.70	.23	.18	.18

CAL YR 1983 TOTAL 871046 MEAN 2386 MAX 10400 MIN 367 CFSM .84 IN 11.41
WTR YR 1984 TOTAL 654565 MEAN 1788 MAX 6440 MIN 239 CFSM .63 IN 8.57

04116500 FLAT RIVER AT SMYRNA, MI

LOCATION.--Lat 43°03'10", long 85°15'50", in NW1/4 sec.28, T.8 N., R.8 W., Ionia County, Hydrologic Unit 04050006, on right bank at downstream side of highway bridge, and 0.5 mi south of Smyrna.

DRAINAGE AREA.--528 mi^2.

PERIOD OF RECORD.--October 1950 to current year. Monthly discharge only for some periods, published in WSP 1727.

GAGE.--Water-stage recorder. Datum of gage is 729.53 ft National Geodetic Vertical Datum of 1929. (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplants above station prior to September 1956; occasional diurnal fluctuation since. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--34 years, 432 ft^3/s, 11.11 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,100 ft^3/s Apr. 22, 1967, gage height, 7.27 ft, caused by momentary release of water from storage above station; maximum gage height, 8.26 ft Feb. 6, 1974, backwater from ice; minimum discharge, 7.4 ft^3/s Sept. 9, 1953; minimum daily, 70 ft^3/s Sept. 6, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,130 ft^3/s May 29, gage height, 5.30 ft; maximum gage height, 7.05 ft Dec. 6, backwater from ice; minimum discharge, 146 ft^3/s Aug. 26, 28, gage height, 3.35 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	316	328	595	340	310	529	631	521	976	250	179	265
2	236	341	578	330	320	524	571	494	883	252	168	213
3	255	346	553	320	330	461	587	462	780	248	176	206
4	337	342	530	320	340	428	576	452	729	241	183	214
5	331	333	505	320	340	414	571	461	615	238	186	227
6	317	330	497	330	330	408	576	457	641	255	190	224
7	308	330	481	340	330	383	575	451	506	218	226	227
8	305	328	401	350	330	335	564	437	542	230	241	225
9	296	324	461	350	340	366	549	426	443	280	246	230
10	296	316	446	350	350	335	530	402	401	265	255	234
11	294	313	470	350	367	327	505	383	405	364	194	233
12	267	309	507	350	413	287	487	378	391	500	165	237
13	309	305	529	350	582	339	504	412	381	516	160	277
14	351	308	548	350	690	393	519	429	340	513	161	277
15	430	315	554	350	744	379	541	476	356	406	182	263
16	441	327	547	350	828	598	570	479	325	312	189	245
17	417	328	504	340	910	646	611	432	284	308	178	208
18	389	323	418	340	947	676	634	362	344	286	168	211
19	372	323	312	340	1020	733	681	362	359	248	175	209
20	330	337	330	340	1050	722	633	360	527	242	166	212
21	297	351	350	330	1020	738	609	361	446	198	164	210
22	329	354	370	310	978	737	589	482	437	194	179	207
23	436	419	380	290	929	716	600	715	420	246	180	219
24	424	546	390	280	876	704	612	743	375	258	175	217
25	409	563	400	290	815	705	624	912	370	208	156	231
26	391	546	400	290	741	715	624	1030	351	232	152	242
27	396	584	400	300	687	719	623	921	337	236	151	232
28	397	612	400	300	647	703	602	962	281	202	150	230
29	371	607	390	300	544	734	571	1100	332	197	159	227
30	334	605	370	300	---	702	556	1070	293	218	192	225
31	331	---	350	310	---	666	---	1030	---	212	245	---
TOTAL	10712	11693	13966	10110	18108	17122	17425	17962	13870	8573	5691	6877
MEAN	346	390	451	326	624	552	581	579	462	277	184	229
MAX	441	612	595	350	1050	738	681	1100	976	516	255	277
MIN	236	305	312	280	310	287	487	360	281	194	150	206
CFSM	.66	.74	.85	.62	1.18	1.05	1.10	1.10	.88	.53	.35	.43
IN.	.75	.82	.98	.71	1.28	1.21	1.23	1.27	.98	.60	.40	.48

CAL YR 1983 TOTAL 170419 MEAN 467 MAX 1250 MIN 156 CFSM .88 IN 12.01
WTR YR 1984 TOTAL 152109 MEAN 416 MAX 1100 MIN 150 CFSM .79 IN 10.72

04117500 THORNAPPLE RIVER NEAR HASTINGS, MI

LOCATION.--Lat 42°36'57", long 85°14'11", in SE1/4 sec.27, T.3 N., R.8 W., Barry County, Hydrologic Unit 04050007, on downstream side of highway bridge, 0.6 mi downstream from Cedar Creek, 2.0 mi downstream from Thornapple Lake, and 3.2 mi southeast of Hastings.

DRAINAGE AREA.--385 mi^2.

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

GAGE.--Water-stage recorder. Datum of gage is 786.71 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 1, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--40 years, 313 ft^3/s, 11.08 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,810 ft^3/s Apr. 7, 1947, gage height, 10.20 ft, from graph based on gage readings; minimum, 33 ft^3/s Aug. 10, 1964, gage height, 2.71 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,290 ft^3/s Feb. 15, gage height, 5.52 ft; minimum, 51 ft^3/s Aug. 22, 26, 27, 28, gage height, 2.76 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	157	161	467	222	185	274	604	304	666	104	77	70
2	151	173	412	212	187	260	530	284	602	102	76	69
3	146	209	356	215	208	251	472	263	506	96	74	69
4	150	223	315	217	247	240	432	248	410	96	78	69
5	148	217	296	225	266	228	411	242	347	94	87	72
6	142	204	307	225	264	227	419	237	298	93	86	71
7	136	194	323	228	255	217	430	227	257	93	86	74
8	128	183	330	222	247	208	425	218	228	91	86	76
9	123	178	320	219	241	188	398	215	212	95	88	85
10	122	173	303	203	239	196	355	214	198	105	87	92
11	125	171	293	198	249	194	321	210	186	143	84	103
12	128	170	344	190	353	180	300	204	174	169	79	109
13	146	167	511	195	714	184	302	205	166	165	75	116
14	184	165	678	195	1110	194	312	213	157	145	70	149
15	203	166	740	198	1270	202	338	216	148	129	67	136
16	199	186	738	198	1270	343	386	209	143	118	73	119
17	185	213	681	187	1200	592	455	198	140	108	75	109
18	174	225	575	187	1080	722	525	190	140	98	68	101
19	164	229	426	190	959	705	583	209	137	93	64	96
20	157	251	327	190	851	645	618	231	132	91	61	92
21	149	274	302	190	767	688	612	237	125	97	58	89
22	147	281	287	190	679	802	566	253	122	93	55	83
23	172	288	282	190	596	850	519	416	119	89	56	85
24	204	363	273	179	525	848	517	536	118	95	55	93
25	226	439	266	179	463	807	531	577	116	92	54	119
26	225	455	262	185	414	773	517	617	112	91	53	185
27	209	414	242	192	374	774	472	625	108	92	53	203
28	193	397	239	187	332	789	415	614	111	88	53	186
29	185	437	233	190	296	780	372	662	109	86	54	166
30	174	484	230	195	---	746	315	707	107	82	65	149
31	166	---	230	195	---	685	---	706	---	79	71	---
TOTAL	5118	7690	11588	6188	15841	14792	13452	10487	6394	3212	2168	3235
MEAN	165	256	374	200	546	477	448	338	213	104	69.9	108
MAX	226	484	740	228	1270	850	618	707	666	169	88	203
MIN	122	161	230	179	185	180	300	190	107	79	53	69
CFSM	.43	.67	.97	.52	1.42	1.24	1.16	.88	.55	.27	.18	.28
IN.	.49	.74	1.12	.60	1.53	1.43	1.30	1.01	.62	.31	.21	.31

CAL YR 1983 TOTAL 139794 MEAN 383 MAX 1990 MIN 95 CFSM 1.00 IN 13.51
WTR YR 1984 TOTAL 100165 MEAN 274 MAX 1270 MIN 53 CFSM .71 IN 9.68

04118000 THORNAPPLE RIVER NEAR CALEDONIA, MI

LOCATION.--Lat 42°48'40", long 85°29'00", in NW1/4 sec.22, T.5 N., R.10 W., Kent County, Hydrologic Unit 04050007, on right bank 200 ft downstream from LaBarge powerplant, 2.3 mi northeast of Caledonia, and 3.3 mi downstream from Coldwater river.

DRAINAGE AREA.--773 mi^2.

PERIOD OF RECORD.--October 1930 to September 1938, October 1951 to March 1982, October 1983 to September 1984. Monthly discharge only for some periods, plublished in WSP 1307.

REVISED RECORDS.--WSP 824: 1931-36. WSP 1307: 1931-37.

GAGE.--Water-stage recorder. Datum of gage is 676.31 ft Consumers Power Co. datum. Oct. 1, 1930 to Sept. 30, 1978, nonrecording gage at same site and at National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Prior to Dec. 1, 1958 and since Oct. 1, 1983, large diurnal fluctuation at low and medium flow caused by powerplant above station; occasional fluctuation during the interim period. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years (water years 1931-38, 1952-81, 1984), 577 ft^3/s, 10.14 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,290 ft^3/s May 10, 1956, gage height, 10.79 ft; maximum gage height, 10.96 ft Apr. 22, 1975; minimum discharge, 1.0 ft^3/s May 28, 1968, gage height, 1.40 ft, result of regulation during bridge construction.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1947, reached a stage of 14.4 ft from information by powerplant operator.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,540 ft^3/s Feb. 15, gage height, 7.11 ft; minimum, 30 ft^3/s June 19, 20, gage height, 1.76 ft; minimum daily, 157 ft^3/s Aug. 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	405	346	873	470	400	615	1290	711	1370	271	208	219
2	355	401	827	460	400	575	1090	666	1240	272	242	213
3	267	505	710	450	430	558	1010	647	1100	260	206	161
4	295	486	754	460	505	583	941	636	947	253	209	219
5	331	432	695	470	468	542	899	555	816	264	229	225
6	290	437	599	470	562	521	898	433	781	280	312	193
7	280	418	722	480	529	526	890	698	732	250	236	230
8	260	495	666	470	463	528	866	603	605	199	245	223
9	250	432	563	430	523	476	838	477	419	252	258	203
10	250	274	710	430	475	478	789	448	613	322	244	216
11	250	362	709	380	463	307	753	585	493	407	214	243
12	260	405	704	400	629	510	724	498	439	403	213	289
13	300	234	911	410	1460	410	641	331	413	374	217	248
14	380	498	1120	410	2060	441	724	646	387	273	225	386
15	410	319	1260	390	2280	527	729	473	453	285	196	418
16	400	244	1290	370	2260	794	750	508	268	376	211	239
17	380	581	1230	400	2160	1220	979	457	428	269	207	330
18	360	330	1090	370	1950	1320	1040	442	359	247	216	214
19	350	488	860	400	1870	1340	1090	542	251	236	222	257
20	348	480	758	400	1720	1330	1120	499	329	228	173	247
21	357	589	704	400	1490	1510	1160	554	210	184	160	228
22	306	573	634	400	1350	1520	1110	488	508	208	187	234
23	420	598	636	400	1130	1540	1090	746	254	331	180	236
24	488	674	471	380	1080	1570	1050	880	248	248	175	231
25	480	761	544	380	975	1580	1020	961	375	220	182	276
26	437	795	672	380	901	1610	997	1110	274	225	192	511
27	377	789	408	400	750	1600	961	1160	335	246	166	402
28	423	813	500	400	714	1570	893	1190	271	233	181	426
29	395	860	490	400	673	1530	816	1580	271	233	157	443
30	339	877	480	400	---	1480	721	1600	272	223	193	324
31	465	---	470	400	---	1410	---	1500	---	214	242	---
TOTAL	10908	15496	23060	12860	30670	30521	27879	22624	15461	8286	6498	8284
MEAN	352	517	744	415	1058	985	929	730	515	267	210	276
MAX	488	877	1290	480	2280	1610	1290	1600	1370	407	312	511
MIN	250	234	408	370	400	307	641	331	210	184	157	161
CFSM	.46	.67	.96	.54	1.37	1.27	1.20	.94	.67	.35	.27	.36
IN.	.52	.75	1.11	.62	1.48	1.47	1.34	1.09	.74	.40	.31	.40

WTR YR 1984 TOTAL 212547 MEAN 581 MAX 2280 MIN 157 CFSM .75 IN 10.23

04119000 GRAND RIVER AT GRAND RAPIDS, MI

LOCATION.--Lat 42°57'52", long 85°40'35", in NE1/4 sec.25, T.7 N., R.12 W., Kent County, Hydrologic Unit 04050006, on right bank 500 ft upstream from bridge on Fulton Street, 1.7 mi upstream from Plaster Creek, and at mile 41.

DRAINAGE AREA.--4,900 mi^2, approximately.

PERIOD OF RECORD.--March 1901 to December 1905, January 1906 to August 1908 (gage heights only), October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records collected in this vicinity since 1907 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 924: 1938(M). WSP 1387: 1901-5, 1940.

GAGE.--Water stage recorder. Datum of gage is 585.70 ft National Geodetic Vertical Datum of 1929 (levels by City of Grand Rapids). March 1901 to August 1918, nonrecording gage at Fulton Street Bridge 500 ft downstream and Oct. 1, 1930 to Oct. 26, 1953, water-stage recorder at sewage pumping station 1 mi downstream at datum 2.99 ft higher.

REMARKS.--Records good except those for the winter period, which are fair. Moderate diurnal fluctuation at low and medium flow caused by powerplants above station. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--58 years, 3,570 ft^3/s, 9.89 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge 54,000 ft^3/s Mar. 28, 1904, gage height, 19.5 ft, from graph based on gage readings, site then in use; minimum daily, 381 ft^3/s Aug. 9, 17, 1936.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, 54,000 ft^3/s Mar. 28, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 11,500 ft^3/s Feb. 16, gage height, 11.38 ft; minimum, 890 ft^3/s Aug. 17, 21, gage height, 2.69 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2010	2280	5240	2800	2200	4740	7500	4750	8420	1680	1100	1150
2	1740	2040	5030	2700	2300	4380	6800	5130	7780	1610	1190	1190
3	1700	2370	4760	2700	2500	4110	6400	4820	7170	1580	1160	1140
4	1640	2390	4700	2700	2700	3840	6000	4250	6400	1550	1090	1150
5	1840	2400	4450	2800	2900	3810	5740	3840	5740	1630	1190	1170
6	1660	2260	4390	2900	3000	3560	5620	3860	5480	1510	1260	1090
7	1640	2330	4430	2900	3000	3260	5540	3760	4990	1590	1390	1210
8	1920	2260	4320	2800	3000	2880	5520	3800	4670	1560	1640	1260
9	1710	2220	3980	2700	3000	2450	5400	3370	4330	1400	1980	1230
10	1630	2190	3910	2570	3000	2630	5240	3450	4000	1630	1890	1130
11	1540	2060	4060	2500	3600	2360	5040	3150	3900	2150	1650	1160
12	1690	2120	4300	2400	4610	2300	4840	3020	3320	2080	1390	1210
13	1820	2300	4860	2300	6360	2330	4790	3160	3180	2450	1310	1250
14	2070	2280	5980	2300	8380	2610	4740	3100	2930	2390	1200	1440
15	2220	2210	6400	2200	9880	2920	4870	3340	2590	2230	1090	1480
16	2310	1920	6480	2100	11200	4450	4920	3090	2400	1890	978	1590
17	2250	2210	6000	2100	10700	5720	5550	3050	2350	1860	973	1250
18	2180	2450	5500	2300	10300	6690	6020	3030	2400	1660	975	1300
19	2260	2380	4800	2300	10100	6560	6220	2710	2320	1510	1030	1200
20	2460	2650	4000	2300	10000	6550	6450	2960	2160	1310	976	1320
21	2170	2760	3700	2200	9760	6850	6470	2730	2220	1310	973	1270
22	2110	2950	3500	2000	9280	7650	6310	3710	2220	1290	998	1130
23	2150	3260	3400	1800	8570	7980	6170	4440	2250	1300	1020	1240
24	2370	3610	3200	1800	7720	8050	6190	5210	2130	1450	980	1200
25	2620	4370	3100	1800	7040	8600	6240	5940	2030	1490	943	1300
26	2370	4670	3100	1900	6450	9600	6420	6330	1920	1260	992	1430
27	2470	4460	3200	2000	6070	10200	6590	6620	2020	1260	1050	1580
28	2530	4720	3300	2100	5510	10000	6330	7130	1890	1330	970	1760
29	2350	4940	3300	2200	5030	9500	5670	8280	1730	1320	964	1680
30	2330	5300	3200	2300	---	8800	5240	8670	1780	1190	1030	1550
31	2160	---	3000	2200	---	8200	---	8690	---	1150	1050	---
TOTAL	63920	86360	133590	72670	178160	173580	174830	139390	106720	49620	36432	39060
MEAN	2062	2879	4309	2344	6143	5599	5828	4496	3557	1601	1175	1302
MAX	2620	5300	6480	2900	11200	10200	7500	8690	8420	2450	1980	1760
MIN	1540	1920	3000	1800	2200	2300	4740	2710	1730	1150	943	1090
CFSM	.42	.59	.88	.48	1.25	1.14	1.19	.92	.73	.33	.24	.27
IN.	.49	.66	1.01	.55	1.35	1.32	1.33	1.06	.81	.38	.28	.30

CAL YR 1983 TOTAL 1582500 MEAN 4336 MAX 14700 MIN 1220 CFSM .89 IN 12.01
WTR YR 1984 TOTAL 1254332 MEAN 3427 MAX 11200 MIN 943 CFSM .70 IN 9.52

04119300 GRAND RIVER AT EASTMANVILLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°00'53", long 85°57'21", in NE1/4 NW1/4 sec.10, T.7 N., R.14 W., Ottawa County, Hydrologic Unit 04050006, at bridge on 68th Avenue in Eastmanville, 1.1 mi downstream from Deer Creek, and at mile 19.3.

DRAINAGE AREA.--5,230 mi^2, approximately.

PERIOD OF RECORD.--February 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1979 to September 1983.
WATER TEMPERATURES: February 1979 to September 1983.

INSTRUMENTATION.--Oct. 7, 1980, to Sept. 30, 1983, water-quality monitor.

REMARKS.--Bimonthly samples were collected at bridge.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,100 micromhos Mar. 2, 1979; minimum observed, 324 micromhos Mar. 24, 1982.
WATER TEMPERATURES: Maximum, 28.5°C July 21, 1983; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
18...	1430	2310	--	--	12.5	3.4	--	--	1800	E280
JAN										
09...	1600	3140	760	7.9	.0	1.9	12.4	86	>600	K1700
FEB										
23...	1120	--	526	8.0	5.0	10	12.5	102	1200	--
MAY										
15...	1315	3760	683	8.6	14.0	5.5	12.1	118	1000	150
JUL										
26...	1430	1240	588	8.4	23.5	6.0	10.5	126	K57	110
SEP										
06...	1100	1250	--	8.4	19.5	5.5	12.0	132	K170	K20

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT										
18...	290	72	76	24	26	16	.7	2.9	217	--
JAN										
09...	330	86	88	26	24	14	.6	2.4	241	5.9
FEB										
23...	240	76	64	19	13	10	.4	2.9	163	3.1
MAY										
15...	300	77	79	24	22	14	.6	2.3	220	1.0
JUL										
26...	230	53	56	22	28	21	.8	2.4	178	1.4
SEP										
06...	250	76	60	24	36	24	1	3.0	173	1.3

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT									
18...	60	44	.20	5.9	396	370	.54	2470	1.1
JAN									
09...	74	45	.20	10	465	410	.63	3940	2.2
FEB									
23...	55	30	.10	7.2	341	290	.46	--	3.1
MAY									
15...	59	41	.20	1.4	491	360	.67	4980	.73
JUL									
26...	59	51	.20	1.0	334	330	.45	1120	.21
SEP									
06...	61	58	.30	4.6	361	350	.49	1220	.38

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT									
18...	.520	1.2	.120	.37	.010	<.010	22	137	98
JAN									
09...	.500	1.0	.060	.18	.040	.020	--	--	--
FEB									
23...	.330	.60	.070	.21	<.010	.040	18	--	91
MAY									
15...	.190	3.4	.090	.28	.020	<.010	25	254	94
JUL									
26...	<.010	.50	.100	--	<.010	<.010	19	64	--
SEP									
06...	.250	1.8	.210	--	.020	.010	21	71	--

DATE	TIME	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
OCT											
18...	1430	<10	1	61	<.5	<1	<1	<3	4	22	2
FEB											
23...	1120	10	1	52	<.5	<1	1	<3	1	36	3
MAY											
15...	1315	<10	1	57	<1.0	<1	<1	<3	2	12	3
SEP											
06...	1100	<10	1	51	<.5	<1	1	4	4	11	1

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
OCT										
18...	10	7	.1	<10	8	<1	<1	310	<6	32
FEB										
23...	9	11	<.1	<10	2	<1	<1	170	<6	8
MAY										
15...	9	4	<.1	<10	6	<1	<1	280	<6	48
SEP										
06...	10	4	<.1	<10	11	<1	<1	350	<6	10

04121300 CLAM RIVER AT VOGEL CENTER, MI

LOCATION.--Lat 44°12'02", long 85°03'10", in SW1/4 NW1/4 sec.21, T.21 N., R.6 W., Missaukee County, Hydrologic Unit 04060102, on left bank 10 ft downstream from bridge on county road, 0.5 mi north of Vogel Center, and 3.5 mi southeast of Falmouth.

DRAINAGE AREA.--243 mi^2.

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,130 ft, from topographic map.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation at low flow by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 123 ft^3/s, 6.87 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,150 ft^3/s Apr. 13, 1971, gage height, 6.33 ft; minimum, 29 ft^3/s Nov. 3, 1969, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 307 ft^3/s Feb. 21, gage height, 3.93 ft, no peak above base of 350 ft^3/s; minimum, 54 ft^3/s Sept. 22, 23, gage height, 2.45 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	71	112	169	120	98	125	161	153	113	73	60	67
2	69	114	152	120	97	130	158	150	107	69	62	77
3	71	114	145	120	97	122	156	143	108	66	64	85
4	82	109	139	111	100	118	154	138	102	67	65	79
5	135	91	137	113	99	115	164	137	97	66	67	71
6	124	86	135	113	103	110	190	131	93	69	68	66
7	116	99	120	113	95	99	194	125	89	70	75	65
8	116	108	118	109	95	95	178	117	86	68	75	65
9	114	110	121	112	94	99	163	115	83	67	69	73
10	112	110	127	112	97	105	153	114	86	70	66	73
11	129	115	126	115	101	97	146	111	85	117	64	81
12	143	113	130	115	113	97	141	104	80	126	63	76
13	145	108	137	115	146	99	156	111	81	93	61	69
14	150	109	138	113	194	105	180	150	83	76	60	67
15	148	111	138	113	217	112	184	139	81	71	59	65
16	145	116	135	111	235	142	194	118	84	68	59	64
17	145	117	127	110	243	156	206	109	98	67	58	62
18	142	115	110	112	240	140	211	106	140	66	58	61
19	140	115	96	112	257	124	204	103	130	66	60	64
20	138	128	102	110	294	120	187	99	108	66	59	61
21	135	148	115	110	290	159	171	96	98	65	58	59
22	138	159	118	110	242	209	159	103	91	64	64	56
23	140	165	118	110	224	205	154	117	83	62	70	57
24	145	192	118	110	226	188	150	112	80	61	67	62
25	143	199	118	110	211	186	148	146	77	61	62	78
26	137	182	118	105	180	191	144	231	76	61	60	91
27	131	160	118	98	154	189	143	234	81	62	59	84
28	125	156	118	100	138	185	139	183	84	62	59	75
29	121	178	120	93	116	180	133	151	80	62	58	75
30	117	179	120	92	---	170	139	135	77	60	63	73
31	114	---	120	103	---	164	---	124	---	59	64	---
TOTAL	3881	3918	3903	3410	4796	4336	4960	4105	2761	2180	1956	2101
MEAN	125	131	126	110	165	140	165	132	92.0	70.3	63.1	70.0
MAX	150	199	169	120	294	209	211	234	140	126	75	91
MIN	69	86	96	92	94	95	133	96	76	59	58	56
CFSM	.51	.54	.52	.45	.68	.58	.68	.54	.38	.29	.26	.29
IN.	.59	.60	.60	.52	.73	.66	.76	.63	.42	.33	.30	.32

CAL YR 1983 TOTAL 48847 MEAN 134 MAX 340 MIN 58 CFSM .55 IN 7.48
WTR YR 1984 TOTAL 42307 MEAN 116 MAX 294 MIN 56 CFSM .48 IN 6.48

04121500 MUSKEGON RIVER AT EVART, MI

LOCATION.--Lat 43°53'57", long 85°15'19", in NW1/4 NE1/4 sec.3, T.17 N., R.8 W., Osceola County, Hydrologic Unit 04060102, on right bank 500 ft downstream from bridge on U.S. Highway 10 in Evart, 0.4 mi upstream from Twin Creek, and at mile 123.9.

DRAINAGE AREA.--1,450 mi^2, approximately.

PERIOD OF RECORD.--October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1437: 1934, 1947(M).

GAGE.--Water-stage recorder. Datum of gage is 977.72 ft National Geodetic Vertical Datum of 1929. Prior to Nov. 7, 1956, nonrecording gages at sites 400 ft and 500 ft upstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation during low flow from dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--52 years, 998 ft^3/s, 9.35 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,790 ft^3/s Mar. 29, 1976; maximum gage height, 14.42 ft Apr. 9, 1959; minimum discharge observed, 164 ft^3/s Dec. 20, 1947, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,040 ft^3/s Feb. 19, gage height, 10.04 ft; minimum, 412 ft^3/s Aug. 21; minimum gage height, 6.69 ft Aug. 21, 22, 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	718	1050	1640	890	720	1490	1510	1010	1290	723	494	450
2	694	1030	1520	880	720	1320	1490	1010	1160	697	485	698
3	700	1010	1390	870	720	1270	1470	1000	1090	672	481	649
4	790	987	1350	860	720	1150	1450	1010	1010	656	486	608
5	839	960	1330	850	720	1150	1480	993	944	641	491	585
6	846	929	1230	850	710	1120	1630	964	900	641	497	558
7	832	909	1170	840	710	985	1660	929	866	636	508	547
8	923	908	1030	830	720	922	1620	887	838	620	515	544
9	1000	899	1000	820	720	844	1580	844	795	570	517	586
10	1040	893	970	810	730	780	1540	808	773	526	510	631
11	1020	883	1000	790	788	811	1510	786	744	596	493	690
12	986	874	1120	780	817	753	1470	769	719	768	475	672
13	1040	867	1160	770	1020	747	1480	850	690	808	468	662
14	1230	860	1220	770	1370	796	1440	1140	663	814	452	637
15	1300	880	1250	770	1710	890	1430	1170	644	756	444	608
16	1290	909	1210	770	1960	1230	1610	1110	630	680	441	588
17	1260	918	1120	760	2160	1300	1750	1030	935	650	431	576
18	1210	917	1020	760	2330	1230	1780	961	1400	634	424	563
19	1190	926	832	755	2590	1150	1760	912	1390	606	430	545
20	1170	966	570	750	2860	1070	1680	869	1270	589	423	532
21	1140	1030	640	740	2680	1210	1590	827	1110	584	417	507
22	1120	1050	680	740	2530	1590	1490	923	971	565	428	498
23	1200	1160	740	740	2470	1630	1410	1190	868	558	430	506
24	1230	1480	860	740	2390	1590	1300	1180	805	576	445	506
25	1250	1560	920	740	2310	1590	1200	1390	746	555	449	541
26	1240	1550	940	740	2190	1640	1140	1970	698	531	435	578
27	1210	1490	940	740	1990	1670	1090	2070	697	529	426	608
28	1160	1530	940	730	1850	1660	1050	2010	702	549	427	614
29	1140	1690	940	730	1640	1630	1010	1790	715	546	423	631
30	1110	1710	930	730	---	1580	996	1580	737	522	431	677
31	1080	---	900	720	---	1540	---	1420	---	501	441	---
TOTAL	32958	32825	32562	24265	44845	38338	43616	35402	26800	19299	14217	17595
MEAN	1063	1094	1050	783	1546	1237	1454	1142	893	623	459	587
MAX	1300	1710	1640	890	2860	1670	1780	2070	1400	814	517	698
MIN	694	860	570	720	710	747	996	769	630	501	417	450
CFSM	.73	.75	.72	.54	1.07	.85	1.00	.79	.62	.43	.32	.41
IN.	.85	.84	.84	.62	1.15	.98	1.12	.91	.69	.50	.36	.45

CAL YR 1983 TOTAL 446710 MEAN 1224 MAX 3600 MIN 385 CFSM .84 IN 11.46
WTR YR 1984 TOTAL 362722 MEAN 991 MAX 2860 MIN 417 CFSM .68 IN 9.31

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI

LOCATION.--Lat 43°30'09", long 85°20'33", in SW1/4 SW1/4 sec.24, T.13 N., R.9 W., Mecosta County, Hydrologic Unit 04060102, on right bank at upstream side of highway bridge on 130th Avenue, 0.5 mi downstream from Rustford Dam, and 5.2 mi east of Morley.

DRAINAGE AREA.--138 mi^2.

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 920 ft, from topographic map.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 125 ft^3/s, 12.30 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,390 ft^3/s July 18, 1982, gage height, 6.98 ft; minimum, 22 ft^3/s July 21, 1979, gage height, 1.53 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 520 ft^3/s June 18, gage height, 3.84 ft, only peak above base of 400 ft^3/s; minimum, 31 ft^3/s Aug 17, gage height, 1.56 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	84	99	155	110	100	122	128	109	158	89	55	53
2	75	107	136	112	99	107	136	105	150	78	54	117
3	71	106	125	112	95	102	133	103	142	75	55	123
4	76	100	119	112	90	99	138	104	119	73	56	95
5	76	96	117	112	89	100	144	106	112	71	59	81
6	80	93	120	112	88	99	147	101	111	84	59	73
7	86	92	118	112	87	97	148	100	105	85	57	71
8	94	91	122	112	86	100	130	97	101	76	58	68
9	92	90	115	112	85	94	136	98	100	74	58	78
10	79	88	105	112	85	98	128	95	110	77	56	113
11	76	89	105	110	88	88	121	93	102	111	57	119
12	77	88	144	112	97	86	117	93	94	99	55	93
13	93	86	158	112	186	93	147	116	91	85	54	84
14	151	86	149	112	262	85	129	167	89	78	53	79
15	144	92	141	112	241	103	156	139	81	75	51	76
16	122	107	132	112	235	247	135	121	75	74	49	72
17	103	105	123	112	236	209	168	109	262	70	46	62
18	99	98	120	112	254	159	135	107	516	68	48	61
19	96	98	119	112	309	131	138	114	490	64	52	58
20	94	109	122	115	308	128	133	107	358	63	48	56
21	92	111	125	115	273	154	138	101	217	63	46	55
22	91	105	125	115	233	178	131	187	166	62	45	55
23	116	143	122	115	221	165	200	315	131	61	45	58
24	115	204	120	112	218	181	212	279	115	63	45	61
25	108	183	120	110	203	195	172	281	107	59	47	73
26	103	150	118	110	170	184	138	338	100	60	47	86
27	99	126	115	108	146	131	134	311	106	62	48	79
28	98	161	115	105	131	150	116	226	103	60	52	73
29	102	200	112	105	128	123	100	276	96	59	51	72
30	103	183	112	103	---	137	102	226	93	56	62	72
31	101	---	112	103	---	123	---	201	---	56	58	---
TOTAL	2996	3486	3841	3440	4843	4068	4190	4925	4600	2230	1626	2316
MEAN	96.6	116	124	111	167	131	140	159	153	71.9	52.5	77.2
MAX	151	204	158	115	309	247	212	338	516	111	62	123
MIN	71	86	105	103	85	85	100	93	75	56	45	53
CFSM	.70	.84	.90	.80	1.21	.95	1.01	1.15	1.11	.52	.38	.56
IN.	.81	.94	1.04	.93	1.31	1.10	1.13	1.33	1.24	.60	.44	.62

CAL YR 1983 TOTAL 47805 MEAN 131 MAX 461 MIN 56 CFSM .95 IN 12.89
WTR YR 1984 TOTAL 42561 MEAN 116 MAX 516 MIN 45 CFSM .84 IN 11.47

04122000 MUSKEGON RIVER AT NEWAYGO, MI

LOCATION.--Lat 43°25'20", long 85°48'04", in NE1/4 NE1/4 sec.24, T.12 N., R.13 W., Newaygo County, Hydrologic Unit 04060102, on left bank near nonoperative powerplant at Newaygo, 600 ft downstream from Penoyer Creek, and at mile 39.1

DRAINAGE AREA.--2,350 mi^2, approximately.

PERIOD OF RECORD.--July to December 1908, July 1909 to July 1915, January 1916 to December 1919, October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Records for June 1901 to December 1906, published in WSP 129, 170, and 206, have been found to be unreliable and should not be used.

REVISED RECORDS.--WSP 974: 1933, 1935, 1937-38. WSP 1307: 1940(M). See also PERIOD OF RECORD.

GAGE.--Water-stage recorder. Datum of gage is 625.83 ft National Geodetic Vertical Datum of 1929. October 1930 to January 1939, nonrecording gage, and Jan. 31, 1939, to Sept. 30, 1963, water-stage recorder at present site at datum 40.0 ft lower.

REMARKS.--Records good. Flow regulated by powerplants above station, the largest of which are Croton Dam, Hardy Dam (since 1931), and Rogers Dam. Since Dec. 27, 1965, powerplant at Newaygo nonoperative, and in January 1969, dam at Newaygo was removed. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--62 years (water years 1910-14, 1917-19, 1931-84), 1,971 ft^3/s, 11.39 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 14,950 ft^3/s Mar. 25, 1913; minimum, 52 ft^3/s Oct. 2, 1965, gage height, 5.31 ft, result of regulation during pipeline repair; minimum daily, 330 ft^3/s Feb. 15, 1914.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,300 ft^3/s June 17, gage height, 10.54 ft; minimum, 700 ft^3/s Aug. 15, gage height, 6.48 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1760	2000	3380	2080	2350	3400	3050	1520	2840	1580	1230	1030
2	1630	1990	3000	1810	2350	2800	3030	1960	2680	1640	1160	1570
3	1360	2270	2880	1890	2620	2900	1810	1740	2390	1550	1090	2170
4	1900	2150	2270	2070	2380	2500	2600	1350	2200	1610	985	2160
5	1760	1960	2540	2030	2200	3000	1990	1560	2310	1140	979	1960
6	1890	1870	2340	2040	2350	2900	2210	1780	2160	1620	985	988
7	1890	1900	2670	1950	3060	2800	1090	1870	1850	1490	1540	1570
8	1900	1850	2360	2390	3050	2400	1080	1780	1960	1350	1030	1620
9	1940	1910	1930	2400	2850	2400	1710	1610	2030	1410	985	1510
10	1990	1890	2080	2410	2660	2400	2750	1770	1650	1420	1010	1550
11	2090	2020	1910	2150	2220	1700	2970	1480	1780	1650	1140	1620
12	2090	2190	2250	1180	2780	1080	2670	1330	1890	1660	977	1710
13	1840	1910	3020	1820	3570	1080	2310	1580	1660	1590	1410	1250
14	2010	1740	2310	1480	3780	1300	2040	2580	1640	1710	975	2030
15	2590	2020	2680	1900	3790	1950	2290	2400	1510	1950	881	2220
16	2280	1650	2950	1720	4110	2410	2990	1810	1520	1620	908	1070
17	2650	1820	2670	1920	4500	3450	2690	1950	3080	1000	975	973
18	2530	1900	1850	1700	4500	3430	3390	2170	5390	1480	980	931
19	1680	2010	1830	1920	4720	3020	3390	2130	3940	1490	970	1010
20	2130	2470	2590	1540	5540	3050	3380	2550	2310	992	965	1090
21	2620	1840	2400	1500	5200	2690	2420	1950	2480	1570	964	1090
22	3450	2130	1440	1650	4620	2860	2060	2030	2250	1690	974	1090
23	3460	2640	1710	1550	4640	3300	2220	3200	2250	1670	967	1110
24	2450	2640	1750	1870	4590	2950	2610	3000	2180	1390	964	1090
25	1280	2780	2510	2000	4430	3030	2810	3640	2010	1020	963	1110
26	1270	2900	2980	2240	3930	3170	2600	5280	1650	979	964	1300
27	1270	2900	1580	2270	3430	3210	1960	4630	1780	969	969	1640
28	1900	2850	1920	2270	3030	3420	1880	3710	1910	1280	971	942
29	2200	2770	2160	2180	3550	3110	1880	3710	1470	1270	974	1340
30	2330	3430	2150	2290	---	3130	1720	3620	1250	1060	1230	1330
31	2080	---	2030	2330	---	3110	---	2850	---	963	1250	---
TOTAL	64220	66400	72140	60550	102800	83950	71600	74540	66020	43813	32365	42074
MEAN	2072	2213	2327	1953	3545	2708	2387	2405	2201	1413	1044	1402
MAX	3460	3430	3380	2410	5540	3450	3390	5280	5390	1950	1540	2220
MIN	1270	1650	1440	1180	2200	1080	1080	1330	1250	963	881	931
CFSM	.88	.94	.99	.83	1.51	1.15	1.02	1.02	.94	.60	.44	.60
IN.	1.02	1.05	1.14	.96	1.63	1.33	1.13	1.18	1.05	.69	.51	.67

CAL YR 1983 TOTAL 854690 MEAN 2342 MAX 6180 MIN 1060 CFSM 1.00 IN 13.53
WTR YR 1984 TOTAL 780472 MEAN 2132 MAX 5540 MIN 881 CFSM .91 IN 12.35

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°19'05", long 86°02'11", in SW1/4 NW1/4 sec.30, T.11 N., R.14 W., Newaygo County, Hydrologic Unit 04060102, at bridge on Maple Island Road, 5 mi southwest of Bridgeton, 13 mi upstream from Muskegon Lake, and 20 mi downstream from gaging station at Newaygo.

DRAINAGE AREA.--2,420 mi^2, approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981.
WATER TEMPERATURES: November 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor November 1975 to September 1981.

REMARKS.--Quarterly samples are collected as a cross-section sample at or near Maple Island Road bridge. Water-discharge measurements are made at times of sampling. Some regulation by dams above station.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1975, 1978-81): Maximum, 1,550 micromhos Sept. 24, 1979; minimum. 69 micromhos May 3, 1979.
WATER TEMPERATURES (water years 1975, 1977-81): Maximum, 33.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV										
30...	1400	3580	362	7.9	3.0	1.4	11.5	86	K10	94
MAR										
21...	1130	2810	317	7.5	2.0	1.8	12.0	90	K5	69
MAY										
16...	1100	2540	326	7.9	12.5	1.8	10.7	99	240	K35
SEP										
12...	1115	2180	366	8.4	19.5	8.2	8.1	89	76	52

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
NOV										
30...	170	26	46	14	9.9	11	.3	1.1	147	3.6
MAR										
21...	150	23	39	12	8.4	11	.3	1.4	124	7.6
MAY										
16...	140	18	39	11	8.1	11	.3	1.2	125	3.0
SEP										
12...	170	22	45	14	9.7	11	.3	1.0	148	1.1

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV									
30...	21	18	.10	5.4	222	200	.30	2150	.29
MAR									
21...	18	16	<.10	7.4	190	180	.26	1440	.45
MAY									
16...	18	16	<.10	4.2	196	170	.27	1340	.25
SEP									
12...	18	17	.10	5.0	231	200	.31	1360	<.10

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 30...	<.010	.90	.020	.06	.010	<.010	33	319	44
MAR 21...	<.010	.30	--	--	.020	<.010	19	144	48
MAY 16...	.030	.90	.010	--	.010	.040	24	165	60
SEP 12...	.040	.80	.110	--	.080	.030	28	165	56

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV 30...	1400	20	1	35	<.5	<1	<1	<3	2	29	4
MAR 21...	1130	<10	1	25	<.5	<1	<1	<3	4	61	7
MAY 16...	1100	<10	1	23	<1	<1	<1	<3	1	19	1
SEP 12...	1115	<10	2	26	<.5	<1	1	<3	6	7	1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV 30...	5	5	<.1	<10	1	<1	<1	150	<6	4
MAR 21...	<4	6	<.1	<10	1	<1	<1	120	<6	8
MAY 16...	4	3	.2	<10	1	<1	<1	130	<6	<3
SEP 12...	<4	2	.1	<10	<1	<1	<1	160	<6	8

04122100 BEAR CREEK NEAR MUSKEGON, MI

LOCATION.--Lat 43°17'19", long 86°13'22", in SW1/4 NW1/4 sec.4, T.10 N., R.16 W., Muskegon County, Hydrologic Unit 04060102, on left bank at upstream side of bridge on North Getty Street, 1.5 mi upstream from Little Bear Creek, and 3.9 mi northeast of Muskegon.

DRAINAGE AREA.--14.8 mi^2.

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-80-1: 1976(M), 1978(M), 1979(P).

GAGE.--Water-stage recorder. Datum of gage is 590.00 ft Michigan Department of Natural Resources datum. Prior to Mar. 17, 1978, at different datum.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation during low flow by dams and irrigation above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 16.6 ft^3/s, 15.23 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 930 ft^3/s Mar. 5, 1976, gage height, 11.00 ft, datum then in use; minimum, 1.0 ft^3/s Aug. 5, 17, 22, 1971.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 14	1230	*260	*15.23	May 25	2230	193	14.83

Minimum discharge, 3.3 ft^3/s Aug. 12-17, 19-21; minimum gage height, 10.31 ft Aug. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.8	9.9	24	23	15	21	21	16	24	7.5	4.5	7.5
2	5.6	32	22	23	15	21	19	14	21	6.9	4.4	7.3
3	5.7	31	21	23	16	19	19	14	19	6.5	4.4	7.4
4	7.7	18	19	23	16	18	18	32	18	6.4	4.8	7.8
5	7.4	15	21	21	16	19	16	33	16	6.1	4.2	7.3
6	6.8	13	26	21	16	19	16	23	15	11	5.8	6.2
7	6.5	12	24	20	16	19	17	19	14	8.1	5.5	7.4
8	9.1	12	20	19	15	19	16	16	13	7.1	5.5	6.7
9	7.5	11	19	18	15	22	15	18	13	7.0	5.5	8.1
10	6.8	11	18	19	15	18	14	16	13	8.5	4.8	8.0
11	6.8	11	18	19	16	16	14	14	11	25	3.9	7.2
12	8.6	11	33	19	18	18	14	13	11	13	3.9	6.4
13	11	10	34	19	110	19	18	21	11	10	3.7	6.2
14	16	10	30	19	171	17	17	25	10	8.6	3.6	6.1
15	12	10	34	19	83	25	20	18	9.5	7.8	3.5	6.3
16	10	10	29	19	62	57	20	15	9.2	7.1	3.5	5.8
17	9.0	9.8	26	19	55	39	19	13	14	6.7	3.5	5.5
18	8.4	9.5	26	19	51	29	18	13	18	6.1	3.9	5.3
19	8.2	11	26	20	62	27	17	12	15	5.7	3.8	5.1
20	8.2	16	25	20	61	29	17	11	12	5.4	3.4	4.9
21	8.1	17	24	20	44	33	15	10	9.7	5.2	3.5	4.3
22	9.7	13	24	20	37	33	15	18	9.1	5.0	5.9	4.2
23	18	27	23	20	34	28	25	34	9.8	4.7	5.0	6.6
24	15	48	23	19	31	31	22	22	9.3	5.1	6.1	6.1
25	13	27	23	19	28	35	18	74	8.4	4.7	5.3	8.9
26	12	21	23	19	26	40	16	109	8.0	6.7	5.2	7.9
27	12	18	22	19	24	34	15	43	12	8.1	6.1	6.5
28	12	38	22	18	24	29	13	37	9.8	7.7	6.5	6.2
29	11	44	22	17	22	28	12	57	8.7	6.2	5.8	5.7
30	10	32	22	15	---	25	17	38	8.2	5.6	13	5.1
31	9.6	---	22	15	---	22	---	29	---	4.8	7.4	---
TOTAL	297.5	558.2	745	603	1114	809	513	827	379.7	234.3	155.9	194.0
MEAN	9.60	18.6	24.0	19.5	38.4	26.1	17.1	26.7	12.7	7.56	5.03	6.47
MAX	18	48	34	23	171	57	25	109	24	25	13	8.9
MIN	5.6	9.5	18	15	15	16	12	10	8.0	4.7	3.4	4.2
CFSM	.65	1.26	1.62	1.32	2.60	1.76	1.16	1.80	.86	.51	.34	.44
IN.	.75	1.40	1.87	1.52	2.80	2.03	1.29	2.08	.95	.59	.39	.49

CAL YR 1983 TOTAL 6104.2 MEAN 16.7 MAX 72 MIN 3.5 CFSM 1.13 IN 15.34
WTR YR 1984 TOTAL 6430.6 MEAN 17.6 MAX 171 MIN 3.4 CFSM 1.19 IN 16.16

04122200 WHITE RIVER NEAR WHITEHALL, MI

LOCATION.--Lat 43°27'51", long 86°13'57", in SE1/4 NW1/4 sec.4, T.12 N., R.16 W., Muskegon County, Hydrologic Unit 04060101, on right bank 30 ft downstream from bridge on Fruitvale Road, 6.3 mi downstream from North Branch, and 6.9 mi northeast of Whitehall.

DRAINAGE AREA.--406 mi^2.

PERIOD OF RECORD.--August 1957 to current year.

REVISED RECORDS.--WDR MI-83: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 594.1 ft National Geodetic Vertical Datum of 1929. Nov. 18, 1957, to Oct. 22, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation during low flow by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 435 ft^3/s, 14.55 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,400 ft^3/s Sept. 1, 1975, gage height, 7.46 ft; minimum, 163 ft^3/s Aug. 18, 19, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,530 ft^3/s Feb. 15, gage height, 5.38 ft; minimum, 248 ft^3/s Aug. 21; minimum gage height, 1.57 ft Aug. 21, 22, 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	394	384	678	560	490	550	611	492	639	389	272	467
2	376	392	641	560	490	534	589	510	581	368	266	410
3	370	405	611	570	490	523	572	494	535	352	263	476
4	402	413	585	570	490	518	559	512	496	340	263	521
5	450	402	563	580	490	502	547	557	468	332	281	500
6	445	393	548	580	490	494	544	596	447	350	325	450
7	426	387	543	580	500	490	541	549	434	357	314	407
8	426	384	530	560	500	460	533	504	425	350	307	392
9	439	381	507	540	500	485	516	480	416	340	303	386
10	440	378	508	530	500	502	499	467	422	340	294	407
11	419	379	499	520	500	520	484	454	427	389	282	452
12	418	378	514	510	530	530	473	443	412	401	273	474
13	438	379	551	500	598	560	477	450	402	377	267	427
14	470	379	596	490	880	565	485	497	388	348	258	387
15	494	378	609	480	1460	556	512	551	374	328	252	366
16	492	380	608	470	1180	600	563	529	364	315	261	354
17	472	380	596	470	1080	758	593	496	403	304	263	342
18	448	381	584	470	1050	871	602	464	502	298	263	330
19	422	385	580	470	1010	752	586	454	594	292	257	319
20	409	414	570	470	1060	689	565	448	653	286	254	313
21	398	459	560	470	1070	657	541	435	634	280	249	301
22	394	483	560	470	956	662	519	448	628	274	267	292
23	410	504	560	470	877	663	520	511	592	281	270	312
24	440	545	560	480	834	643	525	595	479	290	267	340
25	463	633	560	485	796	632	524	657	428	287	264	368
26	457	664	560	490	740	660	508	787	405	305	258	406
27	444	608	560	490	686	715	491	1180	415	320	262	424
28	428	591	560	490	636	714	474	975	431	320	291	390
29	416	603	560	490	590	685	456	824	429	303	295	365
30	403	673	560	490	---	661	461	785	413	289	409	347
31	391	---	560	490	---	635	---	718	---	280	514	---
TOTAL	13294	13515	17581	15795	21473	18786	15870	17862	14236	10085	8864	11725
MEAN	429	451	567	510	740	606	529	576	475	325	286	391
MAX	494	673	678	580	1460	871	611	1180	653	401	514	521
MIN	370	378	499	470	490	460	456	435	364	274	249	292
CFSM	1.06	1.11	1.40	1.26	1.82	1.49	1.30	1.42	1.17	.80	.70	.96
IN.	1.22	1.24	1.61	1.45	1.97	1.72	1.45	1.64	1.30	.92	.81	1.07

CAL YR 1983 TOTAL 178155 MEAN 488 MAX 1030 MIN 252 CFSM 1.20 IN 16.32
WTR YR 1984 TOTAL 179086 MEAN 489 MAX 1460 MIN 249 CFSM 1.20 IN 16.41

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI

LOCATION.--Lat 43°56'42", long 86°16'43", in NW1/4 NW1/4 sec.19, T.18 N., R.16 W., Mason County, Hydrologic Unit 04060101, on right bank 20 ft upstream from highway bridge at south edge of Scottville, 1.4 mi upstream from India Creek, and 5.6 mi downstream from Big South Branch.

DRAINAGE AREA.--681 mi^2.

PERIOD OF RECORD.--August 1939 to current year. Prior to October 1942, published as "at Custer".

REVISED RECORDS.--WSP 1437: 1941(M), 1943(M), 1949(M), 1950. WDR MI-81: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 597.66 ft National Geodetic Vertical Datum of 1929. Prior to June 12, 1943, nonrecording gage at bridge 4.5 mi upstream at different datum.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation at low flow. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--45 years, 670 ft^3/s, 13.36 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,970 ft^3/s July 1, 1969, gage height, 6.26 ft; minimum, 209 ft^3/s Dec. 11, 1962, discharge measurement; minimum daily, 310 ft^3/s Aug. 9, 10, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,920 ft^3/s Feb. 17, gage height, 4.74 ft; minimum, 433 ft^3/s Aug. 27, gage height, 1.87 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	726	671	1050	960	950	915	1010	832	1100	658	475	648
2	689	667	1040	960	960	839	970	881	1000	628	473	774
3	684	664	996	960	960	792	937	911	926	605	473	796
4	724	663	945	960	960	771	908	922	871	589	474	844
5	762	657	906	950	960	766	885	929	821	581	474	907
6	807	649	888	940	970	749	874	955	772	589	530	896
7	794	643	865	930	970	723	861	956	770	586	575	763
8	813	643	824	910	980	668	844	905	750	585	567	674
9	799	642	778	900	990	700	816	847	714	570	537	656
10	804	637	745	890	1000	729	785	803	721	571	513	737
11	804	632	766	870	1010	738	762	777	715	647	493	809
12	783	634	793	850	1030	695	744	751	720	700	477	810
13	784	635	817	840	1030	686	742	772	694	700	463	822
14	809	632	857	830	1410	754	762	844	669	631	455	750
15	836	631	882	810	1720	755	823	917	643	587	439	694
16	852	632	876	800	1770	862	894	969	623	559	439	660
17	832	634	855	790	1890	966	951	911	772	542	438	618
18	789	633	850	790	1830	1040	997	823	996	527	475	594
19	756	638	860	790	1840	1050	1000	789	1220	524	469	572
20	730	682	880	780	1840	1020	969	788	1410	513	459	554
21	708	739	890	790	1810	998	918	782	1490	508	440	538
22	701	774	900	790	1780	1010	871	757	1250	550	476	524
23	746	819	900	800	1640	1010	838	755	983	560	473	528
24	793	876	910	810	1480	1010	819	803	852	537	477	547
25	816	932	920	820	1370	1010	825	1000	772	518	458	681
26	809	978	930	820	1290	1030	816	1200	722	518	443	821
27	775	987	940	840	1200	1060	791	1370	727	522	509	856
28	749	974	940	870	1100	1080	772	1580	719	538	585	850
29	716	988	950	890	998	1080	749	1680	719	519	574	792
30	696	1030	950	910	---	1070	788	1420	692	497	689	719
31	681	---	950	940	---	1040	---	1220	---	482	655	---
TOTAL	23767	22016	27653	26790	37738	27616	25721	29849	25833	17641	15477	21434
MEAN	767	734	892	864	1301	891	857	963	861	569	499	714
MAX	852	1030	1050	960	1890	1080	1010	1680	1490	700	689	907
MIN	681	631	745	780	950	668	742	751	623	482	438	524
CFSM	1.13	1.08	1.31	1.27	1.91	1.31	1.26	1.41	1.26	.84	.73	1.05
IN.	1.30	1.20	1.51	1.46	2.06	1.51	1.41	1.63	1.41	.96	.85	1.17

CAL YR 1983 TOTAL 278506 MEAN 763 MAX 1330 MIN 409 CFSM 1.12 IN 15.21
WTR YR 1984 TOTAL 301535 MEAN 824 MAX 1890 MIN 438 CFSM 1.21 IN 16.47

04124000 MANISTEE RIVER NEAR SHERMAN, MI

LOCATION.--Lat 44°26'11", long 85°41'55", in NE1/4 NE1/4 sec.36, T.24 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on downstream side of bridge near right pier on State Highway 37, 250 ft upstream from Wheeler Creek, 0.9 mi north of Sherman, and at mile 60.8.

DRAINAGE AREA.--900 mi^2.

PERIOD OF RECORD.--July 1903 to May 1916, October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1004: 1936(M). WSP 1307: 1911, 1913-14(M), 1934(M), 1936(M), 1937, 1939-40(M). WSP 1437: 1911, 1913(M), 1937.

GAGE.--Nonrecording gage. Altitude of gage is 804 ft, from river profile map. Prior to Apr. 13, 1934, at various datums.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--64 years (water years 1904-15, 1931, 1934-84), 1,055 ft^3/s, 15.92 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,570 ft^3/s Mar. 25, 1913, gage height, 7.1 ft, from graph based on gage readings, datum then in use; minimum daily, 540 ft^3/s Feb. 21-23, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,620 ft^3/s Apr. 17, June 10; maximum gage height, 13.05 ft June 10; minimum discharge, 748 ft^3/s Aug. 21, gage height, 10.80 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	820	1060	1150	930	950	1090	1310	1180	946	897	802	860
2	840	1040	1110	930	950	1090	1300	1270	918	872	808	890
3	850	1040	1080	940	950	1110	1300	1350	914	872	805	932
4	970	1020	1070	940	950	1060	1300	1180	908	872	817	946
5	1080	1000	1040	940	950	1040	1350	1140	918	858	852	960
6	1150	1000	1020	940	950	1020	1480	1130	900	852	911	908
7	1180	1000	1020	940	960	946	1480	1110	928	850	897	876
8	1200	1000	1000	940	970	876	1440	1070	914	852	904	860
9	1150	1010	1000	940	990	876	1370	1040	900	841	890	858
10	1200	1010	1000	940	1000	1200	1310	1010	1590	834	858	880
11	1200	1009	1000	939	1020	1230	1280	1000	1540	1050	844	894
12	1150	984	1000	918	1080	1290	1260	984	1390	1180	830	886
13	1130	976	1000	918	1220	1330	1270	1130	1410	1300	808	883
14	1150	960	990	920	1440	1460	1360	1180	1350	1350	793	876
15	1200	984	980	920	1560	1500	1390	1140	1220	1210	778	880
16	1180	1000	990	910	1560	1360	1570	1090	1080	1040	775	880
17	1180	1010	990	910	1500	1170	1620	1050	1200	984	769	869
18	1150	1000	988	910	1440	1110	1560	1010	1360	946	766	844
19	1140	984	980	900	1500	1080	1520	976	1330	932	760	830
20	1120	1040	980	900	1540	1080	1500	968	1260	908	754	820
21	1100	1140	980	910	1560	1080	1380	953	1210	880	748	811
22	1050	1170	960	920	1560	1160	1280	936	1130	862	760	796
23	1020	1180	950	920	1520	1310	1250	932	1040	855	796	796
24	1150	1220	950	950	1480	1310	1210	918	980	848	790	894
25	1220	1220	940	960	1420	1320	1200	1020	942	827	784	911
26	1200	1200	940	960	1390	1360	1180	1290	914	808	763	925
27	1190	1140	940	960	1280	1360	1160	1310	914	811	754	880
28	1150	1100	940	960	1190	1360	1140	1240	918	810	754	869
29	1120	1160	930	940	1160	1370	1110	1140	918	811	754	848
30	1090	1180	930	940	---	1350	1120	1050	914	805	830	841
31	1060	---	930	950	---	1310	---	976	---	805	814	---
TOTAL	34390	31828	30778	28895	36040	37208	40000	33773	32856	28622	24968	26203
MEAN	1109	1061	993	932	1243	1200	1333	1089	1095	923	805	873
MAX	1220	1220	1150	960	1560	1500	1620	1350	1590	1350	911	960
MIN	820	960	930	900	950	876	1110	918	900	805	748	796
CFSM	1.23	1.18	1.10	1.04	1.38	1.33	1.48	1.21	1.22	1.03	.89	.97
IN.	1.42	1.32	1.27	1.19	1.49	1.54	1.65	1.40	1.36	1.18	1.03	1.08

CAL YR 1983 TOTAL 406739 MEAN 1114 MAX 2800 MIN 745 CFSM 1.24 IN 16.81
WTR YR 1984 TOTAL 385561 MEAN 1053 MAX 1620 MIN 748 CFSM 1.17 IN 15.94

04126000 MANISTEE RIVER NEAR MANISTEE, MI

LOCATION.--Lat 44°16'14", long 86°11'56", in NW1/4 NW1/4 sec.36, T.22 N., R.16 W., Manistee County, Hydrologic Unit 04060103, on right bank 6.4 mi northeast of Manistee, 7.8 mi upstream from Manistee Lake, and at mile 10.8.

DRAINAGE AREA.--1,780 mi^2, approximately.

PERIOD OF RECORD.--October 1951 to current year. Monthly discharge only for October, November, 1951, published in WSP 1727.

GAGE.--Water-stage recorder. Altitude of gage is 585 ft, from river-profile map.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated at all stages by Tippy hydroelectric powerplant 21 mi above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 2,003 ft^3/s, 15.28 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,120 ft^3/s Mar. 30, 1976, gage height, 8.37 ft; maximum gage height, 9.15 ft Feb. 12, 1955, backwater from ice; minimum daily discharge, 570 ft^3/s June 18, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,010 ft^3/s June 12, gage height, 7.71 ft; maximum gage height, 8.81 ft Jan. 6, backwater from ice; minimum discharge, 678 ft^3/s July 7, gage height, 2.49 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1750	1650	2870	1850	2000	2290	2140	2340	2620	1620	1490	1760
2	1840	1860	2400	2250	1900	1900	2030	2970	1940	1830	1690	1470
3	1750	1990	2000	2250	2300	1920	2340	3120	1420	1790	1840	2050
4	1900	1720	1550	2200	1800	1790	2530	2350	1740	2180	1410	2040
5	2470	2010	1550	2450	2000	1750	2310	2190	1950	2000	1290	1980
6	2090	1780	2140	2550	1750	1980	2670	2320	1920	1910	1680	1800
7	2260	1500	2000	2200	1800	2070	2720	2250	2270	1740	1860	2110
8	2090	1600	1850	1950	1900	1980	2630	2030	1980	1560	2060	1590
9	2440	1890	1700	2100	2000	1740	2000	2040	1940	1950	1870	1600
10	2710	2080	2010	2300	1800	1650	2760	2240	3040	1840	1810	1640
11	2510	1910	1450	1800	1700	1470	2130	2110	3650	1990	1620	1900
12	2710	1820	1400	2100	1820	1480	2590	1920	3960	1690	1260	1820
13	2230	1680	2470	1450	3030	1720	2530	1560	3540	2030	1460	1850
14	2410	1550	1600	2000	2750	1980	2290	2050	2650	1660	1830	1900
15	2590	2210	2150	1600	3030	1980	2010	2390	2350	1950	1690	1800
16	2380	1810	2200	1500	3400	2550	2750	2440	2360	2440	1490	1650
17	2630	1760	1700	1800	2900	2770	2770	2170	2570	1930	1890	1610
18	2650	2100	1450	2300	2800	1720	3060	2160	3170	1450	1620	1520
19	2360	2070	1700	1900	2550	1910	3110	2080	3410	1870	1310	1460
20	2270	1800	1600	1850	2900	2150	2900	1600	3310	2170	1330	1610
21	2210	1800	1250	1950	3370	2410	2500	1490	3160	1430	1570	1570
22	2060	2460	1500	1300	3400	2500	2180	1860	2080	1520	1610	1540
23	1990	2610	1900	980	2800	2610	1990	2070	2110	1450	1980	1350
24	2190	2490	2100	2000	2800	2310	2400	2240	1760	1660	1770	1710
25	2260	2420	1750	2400	3060	2190	2210	2430	1650	1950	1520	2290
26	2110	2400	1600	2100	2670	2340	2280	2900	1820	2440	1190	2680
27	2090	2240	1650	2150	2400	2770	2140	3090	2330	1790	1310	2290
28	2100	2120	1800	2250	2770	2710	1870	3120	1760	2040	1830	1910
29	2230	2460	2200	1650	2510	2630	1780	2890	1890	1100	1700	1530
30	1900	2050	1800	1500	---	2740	2070	2270	1890	1070	1540	1720
31	1940	---	2250	2200	---	2560	---	2300	---	1160	1690	---
TOTAL	69120	59840	57590	60880	71910	66570	71690	70990	72240	55210	50210	53750
MEAN	2230	1995	1858	1964	2480	2147	2390	2290	2408	1781	1620	1792
MAX	2710	2610	2870	2550	3400	2770	3110	3120	3960	2440	2060	2680
MIN	1750	1500	1250	980	1700	1470	1780	1490	1420	1070	1190	1350
CFSM	1.25	1.12	1.04	1.10	1.39	1.21	1.34	1.29	1.35	1.00	.91	1.01
IN.	1.44	1.25	1.20	1.27	1.50	1.39	1.50	1.48	1.51	1.15	1.05	1.12

CAL YR 1983 TOTAL 762080 MEAN 2088 MAX 3670 MIN 1160 CFSM 1.17 IN 15.93
WTR YR 1984 TOTAL 760000 MEAN 2077 MAX 3960 MIN 980 CFSM 1.17 IN 15.88

04126520 MANISTEE RIVER AT MANISTEE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°15'02", long 86°19'09", in SW1/4 SW1/4 sec.1, T.21 N., R.17 W., Manistee County, Hydrologic Unit 04060103, at upstream side of bridge on U.S. Highway 31, in Manistee, and 1.3 mi upstream from mouth.

DRAINAGE AREA.--2,000 mi^2, approximately.

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981.
WATER TEMPERATURES: November 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor March 1977 to September 1981.

REMARKS.--Bimonthly samples are collected as a cross-section sample at Washington Street bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,680 micromhos Nov. 18, 1974; minimum, 226 micromhos Apr. 22, 1980.
WATER TEMPERATURES: Maximum, 26.5°C July 8, 1981, minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV 29...	1400	1700	378	8.2	3.0	2.1	11.9	90	200	66
JAN 31...	1300	1750	411	7.4	.5	2.6	9.8	68	K12	K18
MAR 20...	1330	2290	385	7.6	2.5	6.5	11.6	87	51	K44
MAY 15...	1400	2740	408	7.7	12.5	2.7	9.3	89	--	K12
AUG 02...	1000	1470	445	8.3	22.5	1.4	7.6	89	180	140
SEP 11...	1330	2570	403	8.2	19.0	4.3	8.4	92	300	100

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE, DIS-SOLVED (MG/L AS CO2)
NOV 29...	180	28	49	13	12	13	.4	1.1	148	1.8
JAN 31...	180	26	51	13	11	12	.4	1.1	155	12
MAR 20...	170	32	48	12	9.8	11	.3	1.1	138	6.7
MAY 15...	180	43	52	11	10	11	.3	1.2	133	5.1
AUG 02...	190	39	55	12	11	11	.4	1.3	148	1.4
SEP 11...	180	33	52	12	9.0	10	.3	1.0	147	1.8

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV 29...	16	25	.10	8.2	227	210	.31	1040	.24
JAN 31...	15	32	<.10	8.9	231	230	.31	1090	.27
MAR 20...	14	31	.10	7.7	221	210	.30	1370	.29
MAY 15...	13	39	.10	6.3	228	210	.31	1690	.21
AUG 02...	15	43	.10	6.0	255	230	.35	1010	<.10
SEP 11...	14	30	.10	7.2	246	210	.33	1710	<.10

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 29...	.030	.70	.020	.06	.010	<.010	--	--	--
JAN 31...	.190	--	.040	.12	.020	<.010	1	4.7	100
MAR 20...	<.010	.30	--	--	.020	<.010	8	49	97
MAY 15...	.150	.70	<.010	--	<.010	<.010	8	59	95
AUG 02...	.050	.30	<.010	--	<.010	<.010	15	60	87
SEP 11...	.040	.40	.090	--	.060	.040	11	76	94

DATE	TIME	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
NOV 29...	1400	<10	1	26	<.5	<1	1	<3	3	51	1
MAR 20...	1330	<10	1	23	<.5	1	<1	<3	10	48	8
MAY 15...	1400	<10	<1	22	<1.0	<1	<1	<3	3	35	2
SEP 11...	1330	<10	<1	25	<.5	1	4	<3	2	15	1

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV 29...	9	4	<.1	<10	2	2	<1	190	<6	12
MAR 20...	6	9	<.1	<10	1	<1	<1	250	<6	19
MAY 15...	15	5	.2	<10	1	<1	<1	300	<6	6
SEP 11...	8	7	.1	<10	<1	<1	<1	270	<6	13

04127000 BOARDMAN RIVER NEAR MAYFIELD, MI

LOCATION.--Lat 44°38'18", long 85°31'10", in SE1/4 NE1/4 sec.21, T.26 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, on right bank 25 ft downstream from Brown's Bridge, 300 ft downstream from East Creek, 0.9 mi downstream from Brown's Bridge Dam, 1.0 mi northeast of Mayfield, and 9.6 mi southeast of Traverse City.

DRAINAGE AREA.--182 mi^2.

PERIOD OF RECORD.--June 1952 to current year.

REVISED RECORDS.--WDR MI-83: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 760 ft, by barometer.

REMARKS.--Records good. Flow regulated by hydroelectric powerplant 0.9 mi above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 192 ft^3/s, 14.33 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,220 ft^3/s Sept. 14, 1961, gage height, 6.90 ft; minimum, 30 ft^3/s Jan. 15, 1965, gage height, 2.53 ft; minimum daily, 47 ft^3/s Nov. 2, 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 515 ft^3/s June 10, gage height, 4.95 ft; minimum, 57 ft^3/s Feb. 3, June 8, gage height, 2.71 ft; minimum daily, 134 ft^3/s July 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	150	167	200	170	164	215	271	179	177	180	143	158
2	150	170	197	172	164	180	170	237	176	175	154	180
3	156	170	195	171	165	179	137	254	184	164	163	192
4	213	170	194	170	186	179	196	193	177	147	167	244
5	225	169	176	170	185	174	249	201	174	165	166	195
6	222	169	177	172	182	178	266	221	173	175	231	178
7	222	172	176	172	182	173	272	206	177	176	215	179
8	257	185	174	172	183	174	281	156	167	173	183	179
9	221	214	175	172	182	174	244	164	170	173	183	186
10	241	205	174	171	165	175	229	172	390	175	181	164
11	272	172	174	170	157	174	208	185	395	200	180	171
12	235	147	224	174	166	173	179	220	318	276	179	188
13	216	148	216	166	234	176	202	174	254	267	152	192
14	251	157	196	164	254	176	276	181	179	178	135	188
15	251	176	192	158	293	183	269	184	175	247	135	188
16	242	179	184	161	293	213	225	181	176	211	144	184
17	247	199	180	160	264	226	195	175	281	180	155	161
18	228	229	176	157	262	222	297	178	309	163	160	148
19	219	183	175	155	275	202	275	176	281	167	157	148
20	218	189	179	161	270	187	269	174	259	179	145	147
21	196	246	167	160	268	248	248	173	217	179	142	147
22	185	243	152	161	241	261	180	173	191	178	165	148
23	211	208	170	162	200	205	150	177	227	160	191	148
24	230	209	179	162	229	244	192	164	234	149	163	152
25	241	202	178	175	248	245	276	253	186	170	150	180
26	198	198	178	184	242	218	236	302	156	168	145	190
27	217	195	159	172	240	195	159	245	177	172	139	172
28	227	201	152	161	242	210	179	205	183	181	141	152
29	201	207	151	162	234	255	178	189	206	180	145	156
30	199	203	162	160	---	272	180	171	181	153	188	155
31	182	---	172	162	---	275	---	173	---	134	157	---
TOTAL	6723	5682	5554	5159	6370	6361	6688	6036	6550	5595	5054	5170
MEAN	217	189	179	166	220	205	223	195	218	180	163	172
MAX	272	246	224	184	293	275	297	302	395	276	231	244
MIN	150	147	151	155	157	173	137	156	156	134	135	147
CFSM	1.19	1.04	.98	.91	1.21	1.13	1.23	1.07	1.20	.99	.90	.95
IN.	1.37	1.16	1.14	1.05	1.30	1.30	1.37	1.23	1.34	1.14	1.03	1.06

CAL YR 1983 TOTAL 73298 MEAN 201 MAX 500 MIN 117 CFSM 1.10 IN 14.98
WTR YR 1984 TOTAL 70942 MEAN 194 MAX 395 MIN 134 CFSM 1.07 IN 14.50

04127800 JORDAN RIVER NEAR EAST JORDAN, MI

LOCATION.--Lat 45°06'09", long 85°05'53", in NW1/4 NW1/4 sec.7, T.31 N., R.6 W., Antrim County, Hydrologic Unit 04060105, on right bank 600 ft downstream from Webster Bridge, 4.2 mi south of East Jordan, and 4.5 mi upstream from mouth.

DRAINAGE AREA.--67.9 mi^2.

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1960-65. October 1966 to current year.

REVISED RECORDS.--WDR MI-83: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 610 ft, from topographic map. Nov. 19, 1959, to Sept. 30, 1966, nonrecording gage at present site and at site 600 ft upstream at same datum.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation during low flows by fish hatchery above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 187 ft^3/s, 37.40 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,360 ft^3/s July 19, 1975, gage height, 6.51 ft; minimum, 91 ft^3/s Mar. 8, 1982, result of freezeup.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct. 3	2000	*580	*5.11	Mar. 21	1800	420	4.66
Oct. 8	0500	474	4.85	Sept. 3	0100	468	4.83
Oct. 13	2400	416	4.64				

Minimum discharge, 138 ft^3/s Jan. 15, gage height, 2.98 ft, result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	164	173	184	175	152	180	213	224	169	161	170	156
2	164	175	180	176	152	179	216	197	172	158	170	294
3	366	178	177	179	152	175	219	186	213	157	162	290
4	303	173	176	179	152	175	226	185	172	164	161	178
5	194	173	177	180	152	175	250	180	180	159	158	165
6	216	173	180	180	152	175	284	179	180	162	181	161
7	226	173	179	174	152	175	224	179	177	162	179	163
8	368	173	175	180	155	175	212	179	169	157	198	163
9	206	172	177	175	160	175	213	180	164	158	202	172
10	185	173	176	175	175	175	210	178	259	164	165	172
11	180	175	177	167	181	172	204	176	190	301	161	165
12	179	171	197	165	196	172	203	175	172	179	159	172
13	275	169	192	165	314	170	224	192	171	164	156	224
14	366	172	185	165	316	170	247	189	168	159	155	174
15	260	184	186	162	260	193	224	177	166	172	156	166
16	202	181	181	160	240	194	225	175	163	163	158	164
17	190	176	179	160	237	179	214	179	194	179	155	161
18	184	172	180	158	239	179	228	179	261	167	157	159
19	179	179	172	155	321	177	212	173	191	160	157	158
20	177	198	172	152	284	197	199	172	171	158	153	158
21	176	219	170	152	226	342	189	171	166	156	152	157
22	182	187	170	152	220	277	184	172	163	155	159	157
23	225	183	170	152	258	210	188	175	162	155	160	166
24	189	187	170	152	258	201	189	170	164	156	154	169
25	202	177	172	152	214	212	185	272	162	154	152	188
26	200	174	172	152	197	214	181	241	160	156	151	188
27	182	174	172	152	189	213	180	186	181	168	152	171
28	179	187	172	152	185	214	196	178	177	162	153	173
29	175	193	175	152	174	212	180	176	167	156	152	179
30	174	188	175	152	---	206	204	175	166	155	169	168
31	173	---	175	152	---	208	---	171	---	154	155	---
TOTAL	6641	5382	5495	5054	6063	6071	6323	5741	5370	5131	5022	5331
MEAN	214	179	177	163	209	196	211	185	179	166	162	178
MAX	368	219	197	180	321	342	284	272	261	301	202	294
MIN	164	169	170	152	152	170	180	170	160	154	151	156
CFSM	3.15	2.64	2.61	2.40	3.08	2.89	3.11	2.73	2.64	2.45	2.39	2.62
IN.	3.64	2.95	3.01	2.77	3.32	3.33	3.46	3.15	2.94	2.81	2.75	2.92

CAL YR 1983 TOTAL 68320 MEAN 187 MAX 638 MIN 148 CFSM 2.75 IN 37.43
WTR YR 1984 TOTAL 67624 MEAN 185 MAX 368 MIN 151 CFSM 2.73 IN 37.05

04127918 PINE RIVER NEAR RUDYARD, MI

LOCATION.--Lat 46°11'09", long 84°35'52", in NW1/4 NE1/4 sec.30, T.44 N., R.2 W., Chippewa County, Hydrologic Unit 04070002, on right bank 15 ft upstream from county highway bridge, 3.2 mi south of Rudyard.

DRAINAGE AREA.--184 mi^2.

PERIOD OF RECORD.--April 1972 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft, from topographic map (nearest 10 ft). Prior to Aug. 4, 1972, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--12 years, 232 ft^3/s, 17.12 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,190 ft^3/s June 18, 1975, gage height, 17.62 ft; minimum, 53 ft^3/s July 29, 30, 1982, gage height, 1.83 ft.

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 50.3 ft^3/s was measured Aug. 6, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 12	1500	ice jam	*10.50	Sept. 13	0900	*1,690	8.53
June 27	0800	1,280	6.89	Sept. 25	0900	1,490	7.73

Minimum discharge, 63 ft^3/s Sept. 1, 2, gage height, 2.04 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	108	212	99	85	220	270	395	86	258	67	64
2	73	108	200	100	85	200	280	372	83	200	71	64
3	88	107	190	105	85	190	300	315	83	159	72	76
4	138	103	180	110	85	180	320	275	86	138	70	80
5	145	100	175	110	85	170	350	242	82	127	67	73
6	139	98	165	105	85	160	380	211	84	116	78	70
7	142	98	155	105	86	150	450	200	89	109	96	67
8	150	98	150	100	88	145	560	237	82	101	91	67
9	147	97	145	100	92	135	760	229	76	94	153	73
10	129	107	135	98	100	130	708	211	77	88	128	87
11	116	123	130	97	110	125	666	192	82	91	100	83
12	110	114	125	95	130	125	643	181	103	84	87	97
13	123	142	120	95	200	120	692	167	208	78	79	1330
14	345	117	115	94	230	120	738	152	181	75	72	815
15	370	107	115	94	240	120	682	139	137	78	71	475
16	298	115	110	94	250	115	708	125	109	81	78	335
17	260	112	105	93	280	115	619	117	100	111	82	256
18	224	131	105	93	310	115	499	122	120	222	75	210
19	196	118	105	92	350	120	424	119	124	207	73	176
20	163	458	100	90	400	120	376	111	102	203	72	149
21	150	748	100	90	390	125	331	107	92	150	69	126
22	141	508	100	90	380	140	292	104	80	114	70	110
23	137	438	100	90	370	160	262	102	77	101	71	101
24	130	785	98	90	370	175	250	101	74	91	70	99
25	124	512	98	90	330	190	239	102	75	81	66	1140
26	124	352	97	88	300	200	226	115	85	76	64	845
27	125	292	97	88	270	210	212	111	1100	73	64	525
28	123	228	96	86	260	220	202	102	955	72	66	362
29	118	234	96	86	240	230	192	96	570	69	67	288
30	115	222	97	85	---	240	280	92	360	67	69	241
31	111	---	98	85	---	250	---	90	---	65	68	---
TOTAL	4827	6880	3914	2937	6286	5015	12911	5234	5562	3579	2426	8484
MEAN	156	229	126	94.7	217	162	430	169	185	115	78.3	283
MAX	370	785	212	110	400	250	760	395	1100	258	153	1330
MIN	73	97	96	85	85	115	192	90	74	65	64	64
CFSM	.85	1.25	.69	.52	1.18	.88	2.34	.92	1.01	.63	.43	1.54
IN.	.98	1.39	.79	.59	1.27	1.01	2.61	1.06	1.12	.72	.49	1.72

CAL YR 1983 TOTAL 79025 MEAN 217 MAX 1690 MIN 60 CFSM 1.18 IN 15.98
WTR YR 1984 TOTAL 68055 MEAN 186 MAX 1330 MIN 64 CFSM 1.01 IN 13.76

04128000 STURGEON RIVER NEAR WOLVERINE, MI

LOCATION.--Lat 45°17'56", long 84°36'40", in SE1/4 NE1/4 sec.36, T.34 N., R.3 W., Cheboygan County, Hydrologic Unit 04070004, on left bank 1.8 mi north of Wolverine, 2.8 mi downstream from West Branch, and 9 mi upstream from mouth.

DRAINAGE AREA.--198 mi^2.

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

REVISED RECORDS.--WSP 1307: 1944(M), 1948(M). WSP 1727: 1951(M). WDR MI-83: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 740 ft, from topographic map. Prior to June 15, 1942, nonrecording gage at site 1.0 mi upstream, and June 16, 1942, to Sept. 30, 1958, at site 0.7 mi upstream at different datums.

REMARKS.--Records good except those for the winter period, which are fair. Prior to July 1975, intermittent regulation at low flows by ponds 2.4 mi above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 219 ft^3/s, 15.02 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft^3/s Sept. 29, 1972, gage height, 3.72 ft; maximum gage height, 4.48 ft Sept. 14, 1961; minimum discharge, 94 ft^3/s Jan. 19, 1971, result of freezeup; minimum daily, 113 ft^3/s Aug. 6, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 565 ft^3/s Oct. 14; maximum gage height, 2.73 ft Jan. 22, backwater from ice; minimum discharge, 114 ft^3/s Mar. 7, gage height, 1.31 ft, result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	214	241	253	229	220	235	281	298	215	191	220	183
2	214	238	245	230	220	223	289	301	208	187	234	323
3	344	237	239	235	223	217	300	281	243	184	204	469
4	500	233	234	236	222	217	310	263	217	188	196	346
5	395	231	234	236	220	218	364	247	226	180	186	251
6	370	232	236	236	220	213	437	236	223	192	247	231
7	369	235	235	235	220	181	377	243	228	197	265	222
8	524	229	240	230	220	221	333	239	212	185	255	227
9	412	228	238	230	220	220	325	237	199	181	318	232
10	307	226	225	230	219	220	323	233	333	185	243	238
11	282	230	225	230	222	220	324	225	329	301	209	241
12	273	223	238	230	236	221	316	223	241	286	199	235
13	365	217	235	230	334	222	359	229	225	205	192	374
14	516	219	234	230	368	220	469	248	214	192	187	291
15	471	237	240	230	306	224	444	228	207	196	182	240
16	343	254	235	225	283	235	492	221	200	196	186	224
17	304	244	230	222	280	219	424	213	256	202	186	213
18	290	230	230	220	289	216	398	237	279	204	185	203
19	272	237	189	220	388	211	364	221	258	189	188	199
20	261	285	200	215	413	225	335	214	220	181	184	204
21	256	293	222	215	332	360	300	215	207	175	178	189
22	256	266	225	215	307	371	283	214	198	171	182	183
23	375	252	225	215	345	288	280	217	192	174	196	186
24	324	269	225	215	369	270	282	210	200	171	179	191
25	286	252	225	220	303	277	275	274	203	167	176	210
26	300	241	222	220	269	278	262	344	197	174	174	232
27	275	236	222	220	250	277	255	268	209	199	174	217
28	263	248	222	220	242	277	255	234	228	184	177	204
29	250	276	222	220	238	272	244	221	207	173	179	212
30	242	263	225	220	---	265	254	223	202	171	213	201
31	241	---	227	220	---	271	---	220	---	166	203	---
TOTAL	10094	7302	7097	6979	7978	7584	9954	7477	6776	5947	6297	7171
MEAN	326	243	229	225	275	245	332	241	226	192	203	239
MAX	524	293	253	236	413	371	492	344	333	301	318	469
MIN	214	217	189	215	219	181	244	210	192	166	174	183
CFSM	1.65	1.23	1.16	1.14	1.39	1.24	1.68	1.22	1.14	.97	1.03	1.21
IN.	1.90	1.37	1.33	1.31	1.50	1.42	1.87	1.40	1.27	1.12	1.18	1.35

CAL YR 1983 TOTAL 89632 MEAN 246 MAX 802 MIN 154 CFSM 1.24 IN 16.84
WTR YR 1984 TOTAL 90656 MEAN 248 MAX 524 MIN 166 CFSM 1.25 IN 17.03

04129000 PIGEON RIVER NEAR VANDERBILT, MI

LOCATION.--Lat 45°10'15", long 84°26'18", in SE1/4 SW1/4 sec.9, T.32 N., R.1 W., Otsego County, Hydrologic Unit 04070004, on right bank at Pigeon River Headquarters, 11.1 mi east of Vanderbilt, and 26 mi upstream from Mullett Lake.

DRAINAGE AREA.--62.6 mi^2.

PERIOD OF RECORD.--September 1950 to current year.

REVISED RECORDS.--WDR MI-83: Drainage area.

GAGE.--Water stage recorder. Datum of gage is 886.24 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Prior to May 16, 1957, and since Apr. 22, 1958, occasional regulation by Lansing Club Dam, 3.5 mi above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--34 years, 77.9 ft^3/s, 16.90 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft^3/s May 15, 1957, gage height, 6.80 ft, from floodmark, from rating curve extended above 500 ft^3/s, result of failure of Lansing Club Dam; minimum, 13 ft^3/s Jan. 8, 1957.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 448 ft^3/s Sept. 3, gage height, 5.19 ft; minimum, 37 ft^3/s Jan. 10, gage height, 1.91 ft, result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	55	77	69	65	70	72	84	98	81	73	65	65
2	64	75	72	65	70	71	102	102	66	63	70	159
3	129	70	65	65	71	61	106	95	90	67	63	340
4	260	72	66	65	71	63	107	88	78	64	65	186
5	143	69	68	65	72	64	137	78	71	61	62	100
6	111	83	70	66	72	64	166	87	66	67	64	85
7	107	65	78	66	72	64	131	82	90	64	67	77
8	197	65	93	66	71	63	127	76	94	61	93	80
9	153	74	69	66	71	63	112	82	61	60	124	96
10	99	68	52	66	70	64	114	94	130	60	108	108
11	91	67	73	66	72	65	111	75	110	170	73	88
12	67	74	68	67	73	66	111	65	82	132	72	92
13	111	77	71	68	114	67	136	80	71	81	70	181
14	198	51	67	69	133	66	233	95	75	50	55	120
15	175	66	72	70	107	67	187	83	66	71	71	91
16	106	74	70	70	100	68	249	77	60	66	56	83
17	89	79	72	70	91	85	176	93	70	55	56	69
18	85	64	69	70	95	69	149	76	101	68	58	68
19	81	74	65	70	137	71	163	67	79	72	64	74
20	76	87	60	70	136	72	116	78	77	69	54	65
21	73	106	62	70	102	113	110	75	70	49	60	62
22	78	84	62	69	91	153	96	73	68	46	65	62
23	193	81	62	69	112	114	96	78	56	58	69	64
24	123	90	62	69	120	96	100	83	66	73	65	68
25	109	73	62	69	103	95	98	96	76	58	60	95
26	92	80	63	69	92	89	95	157	55	54	57	77
27	91	67	64	69	84	97	98	90	64	71	55	81
28	84	68	64	68	69	97	89	88	64	65	61	77
29	75	87	64	68	72	97	79	93	83	55	62	82
30	70	84	64	68	---	90	93	74	81	57	81	79
31	69	---	65	69	---	109	---	75	---	56	71	---
TOTAL	3454	2251	2083	2102	2613	2495	3771	2653	2301	2116	2116	2974
MEAN	111	75.0	67.2	67.8	90.1	80.5	126	85.6	76.7	68.3	68.3	99.1
MAX	260	106	93	70	137	153	249	157	130	170	124	340
MIN	55	51	52	65	69	61	79	65	55	46	54	62
CFSM	1.77	1.20	1.07	1.08	1.44	1.29	2.01	1.37	1.23	1.09	1.09	1.58
IN.	2.05	1.34	1.24	1.25	1.55	1.48	2.24	1.58	1.37	1.26	1.26	1.77

CAL YR 1983 TOTAL 30445 MEAN 83.4 MAX 459 MIN 45 CFSM 1.33 IN 18.09
WTR YR 1984 TOTAL 30929 MEAN 84.5 MAX 340 MIN 46 CFSM 1.35 IN 18.38

04130500 BLACK RIVER NEAR TOWER, MI

LOCATION.--Lat 45°23'33", long 84°20'00", in SE1/4 NE1/4 sec.29, T.35 N., R.1 E., Cheboygan County, Hydrologic Unit 04070005, on right bank 400 ft downstream from Kleber Dam, 1,000 ft upstream from Milligan Creek, 3.0 mi northwest of Tower, and 10.8 mi upstream from Black Lake.

DRAINAGE AREA.--311 mi^2.

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for October 1942, published in WSP 1307.

REVISED RECORDS.--WSP 1307: 1942. WDR MI-83: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 658.00 ft Stanley Engineering Co. datum. Prior to Aug. 1, 1949, at site 1 mi upstream at different datum.

REMARKS.--Records good. Flow regulated by hydroelectric powerplant 400 ft above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 271 ft^3/s, 11.83 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,340 ft^3/s Apr. 17, 1960, gage height, 7.13 ft; minimum, 0.60 ft^3/s Mar. 11, 1950; minimum daily, 4.0 ft^3/s Nov. 27, 1949.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 985 ft^3/s Apr. 17-19, gage height, 4.67 ft; minimum, 11 ft^3/s May 22, gage height, 1.19 ft; minimum daily, 142 ft^3/s Mar. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	218	251	330	266	213	297	402	304	307	191	150	240
2	220	227	367	260	216	302	420	385	289	180	204	353
3	257	307	255	249	211	303	410	383	248	175	215	509
4	342	281	228	255	264	260	419	377	248	189	253	509
5	507	296	352	278	208	288	434	381	276	180	231	610
6	460	285	309	265	211	282	562	383	252	176	246	644
7	546	274	265	230	212	250	705	278	285	185	274	577
8	546	270	184	228	212	164	705	278	299	188	348	419
9	582	249	192	221	218	142	688	286	275	222	501	387
10	605	221	212	227	225	164	609	275	299	178	488	330
11	576	282	284	228	250	211	529	306	375	189	408	433
12	530	258	280	242	252	205	512	250	406	258	425	497
13	434	258	320	232	347	200	512	282	412	266	398	501
14	446	336	376	233	366	203	570	268	410	245	219	488
15	546	300	368	227	436	284	639	285	241	225	221	427
16	569	316	253	228	511	278	812	296	191	218	223	488
17	628	289	209	223	512	232	908	286	283	193	209	414
18	629	317	194	229	529	201	985	250	333	211	216	340
19	527	322	199	229	624	273	939	250	409	215	220	258
20	327	363	178	179	655	290	827	250	305	228	183	258
21	310	426	184	220	693	424	706	223	293	224	169	253
22	330	388	183	176	684	470	597	255	244	161	180	221
23	364	403	255	217	576	515	524	271	209	197	210	205
24	525	386	267	223	553	512	509	281	214	188	200	222
25	542	407	248	203	584	499	496	312	207	189	199	228
26	542	388	304	202	556	377	413	346	196	178	184	238
27	521	364	244	224	509	386	415	479	173	192	186	237
28	440	411	217	228	424	492	438	409	220	186	167	264
29	387	251	248	224	297	361	392	409	234	182	215	231
30	384	287	240	216	---	415	401	302	225	182	215	233
31	377	---	245	213	---	419	---	286	---	169	214	---
TOTAL	14217	9413	7990	7075	11548	9699	17478	9626	8358	6160	7771	11014
MEAN	459	314	258	228	398	313	583	311	279	199	251	367
MAX	629	426	376	278	693	515	985	479	412	266	501	644
MIN	218	221	178	176	208	142	392	223	173	161	150	205
CFSM	1.48	1.01	.83	.73	1.28	1.01	1.88	1.00	.90	.64	.81	1.18
IN.	1.70	1.13	.96	.85	1.38	1.16	2.09	1.15	1.00	.74	.93	1.32

CAL YR 1983 TOTAL 118485 MEAN 325 MAX 1350 MIN 120 CFSM 1.05 IN 14.17
WTR YR 1984 TOTAL 120349 MEAN 329 MAX 985 MIN 142 CFSM 1.06 IN 14.40

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°38'02", long 84°28'52", in NW1/4 NE1/4 sec.6, T.37 N., R.1 W., Cheboygan County, Hydrologic Unit 04070004, at upstream side of bridge on Lincoln Avenue in Cheboygan, 1.75 mi upstream from mouth.

DRAINAGE AREA.--1,500 mi^2, approximately.

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURES: October 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor October 1976 to September 1981.

REMARKS.--Bimonthly samples are collected as a cross-section sample at Lincoln Ave. bridge. Water-discharge measurements are made at times of sampling. Flow regulated by dam 1,000 ft downstream.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1975-78, 1981): Maximum daily recorded, 900 micromhos Apr. 24, 25, 1975; minimum daily recorded, 140 micromhos Mar. 8, 1975.
WATER TEMPERATURES (water years 1976-78, 1981): Maximum, 27.0°C July 20, 1977, July 8, 12, 13, 1981; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV 03...	0930	1820	312	8.1	8.0	2.2	11.0	91	K10	K15
MAR 29...	0930	2200	310	7.7	3.5	2.4	13.8	105	K7	44
MAY 10...	0900	1840	312	7.9	10.0	1.4	11.2	100	K5	K12
JUL 24...	1100	E646	312	8.3	22.5	1.0	8.0	94	37	130
SEP 20...	1000	1730	307	8.3	17.5	1.6	8.9	95	K11	K19

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
NOV 03...	170	14	45	13	4.2	5	.1	.70	152	2.3
MAR 29...	160	10	44	12	3.8	5	.1	.80	150	5.8
MAY 10...	160	11	43	12	3.6	5	.1	.70	146	3.5
JUL 24...	150	7	41	12	3.7	5	.1	.70	145	1.4
SEP 20...	150	10	42	12	3.6	5	.1	.70	145	1.4

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV 03...	13	5.4	.20	8.1	184	180	.25	904	<.10
MAR 29...	12	5.4	.20	7.5	193	180	.26	1150	<.10
MAY 10...	11	5.0	.20	6.6	188	170	.26	934	<.10
JUL 24...	13	5.7	.10	5.7	193	170	.26	--	<.10
SEP 20...	12	5.2	.10	6.8	180	170	.24	841	<.10

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 03...	.030	.20	.020	.06	.020	<.010	7	34	96
MAR 29...	<.010	.70	.020	.06	.020	<.010	3	18	89
MAY 10...	.360	2.1	.030	.09	.010	<.010	4	20	100
JUL 24...	<.010	.40	.030	--	<.010	<.010	3	--	87
SEP 20...	<.010	.30	<.010	--	.010	.010	6	28	90

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV 03...	0930	10	1	19	.6	<1	<1	<3	3	9	3
MAR 29...	0930	<10	1	18	<.5	<1	<1	<3	3	15	2
MAY 10...	0900	<10	<1	17	<1	<1	<1	<3	3	8	2
SEP 20...	1000	<10	<1	18	<1	<1	4	<3	6	7	1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV 03...	20	<1	<.1	<10	<1	<1	<1	94	6	<3
MAR 29...	11	2	<.1	<10	1	<1	<1	91	<6	4
MAY 10...	<4	<1	<.1	<10	2	<1	<1	87	<6	5
SEP 20...	5	<1	<.1	<10	1	<1	<1	91	<6	<3

04135000 THUNDER BAY RIVER NEAR ALPENA, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°05'39", long 83°29'59", in SW1/4 SE1/4 sec.7, T.31 N., R.8 E., Alpena County, Hydrologic Unit 04070006, on left bank 1,000 ft downstream from Alpena Power Company Fourmile Dam, 2.5 mi upstream from Bagley Street in Alpena, and 6.0 mi upstream from mouth.

DRAINAGE AREA.--1,238 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional measurements made water years 1945-50. October 1979 to current year.

GAGE.--Two water-stage recorders. Altitude of gage on main (north) channel and secondary gage on (south) channel is 615 ft, from topographic map.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Flow regulated at all stages by hydroelectric plant 1,000 ft above station.

AVERAGE DISCHARGE.--5 years, 823 ft^3/s, 9.03 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 9,250 ft^3/s May 9, 1983; minimum daily, 33 ft^3/s Oct. 4, 1980, June 25, 1983.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 3,840 ft^3/s Apr. 20; minimum daily, 87 ft^3/s July 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	258	635	1220	720	560	2420	1380	713	1080	390	596	619
2	297	780	1230	720	580	2420	1380	971	855	708	570	743
3	945	968	160	720	500	2170	1400	1120	915	466	577	1190
4	963	916	160	660	270	969	1410	1020	806	254	426	1200
5	751	557	970	680	270	1110	1590	622	948	777	284	1320
6	730	575	970	720	460	1190	1690	695	906	891	663	1320
7	953	1000	1140	320	460	1130	2440	880	1000	450	671	1310
8	820	894	1100	320	520	1000	2540	767	815	378	657	1050
9	573	877	660	540	470	1010	2500	842	469	728	809	920
10	1010	912	330	540	560	825	2290	727	691	573	618	1110
11	1090	816	340	740	600	860	1780	851	856	772	527	1200
12	1130	523	940	640	600	1080	1640	475	1140	714	841	1170
13	1040	495	1050	760	1170	1120	1620	379	1110	782	696	1050
14	1110	687	1100	230	1170	1360	1610	646	1110	351	634	1040
15	1120	852	1200	230	1050	1410	1640	726	1010	400	665	947
16	1000	947	1150	610	1280	1470	2150	822	226	781	661	1020
17	910	874	660	610	1650	1050	2550	812	271	765	625	1050
18	1140	931	660	460	1800	1130	3510	831	827	730	468	1070
19	1120	703	680	600	2300	1390	3630	377	890	715	466	1040
20	1120	773	680	810	2200	1080	3840	419	940	771	585	730
21	897	1060	720	180	2200	1140	3170	729	978	410	579	699
22	832	1070	800	180	2700	1520	2380	717	1080	396	536	392
23	1020	1140	920	520	2800	1580	1800	668	598	737	573	415
24	929	1240	560	520	3050	1600	1600	660	403	764	556	681
25	1120	1220	560	580	2800	1780	1590	792	822	708	358	693
26	1120	1220	560	640	1550	1930	1590	850	761	474	284	752
27	1300	1220	740	430	1820	1690	1520	915	747	289	479	717
28	1390	1220	740	220	2230	1730	962	750	718	87	520	695
29	1260	1210	680	220	2390	1570	827	1040	693	123	622	404
30	1120	1210	710	630	---	1430	805	1100	390	426	573	342
31	1220	---	720	630	---	1390	---	1110	---	549	860	---
TOTAL	30288	27525	24110	16380	40010	43554	58834	24026	24055	17359	17979	26889
MEAN	977	918	778	528	1380	1405	1961	775	802	560	580	896
MAX	1390	1240	1230	810	3050	2420	3840	1120	1140	891	860	1320
MIN	258	495	160	180	270	825	805	377	226	87	284	342
CFSM	.79	.74	.63	.43	1.12	1.14	1.58	.63	.65	.45	.47	.72
IN.	.91	.83	.72	.49	1.20	1.31	1.77	.72	.72	.52	.54	.81

CAL YR 1983 TOTAL 421533 MEAN 1155 MAX 9250 MIN 33 CFSM .93 IN 12.67
WTR YR 1984 TOTAL 351009 MEAN 959 MAX 3840 MIN 87 CFSM .78 IN 10.55

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1979 to current year.
WATER TEMPERATURE: October 1979 to current year.

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

REMARKS.--In addition to the water-quality monitor, samples were collected by a local observer approximately twice per week, and daily during the period when the monitor was not operating. (The monitor did not operate Nov. 3 to Mar. 15; once-daily temperatures and specific conductances are reported for this period.) Bimonthly samples were collected near the gage; the March sample was collected at Bagley Street bridge, 2.5 mi downstream from gage. A water-discharge measurement was made at times of sampling. February 1979 to September 1979, samples were collected 6.9 mi downstream from gage (station number 04135020).

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 511 micromhos Jan. 2, 1982; minimum, 140 micromhos Nov. 2, 1981.
WATER TEMPERATURES: Maximum, 31.0°C July 11, 12, 1981; minimum, 0.0°C on many days during winter periods.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance of 120 micromhos was observed Dec. 19, 1981.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 502 micromhos June 24; minimum, 270 micromhos June 23.
WATER TEMPERATURES: Maximum, 28.5°C July 28, 29, Aug. 26; minimum, 0.0°C was observed on Jan. 18.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV 02...	1015	301	361	8.2	7.5	1.9	12.2	102	K2	44
JAN 18...	1030	599	401	7.6	.0	1.7	10.3	72	K5	K4
MAR 28...	1015	1490	284	7.3	1.5	4.0	12.4	89	26	310
MAY 09...	1100	1290	351	7.8	12.0	1.8	10.1	95	K2	K7
JUL 25...	1330	1280	335	8.3	24.0	2.0	7.8	94	K5	K10
SEP 19...	1030	1170	385	8.4	15.5	1.7	9.9	101	K19	K9

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
NOV 02...	190	24	52	15	5.5	6	.2	.90	168	2.0
JAN 18...	210	6	56	16	5.8	6	.2	.80	200	9.7
MAR 28...	140	13	41	9.8	3.3	5	.1	1.8	130	13
MAY 09...	180	12	51	13	4.7	5	.2	.90	169	5.2
JUL 25...	170	4	44	14	4.6	6	.2	.40	164	1.6
SEP 19...	200	12	55	14	4.6	5	.1	.90	183	1.4

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV 02...	22	7.0	.20	8.9	222	210	.30	180	<.10
JAN 18...	17	6.5	.20	10	245	230	.33	396	.12
MAR 28...	17	5.6	.10	5.9	187	160	.25	752	.27
MAY 09...	12	5.5	.20	4.3	221	190	.30	770	<.10
JUL 25...	10	4.8	.20	7.6	214	180	.29	740	<.10
SEP 19...	13	6.8	.10	9.1	239	210	.33	755	<.10

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 02...	.040	.40	.020	.06	.010	<.010	4	3.3	98
JAN 18...	.070	.30	.020	.06	<.010	<.010	8	13	100
MAR 28...	.210	.90	.020	.06	<.010	<.010	5	20	88
MAY 09...	.270	2.3	.010	.03	<.010	<.010	5	17	95
JUL 25...	<.010	1.0	.020	--	<.010	.010	4	14	87
SEP 19...	<.010	.70	<.010	--	<.010	<.010	7	22	94

DATE	TIME	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
NOV 02...	1015	<10	1	26	<.5	<1	<1	<3	1	54	2
MAR 28...	1015	<10	1	19	<.5	<1	<1	<3	1	66	1
MAY 09...	1100	<10	<1	25	<1	<1	<1	<3	4	41	1
SEP 19...	1030	<10	<1	26	<.5	<1	5	<3	4	58	1

DATE	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	VANA-DIUM, DIS-SOLVED (UG/L AS V) (01085)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
NOV 02...	13	6	<.1	<10	<1	<1	<1	100	<6	7
MAR 28...	10	10	<.1	<10	1	<1	<1	82	<6	13
MAY 09...	<4	3	.5	<10	3	<1	<1	110	<6	15
SEP 19...	6	4	<.1	<10	2	<1	<1	120	<6	14

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	418	339	362	371	357	366						
2	360	351	354	381	361	369						
3	381	350	353	---	---	---						
4	353	340	352	---	---	---						
5	366	351	352	---	---	---						
6	356	354	355	---	---	---						
7	378	354	358	---	---	---						
8	358	355	356	---	---	---						
9	362	358	361	---	---	---						
10	365	362	364	---	---	---						
11	397	345	368	---	---	---						
12	372	369	371	---	---	---						
13	376	371	374	---	---	---						
14	391	357	376	---	---	---						
15	374	365	372	---	---	---						
16	375	334	364	---	---	---						
17	379	367	369	---	---	---						
18	397	372	377	---	---	---						
19	402	355	383	---	---	---						
20	403	384	387	---	---	---						
21	385	380	382	---	---	---						
22	399	375	379	---	---	---						
23	376	367	372	---	---	---						
24	379	363	368	---	---	---						
25	377	363	365	---	---	---						
26	376	362	365	---	---	---						
27	371	359	364	---	---	---						
28	382	367	371	---	---	---						
29	389	348	371	---	---	---						
30	386	358	367	---	---	---						
31	400	362	368	---	---	---						
MONTH	418	334	367									

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1				---	---	---	306	302	304	339	337	338
2				---	---	---	314	305	310	344	339	342
3				---	---	---	319	314	317	345	342	343
4				---	---	---	318	308	312	345	340	343
5				---	---	---	309	306	308	357	343	349
6				---	---	---	309	306	307	362	352	357
7				---	---	---	308	305	307	357	344	348
8				---	---	---	306	301	304	361	341	351
9				---	---	---	303	299	301	370	343	356
10				---	---	---	304	301	302	369	333	345
11				---	---	---	308	301	304	355	323	334
12				---	---	---	310	302	307	343	319	330
13				---	---	---	305	302	304	354	328	339
14				---	---	---	314	306	310	363	330	343
15				407	401	403	319	314	315	351	326	336
16				400	394	396	321	318	320	350	322	333
17				406	388	396	322	320	322	343	317	326
18				388	384	386	322	318	320	342	311	320
19				384	373	379	318	311	315	376	315	342
20				379	369	374	313	311	312	407	330	357
21				375	327	362	315	311	313	335	274	302
22				362	358	360	314	312	313	362	276	307
23				361	330	347	313	311	312	340	271	298
24				331	290	306	316	313	315	386	326	348
25				296	288	291	320	316	318	414	351	373
26				299	284	290	322	320	321	379	363	373
27				292	289	290	328	323	325	370	362	366
28				293	290	291	336	329	333	381	362	369
29				296	293	295	338	334	336	376	356	363
30				302	298	300	344	336	339	362	353	358
31				303	301	302	---	---	---	364	355	359
MONTH							344	299	314	414	271	343

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	365	354	358	377	339	356	381	313	335	339	315	326
2	364	350	357	385	374	379	370	305	334	340	314	326
3	364	359	363	389	365	375	368	302	327	344	330	339
4	365	361	363	374	351	361	351	299	317	350	336	347
5	372	363	367	366	355	359	352	299	317	353	310	336
6	375	365	370	364	351	359	307	306	307	321	310	315
7	370	357	366	363	337	349	305	303	304	325	318	321
8	379	370	373	365	347	357	308	303	304	324	320	322
9	381	375	378	381	357	368	315	290	301	366	322	330
10	374	357	366	384	366	374	316	298	306	370	350	360
11	369	354	364	385	367	373	321	302	310	369	350	355
12	361	350	357	382	369	376	327	295	314	381	360	366
13	356	348	351	380	343	365	328	307	317	379	361	369
14	354	347	351	350	331	342	341	312	321	380	362	371
15	352	347	350	359	336	345	361	309	332	375	369	372
16	369	355	363	363	322	345	364	328	344	382	375	378
17	373	353	361	368	337	355	359	318	335	384	379	382
18	369	355	359	370	345	358	356	325	335	390	383	386
19	367	359	362	373	343	361	340	312	332	392	379	385
20	366	340	358	372	353	362	340	325	333	405	365	382
21	345	307	325	359	328	348	361	314	336	394	367	381
22	310	295	306	355	341	349	351	329	337	391	368	377
23	406	270	323	359	345	351	348	335	339	399	368	378
24	502	296	452	366	342	351	349	333	337	377	366	373
25	361	307	325	337	332	335	353	320	339	390	369	373
26	348	338	343	343	316	329	351	329	338	382	370	372
27	352	344	349	355	311	339	359	310	339	380	347	366
28	354	338	346	351	305	325	355	319	332	374	359	363
29	344	334	339	337	285	313	346	303	337	381	351	364
30	347	326	334	306	288	298	344	321	332	380	348	363
31	---	---	---	351	285	299	342	316	330	---	---	---
MONTH	502	270	356	389	285	350	381	290	326	405	310	359

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1		---	375	412	409	336						
2		---	378	412	408	368						
3		365	379	404	396	380						
4		359	388	402	403	---						
5		357	388	408	407	---						
6		366	392	400	380	---						
7		366	388	398	406	398						
8		359	393	394	407	388						
9		368	394	397	416	400						
10		364	398	399	407	390						
11		362	388	402	407	408						
12		366	396	---	417	409						
13		377	393	400	406	408						
14		369	388	402	407	408						
15		371	389	401	407	---						
16		359	385	399	396	---						
17		369	388	403	363	---						
18		374	380	408	374	---						
19		378	381	399	363	---						
20		368	389	407	374	---						
21		376	392	396	361	---						
22		375	393	410	352	---						
23		384	400	396	339	---						
24		382	405	408	332	---						
25		387	412	420	336	---						
26		385	414	396	319	---						
27		371	410	418	330	---						
28		386	412	420	333	---						
29		377	410	407	342	---						
30		377	408	407	---	---						
31		---	414	408	---	---						

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	21.0	14.0	17.0	9.0	6.5	7.0						
2	17.0	14.0	16.0	10.0	7.0	8.0						
3	17.5	17.0	17.0	---	---	---						
4	17.5	17.0	17.5	---	---	---						
5	17.0	16.0	16.5	---	---	---						
6	16.0	15.5	15.5	---	---	---						
7	15.0	14.0	14.5	---	---	---						
8	14.0	13.0	13.5	---	---	---						
9	13.0	12.5	13.0	---	---	---						
10	12.5	12.0	12.0	---	---	---						
11	12.0	11.5	12.0	---	---	---						
12	12.5	12.0	12.0	---	---	---						
13	12.5	12.0	12.0	---	---	---						
14	12.0	10.5	11.5	---	---	---						
15	10.5	9.5	10.0	---	---	---						
16	10.0	9.5	10.0	---	---	---						
17	10.5	10.0	10.0	---	---	---						
18	10.0	9.5	10.0	---	---	---						
19	9.5	9.5	9.5	---	---	---						
20	9.5	8.5	9.0	---	---	---						
21	9.0	8.5	8.5	---	---	---						
22	8.5	8.0	8.5	---	---	---						
23	8.0	8.0	8.0	---	---	---						
24	8.0	7.5	7.5	---	---	---						
25	8.0	7.5	7.5	---	---	---						
26	8.0	7.5	7.5	---	---	---						
27	7.5	7.0	7.0	---	---	---						
28	8.0	7.0	7.5	---	---	---						
29	7.5	7.0	7.5	---	---	---						
30	7.5	6.5	7.0	---	---	---						
31	7.0	6.5	6.5	---	---	---						
MONTH	21.0	6.5	11.0									

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1				---	---	---	3.0	2.5	2.5	13.0	11.5	12.0
2				---	---	---	4.0	3.0	3.5	11.0	9.5	10.5
3				---	---	---	4.5	3.5	4.0	9.5	9.5	9.5
4				---	---	---	5.0	4.0	4.5	10.5	9.0	9.5
5				---	---	---	5.0	4.0	4.5	15.5	8.5	11.0
6				---	---	---	4.0	3.5	4.0	15.0	6.5	10.0
7				---	---	---	4.0	3.0	3.5	11.5	10.5	11.0
8				---	---	---	4.5	3.5	4.0	12.0	8.5	10.5
9				---	---	---	5.5	4.5	5.0	12.0	7.5	10.0
10				---	---	---	6.0	5.0	5.5	12.0	6.5	10.0
11				---	---	---	7.5	6.0	6.5	13.0	9.0	11.5
12				---	---	---	8.0	7.0	7.5	17.0	9.0	12.0
13				---	---	---	9.0	8.0	8.5	15.0	8.0	11.0
14				---	---	---	9.5	8.5	9.0	12.5	6.5	10.0
15				1.0	1.0	1.0	9.5	9.0	9.5	13.0	8.0	10.5
16				1.0	.5	.5	9.0	8.5	9.0	13.0	7.5	11.0
17				2.5	.5	1.0	8.5	6.5	7.5	12.5	10.0	11.5
18				1.5	.5	1.0	6.5	5.5	6.0	14.0	11.0	12.5
19				1.0	1.0	1.0	6.5	5.5	6.0	21.0	11.0	15.5
20				1.0	.5	1.0	8.0	6.5	7.0	18.5	12.5	15.0
21				1.5	1.0	1.0	8.5	7.5	8.0	16.5	12.5	15.0
22				1.0	1.0	1.0	9.0	8.5	9.0	17.0	15.0	16.0
23				1.0	.5	1.0	8.5	8.0	8.5	18.0	14.5	16.5
24				1.0	.5	1.0	8.5	8.0	8.0	18.0	12.5	16.0
25				1.0	.5	1.0	9.5	8.0	8.5	17.5	15.0	16.5
26				2.0	.5	1.0	10.5	9.0	9.5	17.0	16.5	17.0
27				1.5	1.0	1.0	12.0	10.0	11.0	17.0	16.0	16.5
28				1.5	1.0	1.5	14.5	12.0	13.0	16.0	14.5	16.0
29				2.0	1.0	1.5	14.5	13.5	14.0	15.5	14.0	15.0
30				2.0	1.5	2.0	14.0	13.0	13.5	14.0	13.0	13.5
31				2.5	2.0	2.0	---	---	---	13.5	12.5	13.0
MONTH							14.5	2.5	7.5	21.0	6.5	13.0

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	14.0	12.5	13.5	21.5	20.0	21.0	24.5	24.0	24.5	22.5	22.0	22.0
2	15.0	14.0	14.5	22.5	21.0	21.5	24.5	24.0	24.0	22.0	20.5	21.0
3	16.5	14.5	15.5	23.5	21.0	22.5	24.5	24.0	24.0	20.5	19.0	20.0
4	18.0	16.0	17.0	27.5	20.0	23.0	25.0	24.0	24.5	19.0	18.0	18.5
5	19.0	17.5	18.0	24.5	21.0	23.5	25.5	23.0	24.5	18.0	17.0	17.5
6	20.5	19.0	19.5	24.5	22.5	23.5	26.0	25.5	25.5	17.0	16.0	16.5
7	22.0	20.5	21.5	22.5	21.5	21.5	26.5	25.5	26.0	16.5	16.0	16.0
8	23.5	22.0	23.0	26.0	20.5	22.0	26.5	26.0	26.0	16.5	15.5	16.0
9	23.5	23.0	23.0	21.5	21.0	21.0	27.5	26.0	26.5	17.0	16.0	16.5
10	23.0	21.5	22.5	21.5	21.0	21.0	27.0	26.5	26.5	17.5	17.0	17.0
11	22.0	20.5	21.5	22.5	21.0	21.5	27.0	26.5	26.5	18.0	17.0	17.5
12	22.0	20.5	21.5	23.5	21.5	22.5	26.5	25.5	26.0	18.0	18.0	18.0
13	22.0	21.5	21.5	24.0	22.5	23.5	26.0	25.5	25.5	18.5	18.0	18.0
14	21.5	20.0	21.0	25.0	23.5	24.5	26.5	25.5	26.0	18.0	17.0	17.5
15	20.5	16.5	19.5	26.0	24.5	25.5	26.5	25.5	26.0	17.5	17.0	17.0
16	23.5	16.5	19.5	25.5	24.5	25.0	26.0	25.5	26.0	16.5	16.0	16.5
17	22.5	17.5	19.5	24.5	23.5	24.0	26.0	25.5	25.5	16.0	15.0	16.0
18	20.5	19.0	20.0	24.0	23.0	23.5	25.5	25.0	25.0	16.0	15.0	15.5
19	21.5	20.0	20.5	23.5	22.5	23.0	25.5	24.5	25.0	16.5	15.0	15.5
20	21.5	20.5	21.0	23.5	22.5	2.0	25.0	24.0	24.5	17.0	15.0	16.5
21	22.0	20.5	21.5	24.0	23.0	23.5	25.0	24.0	24.5	17.0	16.0	16.5
22	22.5	21.0	22.0	24.0	23.0	23.5	25.0	24.0	24.5	20.5	16.0	17.0
23	22.5	21.5	22.0	25.5	24.0	24.5	24.0	23.5	24.0	18.0	16.0	17.0
24	22.0	21.0	21.5	25.5	24.0	24.5	23.5	22.5	23.0	17.5	17.5	17.5
25	21.0	20.5	21.0	25.0	23.5	24.5	23.0	19.5	22.0	18.0	17.5	18.0
26	21.0	19.5	20.5	24.5	21.5	23.5	28.5	19.5	23.5	17.5	16.0	17.0
27	21.0	20.0	20.5	26.0	20.5	22.5	23.0	20.5	22.5	16.5	15.5	16.0
28	20.5	19.5	20.0	28.5	20.0	23.5	23.5	21.5	22.5	15.5	14.5	15.0
29	20.0	19.0	19.5	28.5	19.5	23.5	23.5	22.0	23.0	17.5	14.0	14.5
30	21.0	19.0	20.0	25.0	20.0	23.0	23.5	20.5	23.0	14.0	10.5	13.0
31	---	---	---	25.0	24.5	24.5	23.0	22.0	22.5	---	---	---
MONTH	23.5	12.5	20.0	28.5	19.5	22.5	28.5	19.5	24.5	22.5	10.5	17.0

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1		---	1.5	.5	1.0	1.0						
2		---	1.5	1.0	1.0	1.0						
3		7.5	1.0	1.0	1.0	1.0						
4		6.5	1.0	1.0	1.0	---						
5		6.0	1.0	1.0	1.0	---						
6		6.0	1.5	1.0	1.0	---						
7		6.0	1.0	2.0	1.0	2.0						
8		6.0	1.0	1.0	1.0	1.5						
9		6.5	1.0	1.0	1.0	1.5						
10		7.0	1.5	1.0	1.0	1.0						
11		6.0	1.0	1.0	1.0	1.5						
12		5.5	1.0	1.0	1.0	1.5						
13		5.0	1.0	1.0	1.0	1.5						
14		4.5	1.0	.5	1.0	1.5						
15		3.5	1.0	.5	1.0	---						
16		4.5	1.0	.5	1.0	---						
17		4.5	1.0	.5	1.0	---						
18		3.0	.5	.5	1.0	---						
19		2.5	.5	.5	1.0	---						
20		3.0	.5	.5	1.0	---						
21		3.0	.5	.5	1.0	---						
22		4.0	.5	1.0	1.0	---						
23		4.0	1.0	1.0	1.0	---						
24		4.5	.5	1.0	1.0	---						
25		3.5	.5	1.0	1.0	---						
26		3.0	.5	.5	1.0	---						
27		3.0	1.0	1.0	1.0	---						
28		3.0	1.0	1.0	1.0	---						
29		2.5	1.0	1.0	1.0	---						
30		1.5	1.0	1.0	---	---						
31		---	.5	1.0	---	---						

04135500 AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°39'35", long 84°42'45", in SE1/4 SE1/4 sec. 7, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007, on right bank 65 ft upstream from bridge on Interstate Highway 75 (Business Loop) in Grayling, 0.7 mi upstream from East Branch, and 114 mi upstream from mouth.

DRAINAGE AREA.--110 mi^2.

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307. Prior to October 1954, published as Middle Branch Au Sable River at Grayling.

GAGE.--Water-stage recorder above steel-crested dam. Datum of gage is 1,123.49 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Prior to Dec. 31, 1952, diurnal fluctuation caused by powerplant 2.5 mi above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 74.4 ft^3/s, 9.18 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 274 ft^3/s June 2, 1943, gage height, 3.00 ft; minimum, 28 ft^3/s Apr. 21, 1946, gage height, 0.80 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 170 ft^3/s July 12, gage height, 2.22 ft; minimum, 58 ft^3/s Aug. 21, 22, gage height, 1.22 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	63	74	82	71	66	77	93	81	78	72	63	74
2	62	74	80	72	66	81	94	83	76	70	64	85
3	64	75	77	72	68	78	96	83	77	68	65	107
4	76	76	76	73	68	76	97	82	77	68	67	113
5	85	75	76	74	68	79	104	81	76	67	65	99
6	84	74	75	74	67	78	113	79	75	67	67	84
7	81	74	75	71	65	71	117	77	76	66	71	77
8	94	74	71	70	65	69	113	76	75	66	76	77
9	105	73	69	71	66	71	108	74	73	65	78	84
10	100	73	74	71	68	71	105	74	81	69	75	87
11	89	74	75	69	69	71	102	74	111	136	72	86
12	82	76	77	69	74	69	97	73	122	167	70	81
13	87	76	78	69	87	71	100	74	109	151	67	82
14	108	75	79	70	104	72	111	79	97	116	65	83
15	122	77	79	68	103	75	123	81	88	96	64	82
16	123	78	78	67	99	84	126	80	80	88	62	78
17	111	79	75	68	100	87	120	77	82	85	61	75
18	99	78	70	68	99	88	114	76	110	84	60	72
19	90	78	66	67	105	86	109	75	120	82	60	73
20	83	82	68	66	113	84	104	73	113	78	60	73
21	79	89	70	66	113	92	99	72	99	75	59	74
22	80	92	70	65	105	105	93	73	88	72	62	74
23	85	92	71	66	102	106	92	74	82	69	65	73
24	93	93	71	66	106	101	92	73	78	67	65	72
25	94	90	69	66	107	97	92	83	76	66	63	73
26	89	87	68	67	102	95	89	102	74	65	62	76
27	85	83	70	67	94	94	87	106	74	65	61	77
28	81	82	71	67	89	94	84	97	77	71	63	75
29	80	83	71	67	80	95	80	89	76	67	74	73
30	78	83	70	67	---	93	80	84	74	65	82	71
31	76	---	70	65	---	92	---	80	---	63	80	---
TOTAL	2728	2389	2271	2129	2518	2602	3034	2485	2594	2506	2068	2410
MEAN	88.0	79.6	73.3	68.7	86.8	83.9	101	80.2	86.5	80.8	66.7	80.3
MAX	123	93	82	74	113	106	126	106	122	167	82	113
MIN	62	73	66	65	65	69	80	72	73	63	59	71
CFSM	.80	.72	.67	.63	.79	.76	.92	.73	.79	.74	.61	.73
IN.	.92	.81	.77	.72	.85	.88	1.03	.84	.88	.85	.70	.82

CAL YR 1983 TOTAL 27910 MEAN 76.5 MAX 195 MIN 52 CFSM .70 IN 9.44
WTR YR 1984 TOTAL 29734 MEAN 81.2 MAX 167 MIN 59 CFSM .74 IN 10.06

04135600 EAST BRANCH AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°40'08", long 84°42'20", in NW1/4 NW1/4 sec.8, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007,on right bank at south boundary of Michigan Department of Natural Resources field office in Grayling and 0.4 mi upstream from mouth.

DRAINAGE AREA.--76.0 mi^2.

PERIOD OF RECORD.--April 1958 to September 1984 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 1,110 ft, from topographic map. Prior to Sept. 30, 1958, nonrecording gage at site 10 ft downstream at present datum.

REMARKS.--Records fair except those for the winter period, which are poor. Occasional regulation by Michigan Department of Natural Resources ponds above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years, 44.2 ft^3/s, 7.90 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 207 ft^3/s Mar. 28, 1976, gage height, 5.24 ft; minimum, 7.0 ft^3/s Mar. 27, 1965, result of freezeup; minimum daily, 16 ft^3/s Aug. 20, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 158 ft^3/s July 11, gage height, 5.11 ft; minimum, 29 ft^3/s Jan. 7, result of freezeup; minimum gage height, 3.17 ft Aug. 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	48	56	44	40	61	67	66	46	44	44	41
2	34	48	54	44	40	58	69	65	46	43	45	58
3	47	49	53	44	39	54	70	54	49	42	46	64
4	59	49	53	45	40	53	71	48	47	43	45	57
5	56	48	52	46	40	51	77	47	47	42	44	50
6	54	48	52	45	37	48	83	46	45	42	46	46
7	53	47	51	36	38	47	82	45	48	42	47	48
8	68	47	41	43	38	47	78	45	47	41	52	44
9	65	47	54	42	39	47	76	45	45	41	52	53
10	59	46	49	42	38	46	74	44	63	46	49	54
11	53	46	49	41	40	45	72	45	69	132	47	50
12	52	47	51	42	44	45	70	43	65	117	44	49
13	64	45	53	42	57	42	77	46	62	95	43	54
14	74	45	52	41	61	44	88	48	56	74	42	50
15	76	46	51	41	60	47	97	46	52	67	41	48
16	70	48	51	41	58	53	95	45	49	62	40	44
17	64	48	48	40	57	48	93	45	58	60	39	42
18	57	47	40	40	58	49	88	44	74	57	40	40
19	54	48	41	40	65	45	85	44	73	56	39	39
20	53	54	42	40	69	47	81	43	66	53	38	38
21	51	60	42	40	67	64	75	42	58	52	38	38
22	52	59	42	40	65	70	70	44	53	50	41	38
23	61	58	42	40	68	63	70	46	51	48	42	39
24	62	62	42	40	71	59	69	47	49	48	40	40
25	60	61	42	40	70	59	68	63	47	47	37	44
26	57	58	42	40	68	60	66	64	46	46	37	44
27	54	54	42	40	64	61	66	60	48	46	36	42
28	53	56	43	40	64	63	64	55	48	46	46	41
29	51	58	43	40	56	64	61	51	47	46	44	41
30	49	58	43	40	---	64	65	50	46	44	48	40
31	49	---	43	40	---	65	---	48	---	43	43	---
TOTAL	1745	1535	1459	1279	1551	1669	2267	1524	1600	1715	1335	1376
MEAN	56.3	51.2	47.1	41.3	53.5	53.8	75.6	49.2	53.3	55.3	43.1	45.9
MAX	76	62	56	46	71	70	97	66	74	132	52	64
MIN	34	45	40	36	37	42	61	42	45	41	36	38
CFSM	.74	.67	.62	.54	.70	.71	1.00	.65	.70	.73	.57	.60
IN.	.85	.75	.71	.63	.76	.82	1.11	.75	.78	.84	.65	.67

CAL YR 1983 TOTAL 17968 MEAN 49.2 MAX 133 MIN 28 CFSM .65 IN 8.79
WTR YR 1984 TOTAL 19055 MEAN 52.1 MAX 132 MIN 34 CFSM .69 IN 9.33

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI

LOCATION.--Lat 44°36'53", long 84°27'20", in SE1/4 SE1/4 sec.29, T.26 N., R.1 W., Crawford County, Hydrologic Unit 04070007, on right bank 10 ft upstream from Smith Bridge, 400 ft downstream from bridge on State Highway 72, 4.6 mi upstream from mouth, and 9.1 mi west of Luzerne.

DRAINAGE AREA.--401 mi^2.

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1951-66. October 1966 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,070 ft, from topographic map. Apr. 19, 1951, to Nov. 14, 1966, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 221 ft^3/s, 7.48 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,120 ft^3/s Mar. 28, 1976, gage height, 7.30 ft; minimum, 78 ft^3/s Feb. 12, 1981, gage height, 3.98 ft, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 431 ft^3/s Apr. 18, gage height, 5.44 ft; maximum gage height, 6.25 ft Jan. 21, backwater from ice; minimum discharge, 123 ft^3/s Aug. 21, 22, gage height, 4.29 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	198	268	256	198	171	258	307	301	230	156	137	152
2	192	262	243	193	168	239	311	303	217	150	141	187
3	199	255	231	192	170	228	312	296	222	147	184	202
4	231	249	227	194	171	221	314	292	217	145	179	199
5	232	245	239	194	171	220	325	284	215	141	161	183
6	235	242	243	194	168	215	350	275	212	138	161	172
7	236	238	232	192	173	206	354	266	205	138	162	163
8	271	237	222	193	172	205	354	258	196	137	155	161
9	267	236	205	194	172	200	347	251	191	135	154	186
10	257	235	211	188	171	195	336	242	200	135	147	189
11	251	234	221	190	176	192	324	234	196	260	142	192
12	247	229	226	190	183	188	318	216	191	277	138	184
13	273	225	224	190	213	182	326	213	201	286	135	190
14	317	222	227	186	246	181	346	231	194	345	131	181
15	322	222	229	188	251	192	374	229	186	361	129	175
16	327	225	227	188	265	214	407	225	178	322	128	168
17	328	225	220	186	286	208	422	216	187	275	126	161
18	316	223	210	185	301	211	428	207	241	239	126	156
19	299	226	210	186	333	204	416	201	238	214	127	153
20	286	244	202	182	356	207	399	194	224	197	126	151
21	274	262	202	182	356	264	376	187	212	186	124	147
22	274	262	202	180	347	293	356	200	196	175	133	146
23	321	267	201	180	354	289	348	229	182	164	136	144
24	324	284	201	180	362	312	344	230	176	157	133	147
25	326	281	201	178	355	318	336	302	170	152	129	155
26	330	273	200	176	333	323	331	351	165	147	125	163
27	320	268	200	174	309	314	326	343	175	146	126	165
28	306	267	200	170	293	309	320	329	179	144	132	159
29	294	269	197	171	257	308	306	311	175	141	136	160
30	283	265	200	169	---	305	302	282	165	137	168	159
31	273	---	200	168	---	306	---	251	---	135	160	---
TOTAL	8609	7440	6709	5731	7283	7507	10415	7949	5936	5882	4391	5050
MEAN	278	248	216	185	251	242	347	256	198	190	142	168
MAX	330	284	256	198	362	323	428	351	241	361	184	202
MIN	192	222	197	168	168	181	302	187	165	135	124	144
CFSM	.69	.62	.54	.46	.63	.60	.87	.64	.49	.47	.35	.42
IN.	.80	.69	.62	.53	.68	.70	.97	.74	.55	.55	.41	.47

CAL YR 1983 TOTAL 90198 MEAN 247 MAX 542 MIN 123 CFSM .62 IN 8.37
WTR YR 1984 TOTAL 82902 MEAN 227 MAX 428 MIN 124 CFSM .57 IN 7.69

04136500 AU SABLE RIVER AT MIO, MI

LOCATION.--Lat 44°39'36", long 84°07'52", in NW1/4 sec.7, T.26 N., R.3 E., Oscoda County, Hydrologic Unit 04070007, on right bank 150 ft upstream from bridge on State Highway 33 in Mio, 500 ft downstream from Mio hydroelectric plant, 9.5 mi downstream from Big Creek, and 73.0 mi upstream from mouth.

DRAINAGE AREA.--1,100 mi^2, approximately.

PERIOD OF RECORD.--July 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 929.60 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated at all stages by hydroelectric plant 500 ft above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 986 ft^3/s, 12.17 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,170 ft^3/s Mar. 28, 1976, gage height, 6.14 ft; minimum, 7.0 ft^3/s Aug. 4, 1977, gage height, -0.09 ft; minimum daily , 21 ft^3/s Aug. 9, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,630 ft^3/s July 11, gage height, 4.97 ft; minimum, 32 ft^3/s Jan. 10, Mar. 13, gage height, 0.27 ft; minimum daily, 647 ft^3/s Dec. 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	861	978	1080	963	838	1030	1230	1120	1030	875	777	838
2	834	993	1060	954	934	1050	1260	1170	974	834	806	952
3	847	1020	1040	996	922	1020	1230	1140	989	815	807	1220
4	995	1030	1010	1020	908	984	1240	1130	992	815	1020	1180
5	1110	996	984	1010	917	971	1320	1120	946	820	880	1050
6	1050	963	976	999	884	981	1520	1070	956	825	854	929
7	1000	956	1020	868	836	886	1570	1050	935	786	859	851
8	1110	981	918	888	849	819	1410	1050	917	799	918	880
9	1300	968	922	964	950	839	1340	1020	912	805	935	1000
10	1110	959	1010	734	940	900	1340	1010	937	805	938	1160
11	1060	959	982	855	989	947	1340	985	1120	1770	890	1070
12	1030	941	1030	758	970	815	1250	976	1080	1790	820	991
13	1150	931	1010	910	1050	765	1300	940	1030	1310	784	994
14	1260	937	990	948	1240	1100	1670	1080	1030	1240	772	1010
15	1340	937	1020	833	1240	1100	1670	1050	962	1200	780	953
16	1310	951	1020	713	1200	1040	1780	968	926	1110	765	932
17	1220	959	1020	899	1200	952	1780	972	1000	1070	755	860
18	1140	960	858	901	1220	939	1600	971	1200	1000	755	821
19	1090	956	706	800	1400	993	1610	938	1520	942	724	843
20	1040	1050	647	739	1450	993	1500	914	1170	901	743	825
21	1010	1200	921	769	1440	1300	1270	914	962	890	754	802
22	1040	1150	952	801	1260	1580	1270	959	987	881	756	795
23	1320	1150	972	920	1490	1300	1320	1060	928	841	795	799
24	1360	1230	868	911	1390	1180	1310	1010	922	816	779	814
25	1230	1210	855	877	1330	1260	1270	1220	900	810	727	852
26	1190	1080	893	871	1250	1280	1260	1500	879	775	737	867
27	1150	1050	953	875	1200	1260	1190	1430	893	788	751	839
28	1110	1140	999	855	1120	1260	1250	1220	902	809	731	838
29	1070	1130	958	858	1070	1230	1190	1240	886	813	770	842
30	1030	1060	905	884	---	1240	1130	1150	878	768	998	837
31	979	---	930	832	---	1200	---	1090	---	777	947	---
TOTAL	34346	30825	29509	27205	32487	33214	41420	33467	29763	29480	25327	27644
MEAN	1108	1028	952	878	1120	1071	1381	1080	992	951	817	921
MAX	1360	1230	1080	1020	1490	1580	1780	1500	1520	1790	1020	1220
MIN	834	931	647	713	836	765	1130	914	878	768	724	795
CFSM	1.01	.94	.87	.80	1.02	.97	1.26	.98	.90	.87	.74	.84
IN.	1.16	1.04	1.00	.92	1.10	1.12	1.40	1.13	1.01	1.00	.86	.93

CAL YR 1983 TOTAL 387338 MEAN 1061 MAX 2830 MIN 647 CFSM .97 IN 13.10
WTR YR 1984 TOTAL 374687 MEAN 1024 MAX 1790 MIN 647 CFSM .93 IN 12.67

04137500 AU SABLE RIVER NEAR AU SABLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°26'09", long 83°26'28", in NE1/4 NW1/4 sec.35, T.24 N., R.8 E., Iosco County, Hydrologic Unit 04070007, at bridge on Rea Road, 5.5 mi northwest of Au Sable and 10.4 mi upstream from mouth.

DRAINAGE AREA.--1,540 mi^2, approximately.

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981.
WATER TEMPERATURES: April 1978 to September 1981.

REMARKS.--Bimonthly samples are collected as a cross-section sample at or near bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1978, 1979): Maximum daily, 346 micromhos Nov. 21, 1978; minimum daily, 229 micromhos Apr. 19, 21, 1979.
WATER TEMPERATURES (water years 1978-80): Maximum daily, 26.0°C Aug. 12, 1980; minimum daily, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
NOV										
01...	1330	2450	293	8.1	10.0	1.5	10.2	93	K1	K16
JAN										
17...	1300	3320	313	7.4	1.0	1.8	11.9	85	<1	K1
MAR										
27...	1300	2260	284	7.6	2.5	1.7	14.1	104	<1	<1
MAY										
08...	1100	3090	275	7.7	11.5	1.0	10.2	95	<1	K5
JUL										
26...	1100	2080	300	8.0	23.5	.90	7.2	86	K2	33
SEP										
18...	1300	2240	299	8.4	19.5	1.0	8.2	90	K2	K5

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
NOV										
01...	150	6	44	10	4.8	6	.2	.60	145	2.2
JAN										
17...	160	6	45	11	4.8	6	.2	.60	152	12
MAR										
27...	140	7	40	9.5	4.1	6	.2	.60	132	6.4
MAY										
08...	130	9	39	9.1	3.6	5	.1	.60	126	4.9
JUL										
26...	140	4	41	10	4.0	6	.2	.40	140	2.7
SEP										
18...	150	7	42	11	4.2	6	.2	.50	143	1.1

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
NOV 01...	15	5.5	.20	8.5	176	180	.24	1160	<.10
JAN 17...	13	6.1	.10	8.5	188	180	.26	1690	<.10
MAR 27...	12	5.5	<.10	7.2	171	160	.23	1040	<.10
MAY 08...	12	4.8	.10	6.2	170	150	.23	1420	<.10
JUL 26...	10	5.2	<.10	8.1	179	160	.24	1010	<.10
SEP 18...	9.5	5.2	.10	8.9	169	170	.23	1020	.36

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV 01...	.020	.30	.030	.09	.020	<.010	6	40	89
JAN 17...	.030	.20	.030	.09	<.010	<.010	11	99	100
MAR 27...	<.010	.60	<.010	--	.010	<.010	5	31	88
MAY 08...	.360	.60	--	--	.030	<.010	8	67	100
JUL 26...	*<.010	.20	.020	--	.020	<.010	4	22	69
SEP 18...	<.010	.70	<.010	--	<.010	<.010	7	42	92

DATE	TIME	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
NOV 01...	1330	10	1	44	.5	<1	<1	<3	4	8	.2
MAR 27...	1300	<10	1	21	<.5	<1	<1	<3	4	23	2
MAY 08...	1100	<10	1	23	<1	<1	<1	<3	3	10	1
SEP 18...	1300	<10	2	26	<.5	<1	<1	<3	4	<3	<1

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
NOV 01...	14	<1	<.1	<10	<1	<1	<1	70	<6	<3
MAR 27...	12	7	<.1	<10	2	<1	<1	64	<6	10
MAY 08...	<4	2	<.1	<10	2	<1	<1	62	<6	10
SEP 18...	7	6	<.1	<10	<1	<1	<1	73	<6	23

04142000 RIFLE RIVER NEAR STERLING, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°04'21", long 84°01'12", in NE1/4 SW1/4 sec.5, T.19 N., R.4 E., Arenac County, Hydrologic Unit 04080101, on left bank 30 ft downstream from bridge on Old M-70, 2.8 mi north of Sterling, and 20 mi upstream from mouth.

DRAINAGE AREA.--320 mi^2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--November 1905 to December 1908 (gage heights and discharge measurements only), October 1936 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Rifle River at Michigan Highway 70 near Sterling 1936-61.

REVISED RECORDS.--WSP 1437: 1937(M), 1939-40(M).

GAGE.--Water-stage recorder. Datum of gage is 649.48 ft National Geodetic Vertical Datum of 1929. November 1905 to December 1908, nonrecording gage at site 400 ft downstream at different datum. Jan. 13, 1937, to Jan. 10, 1939, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period and those for the period of no gage-height record, Dec. 21 to Jan. 26, which are poor. Occasional regulation by dams above station.

AVERAGE DISCHARGE.--48 years, 309 ft^3/s, 13.11 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,340 ft^3/s Mar. 28, 1950, gage height, 13.74 ft, from rating curve extended above 3,800 ft^3/s; minimum, 75 ft^3/s Nov. 22, 1964, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,690 ft^3/s Mar. 22, gage height, 6.47 ft, only peak above base of 1,600 ft^3/s; minimum, 130 ft^3/s Aug. 21, 22, gage height, 1.30 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	239	241	395	260	225	330	449	401	412	192	156	169
2	215	243	351	260	225	300	441	366	379	181	165	210
3	219	249	323	260	220	270	434	356	423	172	171	269
4	373	248	320	260	220	250	427	340	401	167	179	229
5	391	242	310	260	220	230	482	320	352	163	179	205
6	315	243	312	260	220	225	635	298	352	184	169	182
7	274	241	309	255	220	220	587	297	321	183	205	172
8	328	238	276	255	220	220	481	287	299	171	260	172
9	382	233	279	250	220	220	419	281	286	165	211	200
10	321	236	292	250	225	220	387	276	278	168	189	231
11	281	237	287	250	230	220	369	272	265	359	173	215
12	264	238	394	245	240	220	366	274	252	751	173	188
13	341	233	479	245	270	220	419	319	264	656	167	177
14	586	249	453	245	550	230	490	447	361	358	160	171
15	532	255	425	240	750	280	597	432	393	266	149	168
16	400	256	392	235	840	500	946	366	299	230	145	169
17	378	261	348	235	920	700	994	315	357	212	142	161
18	335	255	304	230	1050	600	862	297	531	211	140	155
19	317	249	290	230	1150	500	719	292	514	199	140	152
20	279	287	275	230	1220	450	604	285	376	193	137	149
21	279	411	265	230	1030	1000	531	270	307	185	133	145
22	298	386	260	225	820	1530	487	490	274	177	137	144
23	357	394	260	225	777	1100	484	975	256	175	158	152
24	413	701	260	225	730	822	537	784	236	177	150	160
25	367	670	260	225	630	705	495	795	223	171	140	177
26	321	492	260	225	510	633	444	1250	217	165	137	189
27	288	408	260	225	440	569	408	1030	204	163	135	174
28	274	389	260	225	390	533	395	693	196	163	147	168
29	262	483	260	225	340	502	356	561	202	162	162	180
30	256	461	260	225	---	479	359	497	204	158	232	180
31	251	---	260	225	---	461	---	457	---	156	205	---
TOTAL	10136	9729	9679	7435	15102	14739	15604	14323	9434	7033	5146	5413
MEAN	327	324	312	240	521	475	520	462	314	227	166	180
MAX	586	701	479	260	1220	1530	994	1250	531	751	260	269
MIN	215	233	260	225	220	220	356	270	196	156	133	144
CFSM	1.02	1.01	.98	.75	1.63	1.48	1.63	1.44	.98	.71	.52	.56
IN.	1.18	1.13	1.13	.86	1.76	1.71	1.81	1.67	1.10	.82	.60	.63

CAL YR 1983 TOTAL 142512 MEAN 390 MAX 2340 MIN 132 CFSM 1.22 IN 16.57
WTR YR 1984 TOTAL 123773 MEAN 338 MAX 1530 MIN 133 CFSM 1.06 IN 14.39

04142000 RIFLE RIVER NEAR STERLING, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°04'21", long 84°01'12", in NE1/4 SW1/4 sec.5, T.19 N., R.4 E., Arenac County, Hydrologic Unit 04080101, on left bank 30 ft downstream from bridge on Old M-70, 2.8 mi north of Sterling, and 20 mi upstream from mouth.

DRAINAGE AREA.--320 mi^2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--November 1905 to December 1908 (gage heights and discharge measurements only), October 1936 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Rifle River at Michigan Highway 70 near Sterling 1936-61.

REVISED RECORDS.--WSP 1437: 1937(M), 1939-40(M).

GAGE.--Water-stage recorder. Datum of gage is 649.48 ft National Geodetic Vertical Datum of 1929. November 1905 to December 1908, nonrecording gage at site 400 ft downstream at different datum. Jan. 13, 1937, to Jan. 10, 1939, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period and those for the period of no gage-height record, Dec. 21 to Jan. 26, which are poor. Occasional regulation by dams above station.

AVERAGE DISCHARGE.--48 years, 309 ft^3/s, 13.11 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,340 ft^3/s Mar. 28, 1950, gage height, 13.74 ft, from rating curve extended above 3,800 ft^3/s; minimum, 75 ft^3/s Nov. 22, 1964, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,690 ft^3/s Mar. 22, gage height, 6.47 ft, only peak above base of 1,600 ft^3/s; minimum, 130 ft^3/s Aug. 21, 22, gage height, 1.30 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	239	241	395	260	225	330	449	401	412	192	156	169
2	215	243	351	260	225	300	441	366	379	181	165	210
3	219	249	323	260	220	270	434	356	423	172	171	269
4	373	248	320	260	220	250	427	340	401	167	179	229
5	391	242	310	260	220	230	482	320	352	163	179	205
6	315	243	312	260	220	225	635	298	352	184	169	182
7	274	241	309	255	220	220	587	297	321	183	205	172
8	328	238	276	255	220	220	481	287	299	171	260	172
9	382	233	279	250	220	220	419	281	286	165	211	200
10	321	236	292	250	225	220	387	276	278	168	189	231
11	281	237	287	250	230	220	369	272	265	359	173	215
12	264	238	394	245	240	220	366	274	252	751	173	188
13	341	233	479	245	270	220	419	319	264	656	167	177
14	586	249	453	245	550	230	490	447	361	358	160	171
15	532	255	425	240	750	280	597	432	393	266	149	168
16	400	256	392	235	840	500	946	366	299	230	145	169
17	378	261	348	235	920	700	994	315	357	212	142	161
18	335	255	304	230	1050	600	862	297	531	211	140	155
19	317	249	290	230	1150	500	719	292	514	199	140	152
20	279	287	275	230	1220	450	604	285	376	193	137	149
21	279	411	265	230	1030	1000	531	270	307	185	133	145
22	298	386	260	225	820	1530	487	490	274	177	137	144
23	357	394	260	225	777	1100	484	975	256	175	158	152
24	413	701	260	225	730	822	537	784	236	177	150	160
25	367	670	260	225	630	705	495	795	223	171	140	177
26	321	492	260	225	510	633	444	1250	217	165	137	189
27	288	408	260	225	440	569	408	1030	204	163	135	174
28	274	389	260	225	390	533	395	693	196	163	147	168
29	262	483	260	225	340	502	356	561	202	162	162	180
30	256	461	260	225	---	479	359	497	204	158	232	180
31	251	---	260	225	---	461	---	457	---	156	205	---
TOTAL	10136	9729	9679	7435	15102	14739	15604	14323	9434	7033	5146	5413
MEAN	327	324	312	240	521	475	520	462	314	227	166	180
MAX	586	701	479	260	1220	1530	994	1250	531	751	260	269
MIN	215	233	260	225	220	220	356	270	196	156	133	144
CFSM	1.02	1.01	.98	.75	1.63	1.48	1.63	1.44	.98	.71	.52	.56
IN.	1.18	1.13	1.13	.86	1.76	1.71	1.81	1.67	1.10	.82	.60	.63

CAL YR 1983 TOTAL 142512 MEAN 390 MAX 2340 MIN 132 CFSM 1.22 IN 16.57
WTR YR 1984 TOTAL 123773 MEAN 338 MAX 1530 MIN 133 CFSM 1.06 IN 14.39

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966-72, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981.
WATER TEMPERATURES: November 1974 to September 1981.
SUSPENDED-SEDIMENT DISCHARGE: Water year 1970.

INSTRUMENTATION.--Water-quality monitor August 1975 to September 1981.

REMARKS.--Quarterly samples are collected as a cross-section sample at or near bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1976, 1977, 1979, 1980), 567 micromhos Sept. 6, 1979; minimum recorded (water years 1975-77, 1980), 157 micromhos Aug. 31, 1975.
WATER TEMPERATURES (water years 1976, 1977, 1980): Maximum, 30.5°C July 20, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
20...	1030	284	435	7.8	7.0	1.5	12.7	103	K19	370
MAR										
01...	1045	330	420	7.6	.0	4.2	14.0	97	K11	K31
APR										
12...	1000	379	414	7.8	6.5	3.9	11.8	97	K3	190
AUG										
09...	1015	209	405	8.3	21.0	6.8	8.0	92	760	K73

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT										
20...	220	37	62	15	9.6	9	.3	1.3	180	5.5
MAR										
01...	200	31	56	14	10	10	.3	1.6	167	8.1
APR										
12...	190	24	53	13	9.9	10	.3	1.3	162	5.0
AUG										
09...	190	24	54	14	8.9	9	.3	1.2	169	1.6

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT									
20...	34	16	.10	8.1	262	250	.36	201	.29
MAR									
01...	29	18	.10	7.5	254	240	.35	226	.49
APR									
12...	32	17	.10	5.1	265	230	.36	271	.26
AUG									
09...	26	14	.10	8.6	241	230	.33	136	.13

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT									
20...	<.010	.70	.030	.09	.010	<.010	12	9.2	85
MAR									
01...	.060	.70	<.010	--	<.010	<.010	38	34	50
APR									
12...	.080	1.3	.130	.40	.110	<.010	32	33	83
AUG									
09...	<.010	.60	.030	--	.020	<.010	30	17	86

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT											
20...	1030	20	2	53	<.5	<1	1	<3	1	77	1
MAR											
01...	1045	<10	2	45	<.5	<1	<1	<3	1	53	2
APR											
12...	1000	<10	1	50	<.5	<1	<1	<3	1	36	1
AUG											
09...	1015	20	1	63	<.5	<1	<1	<3	1	25	6

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT										
20...	7	13	<.1	<10	1	<1	<1	230	<6	12
MAR										
01...	6	21	<.1	<10	<1	<1	<1	210	<6	15
APR										
12...	5	15	<.1	<10	3	<1	<1	210	<6	11
AUG										
09...	4	7	<.1	<10	<1	<1	<1	220	<6	<3

04143900 SHIAWASSEE RIVER AT LINDEN, MI

LOCATION.--Lat 42°48'56", long 83°48'08", in SW1/4 sec.19, T.5 N., R.6 E., Genesee County, Hydrologic Unit 04080203, on right bank at upstream side of bridge on Hogan Road, 1.0 mi west of Linden.

DRAINAGE AREA.--81.2 mi^2.

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

GAGE.--Water-stage recorder. Datum of gage is 844.96 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period and those for period of indefinite stage-discharge relation, Oct. 16 to Dec. 15, which are poor. Flow regulated by dam at Linden since 1967. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 59.5 ft^3/s, 9.95 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 476 ft^3/s Apr. 22, 1975, gage height, 7.43 ft; minimum, 0.74 ft^3/s May 22, 23, 1971; minimum gage height, 2.82 ft Aug. 2, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 149 ft^3/s Mar. 27, gage height, 5.53 ft; minimum, 5.5 ft^3/s Aug. 1, gage height, 3.27 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	33	80	30	23	66	119	110	130	13	5.9	8.1
2	23	35	72	30	24	60	117	108	124	12	6.0	8.0
3	22	40	66	29	25	56	116	101	115	12	7.5	7.8
4	21	45	64	29	25	52	115	90	107	11	11	7.6
5	21	47	62	28	26	47	114	84	98	11	13	7.8
6	20	45	58	28	27	45	105	81	95	11	12	7.6
7	19	40	50	28	29	43	93	72	89	10	12	8.0
8	16	36	45	28	32	42	93	54	48	9.6	14	7.6
9	16	32	49	27	35	41	94	33	37	9.4	18	8.0
10	16	30	52	27	40	40	96	32	37	9.7	20	8.3
11	16	29	56	27	49	39	96	31	34	12	22	9.1
12	16	29	62	27	57	38	96	33	24	12	25	9.7
13	21	29	72	27	71	37	96	41	29	12	25	10
14	24	29	75	27	78	37	94	49	32	12	24	12
15	26	29	75	27	85	38	89	52	35	12	22	12
16	25	32	74	27	86	42	87	59	38	11	19	13
17	24	45	72	27	86	54	83	57	27	10	16	13
18	28	60	70	27	95	74	89	49	26	9.5	13	12
19	32	62	66	26	105	85	89	47	27	9.0	14	13
20	31	63	60	26	105	99	88	45	25	8.3	13	13
21	32	64	54	26	104	120	87	42	23	10	11	13
22	33	64	49	25	102	131	86	46	22	9.6	9.2	13
23	38	63	45	25	95	139	87	57	19	8.8	9.1	13
24	45	62	42	25	83	140	90	74	17	9.2	8.9	14
25	49	62	39	24	81	140	90	85	17	8.4	8.3	15
26	46	61	37	24	80	142	96	109	18	8.4	8.0	18
27	42	60	36	24	80	147	111	130	17	8.3	7.7	21
28	39	63	34	24	75	148	115	133	16	7.6	7.5	28
29	37	92	33	23	72	147	112	135	15	7.1	7.6	29
30	35	92	32	23	---	142	111	134	14	6.7	8.3	27
31	34	---	31	23	---	132	---	132	---	6.3	8.2	---
TOTAL	870	1473	1712	818	1875	2563	2954	2305	1355	306.9	406.2	386.6
MEAN	28.1	49.1	55.2	26.4	64.7	82.7	98.5	74.4	45.2	9.90	13.1	12.9
MAX	49	92	80	30	105	148	119	135	130	13	25	29
MIN	16	29	31	23	23	37	83	31	14	6.3	5.9	7.6
CFSM	.35	.61	.68	.33	.80	1.02	1.21	.92	.56	.12	.16	.16
IN.	.40	.67	.78	.37	.86	1.17	1.35	1.06	.62	.14	.19	.18

CAL YR 1983 TOTAL 19794.1 MEAN 54.2 MAX 158 MIN 7.9 CFSM .67 IN 9.07
WTR YR 1984 TOTAL 17024.7 MEAN 46.5 MAX 148 MIN 5.9 CFSM .57 IN 7.80

04144500 SHIAWASSEE RIVER AT OWOSSO, MI

LOCATION.--Lat 43°00'54", long 84°10'52", in SW1/4 sec.12, T.7 N., R.2 E., Shiawassee County, Hydrologic Unit 04080203, on right bank on grounds of sewage-treatment plant, 1.5 mi north of Owosso.

DRAINAGE AREA.--538 mi^2.

PERIOD OF RECORD.--March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height record for flood seasons collected in this vicinity 1904, 1910-30 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1949(M). WSP 1337: 1932, 1934, 1936-38, 1944.

GAGE.--Water-stage recorder. Datum of gage is 707.25 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 15, 1933, at site 1.5 mi upstream at datum 5.46 ft higher.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated below about 800 ft^3/s by powerplant at Shiawasseetown prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--53 years, 332 ft^3/s, 8.38 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,240 ft^3/s Apr. 6, 1947, gage height, 10.35 ft; minimum, 0.2 ft^3/s July 27, 1934, gage height, 1.12 ft; minimum daily, 2.0 ft^3/s July 28, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,330 ft^3/s Mar. 25, gage height, 5.01 ft, no peak discharge above base of 1,500 ft^3/s; minimum, 41 ft^3/s Aug. 29, 30; minimum gage height, 2.08 ft Sept. 6, 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	145	457	185	195	240	627	566	779	77	46	50
2	87	151	403	185	190	230	570	528	642	74	44	51
3	78	152	343	195	195	215	524	503	538	79	45	51
4	73	161	320	210	200	205	475	475	471	82	52	51
5	75	190	301	220	205	195	485	444	404	80	48	48
6	74	206	301	236	210	190	516	394	383	79	66	46
7	70	198	277	235	215	185	549	342	344	82	87	48
8	72	171	200	235	230	180	557	268	327	79	125	49
9	67	158	203	230	245	180	545	265	327	74	153	57
10	65	141	261	230	270	180	517	261	286	65	158	61
11	66	139	295	225	350	175	495	244	217	81	118	61
12	66	130	383	220	625	175	435	227	186	72	110	53
13	97	125	588	215	1020	175	397	236	149	67	101	64
14	95	124	588	210	1130	200	379	234	122	71	98	72
15	102	123	722	210	1050	240	426	225	121	75	96	72
16	115	144	695	210	1010	500	447	240	114	75	94	94
17	110	158	614	205	855	610	499	242	112	63	94	94
18	106	215	479	205	743	557	628	236	111	55	94	78
19	114	278	389	200	708	551	695	226	109	54	96	64
20	146	298	313	200	666	523	711	220	106	54	98	70
21	137	300	290	195	628	899	666	209	99	59	89	61
22	149	301	260	190	642	1180	626	239	91	59	78	57
23	172	343	250	185	635	1130	689	429	85	61	76	55
24	185	348	240	175	571	1260	676	429	80	76	76	61
25	214	327	230	170	495	1310	659	512	77	58	70	61
26	222	325	215	175	412	1210	643	890	74	53	66	57
27	215	302	210	185	348	1070	624	944	70	54	70	70
28	190	322	200	200	283	1010	645	861	73	56	55	106
29	168	351	195	220	234	918	631	1000	77	55	44	115
30	159	412	190	210	---	823	620	1090	80	51	53	110
31	154	---	185	200	---	709	---	1000	---	47	51	---
TOTAL	3749	6738	10597	6366	14560	17225	16956	13979	6654	2067	2551	1987
MEAN	121	225	342	205	502	556	565	451	222	66.7	82.3	66.2
MAX	222	412	722	236	1130	1310	711	1090	779	82	158	115
MIN	65	123	185	170	190	175	379	209	70	47	44	46
CFSM	.23	.42	.64	.38	.93	1.03	1.05	.84	.41	.12	.15	.12
IN.	.26	.47	.73	.44	1.01	1.19	1.17	.97	.46	.14	.18	.14

CAL YR 1983 TOTAL 140332 MEAN 384 MAX 2020 MIN 37 CFSM .71 IN 9.70
WTR YR 1984 TOTAL 103429 MEAN 283 MAX 1310 MIN 44 CFSM .53 IN 7.15

04145000 SHIAWASSEE RIVER NEAR FERGUS, MI

LOCATION.--Lat 43°15'17", long 84°06'20", in sec.22, T.10 N., R.3 E., Saginaw County, Hydrologic Unit 04080203, on right bank at downstream side of county highway bridge, 1.2 mi east of Fergus, 1.8 mi upstream from Bear Creek, and 14 mi above mouth.

DRAINAGE AREA.--637 mi^2.

PERIOD OF RECORD.--October 1939 to September 1984 (discontinued). Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1940(M), 1941-42, 1943(M), 1944, 1945(M), 1946, 1947(M), 1948, 1950. WSP 1627: 1952, 1954(M), 1957.

GAGE.--Water-stage recorder. Datum of gage is 585.80 ft National Geodetic Vertical Datum of 1929. Prior to Aug. 22, 1968, nonrecording gage at same site and datum. Prior to Oct. 1, 1970, at datum 2.00 ft higher.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation at low stages by powerplant above Owosso prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--45 years, 420 ft^3/s, 8.95 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,500 ft^3/s Apr. 6, 1947 (includes overflow bypassing gage); maximum gage height, 15.44 ft, present datum, Mar. 29, 1960; minimum discharge, 27 ft^3/s Aug. 8, 1966; minimum gage height, 0.95 ft Sept. 8, 1984.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,900 ft^3/s Mar. 22, gage height, 7.14 ft; maximum gage height, 8.35 ft Mar. 16, backwater from ice; minimum discharge, 49 ft^3/s Sept. 8, gage height, 0.95 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	124	177	514	220	230	320	786	729	1140	105	60	66
2	122	176	497	225	220	280	709	665	913	100	58	61
3	110	190	422	232	225	250	640	631	749	97	57	60
4	110	183	385	240	230	230	596	596	625	101	59	59
5	109	191	351	250	240	220	590	550	546	101	65	56
6	104	220	352	270	250	215	669	492	483	106	63	55
7	102	232	330	280	260	210	683	426	446	105	72	53
8	99	221	270	290	270	205	689	373	381	102	101	52
9	101	201	270	290	290	205	672	326	385	98	154	55
10	94	198	330	280	320	205	648	329	440	97	172	63
11	86	205	380	270	360	205	612	316	306	120	154	72
12	79	187	500	265	450	210	567	292	236	122	126	74
13	90	170	740	260	800	220	507	281	210	97	118	68
14	113	164	776	255	1500	250	481	315	176	90	109	80
15	107	165	805	250	1450	330	500	288	156	91	106	89
16	110	191	770	245	1350	500	698	276	152	95	104	83
17	122	204	690	240	1290	800	714	297	158	98	102	101
18	126	215	620	240	1100	760	1030	285	159	92	103	98
19	128	294	500	235	950	720	987	274	152	73	109	90
20	140	349	400	230	900	900	1070	259	147	69	104	78
21	162	365	350	230	797	1290	954	245	141	70	103	82
22	162	373	330	225	747	1680	842	241	131	74	98	75
23	200	427	310	220	766	1380	1280	553	124	71	93	71
24	211	494	290	215	726	1570	1150	580	118	78	89	72
25	213	465	280	210	638	1550	955	574	111	90	85	80
26	235	440	270	215	541	1440	879	980	105	73	81	88
27	237	431	260	220	453	1290	823	1240	93	70	76	77
28	226	441	250	230	412	1210	803	1090	94	69	77	87
29	206	435	240	240	380	1130	805	1620	101	67	78	123
30	189	437	230	250	---	1020	772	1580	104	64	72	123
31	182	---	220	240	---	911	---	1380	---	61	67	---
TOTAL	4399	8441	12932	7562	18145	21706	23111	18083	9082	2746	2915	2291
MEAN	142	281	417	244	626	700	770	583	303	88.6	94.0	76.4
MAX	237	494	805	290	1500	1680	1280	1620	1140	122	172	123
MIN	79	164	220	210	220	205	481	241	93	61	57	52
CFSM	.22	.44	.66	.38	.98	1.10	1.21	.92	.48	.14	.15	.12
IN.	.26	.49	.76	.44	1.06	1.27	1.35	1.06	.53	.16	.17	.13

CAL YR 1983 TOTAL 173194 MEAN 475 MAX 2600 MIN 45 CFSM .75 IN 10.11
WTR YR 1984 TOTAL 131413 MEAN 359 MAX 1680 MIN 52 CFSM .56 IN 7.67

04146000 FARMERS CREEK NEAR LAPEER, MI

LOCATION.--Lat 43°02'41", long 83°20'14", in sec.6, T.7 N., R.10 E., Lapeer County, Hydrologic Unit 04080204, on left bank at sewage-treatment plant at Michigan Home and Training School, 2.0 mi west of Lapeer.

DRAINAGE AREA.--55.3 mi^2.

PERIOD OF RECORD.--October 1932 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1940. WSP 1084: 1942(M), 1943. WSP 1337: 1934-38, 1940(M), 1944(M), 1945, 1946(M), 1948-51(M). WSP 1727: 1952 (M). WDR MI-78: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 805.79 ft National Geodetic Vertical Datum of 1929. Prior to May 25, 1954, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Prior to 1941, occasional regulation by dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--52 years, 30.3 ft^3/s, 7.44 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft^3/s Apr. 6, 1947, gage height, 19.87 ft, from floodmark, from rating curve extended above 660 ft^3/s on basis of contracted-opening measurement of peak flow; minimum not determined.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 162 ft^3/s Mar. 24, gage height, 16.82 ft, only peak discharge above base of 160 ft^3/s; minimum, 1.2 ft^3/s Aug. 27, 28, gage height, 14.98 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	13	47	22	11	26	78	51	90	5.4	2.2	26
2	20	15	45	21	14	22	71	46	65	5.4	2.3	23
3	16	18	44	21	17	19	64	40	51	5.2	2.1	18
4	13	19	41	21	18	17	57	35	50	5.0	2.5	15
5	12	18	38	21	18	16	58	33	45	5.1	3.5	13
6	10	18	37	20	18	15	59	30	40	5.8	3.1	11
7	9.3	18	32	18	17	14	59	21	36	6.3	3.3	8.5
8	9.0	17	30	19	16	13	60	10	33	5.4	4.9	3.9
9	9.3	16	31	19	16	11	58	8.0	30	5.3	5.7	3.3
10	9.3	15	32	18	18	10	53	7.3	28	4.7	4.9	3.7
11	9.0	19	30	18	25	9.4	46	6.4	26	6.7	4.3	5.9
12	8.6	20	43	18	45	8.8	42	5.7	21	8.3	3.8	9.7
13	18	20	47	18	80	9.0	38	7.8	18	7.5	3.3	14
14	28	20	54	17	90	10	35	13	17	6.5	3.0	27
15	27	22	66	17	100	11	36	9.7	15	5.8	2.5	24
16	27	37	66	16	104	44	39	8.0	14	5.2	2.3	21
17	28	41	60	15	100	51	46	7.3	14	4.2	1.9	17
18	25	42	55	14	92	83	55	7.3	15	3.5	1.9	14
19	22	50	50	13	83	87	63	6.6	14	3.0	2.1	13
20	18	54	46	12	79	87	71	5.8	8.7	2.5	1.7	10
21	16	53	41	11	72	110	75	5.6	5.3	2.4	1.5	8.8
22	15	50	36	9.4	66	108	76	13	5.3	2.4	1.4	7.5
23	17	53	33	8.4	60	134	76	43	6.0	3.2	1.4	6.7
24	19	53	30	8.3	54	155	73	51	7.5	5.5	1.4	7.4
25	18	49	28	8.2	48	148	75	64	8.5	4.3	1.3	8.0
26	18	49	27	8.0	43	136	77	99	7.3	3.8	1.3	11
27	18	49	26	8.2	37	124	74	106	7.1	3.6	1.2	13
28	17	54	25	8.8	33	113	72	132	6.9	3.5	1.4	13
29	16	52	24	9.4	31	102	65	142	5.8	3.0	14	13
30	15	49	23	9.8	---	91	58	127	5.6	2.7	20	12
31	14	---	23	10	---	83	---	107	---	2.4	23	---
TOTAL	529.5	1003	1210	457.5	1405	1867.2	1809	1248.5	696.0	143.6	129.2	381.4
MEAN	17.1	33.4	39.0	14.8	48.4	60.2	60.3	40.3	23.2	4.63	4.17	12.7
MAX	28	54	66	22	104	155	78	142	90	8.3	23	27
MIN	8.6	13	23	8.0	11	8.8	35	5.6	5.3	2.4	1.2	3.3
CFSM	.31	.60	.71	.27	.88	1.09	1.09	.73	.42	.08	.08	.23
IN.	.36	.67	.81	.31	.95	1.26	1.22	.84	.47	.10	.09	.26

CAL YR 1983 TOTAL 11074.9 MEAN 30.3 MAX 140 MIN 2.7 CFSM .55 IN 7.45
WTR YR 1984 TOTAL 10879.9 MEAN 29.7 MAX 155 MIN 1.2 CFSM .54 IN 7.32

04146063 SOUTH BRANCH FLINT RIVER NEAR COLUMBIAVILLE, MI

LOCATION.--Lat 43°09'34", long 83°21'03", in NE1/4 NE1/4 sec.36, T.9 N., R.9 E., Lapeer County, Hydrologic Unit 04080204, on right bank at upstream side of bridge on Columbiaville Road, 3.0 miles east of Columbiaville, and 3.2 miles upstream from confluence of North and South Branches.

DRAINAGE AREA.--221 mi^2.

PERIOD OF RECORD.--March 1980 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 765 ft, from topographic map.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year. Gage-height telemark at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,510 ft^3/s Mar. 15, 1982, gage height, 8.34 ft; minimum daily, 14 ft^3/s Aug. 27, 1984.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 803 ft^3/s Mar. 22, gage height, 4.58 ft; maximum gage height, 4.96 ft Feb. 15, backwater from ice; minimum daily discharge, 14 ft^3/s Aug. 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	69	88	189	89	74	125	319	177	312	40	26	165
2	58	90	173	88	76	120	288	161	250	37	26	130
3	48	130	161	88	80	115	257	147	200	33	28	100
4	39	132	149	88	90	110	241	136	169	39	29	85
5	40	123	145	90	95	105	259	130	157	50	39	70
6	40	116	151	90	90	100	340	123	145	48	35	55
7	37	111	159	90	85	95	347	116	142	45	45	46
8	37	105	153	88	82	92	340	102	132	43	60	45
9	43	100	160	86	80	89	322	91	118	42	85	39
10	46	99	165	84	80	87	269	88	111	41	48	45
11	45	107	165	82	130	83	239	83	100	65	42	50
12	43	120	185	80	250	80	215	81	93	76	38	67
13	79	120	322	78	430	77	202	83	83	67	34	68
14	169	114	329	77	700	90	202	143	76	60	30	116
15	171	116	319	76	650	88	204	155	70	55	27	125
16	147	187	305	75	503	297	221	130	65	50	26	104
17	134	271	259	74	463	506	239	116	67	45	25	90
18	121	246	200	73	400	389	285	105	91	40	25	81
19	104	228	170	73	357	370	307	100	97	35	26	70
20	84	248	155	72	324	347	307	88	91	30	22	62
21	77	248	150	73	302	457	281	77	72	30	21	50
22	72	221	140	74	273	746	253	81	64	30	19	40
23	93	215	130	76	250	710	264	266	56	45	17	35
24	114	262	120	78	230	664	273	345	60	64	16	33
25	114	239	115	81	208	642	269	271	56	50	15	35
26	109	210	110	82	187	633	257	352	51	35	15	46
27	102	193	105	82	167	562	248	512	48	36	14	53
28	100	204	100	80	147	500	250	443	48	36	16	65
29	90	223	96	78	129	432	223	419	43	32	95	65
30	88	206	92	76	---	392	195	410	40	33	120	67
31	88	---	90	74	---	352	---	378	---	28	145	---
TOTAL	2601	5072	5262	2495	6932	9455	7916	5909	3107	1360	1209	2102
MEAN	83.9	169	170	80.5	239	305	264	191	104	43.9	39.0	70.1
MAX	171	271	329	90	700	746	347	512	312	76	145	165
MIN	37	88	90	72	74	77	195	77	40	28	14	33
CFSM	.38	.77	.77	.36	1.08	1.38	1.20	.86	.47	.20	.18	.32
IN.	.44	.85	.89	.42	1.17	1.59	1.33	.99	.52	.23	.20	.35

CAL YR 1983 TOTAL 52630 MEAN 144 MAX 639 MIN 19 CFSM .65 IN 8.86
WTR YR 1984 TOTAL 53420 MEAN 146 MAX 746 MIN 14 CFSM .66 IN 8.99

04147000 HOLLOWAY RESERVOIR NEAR OTISVILLE, MI

LOCATION.--Lat 43°07'15", long 83°29'45", in NW1/4 sec.11, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, in gatehouse on right side of Holloway Dam on Flint River, 3.5 mi southeast of Otisville.

DRAINAGE AREA.--526 mi^2.

PERIOD OF RECORD.--March 1954 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is National Geodetic Vertical Datum of 1929 (levels by city of Flint).

REMARKS.--Reservoir is formed by an earth-fill dam with concrete spillway completed in 1953. Capacity of reservoir, 1,256,000,000 cu ft at elevation 760.00 ft. The spillway section includes two 90 foot drum gates with minimum crest elevation of 751 ft, maximum at 755 ft, three 20-foot radial gates with sill elevation of 745 ft, and 2 sluices (each 4 by 6 ft), one on each side with valve controls. Entrance elevation of sluiceways is 724 ft. Reservoir is used to regulate flow for sewage dilution for city of Flint.

COOPERATION.--Reservoir elevations furnished by city of Flint.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 996,000,000 cu ft Mar. 8, 1956, elevation, 757.4 ft; minimum, reservoir empty at times during October, November, 1954, January, February, 1955, October, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 835,000,000 cu ft Apr. 21, May 28, 29, elevation, 755.72 ft; minimum, 209,000,000 cu ft Dec. 12, elevation, 745.68 ft.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

Date	Elevation (feet)	Contents (millions of cubic feet)	Change in contents during month (millions of cubic feet)	Change in contents during month (equivalent in ft^3/s)
Sept. 30	754.67	741	--	--
Oct. 31	755.05	774	+ 33	+12.3
Nov. 30	752.95	604	-170	-65.6
Dec. 31	750.78	460	-144	-53.8
CAL YR 1983	--	--	-56	-1.8
Jan. 31	751.09	478	+18	+6.7
Feb. 29	750.81	462	-16	-6.4
Mar. 31	751.13	481	+19	+7.1
Apr. 30	754.95	766	+285	+110.0
May 31	755.70	833	+67	+25.0
June 30	755.11	780	-53	-20.4
July 31	754.69	742	-38	-14.2
Aug. 31	754.49	726	-16	-6.0
Sept. 30	755.00	770	+44	+17.0
WTR YR 1984	--	--	+29	+0.9

04147500 FLINT RIVER NEAR OTISVILLE, MI

LOCATION.--Lat 43°06'40", long 83°31'10", in SE1/4 sec.9, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft downstream from bridge on State Highway 15, 1.5 mi downstream from Holloway Reservoir, 3.5 mi upstream from Powers-Cullen drain, and 3.8 mi south of Otisville.

DRAINAGE AREA.--530 mi^2.

PERIOD OF RECORD.--October 1952 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 721.39 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by Holloway Reservoir, 1.5 mi above station (see preceding page). Several observations of water temperature were made during the year. City of Flint gage-height telemark at station.

AVERAGE DISCHARGE.--32 years, 304 ft^3/s, 7.79 in/yr, adjusted for storage since 1954.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,150 ft^3/s Apr. 1, 1960, gage height, 14.97 ft; minimum, 2.1 ft^3/s Oct. 11, 12, 1971, gage height, 1.57 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,920 ft^3/s Feb. 16, gage height, 9.70 ft; minimum, 12 ft^3/s July 9, gage height, 1.93 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	104	157	1180	335	151	216	836	427	798	148	103	108
2	104	164	1600	333	151	243	934	308	724	136	95	108
3	140	178	1360	331	167	252	658	214	634	128	92	108
4	292	371	692	266	191	254	106	234	554	128	92	108
5	351	720	36	149	191	250	108	245	498	124	76	109
6	351	620	34	112	191	245	111	256	454	125	33	116
7	229	138	349	112	191	225	111	243	340	125	33	125
8	120	167	1500	112	191	200	109	223	225	125	37	119
9	120	187	1320	112	191	180	112	216	311	93	38	125
10	120	187	1020	112	191	180	167	205	315	111	71	133
11	120	234	748	112	193	173	326	198	277	109	100	141
12	120	360	68	112	200	159	425	187	250	116	100	146
13	124	286	119	120	409	156	443	223	223	164	100	176
14	122	70	119	133	928	151	454	252	203	29[illegible]	95	268
15	122	146	119	133	894	154	445	295	185	367	87	265
16	120	133	119	135	1490	333	464	310	171	351	85	247
17	122	41	120	135	1790	592	504	293	178	310	93	223
18	120	391	120	133	1440	738	584	317	209	265	130	191
19	122	866	159	140	1180	994	622	333	311	191	133	169
20	127	650	275	151	1020	1180	686	229	554	151	127	151
21	128	49	277	149	900	1160	718	171	688	140	127	140
22	128	203	279	149	832	1440	684	193	650	124	127	125
23	127	524	279	149	772	1720	716	313	554	109	128	117
24	132	632	279	149	718	1860	746	480	458	108	125	114
25	138	690	281	149	666	1860	682	572	398	108	125	111
26	160	870	279	149	636	1750	642	816	335	120	127	111
27	143	991	308	151	434	1700	602	940	270	132	127	109
28	148	1050	346	151	132	1500	546	955	232	120	117	109
29	212	1320	338	151	173	1350	532	916	196	114	108	111
30	185	1210	338	151	---	1230	432	884	169	114	109	111
31	169	---	337	151	---	988	---	842	---	109	108	---
TOTAL	4820	13605	14398	4927	16613	23433	14505	12290	11364	4855	3048	4294
MEAN	155	454	464	159	573	756	484	396	379	157	98.3	143
MAX	351	1320	1600	335	1790	1860	934	955	798	367	133	268
MIN	104	41	34	112	132	151	106	171	169	93	33	108
MEAN+	168	388	411	166	566	763	593	421	358	142	92.4	160
CFSM+	.32	.73	.78	.31	1.07	1.44	1.12	.79	.68	.27	.17	.30
IN+	.37	.82	.89	.36	1.15	1.66	1.25	.92	.75	.31	.20	.34

CAL YR 1983 TOTAL 115624 MEAN 317 MAX 1600 MIN 34 MEAN+ 315 CFSM+ .59 IN+ 8.07
WTR YR 1984 TOTAL 128152 MEAN 350 MAX 1860 MIN 33 MEAN+ 351 CFSM+ .66 IN+ 9.02

+ Adjusted for change in contents in Holloway Reservoir.

04147990 BUTTERNUT CREEK NEAR GENESEE, MI

LOCATION.--Lat 43°08'09", long 83°35'57", in NE1/4 NE1/4 sec.2, T.8 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft downstream from bridge on Frances Road, 2.3 mi upstream from mouth, and 2.0 mi northeast of Genesee.

DRAINAGE AREA.--34.7 mi^2.

PERIOD OF RECORD.--January 1970 to December 1983 (discontinued).

REVISED RECORDS.--WDR MI-78: Drainage area. WDR MI-81: 1971-72(P), 1973, 1974-79(P).

GAGE.--Water-stage recorder. Altitude of gage is 730 ft, from topographic map (nearest 10 ft). Prior to June 11, 1970, nonrecording gage at same site and datum.

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

AVERAGE DISCHARGE.--13 years, 21.6 ft^3/s, 8.45 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,800 ft^3/s Oct. 1, 1981, gage height, 9.00 ft; minimum, 1.2 ft^3/s Dec. 1, 1971, result of freezeup, Oct. 3, 1978; minimum gage height, 1.48 ft July 23, 27, 28, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October to December, 93 ft^3/s Dec. 12, gage height, 4.66 ft, no peak discharge above base of 200 ft^3/s; minimum, 1.8 ft^3/s Oct. 2, gage height, 1.54 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.0	7.9	18									
2	2.0	4.9	12									
3	1.9	5.5	11									
4	2.0	5.5	10									
5	2.2	4.7	10									
6	2.2	4.1	15									
7	2.2	3.8	15									
8	2.5	3.6	14									
9	2.3	3.5	13									
10	2.4	3.3	12									
11	8.9	4.2	11									
12	9.2	5.6	57									
13	8.8	5.4	61									
14	9.2	5.0	39									
15	5.5	6.2	37									
16	4.2	23	25									
17	3.5	23	20									
18	3.0	15	17									
19	2.7	12	15									
20	2.6	16	13									
21	6.3	16	12									
22	11	12	11									
23	9.3	19	11									
24	7.6	24	10									
25	5.3	16	9.6									
26	4.4	12	9.2									
27	3.8	11	8.9									
28	3.6	17	8.7									
29	3.4	18	8.4									
30	9.5	24	8.1									
31	15	---	7.9									
TOTAL	158.5	331.2	529.8	---	---	---	---	---	---	---	---	---
MEAN	5.11	11.0	17.1	---	---	---	---	---	---	---	---	---
MAX	15	24	61	---	---	---	---	---	---	---	---	---
MIN	1.9	3.3	7.9	---	---	---	---	---	---	---	---	---
CFSM	.15	.32	.49	---	---	---	---	---	---	---	---	---
IN.	.17	.36	.57	---	---	---	---	---	---	---	---	---

CAL YR 1983 TOTAL 6826.4 MEAN 18.7 MAX 235 MIN 1.7 CFSM .54 IN 7.32

04148140 KEARSLEY CREEK NEAR DAVISON, MI

LOCATION.--Lat 43°02'01", long 83°34'53", in NE1/4 sec.12, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft upstream from bridge on State Highway 21, 1.4 mi downstream from Black Creek, and 3.3 mi west of Davison.

DRAINAGE AREA.--99.4 mi^2.

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 747.39 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Some diurnal fluctuation caused by small dams, and occasional diversion for sprinkler irrigation above station. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.---19 years, 69.3 ft^3/s, 9.47 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,430 ft^3/s Apr. 21, 1975, gage height, 11.32 ft; minimum, 2.5 ft^3/s Sept. 10, 1978; minimum gage height, 2.69 ft Sept. 12, 1969.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 350 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 16	1200	*505	*8.58	Mar. 21	1900	466	8.27

Minimum discharge, 4.2 ft^3/s Aug. 26, gage height, 2.74 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.5	18	76	37	43	44	125	84	122	8.7	7.0	7.5
2	9.2	26	69	36	50	42	108	77	108	13	6.4	7.2
3	9.2	30	58	35	55	40	100	73	89	11	5.8	7.2
4	10	29	59	35	50	39	98	69	75	9.7	21	7.5
5	11	32	44	35	45	38	119	66	69	8.9	12	7.2
6	10	31	52	34	43	36	132	59	71	9.7	7.5	7.2
7	9.7	28	52	34	44	35	119	52	57	19	6.4	8.4
8	12	25	57	34	45	35	110	41	50	13	24	8.2
9	11	22	66	33	50	35	104	26	44	12	26	11
10	11	21	62	33	60	35	95	24	41	11	11	11
11	11	28	61	32	100	36	87	30	38	10	13	15
12	11	30	178	32	150	36	76	34	31	9.7	12	12
13	52	29	195	32	240	38	74	50	24	8.4	10	39
14	38	30	177	31	227	41	74	60	22	7.9	8.9	45
15	34	35	178	31	227	45	96	64	22	7.9	7.9	26
16	37	97	146	31	240	374	135	74	21	7.2	7.0	21
17	33	95	110	30	213	256	151	61	22	7.7	6.8	17
18	27	80	80	29	171	223	173	40	22	7.0	6.6	14
19	22	85	70	28	173	255	169	33	22	6.8	7.2	13
20	20	92	65	28	161	221	166	35	21	6.6	6.2	11
21	18	99	60	27	148	382	155	36	18	6.6	5.6	11
22	19	99	56	26	112	329	134	51	16	6.5	5.4	9.7
23	28	124	52	26	95	279	159	167	12	15	5.4	9.2
24	23	131	50	27	85	309	153	163	12	12	5.2	9.2
25	25	116	47	28	78	327	138	173	11	9.5	5.0	14
26	26	107	44	32	71	282	129	303	10	8.2	4.5	14
27	25	81	42	33	62	250	120	262	10	8.7	4.5	15
28	23	110	40	34	52	224	110	211	9.4	7.7	5.0	19
29	21	100	39	36	49	172	95	238	9.2	7.0	25	19
30	20	84	38	37	---	152	86	204	8.7	7.9	17	17
31	19	---	38	40	---	139	---	141	---	6.8	9.5	---
TOTAL	634.6	1914	2361	996	3139	4749	3590	3001	1087.3	291.1	304.8	432.5
MEAN	20.5	63.8	76.2	32.1	108	153	120	96.8	36.2	9.39	9.83	14.4
MAX	52	131	195	40	240	382	173	303	122	19	26	45
MIN	9.2	18	38	26	43	35	74	24	8.7	6.5	4.5	7.2
CFSM	.21	.64	.77	.32	1.09	1.54	1.21	.97	.36	.09	.10	.15
IN.	.24	.72	.88	.37	1.17	1.78	1.34	1.12	.41	.11	.11	.16

CAL YR 1983 TOTAL 22658.4 MEAN 62.1 MAX 373 MIN 4.7 CFSM .63 IN 8.48
WTR YR 1984 TOTAL 22500.3 MEAN 61.5 MAX 382 MIN 4.5 CFSM .62 IN 8.42

04148160 GILKEY CREEK NEAR FLINT, MI

LOCATION.--Lat 43°01'27", long 83°37'32", in NE1/4 SW1/4 sec.10, T.7 N., R. 7 E., Genesee County, Hydrologic Unit 04080204, on right bank 25 ft downstream from culvert on extension of Arapaho Street, 5.1 mi upstream from mouth, and 3.5 mi east of Flint.

DRAINAGE AREA.--6.43 mi^2.

PERIOD OF RECORD.--January 1970 to December 1983 (discontinued).

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 742.56 ft National Geodetic Vertical Datum of 1929. Prior to Mar. 17, 1983,at datum 5.00 ft higher.

REMARKS.--Records poor.

AVERAGE DISCHARGE.--13 years, 4.75 ft^3/s, 10.03 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 393 ft^3/s Oct. 1, 1981, gage height, 8.93 ft, datum then in use; no flow on many days during 1970, 1973-80.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October to December, 54 ft^3/s Dec. 12, gage height, 7.07 ft, no peak discharge above base of 80 ft^3/s; minimum daily, 0.01 ft^3/s Oct. 3, 7, 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.04	.25	2.4									
2	.07	6.5	1.9									
3	.01	3.8	1.8									
4	.65	1.4	1.6									
5	.20	.93	1.7									
6	.05	.70	2.5									
7	.01	.50	2.4									
8	1.8	.41	2.3									
9	.33	.37	2.3									
10	.07	.37	2.2									
11	.01	3.4	2.7									
12	.12	1.8	35									
13	18	.99	17									
14	3.6	.81	9.7									
15	.93	3.4	7.3									
16	.45	18	4.3									
17	.29	9.4	3.0									
18	.22	3.6	2.3									
19	.16	4.7	2.0									
20	.10	7.5	1.8									
21	.07	6.4	1.6									
22	3.3	3.3	1.4									
23	6.0	12	1.3									
24	1.1	9.8	1.2									
25	.60	4.4	1.2									
26	.50	3.0	1.1									
27	.29	2.8	1.1									
28	.29	12	1.0									
29	.29	7.0	1.0									
30	.25	3.8	1.0									
31	.22	---	1.0									
TOTAL	40.02	133.33	119.1	---	---	---	---	---	---	---	---	---
MEAN	1.29	4.44	3.84	---	---	---	---	---	---	---	---	---
MAX	18	18	35	---	---	---	---	---	---	---	---	---
MIN	.01	.25	1.0	---	---	---	---	---	---	---	---	---
CFSM	.20	.69	.60	---	---	---	---	---	---	---	---	---
IN.	.23	.77	.69	---	---	---	---	---	---	---	---	---

CAL YR 1983 TOTAL 1335.64 MEAN 3.66 MAX 65 MIN .01 CFSM .57 IN 7.73

04148300 SWARTZ CREEK AT FLINT, MI

LOCATION.--Lat 42°59'16", long 83°43'57", in NW1/4 sec.26, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on right bank 6 ft downstream from bridge on South Ballenger Highway, in Flint, 3.6 mi upstream from mouth.

DRAINAGE AREA.--115 mi^2.

PERIOD OF RECORD.--January 1970 to December 1983 (discontinued).

REVISED RECORDS.--WDR MI-75: 1971-73.

GAGE.--Water-stage recorder. Datum of gage is 727.05 ft National Geodetic Vertical Datum of 1929. Prior to Sept. 4, 1970, nonrecording gage at same site and datum .

REMARKS.--Records good except those for the winter period, which are fair. Gage-height telemark at station.

AVERAGE DISCHARGE.--13 years, 79.2 ft^3/s, 9.34 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,160 ft^3/s Apr. 19, 1975, gage height, 9.02 ft; minimum, 0.01 ft^3/s Sept. 9, 1978; minimum gage height, 1.16 ft Aug. 19, 1971, Aug. 26, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October to December, 417 ft^3/s Dec. 12, gage height, 5.07 ft, no peak discharge above base of 800 ft^3/s; minimum, 2.1 ft^3/s Oct. 7, gage height, 1.42 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.6	11	46									
2	2.8	30	41									
3	2.7	25	38									
4	4.8	17	37									
5	3.3	14	36									
6	2.8	13	52									
7	2.6	12	51									
8	9.8	12	48									
9	4.8	12	45									
10	3.7	12	44									
11	3.3	23	41									
12	5.0	16	279									
13	69	14	291									
14	27	14	164									
15	15	31	140									
16	10	100	100									
17	8.0	64	79									
18	6.9	39	65									
19	6.7	46	55									
20	6.8	61	49									
21	7.1	58	45									
22	19	42	41									
23	40	99	38									
24	20	105	36									
25	15	63	34									
26	13	47	32									
27	13	44	30									
28	12	110	29									
29	11	89	28									
30	10	60	27									
31	10	---	25									
TOTAL	367.7	1283	2066	---	---	---	---	---	---	---	---	---
MEAN	11.9	42.8	66.6	---	---	---	---	---	---	---	---	---
MAX	69	110	291	---	---	---	---	---	---	---	---	---
MIN	2.6	11	25	---	---	---	---	---	---	---	---	---
CFSM	.10	.37	.58	---	---	---	---	---	---	---	---	---
IN.	.12	.42	.67	---	---	---	---	---	---	---	---	---

CAL YR 1983 TOTAL 24754.6 MEAN 67.8 MAX 751 MIN 1.1 CFSM .59 IN 8.01

04148440 THREAD CREEK NEAR FLINT, MI

LOCATION.--Lat 42°58'30", long 83°38'09", in SE1/4 SE1/4 sec.28, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft downstream from bridge on Bristol Road, 6.0 mi upstream from mouth, and 4.0 mi southeast of Flint.

DRAINAGE AREA.--54.4 mi^2.

PERIOD OF RECORD.--January 1970 to December 1983 (discontinued).

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 764.36 ft National Geodetic Vertical Datum of 1929. Prior to May 13, 1970, nonrecording gage at same site and datum.

REMARKS.--Records fair. Gage-height telemark at station.

AVERAGE DISCHARGE.--13 years, 36.7 ft^3/s, 9.16 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,260 ft^3/s Apr. 19, 1975, gage height, 7.65 ft,from high water marks; no flow Aug. 7, 8, 10, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October to December, 130 ft^3/s Dec. 12, gage height, 3.82 ft, no peak discharge above base of 300 ft^3/s; minimum daily, 1.8 ft^3/s Oct. 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.2	7.2	32									
2	2.1	15	27									
3	2.1	21	24									
4	3.3	14	22									
5	2.5	12	22									
6	2.0	12	30									
7	1.8	10	28									
8	6.5	9.6	27									
9	4.0	9.5	26									
10	3.0	9.2	25									
11	2.3	13	28									
12	3.5	14	100									
13	35	13	80									
14	19	12	82									
15	11	14	82									
16	8.8	47	67									
17	9.0	39	56									
18	7.9	32	48									
19	6.9	37	41									
20	5.9	41	35									
21	5.7	37	32									
22	6.7	31	29									
23	15	49	27									
24	9.7	45	25									
25	9.6	36	23									
26	9.3	33	22									
27	8.4	30	21									
28	7.7	50	20									
29	7.0	38	19									
30	6.9	35	19									
31	6.9	---	18									
TOTAL	231.7	765.5	1137	---	---	---	---	---	---	---	---	---
MEAN	7.47	25.5	36.7	---	---	---	---	---	---	---	---	---
MAX	35	50	100	---	---	---	---	---	---	---	---	---
MIN	1.8	7.2	18	---	---	---	---	---	---	---	---	---
CFSM	.14	.47	.68	---	---	---	---	---	---	---	---	---
IN.	.16	.52	.78	---	---	---	---	---	---	---	---	---

CAL YR 1983 TOTAL 10915.1 MEAN 29.9 MAX 175 MIN 1.3 CFSM .55 IN 7.46

04148500 FLINT RIVER NEAR FLINT, MI

LOCATION.--Lat 43°02'20", long 83°46'10", in SW1/4 sec.4, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on left bank on grounds of sewage-treatment plant, 1.2 mi upstream from Pirnie Creek, and 5.0 mi downstream from Swartz Creek.

DRAINAGE AREA.--956 mi^2.

PERIOD OF RECORD.--September 1903 to March 1904 (gage heights only), August 1932 to current year. Gage-height records for flood seasons collected in this vicinity 1911-32, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1933-34(M), 1935-37. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 678.80 ft National Geodetic Vertical Datum of 1929 (levels by U.S. Weather Bureau and city of Flint).

REMARKS.--Records good. Some regulation by reservoirs above station (station 04147000). Occasional diversion for industrial use. Since Dec. 17, 1967, flow contains up to 50 ft^3/s as sewage effluent which originates outside the basin. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--52 years, 589 ft^3/s, 8.37 in/yr, adjusted for storage since 1954.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,900 ft^3/s Apr. 6, 1947, gage height, 16.35 ft; minimum, 9.0 ft^3/s Aug. 7, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,280 ft^3/s Mar. 21, gage height, 9.76 ft; minimum, 52 ft^3/s Aug. 12, gage height, 2.61 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	150	295	1490	528	292	476	1420	898	1440	247	177	170
2	144	419	1670	524	300	448	1340	812	1270	228	178	165
3	151	455	1760	524	420	453	1460	463	1070	204	185	169
4	243	478	1450	515	451	448	765	397	970	221	240	176
5	425	750	370	403	389	451	523	480	915	196	368	183
6	426	846	416	311	373	470	620	520	799	271	240	166
7	416	577	285	273	343	438	658	513	745	205	72	220
8	306	164	1270	270	339	405	554	489	509	190	280	197
9	205	226	1670	268	343	373	523	464	567	191	478	353
10	193	310	1470	268	373	363	495	434	584	183	322	308
11	182	410	1300	250	556	351	602	415	518	408	64	384
12	199	467	820	259	908	334	726	398	460	241	59	291
13	708	498	1070	258	1660	499	811	646	409	223	150	763
14	401	283	887	268	2210	329	800	629	361	298	162	720
15	300	335	775	268	1740	292	968	575	327	436	154	582
16	248	882	679	273	1860	2070	989	586	308	464	151	466
17	333	655	603	281	2370	1900	1170	566	315	480	144	365
18	199	576	504	275	2030	1430	1440	620	331	432	175	304
19	190	1090	450	268	1660	1580	1590	707	392	237	211	295
20	198	1360	505	276	1660	1960	1560	327	549	320	188	268
21	224	461	464	280	1530	3290	1450	383	766	508	187	246
22	306	188	494	278	1250	3510	1300	580	805	251	197	215
23	489	804	500	286	1260	2780	1360	1060	726	257	203	201
24	278	1240	470	288	1160	2860	1480	1140	614	393	193	203
25	266	1070	453	290	1070	3030	1350	1160	546	213	186	296
26	287	1220	439	294	992	2860	1240	2470	473	194	179	251
27	290	1280	476	299	963	2530	1350	2090	402	205	184	207
28	235	1530	555	288	496	2190	1250	1960	354	201	193	203
29	301	1580	533	288	381	2080	1090	1940	322	178	447	201
30	291	1600	511	293	---	1870	924	1780	298	176	358	196
31	294	---	507	292	---	1650	---	1660	---	187	201	---
TOTAL	**8878**	**22049**	**24846**	**9736**	**29379**	**43720**	**31808**	**27162**	**18145**	**8438**	**6526**	**8764**
MEAN	**286**	**735**	**801**	**314**	**1013**	**1410**	**1060**	**876**	**605**	**272**	**211**	**292**
MAX	**708**	**1600**	**1760**	**528**	**2370**	**3510**	**1590**	**2470**	**1440**	**508**	**478**	**763**
MIN	**144**	**164**	**285**	**250**	**292**	**292**	**495**	**327**	**298**	**176**	**59**	**165**
MEAN+	299	669	748	321	1007	1417	1170	901	584	258	205	309
CFSM+	.31	.70	.78	.34	1.05	1.48	1.22	.94	.61	.27	.21	.32
IN+	.36	.78	.90	.39	1.14	1.71	1.37	1.09	.68	.31	.25	.36

CAL YR 1983 TOTAL 238858 MEAN 654 MAX 3500 MIN 129 MEAN+ 653 CFSM+ .68 IN+ 9.27
WTR YR 1984 TOTAL 239451 MEAN 654 MAX 3510 MIN 59 MEAN+ 655 CFSM+ .69 IN+ 9.33

+ Adjusted for change in contents in Holloway Reservoir.

04148720 BRENT RUN NEAR MONTROSE, MI

LOCATION.--Lat 43°10'12", long 83°50'03", in SE1/4 NE1/4 sec.23, T.9 N., R.5 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft downstream from bridge on Morrish Road, 0.8 mi upstream from Central-Stadler Drain , 3.0 mi upstream from mouth, and 3.1 mi east of Montrose.

DRAINAGE AREA.--20.8 mi^2.

PERIOD OF RECORD.--January 1970 to December 1983 (discontinued).

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 655 ft,from topographic map (nearest 5 ft). Prior to Aug. 26, 1970, nonrecording gage at same site and datum.

REMARKS.--Records fair.

AVERAGE DISCHARGE.--13 years, 15.0 ft^3/s, 9.79 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 735 ft^3/s Oct. 1, 1981; maximum gage height, 7.20 ft Mar. 13, 1982, backwater from ice; minimum discharge, 1.9 ft^3/s Oct. 13, 1978; minimum gage height, 1.01 ft Aug. 9, 17, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October to December, 72 ft^3/s Dec. 13, gage height, 2.33 ft, no peak discharge above base of 250 ft^3/s; maximum gage height, 2.46 ft Nov. 24; minimum daily discharge, 2.8 ft^3/s Oct. 7; minimum gage height, 1.09 ft Oct. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.7	4.9	6.8									
2	3.7	5.4	5.8									
3	3.6	14	5.6									
4	3.6	11	5.5									
5	4.0	6.7	6.6									
6	3.1	5.1	8.8									
7	2.8	4.7	13									
8	3.6	4.8	11									
9	6.7	4.6	9.7									
10	6.1	4.5	8.7									
11	3.7	6.9	8.6									
12	3.3	17	31									
13	8.5	9.3	46									
14	33	6.7	16									
15	8.8	6.3	14									
16	5.6	25	11									
17	4.6	34	10									
18	4.3	13	9.2									
19	4.2	9.0	8.5									
20	4.4	13	8.0									
21	5.2	13	7.6									
22	5.0	8.9	7.2									
23	17	9.7	6.8									
24	18	36	6.5									
25	8.1	13	6.2									
26	6.1	8.1	6.0									
27	5.0	6.6	5.7									
28	5.6	12	5.5									
29	5.2	17	5.3									
30	4.9	8.8	5.2									
31	5.2	---	5.1									
TOTAL	206.6	339.0	310.9	---	---	---	---	---	---	---	---	---
MEAN	6.66	11.3	10.0	---	---	---	---	---	---	---	---	---
MAX	33	36	46	---	---	---	---	---	---	---	---	---
MIN	2.8	4.5	5.1	---	---	---	---	---	---	---	---	---
CFSM	.32	.54	.48	---	---	---	---	---	---	---	---	---
IN.	.37	.61	.56	---	---	---	---	---	---	---	---	---

CAL YR 1983 TOTAL 5149.8 MEAN 14.1 MAX 215 MIN 2.6 CFSM .68 IN 9.21

04149000 FLINT RIVER NEAR FOSTERS, MI

LOCATION.--Lat 43°18'30", long 83°57'13", in SE1/4 SE1/4 sec.35, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 20 ft downstream from bridge on State Highway 13, 2 mi west of Fosters and 6.5 mi downstream from Silver Creek. Records include flow of Birch Run.

DRAINAGE AREA.--1,188 mi^2, includes that of Birch Run above State Highway 13.

PERIOD OF RECORD.--October 1939 to September 1984 (discontinued). Monthly discharge only for some periods, published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-20, 1922-27 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1940, 1942, 1943-44(M), 1945, 1946-47(M), 1948-50. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft, from topographic map. Prior to Oct. 1, 1969, nonrecording gage at site 2.2 mi upstream at datum 582.22 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation by reservoirs above Flint. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--45 years, 743 ft^3/s, 8.49 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,000 ft^3/s Apr. 7, 1947 (including flow by-passing gage); maximum gage height, 18.6 ft Feb. 2, 1968, site and datum then in use; minimum discharge observed, 27 ft^3/s Aug. 6, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of March 1904, reached a stage of 18.4 ft from U.S. Weather Bureau data, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,020 ft^3/s Mar. 22, gage height, 13.86 ft; minimum, 106 ft^3/s Aug. 13, 14, gage height, 1.67 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	220	349	1580	620	370	987	1680	1100	1840	338	217	271
2	211	366	1500	630	370	940	1540	1070	1530	295	212	232
3	207	530	1780	640	380	647	1510	982	1400	279	212	229
4	225	557	1680	640	470	626	1470	612	1130	259	246	222
5	319	556	1230	600	550	617	961	604	1060	265	308	220
6	459	864	519	550	500	623	1030	657	1050	256	416	222
7	465	923	582	450	480	600	1090	677	924	322	241	201
8	440	484	512	370	450	570	937	659	808	257	133	248
9	363	252	1620	340	430	540	809	618	606	236	385	233
10	273	309	1620	330	450	500	755	597	711	242	580	403
11	254	450	1460	330	600	480	722	560	671	345	325	347
12	235	495	1430	320	1000	460	830	536	582	554	140	424
13	321	549	1390	320	2840	450	943	540	516	316	111	319
14	820	536	1340	320	2960	600	987	956	468	278	176	1040
15	470	346	1110	330	2480	450	1030	810	423	347	200	820
16	359	557	972	330	2130	1320	1330	734	382	455	196	592
17	308	1170	823	340	2380	2750	1410	717	405	468	190	466
18	386	711	750	340	2540	1830	1960	682	452	498	190	375
19	263	733	650	350	2130	1640	1990	818	495	436	238	320
20	248	1290	600	340	1990	1820	2090	665	579	276	243	305
21	260	1330	600	340	1870	2860	1880	466	717	964	226	284
22	278	479	600	350	1690	4820	1630	506	827	684	224	261
23	452	376	600	350	1440	3930	1730	1870	808	319	245	236
24	525	1200	600	350	1420	3430	1820	1660	718	410	244	225
25	357	1300	600	360	1330	3380	1800	1400	621	390	234	225
26	339	1220	580	360	1220	3360	1580	2340	558	271	224	326
27	351	1270	560	370	1140	2980	1510	3140	484	250	217	272
28	349	1460	620	370	1100	2580	1860	2260	429	245	228	231
29	309	1600	620	370	701	2350	1450	2470	394	236	291	226
30	358	1650	660	360	---	2110	1310	2440	366	212	452	220
31	352	---	630	360	---	2000	---	2150	---	208	432	---
TOTAL	10776	23912	29818	12430	37411	52250	41644	35296	21954	10911	7976	9995
MEAN	348	797	962	401	1290	1685	1388	1139	732	352	257	333
MAX	820	1650	1780	640	2960	4820	2090	3140	1840	964	580	1040
MIN	207	252	512	320	370	450	722	466	366	208	111	201

CAL YR 1983 TOTAL 292014 MEAN 800 MAX 5110 MIN 172
WTR YR 1984 TOTAL 294373 MEAN 804 MAX 4820 MIN 111

04149500 FLINT RIVER NEAR ALICIA, MI

LOCATION.--Lat 43°18'40", long 84°02'00", in SE1/4 sec.31, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 100 ft downstream from the Prairie Farms Association flood-pumping station, 2.8 mi north of Alicia, and 4 mi upstream from mouth.

PERIOD OF RECORD.--November 1948 to September 1984 (gage heights only) (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 577.00 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Records represent stages in the Shiawassee Flats area.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 13.70 ft Apr. 3, 1960; minimum, less than 1.5 ft during many days in 1949, 1958, 1959, 1963, 1964, 1966-69.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 8.48 ft Mar. 23; minimum, 2.49 ft Oct. 14.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.21	3.96	4.70	3.86	3.42	4.71	5.34	4.21	6.89	4.95	4.80	4.78
2	4.01	3.96	4.49	3.80	3.40	4.54	5.02	4.89	6.32	4.80	4.86	4.77
3	3.90	4.78	4.82	3.75	3.34	4.26	5.04	5.05	5.76	4.61	4.88	5.12
4	4.72	4.98	4.77	4.09	3.86	3.93	5.08	5.08	5.32	4.73	4.79	4.88
5	4.44	4.45	4.37	4.08	3.88	3.69	5.37	4.48	5.08	4.78	4.65	4.93
6	4.14	4.04	4.64	4.02	3.85	3.91	5.27	4.43	4.90	4.64	4.56	4.72
7	4.44	4.16	4.22	4.04	3.83	4.07	5.38	4.28	4.82	4.86	4.86	4.07
8	4.48	3.76	4.01	3.83	3.75	3.99	5.26	4.25	4.48	4.76	4.85	3.92
9	4.74	4.11	4.61	4.02	3.83	3.94	5.05	4.25	4.77	4.62	4.66	4.21
10	4.32	4.28	4.75	3.88	3.76	3.93	4.82	4.39	4.60	4.75	4.98	4.47
11	4.00	5.79	4.74	3.87	3.81	3.95	4.62	4.20	4.79	5.00	5.33	4.77
12	3.88	4.78	4.52	3.78	4.29	4.02	4.51	4.34	4.58	5.06	5.17	4.65
13	4.19	4.05	5.33	3.73	6.22	3.96	4.35	4.76	4.70	4.87	4.96	4.33
14	3.23	3.70	5.58	3.77	7.74	3.91	4.57	4.64	5.00	4.70	4.79	5.14
15	4.72	4.11	5.24	3.80	7.72	3.75	5.07	4.95	4.95	4.68	4.72	5.14
16	4.06	5.05	4.95	3.54	7.74	5.05	5.35	4.77	4.69	4.82	4.91	4.72
17	4.11	4.60	4.76	3.55	7.72	6.61	5.87	4.54	4.80	4.70	4.85	4.69
18	4.38	4.20	4.69	3.55	7.48	6.34	6.84	4.28	5.40	4.99	4.72	4.40
19	4.63	4.05	4.54	3.55	7.04	5.74	7.15	4.45	6.29	4.75	5.45	4.60
20	4.72	3.82	4.32	3.55	6.79	5.43	7.03	4.65	6.72	4.84	4.72	4.57
21	4.44	3.49	4.27	3.55	6.74	6.23	6.89	4.42	6.43	5.11	4.45	4.89
22	4.23	4.25	3.75	3.55	6.36	8.01	6.40	4.19	5.76	4.89	4.59	4.52
23	4.57	4.14	3.91	3.54	5.73	8.45	6.11	5.45	5.24	4.49	5.07	4.50
24	4.72	3.75	4.14	3.36	5.48	8.30	6.36	5.97	4.87	5.02	4.88	4.57
25	4.31	4.35	4.19	3.29	5.35	7.96	6.42	5.71	5.09	5.05	4.66	4.25
26	4.46	4.70	4.15	3.69	5.02	7.66	6.09	6.24	4.77	4.87	4.49	4.90
27	4.08	4.99	4.08	3.45	4.96	7.31	5.60	7.17	4.31	5.27	4.32	4.69
28	3.56	5.28	3.92	3.54	5.87	7.14	5.43	7.12	4.83	5.06	4.44	4.39
29	4.68	4.34	3.93	3.33	5.18	7.01	5.22	7.62	5.02	4.84	4.51	4.74
30	4.04	4.29	3.97	3.64	---	6.36	4.58	7.68	5.07	4.72	4.71	4.61
31	4.09	---	3.79	3.51	---	5.88	---	7.38	---	4.60	4.71	---
MEAN	4.27	4.34	4.46	3.69	5.32	5.49	5.54	5.16	5.21	4.83	4.79	4.63
MAX	4.74	5.79	5.58	4.09	7.74	8.45	7.15	7.68	6.89	5.27	5.45	5.14
MIN	3.23	3.49	3.75	3.29	3.34	3.69	4.35	4.19	4.31	4.49	4.32	3.92

04150500 CASS RIVER AT CASS CITY, MI

LOCATION.--Lat 43°35'03", long 83°10'34", in NE1/4 NE1/4 sec.4, T.13 N., R.11 E., Tuscola County, Hydrologic Unit 04080205, on left bank 600 ft downstream from bridge on Cemetery Road, 0.3 mi downstream from confluence of North and South Branches, and 1.1 mi south of Cass City.

DRAINAGE AREA.--359 mi^2.

PERIOD OF RECORD.--October 1947 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1949-50. WSP 1727: 1948(M), 1950. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 697.92 ft National Geodetic Vertical Datum of 1929. Prior to Nov. 14, 1952, nonrecording gage at site 600 ft upstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 207 ft^3/s, 7.83 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,460 ft^3/s Mar. 20, 1948, gage height, 15.80 ft, from graph based on gage readings; minimum, 0.50 ft^3/s Sept. 26, 1948.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,400 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Nov. 17	1200	1,560	8.91	Mar. 26	1000	1,960	9.17
Dec. 13	1400	1,820	9.34	Apr. 18	0700	2,000	9.25
Feb. 14	0800	4,500	12.20	May 26	2400	1,960	9.54
Mar. 17	0300	2,540	9.97	June 18	1300	*5,080	*13.27
Mar. 22	0100	3,450	11.08				

Minimum discharge, 15 ft^3/s Aug. 27, 28, gage height, 4.64 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	69	239	64	65	130	410	156	522	93	18	223
2	21	69	210	64	65	120	373	140	387	81	17	310
3	20	74	170	64	65	115	339	129	321	73	17	966
4	20	104	160	64	65	110	304	120	283	65	24	771
5	20	108	148	62	66	105	446	111	233	59	178	307
6	30	91	150	62	68	100	974	103	324	59	119	167
7	34	80	155	62	68	95	781	97	343	60	54	111
8	33	73	155	62	70	90	575	93	271	56	92	83
9	30	68	158	62	72	80	426	88	192	51	59	72
10	28	65	160	62	76	75	332	85	169	50	64	80
11	27	80	165	62	80	70	277	82	163	242	65	166
12	25	103	389	62	130	65	240	80	130	691	45	202
13	89	128	1650	62	1700	62	216	85	119	386	33	238
14	1060	144	1330	62	4250	62	208	124	106	224	27	281
15	889	152	999	61	2870	64	677	136	99	124	23	315
16	431	577	700	61	1950	750	1080	127	92	92	20	222
17	257	1470	461	60	1390	2130	1370	113	1320	72	19	158
18	178	996	270	60	1050	1170	1880	104	4720	59	19	111
19	130	596	200	59	1020	814	1380	100	3540	50	22	87
20	100	509	150	59	1030	508	936	97	1680	43	40	72
21	83	561	120	59	775	1920	641	91	787	38	30	59
22	74	442	110	59	587	2680	459	110	451	52	22	51
23	105	415	100	59	483	1450	391	671	300	37	18	45
24	199	982	86	59	426	1070	412	850	258	29	19	43
25	205	768	78	59	363	1140	400	612	217	25	18	43
26	169	479	72	59	250	1800	340	1340	191	22	17	45
27	139	340	68	59	180	1550	282	1500	166	22	15	45
28	119	279	66	59	160	1080	247	767	139	21	23	42
29	102	310	65	59	150	777	204	697	119	21	250	39
30	85	316	64	60	---	589	177	727	103	19	414	39
31	72	---	64	60	---	473	---	645	---	18	417	---
TOTAL	4797	10448	8912	1887	19524	21244	16777	10180	17745	2934	2198	5393
MEAN	155	348	287	60.9	673	685	559	328	592	94.6	70.9	180
MAX	1060	1470	1650	64	4250	2680	1880	1500	4720	691	417	966
MIN	20	65	64	59	65	62	177	80	92	18	15	39
CFSM	.43	.97	.80	.17	1.88	1.91	1.56	.91	1.65	.26	.20	.50
IN.	.50	1.08	.92	.20	2.02	2.20	1.74	1.05	1.84	.30	.23	.56

CAL YR 1983 TOTAL 90505.6 MEAN 248 MAX 2690 MIN 9.6 CFSM .69 IN 9.38
WTR YR 1984 TOTAL 122039.0 MEAN 333 MAX 4720 MIN 15 CFSM .93 IN 12.65

04150800 CASS RIVER AT WAHJAMEGA, MI

LOCATION.--Lat 43°27'02", long 83°26'29", in NW1/4 NW1/4 sec.20, T.12 N., R.9 E., Tuscola County, Hydrologic Unit 04080205, on right bank 90 ft upstream from bridge on Chambers Road, on grounds of Caro Regional Center at Wahjamega, 1.9 mi downstream from Michigan Sugar Co. dam, and 40 mi upstream from mouth.

DRAINAGE AREA.--645 mi^2.

PERIOD OF RECORD.--October 1968 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 650 ft,from topographic map. Prior to June 19, 1969, nonrecording gage at bridge 90 ft downstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation by dam at Michigan Sugar Co., 1.9 mi above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--16 years, 420 ft^3/s, 8.84 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,700 ft^3/s Mar. 6, 1976, gage height, 19.92 ft; minimum, 20 ft^3/s Oct. 2, 3, 1979.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 2,400 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 14	0100	2,820	10.46	Mar. 26	1800	2,850	10.52
Feb. 14	2100	6,440	15.76	Apr. 18	1300	3,040	10.86
Mar. 17	2100	2,990	10.78	May 27	0600	3,290	11.30
Mar. 22	1500	4,740	13.74	June 19	0100	*8,190	*17.37

Minimum discharge, 56 ft^3/s Aug. 3, gage height, 3.07 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	72	164	535	130	130	300	818	358	1150	189	59	436
2	72	166	434	130	130	272	734	324	846	173	58	565
3	64	170	385	130	130	277	669	300	685	160	57	1150
4	66	185	363	125	130	268	610	278	619	146	77	1360
5	63	211	344	125	130	296	749	266	514	132	102	721
6	62	204	364	125	140	270	1710	250	523	131	219	398
7	69	187	381	125	140	230	1590	237	601	133	166	282
8	80	172	307	125	140	238	1120	226	537	126	128	230
9	80	142	419	125	150	213	847	219	400	119	148	203
10	74	160	375	125	150	189	670	220	316	133	250	227
11	71	185	345	125	160	166	562	207	294	324	237	330
12	71	217	533	125	300	151	491	199	256	963	184	381
13	126	252	2120	125	1700	153	449	215	238	850	141	419
14	754	274	2520	125	5280	148	447	314	209	491	114	484
15	1480	289	1830	120	5150	157	898	344	190	322	96	501
16	816	655	1430	120	3290	951	1810	306	175	234	88	435
17	493	1990	900	120	2160	2650	2090	270	1370	186	78	336
18	348	1980	600	120	1660	2010	2930	246	6460	158	95	266
19	270	1190	370	120	1550	1250	2400	233	7200	135	139	218
20	218	926	270	120	1630	916	1710	215	3920	121	123	187
21	202	962	250	120	1310	1950	1220	201	1650	110	113	164
22	183	888	220	120	1010	4310	903	231	933	102	96	147
23	202	727	200	120	831	2850	779	1540	614	107	83	136
24	294	1300	170	120	731	2010	821	1900	476	95	75	130
25	375	1470	150	120	633	1920	824	1240	411	82	71	132
26	334	969	140	120	532	2630	716	2130	336	74	69	138
27	283	701	135	120	438	2640	610	3030	300	71	66	143
28	247	588	130	120	357	2080	531	1680	265	68	110	139
29	216	596	130	120	350	1550	453	1390	232	66	150	130
30	190	626	130	120	---	1200	383	1500	208	63	464	123
31	173	---	130	120	---	958	---	1450	---	60	584	---
TOTAL	8048	18546	16610	3805	30442	35203	30544	21519	31928	6124	4440	10511
MEAN	260	618	536	123	1050	1136	1018	694	1064	198	143	350
MAX	1480	1990	2520	130	5280	4310	2930	3030	7200	963	584	1360
MIN	62	142	130	120	130	148	383	199	175	60	57	123
CFSM	.40	.96	.83	.19	1.63	1.76	1.58	1.08	1.65	.31	.22	.54
IN.	.46	1.07	.96	.22	1.76	2.03	1.76	1.24	1.84	.35	.26	.61

CAL YR 1983 TOTAL 167834 MEAN 460 MAX 3900 MIN 48 CFSM .71 IN 9.68
WTR YR 1984 TOTAL 217720 MEAN 595 MAX 7200 MIN 57 CFSM .92 IN 12.56

04151500 CASS RIVER AT FRANKENMUTH, MI

LOCATION.--Lat 43°19'40", long 83°44'53", in NW1/4 SE1/4 sec.27, T.11 N., R.6 E., Saginaw County, Hydrologic Unit 04080205, on right bank 2,000 ft below dam in Frankenmuth, 3,600 ft above highway bridge on Dehmel Road, 3.4 mi upstream from Dead Creek, and 17 mi upstream from mouth.

DRAINAGE AREA.--841 mi^2.

PERIOD OF RECORD.--February 1908 to March 1909, July 1935 to September 1936, June 1939 to current year.

REVISED RECORDS.--WSP 1307: 1936(M), 1940(M). WSP 1727: 1952. WSP 1911: 1952. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 583.96 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). February 1908 to March 1909, nonrecording gage at site 2,000 ft upstream at datum 1.81 ft lower. July 18 to September 11, 1935, nonrecording gage, Sept. 12, 1935, to Sept. 30, 1936, June 20, 1939, to Sept. 30, 1949, water-stage recorder, at site 3,600 ft downstream at datum 0.04 ft higher.

REMARKS.--Records good except those for the winter period, which are poor. Occasional regulation by dams above station. Prior to 1950, regulation at low and medium flows by mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--46 years, 490 ft^3/s, 7.91 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,700 ft^3/s Mar. 18, 1942, gage height, 20.88 ft, site and datum then in use; maximum gage height, 23.37 ft Feb. 3, 1968, backwater from ice; minimum daily discharge, about 1.5 ft^3/s Aug. 6, 1944.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 14	1900	8,180	*a19.37	May 27	1300	3,980	14.36
Mar. 22	2400	5,590	16.26	June 19	1400	*8,720	19.20
Apr. 18	2000	3,590	13.83				

a Ice jam.

Minimum discharge, 77 ft^3/s Aug. 2, gage height, 3.65 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	217	707	170	165	349	1030	491	1620	259	81	546
2	95	226	589	170	170	408	914	452	1180	234	80	532
3	92	238	517	170	170	383	829	420	927	218	80	964
4	93	247	470	165	170	371	759	399	796	198	106	1380
5	99	261	476	165	170	379	865	373	690	180	126	1050
6	95	272	499	165	180	383	1720	353	648	179	162	586
7	99	255	540	165	180	318	2100	333	691	177	250	408
8	114	234	476	165	180	287	1530	322	667	168	246	326
9	118	224	494	165	190	296	1140	308	553	158	250	278
10	108	216	542	165	200	266	893	302	443	169	395	281
11	101	242	484	165	240	229	740	296	385	589	390	352
12	107	291	728	165	530	198	645	278	358	969	297	448
13	266	316	1800	165	1650	202	596	292	317	1150	228	478
14	742	337	2940	165	4500	222	593	449	293	734	182	532
15	1430	364	2390	165	7780	222	800	496	262	494	148	553
16	895	609	1850	160	5110	937	1920	449	237	367	125	541
17	581	1630	1290	160	2990	2520	2400	395	993	286	109	448
18	440	2310	802	160	2190	2820	3330	357	5890	238	123	367
19	353	1610	500	160	1930	1700	3120	332	8460	202	212	301
20	295	1150	400	160	1980	1250	2270	307	6650	175	187	254
21	269	1110	325	160	1750	1990	1640	285	2780	159	163	218
22	262	1090	280	160	1350	4700	1200	362	1350	143	149	188
23	300	942	250	160	1090	4550	1080	1950	855	133	128	170
24	362	1180	220	160	940	2830	1080	2720	640	137	111	161
25	448	1710	200	160	826	2420	1080	1890	543	121	99	171
26	421	1300	190	160	710	2620	955	2450	466	109	91	193
27	367	916	180	160	594	2980	828	3830	406	101	86	186
28	322	774	175	160	510	2570	722	2680	367	98	101	185
29	287	759	170	160	420	1990	612	2070	322	89	152	174
30	251	763	170	160	---	1540	533	2090	289	86	319	161
31	227	---	170	160	---	1230	---	2000	---	86	583	---
TOTAL	9739	21793	20824	5050	38865	43160	37924	29731	40078	8406	5759	12432
MEAN	314	726	672	163	1340	1392	1264	959	1336	271	186	414
MAX	1430	2310	2940	170	7780	4700	3330	3830	8460	1150	583	1380
MIN	92	216	170	160	165	198	533	278	237	86	80	161
CFSM	.37	.86	.80	.19	1.59	1.66	1.50	1.14	1.59	.32	.22	.49
IN.	.43	.96	.92	.22	1.72	1.91	1.68	1.32	1.77	.37	.25	.55

CAL YR 1983 TOTAL 217910 MEAN 597 MAX 4590 MIN 59 CFSM .71 IN 9.64
WTR YR 1984 TOTAL 273761 MEAN 748 MAX 8460 MIN 80 CFSM .89 IN 12.11

04154000 CHIPPEWA RIVER NEAR MOUNT PLEASANT, MI

LOCATION.--Lat 43°37'32", long 84°42'28", in NW1/4 NW1/4 sec.8, T.14 N., R.3 W., Isabella County, Hydrologic Unit 04080202, on right bank 12 ft downstream from bridge on South Leaton Road, 3.8 mi northeast of Mount Pleasant, and 36 mi upstream from mouth.

DRAINAGE AREA.--416 mi^2.

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to current year. Monthly discharge only for some periods published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-27, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1337: 1931, 1933-40, 1945, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 710.38 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 21, 1938, nonrecording gage at site 30 ft upstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Diurnal fluctuation below 750 ft^3/s caused by powerplant at Mount Pleasant prior to 1962, occasional regulation at low flow since. Since July 30, 1968, occasional regulation by control structures on lake outlets. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--53 years, 308 ft^3/s, 10.05 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,960 ft^3/s Mar. 8, 1946, gage height, 12.78 ft; minimum, 12 ft^3/s Aug. 18, 1945; minimum daily, 19 ft^3/s Aug. 16, 1936; minimum gage height, 2.70 ft Oct. 8, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 15	1500	*1,450	*6.94	June 18	1200	1,300	6.54

Minimum discharge, 136 ft^3/s Aug. 16; minimum gage height, 2.84 ft Aug. 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	235	342	468	245	210	453	402	417	584	261	151	168
2	232	348	441	245	210	402	384	396	522	253	143	230
3	232	342	423	245	210	393	381	384	474	244	140	254
4	237	333	411	245	210	384	375	372	437	231	144	268
5	248	330	402	240	210	378	366	360	431	224	143	245
6	268	324	405	240	210	369	384	348	422	234	145	229
7	274	321	399	240	210	363	372	333	378	236	147	223
8	282	316	390	240	210	366	357	333	360	230	147	216
9	279	313	375	240	210	360	345	316	347	222	150	221
10	268	307	366	235	220	354	342	310	370	220	146	235
11	263	307	363	235	240	351	333	301	350	232	143	254
12	255	301	465	235	300	345	327	296	317	237	141	253
13	290	296	540	235	500	330	333	324	305	227	140	245
14	390	293	495	235	1220	318	354	402	286	215	140	228
15	384	293	477	230	1380	327	378	417	265	203	140	220
16	399	301	447	230	1360	668	501	414	262	196	139	213
17	369	299	420	225	1100	655	683	381	519	187	140	207
18	330	299	400	220	751	468	745	353	1130	177	139	200
19	310	304	380	215	821	420	674	340	1080	171	144	197
20	333	324	360	215	877	435	612	318	997	173	140	195
21	354	345	340	215	717	717	555	309	780	166	140	193
22	378	330	320	215	640	943	498	360	615	164	142	191
23	414	408	300	215	627	627	534	667	504	163	142	191
24	420	742	285	215	609	606	549	678	429	166	143	195
25	399	591	270	215	561	552	507	699	375	161	143	201
26	384	492	260	215	513	516	474	910	336	158	143	209
27	372	447	250	215	480	489	450	855	322	159	145	213
28	366	477	250	215	456	474	423	800	303	163	152	208
29	357	597	250	215	435	459	381	880	285	156	155	205
30	351	522	250	210	---	447	399	789	272	156	168	193
31	345	---	250	210	---	438	---	668	---	155	171	---
TOTAL	10018	11244	11452	7045	15697	14407	13418	14730	14057	6140	4506	6500
MEAN	323	375	369	227	541	465	447	475	469	198	145	217
MAX	420	742	540	245	1380	943	745	910	1130	261	171	268
MIN	232	293	250	210	210	318	327	296	262	155	139	168
CFSM	.78	.90	.89	.55	1.30	1.12	1.08	1.14	1.13	.48	.35	.52
IN.	.90	1.01	1.02	.63	1.40	1.29	1.20	1.32	1.26	.55	.40	.58

CAL YR 1983 TOTAL 138310 MEAN 379 MAX 1660 MIN 132 CFSM .91 IN 12.37
WTR YR 1984 TOTAL 129214 MEAN 353 MAX 1380 MIN 139 CFSM .85 IN 11.55

04155000 PINE RIVER AT ALMA, MI

LOCATION.--Lat 43°22'46", long 84°39'20", in SW1/4 SE1/4 sec.34, T.12 N., R.3 W., Gratiot County, Hydrologic Unit 04080202, on right bank 270 ft downstream from Superior Street Bridge in Alma, 0.6 mi downstream from municipal reservoir, and 38 mi upstream from mouth.

DRAINAGE AREA.--288 mi^2.

PERIOD OF RECORD.--October 1930 to current year. Gage-height records for flood seasons collected in this vicinity 1910-28 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1307: 1945(M). WSP 1337: 1931, 1932-34(M), 1936, 1939, 1945, 1949.

GAGE.--Water-stage recorder. Datum of gage is 718.37 ft National Geodetic Vertical Datum of 1929. Prior to Dec. 10, 1930, nonrecording gage at Superior Street Bridge at different datum. Dec. 10, 1930, to June 15, 1938, nonrecording gage at site 70 ft downstream from bridge and June 16 to Oct. 25, 1938, nonrecording gage at bridge at present datum.

REMARKS.--Records good except those for the winter period, and those for the period of no gage-height record, Dec. 17 to Jan. 24, which are poor. Occasional regulation caused by dam 0.6 mi above station and by variable backwater from powerplant at St. Louis, 5.2 mi below station. About 4.5 ft^3/s diverted above station for municipal and industrial use; sewage effluent is returned below station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--54 years, 215 ft^3/s, 10.14 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,400 ft^3/s Mar. 19, 1948, gage height, 10.81 ft; minimum daily, 0.40 ft^3/s Sept. 6, 1964, caused by closing dam during construction of waterworks.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 936 ft^3/s Feb. 28, gage height, 5.31 ft; minimum, 60 ft^3/s Aug. 23, 25, 26, gage height, 0.68 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	157	138	377	135	115	301	349	279	603	163	88	104
2	141	132	359	130	115	298	321	284	531	151	76	143
3	139	142	353	130	110	290	313	293	441	144	70	174
4	126	165	330	130	110	264	316	296	382	126	84	165
5	111	170	283	130	110	236	295	270	334	114	96	166
6	112	155	280	125	110	205	329	252	303	116	103	123
7	113	143	281	125	110	209	338	263	301	122	99	113
8	115	146	236	125	110	209	322	243	305	158	95	106
9	124	152	232	120	110	208	335	226	260	178	114	126
10	141	152	230	120	115	207	323	225	231	143	106	149
11	151	158	266	120	120	206	298	228	172	382	95	131
12	163	133	330	120	170	206	273	203	191	359	102	146
13	168	122	416	120	442	203	276	226	190	342	98	154
14	173	133	415	120	670	181	258	266	172	262	76	139
15	186	136	442	120	615	184	281	283	160	181	73	112
16	205	145	449	120	662	340	320	321	150	157	69	98
17	203	159	389	120	771	377	402	313	299	139	64	104
18	182	179	336	120	774	350	452	282	365	122	66	107
19	188	165	310	120	827	399	451	231	338	112	73	105
20	188	162	280	120	754	511	462	212	418	105	78	102
21	156	201	250	120	667	609	425	221	539	103	79	95
22	152	199	230	120	649	619	386	292	538	120	66	89
23	179	248	210	120	601	542	464	549	434	127	62	104
24	199	310	190	120	541	668	477	503	311	93	63	116
25	229	318	170	120	469	690	471	567	241	86	63	111
26	222	324	160	120	409	616	506	642	203	89	62	105
27	206	397	150	120	396	562	493	579	192	87	65	101
28	189	473	140	120	473	502	441	572	176	99	68	96
29	167	450	135	120	314	460	352	782	168	116	75	103
30	160	383	135	115	---	421	322	693	165	118	87	109
31	154	---	135	115	---	383	---	650	---	100	89	---
TOTAL	5099	6290	8499	3780	11439	11456	11051	11246	9113	4714	2504	3596
MEAN	164	210	274	122	394	370	368	363	304	152	80.8	120
MAX	229	473	449	135	827	690	506	782	603	382	114	174
MIN	111	122	135	115	110	181	258	203	150	86	62	89
CFSM	.57	.73	.95	.42	1.37	1.29	1.28	1.26	1.06	.53	.28	.42
IN.	.66	.81	1.10	.49	1.48	1.48	1.43	1.45	1.18	.61	.32	.46

CAL YR 1983 TOTAL 98791 MEAN 271 MAX 1280 MIN 40 CFSM .94 IN 12.76
WTR YR 1984 TOTAL 88787 MEAN 243 MAX 827 MIN 62 CFSM .84 IN 11.47

04155500 PINE RIVER NEAR MIDLAND, MI

LOCATION.--Lat 43°33'52", long 84°22'09", in SW1/4 NW1/4 sec.4, T.13 N., R.1 E., Midland County, Hydrologic Unit 04080202, on left bank at downstream side of bridge on Meridian Road, 7.2 mi southwest of Midland, and 7.8 mi upstream from Chippewa River.

DRAINAGE AREA.--390 mi^2, approximately.

PERIOD OF RECORD.--May 1934 to September 1938, February 1948 to current year.

REVISED RECORDS.--WSP 1207: Drainage area. WSP 1307: 1935(M). WSP 1337: 1936-38, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 623.94 ft National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1938, nonrecording gage at same site, at datum 5.55 ft lower. Feb. 3, 1948, to Dec. 13, 1951, nonrecording gage at present site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Regulation at low and medium flows by hydroelectric powerplant at St. Louis. Some diversion above station for irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 298 ft^3/s, 10.38 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,360 ft^3/s Mar. 20, 1948, gage height, 10.00 ft, from graph based on gage readings; maximum gage height, 12.08 ft Feb. 2, 1968, backwater from ice; minimum discharge not determined.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 18	1300	ice jam	*6.39	May 29	1300	1,400	5.15
Mar. 22	1900	*1,410	5.10	June 18	0500	1,360	5.23
May 23	1100	1,250	4.92				

Minimum discharge, 61 ft^3/s July 26, Aug. 16, 21, 22, 23; minimum gage height, 2.33 ft Aug. 16, 21, 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	114	203	436	210	150	499	508	324	805	167	129	66
2	129	220	527	180	135	415	463	319	691	158	131	86
3	146	156	457	250	175	305	391	319	625	168	126	101
4	128	132	448	250	150	275	358	316	367	174	66	183
5	177	148	444	240	160	309	551	362	538	147	67	175
6	122	210	291	230	170	299	323	325	477	164	69	258
7	114	206	347	220	190	186	450	225	353	128	67	132
8	135	176	419	220	170	251	521	300	347	69	131	130
9	89	125	373	220	160	227	346	275	411	70	72	70
10	87	193	359	220	230	304	386	246	348	205	135	73
11	117	173	368	210	310	234	381	231	221	203	131	174
12	98	199	428	190	170	225	372	302	226	624	68	154
13	146	199	549	220	280	388	309	251	228	378	68	130
14	199	137	692	190	830	260	465	271	251	397	126	137
15	178	164	526	170	1000	279	366	348	223	351	123	170
16	216	170	525	160	780	392	396	298	227	174	69	153
17	213	180	621	150	780	812	543	410	406	200	71	86
18	218	161	554	150	1050	741	746	351	1030	150	74	91
19	168	238	350	150	1050	446	716	383	642	149	65	96
20	161	276	250	140	1020	539	571	286	467	125	66	103
21	238	137	200	130	950	1000	620	193	591	140	64	102
22	170	253	200	115	900	1080	558	331	606	66	108	108
23	313	288	250	200	830	756	624	1100	582	70	62	76
24	224	440	200	105	750	759	883	861	469	163	63	76
25	245	493	200	125	650	953	668	778	323	151	64	120
26	273	526	250	110	600	806	616	831	278	63	64	118
27	269	364	200	170	373	672	650	851	215	132	64	116
28	235	516	180	180	608	694	538	718	220	65	67	116
29	224	670	170	200	458	581	552	1220	199	64	66	145
30	186	566	160	220	---	537	480	1120	174	69	91	166
31	170	---	210	180	---	526	---	862	---	128	137	---
TOTAL	5502	7919	11184	5705	15079	15750	15351	15007	12540	5312	2704	3711
MEAN	177	264	361	184	520	508	512	484	418	171	87.2	124
MAX	313	670	692	250	1050	1080	883	1220	1030	624	137	258
MIN	87	125	160	105	135	186	309	193	174	63	62	66
CFSM	.45	.68	.93	.47	1.33	1.30	1.31	1.24	1.07	.44	.22	.32
IN.	.52	.76	1.07	.54	1.44	1.50	1.46	1.43	1.20	.51	.26	.35

CAL YR 1983 TOTAL 127142 MEAN 348 MAX 2020 MIN 57 CFSM .89 IN 12.13
WTR YR 1984 TOTAL 115764 MEAN 316 MAX 1220 MIN 62 CFSM .81 IN 11.04

04156000 TITTABAWASSEE RIVER AT MIDLAND, MI

LOCATION.--Lat 43°35'43", long 84°14'08", in NW1/4 NE1/4 sec.28, T.14 N., R.2 E., Midland County, Hydrologic Unit 04080201, on right bank 2,000 ft downstream from dam at Dow Chemical Co. powerplant in Midland, 0.7 mi upstream from Bullock Creek, 1.4 mi downstream from Chippewa River and 23 mi upstream from mouth.

DRAINAGE AREA.--2,400 mi^2, approximately.

PERIOD OF RECORD.--March 1936 to current year. Gage-height records for flood seasons collected in this vicinity 1910-26, 1928, and since 1946 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1045: 1945. WSP 1144: 1948.

GAGE.--Water-stage recorder. Datum of gage is 580.28 ft National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1955, at datum 10.00 ft higher.

REMARKS.--Records good except those for the winter period, which are poor. Water is diverted from river a short distance above station for industrial use. Small part returned to river 0.25 mi below station, remainder returned 1 mi below. Extremes and daily discharges not adjusted for diversion. Prior to May 20, 1970, discharge below 4,000 ft^3/s regulated by dam 2,000 ft above station; fixed crest dam since. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--48 years, 1,684 ft^3/s, 9.53 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 34,000 ft^3/s Mar. 21, 1948, gage height, 29.50 ft, current datum; minimuum, 39 ft^3/s Oct. 1, 1942; minimum daily, 111 ft^3/s Aug. 21, 1949; minimum gage height, 8.98 ft Aug. 26, 27, 1984.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since at least 1907, 29.7 ft Mar. 28, 1916, discharge, 34,800 ft^3/s, from information by U.S. Weather Bureau.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 7,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 15	--	8,240	ice jam	May 24	1100	8,280	18.23
Feb. 21	0400	*9,340	*19.29	May 26	2030	7,920	17.87
Apr. 18	0400	7,990	17.94	June 19	0200	8,840	18.79

Minimum discharge, 196 ft^3/s Aug. 26, 27, gage height, 8.98 ft; minimum daily, 228 ft^3/s Aug. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	573	870	3650	1140	1360	3380	1700	2390	4310	572	561	387
2	401	1260	2720	950	1330	3340	2360	2370	2480	695	565	512
3	770	1230	1450	910	1450	1540	2390	2300	1850	902	554	823
4	789	834	937	2470	910	893	2460	1930	2230	539	396	1200
5	1030	586	1830	2530	570	1640	2920	1280	2620	804	366	1820
6	1270	629	2020	2380	1170	2180	3960	1010	2710	1090	494	1170
7	1570	1090	1610	1060	1430	1910	4050	1700	2460	535	470	893
8	820	1600	1320	580	1680	1560	3430	1990	2260	419	498	632
9	464	1640	1230	900	1670	882	2620	1720	1500	913	458	487
10	1170	1730	840	1020	1520	851	2650	1210	959	1070	562	793
11	1460	1410	677	1030	1270	679	2460	1370	1390	1170	427	876
12	918	789	1860	630	1020	1450	2060	1010	1500	1260	335	944
13	1130	598	4080	695	2490	1570	2320	854	1400	1190	458	869
14	1600	1310	4450	530	6800	1370	1670	1940	1420	749	468	1040
15	1240	1220	3910	395	8000	1870	1620	2600	1230	686	457	515
16	874	1220	3330	620	7950	2860	4580	2540	647	667	405	442
17	1610	1140	1730	830	7130	4990	7170	2310	2550	838	407	729
18	1890	925	780	950	6580	3300	7830	2360	8030	809	340	723
19	1780	753	850	850	7030	2650	6240	1500	8480	614	294	723
20	1420	708	1550	800	8280	2980	5180	951	6320	578	396	723
21	1110	1390	1750	550	7980	3800	4690	1570	4870	445	368	715
22	791	1740	1850	400	5800	4050	4300	2370	3170	334	415	371
23	781	1790	2110	660	5480	3990	4110	6050	1900	635	396	304
24	1710	1860	1670	880	5000	3990	4990	7790	1350	775	372	588
25	2170	3040	1540	890	4580	3920	4550	5640	1760	811	317	724
26	1710	3100	1570	890	4220	4610	3310	7250	1380	712	228	730
27	1580	3500	2350	875	3800	4580	3170	7210	990	588	340	732
28	1500	3400	2620	575	3650	4430	2160	5170	891	412	244	929
29	978	3000	2640	430	3480	4210	1540	5850	1030	372	304	461
30	694	3270	2630	840	---	4030	2220	6320	658	504	418	434
31	984	---	1680	1210	---	2290	---	5400	---	548	507	---
TOTAL	36787	47632	63234	29470	113630	85795	104710	95955	74345	22236	12820	22289
MEAN	1187	1588	2040	951	3918	2768	3490	3095	2478	717	414	743
MAX	2170	3500	4450	2530	8280	4990	7830	7790	8480	1260	565	1820
MIN	401	586	677	395	570	679	1540	854	647	334	228	304
†	16.9	13.8	14.4	9.3	11.6	12.1	13.2	15.6	16.9	14.4	10.5	11.0
MEAN‡	1204	1602	2054	960	3930	2780	3503	3111	2495	731	424	754
CFSM‡	.50	.67	.86	.40	1.64	1.16	1.46	1.30	1.04	.30	.18	.31
IN‡	.58	.74	.99	.46	1.77	1.34	1.63	1.49	1.16	.35	.20	.35

CAL YR 1983 TOTAL 826082 MEAN 2263 MAX 13100 MIN 272 MEAN‡ 2279 CFSM‡ .95 IN‡ 12.89
WTR YR 1984 TOTAL 708903 MEAN 1937 MAX 8480 MIN 228 MEAN‡ 1950 CFSM‡ .81 IN‡ 11.06

† Diversion, in cubic feet per second, furnished by Dow Chemical Co.
‡ Adjusted for diversion.

04157000 SAGINAW RIVER AT SAGINAW, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°24'46", long 83°57'47", in NW1/4 SE1/4 sec.26, T.12 N., R.4 E., Saginaw County, Hydrologic Unit 04080206, on right bank 1,000 ft downstream from bridge on Rust Avenue in Saginaw, 1.9 mi downstream from Tittabawasee River and 20.3 mi upstream from mouth. Water quality sampling site at downstream side of bridge on Rust Avenue.

DRAINAGE AREA.--6,060 mi^2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--1904, 1908-9, 1912-13, 1916, 1918-19, 1929-30, and 1942 (flood discharge for certain periods only) in WSP 1084; December 1942 to current year (high-water periods only); no high water 1944, 1949, 1953, 1955, 1958, 1961, 1963, 1964, 1966. Gage-height records for flood seasons collected in this vicinity 1910-20, and for entire years since 1921 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 565.11 ft, International Great Lakes datum. Prior to Oct. 1, 1972, nonrecording gage at site 1.9 mi downstream at same datum. Auxiliary water-stage recorder on right bank near Aplin Beach, 19.9 mi downstream,

REMARKS.--Water-discharge records good. Considerable diversion through metropolitan area of Saginaw. National Weather Service gage-height telemark at station.

COOPERATION.--Auxiliary gage-height record furnished by NOAA-National Ocean Survey.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 68,000 ft^3/s Mar. 30, 1904, gage height, 24.9 ft, site then in use.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 17,700 ft^3/s Mar. 23; maximum daily gage height, 16.57 ft May 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1		---	---		---	---	---	---	11700			
2		---	---		---	---	---	---	10100			
3		---	---		---	---	---	---	---			
4		---	---		---	---	---	---	---			
5		---	---		---	---	---	---	---			
6		---	---		---	---	---	---	---			
7		---	---		---	---	---	---	---			
8		---	---		---	---	---	---	---			
9		---	---		---	---	---	---	---			
10		---	---		---	---	---	---	---			
11		---	---		---	---	---	---	---			
12		---	---		---	---	---	---	---			
13		---	---		---	---	---	---	---			
14		---	10900		12300	---	---	---	---			
15		---	15300		16000	---	---	---	---			
16		---	11200		17300	---	---	---	---			
17		---	---		17300	---	11200	---	---			
18		---	---		16000	---	13800	---	10800			
19		---	---		15400	---	14300	---	14100			
20		---	---		14800	10300	13700	---	15200			
21		---	---		14900	11800	11900	---	13800			
22		---	---		13800	15500	10800	---	---			
23		---	---		12100	17700	10400	---	---			
24		---	---		10800	17300	10800	11300	---			
25		---	---		10200	15900	10800	10400	---			
26		---	---		---	14900	---	10600	---			
27		---	---		---	14200	---	13100	---			
28		11100	---		10100	13000	---	11800	---			
29		---	---		---	13600	---	13300	---			
30		---	---		---	12100	---	14000	---			
31		---	---		---	10200	---	13300	---			

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: November 1974 to September 1981.

WATER TEMPERATURES: November 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor November 1976 to September 1981.

REMARKS.--Quarterly samples are collected as a cross-section sample at Rust Ave. bridge. Occasional winter samples are collected near Court St. bridge. Water-discharge measurements are made at times of sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE (water years 1975, 1977, 1979): Maximum recorded, 1,230 micromhos Jan. 5, 1977; minimum recorded, 224 micromhos Mar. 13, 1977.

WATER TEMPERATURES (water years 1975-77, 1979): Maximum, 30.0°C July 10, 14, 20, 1977; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
19...	1000	4940	621	7.6	11.0	17	7.9	74	390	570
FEB										
29...	1030	--	600	7.8	.0	9.5	12.4	86	270	180
APR										
11...	1115	5500	594	7.8	8.5	14	11.9	102	470	K75
AUG										
08...	1000	372	873	8.3	27.0	13	8.6	111	110	K30

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT										
19...	260	83	70	20	35	23	1	2.5	175	8.5
FEB										
29...	250	78	68	19	23	17	.7	2.8	171	5.2
APR										
11...	250	77	68	19	25	18	.7	2.7	172	5.3
AUG										
08...	250	85	66	21	80	40	2	3.6	167	1.6

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT									
19...	49	79	.20	5.9	427	370	.58	5700	.91
FEB									
29...	53	51	.20	6.7	365	330	.50	--	2.3
APR									
11...	58	57	.10	3.4	--	340	.46	5010	1.9
AUG									
08...	52	160	.30	2.9	479	490	.65	481	.35

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 19...	.090	1.6	.110	.34	.040	.040	40	534	98
FEB 29...	.370	1.3	.030	.09	<.010	<.010	11	--	99
APR 11...	.270	2.8	.060	.18	.030	<.010	36	535	96
AUG 08...	<.010	2.2	.140	--	.040	.010	33	33	95

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT 19...	1000	<10	1	47	<.5	<1	2	<3	1	11	1
FEB 29...	1030	<10	2	44	<.5	<1	<1	<3	2	54	<1
APR 11...	1115	<10	1	48	<.5	<1	<1	<3	2	39	1
AUG 08...	1000	20	3	56	<.5	<1	<1	<3	4	6	6

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 19...	11	7	<.1	<10	2	<1	<1	410	<6	17
FEB 29...	8	24	<.1	<10	<1	1	<1	260	<6	21
APR 11...	6	29	<.1	<10	7	<1	<1	270	<6	11
AUG 08...	12	2	<.1	<10	1	<1	1	480	<6	5

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT

DATE	DISCHARGE, IN CUBIC FEET PER SECOND	SED. SUSP. FALL DIAM. % FINER THAN .002 MM	SED. SUSP. FALL DIAM. % FINER THAN .004 MM	SED. SUSP. FALL DIAM. % FINER THAN .008 MM	SED. SUSP. FALL DIAM. % FINER THAN .016 MM	SED. SUSP. FALL DIAM. % FINER THAN .031 MM	SED. SUSP. FALL DIAM. % FINER THAN .062 MM	SED. SUSP. FALL DIAM. % FINER THAN .125 MM	SED. SUSP. FALL DIAM. % FINER THAN .250 MM	SED. SUSP. FALL DIAM. % FINER THAN .500 MM	SEDIMENT, SUSPENDED (MG/L)
DEC 06...	4690	43	61	76	87	93	96	98	99	100	6
FEB 22...	13800	40	53	63	73	81	86	93	99	100	24
JUN 13...	4280	45	64	78	88	93	96	98	99	100	29

04159010 PIGEON RIVER NEAR CASEVILLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°56'22", long 83°14'30", in SW1/4 NW1/4 sec.31, T.18 N., R.11 E., Huron County, Hydrologic Unit 04080103, at bridge on Kinde Road, 1.5 mi east of Caseville, and 3.1 mi upstream from mouth.

DRAINAGE AREA.--125 mi^2.

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981.
WATER TEMPERATURES: April 1978 to September 1981.

REMARKS.--Quarterly samples are collected as a cross-section sample at or near bridge. Water-discharge measurements are made at times of sampling. Some regulation at low flows.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily recorded (water year 1980), 2,000 micromhos Oct. 20, 1979; minimum daily recorded (water year 1979), 175 micromhos Mar. 6, 1979.
WATER TEMPERATURES: Maximum daily recorded (water year 1978), 27.5°C July 7, 1978; minimum daily recorded, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
OCT										
18...	1400	80	918	7.9	10.5	3.0	9.6	85	560	K2600
FEB										
28...	1430	54	890	8.0	.0	3.1	12.7	88	K42	470
APR										
10...	1400	118	761	7.8	8.0	6.0	12.8	107	K11	320
AUG										
07...	1230	10	705	8.2	23.5	1.9	7.6	92	4500	2800

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
OCT										
18...	460	200	130	33	14	6	.3	4.3	263	6.4
FEB										
28...	440	--	120	33	14	6	.3	2.7	--	--
APR										
10...	400	170	110	30	12	6	.3	2.6	234	7.2
AUG										
07...	330	110	84	30	17	10	.4	3.3	225	2.7

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
OCT									
18...	110	54	.20	9.4	567	510	.77	122	3.4
FEB									
28...	120	51	.20	5.9	625	--	.85	91	9.5
APR									
10...	100	46	.20	3.0	443	440	.60	141	9.4
AUG									
07...	100	42	.30	1.9	428	410	.58	12	<.10

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 18...	<.010	1.0	.090	.28	.070	.070	5	1.1	99
FEB 28...	.090	1.3	.080	.25	--	.040	14	2.0	96
APR 10...	.060	1.5	.070	.21	.040	<.010	26	8.3	95
AUG 07...	<.010	.50	.110	--	.100	.070	6	.16	94

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
OCT 18...	1400	30	1	64	<.5	<1	<1	<3	2	15	1
FEB 28...	1430	<10	1	51	<.5	<1	5	<3	<1	15	1
APR 10...	1400	<10	1	45	<.5	<1	<1	<3	2	7	2
AUG 07...	1230	20	3	57	<.5	<1	<1	<3	2	8	5

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 18...	11	8	<.1	<10	1	2	<1	290	<6	46
FEB 28...	8	26	<.1	<10	<1	2	<1	290	<6	12
APR 10...	9	12	<.1	<10	4	2	<1	250	<6	9
AUG 07...	10	29	<.1	<10	1	<1	<1	320	<6	5

04159130 ST. CLAIR RIVER AT PORT HURON, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°59'19", long 82°25'29", in SE1/4 sec.3, T.6 N., R.17 E., St. Clair County, Hydrologic Unit 04090001, at Port Huron municipal water treatment plant in Port Huron.

DRAINAGE AREA.--222,400 mi^2, approximately.

PERIOD OF RECORD.--Water years 1970-73, January 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981.
WATER TEMPERATURES: April 1978 to September 1981.

REMARKS.--Bimonthly grab samples were collected near the Port Huron municipal water treatment plant.

COOPERATION.--Water discharges were furnished by the National Oceanic and Atmospheric Administration.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 260 micromhos Dec. 18, 1980; minimum daily, 194 micromhos Jan. 27, 28, 1980.
WATER TEMPERATURES: Maximum daily, 24.0°C Aug. 14-16, 1980; minimum daily, 0.0°C on many days during winter periods.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--Specific conductance values of 164 micromhos July 3, 1972, and 265 micromhos Mar. 18, 1982, were observed.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)
NOV												
16...	1230	215000	222	8.3	5.5	75	12.0	99	E70	>200	110	23
DEC												
12...	1300	190000	206	8.2	4.0	1.5	12.7	99	K1	K16	99	17
MAR												
09...	1000	156000	215	8.1	.0	4.4	16.0	110	<1	K4	100	18
MAY												
09...	1100	213000	201	8.1	4.5	<1.0	12.8	102	K1	<1	93	17
JUN												
26...	1100	206000	205	8.3	17.0	1.5	9.9	105	K3	K3	96	17
SEP												
19...	1300	220000	205	8.4	17.0	.80	9.4	99	<1	K1	97	17

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)
NOV												
16...	30	7.9	4.6	8	.2	.80	85	.8	17	7.3	.20	1.8
DEC												
12...	28	7.1	3.9	8	.2	.90	82	1.0	17	6.4	.10	1.6
MAR												
09...	28	7.5	3.6	7	.2	.90	83	1.3	18	6.8	<.10	1.5
MAY												
09...	26	6.8	3.2	7	.1	.80	76	1.2	20	6.1	.20	1.5
JUN												
26...	27	6.9	3.5	7	.2	.80	79	.8	19	6.7	.10	.6
SEP												
19...	27	7.1	3.5	7	.2	.80	80	.6	19	6.2	.10	.8

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)
NOV											
16...	124	120	.17	72000	.18	.070	1.3	.060	.18	<.010	.030
DEC											
12...	117	110	.16	60000	.27	<.010	.50	.020	.06	.020	<.010
MAR											
09...	146	120	.20	61500	.37	.250	.60	<.010	--	<.010	<.010
MAY											
09...	119	110	.16	68400	.22	.070	.20	.060	.18	.050	.030
JUN											
26...	127	110	.17	70600	.27	<.010	.60	<.010	--	<.010	<.010
SEP											
19...	119	110	.16	70700	.19	<.010	.50	<.010	--	<.010	<.010

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
NOV 16...	1230	30	<1	25	<.5	<1	<1	<3	2	20	4
MAR 09...	1000	<10	<1	20	<.5	<1	<1	<3	<1	6	<1
MAY 09...	1100	<10	1	18	<1.0	<1	<1	<3	1	5	1
SEP 19...	1300	<10	1	19	<1.0	<1	3	<3	1	4	1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
NOV 16...	<4	3	<.1	<10	2	<1	<1	100	<6	78
MAR 09...	<4	<1	.2	<10	1	<1	<1	100	<6	4
MAY 09...	<4	<1	<.1	<10	2	<1	<1	93	<6	5
SEP 19...	<4	<1	<.1	<10	<1	<1	<1	99	<6	3

04159500 BLACK RIVER NEAR FARGO, MI

LOCATION.--Lat 43°05'32", long 82°37'05", in NW1/4 sec.32, T.8 N., R.16 E., St. Clair County, Hydrologic Unit 04090001, on left bank 20 ft downstream from bridge on Norman Road, 2.1 mi east of Fargo, 5.3 mi upstream from Mill Creek, and 12 mi northwest of Port Huron.

DRAINAGE AREA.--480 mi^2.

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

REVISED RECORDS.--WSP 1307: 1950(M). WSP 1627: 1956-58. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 613.75 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to July 9, 1954, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 285 ft^3/s, 8.06 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,400 ft^3/s Apr. 5, 1947, gage height, 16.06 ft, from floodmark, from rating curve extended above 9,500 ft^3/s; maximum gage height observed, 18.05 ft Feb. 20, 1951, backwater from ice; minimum discharge observed, 1.8 ft^3/s Sept. 18, 19, 1946.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 15	--	4,340	ice jam	Mar. 22	0100	3,550	9.71
Mar. 16	2400	3,640	9.83	June 18	1700	*5,550	*11.89

Minimum discharge, 26 ft^3/s Oct. 4, 5; minimum gage height, 1.93 ft, Oct. 4, 5, Aug. 19, 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	65	385	68	50	185	485	180	515	100	36	286
2	30	61	278	66	50	125	440	170	415	90	36	174
3	28	67	226	65	52	120	402	153	340	82	36	608
4	26	101	198	68	53	100	360	143	280	77	36	932
5	30	120	188	77	54	92	676	137	240	71	39	488
6	35	110	210	80	54	85	1600	131	200	69	52	237
7	50	93	291	79	54	80	1230	121	180	92	84	140
8	43	81	279	77	53	75	676	114	160	84	57	103
9	38	74	292	75	52	71	440	108	150	72	55	86
10	33	70	235	72	52	67	348	108	140	99	53	82
11	32	70	199	69	60	62	292	106	135	262	66	125
12	30	91	815	68	300	60	255	103	125	649	67	199
13	43	113	2620	66	1300	58	228	107	118	645	56	269
14	404	112	2540	65	3800	57	215	158	110	344	47	380
15	827	124	1780	64	4300	65	575	196	100	222	40	765
16	474	722	1090	61	3280	1730	1580	169	85	141	37	470
17	271	2100	580	59	1560	3330	1720	138	1210	103	35	260
18	179	1740	368	57	1090	2660	2380	126	5200	90	34	180
19	133	850	330	53	1080	1330	1800	121	4770	78	32	132
20	107	602	290	52	1250	542	1000	124	3930	71	31	114
21	100	671	250	51	977	2070	636	117	2030	89	36	95
22	94	568	210	50	644	3290	467	115	583	96	37	82
23	110	466	180	49	503	2550	408	258	358	79	36	74
24	243	1170	160	50	469	1460	500	944	274	63	36	67
25	238	1180	140	52	410	1390	506	660	230	49	36	65
26	186	624	120	54	326	2310	405	1080	194	43	34	63
27	153	395	100	56	251	2500	335	2200	160	42	33	60
28	124	353	90	56	197	1780	290	1210	143	39	41	61
29	100	555	84	55	268	1140	248	684	125	39	137	61
30	86	559	78	54	---	800	203	836	109	39	442	56
31	72	---	73	53	---	581	---	672	---	36	398	---
TOTAL	4350	13907	14679	1921	22589	30765	20700	11489	22609	4055	2195	6714
MEAN	140	464	474	62.0	779	992	690	371	754	131	70.8	224
MAX	827	2100	2620	80	4300	3330	2380	2200	5200	649	442	932
MIN	26	61	73	49	50	57	203	103	85	36	31	56
CFSM	.29	.97	.99	.13	1.62	2.07	1.44	.77	1.57	.27	.15	.47
IN.	.34	1.08	1.14	.15	1.75	2.38	1.60	.89	1.75	.31	.17	.52

CAL YR 1983 TOTAL 103791 MEAN 284 MAX 2920 MIN 15 CFSM .59 IN 8.04
WTR YR 1984 TOTAL 155973 MEAN 426 MAX 5200 MIN 26 CFSM .89 IN 12.09

04160570 NORTH BRANCH BELLE RIVER AT IMLAY CITY, MI

LOCATION.--Lat 43°01'49", long 83°04'02", in SW1/4 NW1/4 sec.16, T.7 N., R.12 E., Lapeer County, Hydrologic Unit 04090001, on left bank 12 ft upstream from bridge on State Highway 21, and 0.6 mi northeast of Imlay City.

DRAINAGE AREA.--18.0 mi^2.

PERIOD OF RECORD.--August 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 800 ft, from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Some diversion by pumping for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 11.4 ft^3/s, 8.60 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 334 ft^3/s Apr. 19, 1975, gage height, 9.33 ft; no flow for part of each day June 27, 28, 1977, June 26-28, 1979, caused by irrigation pumpage.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 60 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 12	2300	65	3.54	Mar. 21	1500	*156	*5.53
Feb. 13	2200	97	4.06	Mar. 24	2200	61	3.62
Mar. 16	1000	126	4.91	May 26	0800	69	3.79

Minimum discharge, 0.30 ft^3/s June 16, gage height, 2.33 ft, caused by irrigation pumpage.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.7	6.9	13	6.0	5.3	11	20	7.9	11	3.6	1.6	15
2	3.6	8.8	12	6.0	5.4	10	19	7.2	8.8	2.5	1.5	10
3	3.4	12	11	6.1	5.9	9.5	19	8.6	7.2	2.2	1.6	6.6
4	3.4	11	11	6.2	6.2	9.0	18	8.8	5.8	7.2	1.7	4.1
5	3.5	9.5	11	6.2	6.0	8.3	34	8.6	5.9	9.7	1.4	2.9
6	3.6	8.8	12	6.4	5.8	7.8	30	8.3	5.4	15	1.9	2.7
7	3.3	8.3	13	6.7	5.6	7.3	24	8.1	4.2	13	1.7	3.5
8	3.8	7.7	11	6.7	5.5	7.0	19	8.1	3.3	7.0	2.7	3.9
9	4.1	7.3	10	6.5	5.4	6.7	17	8.5	3.0	2.1	14	4.8
10	3.7	7.5	9.6	6.3	5.4	6.3	16	8.5	3.8	1.3	4.3	6.1
11	3.9	9.9	9.2	6.2	7.0	6.0	14	8.3	3.1	15	2.8	11
12	4.1	11	36	6.0	27	5.8	14	8.0	2.5	15	2.2	9.7
13	16	9.9	53	5.9	75	5.8	13	12	2.3	8.5	2.0	9.1
14	20	9.1	33	5.8	81	6.9	13	16	2.1	4.5	1.7	12
15	15	9.9	27	5.7	46	8.0	15	11	1.9	3.1	1.4	12
16	12	31	19	5.6	35	98	15	9.0	1.5	2.5	1.4	8.9
17	9.8	32	14	5.5	30	52	17	7.8	26	1.9	1.4	7.1
18	8.0	20	11	5.4	30	33	20	7.4	46	9.3	1.7	5.8
19	6.8	18	9.4	5.4	29	23	18	6.7	28	8.1	1.6	3.8
20	6.3	20	7.3	5.4	26	32	17	6.6	19	5.2	1.5	2.7
21	5.9	19	6.8	5.3	22	133	16	6.2	14	3.8	1.4	2.2
22	6.7	15	6.6	5.3	19	86	13	8.3	11	2.5	1.7	1.6
23	13	19	6.5	5.2	18	48	16	20	10	2.4	1.3	1.3
24	13	25	6.4	5.2	17	44	18	14	11	3.8	1.4	1.4
25	11	19	6.4	5.2	16	49	16	12	8.9	3.1	1.3	3.4
26	10	16	6.3	5.3	13	43	14	56	7.2	2.8	1.1	4.7
27	8.9	14	6.2	5.3	12	35	13	28	5.2	2.7	1.0	2.7
28	8.2	20	6.2	5.3	12	30	12	18	5.1	2.2	3.9	2.1
29	7.4	20	6.2	5.2	11	27	9.9	16	4.0	1.8	26	2.0
30	6.9	16	6.1	5.2	---	24	9.3	15	5.2	1.7	23	1.5
31	7.1	---	6.1	5.2	---	21	---	13	---	1.6	20	---
TOTAL	236.1	441.6	402.3	177.7	582.5	893.4	509.2	381.9	272.4	165.1	132.2	164.6
MEAN	7.62	14.7	13.0	5.73	20.1	28.8	17.0	12.3	9.08	5.33	4.26	5.49
MAX	20	32	53	6.7	81	133	34	56	46	15	26	15
MIN	3.3	6.9	6.1	5.2	5.3	5.8	9.3	6.2	1.5	1.3	1.0	1.3
CFSM	.42	.82	.72	.32	1.12	1.60	.94	.68	.50	.30	.24	.31
IN.	.49	.91	.83	.37	1.20	1.85	1.05	.79	.56	.34	.27	.34

CAL YR 1983 TOTAL 3448.7 MEAN 9.45 MAX 87 MIN 1.6 CFSM .53 IN 7.13
WTR YR 1984 TOTAL 4359.0 MEAN 11.9 MAX 133 MIN 1.0 CFSM .66 IN 9.01

04160600 BELLE RIVER AT MEMPHIS, MI

LOCATION.--Lat 42°54'03", long 82°46'09", in NW1/4 SE1/4 sec.35, T.6 N., R.14 E., St. Clair County, Hydrologic Unit 04090001, on right downstream side of bridge on State Highway 19 at Memphis.

DRAINAGE AREA.--151 mi^2.

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 720 ft, from topographic map (nearest 5 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 86.1 ft^3/s, 7.74 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,520 ft^3/s Apr. 19, 1975, gage height, 8.96 ft; minimum, 2.3 ft^3/s Sept. 6, 10, 1978; minimum gage height, 1.17 ft Sept. 6, 1978.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1947, reached a stage of about 9 ft, from information by local residents.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 600 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 13	1900	863	5.46	Mar. 21	2300	*1,510	*6.93
Feb. 14	1900	1,120	6.17	Mar. 25	2000	689	4.88
Mar. 17	1600	830	5.35				

Minimum discharge, 7.4 ft^3/s Aug. 25, 26, gage height, 1.31 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	27	139	30	27	55	149	63	91	19	10	34
2	12	29	97	30	27	50	130	56	75	17	11	25
3	11	36	80	31	30	47	114	50	62	16	11	22
4	11	61	70	32	34	46	106	49	51	17	12	18
5	11	57	68	34	35	45	149	48	47	16	11	18
6	11	47	80	35	34	43	268	46	50	17	11	16
7	11	41	100	35	33	41	239	44	49	17	13	15
8	12	37	101	34	31	37	170	43	47	18	16	15
9	13	34	125	33	29	35	127	44	41	17	45	16
10	13	31	96	32	28	33	105	45	35	16	34	17
11	14	34	91	31	35	30	91	43	31	16	23	18
12	13	38	401	30	190	29	82	43	27	17	16	19
13	24	46	791	29	525	26	78	46	26	20	14	22
14	163	45	706	29	980	26	75	68	24	17	12	22
15	191	45	523	29	815	29	74	104	22	16	11	29
16	107	192	348	28	548	360	86	80	22	16	10	27
17	70	385	221	28	379	712	95	66	26	13	9.6	23
18	51	323	163	28	317	558	144	59	160	13	9.3	20
19	41	204	117	28	288	311	187	56	208	15	9.0	18
20	33	226	100	28	260	196	158	52	111	16	8.9	17
21	29	261	85	28	209	975	127	47	64	15	9.1	17
22	27	196	70	28	160	1240	100	47	45	15	8.6	17
23	35	186	60	27	132	801	95	98	36	12	8.4	18
24	86	344	52	27	117	530	142	165	53	11	8.2	17
25	91	280	45	27	101	543	168	130	36	12	8.2	20
26	68	172	41	27	84	558	124	194	33	14	8.2	26
27	55	119	38	27	69	423	99	281	28	14	8.1	31
28	45	191	35	27	57	319	87	222	24	13	11	27
29	38	309	33	27	56	259	76	150	22	13	26	23
30	33	230	32	27	---	212	66	129	20	11	51	22
31	29	---	31	27	---	172	---	114	---	9.6	50	---
TOTAL	1360	4226	4939	913	5630	8741	3711	2682	1566	468.6	493.6	629
MEAN	43.9	141	159	29.5	194	282	124	86.5	52.2	15.1	15.9	21.0
MAX	191	385	791	35	980	1240	268	281	208	20	51	34
MIN	11	27	31	27	27	26	66	43	20	9.6	8.1	15
CFSM	.29	.93	1.05	.20	1.29	1.87	.82	.57	.35	.10	.11	.14
IN.	.34	1.04	1.22	.22	1.39	2.15	.91	.66	.39	.12	.12	.15

CAL YR 1983 TOTAL 31760.2 MEAN 87.0 MAX 980 MIN 7.8 CFSM .58 IN 7.82
WTR YR 1984 TOTAL 35359.2 MEAN 96.6 MAX 1240 MIN 8.1 CFSM .64 IN 8.71

04160800 SASHABAW CREEK NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°43'12", long 83°21'13", in SE1/4 sec.26, T.4 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on right bank, at upstream side of culverts on Maybee Road, 1.1 mi upstream from mouth, and 2.5 mi northeast of Drayton Plains.

DRAINAGE AREA.--20.9 mi^2.

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Metal V-notch weir Aug. 30, 1961, to Mar. 6, 1968. Altitude of gage is 970 ft, from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 12.2 ft^3/s, 7.93 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 181 ft^3/s Oct. 1, 1981, gage height, 4.53 ft; minimum, 0.5 ft^3/s Aug. 21, 24, 27, 1984; minimum gage height, 1.59 ft Aug. 1, 2, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 45 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Jan. 31	0600	ice jam	*4.34	Mar. 16	1300	56	3.27
Feb. 14	1500	*105	3.95	Mar. 21	2400	61	3.38

Minimum discharge, 0.05 ft^3/s Aug. 21, 24, 27; minimum gage height, 1.68 ft Aug. 21, 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.7	3.3	12	10	11	13	31	16	18	1.7	.18	.15
2	2.7	4.0	11	10	10	12	28	14	14	1.5	.18	.18
3	2.7	5.3	10	10	9.5	11	26	14	14	1.4	.33	.15
4	2.9	4.8	11	10	9.0	10	27	12	13	1.4	.62	.12
5	3.1	4.5	11	10	8.3	10	28	12	15	1.5	.54	.18
6	3.1	4.2	13	10	7.2	9.4	27	12	15	1.5	.39	.18
7	2.9	4.0	16	10	6.5	9.0	25	11	13	1.4	.33	.22
8	2.9	3.7	17	10	5.7	8.5	23	10	12	1.1	.70	.27
9	3.1	3.7	13	9.9	5.0	8.0	21	9.8	11	1.2	1.2	.33
10	3.1	3.7	13	9.7	6.9	7.7	20	9.4	8.6	1.4	.90	.70
11	3.3	4.5	13	9.6	8.3	7.3	18	9.0	7.2	1.8	.62	.70
12	3.5	4.8	25	9.5	11	6.9	17	9.0	6.2	1.8	.54	.54
13	7.9	4.8	28	9.3	18	6.5	18	9.8	5.6	1.2	.39	.62
14	12	4.8	26	9.2	62	6.2	18	13	5.3	1.0	.33	.80
15	7.2	5.3	26	9.0	40	7.2	18	12	4.8	.90	.27	.90
16	6.2	11	23	8.8	30	45	18	11	4.2	.80	.18	.80
17	5.0	12	20	8.6	28	37	21	9.8	4.2	.70	.15	.62
18	4.5	9.8	18	8.5	27	26	23	10	4.2	.70	.18	.62
19	4.0	9.8	15	8.4	26	23	21	12	3.5	.54	.18	.62
20	3.7	12	13	8.2	24	23	20	11	3.3	.46	.12	.54
21	3.5	12	12	8.0	23	51	18	9.8	3.1	.46	.08	.54
22	3.5	9.8	12	7.9	20	48	18	10	2.7	.46	.08	.54
23	5.0	13	12	7.7	19	42	22	30	2.9	.39	.08	.80
24	5.0	16	11	7.5	19	43	23	22	3.1	.39	.08	.90
25	4.5	13	11	7.4	18	45	21	20	2.5	.33	.10	1.7
26	4.2	12	11	7.2	16	44	20	36	2.3	.33	.08	2.7
27	4.0	11	11	1.8	15	44	20	30	2.1	.54	.06	1.7
28	3.7	16	11	2.9	14	42	19	25	2.0	.39	.08	1.2
29	3.5	16	11	2.3	14	39	18	24	1.8	.27	.10	1.1
30	3.3	14	11	2.1	---	36	17	22	1.8	.18	.18	1.0
31	3.3	---	10	11	---	33	---	21	---	.18	.18	---
TOTAL	130.0	252.8	457	254.5	511.4	753.7	644	476.6	206.4	27.92	9.43	21.42
MEAN	4.19	8.43	14.7	8.21	17.6	24.3	21.5	15.4	6.88	.90	.30	.71
MAX	12	16	28	11	62	51	31	36	18	1.8	1.2	2.7
MIN	2.7	3.3	10	1.8	5.0	6.2	17	9.0	1.8	.18	.06	.12
CFSM	.20	.40	.70	.39	.84	1.16	1.03	.74	.33	.04	.01	.03
IN.	.23	.45	.81	.45	.91	1.34	1.15	.85	.37	.05	.02	.04

CAL YR 1983 TOTAL 4149.99 MEAN 11.4 MAX 55 MIN .90 CFSM .55 IN 7.39
WTR YR 1984 TOTAL 3745.17 MEAN 10.2 MAX 62 MIN .06 CFSM .49 IN 6.67

04160900 CLINTON RIVER NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°39'37", long 83°23'25", in NE1/4 sec.21, T.3 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on State Highway 59, 1.0 mi downstream from State fish hatchery, and 2.0 mi south of Drayton Plains.

DRAINAGE AREA.--79.2 mi^2.

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 940 ft, from topographic map (nearest 10 ft). Jan. 29 to July 9, 1964, nonrecording gage at same site and datum.

REMARKS.--Records good except those for May and June, which are fair. Some regulation and occasional diversion for lake level control at many lakes above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 49.6 ft^3/s, 8.50 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 276 ft^3/s Mar. 12, 1974, gage height, 4.95 ft; minimum, 2.4 ft^3/s May 31, 1961; minimum gage height, 1.23 ft Jan. 4, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 102 ft^3/s Mar. 25, gage height, 3.31 ft; maximum gage height, 3.62 ft May 28, backwater from bridge construction; minimum discharge, 4.6 ft^3/s Aug. 1, 2, gage height, 1.93 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	20	72	54	37	48	87	42	55	6.7	4.9	6.3
2	13	20	71	51	37	48	86	37	40	7.0	4.9	6.7
3	15	20	71	49	38	47	82	30	28	7.9	6.7	9.1
4	15	19	71	49	37	47	76	29	26	7.0	6.7	8.2
5	13	18	69	48	36	44	74	28	26	7.3	6.3	7.6
6	13	18	76	46	35	41	71	26	27	7.0	6.0	7.3
7	13	19	83	46	35	38	68	20	32	6.7	11	7.6
8	13	20	86	46	34	37	65	22	33	6.7	8.6	5.7
9	13	20	84	46	34	35	61	26	32	7.0	7.0	6.7
10	13	20	82	46	34	34	51	29	30	7.0	6.3	6.7
11	12	21	78	46	37	34	39	35	28	8.2	6.7	7.0
12	12	21	83	46	38	33	27	43	26	7.3	6.7	6.0
13	29	22	80	45	42	34	23	46	23	7.0	7.0	7.3
14	61	24	79	44	44	33	30	48	21	6.3	7.3	7.0
15	60	33	80	44	48	34	44	41	19	6.7	10	7.6
16	58	63	79	44	54	48	48	38	17	6.7	13	7.0
17	56	58	77	42	58	49	36	34	14	6.7	16	6.3
18	50	55	76	42	62	55	44	29	12	7.0	17	6.3
19	26	54	73	42	66	61	50	27	10	6.7	16	6.6
20	25	54	69	42	68	66	46	24	9.0	6.7	13	7.0
21	23	51	68	43	69	83	49	24	8.0	6.7	8.2	7.3
22	23	55	67	44	71	89	49	27	7.3	6.3	8.2	7.3
23	23	72	70	42	70	95	49	31	7.6	6.3	7.6	7.3
24	24	77	67	41	59	98	50	45	7.9	6.3	5.4	7.0
25	24	74	69	39	49	100	51	75	7.6	6.0	5.1	11
26	25	72	70	39	43	100	56	96	7.3	6.0	5.1	8.2
27	25	71	69	38	42	101	53	99	7.6	6.0	5.1	11
28	23	79	65	39	46	101	51	100	7.0	5.7	5.1	17
29	23	73	61	37	47	95	48	99	7.0	5.4	5.1	19
30	21	71	59	37	---	88	46	94	6.7	5.1	5.4	22
31	21	---	58	37	---	89	---	73	---	5.4	5.7	---
TOTAL	778	1294	2262	1354	1370	1905	1610	1417	582.0	204.8	247.1	257.1
MEAN	25.1	43.1	73.0	43.7	47.2	61.5	53.7	45.7	19.4	6.61	7.97	8.57
MAX	61	79	86	54	71	101	87	100	55	8.2	17	22
MIN	12	18	58	37	34	33	23	20	6.7	5.1	4.9	5.7
CFSM	.32	.54	.92	.55	.60	.78	.68	.58	.25	.08	.10	.11
IN.	.37	.61	1.06	.64	.64	.89	.76	.67	.27	.10	.12	.12

CAL YR 1983 TOTAL 16760.6 MEAN 45.9 MAX 130 MIN 6.3 CFSM .58 IN 7.87
WTR YR 1984 TOTAL 13281.0 MEAN 36.3 MAX 101 MIN 4.9 CFSM .46 IN 6.24

04161100 GALLOWAY CREEK NEAR AUBURN HEIGHTS, MI

LOCATION.--Lat 42°40'02", long 83°12'02", in SE1/4 sec.18, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank 12 ft downstream from wooden bridge on Oakland University property, and 2.7 mi northeast of Auburn Heights.

DRAINAGE AREA.--17.9 mi^2.

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 820.78 ft National Geodetic Vertical Datum of 1929 (levels by Johnson & Anderson, Inc.).

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 10.0 ft^3/s, 7.59 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 368 ft^3/s June 25, 1968, gage height, 6.27 ft; minimum, 0.01 ft^3/s on many days during July and August, 1964; minimum gage height, 0.82 ft Aug. 1, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 90 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 12	1100	96	3.89	Mar. 16	0800	198	4.79
Feb. 13	1700	103	4.02	Mar. 21	1100	*237	*4.93

Minimum discharge, 0.90 ft^3/s on many days during July, August, and September.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.3	1.9	3.1	3.1	2.6	6.2	18	8.8	11	1.2	.99	.99
2	1.3	3.8	2.1	3.1	2.6	5.6	16	7.9	8.8	1.2	1.1	.99
3	1.2	4.4	1.6	3.1	5.1	5.0	15	7.5	7.5	1.2	2.8	.99
4	1.2	2.6	1.7	3.3	5.8	4.6	16	7.5	5.8	1.4	1.7	1.1
5	1.3	2.4	1.7	3.6	5.1	4.2	21	6.2	7.5	1.9	1.2	.99
6	1.3	2.4	3.8	4.1	4.7	3.9	19	5.8	7.5	1.9	1.2	.99
7	1.2	2.2	3.8	3.6	4.1	3.7	17	5.8	5.8	1.4	1.7	1.2
8	1.4	1.9	2.4	3.6	3.6	3.5	14	5.8	4.4	1.2	3.8	.99
9	1.3	1.7	2.1	3.3	3.6	3.3	13	5.1	3.3	1.3	4.7	1.3
10	1.3	1.7	2.1	3.3	4.1	3.1	11	4.7	2.8	1.4	2.2	2.6
11	1.3	3.6	4.7	3.3	31	2.8	11	4.7	2.2	4.1	1.7	3.3
12	1.3	3.1	87	2.8	51	2.4	10	4.7	1.9	2.2	1.3	2.2
13	40	2.2	60	2.6	87	2.8	12	10	1.7	1.4	1.2	2.2
14	8.3	2.1	37	2.5	78	3.3	14	12	4.4	1.2	1.1	3.3
15	5.8	3.3	30	2.4	46	8.8	15	8.8	2.1	1.2	1.1	3.1
16	4.7	19	22	2.3	33	126	16	7.0	1.6	1.1	.99	2.1
17	3.8	12	16	2.2	26	75	20	5.4	2.1	1.2	.99	1.4
18	3.1	5.8	11	2.2	23	35	22	7.0	1.9	1.2	1.1	1.2
19	2.6	4.4	7.9	2.1	22	24	18	7.9	1.6	1.1	1.2	1.0
20	2.2	7.0	6.2	2.0	19	49	16	6.6	1.3	1.1	.99	.99
21	2.1	5.4	5.1	2.0	17	188	14	5.4	1.3	1.1	.99	.99
22	2.2	2.4	5.8	2.1	14	103	13	7.7	1.2	.99	.99	.99
23	9.2	16	4.7	1.9	13	59	18	28	1.9	.99	.99	1.1
24	4.1	15	4.0	2.1	12	50	22	18	5.4	1.2	.99	1.1
25	3.1	5.1	3.5	2.4	11	48	18	13	1.9	.99	.99	18
26	2.8	2.6	3.1	2.6	8.8	37	16	53	1.3	1.1	.99	24
27	2.4	1.7	3.1	2.8	7.5	30	15	29	5.1	1.1	.99	9.7
28	2.2	28	3.1	2.4	7.5	27	13	20	2.6	.99	1.1	5.4
29	2.1	14	3.3	2.8	6.6	24	11	19	1.6	.99	1.1	3.3
30	1.9	5.4	3.3	2.8	---	22	11	17	1.3	.99	1.6	2.2
31	1.9	---	3.1	2.6	---	19	---	14	---	.99	.99	---
TOTAL	119.9	183.1	348.3	85.0	554.7	979.2	465	363.3	108.8	41.33	44.78	99.71
MEAN	3.87	6.10	11.2	2.74	19.1	31.6	15.5	11.7	3.63	1.33	1.44	3.32
MAX	40	28	87	4.1	87	188	22	53	11	4.1	4.7	24
MIN	1.2	1.7	1.6	1.9	2.6	2.4	10	4.7	1.2	.99	.99	.99
CFSM	.22	.34	.63	.15	1.07	1.77	.87	.65	.20	.07	.08	.19
IN.	.25	.38	.72	.18	1.15	2.03	.97	.75	.23	.09	.09	.21

CAL YR 1983 TOTAL 3700.70 MEAN 10.1 MAX 151 MIN 1.0 CFSM .56 IN 7.69
WTR YR 1984 TOTAL 3393.12 MEAN 9.27 MAX 188 MIN .99 CFSM .52 IN 7.05

04161540 PAINT CREEK AT ROCHESTER, MI

LOCATION.--Lat 42°41'18", long 83°08'35", in NW1/4 SE1/4 sec.10, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Ludlow Street in Rochester, and 1.5 mi upstream from mouth.

DRAINAGE AREA.--70.9 mi^2.

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.11 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by Lake Orion. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 51.2 ft^3/s, 9.81 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 918 ft^3/s Feb. 1, 1968; maximum gage height, 5.95 ft Feb. 10, 1965, backwater from ice; minimum discharge, 1.2 ft^3/s Aug. 19, 1974, caused by regulation due to bridge construction; minimum gage height, 1.26 ft Sept. 16, 1960.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 16	0900	297	3.19	Sep. 25	1900	203	2.86
Mar. 21	1200	*413	*3.57				

Minimum discharge, 6.5 ft^3/s July 31, Aug. 1, gage height, 1.45 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	35	60	32	28	56	88	41	63	16	7.0	13
2	20	40	59	31	28	53	83	48	55	15	8.0	13
3	20	42	51	30	30	50	80	49	49	17	11	12
4	22	37	51	31	31	48	80	49	45	17	17	12
5	23	34	55	36	30	45	91	48	45	17	16	13
6	20	33	67	35	29	43	88	44	42	16	11	12
7	18	32	67	32	29	41	81	42	39	14	16	13
8	19	31	67	30	29	39	77	42	37	13	19	14
9	19	31	63	28	29	37	74	41	35	13	20	17
10	18	30	61	27	34	36	73	39	33	16	13	22
11	17	39	67	27	51	35	71	36	31	19	11	22
12	17	38	144	27	71	34	69	34	32	18	10	18
13	99	35	108	26	133	35	72	41	30	16	12	20
14	55	33	87	26	128	36	72	47	28	16	12	23
15	38	38	80	26	89	42	70	41	26	14	12	21
16	34	72	71	26	79	225	69	39	25	13	11	20
17	37	58	66	26	77	95	74	37	26	15	10	18
18	34	46	62	26	79	73	71	38	28	16	10	17
19	31	50	58	25	90	65	68	37	24	15	9.8	16
20	30	56	54	25	90	105	65	41	21	12	9.2	15
21	28	55	50	25	87	353	58	39	19	12	9.3	14
22	30	55	47	26	81	192	57	44	19	11	9.4	13
23	43	67	44	26	76	167	63	79	20	10	9.4	14
24	38	68	42	26	71	170	67	65	21	11	9.5	16
25	35	55	40	28	67	169	64	66	20	11	8.9	43
26	58	50	38	28	62	151	63	122	18	11	8.3	44
27	51	58	37	28	59	136	61	89	22	12	8.7	24
28	45	84	36	28	59	124	36	76	19	10	11	21
29	42	68	35	27	58	112	33	76	17	8.2	22	21
30	38	61	34	27	---	102	39	72	16	8.0	23	21
31	36	---	33	27	---	95	---	69	---	7.0	16	---
TOTAL	1035	1431	1834	868	1804	2964	2057	1631	905	419.2	380.5	562
MEAN	33.4	47.7	59.2	28.0	62.2	95.6	68.6	52.6	30.2	13.5	12.3	18.7
MAX	99	84	144	36	133	353	91	122	63	19	23	44
MIN	17	30	33	25	28	34	33	34	16	7.0	7.0	12
CFSM	.47	.67	.84	.40	.88	1.35	.97	.74	.43	.19	.17	.26
IN.	.54	.75	.96	.46	.95	1.56	1.08	.86	.47	.22	.20	.29

CAL YR 1983 TOTAL 18140.0 MEAN 49.7 MAX 418 MIN 11 CFSM .70 IN 9.52
WTR YR 1984 TOTAL 15890.7 MEAN 43.4 MAX 353 MIN 7.0 CFSM .61 IN 8.34

04161580 STONY CREEK NEAR ROMEO, MI

LOCATION.--Lat 42°48'03", long 83°05'25", in SW1/4 sec.31, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Romeo Road, and 4.0 mi west of Romeo.

DRAINAGE AREA.--25.6 mi^2.

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

GAGE.--Water-stage recorder. Datum of gage is 861.64 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period and those for periods of no gage-height record, Dec. 6 to Jan. 9, Feb. 13 to Mar. 22, and July 6 to Aug. 9, which are poor.

AVERAGE DISCHARGE.--20 years, 17.0 ft^3/s, 9.02 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 290 ft^3/s Apr. 19, 1975, gage height, 5.19 ft; minimum, 0.92 ft^3/s Oct. 5, 9, 1967; minimum gage height, 1.28 ft July 27, 28, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 92 ft^3/s March 21, gage height, 3.41 ft, from high-water mark, no peak above base of 100 ft^3/s; minimum daily, 2.0 ft^3/s Aug. 21, 22, 24, 26, 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.2	11	19	12	8.6	20	28	15	28	3.0	2.1	10
2	3.2	13	18	11	8.6	20	27	14	24	2.9	2.2	8.7
3	3.0	14	17	11	9.0	19	25	14	21	2.9	2.3	8.3
4	3.2	8.2	16	10	9.4	18	24	14	16	2.9	2.5	7.3
5	3.4	9.5	16	10	9.6	18	33	13	12	3.1	2.7	6.7
6	3.5	7.3	19	10	9.5	17	33	13	12	4.2	2.8	6.2
7	3.5	7.2	19	10	10	17	30	12	11	3.8	3.2	12
8	3.5	11	17	10	10	16	26	12	9.8	3.5	3.7	13
9	3.9	11	17	10	10	16	29	12	9.0	3.2	6.0	13
10	3.5	11	16	9.9	10	15	29	12	8.0	3.3	3.5	14
11	3.5	12	17	9.8	15	15	26	12	7.2	4.1	2.8	13
12	3.4	9.0	24	9.4	20	14	24	12	6.6	4.0	2.9	11
13	17	6.5	28	9.2	40	14	24	16	6.0	3.5	2.7	10
14	19	6.3	30	9.0	52	15	17	22	5.9	3.0	2.3	11
15	8.5	8.4	30	9.0	52	15	17	17	5.3	2.9	2.2	10
16	6.9	20	28	9.0	45	50	17	15	4.6	3.1	2.2	7.4
17	7.4	13	25	9.0	41	45	19	13	4.7	3.3	2.2	5.9
18	14	10	23	8.8	39	35	20	14	5.1	3.3	2.2	3.1
19	13	19	20	8.6	36	28	18	14	4.8	3.2	2.2	2.5
20	14	20	18	8.4	34	32	16	13	4.3	2.9	2.1	2.4
21	13	19	17	8.0	32	80	15	12	3.9	2.7	2.0	2.3
22	12	18	16	7.6	30	85	14	13	3.5	2.5	2.0	2.2
23	16	23	15	7.6	29	80	17	32	3.1	2.5	2.1	2.7
24	14	31	14	7.8	28	71	20	23	3.8	2.8	2.0	3.5
25	15	29	14	7.8	26	62	19	20	3.4	2.6	2.1	4.5
26	13	26	14	7.8	24	55	18	37	3.1	2.4	2.0	8.9
27	9.9	23	13	8.0	23	50	18	32	3.3	2.7	2.0	5.1
28	12	28	13	8.2	22	46	17	26	3.3	2.4	2.5	4.2
29	9.1	26	13	8.5	21	42	16	26	3.2	2.2	27	4.0
30	7.3	22	12	8.7	---	36	16	32	3.2	2.2	22	3.8
31	6.8	---	12	8.8	---	31	---	31	---	2.2	14	---
TOTAL	268.7	472.4	570	282.9	703.7	1077	652	563	239.1	93.3	134.5	216.7
MEAN	8.67	15.7	18.4	9.13	24.3	34.7	21.7	18.2	7.97	3.01	4.34	7.22
MAX	19	31	30	12	52	85	33	37	28	4.2	27	14
MIN	3.0	6.3	12	7.6	8.6	14	14	12	3.1	2.2	2.0	2.2
CFSM	.34	.61	.72	.36	.95	1.36	.85	.71	.31	.12	.17	.28
IN.	.39	.69	.83	.41	1.02	1.56	.95	.82	.35	.14	.20	.31

CAL YR 1983 TOTAL 5295.3 MEAN 14.5 MAX 86 MIN 2.4 CFSM .57 IN 7.69
WTR YR 1984 TOTAL 5273.3 MEAN 14.4 MAX 85 MIN 2.0 CFSM .56 IN 7.66

04161790 STONY LAKE NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'58", long 83°05'58", in SE1/4 sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 1,000 ft east of bridge over dam on Stony Creek, and 2.7 mi west of Washington.

DRAINAGE AREA.--68.0 mi^2.

PERIOD OF RECORD.--February 1963 to current year.

REVISED RECORDS.--WDR MI-77-1: 1976.

GAGE.--Water-stage recorder. Datum of gage is 790.00 ft National Geodetic Vertical Datum of 1929 (levels by Huron-Clinton Metropolitan Authority). Gage readings have been converted to elevations NGVD.

REMARKS.--Reservoir is formed by an earthfill dam with concrete spillway completed in 1962. The spillway section includes a drum gate with minimum crest elevation of 796 ft, maximum of 802 ft; and 2 sluices, one on each side, with valve controls capable of draining lake. Total capacity (new capacity table put into use Oct. 1, 1973), 4,649 acre-ft at elevation of 802 ft. The reservoir began filling February 1963. Lake is used for recreational purposes.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 5,495 acre-ft May 17, 18, 1974, Apr. 20, 1975, elevation, 803.6 ft; minimum recorded, 1,758 acre-ft Nov. 21, 1967, elevation, 794.7 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 4,888 acre-ft May 26, 27, elevation, 802.46 ft; minimum, 3,956 acre-ft Jan. 24, elevation, 800.59 ft.

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

Date	Elevation (feet)	Contents (acre-feet)	Change in contents during month (acre-feet)	Change in contents during month (equivalent in ft^3/s)
Sept. 30	802.1	4701	--	--
Oct. 31	802.2	4753	+52	+0.8
Nov. 30	800.8	4057	-696	-11.7
Dec. 31	800.7	4009	-48	-0.8
CAL YR 1983	--	--	+96	+0.1
Jan. 31	800.6	3961	-48	-0.8
Feb. 29	800.8	4057	+96	+1.7
Mar. 31	802.1	4701	+644	+10.5
Apr. 30	802.2	4753	+52	+0.9
May 31	802.4	4857	+104	+1.7
June 30	802.1	4701	-156	-2.6
July 31	802.0	4649	-52	-0.8
Aug. 31	802.2	4753	+104	+1.7
Sept. 30	802.1	4701	-52	-0.9
WTR YR 1984	--	--	0	0

04161800 STONY CREEK NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'55", long 83°05'31", in SW1/4 sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on Mt. Vernon Road, 500 ft downstream from Stony Lake Dam, and 2.9 mi west of Washington.

DRAINAGE AREA.--68.2 mi^2.

PERIOD OF RECORD.--July 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 772.59 ft National Geodetic Vertical Datum of 1929 (levels by Huron-Clinton Metropolitan Authority).

REMARKS.--Records good. Occasional diurnal fluctuation caused by mills above station prior to February 1963; occasional regulation by Stony Lake since (station 04161790). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years, 41.6 ft^3/s, 8.28 in/yr, adjusted for storage since 1963.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 427 ft^3/s Feb. 2, 1968, gage height, 5.86 ft; maximum gage height, 6.71 ft Mar. 6, 1959, backwater from ice; minimum discharge, 0.9 ft^3/s July 10, 1963; minimum gage height, 1.79 ft Apr. 6, 1979; minimum daily discharge, 1.3 ft^3/s July 31, Aug. 1, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 187 ft^3/s Mar. 23, gage height, 4.42 ft; minimum, 3.6 ft^3/s Aug. 23, 24-28, gage height, 1.92 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.1	17	54	37	29	45	76	39	60	8.7	4.4	30
2	8.3	20	49	36	28	45	71	38	56	6.8	4.6	26
3	7.8	26	45	35	30	44	67	40	52	7.1	4.8	24
4	8.5	23	43	34	31	42	66	39	46	7.9	5.9	18
5	9.4	20	41	33	32	42	68	37	44	9.5	7.3	18
6	7.6	19	49	33	31	41	71	37	41	11	7.3	16
7	6.2	50	48	33	31	40	73	37	39	9.0	8.1	16
8	8.8	68	44	33	30	38	67	36	36	7.1	9.8	18
9	10	70	43	33	30	36	66	36	34	7.1	12	20
10	7.4	82	42	32	30	34	65	35	30	8.1	12	25
11	6.7	68	42	31	35	34	63	35	26	11	14	28
12	8.8	43	62	30	40	32	61	35	24	11	10	27
13	27	34	74	29	56	34	61	38	22	10	7.4	27
14	33	60	79	30	80	33	63	35	24	9.8	5.7	30
15	34	89	79	30	95	35	60	36	17	8.7	5.4	27
16	28	74	71	30	103	33	58	39	12	8.1	6.1	24
17	24	55	67	30	100	38	56	38	14	6.6	5.0	21
18	21	47	60	30	93	76	58	39	15	7.9	5.2	19
19	20	43	54	29	87	84	57	38	15	5.2	11	17
20	19	44	51	28	82	88	57	37	14	5.0	4.0	16
21	19	45	49	27	76	113	56	36	12	6.6	3.8	14
22	21	44	47	26	71	172	49	37	11	6.1	4.2	12
23	29	49	46	25	66	185	50	50	10	6.1	5.9	13
24	29	55	44	26	63	176	54	52	11	8.4	4.2	13
25	27	55	43	26	58	166	55	54	10	6.1	3.6	20
26	26	53	42	25	55	144	41	71	8.1	5.9	3.6	30
27	24	52	41	27	54	133	42	71	11	8.7	3.6	26
28	23	59	40	27	52	124	45	72	11	7.1	3.8	24
29	22	59	40	28	46	109	44	65	12	5.0	8.7	21
30	19	58	39	29	---	97	42	61	13	4.4	22	18
31	17	---	38	29	---	84	---	60	---	4.2	31	---
TOTAL	560.6	1481	1566	931	1614	2397	1762	1373	730.1	234.2	244.4	638
MEAN	18.1	49.4	50.5	30.0	55.7	77.3	58.7	44.3	24.3	7.55	7.88	21.3
MAX	34	89	79	37	103	185	76	72	60	11	31	30
MIN	6.2	17	38	25	28	32	41	35	8.1	4.2	3.6	12
MEAN+	18.9	37.7	49.7	29.2	57.4	87.8	59.6	46.0	21.7	6.75	9.58	20.4
CFSM+	.28	.55	.73	.43	.84	1.29	.87	.67	.32	.10	.14	.30
IN+	.32	.62	.84	.49	.91	1.48	.98	.78	.36	.11	.16	.33

CAL YR 1983 TOTAL 14299.5 MEAN 39.2 MAX 237 MIN 1.6 MEAN+ 39.3 CFSM+ .58 IN+ 7.82
WTR YR 1984 TOTAL 13531.3 MEAN 37.0 MAX 185 MIN 3.6 MEAN+ 37.0 CFSM+ .54 IN+ 7.38

+ Adjusted for change in contents of Stony Lake.

04162010 RED RUN NEAR WARREN, MI

LOCATION.--Lat 42°31'46", long 83°04'07", in SE1/4 NE1/4 sec.6, T.1 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at upstream side of bridge on Ryan Road, and 1.0 mi northwest of Warren.

DRAINAGE AREA.--Indeterminate.

PERIOD OF RECORD.--October 1979 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 620 ft, from topographic map.

REMARKS.--Records poor. Diversion from Big Beaver Creek basin via Henry-Graham Drain started in 1976, is ongoing and increasing with further development of new drains. Gage-height telemark at station.

AVERAGE DISCHARGE.--5 years, 29.2 ft^3/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,940 ft^3/s Oct. 1, 1981, gage height, 30.2 ft, from floodmark; minimum daily, 0.30 ft^3/s Sept. 11, 1983.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,100 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct. 13	1130	1,580	18.43	May 25	--	1,440	17.43
Mar. 16	0215	1,510	17.89	Aug. 18	1915	*1,700	*19.38
Mar. 21	0830	1,320	16.56	Sep. 25	2030	1,560	18.11

Minimum daily discharge, 0.43 ft^3/s Oct. 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.71	3.6	11	5.0	4.0	4.4	12	4.5	3.8	3.0	3.4	.81
2	.80	90	6.5	4.8	5.0	4.2	12	5.2	12	3.6	128	60
3	.90	49	5.7	4.6	7.0	4.1	11	5.9	3.8	4.2	23	37
4	1.1	8.2	12	5.0	9.0	3.9	17	4.5	7.7	12	50	4.5
5	.71	5.2	19	5.9	7.5	3.8	43	4.8	2.6	11	6.4	.80
6	.56	3.8	91	6.2	6.5	3.7	17	4.5	2.0	33	3.3	.63
7	.43	3.4	42	5.7	5.8	3.6	9.8	5.2	1.8	6.2	53	11
8	2.2	3.0	20	5.2	5.3	3.5	7.7	8.2	1.8	2.7	135	4.8
9	2.4	3.1	16	4.7	5.0	3.4	7.2	5.5	2.0	10	43	55
10	.90	8.4	18	4.4	64	3.3	5.5	7.7	1.6	7.1	6.1	52
11	.80	94	86	4.3	309	3.2	5.5	4.8	1.6	4.2	3.1	211
12	.80	20	570	4.1	240	3.1	6.3	12	1.8	3.7	3.1	22
13	667	9.1	285	4.0	269	3.4	13	40	13	3.2	24	33
14	43	7.6	81	3.9	145	15	13	11	3.6	4.7	8.9	23
15	7.5	38	51	3.9	65	29	8.7	5.5	2.2	3.4	2.9	20
16	5.0	119	33	3.8	27	857	8.2	4.1	3.0	4.4	1.9	7.1
17	4.8	26	21	3.8	23	200	34	4.1	2.2	34	1.8	4.0
18	4.1	14	15	3.8	21	65	23	19	9.8	3.8	266	5.1
19	3.3	41	12	3.8	19	22	11	9.2	2.6	3.0	32	3.3
20	2.9	51	10	3.8	15	208	7.7	6.8	1.6	1.7	3.9	3.3
21	2.8	27	9.0	3.8	12	839	8.2	4.8	1.5	1.6	3.3	2.4
22	28	13	8.5	3.8	10	138	30	134	1.4	1.9	2.6	2.2
23	71	106	8.0	3.9	9.2	82	42	34	142	4.2	2.3	52
24	17	39	7.5	4.2	8.5	75	18	9.2	42	4.6	2.0	14
25	8.1	14	7.0	5.3	7.2	59	13	222	15	2.0	1.6	240
26	5.0	9.4	6.6	6.3	5.8	38	9.8	174	7.9	7.0	1.3	142
27	4.0	15	6.2	5.7	5.2	30	15	21	11	4.5	1.1	18
28	4.1	161	6.0	4.9	4.9	24	8.2	8.7	4.5	3.1	2.0	10
29	3.4	30	5.7	4.3	4.6	17	5.2	15	3.6	1.7	12	5.9
30	3.0	15	5.5	3.9	---	16	7.7	9.8	3.1	2.2	81	3.9
31	2.3	---	5.3	3.8	---	13	---	6.3	---	2.3	5.8	---
TOTAL	898.61	1026.8	1480.5	140.6	1319.5	2774.6	429.7	811.3	312.5	194.0	913.8	1048.74
MEAN	29.0	34.2	47.8	4.54	45.5	89.5	14.3	26.2	10.4	6.26	29.5	35.0
MAX	667	161	570	6.3	309	857	43	222	142	34	266	240
MIN	.43	3.0	5.3	3.8	4.0	3.1	5.2	4.1	1.4	1.6	1.1	.63

CAL YR 1983 TOTAL 12667.93 MEAN 34.7 MAX 1050 MIN .30
WTR YR 1984 TOTAL 11350.65 MEAN 31.0 MAX 857 MIN .43

04162900 BIG BEAVER CREEK NEAR WARREN, MI

LOCATION.--Lat 42°32'31", long 83°02'52", in NW1/4 SW1/4 sec.33, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank between bridges on Mound Road, 1.0 mi north of Warren, and 2.0 mi upstream from mouth.

DRAINAGE AREA.--Indeterminate since 1976. Prior to 1976, 23.5 mi^2.

PERIOD OF RECORD.--October 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 598.80 ft Macomb County datum. Prior to Aug. 26, 1960, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Records poor. Diversion from the basin via Henry-Graham Drain started in 1976, is ongoing and increasing with further development of new drains. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,240 ft^3/s June 26, 1968, gage height, 14.45 ft; no flow on several days in June and July 1962, caused by unusual regulation above gage; minimum discharge affected by diversion since 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 267 ft^3/s Mar. 16, gage height, 8.53 ft; minimum daily, 0.04 ft^3/s Oct. 4; minimum gage height, 4.77 ft July 16, 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.05	.80	1.5	.62	.45	.70	1.5	.88	.72	.25	.25	.42
2	.05	8.5	1.3	.59	.60	.68	1.4	.80	.80	.20	16	5.2
3	.05	6.7	1.1	.56	.90	.66	1.2	.80	3.8	.25	7.2	4.2
4	.04	1.3	1.7	.62	1.1	.64	1.7	.72	.80	.80	23	.72
5	.05	.80	2.2	.68	.90	.61	8.5	.80	2.2	1.3	7.7	.42
6	.07	.65	38	.75	.80	.59	2.9	.72	.88	1.9	1.3	.33
7	.07	.59	25	.70	.70	.58	1.6	.72	.53	1.3	3.6	.59
8	.56	.59	2.7	.62	.65	.56	1.2	.72	.47	.33	7.2	.65
9	.24	.80	1.9	.58	.60	.55	1.1	.88	.47	.33	4.7	3.6
10	.12	1.3	1.7	.53	15	.54	.96	.72	.47	.42	.96	5.2
11	.08	29	9.7	.47	104	.52	.88	1.1	.42	.37	.53	18
12	.09	11	133	.47	56	.51	.80	.65	.37	.29	.53	4.0
13	137	1.4	56	.47	52	.50	1.6	3.6	1.6	.33	.42	2.4
14	29	.96	10	.47	26	1.0	1.7	2.9	3.3	.42	.96	2.5
15	1.7	4.2	5.8	.47	6.2	5.0	1.4	.80	.47	.20	.47	1.5
16	1.1	110	3.8	.47	4.2	141	1.1	.47	.33	.17	.37	.88
17	1.1	8.8	2.7	.47	3.6	37	3.6	.37	.59	1.7	.33	.59
18	1.2	1.9	1.7	.47	3.3	13	5.2	1.1	.88	1.1	3.5	.47
19	.96	4.7	1.4	.47	3.1	3.8	2.4	1.3	.65	.53	3.1	.42
20	1.3	6.0	1.2	.47	2.4	27	1.5	.80	.33	.20	.59	.42
21	.96	4.2	1.1	.46	1.9	117	1.2	.59	.20	.25	.37	.37
22	3.6	1.5	1.0	.46	1.5	39	1.5	3.1	.20	.25	.29	.42
23	6.2	17	.96	.47	1.5	26	3.5	10	2.2	.29	.29	1.5
24	2.0	13	.92	.50	1.4	21	5.6	1.4	6.5	.65	.29	1.7
25	.96	1.9	.86	.65	1.1	13	2.9	1.7	1.7	.37	.29	21
26	.96	1.3	.82	.80	.96	7.4	1.7	45	.42	.72	.29	16
27	.88	1.5	.76	.70	.80	5.4	1.5	4.2	.72	.88	.33	3.6
28	.96	75	.72	.60	.80	3.8	1.3	2.4	.72	.47	.37	1.3
29	.96	9.1	.68	.50	.72	3.1	.96	2.7	.33	.33	2.4	1.3
30	.88	2.4	.66	.47	---	2.4	1.1	1.6	.33	.29	4.7	.96
31	.88	---	.64	.45	---	1.7	---	1.3	---	.25	1.3	---
TOTAL	194.07	326.89	311.52	17.01	293.18	475.24	63.50	94.84	33.40	17.14	93.63	100.66
MEAN	6.26	10.9	10.0	.55	10.1	15.3	2.12	3.06	1.11	.55	3.02	3.36
MAX	137	110	133	.80	104	141	8.5	45	6.5	1.9	23	21
MIN	.04	.59	.64	.45	.45	.50	.80	.37	.20	.17	.25	.33

CAL YR 1983 TOTAL 2912.89 MEAN 7.98 MAX 194 MIN .02
WTR YR 1984 TOTAL 2021.08 MEAN 5.52 MAX 141 MIN .04

04163400 PLUM BROOK AT UTICA, MI

LOCATION.--Lat 42°36'05", long 83°04'27", in SE1/4 NE1/4 sec.7, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at upstream side of bridge on Ryan Road, 1.0 mi southwest of Utica.

DRAINAGE AREA.--16.5 mi^2.

PERIOD OF RECORD.--July 1965 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 619.79 ft National Geodetic Vertical Datum of 1929 (levels by Johnson & Anderson, Inc.).

REMARKS.--Records good except those for the winter period, which are fair. Occasional diversion for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 13.0 ft^3/s, 10.70 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,160 ft^3/s June 26, 1968, gage height, 10.36 ft; no flow part of each day July 19, 28, 1966, Aug. 22-28, Sept. 3, 11, 1969; minimum gage height, 1.23 ft Sept. 16, 1967.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 12	1300	248	6.77	Mar. 16	1000	*379	*8.03
Feb. 13	1800	201	6.12	Mar. 21	1000	372	7.99

Minimum discharge, 0.03 ft^3/s Aug. 23, gage height, 1.60 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.1	3.6	14	4.2	3.9	6.8	15	7.1	8.2	1.6	.55	2.0
2	1.9	8.5	7.0	4.1	4.5	6.3	14	6.8	5.7	2.3	1.1	1.7
3	1.7	13	6.5	4.0	7.0	5.9	13	9.9	4.8	2.2	2.0	2.6
4	2.6	6.3	5.3	4.0	6.5	5.5	14	7.6	4.4	1.9	1.9	2.1
5	3.2	4.7	6.1	4.3	5.6	6.0	24	5.6	4.7	3.8	1.7	1.6
6	2.7	3.6	14	4.7	5.0	5.5	20	4.9	4.6	4.4	1.1	.88
7	2.2	3.4	15	4.5	4.5	5.0	15	4.9	2.9	3.8	2.0	1.5
8	2.7	3.1	9.3	4.3	4.2	4.7	13	5.1	2.0	2.3	7.1	1.7
9	3.3	3.4	7.2	4.1	4.5	4.4	12	4.2	2.1	2.2	7.6	2.5
10	2.1	4.3	7.0	3.9	5.0	4.3	13	4.4	2.0	2.6	2.8	5.4
11	2.1	11	10	3.8	50	4.2	11	4.2	1.7	3.2	1.6	10
12	2.4	9.8	200	3.7	100	4.2	12	3.7	1.4	3.2	1.3	4.0
13	68	6.1	101	3.7	160	4.2	11	7.7	1.1	2.2	1.8	2.8
14	25	5.0	58	3.6	91	5.0	12	11	5.9	1.8	1.1	5.1
15	9.2	5.2	44	3.6	45	7.0	12	5.9	3.0	1.9	.90	2.6
16	6.7	29	25	3.6	31	249	15	4.3	2.6	2.1	.70	2.1
17	5.6	14	17	3.6	26	67	19	3.8	2.7	1.7	1.3	2.2
18	4.9	8.9	13	3.5	23	31	22	4.9	4.5	1.7	.84	1.4
19	3.8	8.6	11	3.5	21	24	16	4.8	3.3	2.1	1.5	1.2
20	4.4	12	9.1	3.5	20	62	12	3.9	4.8	1.8	.64	1.4
21	5.3	12	7.8	3.5	22	315	9.9	4.4	2.4	2.1	.36	.98
22	5.6	8.0	7.0	3.5	20	90	9.6	7.2	1.7	1.0	.25	1.5
23	11	22	6.2	3.5	14	58	20	50	23	1.9	.68	2.6
24	9.8	25	5.7	3.5	12	56	24	13	70	2.0	.31	3.0
25	7.0	11	5.3	5.0	10	51	16	7.6	12	1.6	.16	17
26	5.3	9.7	5.1	4.8	8.8	34	14	81	7.9	1.6	.18	42
27	4.7	8.6	4.9	4.4	8.4	26	14	20	4.7	2.6	.37	7.1
28	4.4	53	4.7	4.0	7.4	23	9.6	11	3.4	1.0	.34	5.4
29	4.1	27	4.6	3.9	7.0	20	7.3	15	3.6	.89	3.1	3.1
30	3.9	16	4.4	3.8	---	20	7.3	11	1.9	1.6	9.3	2.4
31	3.7	---	4.3	3.8	---	16	---	10	---	.58	4.9	---
TOTAL	221.4	355.8	639.5	121.9	727.3	1221.0	426.7	344.9	203.0	65.67	59.48	139.86
MEAN	7.14	11.9	20.6	3.93	25.1	39.4	14.2	11.1	6.77	2.12	1.92	4.66
MAX	68	53	200	5.0	160	315	24	81	70	4.4	9.3	42
MIN	1.7	3.1	4.3	3.5	3.9	4.2	7.3	3.7	1.1	.58	.16	.88
CFSM	.43	.72	1.25	.24	1.52	2.39	.86	.67	.41	.13	.12	.28
IN.	.50	.80	1.44	.27	1.64	2.75	.96	.78	.46	.15	.13	.32

CAL YR 1983 TOTAL 5129.20 MEAN 14.1 MAX 343 MIN 1.1 CFSM .86 IN 11.56
WTR YR 1984 TOTAL 4526.51 MEAN 12.4 MAX 315 MIN .16 CFSM .75 IN 10.20

04164000 CLINTON RIVER NEAR FRASER, MI

LOCATION.--Lat 42°34'40", long 82°57'00", in NW1/4 sec.20, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 800 ft downstream from bridge on Garfield Road, 2.8 mi north of Fraser, and 4.0 mi upstream from North Branch.

DRAINAGE AREA.--444 mi^2.

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 577.71 ft National Geodetic Vertical Datum of 1929. Prior to Nov. 17, 1949, nonrecording gage at site 800 ft upstream at same datum.

REMARKS.--Records good. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--37 years, 373 ft^3/s, 11.41 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,840 ft^3/s Oct. 1, 1981, gage height, 19.56 ft; minimum, 47 ft^3/s Sept. 6, 1955; minimum gage height, 4.29 ft Sept. 7, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6, 1947, reached a stage of 20 ft, from floodmarks, discharge, 9,000 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 2,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct. 13	1600	2,830	14.37	Mar. 21	1100	3,980	15.73
Dec. 12	1000	2,480	13.86	May 26	0600	2,460	13.90
Mar. 16	1000	*4,240	*16.00				

Minimum discharge, 99 ft^3/s Aug. 27, gage height, 5.14 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	147	240	404	398	219	293	523	288	467	157	119	178
2	144	380	361	334	218	311	492	270	441	142	312	180
3	139	479	339	304	465	279	473	271	514	147	371	281
4	153	291	366	277	338	275	479	277	327	160	305	166
5	164	267	360	277	286	296	599	265	291	240	272	169
6	157	243	804	320	243	302	530	249	291	268	149	141
7	181	236	655	293	234	303	479	236	259	187	160	157
8	253	278	443	252	221	255	445	248	240	142	389	173
9	253	272	434	244	229	237	423	238	232	137	501	260
10	205	272	451	280	289	233	398	223	212	176	175	593
11	203	653	440	267	980	230	374	231	198	171	151	694
12	191	410	2150	263	794	232	367	214	203	172	136	297
13	1540	285	1430	257	911	237	400	306	214	147	130	220
14	1030	244	844	247	1000	267	419	378	384	145	154	321
15	365	310	706	245	658	348	405	260	205	136	126	235
16	275	898	575	245	538	2960	383	229	187	127	128	177
17	249	525	496	240	499	1540	446	222	198	199	125	156
18	239	355	446	239	468	663	501	256	253	244	320	156
19	225	371	376	236	452	556	398	261	228	138	563	143
20	209	432	387	240	440	765	358	224	189	137	138	137
21	208	431	359	240	418	3320	331	219	177	133	124	132
22	259	334	451	240	394	2340	318	224	173	136	122	127
23	486	508	353	240	376	1420	421	823	243	123	121	167
24	352	630	346	230	365	1160	483	377	842	144	122	184
25	297	379	360	220	357	1060	407	299	272	126	116	377
26	289	324	370	210	337	918	359	1660	214	148	108	1180
27	289	306	390	200	325	789	333	677	202	223	105	294
28	285	908	410	190	322	706	327	491	201	130	123	213
29	295	611	364	168	304	658	274	508	170	117	342	189
30	287	452	345	207	---	604	297	478	167	113	423	157
31	276	---	411	236	---	569	---	477	---	117	240	---
TOTAL	9645	12324	16626	7839	12680	24126	12442	11379	8194	4882	6670	7854
MEAN	311	411	536	253	437	778	415	367	273	157	215	262
MAX	1540	908	2150	398	1000	3320	599	1660	842	268	563	1180
MIN	139	236	339	168	218	230	274	214	167	113	105	127
CFSM	.70	.93	1.21	.57	.98	1.75	.94	.83	.62	.35	.48	.59
IN.	.81	1.03	1.39	.66	1.06	2.02	1.04	.95	.69	.41	.56	.66

CAL YR 1983 TOTAL 152323 MEAN 417 MAX 3870 MIN 117 CFSM .94 IN 12.76
WTR YR 1984 TOTAL 134661 MEAN 368 MAX 3320 MIN 105 CFSM .83 IN 11.28

04164100 EAST POND CREEK AT ROMEO, MI

LOCATION.--Lat 42°49'21", long 83°01'13", in NE1/4 SE1/4 sec.27, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on State Highway 53, and 1.4 mi north of Romeo.

DRAINAGE AREA.--21.8 mi^2.

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 780 ft, from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years, 15.3 ft^3/s, 9.53 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 358 ft^3/s Feb. 10, 1965, gage height, 4.48 ft; maximum gage height, 4.56 ft Mar. 12, 1962, backwater from ice; minimum discharge, 0.8 ft^3/s July 30, 31, 1964, Aug. 6, 7, 1965; minimum gage height, 0.71 ft July 21, 1959.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 80 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 21	1400	*134	*2.82

Minimum discharge, 2.4 ft^3/s Aug. 21, 22, 23, 24, 25, 26, 27, gage height, 0.89 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.9	10	16	10	9.4	15	31	17	21	5.2	3.0	9.9
2	4.6	12	14	10	9.6	14	29	17	19	4.7	3.2	7.7
3	4.6	16	14	10	10	13	28	16	17	4.6	3.4	7.1
4	4.6	14	15	10	11	12	28	16	16	4.3	3.7	6.2
5	4.6	12	15	11	11	11	35	13	17	4.5	3.7	5.7
6	4.6	12	17	11	10	11	35	12	17	6.5	3.5	5.4
7	4.3	11	18	12	10	11	32	12	17	6.0	3.2	5.5
8	4.6	11	17	12	9.6	10	31	12	15	5.3	4.6	6.0
9	4.9	11	15	11	9.4	10	46	13	14	4.9	10	5.8
10	4.9	11	13	11	10	10	16	13	13	5.2	5.8	8.3
11	4.9	14	13	11	12	9.7	17	12	10	6.4	4.4	8.3
12	4.9	14	35	10	45	9.7	22	12	5.7	6.3	3.7	7.8
13	18	12	35	10	50	9.7	24	13	4.9	5.1	3.7	7.3
14	20	15	29	10	48	9.5	25	13	4.5	4.5	3.5	8.6
15	15	14	27	10	39	11	24	10	4.5	4.3	3.5	8.6
16	13	27	24	9.8	37	60	24	18	4.6	4.0	3.3	7.8
17	12	24	21	9.7	36	46	25	16	5.4	3.8	3.0	7.1
18	11	19	20	9.6	34	32	27	17	8.6	3.6	3.0	6.6
19	10	18	18	9.5	33	30	26	16	9.5	3.5	2.9	6.3
20	10	20	17	9.4	30	35	25	15	9.1	3.4	2.8	6.0
21	9.9	20	16	9.3	27	106	25	15	8.7	3.6	2.7	5.5
22	10	16	15	9.2	24	89	25	14	8.2	3.6	2.6	5.2
23	17	21	14	9.2	23	65	27	21	7.7	3.7	2.6	5.5
24	15	25	13	9.5	22	58	28	16	8.3	4.2	2.5	6.1
25	13	20	13	10	20	56	26	15	7.4	3.6	2.5	7.4
26	12	17	12	9.9	18	51	25	26	6.9	3.5	2.5	11
27	11	15	12	9.8	16	46	24	27	6.5	3.5	2.5	9.3
28	12	24	11	9.7	16	43	23	27	6.0	3.4	3.2	8.4
29	10	22	11	9.5	15	40	21	27	5.5	3.2	44	7.7
30	10	18	11	9.5	---	36	19	25	5.5	3.1	36	7.0
31	10	---	10	9.5	---	33	---	24	---	3.0	16	---
TOTAL	295.3	495	531	312.1	645.0	992.6	793	520	303.5	134.5	195.0	215.1
MEAN	9.53	16.5	17.1	10.1	22.2	32.0	26.4	16.8	10.1	4.34	6.29	7.17
MAX	20	27	35	12	50	106	46	27	21	6.5	44	11
MIN	4.3	10	10	9.2	9.4	9.5	16	10	4.5	3.0	2.5	5.2
CFSM	.44	.76	.78	.46	1.02	1.47	1.21	.77	.46	.20	.29	.33
IN.	.50	.84	.91	.53	1.10	1.69	1.35	.89	.52	.23	.33	.37

CAL YR 1983 TOTAL 5395.4 MEAN 14.8 MAX 98 MIN 2.6 CFSM .68 IN 9.21
WTR YR 1984 TOTAL 5432.1 MEAN 14.8 MAX 106 MIN 2.5 CFSM .68 IN 9.27

04164300 EAST BRANCH COON CREEK AT ARMADA, MI

LOCATION.--Lat 42°50'45",long 82°53'06", in NE1/4 sec.23, T.5 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank at downstream side of bridge on Prospect Street in Armada.

DRAINAGE AREA.--13.0 mi^2.

PERIOD OF RECORD.--October 1958 to current year.

REVISED RECORDS.--WDR MI-83: 1982.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 735 ft, from topographic map (nearest 5 ft).

REMARKS.--Records good except those for the winter period and those below 0.1 ft^3/s, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years, 6.73 ft^3/s, 7.03 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 910 ft^3/s Apr. 19, 1975, gage height, 6.69 ft; no flow Jan. 25 to Feb. 9, 1961, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 12	2000	339	4.35	Mar. 21	1200	*430	*4.81
Feb. 13	unknown	213	3.69	Mar. 24	2400	140	3.13
Mar. 16	1400	234	3.75	Mar. 25	2300	108	2.85

Minimum daily discharge, 0.05 ft^3/s Oct. 4, Aug. 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.08	.99	7.8	1.4	.13	1.3	7.1	1.4	3.1	.36	.11	1.6
2	.08	1.5	5.2	1.5	.13	1.2	5.8	1.4	2.4	.29	.25	.82
3	.08	2.1	4.1	1.5	.20	1.1	4.8	1.4	1.9	.23	.15	.54
4	.05	2.2	3.8	1.4	.30	1.1	4.5	1.4	1.6	.17	.11	.36
5	.12	1.7	3.8	1.3	.22	1.0	16	1.4	1.5	.18	.10	.29
6	.12	1.6	4.8	1.2	.19	1.0	18	1.4	1.7	.24	.12	.18
7	.12	1.5	5.2	1.1	.17	.96	10	1.3	1.7	.19	.08	.18
8	.18	1.5	6.0	1.0	.16	.94	6.0	1.2	1.3	.16	.48	.15
9	.08	1.2	5.6	.90	.15	.92	5.6	1.3	1.2	.12	.24	.22
10	.08	1.2	5.2	.80	1.5	.90	4.4	1.3	1.0	.10	.08	.26
11	.08	1.6	5.6	.70	10	.88	4.1	1.3	.77	.19	.10	.28
12	.17	2.0	165	.60	39	.88	4.1	1.2	.62	.12	.19	.17
13	6.8	1.9	169	.52	134	.88	4.1	1.8	.58	.12	.19	.31
14	14	1.9	84	.47	134	.88	3.8	2.2	.58	.11	.12	.26
15	8.4	2.8	59	.42	70	.91	4.4	1.8	.53	.08	.08	.32
16	4.5	34	26	.37	42	127	4.1	1.6	.44	.09	.08	.33
17	2.5	50	11	.33	33	43	5.2	1.6	.54	.09	.12	.21
18	1.7	20	6.0	.30	28	21	8.1	1.4	38	.10	.12	.13
19	1.3	12	3.5	.27	28	8.1	7.8	1.4	22	.11	.17	.10
20	1.2	19	2.2	.24	22	19	5.2	1.3	9.1	.09	.08	.14
21	.94	26	1.5	.22	14	305	3.8	1.2	3.5	.10	.08	.17
22	1.2	14	1.4	.20	9.3	90	2.8	2.2	2.0	.08	.08	.20
23	2.6	16	1.3	.19	8.0	50	4.4	10	1.7	.10	.12	.22
24	3.7	64	1.3	.18	6.8	60	12	4.6	3.0	.13	.12	.25
25	2.9	23	1.2	.17	5.2	81	9.6	3.5	1.8	.10	.08	.57
26	2.4	11	1.2	.16	3.8	52	5.2	18	.96	.14	.08	.29
27	1.9	7.2	1.2	.15	3.0	28	3.4	12	.71	.13	.05	.89
28	1.5	26	1.2	.15	2.0	21	2.8	6.6	.64	.13	.08	.67
29	1.4	42	1.2	.14	1.3	16	2.0	5.5	.52	.20	3.8	.51
30	1.1	17	1.3	.14	---	11	1.6	4.6	.44	.08	7.2	.52
31	.98	---	1.4	.13	---	8.6	---	3.9	---	.07	3.0	---
TOTAL	62.26	406.89	597.0	18.15	596.55	955.55	180.7	101.2	105.83	4.40	17.66	11.14
MEAN	2.01	13.6	19.3	.59	20.6	30.8	6.02	3.26	3.53	.14	.57	.37
MAX	14	64	169	1.5	134	305	18	18	38	.36	7.2	1.6
MIN	.05	.99	1.2	.13	.13	.88	1.6	1.2	.44	.07	.05	.10
CFSM	.16	1.05	1.49	.05	1.59	2.37	.46	.25	.27	.01	.04	.03
IN.	.18	1.16	1.71	.05	1.71	2.73	.52	.29	.30	.01	.05	.03

CAL YR 1983 TOTAL 3115.98 MEAN 8.54 MAX 272 MIN .03 CFSM .66 IN 8.92
WTR YR 1984 TOTAL 3057.33 MEAN 8.35 MAX 305 MIN .05 CFSM .64 IN 8.75

04164500 NORTH BRANCH CLINTON RIVER NEAR MOUNT CLEMENS, MI

LOCATION.--Lat 42°37'45", long 82°53'25", in SW1/4 sec.35, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 30 ft upstream from bridge on State Highway 59, 2 mi north of Mount Clemens, and 3.6 mi upstream from mouth.

DRAINAGE AREA.--199 mi^2.

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 1437: 1948. WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since September 1961. Datum of gage is 576.38 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 15, 1949, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation at times by mill above station. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--37 years, 121 ft^3/s, 8.26 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,700 ft^3/s Feb. 2, 1968, gage height, 18.62 ft; minimum, 0.2 ft^3/s Sept. 13, 14, 1954, July 30, 1965; minimum gage height, 3.12 ft Sept. 13, 14, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6,1947, reached a stage of 20.0 ft, from floodmark.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 14	0400	1,360	12.53	Mar. 22	1200	*3,060	*14.77
Feb. 15	0100	1,790	13.17				

Minimum discharge, 0.80 ft^3/s Aug. 24, gage height, 3.83 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	28	231	40	40	84	193	93	100	15	2.1	45
2	11	30	127	40	38	82	169	84	83	14	1.4	29
3	11	35	95	41	44	75	150	77	70	12	12	21
4	11	50	84	44	50	73	140	74	59	11	11	17
5	10	50	85	45	58	70	169	70	50	15	9.5	16
6	12	39	103	47	55	65	289	66	50	14	8.0	15
7	11	35	160	50	50	62	302	61	51	14	6.2	14
8	12	35	200	47	45	59	212	58	51	16	4.5	13
9	11	33	170	46	42	53	158	57	44	13	5.4	14
10	11	31	150	44	50	51	147	56	37	14	19	15
11	12	33	122	41	144	44	116	53	33	13	16	20
12	11	42	402	39	391	38	105	50	28	14	9.9	22
13	28	48	1000	38	740	35	106	50	23	15	7.3	21
14	93	45	1330	37	1480	38	112	61	19	12	5.7	20
15	115	43	905	38	1570	44	121	89	17	11	3.7	21
16	82	83	643	38	1060	380	129	75	17	10	3.5	23
17	53	254	386	39	643	800	134	63	17	8.6	2.7	19
18	42	290	189	38	496	1000	162	58	18	7.9	2.6	17
19	36	182	165	38	429	590	202	58	38	7.3	2.0	15
20	33	137	150	40	386	350	175	55	78	6.5	2.2	14
21	31	189	120	45	321	909	143	51	48	7.1	2.2	13
22	28	201	83	50	235	2780	123	47	33	6.5	1.7	12
23	28	146	72	47	183	1620	124	83	26	6.8	1.2	11
24	41	239	58	44	164	846	198	246	31	6.0	.87	12
25	57	330	52	40	147	718	293	146	32	8.2	1.0	17
26	50	240	45	39	124	742	225	199	27	6.5	1.5	43
27	43	135	40	38	104	622	167	324	22	7.4	1.4	38
28	37	184	39	40	94	451	140	225	19	6.1	2.1	34
29	33	370	41	42	126	351	119	135	16	4.9	19	26
30	30	377	40	40	---	288	102	125	15	4.9	87	22
31	26	---	39	42	---	229	---	115	---	4.0	79	---
TOTAL	1021	3934	7326	1297	9309	13549	4925	3004	1152	311.7	331.67	619
MEAN	32.9	131	236	41.8	321	437	164	96.9	38.4	10.1	10.7	20.6
MAX	115	377	1330	50	1570	2780	302	324	100	16	87	45
MIN	10	28	39	37	38	35	102	47	15	4.0	.87	11
CFSM	.17	.66	1.19	.21	1.61	2.20	.82	.49	.19	.05	.05	.10
IN.	.19	.74	1.37	.24	1.74	2.53	.92	.56	.22	.06	.06	.12

CAL YR 1983 TOTAL 46161.70 MEAN 126 MAX 2670 MIN 4.6 CFSM .63 IN 8.63
WTR YR 1984 TOTAL 46779.37 MEAN 128 MAX 2780 MIN .87 CFSM .64 IN 8.74

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°35'45", long 82°54'35", Macomb County, Hydrologic Unit 04090003, on left downstream side of bridge on Moravian Drive, 0.2 mi downstream from North Branch, and 0.5 mi west of Mount Clemens.

DRAINAGE AREA.--734 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1934 to current year.

REVISED RECORDS.--WSP 1084: 1943, 1945-46. WSP 1937: 1935, 1936(M), 1937-39, 1949(M), 1950. WSP 1557: Drainage area. WSP 1727: 1952(M), 1954(M).

GAGE.--Water-stage recorder. Datum of gage is 570.43 ft National Geodetic Vertical Datum of 1929. May 10, 1934, to Jan. 11, 1939, nonrecording gage at same site and datum. Auxiliary gage is a water-stage recorder on right bank 2.0 mi downstream from base gage at same datum. Mar. 15, 1938, to Jan. 3, 1952, auxililary nonrecording gage 1.6 mi downstream from base gage at same datum.

REMARKS.--Water-discharge records fair. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--50 years, 531 ft^3/s, 9.82 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,200 ft^3/s Apr. 6, 1947, gage height, 23.55 ft, from floodmark; minimum not determined; minimum gage height, 2.72 ft Nov. 29, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 12	1700	3,320	9.72	Mar. 21	1900	*6,450	*13.07
Mar. 16	1500	5,020	11.69				

Minimum daily discharge, 120 ft^3/s Aug. 27; minimum gage height, 5.04 ft Apr. 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	180	310	716	500	276	372	832	418	593	190	140	250
2	175	450	564	450	281	401	766	377	533	180	350	240
3	170	602	499	400	601	350	716	380	591	180	430	340
4	180	400	507	360	468	355	705	380	430	190	350	210
5	200	370	508	330	401	386	904	370	390	280	300	210
6	190	330	1060	411	334	396	983	360	380	320	180	170
7	243	310	1010	364	327	361	925	340	350	240	190	180
8	300	350	671	284	296	297	796	350	330	180	400	210
9	290	340	673	297	290	344	710	330	310	170	580	350
10	240	340	661	338	359	314	663	320	280	210	220	700
11	240	757	614	373	1330	287	598	320	265	210	190	800
12	230	527	2820	346	1420	272	571	300	260	200	170	400
13	1500	356	2950	309	1940	274	608	380	270	190	160	280
14	1390	304	2500	338	2820	304	637	480	450	180	180	380
15	526	354	1910	320	2540	440	642	390	250	170	150	300
16	367	1160	1410	315	1950	3670	619	350	230	160	145	230
17	340	905	1010	310	1370	2860	692	330	250	230	145	200
18	320	694	703	305	1130	1800	857	350	300	290	350	180
19	300	612	599	305	1030	1240	765	350	300	170	640	160
20	275	674	613	310	955	1170	671	300	290	160	170	150
21	270	715	540	315	852	4980	589	280	250	160	150	150
22	330	577	600	320	733	5630	539	300	230	160	140	150
23	551	718	500	310	659	3450	690	983	300	150	140	200
24	450	1040	450	300	617	2340	875	670	902	170	140	220
25	400	761	450	290	573	2030	871	459	300	150	130	333
26	380	611	454	280	520	1850	737	1920	270	180	125	1430
27	370	495	453	270	468	1600	634	1140	230	260	120	454
28	365	1270	512	260	383	1330	583	759	250	170	140	304
29	370	1170	445	250	391	1150	486	698	210	140	614	240
30	360	926	430	270	---	1010	465	643	200	135	525	200
31	340	---	500	319	---	924	---	622	---	135	316	---
TOTAL	11842	18428	27332	10149	25314	42187	21129	15649	10194	5910	7980	9621
MEAN	382	614	882	327	873	1361	704	505	340	191	257	321
MAX	1500	1270	2950	500	2820	5630	983	1920	902	320	640	1430
MIN	170	304	430	250	276	272	465	280	200	135	120	150
CFSM	.52	.84	1.20	.45	1.19	1.85	.96	.69	.46	.26	.35	.44
IN.	.60	.93	1.39	.51	1.28	2.14	1.07	.79	.52	.30	.40	.49

CAL YR 1983 TOTAL 218449 MEAN 598 MAX 6320 MIN 130 CFSM .82 IN 11.07
WTR YR 1984 TOTAL 205735 MEAN 562 MAX 5630 MIN 120 CFSM .77 IN 10.43

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURES: October 1974 to September 1981.

INSTRUMENTATION.--Aug. 13, 1975 to Sept. 6, 1981, water-quality monitor.

REMARKS.--Quarterly samples collected at bridge.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 3,580 micromhos Jan. 26, 1978; minimum recorded (water years 1975-76, 1978-81), 126 micromhos July 29, 1976.
WATER TEMPERATURES: Maximum, 29.5°C Sept. 20, 1978; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
DEC										
13...	1500	2880	625	7.9	3.0	50	11.7	89	--	--
MAR										
28...	1300	1300	714	8.0	5.0	15	12.4	101	490	670
JUN										
29...	1100	120	763	8.0	21.0	13	6.2	71	440	270
SEP										
20...	1300	123	806	8.1	19.5	6.8	7.0	79	K1400	88

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
DEC										
13...	200	74	55	15	47	33	2	4.7	126	3.1
MAR										
28...	250	74	67	19	39	25	1	3.1	172	3.3
JUN										
29...	230	69	64	18	62	36	2	5.4	166	3.2
SEP										
20...	260	73	69	21	61	33	2	5.8	186	2.8

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)
DEC 13...	50	84	.20	5.5	364	340	.50	2830	2.3
MAR 28...	58	80	.10	5.0	396	370	.54	1390	2.0
JUN 29...	58	110	.50	5.4	475	420	.65	154	2.6
SEP 20...	69	97	.50	6.2	479	440	.65	159	.25

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
DEC 13...	.090	1.0	--	.15	.080	.050	131	1020	81
MAR 28...	.020	1.0	.090	.28	.030	.010	27	95	96
JUN 29...	.250	1.1	.230	--	.180	.150	28	9.1	--
SEP 20...	<.010	.50	--	--	.020	.030	21	7.0	--

DATE	TIME	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)
DEC 13...	1500	<10	1	45	<.5	<1	<1	<3	5	75	<1
MAR 28...	1300	<10	1	45	<.1	<1	<1	4	4	26	4
JUN 29...	1100	20	2	71	<.5	<1	9	<3	4	14	3
SEP 20...	1300	<10	1	80	<1.0	<1	<1	<3	2	9	2

DATE	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
DEC 13...	<4	37	<.1	<10	4	<1	<1	160	<6	9
MAR 28...	5	30	.4	<10	6	<1	<1	170	<6	22
JUN 29...	7	59	.1	<10	12	<1	2	250	<6	38
SEP 20...	6	33	.2	<10	9	<1	<1	260	<6	15

04165700 DETROIT RIVER AT DETROIT, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°20'50", long 82°57'31", in T.2 S., R.13 E., Wayne County, Hydrologic Unit 04090004, at Detroit municipal water treatment facility at Water Works Park in Detroit.

DRAINAGE AREA.--228,800 mi^2, approximately.

PERIOD OF RECORD.--Water years 1970 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1974 to September 1981.
WATER TEMPERATURES: October 1973 to September 1981.

REMARKS.--Quarterly grab samples were collected near the municipal water intake. The intake is in a lagoon at the north end of Belle Isle in the Detroit River. Daily-mean water discharges are reported for sampling times.

COOPERATION.--Water discharges were furnished by the National Oceanic and Atmospheric Administration.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 383 micromhos Apr. 8, 1979; minimum daily, 194 micromhos July 24, 1976.
WATER TEMPERATURES: Maximum daily, 24.5°C July 21, 1977, Aug. 29-31, 1980; minimum daily, 0.0°C Jan. 8, 1980.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance of 174 micromhos was observed Jan. 12, 1982; a water temperature of 0.0°C, was observed several days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	DISCHARGE, IN CUBIC FEET PER SECOND	SPECIFIC CONDUCTANCE (UMHOS)	PH (STANDARD UNITS)	TEMPERATURE (DEG C)	TURBIDITY (NTU)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)
DEC												
12...	1700	207000	215	8.1	2.0	13	13.0	96	K4	E28	100	18
MAR												
08...	1400	194000	227	8.1	.0	5.0	16.8	117	K2	K6	100	17
JUN												
28...	1200	223000	206	8.3	19.5	5.6	8.7	97	K2	K4	100	20
SEP												
19...	1000	233000	209	8.3	16.5	1.5	8.8	92	K2	K4	100	18

DATE	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)
DEC												
12...	28	7.2	4.3	9	.2	.90	82	1.3	18	6.9	.20	1.7
MAR												
08...	28	7.5	3.9	8	.2	.90	84	1.3	20	7.1	<.10	1.5
JUN												
28...	28	7.3	3.9	8	.2	1.0	80	.8	18	7.1	.10	.8
SEP												
19...	28	7.3	3.9	8	.2	.90	82	.8	19	7.0	<.10	1.1

DATE	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER AC-FT)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)
DEC											
12...	123	120	.17	68700	.34	<.010	.60	.030	.09	.020	<.010
MAR											
08...	149	120	.20	78000	.37	.070	.50	<.010	--	<.010	<.010
JUN											
28...	137	110	.19	82500	.35	.020	.80	.020	--	<.010	<.010
SEP											
19...	121	120	.16	76100	4.2	<.010	.90	.120	--	.110	.090

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)
DEC											
12...	1700	<10	1	31	<.5	<1	<1	<3	1	7	<1
MAR											
08...	1400	<10	1	20	<.5	<1	<1	<3	<1	4	<1
JUN											
28...	1200	<10	1	24	<.5	<1	<1	<3	1	<3	2
SEP											
19...	1000	<10	1	21	<1.0	<1	1	<3	1	4	1

DATE	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
DEC										
12...	5	<1	<.1	<10	2	<1	<1	98	<6	36
MAR										
08...	<4	1	.1	<10	1	<1	<1	100	<6	5
JUN										
28...	<4	<1	<.1	<10	2	<1	2	100	<6	13
SEP										
19...	<4	<1	<.1	<10	<1	<1	<1	100	<6	<3

04166000 RIVER ROUGE AT BIRMINGHAM, MI

LOCATION.--Lat 42°32'45", long 83°13'25", in NW1/4 sec.36, T.2 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on left bank 25 ft downstream from mouth of Quarton Lake outlet, and 100 ft upstream from bridge on Maple Road at Birmingham.

DRAINAGE AREA.--33.3 mi^2. Prior to water year 1971, drainage area was 36.9 mi^2. An area of 3.6 mi^2 noncontributing since then.

PERIOD OF RECORD.--June 1950 to current year.

REVISED RECORDS.--WSP 1387: 1951-52(M). WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since July 27,1962. Datum of gage is 715.94 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Occasional regulation by Quarton Lake above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years (water years 1951-70), 15.3 ft^3/s, 5.63 in/yr; 14 years (water years 1971-84), 22.2 ft^3/s, 9.05 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,390 ft^3/s June 26, 1968, gage height, 8.70 ft; minimum, 0.10 ft^3/s Aug. 8, 9, 1963; minimum gage height, 1.02 ft Oct. 12, 1961.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 12	1000	255	3.66	Mar. 21	1100	355	4.21
Mar. 16	1100	*381	*4.34	Sep. 26	0100	226	3.49

Minimum discharge, 1.8 ft^3/s July 25, gage height, 1.50 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.1	7.2	20	15	13	17	27	20	19	6.1	2.2	5.6
2	6.5	18	18	28	13	17	26	18	18	5.8	5.6	8.5
3	6.3	25	16	28	21	17	24	19	19	6.1	6.3	8.5
4	6.2	14	16	29	19	16	26	18	16	6.9	16	6.4
5	5.5	9.5	17	30	17	17	34	15	15	16	17	5.0
6	6.0	8.8	28	31	14	17	31	14	15	13	7.2	4.7
7	5.3	8.5	30	28	13	16	27	13	14	15	11	5.3
8	6.6	8.5	22	28	13	15	24	13	13	8.8	26	5.6
9	7.2	7.9	21	28	13	13	24	12	13	9.1	30	7.6
10	6.3	7.9	19	27	17	14	22	12	11	11	12	13
11	6.5	20	26	26	55	14	22	12	10	10	7.2	23
12	6.1	17	213	25	65	13	22	12	8.9	11	5.6	12
13	104	11	125	12	95	14	26	17	8.4	7.4	6.0	9.9
14	38	9.5	80	12	76	15	29	23	12	6.0	9.9	14
15	15	14	69	25	47	20	28	15	9.0	5.4	7.2	11
16	11	38	53	24	38	261	27	13	7.8	5.3	5.3	7.9
17	8.8	23	44	19	34	74	33	12	8.2	5.3	4.7	6.0
18	7.0	15	38	11	32	44	36	14	8.0	5.3	11	5.2
19	9.4	16	33	11	30	35	32	15	7.9	4.6	11	5.0
20	7.6	23	32	11	27	68	26	14	6.6	3.9	6.8	4.8
21	7.0	23	31	11	26	295	24	13	6.4	3.7	5.6	4.6
22	8.6	15	17	11	24	114	25	22	5.6	3.7	5.3	4.5
23	28	29	31	11	23	69	36	72	26	3.3	4.7	8.9
24	16	36	29	12	22	63	38	29	73	2.9	4.0	8.4
25	13	20	27	13	20	61	32	24	19	2.2	3.4	43
26	9.8	17	14	13	18	50	27	102	13	3.2	3.2	83
27	8.4	16	27	13	18	43	27	37	14	4.4	3.2	19
28	7.9	54	15	12	18	39	27	26	11	4.8	3.7	11
29	5.5	34	15	12	18	35	22	27	8.9	4.7	4.7	9.0
30	6.8	24	15	12	---	32	22	25	6.9	3.8	22	7.7
31	6.8	---	15	12	---	30	---	22	---	2.7	11	---
TOTAL	393.2	569.8	1156	580	839	1548	826	700	423.6	201.4	278.8	368.1
MEAN	12.7	19.0	37.3	18.7	28.9	49.9	27.5	22.6	14.1	6.50	8.99	12.3
MAX	104	54	213	31	95	295	38	102	73	16	30	83
MIN	5.3	7.2	14	11	13	13	22	12	5.6	2.2	2.2	4.5
CFSM	.38	.57	1.12	.56	.87	1.50	.83	.68	.42	.20	.27	.37
IN.	.44	.64	1.29	.65	.94	1.73	.92	.78	.47	.22	.31	.41

CAL YR 1983 TOTAL 8648.6 MEAN 23.7 MAX 418 MIN 3.5 CFSM .71 IN 9.66
WTR YR 1984 TOTAL 7883.9 MEAN 21.5 MAX 295 MIN 2.2 CFSM .65 IN 8.81

04166100 RIVER ROUGE AT SOUTHFIELD, MI

LOCATION.--Lat 42°26'52", long 83°17'52", in SW1/4 sec.32, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank at downstream side of bridge on Beech Road at Southfield, 4.2 mi east of Farmington.

DRAINAGE AREA.--87.9 mi^2.

PERIOD OF RECORD.--April 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 609.62 ft, city of Southfield datum. Prior to Sept. 30, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Dec. 16 to Jan. 16, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years, 60.3 ft^3/s, 9.32 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,900 ft^3/s June 26, 1968, gage height, 19.04 ft; minimum, 0.1 ft^3/s Aug. 2, 1964, gage height, 1.15 ft.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct. 13	2000	637	8.83	Mar. 21	1300	1,380	11.64
Dec. 12	--	800	--	May 26	1400	822	9.64
Feb. 13	--	510	ice jam	Aug. 19	0200	501	8.01
Mar. 16	1400	*1,400	*11.71	Sep. 26	0600	584	8.55

Minimum discharge, 7.9 ft^3/s July 31, Aug. 1, 2, gage height, 2.62 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	27	60	39	27	42	75	53	51	14	8.0	18
2	14	82	53	39	29	40	70	49	44	13	8.0	16
3	14	100	49	40	42	38	67	49	49	12	17	36
4	14	47	51	41	46	36	69	49	39	13	18	18
5	14	36	52	42	40	35	89	47	35	23	26	16
6	14	31	96	43	35	40	85	44	33	42	14	14
7	14	29	97	42	28	38	72	41	32	25	13	16
8	17	30	68	41	26	36	64	40	30	17	49	19
9	21	33	60	39	27	34	60	40	29	15	159	21
10	17	35	56	36	31	32	57	40	27	17	29	48
11	16	74	56	34	130	31	54	40	24	16	18	107
12	16	66	644	32	250	30	53	38	22	17	14	46
13	315	46	458	31	480	36	69	56	21	14	13	32
14	175	39	176	30	310	41	85	75	23	12	14	50
15	44	41	150	30	148	50	84	48	22	11	15	35
16	31	144	100	29	111	855	68	39	20	11	13	26
17	28	87	70	29	99	410	89	36	20	19	11	22
18	24	54	55	28	91	170	106	38	27	32	44	20
19	23	60	50	27	85	120	80	44	28	13	144	18
20	24	86	47	26	78	170	69	42	18	11	22	18
21	22	86	45	26	68	1050	60	38	16	11	16	17
22	25	55	44	26	64	682	62	36	15	10	15	17
23	96	86	42	29	60	245	113	243	15	9.8	14	41
24	58	135	39	30	58	210	115	77	96	11	13	40
25	38	69	37	32	54	202	89	55	36	9.0	12	50
26	32	53	37	33	49	154	71	510	22	8.6	12	315
27	29	47	38	32	46	127	71	127	22	13	12	56
28	27	217	39	28	44	112	68	77	22	11	14	36
29	26	123	39	29	43	99	56	72	17	9.6	13	28
30	24	80	39	30	---	87	57	64	15	9.2	67	24
31	26	---	39	29	---	80	---	59	---	8.5	34	---
TOTAL	1252	2098	2886	1022	2599	5332	2227	2266	870	457.7	871.0	1220
MEAN	40.4	69.9	93.1	33.0	89.6	172	74.2	73.1	29.0	14.8	28.1	40.7
MAX	315	217	644	43	480	1050	115	510	96	42	159	315
MIN	14	27	37	26	26	30	53	36	15	8.5	8.0	14
CFSM	.46	.80	1.06	.38	1.02	1.96	.84	.83	.33	.17	.32	.46
IN.	.53	.89	1.22	.43	1.10	2.26	.94	.96	.37	.19	.37	.52

CAL YR 1983 TOTAL 26585.2 MEAN 72.8 MAX 1480 MIN 9.1 CFSM .83 IN 11.25
WTR YR 1984 TOTAL 23100.7 MEAN 63.1 MAX 1050 MIN 8.0 CFSM .72 IN 9.78

04166200 EVANS DITCH AT SOUTHFIELD, MI

LOCATION.--Lat 42°27'28", long 83°16'03", in SE1/4 sec.28, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank 20 ft upstream from bridge on Nine Mile Road at Southfield, 1.6 mi upstream from mouth, and 5.5 mi east of Farmington.

DRAINAGE AREA.--9.49 mi^2.

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 615.07 ft, city of Southfield datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years, 8.26 ft^3/s, 11.82 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,200 ft^3/s Oct. 1, 1981, gage height, 15.03 ft, from floodmarks, from rating curve extended above 410 ft^3/s; no flow part of each day Aug. 30, 31, 1978.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 270 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct. 13	1400	388	9.31	Aug. 8	2300	420	9.43
Mar. 16	0430	559	10.46	Aug. 18	2030	*627	*10.95
Mar. 21	0930	314	8.71	Sep. 11	1100	320	8.73
May 26	0230	499	10.05	Sep. 25	2300	422	9.46
July 17	2030	305	8.61				

Minimum discharge, 0.83 ft^3/s Oct. 1; minimum gage height, 5.80 ft July 15, 16, 17, 31, Aug. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.99	3.2	4.8	2.3	2.1	3.1	6.3	3.8	4.1	1.3	1.5	2.4
2	1.0	23	4.5	2.4	2.8	2.9	5.4	3.5	3.8	1.4	1.5	3.1
3	1.3	6.9	4.0	2.5	5.0	2.8	4.8	3.7	8.3	1.5	3.1	4.1
4	2.3	3.3	7.6	2.6	3.0	2.7	6.9	3.2	3.2	1.6	2.3	1.8
5	3.0	2.9	5.1	2.6	2.5	2.9	13	3.1	6.0	14	1.7	1.7
6	3.4	2.7	28	2.5	2.3	2.7	7.0	2.9	3.0	21	1.8	1.6
7	4.2	2.9	13	2.4	2.2	2.6	5.4	2.8	2.7	2.3	6.1	4.2
8	7.6	3.1	7.4	2.3	2.2	2.5	4.4	3.1	2.4	1.6	58	2.0
9	2.0	3.4	6.7	2.2	2.8	2.3	4.1	3.0	2.3	2.5	25	14
10	1.6	4.2	6.5	2.1	4.5	2.2	4.1	2.6	2.2	2.0	3.0	11
11	2.1	29	20	2.0	45	2.1	4.1	3.4	2.0	1.9	2.5	79
12	2.6	6.4	127	2.0	34	2.1	4.0	2.6	2.1	1.8	2.0	5.1
13	132	4.3	19	2.0	36	2.9	9.0	16	3.8	1.5	2.1	9.2
14	6.8	3.8	13	2.0	17	6.2	11	4.8	4.1	1.4	2.2	6.4
15	2.8	14	11	1.9	10	9.5	6.4	2.7	2.3	1.2	1.9	6.5
16	2.2	32	7.4	1.9	8.3	195	5.0	2.6	2.1	1.3	1.9	3.0
17	2.4	7.6	5.0	1.9	8.4	15	14	2.7	2.0	49	2.0	2.4
18	2.4	5.1	4.0	1.9	7.1	10	9.3	3.9	8.8	7.0	122	2.3
19	2.7	15	3.5	1.9	7.2	8.7	5.6	4.1	3.2	2.3	30	2.2
20	3.0	17	3.3	2.0	6.4	73	4.7	4.0	1.8	1.9	3.5	2.2
21	3.0	8.5	3.1	2.2	5.6	182	3.8	2.7	1.6	1.9	2.6	2.2
22	8.2	5.2	3.0	2.5	5.2	30	9.6	10	1.6	1.9	2.4	2.2
23	20	32	2.9	3.2	5.2	21	13	34	2.9	1.7	2.1	14
24	4.5	11	2.7	3.4	4.9	19	13	3.6	4.4	2.1	2.0	3.7
25	3.1	6.1	2.6	3.1	4.5	15	5.9	8.8	1.6	1.8	2.0	65
26	3.3	5.0	2.4	2.8	3.6	11	4.5	126	1.5	2.8	2.7	23
27	3.0	4.9	2.3	2.5	3.5	9.8	7.8	7.7	2.4	3.9	3.4	3.7
28	3.2	45	2.3	2.1	3.5	8.7	4.2	6.7	1.9	1.8	5.2	3.2
29	3.3	8.8	2.3	2.0	3.3	8.1	3.2	6.6	1.5	1.5	1.9	2.8
30	4.3	5.8	2.3	2.0	---	7.0	4.4	5.8	1.4	1.5	37	2.6
31	2.8	---	2.3	2.0	---	7.7	---	4.8	---	1.4	3.5	---
TOTAL	245.09	322.1	329.0	71.2	248.1	670.5	203.9	295.2	91.0	140.8	338.9	286.6
MEAN	7.91	10.7	10.6	2.30	8.56	21.6	6.80	9.52	3.03	4.54	10.9	9.55
MAX	132	45	127	3.4	45	195	14	126	8.8	49	122	79
MIN	.99	2.7	2.3	1.9	2.1	2.1	3.2	2.6	1.4	1.2	1.5	1.6
CFSM	.83	1.13	1.12	.24	.90	2.28	.72	1.00	.32	.48	1.15	1.01
IN.	.96	1.26	1.29	.28	.97	2.63	.80	1.16	.36	.55	1.33	1.12

CAL YR 1983 TOTAL 3347.09 MEAN 9.17 MAX 237 MIN .42 CFSM .97 IN 13.12
WTR YR 1984 TOTAL 3242.39 MEAN 8.86 MAX 195 MIN .99 CFSM .93 IN 12.71

04166300 UPPER RIVER ROUGE AT FARMINGTON, MI

LOCATION.--Lat 42°27'52", long 83°22'11", in NW1/4 sec.27, T.1 N., R.9 E., Oakland County, Hydrologic Unit 04090004, on left bank 800 ft downstream from bridge on Shiawassee Road at Farmington.

DRAINAGE AREA.--17.5 mi^2.

PERIOD OF RECORD.--March 1958 to current year.

REVISED RECORDS.--WSP 1912: 1959(M), 1960(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 690.4 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--36 years, 11.9 ft^3/s, 9.23 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft^3/s June 25, 1968, gage height, 8.70 ft; minimum, 0.07 ft^3/s Aug. 30, 1966, result of regulation; minimum daily, 0.32 ft^3/s Aug. 10, 1964, Aug. 29, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 120 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 12	0700	132	4.11	Mar. 21	1000	222	4.63
Mar. 16	0700	*275	*4.91	May 26	0400	142	4.18

Minimum discharge, 0.39 ft^3/s Mar. 7, gage height, 2.68 ft, result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	4.8	11	6.0	4.0	7.0	16	9.7	11	2.5	1.6	2.8
2	2.3	20	9.2	6.0	4.0	6.7	14	8.9	9.5	2.5	1.6	2.4
3	2.2	17	8.4	6.1	7.5	6.3	13	8.6	8.9	2.4	7.8	3.8
4	2.3	8.7	9.2	6.3	7.0	6.0	14	8.0	7.5	2.5	4.9	2.7
5	2.4	7.1	9.3	6.5	6.5	6.2	19	8.1	6.4	4.5	3.2	2.3
6	2.4	6.3	15	6.5	5.7	5.8	19	7.8	6.8	5.3	2.6	2.0
7	2.8	5.7	14	6.4	5.2	5.5	16	7.3	5.1	3.9	2.4	2.3
8	2.6	5.6	13	6.2	4.8	5.3	13	7.6	4.5	2.9	16	2.4
9	3.4	5.1	10	5.9	4.9	5.2	12	7.9	4.1	2.6	21	3.3
10	2.4	5.2	9.5	5.5	6.0	5.1	11	7.7	3.7	2.9	5.8	6.4
11	2.5	9.0	14	5.3	40	5.0	9.9	8.2	3.6	2.8	3.4	14
12	2.9	8.3	112	5.0	65	4.9	9.7	7.5	3.2	2.7	2.7	6.7
13	48	6.6	56	4.8	80	6.0	14	12	3.0	2.3	2.4	6.5
14	20	6.1	35	4.6	64	9.0	18	14	2.8	2.0	2.2	8.6
15	8.1	8.4	25	4.5	38	17	19	10	3.0	1.9	1.9	6.2
16	5.7	27	16	4.4	29	182	16	8.6	2.8	1.9	1.8	3.5
17	5.1	15	12	4.4	23	59	23	7.8	3.1	6.8	1.9	3.0
18	4.2	9.9	9.5	4.3	22	32	26	8.3	4.8	5.4	2.7	2.6
19	3.8	12	8.5	4.2	20	24	19	9.3	4.7	2.9	8.9	2.4
20	3.3	18	8.0	4.1	18	47	16	9.6	3.6	2.4	3.2	2.3
21	3.1	14	7.4	4.0	15	178	13	8.6	3.4	2.4	2.3	2.2
22	3.6	9.5	7.0	4.0	12	85	14	11	2.9	2.3	1.8	2.1
23	13	22	6.7	4.5	12	53	30	35	3.1	1.9	1.8	4.3
24	9.7	22	6.5	5.2	11	46	29	16	3.7	1.8	2.0	3.9
25	7.0	13	6.4	6.2	11	47	22	13	3.5	1.8	1.7	13
26	6.8	10	6.3	5.7	9.0	36	17	85	3.0	1.7	1.5	40
27	5.9	9.3	6.2	5.2	8.5	30	15	32	3.2	2.7	1.5	10
28	5.4	47	6.2	4.7	8.0	26	14	20	3.4	2.3	1.8	6.0
29	4.9	24	6.1	4.5	7.5	22	11	16	2.8	1.8	1.9	4.3
30	5.3	14	6.1	4.2	---	19	11	15	2.6	1.6	8.2	3.7
31	5.4	---	6.0	4.1	---	17	---	13	---	1.5	4.4	---
TOTAL	198.8	390.6	475.5	159.3	548.6	1004.0	493.6	441.5	133.7	84.9	126.9	175.7
MEAN	6.41	13.0	15.3	5.14	18.9	32.4	16.5	14.2	4.46	2.74	4.09	5.86
MAX	48	47	112	6.5	80	182	30	85	11	6.8	21	40
MIN	2.2	4.8	6.0	4.0	4.0	4.9	9.7	7.3	2.6	1.5	1.5	2.0
CFSM	.37	.74	.87	.29	1.08	1.85	.94	.81	.26	.16	.23	.34
IN.	.42	.83	1.01	.34	1.17	2.13	1.05	.94	.28	.18	.27	.37

CAL YR 1983 TOTAL 5325.5 MEAN 14.6 MAX 326 MIN 1.9 CFSM .83 IN 11.32
WTR YR 1984 TOTAL 4233.1 MEAN 11.6 MAX 182 MIN 1.5 CFSM .66 IN 9.00

04166500 RIVER ROUGE AT DETROIT, MI

LOCATION.--Lat 42°22'20", long 83°15'20", in SW1/4 sec.27, T.1 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 500 ft upstream from bridge on Plymouth Road at Detroit, and 4 mi upstream from Middle River Rouge.

DRAINAGE AREA.--187 mi^2.

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1034: 1933(M). WSP 1054: 1939, 1943, 1945(M). WSP 1437: 1931-32, 1934, 1936(M), 1937-38, 1944(M), 1945. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 16, 1948, nonrecording gage at site 1 mi downstream at datum 4.6 ft lower.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--54 years, 115 ft^3/s, 8.35 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,000 ft^3/s Apr. 5, 1947; maximum gage height, 23.0 ft Apr. 6, 1947, from floodmark, site and datum then in use; minimum discharge, 1.8 ft^3/s Aug. 1, 2, 1964, gage height, 3.00 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 16	2400	2,000	14.55	May 26	1700	1,260	12.44
Mar. 21	2400	*2,200	*14.97				

Minimum discharge, 14 ft^3/s Aug. 1; minimum, gage height, 3.95 ft Oct. 6, 7, 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	36	104	60	44	68	133	88	98	27	17	46
2	21	104	84	60	43	64	120	81	85	26	15	37
3	20	244	78	62	80	62	111	80	187	25	36	43
4	19	95	95	63	68	60	122	80	82	26	89	48
5	20	61	95	64	62	58	180	84	67	28	50	36
6	19	49	269	63	57	56	160	80	65	124	36	32
7	19	43	233	62	53	54	132	68	58	79	31	30
8	30	43	129	60	51	53	111	69	55	48	101	38
9	44	41	113	58	50	52	100	67	51	34	330	49
10	27	43	98	56	80	52	96	69	48	44	90	196
11	22	177	124	52	430	52	88	71	46	39	44	329
12	24	136	942	50	596	51	87	69	44	39	34	144
13	620	73	820	48	784	52	120	118	68	34	35	67
14	481	56	328	46	560	72	171	174	56	28	33	119
15	99	70	267	45	285	97	186	89	42	23	31	72
16	60	319	194	44	207	1460	131	69	39	23	29	51
17	48	194	120	44	182	1230	173	61	38	48	26	38
18	42	101	90	44	171	295	234	68	47	166	37	32
19	36	117	80	44	154	205	156	91	86	44	239	30
20	35	190	75	43	145	343	127	76	42	29	56	29
21	33	188	70	41	124	1590	107	74	32	25	36	27
22	39	103	67	40	110	1600	112	94	31	24	30	26
23	183	163	64	44	106	519	251	428	30	21	29	42
24	134	282	62	50	98	386	227	167	103	21	27	99
25	75	136	60	64	92	361	178	126	81	23	26	72
26	56	97	60	56	80	290	132	1060	47	19	25	409
27	48	79	60	52	75	235	138	379	38	31	24	115
28	41	392	60	50	75	200	130	165	45	30	31	48
29	39	284	60	49	72	179	98	145	37	19	36	31
30	33	149	60	47	---	156	96	127	32	18	85	25
31	34	---	60	46	---	141	---	113	---	17	115	---
TOTAL	2421	4065	5021	1607	4934	10093	4207	4530	1780	1182	1823	2360
MEAN	78.1	136	162	51.8	170	326	140	146	59.3	38.1	58.8	78.7
MAX	620	392	942	64	784	1600	251	1060	187	166	330	409
MIN	19	36	60	40	43	51	87	61	30	17	15	25
CFSM	.42	.73	.87	.28	.91	1.74	.75	.78	.32	.20	.31	.42
IN.	.48	.81	1.00	.32	.98	2.01	.84	.90	.35	.24	.36	.47

CAL YR 1983 TOTAL 50538 MEAN 138 MAX 2380 MIN 12 CFSM .74 IN 10.05
WTR YR 1984 TOTAL 44023 MEAN 120 MAX 1600 MIN 15 CFSM .64 IN 8.76

04167000 MIDDLE RIVER ROUGE NEAR GARDEN CITY, MI

LOCATION.--lat 42°20'55", long 83°18'45", in SW 1/4 NW 1/4 sec.6, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 200 ft downstream from bridge on Inkster Road, 1.8 mi northeast of Garden City, and 6.0 mi upstream from mouth.

DRAINAGE AREA.--99.9 mi^2.

PERIOD OF RECORD.--October 1930 to September 1933 (published as "at Detroit"), June 1947 to September 1977, October 1983 to September 1984. Monthly discharge only for October, November 1930, published in WSP 1307. Annual maximum only, water-years 1978-83.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 600.95 ft National Geodetic Vertical Datum of 1929. Nov. 21, 1930 to Sept. 30, 1933, nonrecording gage at site 4.8 mi downstream at datum 17.48 ft lower. June 6, 1947 to Oct. 18, 1948, nonrecording gage at site 200 ft upstream at present datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Oct. 1-25, which are fair. Occasional regulation by reservoirs above station since 1956. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--34 years, 69.4 ft^3/s, 9.43 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,330 ft^3/s June 26, 1968; maximum gage height, 10.50 ft May 10, 1948; minimum discharge, 0.9 ft^3/s Aug. 16, 1956.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 700 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 16	2100	965	8.82	Mar. 21	2100	*1,110	*9.06

Minimum daily discharge, 18 ft^3/s Oct. 1, 3, 4, 6, 7, 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	28	75	40	31	50	91	73	84	23	24	26
2	19	85	59	40	30	47	83	66	80	23	22	23
3	18	100	53	40	50	43	76	65	242	22	24	22
4	18	61	66	40	45	43	92	64	84	23	26	21
5	19	42	65	40	43	45	141	65	61	23	24	20
6	18	34	240	40	40	44	126	64	52	36	23	20
7	18	33	148	40	37	41	108	58	47	31	29	24
8	23	31	89	39	35	39	90	58	42	23	74	23
9	35	29	73	38	35	39	79	55	38	24	93	96
10	24	34	68	37	35	39	73	54	36	25	44	180
11	18	133	115	36	176	39	68	57	35	25	29	159
12	30	63	521	35	235	39	66	54	31	23	28	74
13	430	39	409	34	417	40	103	97	94	22	24	57
14	350	35	298	33	452	47	131	108	95	20	26	64
15	90	63	219	32	322	60	141	78	31	19	23	48
16	50	213	167	31	208	788	127	64	29	19	21	33
17	40	99	121	31	173	603	171	56	30	20	21	28
18	35	65	80	31	152	294	196	59	56	27	70	26
19	30	99	60	31	139	176	168	83	63	25	29	26
20	28	133	52	31	123	309	131	75	34	21	21	26
21	28	102	48	31	107	992	105	68	29	20	20	25
22	29	67	45	31	94	810	111	81	26	20	20	26
23	120	123	43	32	85	442	195	259	26	20	20	37
24	100	132	42	35	79	295	194	131	28	19	20	41
25	60	87	41	45	74	251	160	106	26	19	19	97
26	38	62	40	40	65	226	128	562	25	22	19	109
27	35	53	40	37	60	186	134	344	25	32	19	46
28	31	271	40	35	58	159	109	204	25	28	23	40
29	29	174	40	35	52	139	88	143	25	21	22	37
30	26	113	40	34	---	119	86	116	23	20	86	30
31	26	---	40	33	---	102	---	99	---	20	41	---
TOTAL	1833	2603	3437	1107	3452	6546	3571	3466	1522	715	984	1484
MEAN	59.1	86.8	111	35.7	119	211	119	112	50.7	23.1	31.7	49.5
MAX	430	271	521	45	452	992	196	562	242	36	93	180
MIN	18	28	40	31	30	39	66	54	23	19	19	20
CFSM	.59	.87	1.11	.36	1.19	2.11	1.19	1.12	.51	.23	.32	.50
IN.	.68	.97	1.28	.41	1.29	2.44	1.33	1.29	.57	.27	.37	.55

WTR YR 1984 TOTAL 30720 MEAN 83.9 MAX 992 MIN 18 CFSM .84 IN 11.44

04168000 LOWER RIVER ROUGE AT INKSTER, MI

LOCATION.--Lat 42°18'00", long 83°18'00", in SW1/4 SE1/4 sec.19, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 10 ft downstream from bridge on John Daly Road, 0.6 mi northeast of Inkster, and 4.8 mi upstream from mouth.

DRAINAGE AREA.--83.2 mi^2.

PERIOD OF RECORD.--June 1947 to current year.

REVISED RECORDS.--WSP 1174: 1948(M). WSP 1437: 1949. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 593.14 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 20, 1948, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 52.5 ft^3/s, 8.57 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,600 ft^3/s June 26, 1968, gage height, 13.62 ft; minimum, 0.2 ft^3/s Sept. 13, 1955, Jan. 23, 1961.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 22	0300	*1,310	*10.67

Minimum discharge, 1.4 ft^3/s Mar. 12, Aug. 29, Sept. 5, 6, 20, 21; minimum gage height, 2.58 ft Aug. 29, Sept. 5, 6.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.6	4.7	36	10	13	29	52	36	44	3.9	2.5	5.8
2	3.4	26	28	9.5	15	26	47	30	49	4.0	3.2	2.7
3	3.7	31	24	9.3	21	23	42	28	277	3.5	6.0	2.1
4	6.7	16	31	9.2	18	21	49	30	84	3.3	5.3	1.9
5	9.5	13	32	9.0	16	22	89	25	54	3.3	3.9	1.8
6	7.5	5.5	231	8.8	14	21	94	23	33	13	3.4	1.8
7	6.3	4.0	210	8.6	13	19	67	22	25	7.2	13	3.4
8	14	3.8	84	8.3	13	17	51	22	19	4.0	38	3.5
9	10	6.6	59	7.9	13	15	42	23	15	3.4	39	41
10	5.6	12	42	7.5	15	14	37	21	13	3.3	7.9	101
11	6.7	66	77	7.4	80	13	36	22	11	4.5	6.0	49
12	7.1	35	517	7.4	150	12	31	20	11	4.8	3.1	18
13	199	18	505	7.4	360	13	51	40	35	4.3	2.8	52
14	67	11	219	7.5	500	16	75	41	59	4.4	3.7	37
15	18	23	90	7.6	330	26	108	29	20	3.7	3.5	18
16	7.9	126	55	7.7	218	664	117	22	14	3.2	3.6	11
17	6.3	60	40	7.7	171	549	136	20	9.7	2.9	4.3	3.7
18	4.9	32	30	7.9	154	168	241	20	22	2.8	23	2.4
19	4.9	44	25	8.0	138	103	164	34	18	3.6	14	1.8
20	9.1	71	22	8.2	113	231	99	34	8.8	3.4	3.3	1.6
21	9.9	59	20	8.5	84	984	68	30	7.3	3.3	2.7	3.1
22	14	34	18	9.5	66	1050	68	31	13	3.3	2.7	3.3
23	38	61	17	10	60	328	156	124	7.5	3.2	4.7	4.6
24	15	73	16	11	57	301	171	71	5.2	3.0	2.7	7.9
25	10	43	15	13	48	249	129	53	7.3	2.7	2.2	37
26	6.7	26	14	14	38	168	78	606	5.5	3.6	2.2	53
27	6.5	22	13	14	35	125	88	336	5.4	10	2.0	14
28	7.5	167	12	14	32	104	74	128	6.1	11	1.9	6.1
29	6.1	144	11	13	30	86	52	97	6.6	4.4	1.7	5.2
30	4.5	59	11	13	---	70	44	80	6.5	3.2	8.2	2.8
31	4.4	---	10	13	---	62	---	56	---	2.6	3.9	---
TOTAL	524.8	1296.6	2514	297.9	2815	5529	2556	2154	891.9	136.8	224.4	496.5
MEAN	16.9	43.2	81.1	9.61	97.1	178	85.2	69.5	29.7	4.41	7.24	16.6
MAX	199	167	517	14	500	1050	241	606	277	13	39	101
MIN	3.4	3.8	10	7.4	13	12	31	20	5.2	2.6	1.7	1.6
CFSM	.20	.52	.98	.12	1.17	2.14	1.02	.84	.36	.05	.09	.20
IN.	.23	.58	1.12	.13	1.26	2.47	1.14	.96	.40	.06	.10	.22

CAL YR 1983 TOTAL 22792.9 MEAN 62.4 MAX 1510 MIN 1.4 CFSM .75 IN 10.19
WTR YR 1984 TOTAL 19436.9 MEAN 53.1 MAX 1050 MIN 1.6 CFSM .64 IN 8.69

04170000 HURON RIVER AT MILFORD, MI

LOCATION.--Lat 42°34'44", long 83°37'36", in NE1/4 sec.16, T.2 N., R.7 E., Oakland County, Hydrologic Unit 04090005, on left bank 40 ft downstream from bridge on General Motors Road, 0.5 mi downstream from Sherwood Creek, and 0.5 mi west of Milford.

DRAINAGE AREA.--132 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1948 to current year.

REVISED RECORDS.--WSP 1337: 1952(m). WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 880.00 ft National Geodetic Vertical Datum of 1929. Prior to Apr. 1, 1970 at site 240 ft upstream at same datum.

REMARKS.--Water-discharge records good. Flow below about 300 ft^3/s regulated by powerplant 1.5 mi above station prior to May 20, 1957; occasional regulation for lake level control since.

AVERAGE DISCHARGE.--36 years, 97.1 ft^3/s, 9.99 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 648 ft^3/s Oct. 3, 1981, gage height, 7.87 ft; maximum gage height, 8.26 ft June 28, 1968; minimum daily discharge, 5.2 ft^3/s Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 198 ft^3/s Mar. 22, gage height, 6.17 ft; minimum, 24 ft^3/s July 31, gage height, 4.16 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	42	58	129	89	74	73	124	90	131	32	25	32
2	43	69	126	88	73	71	117	89	125	29	26	30
3	42	80	123	87	77	70	114	90	118	28	44	30
4	43	76	121	86	77	72	108	88	106	28	60	29
5	43	72	120	85	77	71	116	86	86	32	59	28
6	36	74	127	84	75	71	118	86	74	39	55	27
7	40	70	132	81	72	69	114	80	68	38	46	28
8	45	67	131	82	72	67	108	78	63	32	61	30
9	46	65	128	81	71	63	104	86	58	31	98	32
10	45	64	126	80	72	61	99	80	54	33	74	41
11	45	71	131	77	87	59	94	76	49	51	57	52
12	46	76	165	80	103	59	90	72	42	49	45	53
13	86	73	183	76	134	58	95	80	35	44	43	47
14	105	70	173	76	143	60	91	85	40	38	41	45
15	96	75	166	76	135	64	95	72	39	36	42	45
16	93	101	154	76	131	149	90	68	34	32	40	42
17	84	108	138	76	129	154	95	56	36	30	38	40
18	72	99	131	75	127	127	105	50	38	29	32	40
19	72	97	125	75	125	114	101	54	41	29	33	40
20	71	108	124	73	120	114	96	54	42	29	35	39
21	59	109	118	72	115	167	95	54	39	29	35	39
22	58	105	121	70	109	196	96	58	33	29	34	34
23	65	117	113	70	104	185	106	109	34	31	32	38
24	65	117	116	72	103	179	109	117	38	36	28	44
25	62	119	108	73	96	174	112	105	35	33	28	60
26	61	112	104	75	88	167	112	147	31	29	30	84
27	60	109	100	76	82	161	114	161	32	29	30	70
28	58	139	101	73	78	156	113	149	32	29	26	61
29	56	145	101	76	72	149	111	144	32	27	25	57
30	56	134	97	76	---	144	101	146	31	27	30	55
31	59	---	93	74	---	136	---	142	---	26	32	---
TOTAL	1854	2779	3925	2410	2821	3460	3143	2852	1616	1014	1284	1292
MEAN	59.8	92.6	127	77.7	97.3	112	105	92.0	53.9	32.7	41.4	43.1
MAX	105	145	183	89	143	196	124	161	131	51	98	84
MIN	36	58	93	70	71	58	90	50	31	26	25	27
CFSM	.45	.70	.96	.59	.74	.85	.80	.70	.41	.25	.31	.33
IN.	.52	.78	1.11	.68	.80	.98	.89	.80	.46	.29	.36	.36

CAL YR 1983 TOTAL 34237 MEAN 93.8 MAX 302 MIN 25 CFSM .71 IN 9.65
WTR YR 1984 TOTAL 28450 MEAN 77.7 MAX 196 MIN 25 CFSM .59 IN 8.02

04170000 HURON RIVER AT MILFORD, MI--CONTINUED
WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1970-75, 1984.

COOPERATION.--Samples for biochemical oxygen demand were collected by the U.S. Geological Survey and analyzed by Canton Analytical Laboratory.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L)	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)
APR												
06...	1000	119	610	8.0	6.0	11.9	100	2.9	20	K26	63	18
MAY												
04...	0930	86	609	8.2	11.5	9.9	96	1.0	1600	K19	64	19
JUN												
01...	0900	132	586	8.1	15.0	9.3	95	20	K250	36	60	18
JUL												
06...	1000	39	605	--	21.5	6.0	71	3.5	K140	E92	50	21
AUG												
10...	0900	76	560	8.1	25.0	6.2	78	2.0	680	K11	49	19
SEP												
07...	1300	31	649	8.0	18.0	7.7	84	3.6	500	100	54	22

DATE	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)
APR												
06...	30	1.8	188	36	54	.20	5.9	337	320	.18	.020	.20
MAY												
04...	29	1.8	172	35	50	.20	5.3	355	310	--	.020	<.10
JUN												
01...	28	1.6	192	31	53	.20	4.9	391	310	--	.020	<.10
JUL												
06...	40	2.0	175	29	77	.20	3.7	386	330	--	.030	<.10
AUG												
10...	34	2.0	167	28	64	.20	7.2	316	300	--	.030	<.10
SEP												
07...	45	2.6	186	30	83	.20	6.9	410	360	.28	.120	.40

DATE	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	PHENOLS TOTAL (UG/L)	2,4-D, DIS-SOLVED (UG/L)	2,4-DP DISSOLV (UG/L)	2,4,5-T DIS-SOLVED (UG/L)	SILVEX, DIS-SOLVED (UG/L)	SEDI-MENT, SUS-PENDED (MG/L)
APR												
06...	.100	.60	.70	.90	.060	.010	<1	.02	<.01	<.01	<.01	--
MAY												
04...	.400	1.4	1.8	--	.140	.030	<1	.01	<.01	<.01	<.01	8
JUN												
01...	.050	1.6	1.6	--	.040	.030	<1	.10	<.01	<.01	<.01	8
JUL												
06...	.310	.79	1.1	--	.070	.040	<1	.19	<.01	<.01	<.01	6
AUG												
10...	.130	1.1	1.2	--	.080	.040	<1	--	--	--	--	5
SEP												
07...	.200	.50	.70	1.1	.050	.030	<1	--	--	--	--	5

04170500 HURON RIVER NEAR NEW HUDSON, MI

LOCATION.--Lat 42°30'45", long 83°40'35", in NE1/4 sec.1, T.1 N., R.6 E., Livingston County, Hydrologic Unit 04090005, on right bank 150 ft downstream from Kent Lake Dam, 2 mi upstream from Woodruff Creek, and 3 mi west of New Hudson.

DRAINAGE AREA.--148 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1948 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 868.00 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good. Occasional regulation by Kent Lake.

AVERAGE DISCHARGE.--36 years, 111 ft^3/s, 10.18 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,080 ft^3/s Dec. 29, 1950, gage height, 5.05 ft, from rating curve extended above 600 ft^3/s; minimum, 2.6 ft^3/s May 27, 1963, gage height, 0.53 ft; minimum daily, 6.4 ft^3/s May 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 299 ft^3/s Nov. 23, gage height, 2.76 ft; maximum gage height, 2.77 ft Nov. 8; minimum discharge, 16 ft^3/s Apr. 13, gage height, 0.78 ft; minimum daily, 20 ft^3/s July 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	49	129	148	107	89	91	103	107	133	30	21	42
2	49	154	146	105	89	89	70	102	126	29	24	40
3	47	148	142	104	90	87	80	102	123	27	31	43
4	48	143	140	102	91	86	90	102	119	28	42	36
5	49	134	138	101	91	86	77	99	107	29	50	33
6	46	111	149	101	91	87	68	99	96	34	51	28
7	42	100	148	98	90	86	90	96	90	35	53	29
8	46	194	145	98	89	85	100	91	80	32	64	29
9	51	195	143	97	87	80	62	89	82	31	109	35
10	49	140	140	97	87	78	47	88	73	32	105	45
11	48	118	140	93	90	76	66	88	69	48	89	62
12	50	102	156	93	98	75	81	84	63	49	73	60
13	79	96	171	92	111	76	49	87	60	47	64	62
14	88	153	179	91	129	73	49	90	59	44	60	65
15	93	168	177	90	144	76	73	84	48	39	54	60
16	88	148	172	90	145	121	71	77	42	34	53	50
17	87	137	162	90	145	143	71	72	39	27	53	43
18	82	128	152	89	144	143	94	69	43	27	52	38
19	80	124	143	89	142	134	57	69	49	23	50	39
20	78	123	139	87	140	129	58	72	46	23	44	40
21	73	156	136	86	135	154	80	70	42	27	42	38
22	67	160	139	84	129	184	91	69	38	26	44	35
23	73	226	130	84	125	188	64	95	34	23	43	40
24	74	254	129	84	122	184	70	103	34	27	40	45
25	71	240	125	86	116	182	92	107	35	26	37	58
26	71	220	120	86	111	173	104	139	31	25	36	83
27	68	200	116	87	108	167	113	147	30	25	36	75
28	65	180	117	87	105	114	116	148	33	24	36	68
29	67	170	116	89	94	97	119	142	33	22	35	64
30	65	160	112	89	---	72	97	136	32	21	50	60
31	116	---	109	89	---	82	---	139	---	20	46	---
TOTAL	2059	4711	4379	2865	3227	3498	2402	3062	1889	934	1587	1445
MEAN	66.4	157	141	92.4	111	113	80.1	98.8	63.0	30.1	51.2	48.2
MAX	116	254	179	107	145	188	119	148	133	49	109	83
MIN	42	96	109	84	87	72	47	69	30	20	21	28
CFSM	.45	1.06	.95	.62	.75	.76	.54	.67	.43	.20	.35	.33
IN.	.52	1.18	1.10	.72	.81	.88	.60	.77	.47	.23	.40	.36

CAL YR 1983 TOTAL 39138 MEAN 107 MAX 293 MIN 31 CFSM .72 IN 9.84
WTR YR 1984 TOTAL 32058 MEAN 87.6 MAX 254 MIN 20 CFSM .59 IN 8.06

04170500 HURON RIVER NEAR NEW HUDSON, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1970-75, 1984.

COOPERATION.--Samples for biochemical oxygen demand were collected by the U.S. Geological Survey and analyzed by Canton Analytical Laboratory.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIO-CHEM-ICAL, 5 DAY (MG/L)	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)
APR												
06...	1300	68	574	8.4	6.0	12.1	102	2.6	K18	K100	58	18
MAY												
04...	1130	103	571	8.4	11.5	10.0	96	3.0	K20	<1	57	18
JUN												
01...	1100	135	589	8.2	17.0	8.7	93	160	K2	K3	58	18
JUL												
06...	1300	35	541	--	23.0	7.4	90	3.0	60	E21	52	19
AUG												
10...	1100	107	509	8.6	25.5	7.0	88	3.6	42	K13	41	20
SEP												
07...	1000	29	517	8.5	17.5	7.8	84	2.3	<2	K1	39	21

DATE	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)
APR												
06...	29	1.6	176	37	55	.20	4.9	332	310	.17	.030	.20
MAY												
04...	28	1.6	177	39	50	.20	.3	342	300	--	<.010	<.10
JUN												
01...	30	1.8	186	37	54	.20	1.1	396	--	--	<.010	<.10
JUL												
06...	29	1.8	171	32	57	.20	4.1	372	300	--	<.010	<.10
AUG												
10...	31	1.8	148	29	60	.20	7.6	286	280	--	<.010	<.10
SEP												
07...	34	2.0	144	28	63	.20	7.5	294	280	--	<.010	<.10

DATE	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P)	PHENOLS TOTAL (UG/L)	2,4-D, DIS-SOLVED (UG/L)	2,4-DP DISSOLV (UG/L)	2,4,5-T DIS-SOLVED (UG/L)	SILVEX, DIS-SOLVED (UG/L)	SEDI-MENT, SUS-PENDED (MG/L)
APR												
06...	<.010	--	.50	.70	.030	<.010	<1	.02	<.01	<.01	<.01	--
MAY												
04...	.160	1.3	1.5	--	.090	.020	<1	.02	<.01	<.01	<.01	30
JUN												
01...	.050	1.9	1.9	--	.070	.040	1	.03	<.01	<.01	<.01	16
JUL												
06...	.110	1.2	1.3	--	.070	.030	<1	.23	<.01	<.01	<.01	6
AUG												
10...	<.010	--	1.2	--	.060	.030	<1	--	--	--	--	5
SEP												
07...	.050	.95	1.0	--	.040	.010	<1	--	--	--	--	5

04172000 HURON RIVER NEAR HAMBURG, MI

LOCATION.--Lat 42°27'55", long 83°48'00", in sec.24, T.1 N., R.5 E., Livingston County, Hydrologic Unit 04090005, on right bank at downstream side of bridge on Hamburg Road, 1.1 mi north of Hamburg, and 3 mi upstream from Strawberry Lake.

DRAINAGE AREA.--308 mi^2.

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 850.00 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Aug. 12, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by Kent Lake, 11 mi above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 210 ft^3/s, 9.26 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,560 ft^3/s May 15, 1956; maximum gage height, 8.46 ft June 30, 1968; minimum discharge, 32 ft^3/s July 2, 3, 1965; minimum gage height, 3.16 ft Aug. 1-3, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 490 ft^3/s Mar. 25, gage height, 5.38 ft; minimum, 43 ft^3/s Aug. 1, 2, gage height, 3.30 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	86	160	262	200	160	214	275	284	362	82	44	67
2	84	199	255	190	160	202	272	269	341	79	44	67
3	83	228	246	190	160	192	238	251	326	77	46	67
4	83	239	238	180	150	182	226	243	304	74	58	65
5	83	231	232	180	160	180	235	238	282	72	72	63
6	80	224	239	180	160	177	216	229	262	71	79	60
7	76	200	246	180	160	169	211	223	240	71	84	58
8	75	181	245	180	160	161	218	216	218	70	92	58
9	78	215	246	170	150	160	222	209	199	69	113	60
10	78	265	245	170	150	150	190	201	187	69	144	69
11	80	256	246	170	150	151	172	196	172	75	152	81
12	82	217	269	170	160	143	174	191	158	84	141	93
13	106	187	284	160	199	140	194	189	148	88	125	100
14	138	170	295	160	254	141	183	200	138	86	113	113
15	158	201	309	160	293	139	197	199	128	80	104	119
16	165	258	315	160	320	203	226	191	119	75	96	113
17	160	268	311	160	341	263	234	181	113	69	90	104
18	153	257	306	160	352	305	251	175	114	63	86	97
19	147	245	300	160	356	326	268	175	121	59	82	89
20	140	241	280	160	354	329	248	176	120	56	76	86
21	135	239	270	160	339	355	243	175	116	56	71	84
22	130	246	260	150	320	393	247	178	108	57	69	80
23	132	263	250	150	305	434	266	228	101	56	67	81
24	135	292	250	150	294	470	260	269	97	55	65	89
25	136	327	240	150	282	488	264	293	97	54	63	94
26	133	321	230	150	265	484	272	337	92	53	61	121
27	131	288	220	160	248	468	292	367	87	53	59	146
28	128	277	220	160	241	444	308	395	88	53	56	149
29	126	276	210	160	228	395	303	407	88	51	56	141
30	125	270	210	160	---	340	300	400	84	49	61	131
31	123	---	200	160	---	294	---	381	---	45	67	---
TOTAL	3569	7241	7929	5150	6871	8492	7205	7666	5010	2051	2536	2745
MEAN	115	241	256	166	237	274	240	247	167	66.2	81.8	91.5
MAX	165	327	315	200	356	488	308	407	362	88	152	149
MIN	75	160	200	150	150	139	172	175	84	45	44	58
CFSM	.37	.78	.83	.54	.77	.89	.78	.80	.54	.22	.27	.30
IN.	.43	.87	.96	.62	.83	1.03	.87	.93	.61	.25	.31	.33

CAL YR 1983 TOTAL 78504 MEAN 215 MAX 770 MIN 62 CFSM .70 IN 9.48
WTR YR 1984 TOTAL 66465 MEAN 182 MAX 488 MIN 44 CFSM .59 IN 8.03

04174050 HURON RIVER AT DELHI MILLS, MI

WATER-QUALITY RECORDS

LOCATION.--Lat 42°20'01", long 83°48'34", in SE1/4 sec.2, T.2 S., R.5 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on Delhi Road, 5.0 mi northwest of Ann Arbor, 5.2 mi downstream from Mill Creek, 5.1 mi upstream from Barton Dam, and 60.0 mi upstream from mouth.

DRAINAGE AREA.--699 mi^2.

PERIOD OF RECORD.--Water years 1971-81, October 1982 to current year.

REMARKS.--Bimonthly samples collected at bridge.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	PH LAB (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	SPE-CIFIC CON-DUCT-ANCE LAB (UMHOS)	CARBON, ORGANIC TOTAL (MG/L AS C)	PER-THANE TOTAL (UG/L)	NAPH-THA-LENES, POLY-CHLOR. TOTAL (UG/L)	PCB, TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLOR-DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)
NOV											
08...	1000	7.1	9.0	251	6.9	<.1	<.10	<.1	<.010	<.1	<.010
JAN											
19...	0930	--	.0	--	6.5	<.1	<.10	<.1	<.010	<.1	<.010
MAR											
27...	0900	7.8	3.0	558	6.9	<.1	<.10	<.1	<.010	<.1	<.010
JUN											
05...	0830	7.8	18.0	584	8.8	<.1	<.10	<.1	.010	<.1	<.010
JUL											
27...	0900	8.0	19.0	623	5.7	<.1	<.10	<.1	<.010	<.1	<.010
AUG											
28...	0900	7.8	21.5	583	5.1	<.1	<.10	<.1	<.010	<.1	<.010

DATE	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DI-AZINON, TOTAL (UG/L)	DI-ELDRIN TOTAL (UG/L)	ENDO-SULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTA-CHLOR, TOTAL (UG/L)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA-THION, TOTAL (UG/L)
NOV											
08...	<.010	<.010	<.01	<.010	<.010	<.010	<.01	<.010	<.010	<.010	<.01
JAN											
19...	<.010	.040	<.01	<.010	<.010	<.010	<.01	<.010	<.010	<.010	<.01
MAR											
27...	<.010	<.010	<.01	<.010	<.010	<.010	<.01	<.010	<.010	<.010	<.01
JUN											
05...	<.010	<.010	<.01	<.010	<.010	<.010	<.01	<.010	<.010	<.010	<.01
JUL											
27...	<.010	<.010	<.01	<.010	<.010	<.010	<.01	<.010	<.010	<.010	<.01
AUG											
28...	<.010	<.010	<.01	<.010	<.010	<.010	<.01	<.010	<.010	<.010	<.01

DATE	METH-OXY-CHLOR, TOTAL (UG/L)	METHYL PARA-THION, TOTAL (UG/L)	METHYL TRI-THION, TOTAL (UG/L)	MIREX, TOTAL (UG/L)	PARA-THION, TOTAL (UG/L)	TOX-APHENE, TOTAL (UG/L)	TOTAL TRI-THION (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)
NOV										
08...	<.01	<.01	<.01	<.01	<.01	<1	<.01	.04	<.01	<.01
JAN										
19...	<.01	<.01	<.01	<.01	<.01	<1	<.01	.05	<.01	<.01
MAR										
27...	<.01	<.01	<.01	<.01	<.01	<1	<.01	.01	<.01	<.01
JUN										
05...	<.01	<.01	<.01	<.01	<.01	<1	<.01	<.01	<.01	<.01
JUL										
27...	<.01	<.01	<.01	<.01	<.01	<1	<.01	.10	<.01	<.01
AUG										
28...	<.01	<.01	<.01	<.01	<.01	<1	<.01	.08	<.01	<.01

04174500 HURON RIVER AT ANN ARBOR, MI

LOCATION.--Lat 42°17'10", long 83°44'00", in NW1/4 sec.28, T.2 S., R.6 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 100 ft upstream from bridge on Wall Street in Ann Arbor, 0.7 mi downstream from Argo Dam, and 4.2 mi upstream from Geddes Dam.

DRAINAGE AREA.--729 mi^2.

PERIOD OF RECORD.--February 1904 to current year. Monthly discharge only for some periods published in WSP 1307. Published as "at Geddes" February 1904 to December 1914 and as "at Barton" January 1914 to September 1940.

REVISED RECORDS.--WSP 874: 1938. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 744.81 ft National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). February 1904 to December 1914 at Geddes Dam, 4.2 mi downstream, and January 1914 to September 1947 at Barton Dam, 2.6 mi upstream, flow computed from records of operation of powerplants and records of depth of flow over dam and/or flow through undersluices.

REMARKS.--Records good. Diversion above station for Ann Arbor municipal supply had negligible effect on natural flow prior to 1955, figures of runoff adjusted since. Flow regulated by powerplants prior to May 1962. From June 1962 to 1975 occasional regulation for lake level control operations above station. Since 1975 extensive regulation of flow exists due to automation of gates at dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--80 years, 456 ft^3/s, 8.49 in/yr, adjusted for diversion since 1955.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 5,840 ft^3/s Mar. 14, 1918; minimum daily, 4 ft^3/s Aug. 2, Sept. 11, 1931 (plant leakage), but may be doubtful due to change in leakage.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,860 ft^3/s Aug. 8, gage height, 15.24 ft; minimum daily, 58 ft^3/s Oct. 4, Aug. 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	175	174	561	398	260	475	832	845	853	144	83	71
2	149	207	524	394	261	444	756	799	853	111	82	88
3	139	247	497	379	269	419	741	578	963	136	90	81
4	58	340	493	354	268	399	724	592	869	179	76	73
5	131	337	494	347	276	380	798	599	746	104	103	74
6	130	249	560	349	272	363	895	578	664	161	104	66
7	111	410	571	331	278	344	655	578	599	119	108	70
8	138	446	552	340	282	325	524	543	510	121	159	60
9	121	267	546	315	272	307	476	517	447	144	146	96
10	129	263	520	310	291	296	484	366	466	121	156	103
11	146	289	554	300	319	292	491	435	453	139	117	130
12	141	304	800	300	470	273	447	406	329	138	154	117
13	303	329	1060	310	821	277	550	543	316	105	123	174
14	290	676	1010	300	1020	275	649	523	324	137	129	142
15	219	678	910	300	955	307	716	491	248	142	138	178
16	203	427	842	310	884	926	853	472	250	103	115	167
17	235	438	759	287	861	1110	876	441	257	135	106	149
18	242	427	712	295	881	945	924	429	271	103	108	123
19	223	447	573	310	890	841	884	504	250	141	113	130
20	232	503	554	330	886	885	845	523	220	106	105	149
21	226	499	500	365	845	1370	830	517	210	104	100	142
22	201	459	539	365	785	1530	822	570	209	104	83	130
23	253	505	498	313	759	1340	792	769	209	96	71	100
24	220	570	484	261	706	1420	924	830	120	94	77	174
25	185	567	557	249	674	1330	908	853	141	82	69	217
26	219	545	562	254	617	1350	814	1500	147	81	72	355
27	205	553	442	258	574	1300	955	1620	163	114	75	178
28	169	670	437	274	544	1220	892	1240	179	85	61	189
29	178	721	431	254	492	1150	807	1160	130	107	58	185
30	175	630	501	257	---	1070	838	1200	113	78	74	193
31	175	---	503	279	---	977	---	1040	---	82	71	---
TOTAL	5721	13177	18546	9688	16712	23940	22702	22061	11509	3616	3126	4104
MEAN	185	439	598	313	576	772	757	712	384	117	101	137
MAX	303	721	1060	398	1020	1530	955	1620	963	179	159	355
MIN	58	174	431	249	260	273	447	366	113	78	58	60
MEAN+	205	457	615	328	593	788	774	729	409	145	127	158
CFSM+	.28	.63	.84	.45	.81	1.08	1.06	1.00	.56	.20	.17	.22
IN+	.32	.70	.97	.52	.88	1.25	1.18	1.15	.63	.23	.20	.24

CAL YR 1983 TOTAL 182352 MEAN 500 MAX 2660 MIN 58 MEAN+ 520 CFSM+ .71 IN+ 9.68
WTR YR 1984 TOTAL 154902 MEAN 423 MAX 1620 MIN 58 MEAN+ 443 CFSM+ .61 IN+ 8.27

+ Adjusted for diversion for municipal supply; record furnished by City of Ann Arbor.

04174800 HURON RIVER AT YPSILANTI, MI

LOCATION.--Lat 42°14'57", long 83°36'45", in SW1/4 sec.4, T.3 S., R.7 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 30 ft downstream from bridge on Forest Avenue in Ypsilanti, 4.9 mi downstream from Geddes Dam, 5.6 mi upstream from Ford Dam, and at mile 42.8.

DRAINAGE AREA.--807 mi^2.

PERIOD OF RECORD.--June 1974 to September 1984 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 700 ft from topographic map (nearest 5 ft).

REMARKS.--Records good. Considerable regulation caused by many dams above station; storage capacity is small. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--10 years, 578 ft^3/s, 9.73 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,500 ft^3/s May 2, 1983, gage height, 12.64 ft; minimum daily, 62 ft^3/s June 28, 1984.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,700 ft^3/s Mar. 21, gage height, 11.25 ft; minimum daily, 62 ft^3/s June 28; minimum gage height. 6.68 ft Nov. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	176	230	670	504	359	630	976	994	937	180	164	108
2	177	386	620	494	367	570	817	969	966	149	148	106
3	168	264	590	499	416	540	875	760	1120	190	148	132
4	116	374	580	484	402	510	868	754	1030	188	130	89
5	140	379	600	479	411	480	969	734	817	205	138	104
6	157	314	660	479	398	460	1090	734	786	231	132	104
7	147	443	670	454	393	430	855	698	655	144	114	108
8	175	466	642	454	393	410	711	701	643	185	266	104
9	168	321	660	439	407	390	613	664	496	200	236	168
10	162	324	633	420	425	377	644	489	514	207	154	218
11	158	372	680	393	554	359	647	488	517	180	180	208
12	173	363	1200	411	713	343	581	484	359	195	158	158
13	516	369	1250	420	1250	360	758	644	420	164	166	272
14	400	719	1170	425	1350	366	834	780	379	173	178	218
15	283	768	1070	407	1210	360	937	728	308	178	176	211
16	267	586	969	420	1070	1590	1120	622	296	166	142	193
17	277	533	870	411	1020	1410	1150	563	307	178	146	176
18	265	498	820	393	1030	1180	1210	506	342	142	150	188
19	265	559	689	411	1040	999	1130	573	427	180	150	177
20	284	617	639	435	1070	1100	1040	684	460	154	140	170
21	258	587	612	484	1050	2000	994	657	272	152	128	164
22	296	539	650	520	978	1970	998	657	258	146	130	161
23	307	636	555	398	951	1650	932	985	254	160	87	167
24	285	668	599	384	900	1680	1080	736	210	140	106	186
25	233	630	669	324	840	1560	972	745	178	134	114	298
26	227	614	906	376	790	1540	1030	1950	207	128	83	399
27	249	611	752	372	740	1550	1230	1840	154	188	110	256
28	232	866	564	359	690	1500	1090	1370	62	148	110	212
29	224	815	549	367	660	1350	996	1220	104	180	78	213
30	225	760	647	384	---	1270	986	1320	154	156	112	228
31	227	---	680	354	---	1110	---	1220	---	160	78	---
TOTAL	7237	15611	22865	13154	21877	30044	28133	26269	13632	5281	4352	5496
MEAN	233	520	738	424	754	969	938	847	454	170	140	183
MAX	516	866	1250	520	1350	2000	1230	1950	1120	231	266	399
MIN	116	230	549	324	359	343	581	484	62	128	78	89
CFSM	.29	.64	.91	.53	.93	1.20	1.16	1.05	.56	.21	.17	.23
IN.	.33	.72	1.05	.61	1.01	1.38	1.30	1.21	.63	.24	.20	.25

CAL YR 1983 TOTAL 216860 MEAN 594 MAX 3820 MIN 65 CFSM .74 IN 10.00
WTR YR 1984 TOTAL 193951 MEAN 530 MAX 2000 MIN 62 CFSM .66 IN 8.94

04176500 RIVER RAISIN NEAR MONROE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 41°57'38", long 83°31'52", Monroe County, Hydrologic Unit 04100002, on left bank 0.8 mi downstream from bridge on Ida Maybee Road, 5.0 mi downstream from Saline River, and 7.5 mi west of Monroe.

DRAINAGE AREA.--1,042 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1937 to current year. Published as "Raisin River at Monroe" 1937-52 and as "River Raisin at Monroe" 1952-53.

REVISED RECORDS.--WSP 954: 1938-40(M), 1941. WSP 1437: 1939, 1948. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 616.26 ft National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1953, at site 9 mi downstream at datum 46.26 ft lower.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplants above station prior to June 27, 1968.

AVERAGE DISCHARGE.--47 years, 724 ft^3/s, 9.44 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 15,300 ft^3/s Mar. 16, 1982, gage height, 10.4 ft; maximum gage height, 11.16 ft Mar. 15, 1982, backwater from ice; minimum discharge, about 2 ft^3/s Sept. 4, 1938, Sept. 19, 20, 1941, site then in use.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 13	0400	4,330	6.79	Mar. 22	0400	4,020	6.57
Feb. 16	2300	*5,620	*7.60	May 26	2100	3,700	6.25

Minimum discharge, 90 ft^3/s Aug. 31, gage height, 2.04 ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	156	221	1800	450	300	620	1350	2170	1820	183	132	96
2	159	230	1600	450	290	623	1180	1460	1330	179	131	112
3	156	233	1290	450	290	641	1050	1140	1120	181	129	121
4	155	241	1010	450	280	609	996	982	1340	156	148	117
5	156	273	890	450	280	599	1070	870	1470	156	178	124
6	156	262	1820	450	290	592	1240	779	1340	166	179	127
7	149	245	2550	440	290	571	1360	718	1020	161	233	115
8	129	248	2350	430	280	523	1400	676	821	161	246	110
9	124	238	2250	420	270	466	1270	646	700	184	235	113
10	131	228	2040	400	260	486	1080	628	622	198	206	124
11	136	247	1760	380	320	470	951	556	562	199	210	148
12	146	272	3260	370	550	454	845	534	512	201	221	180
13	210	316	4070	360	1300	395	824	513	477	199	204	202
14	269	356	3600	350	2700	409	852	512	465	189	242	192
15	255	352	3950	340	4000	402	932	542	446	175	212	181
16	291	552	3690	340	5300	1290	1050	538	434	167	175	179
17	245	675	3160	340	5160	2010	1150	505	412	160	146	188
18	222	705	2430	350	4170	2310	1570	502	376	170	131	188
19	203	789	1700	370	3400	2490	1650	529	364	159	208	176
20	190	1150	1180	380	2830	2350	1630	611	339	148	203	162
21	182	1220	976	370	2400	3570	1450	913	321	142	176	142
22	175	1250	886	360	2060	3720	1240	1050	301	136	149	134
23	180	1260	800	340	1750	3570	1560	1070	285	131	125	131
24	190	1470	700	310	1480	3720	2800	1100	260	136	115	130
25	247	1270	650	280	1290	3420	3120	1090	246	131	102	138
26	255	1230	600	290	1120	3000	3140	2710	232	126	103	150
27	248	1110	550	300	980	2680	2980	3090	221	148	106	169
28	274	1620	520	310	821	2410	2900	2920	211	146	107	184
29	257	2090	490	310	688	2120	3040	3070	200	142	102	196
30	242	1900	470	310	---	1820	3030	2840	190	145	97	185
31	234	---	460	300	---	1560	---	2380	---	139	93	---
TOTAL	6122	22253	53502	11450	45149	49900	48710	37644	18437	5014	5044	4514
MEAN	197	742	1726	369	1557	1610	1624	1214	615	162	163	150
MAX	291	2090	4070	450	5300	3720	3140	3090	1820	201	246	202
MIN	124	221	460	280	260	395	824	502	190	126	93	96
CFSM	.19	.71	1.66	.35	1.49	1.55	1.56	1.17	.59	.16	.16	.14
IN.	.22	.79	1.91	.41	1.61	1.78	1.74	1.34	.66	.18	.18	.16

CAL YR 1983 TOTAL 354828 MEAN 972 MAX 8330 MIN 109 CFSM .93 IN 12.67
WTR YR 1984 TOTAL 307739 MEAN 841 MAX 5300 MIN 93 CFSM .81 IN 10.99

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966-72, 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to September 1981.
WATER TEMPERATURES: March 1966 to September 1972, April 1978 to September 1981.
SUSPENDED SEDIMENT DISCHARGE: March 1966 to September 1972.

INSTRUMENTATION.--Water-quality monitor Mar. 23 to July 13, 1981.

REMARKS.--Quarterly samples collected at gaging station or .8 mi upstsream from gage at bridge on Ida Maybee Road.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,020 micromhos Feb. 16, 1979; minimum daily recorded (water years 1978-81), 263 micromhos Jan. 25, 1981.
WATER TEMPERATURES: Maximum daily recorded (water years 1967, 1970-1972, 1978-80), 32.0°C July 18, 1972; minimum daily, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATIONS: Maximum daily 1,430 mg/L Dec. 22, 1967; minimum daily, 1 mg/L on several days in 1969 and 1970.
SEDIMENT LOADS: Maximum daily, 28,000 tons Dec. 22, 1967; minimum daily, 0.29 tons Aug. 31, 1971.

WATER QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS. / 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)
DEC										
14...	1100	3510	480	7.8	3.5	95	11.7	92	--	--
MAR										
06...	1300	586	735	8.2	1.0	2.0	14.4	104	K60	260
JUN										
22...	1000	299	644	8.3	24.5	28	9.7	119	290	280
SEP										
18...	1200	190	627	8.4	19.0	4.0	9.9	109	130	530

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)
DEC										
14...	210	90	63	13	10	--	.3	3.5	121	3.7
MAR										
06...	320	120	94	21	20	12	.5	9.1	207	2.5
JUN										
22...	300	70	84	21	22	14	.6	3.3	227	2.2
SEP										
18...	280	80	75	22	26	17	.7	4.1	199	1.5

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)
DEC 14...	--	--	.20	6.4	242	--	.33	2290	5.5
MAR 06...	100	41	.20	6.5	470	420	.64	744	2.5
JUN 22...	69	39	.20	7.1	483	380	.66	390	1.9
SEP 18...	76	44	.30	7.7	405	380	.55	208	1.2

DATE	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	PHOS- PHORUS, ORTHO, DIS- SOLVED (MG/L AS P)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY)	SED. SUSP SIEVE DIAM. % FINER THAN .062 MM
DEC 14...	.020	1.1	.210	.64	.080	.060	140	1330	97
MAR 06...	.340	.90	.090	.28	.040	.040	18	28	--
JUN 22...	<.010	1.7	.160	--	.110	.090	66	53	--
SEP 18...	<.010	.80	.150	--	.140	.120	27	14	--

DATE	TIME	ALUM- INUM, DIS- SOLVED (UG/L AS AL)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, DIS- SOLVED (UG/L AS BA)	BERYL- LIUM, DIS- SOLVED (UG/L AS BE)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)
DEC 14...	1100	10	1	41	<.5	<1	<1	<3	3	81	<1
MAR 06...	1300	<10	1	61	<.5	<1	<1	<3	<1	11	<1
JUN 22...	1000	30	2	75	<.5	<1	<1	<3	2	3	5
SEP 18...	1200	<10	2	68	<.5	<1	2	<3	1	6	1

DATE	LITHIUM DIS- SOLVED (UG/L AS LI)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO)	NICKEL, DIS- SOLVED (UG/L AS NI)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, DIS- SOLVED (UG/L AS AG)	STRON- TIUM, DIS- SOLVED (UG/L AS SR)	VANA- DIUM, DIS- SOLVED (UG/L AS V)	ZINC, DIS- SOLVED (UG/L AS ZN)
DEC 14...	5	13	<.1	<10	4	<1	<1	190	<6	25
MAR 06...	6	48	.2	<10	3	<1	<1	510	<6	20
JUN 22...	12	8	.1	<10	2	<1	1	440	<6	27
SEP 18...	8	9	.1	<10	3	<1	<1	460	<6	8

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 stream-flow data at sites other than stream-gaging stations. When limited stream-flow 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 useable in low-flow or floodway 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 time 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, when 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 where 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 1984

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Michigan				
04057580	Whitefish River near Rapid River, MI	Lat 45°57'56", long 86°55'15", in SE¼ NW¼ sec.10, T.41 N., R.21 W., Delta County, Hydrologic Unit 04030111, about 800 ft downstream from Chippeny Creek and 3.5 miles northeast of Rapid River.	284	1973-84	10-27-83 02-02-84 06-07-84 09-21-84	293 129 177 145
04058120	Green Creek near Palmer, MI	Lat 46°22'22", long 87°36'21", in NW¼ sec.19, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, at County Highway 565, 4.5 miles south of Palmer.	d8.42	1961-65, 1970-84	11-09-83 01-25-84 05-08-84 06-21-84	b6.18 b18.6 b11.0 b5.18
04059034	Escanaba River near Wells, MI	Lat 45°48'22", long 87°05'51", in SW¼ NW¼ sec. 1, T.39 N., R.23 W., Delta County, Hydrologic Unit 04030110, 600 ft downstream from Bichler Creek, 2.5 miles upstream from mouth and 2.0 miles northwest of Wells.	a920	1981-84	01-04-84 05-22-84 06-26-84 09-21-84	c648 c772 c386 c660
04096517	Hog Creek tributary near Allen, MI	Lat 41°57'33", long 84°49'33", in SW¼ SW¼ sec.7, T.6 S., R.4 W., Hillsdale County, Hydrologic Unit 04050001 at Squires Road, 0.3 mile upstream from mouth, 3.0 miles west of Allen.	2.61	1969-84	11-08-83 06-28-84 08-07-84 09-17-84	.69 .78 .95 .63
04114594	Maple River near St. Johns, MI	Lat 43°02'43", long 84°28'11", in SE¼ SE¼ sec.30, T.8 N., R.1 W., Clinton County, Hydrologic Unit 04050005, at Colony Road, and 4.5 miles northeast of St. Johns.		1981-84	10-17-83 12-01-83 04-02-84 05-10-84	20.6 67.9 121 60.1
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NE¼ NW¼ sec.1, T.9 N., R.16 W., Muskegon County, Hydrologic Unit 04060101, at Mill Iron Road, 4.8 miles east of Muskegon, and 4.9 miles upstream from mouth.	a39	1974-84	11-08-83 03-27-84 07-17-84 08-27-84	43.8 b83.2 30.3 24.0
04123910	Anderson Creek near Buckley, MI	Lat 44°30'44", long 85°37'19", in NW¼ NE¼ sec.3, T.24 N., R.11 W., Wexford County, Hydrologic Unit 04060103, at County Line Road, 2.8 miles northeast of Buckley, MI.		1984	06-19-84 08-01-84 09-06-84	b11.5 b6.81 6.38
04126546	Green Lake Inlet near Interlochen, MI	Lat 44°37'59", long 85°46'55", in NE¼ SE¼ sec.20, T.26 N., R.12 W., Grand Traverse County, Hydrologic Unit 04060104, at Diamond Park Road, 1.0 mile southwest of Interlochen.		1984	06-18-84 08-01-84 09-06-84	b60.0 b17.9 20.3
04126970	Boardman River near Mayfield, MI	Lat 44°39'24", long 85°26'12", in NE¼ NE¼ sec.18, T.26 N., R.9 W., Grand Traverse County, Hydrologic Unit 04060105, at county road by Ranch Rudolph, 5.1 miles northeast of Mayfield.		1949, 1984	06-18-84 07-31-84 09-05-84	b187 99 113
04126991	Boardman River near Mayfield, MI	Lat 44°38'37", long 85°30'33", in SE¼ SW¼ sec.15, T.26 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, at outlet of Brown Bridge Pond, 1.6 miles northeast of Mayfield.		1984	07-31-84 09-05-84	106 146
04126997	East Creek near Mayfield, MI	Lat 44°37'40", long 85°30'15", in NW¼ NE¼ sec. 27, T.26 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, at Green Road, 1.3 miles east of Mayfield.		1984	06-19-84 07-31-84 09-05-84	b32.0 15.8 16.3
04127008	Swainston Creek at Mayfield, MI	Lat 44°37'37", long 85°31'57", in NW¼ NW¼ sec. 28, T.26 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, at Mill Street, in Mayfield.		1984	06-19-84 07-31-84 09-06-84	12.3 11.4 10.9

See footnotes at end of table.

Discharge measurements made at low-flow partial-record stations during water year 1984--continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Michigan--continued				
04127250	Boardman River near Traverse City, MI	Lat 44°41'54", long 85°37'14", in NE¼ NE¼ sec.34, T.27 N., R.11 W., Grand Traverse County, Hydrologic Unit 04060105, at Boardman Dam on Cass Road, 4.6 miles south of Traverse City.		1984	06-19-84 07-31-84 09-06-84	b441 217 237
04127490	Boardman River at Traverse City, MI	Lat 44°45'44", long 85°37'25", in SW¼ SE¼ sec.3, T.27 N., R.11 W., Grand Traverse County, Hydrologic Unit 04060105, at Union Street in Traverse City.		1984	06-19-84 08-01-84 09-06-84	b464 b192 279
04127498	Hospital Creek at Traverse City, MI	Lat 44°45'54", long 85°37'59", in NW¼ SW¼ sec.3, T.27 N., R.11 W., Grand Traverse County, Hydrologic Unit 04060105, at Maple Street, in Traverse City.		1984	06-19-84 08-01-84 09-06-84	b14.5 b11.2 10.3
04127520	Mitchell Creek at Traverse City, MI	Lat 44°44'52", long 85°33'30", in SE¼ SE¼ sec. 7, T.27 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, at first bridge east of Three Mile Road and south of U.S. Highway 31, in Traverse City.		1949 1983-84	06-19-84 07-31-84 09-06-84	b17.3 5.09 6.54
04127528	Acme Creek at Acme, MI	Lat 44°46'31", long 85°29'56", in SE¼ SE¼ sec.3, T.28 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, at U.S. Highway 31, in Acme.		1984	06-19-84 07-31-84 09-05-84	18.9 13.2 14.9
04127535	Yuba Creek near Acme, MI	Lat 44°49'28", long 85°27'30", in SE¼ NE¼ sec. 13, T.28 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, at U.S. Highway 31, 4.0 miles northeast of Acme.		1984	06-18-84 08-01-84 09-05-84	b22.3 4.96 6.55
04127550	Tobeco Creek near Elk Rapids, MI	Lat 44°51'14", long 85°25'55", in SW¼ NW¼ sec.5, T.28 N., R.9 W., Grand Traverse County, Hydrologic Unit 04060105, at U.S. Highway 31, 3.0 miles south of Elk Rapids.		1949-59 1984	06-18-84 08-01-84 09-05-84	6.57 0.76 8.01
04127600	Battle Creek near Williamsburg, MI	Lat 44°46'22", long 85°22'04", in NE¼ NW¼ sec. 2, T.27 N., R.9 W., Grand Traverse County, Hydrologic Unit 04060105, at State Highway 72, 1.8 miles east of Williamsburg, MI.		1949 1984	06-18-84 07-31-84 09-05-84	b18.8 10.1 10.7
04127620	Williamsburg Creek near Williamsburg, MI	Lat 44°47'41", long 85°23'14", in SE¼ NW¼ sec. 27, T.28 N., R.9 W., Grand Traverse County, Hydrologic Unit 04060105, at Ayers Road, 1.7 miles northeast of Williamsburg.		1981 1984	06-18-84 08-01-84 09-05-84	b27.6 12.3 13.2
		Streams tributary to Lake Huron				
04146450	North Branch Flint River near Columbiaville, MI	Lat 43°11'18", long 83°22'03", in NW¼ sec.24, T.9 N., R.9 E., Lapeer County, Hydrologic Unit 04080204, at Barnes Lake Road, 2.5 miles northeast of Columbiaville.	223	1979-84	05-03-84 06-14-84 07-26-84 09-06-84	120 77.1 41.1 108

* Also a crest-stage station.
a Approximately.
b Not base flow.
c Affected by diversion for industrial use.
d Since 1970, affected by diversion for industrial use.

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 of some lower floods may have been obtained but is 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 1984

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake Superior					
04041000	Perch River near Sidnaw, MI	Lat 46°31'06", long 88°39'48", in NE¼ sec.34, T.48 N., R.35 W., Baraga County, Hydrologic Unit 04020104, at State Highway 28, 2.5 miles east of Sidnaw.	63.1	1913-15‡, 1957-84	04-14-84	b9.01	321
04044200	Carp Creek at Ishpeming, MI	Lat 46°29'11", long 87°41'21", in NW¼ sec.9, T.47 N., R.27 W., Marquette County, Hydrologic Unit 04020105, at Highway 41A, at Ishpeming.	16.5	1970-84	04-15-84	c7.08	112
04044813	Two Hearted River near Paradise, MI	Lat 46°41'57", long 85°25'19", in NW¼ SW¼ sec.27, T.50 N., R.9 W., Luce County, Hydrologic Unit 04020201, at foot bridge in State Forest Campground, 0.4 mile upstream from mouth, and 18 miles northwest of Paradise.	201	1973-84	04-17-84	d6.27	1,360
04045538	West Branch Waiska River near Brimley, MI	Lat 46°21'18", long 84°35'35", in SW¼ NW¼ sec.29, T.46 N., R.2 W., Chippewa County, Hydrologic Unit 04020203, at county road, 3.2 miles upstream from mouth, and 3.5 miles south of Brimley.	40.7	1973-84	09-13-84	5.92	268
04045559	East Branch Waiska River near Brimley, MI	Lat 46°25'07", long 84°28'24", in NW¼ NE¼ sec.6, T.46 N., R.1 W., Chippewa County, Hydrologic Unit 04020203, at county road, 4.0 miles upstream from mouth, and 4.7 miles east of Brimley.	e30.1	1973-84	09-13-84	11.86	790
		Streams tributary to Lake Michigan					
04046000	Black River near Garnet, MI	Lat 46°07'05", long 85°21'55", in SE¼ sec.13, T.43 N., R.9 W., Mackinac County, Hydrologic Unit 04060107, on right bank 10 ft upstream from footbridge, 15 feet downstream from Peters Creek, 3.5 miles upstream from Lake Michigan and 4 miles southwest of Garnet.	28.0	1951-78‡, 1979-84	06-27-84	5.15	238
04057900	Black River near Republic, MI	Lat 46°25'08", long 87°53'21", in NE¼ sec.2, T.46 N., R.29 W., Marquette County, Hydrologic Unit 04030110, at county road, 4.4 miles east of Republic.	34.4	1961-68‡, 1970-84	04-15-84	3.36	226
04058400	Goose Lake Outlet near Sands Station, MI	Lat 46°23'36", long 87°29'40", in SE¼ SE¼ sec.12, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on left bank, 0.8 mile upstream from mouth, and 3.0 miles west of Sands Station.	37.5	1965-82‡, 1983-84	05-01-84	3.83	135
04059400	Tenmile Creek at Perronville, MI	Lat 45°48'38", long 87°22'00", in NW¼ NW¼ sec.2, T.39 N., R.25 W., Menominee County, Hydrologic Unit 04030109, 1 mile northwest of Perronville.	38.4	1971-77‡, 1978-84	05-01-84	3.83	234
04062300	Michigamme River at Republic, MI	Lat 46°23'03", long 87°58'48", in SE¼ sec.18, T.46 N., R.29 W., Marquette County, Hydrologic Unit 04030107, on left bank 400 feet upstream from county highway, 0.3 mile upstream from Trout Falls Creek, and 0.6 mile south of Republic.	240	1961-75‡, 1976-84	05-02-84	4.73	1,580
04096272	Beebe Creek near Hillsdale, MI	Lat 41°57'15", long 84°38'20", in NE¼ NE¼ sec.15, T.6 S., R.3 W., Hillsdale County, Hydrologic Unit 04050001, at Moore Road, 1.2 miles northwest of Hillsdale.	42.4	1975-78‡, 1979-84	05-26-84	f5.35	155
04096340	St. Joseph River at Clarendon, MI	Lat 42°07'51", long 84°51'56", in SW¼ SW¼ sec.11, T.4 S., R.5 W., Calhoun County, Hydrologic Unit 04050001, at 22 Mile Road at Clarendon.	144	1975-77‡, 1978-84	05-26-84	6.51	383
04097170	Portage River near Vicksburg, MI	Lat 42°06'53", long 85°29'08", in SW¼ sec.16, T.4 S., R.10 W., Kalamazoo County, Hydrologic Unit 04050001, at W Ave., 2.4 miles east of Vicksburg.	68.2	1947-51‡, 1965-79‡, 1980-84	03-21-84	4.38	87

Annual maximum discharge at crest-stage partial-record stations during water year 1984--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Gage height (feet)	Discharge (ft^3/s)
		Stations tributary to Lake Michigan--Continued					
04108645	Rabbit River at Hamilton, MI	Lat 42°40'31", long 86°00'13", in NE¼ sec.6, T.3 N., R.14 W., Allegan County, Hydrologic Unit 04050003, at State Highway 40, at Hamilton.	274	1979-84‡,	02-14-84	15.32	2,200
04112700	Sycamore Creek near Mason, MI	Lat 42°36'38", long 84°27'58", in NE¼ NE¼ sec.31, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, at Harper Road, 0.7 mile downstream from Aurelius and Ve-Voy Drain, and 2.6 miles northwest of Mason.	39.5	1975-84	03-16-84 05-26-84	8.90	203
04113090	Carrier Creek near Grand Ledge, MI	Lat 42°43'36", long 84°39'16", in SE¼ SW¼ sec.15, T.4 N., R.3 W., Eaton County, Hydrologic Unit 04050004, at St. Joe Highway, 3.7 miles upstream from mouth, and 4.0 miles southeast of Grand Ledge.	7.18	1975-84	03-16-84	4.71	81
04117000	Quaker Brook near Nashville, MI	Lat 42°33'57", long 85°05'37", in NW¼ sec. 13, T.2 N., R.7 W., Barry County, Hydrologic Unit 04050007, on left bank 150 feet upstream from culvert on county road, 500 feet upstream from small tributary, and 2.5 miles south of Nashville.	7.60	1955-75‡, 1976-84	02-13-84	3.04	64
04119055	Plaster Creek at Grand Rapids, MI	Lat 42°54'46", long 85°39'02", in SE¼ sec.7, T.6 N., R.11 W., Kent County, Hydrologic Unit 04050006, at bridge on 28th Street, at Grand Rapids.	46.6	1974-84	02-14-84	9.49	888
04119160	Buck Creek at Grandville, MI	Lat 42°54'09", long 85°45'46", in SE¼ sec.18, T.6 N., R.12 W., Kent County, Hydrologic Unit 04050006, at Wilson Avenue, at Grandville.	50.5	1974-84	02-14-84	7.45	471
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NW¼ NW¼ sec.1, T.9 N., R.16 W., Muskegon County, Hydrologic Unit 04060101, at Mill Iron Road, 4.8 miles east of Muskegon, and 4.9 miles upstream of mouth.	a39	1974-84	02-14-84	3.84	254
04122025	Muskegon River at Bridgeton, MI	Lat 43°20'50", long 85°56'22", in SE¼ NE¼ sec.14, T.11 N., R.14 W., Newaygo County, Hydrologic Unit 04060102, at Warner Road, in Bridgeton.	a2,400	1979-84	02-20-84	14.02	6,100
04122223	Pentwater River near Hart, MI	Lat 43°43'27", long 86°22'36", in NW¼ SW¼ sec.5, T.15 N., R.17 W., Oceana County, Hydrologic Unit 04060101, at county road, 0.8 mile downstream from hydroelectric plant on Hart Lake, 1.8 miles northwest of Hart.	76.6	1975-84	05-26-84	5.03	528
04122230	North Branch Pentwater River near Pentwater, MI	Lat 43°47'42", long 86°21'30", in NE¼ SE¼ sec.8, T.16 N., R.17 W., Oceana County, Hydrologic Unit 04060101, at U.S. Highway 31, 3.5 miles northeast of Pentwater.	42.3	1975-84	05-26-84	2.92	219
04124500	East Branch Pine River near Tustin, MI	Lat 44°06'09", long 85°31'02", in NE¼ NW¼ sec.28, T.20 N., R.10 W., Osceola County, Hydrologic Unit 04060103, at highway bridge, 3.0 miles west of Tustin.	a63	1953-63‡, 1964-84	05-26-84	4.23	232
04126600	Betsie River near Benzonia, MI	Lat 44°36'02", long 86°05'57", in NW¼ NW¼ sec.2, T.25 N., R.15 W., Benzie County, Hydrologic Unit 04060104, at U.S. Highway 31, 1.2 miles south of Benzonia.	a170	1975-84	02-20-84	3.94	726
04127850	Boyne River near Boyne City, MI	Lat 45°11'48", long 84°57'26", in NW¼ SW¼ sec.5, T.32 N., R.5 W., Charlevoix County, Hydrologic Unit 04060105, at Dam Road, 0.3 mile downstream from nonoperative hydroelectric plant, 2.8 miles southeast of Boyne City.	64.2	1975-84	03-21-84	2.55	190
		Streams tributary to Lake Huron					
04139000	Houghton Creek near Lupton, MI	Lat 44°23'45", long 84°02'50", in SE¼ SE¼ sec.10, T.23 N., R.3 E., Ogemaw County, Hydrologic Unit 04080101, 2.7 miles southwest of Lupton.	29.7	1950-72‡, 1973-84	07-11-84	5.92	345

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1984--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake Huron--Continued					
04140200	Klacking Creek near Selkirk, MI	Lat 44°20'05", long 84°08'46", in NE¼ NE¼ sec.2, T.22 N., R.2 E., Ogemaw County, Hydrologic Unit 04080101, at Campbell Road, 4.0 miles northwest of Selkirk.	7.51	1953-84	07-11-84	2.19	123
04140500	Rifle River at Selkirk, MI	Lat 44°18'48", long 84°04'10", in SE¼ NE¼ sec.9, T.22 N., R.3 E., Ogemaw County, Hydrologic Unit 04080101, at State Road, at Selkirk.	117	1950-82‡, 1983-84	03-22-84	g	h645
04141000	South Branch Shepards Creek near Selkirk, MI	Lat 44°18'28", long 84°05'13", in SE¼ SE¼ sec.8, T.22 N., R.3 E., Oegmaw County, Hydrologic Unit 04080101, on right bank 200 feet upstream from mouth, 600 feet west of Bedtelyon Road, and 1.1 miles southwest of Selkirk.	1.15	1951-78‡, 1979-84	03-22-84	3.28	48
04146020	South Branch Flint River near Millville, MI	Lat 43°04'44", long 83°18'25", in SW¼ sec. 29, T.8 N., R.10 E., Lapeer County, Hydrologic Unit 04080204, Saginaw Road, 1.6 miles north of Lapeer.	160	1974-84	03-22-84	7.45	592
04148200	Swartz Creek near Holly, MI	Lat 42°49'39", long 83°37'42", in SW¼ sec. 15, T.5 N., R.7 E., Oakland County, Hydrologic Unit 04080204, on right bank 25 feet downstream from Elliot Road, 2.4 miles north of Holly.	12.1	1956-75‡, 1976-84	05-26-84	2.86	43
04148265	Kimball Drain near Swartz Creek, MI	Lat 42°55'15", long 83°49'51", in NE¼ sec.14, T.6 N., R.5 E., Genesee County, Hydrologic Unit 04080204, at Morrish Road, 2.4 miles south of Swartz Creek.	10.6	1970-84	03-21-84	4.43	102
04148610	Cole Creek near Flushing, MI	Lat 43°02'44", long 83°51'06", in SW¼ sec.35, T.8 N., R.5 E., Genesee County, Hydrologic Unit 04080204, at Potter Road, 1.2 miles south of Flushing.	8.51	1970-84	03-21-84	6.55	203
04148640	Armstrong Creek near Montrose, MI	Lat 43°08'04", long 83°50'03", in SE¼ sec.35, T.9 N., R.5 E., Genesee County, Hydrologic Unit 04080204, at Morrish Road, 4.1 miles southeast of Montrose.	11.9	1970-84	03-17-84	6.18	163
		Streams tributary to St. Clair River					
04160350	Pine River near Rattle Run, MI	Lat 42°52'49", long 82°34'04", in NE¼ sec.9, T.5 N., R.16 E., St. Clair County, Hydrologic Unit 04090001, at Gratiot Road, 1.9 miles northeast of Rattle Run.	135	1974-84	03-21-84	19.03	2,420
		Streams tributary to Lake St. Clair					
04161000	Clinton River at Auburn Heights, MI	Lat 42°38'00", long 83°13'28", in NW¼ sec. 36, T.3 N., R.10 E., Oakland County, Hydrologic Unit 04090003, at Auburn Road, at Auburn Heights.	123	1935-40, 1956-82‡, 1984	03-16-84	4.12	970
04161500	Paint Creek near Lake Orion, MI	Lat 42°46'03", long 83°13'12", in NE¼ sec.13, T.4 N., R.10 E., Oakland County, Hydrologic Unit 04090003, on left bank 100 feet upstream from railroad bridge, 1.6 miles southeast of Lake Orion, and 2.8 miles upstream from Trout Creek.	38.5	1959-75‡, 1976-84	03-21-84	2.88	j120
04161760	West Branch Stony Creek near Washington, MI	Lat 42°43'53", long 83°06'02", in SE¼ sec.25, T.4 N., R.11 E., Oakland County, Hydrologic Unit 04090003, at Huron-Clinton Metropolitan Park Road, and 3.4 miles west of Washington.	22.5	1965-84	03-21-84	2.99	92
04164010	North Branch Clinton River at Almont, MI	Lat 42°54'59", long 83°02'42", in NE¼ sec.28, T.6 N., R.12 E., Lapeer County, Hydrologic Unit 04090003, at State Highway 53, at Almont.	9.56	1959-62, 1963-68‡, 1969-84	03-21-84	4.18	190
04164050	North Branch Clinton River near Romeo, MI	Lat 42°49'11", long 82°58'35", in NW¼ sec.31, T.5 N., R.13 E., Macomb County, Hydrologic Unit 04090003, at 33 Mile Road, 2.2 miles northeast of Romeo.	49.7	1959-64, 1965-69‡, 1970-84	03-21-84	g	h1,000
04164150	North Branch Clinton River near Meade, MI	Lat 42°43'50", long 82°54'23", in NE¼ sec.34, T.4 N., R.13 E., Macomb County, Hydrologic Unit 04090003, at 27 Mile Road, 1.9 miles northwest of Meade.	89.6	1959-67, 1968-72‡, 1973-84	03-22-84	6.77	1,520

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1984--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake St. Clair--Continued					
04164200	Coon Creek near Armada, MI	Lat 42°47'41", long 82°52'58", in SW¼ sec.1, T.4 N., R.13 E., Macomb County, Hydrologic Unit 04090003, at North Road, 3.4 miles south of Armada.	10.0	1971-84	03-21-84	5.77	217
04164350	Highbank Creek near Armada, MI	Lat 42°28'24", long 82°51'08", in NW¼ sec.6, T.4 N., R.14 E., Macomb County, Hydrologic Unit 04090003, at 32 Mile Road, 3.0 miles southeast of Armada.	14.9	1959-65, 1966-70‡, 1971-84	03-21-84	15.47	784
04164360	East Branch Coon Creek near New Haven, MI	Lat 42°45'46", long 82°50'57", in NW¼ sec.19, T.4 N., R.14 E., Macomb County, Hydrologic Unit 04090003, at 29 Mile Road, 3.4 miles northwest of New Haven.	36.1	1959-67, 1968-72‡, 1973-84	03-21-84	7.99	885
04164400	Deer Creek near Meade, MI	Lat 42°42'39", long 82°51'32", in NW¼ sec.6, T.3 N., R.14 E., Macomb County, Hydrologic Unit 04090003, at 25½ Mile Road, 0.9 mile southeast of Meade.	12.7	1959-60, 1961-65‡, 1966-84	03-21-84	6.93	396
04164450	McBride Drain near Macomb, MI	Lat 42°41'14", long 82°55'14", in NE¼ NE¼ sec.16, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, at 24 Mile Road, 2.2 miles southeast of Macomb.	5.79	1960-64‡, 1965-84	03-21-84	7.51	144
04164600	Middle Branch Clinton River near Macomb, MI	Lat 42°42'03", long 82°59'44", in SE¼ sec.2, T.3 N., R.12 E., Macomb County, Hydrologic Unit 04090003, at Schoenherr Road, 2.0 miles west of Macomb.	22.2	1959-64, 1965-69‡, 1971-84	03-21-84	10.21	522
04164800	Middle Branch Clinton River at Macomb, MI	Lat 42°42'23", long 82°57'33", in SW¼ sec.5, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, at Romeo Plank Road, 0.4 mi north of Macomb.	41.0	1959-62, 1963-68‡, 1969, 1970-82‡, 1983-84	03-21-84	12.80	976
04165200	Gloede Ditch near Waldenburg, MI	Lat 42°37'39", long 82°57'10", in SW¼ sec.32, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, 2.2 miles south of Waldenburg.	16.0	1959, 1960-64‡, 1965-84	03-21-84	16.23	353
		Streams tributary to Detroit River					
04168660	Frank and Poet Drain at Trenton, MI	Lat 42°09'19", long 83°12'22", in NW¼ sec.13, T.4 S., R.10 E., Wayne County, Hydrologic Unit 04090004, at King Road, at Trenton.	19.3	1972-84	03-21-84	8.47	348
		Streams tributary to Lake Erie					
04168800	Huron River near Andersonville, MI	Lat 42°41'35", long 83°29'56", in NW¼ SE¼ sec.3, T.3 N., R.8 E., Oakland County, Hydrologic Unit 04090005, at White Lake Road, 2.5 miles south of Andersonville.	14.0	1974-84	03-21-84	2.25	60
04173250	Mill Creek near Lima Center, MI	Lat 42°15'56", long 83°56'45", in NE¼ sec.34, T.2 S., R.4 E., Washtenaw County, Hydrologic Unit 04090005, at Guenther Road, 2.0 miles upstream from North Fork Mill Creek, and 2.2 miles south of Lima Center.	47.3	1973-84	03-21-84	8.08	329
04175960	South Branch River Raisin near Adrian, MI	Lat 41°55'03", long 84°00'37", in SE¼ sec.25, T.6. S., R.3 E., Lenawee County, Hydrologic Unit 04100002, at Howell Highway, 2.0 miles northeast of Adrian.	165	1979-84	03-05-79 12-25-79 09-04-81 03-15-82 05-03-83 02-14-84	10.20 10.10 11.16 11.68 11.41 10.32	e1,560 e1,480 e2,480 e3,100 e2,770 1,660
04176000	River Raisin near Adrian, MI	Lat 41°54'15", long 83°58'50", in NW¼ sec.5, T.7 S., R.4 E., Lenawee County, Hydrologic Unit 04100002, at Academy Road, 1.7 miles east of Adrian.	463	1954-78‡ 1979-84	02-15-84	12.11	2,430
04176400	Saline River near Saline, MI	Lat 42°07'50", long 83°46'35", in SW¼ sec.18, T.4 S., R.5 E., Washtenaw County, Hydrologic Unit 04100002, at Maple Road, 2.8 miles south of Saline.	94.6	1966-77‡, 1978-84	03-21-84	10.38	920

‡ Operated as a continuous-record gaging station.
* Also a low-flow partial-record station.
a Approximately.
b Maximum gage height, 9.66 ft, Feb. 14, 1984, backwater from ice.
c Maximum gage height, 8.15 ft, Sept. 25, 1984, backwater from aquatic growth.
d Backwater from Lake Superior or sand bar at mouth.
e Revised.
f Maximum gage height, 5.53 ft, Feb. 14, backwater from ice.
g Maximum stage not determined.
h Computed on basis of correlation with downstream station.
j Maximum gage height, 3.10 ft Feb. 13, backwater from ice.

Measurements of streamflow at points other than gaging stations or partial-record stations are given in the following table. Those that are measurements of base flow are designated by an asterisk (*).

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1984

Station No.	Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
			Streams tributary to Lake Michigan				
04060500	Iron River	Brule River	Lat 46°03'31", long 88°37'38", in SE¼ SW¼ sec.1, T.42 N., R.35 W., Iron County, Hydrologic Unit 04030106, at County Highway 424, in Caspian, 5.0 mi upstream from mouth.	92.1	1948-80‡ 1983	10-25-83	*85.6
04065392	Skunk Creek	East Branch Sturgeon River	Lat 46°01'51", long 87°49'46", in SE¼ SE¼ sec.17, T.42 N., R.28 W., Dickinson County, Hydrologic Unit 04030108, 0.3 mile upstream from mouth, 2.2 miles north of Felch, MI.	14.5	1973-76, 1978-83	02-16-84	32.9
04103510	Talmadge Creek	Kalamazoo River	Lat 42°14'21", long 84°57'48", in SW¼ NW¼ sec.1, T.3 S., R.6 W., Calhoun County, Hydrologic Unit 04050003, at 17 Mile Rd. (old U.S. Hwy. 27), 2.0 miles south of Marshall, MI.	--	--	05-08-84	*b0.94
04106000	Kalamazoo River	Lake Michigan	Lat 42°17'05", long 85°30'50", in NE¼ sec.19, T.2 S., R.10 W., Kalamazoo County, Hydrologic Unit 04050003, at gaging station at River St., at Comstock, MI.	1,010	1931-79‡ 1983	06-20-84 07-31-84	*b662 *b414
04106599	Kalamazoo River	Lake Michigan	Lat 42°19'55", long 85°34'53", in NW¼ sec.3, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, across from G Ave. 0.5 mile west of Parchment, MI.	--	--	06-27-84 07-31-84	*b668 *b503
04106600	Kalamazoo River	Lake Michigan	Lat 42°20'13", long 85°34'59", in NE¼ SW¼ sec.34, T.1 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, 0.2 mile downstream of G Ave. extended, 0.5 mile west of Parchment, MI.	--	1976	09-19-84	b617
04106750	Spring Brook	Kalamazoo River	Lat 42°21'24", long 85°33'05", in NW¼ sec.25, T.1 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, at Riverview Dr., 0.6 mile north of East Cooper, MI.	31.1	1942 1964-71	06-27-84 07-31-84 09-19-84	*b15.7 *b14.1 *b14.6
04106906	Kalamazoo River	Lake Michigan	Lat 42°27'00", long 85°39'00", in NW¼ NE¼ sec.30, T.1 N., R.11 W., Allegan County, Hydrologic Unit 04050003, at Plainwell Sewage Treatment Plant, at Plainwell, MI.	--	--	09-19-84	*b666
04114153	Perry #2 Drain	Kellogg Drain	Lat 42°49'14", long 84°14'45", in NW¼ NW¼ sec.21, T.05 N., R.02 E., Shiawassee County, Hydrologic Unit 04050004, 600 feet south of Bath Rd., 1.0 mile southwest of Perry, MI.	1.80	--	04-05-84 04-12-84	b1.29 *b1.31
04114154	Perry #2 Drain	Kellogg Drain	Lat 42°49'04", long 84°14'32", in SE¼ NE¼ sec.20, T.05 N., R.02E., Shiawassee County, Hydrologic Unit 04050004, by Grand Trunk Railroad, 1.3 miles southwest of Perry, MI.	2.10	--	11-08-83	b0.00
04114157	Perry #2 Drain	Kellogg Drain	Lat 42°49'40", long 84°15'19", in SW¼ NW¼ sec.17, T.5 N., R.2 E., Shiawassee County, Hydrologic Unit 04050004, at I-69, 1.8 miles west of Perry, MI.	3.40	--	11-08-83 11-09-83 04-05-84 04-05-84 04-12-84	*b1.65 *b2.29 b8.18 b7.65 *b4.44
04114160	Perry #2 Drain	Kellogg Drain	Lat 42°50'50", long 84°14'22", in NW¼ NW¼ sec.9, T.5 N., R.2E., Shiawassee County, Hydrologic Unit 04050004, at Ruess Rd., 2.0 miles northwest of Perry, MI.	5.50	--	11-08-83 11-09-83 04-05-84 04-05-84 04-12-84	*b2.70 *b1.95 b9.34 b9.43 *b5.23
04114165	Kellogg Drain	Looking Glass River	Lat 42°51'21", long 84°13'33", in NE¼ sec.4, T.5 N., R.2 E., Shiawassee County, Hydrologic Unit 04050004, at Winegar Rd., 2.0 miles north of Perry, MI.	--	--	11-08-83 11-09-83 04-05-84	*b3.22 *b2.38 b12.3
04116045	Unnamed tributary	Morrison Lake	Lat 42°51'13", long 85°13'18", in NW¼ NE¼ sec.2, T.5 N., R.8 W., Ionia County, Hydrologic Unit 04050006, at Brooks Landing Rd., 1.2 miles northeast of Clarksville, MI.	--	--	04-24-84 05-23-84	b1.14 b1.29
04116047	Leary Drain	Morrison Lake	Lat 42°52'14", long 85°10'24", in NW¼ NW¼ sec.32, T.6 N., R.7 W., Ionia County, Hydrologic Unit 04050006, at Bliss Rd., 3.5 miles northeast of Clarksville, MI.	--	--	05-23-84 08-20-84	b1.53 *b0.03

See footnotes at end of table.

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1984--CONTINUED

Station No.	Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
			Streams tirbutary to Lake Michigan--continued				
04116049	Leary Drain	Morrison Lake	Lat 42°51'48", long 85°11'48", in NE¼ SE¼ sec.36, T.6 N., R.8 W., Ionia County, Hydrologic Unit 04050006, 200 feet upstream of Morrison Lake, 2.5 miles northeast of Clarksville, MI.	--	--	04-24-84 05-23-84	b5.80 b3.45
04116050	Lake Creek	Grand River	Lat 42°52'17", long 85°12'09", in NW¼ NE¼ sec.36, T.6 N., R.8 W., Ionia County, Hydrologic Unit 04050006, at Portland Rd., 2.5 miles northeast of Clarksville, MI.	--	1944-50	04-24-84	b11.2
04118415	Rogue River	Grand River	Lat 43°07'40", long 85°37'03", in NW¼ sec.33, T.9 N., R.11 W., Kent County, Hydrologic Unit 04050006, at Grange Ave., near Sparta, MI.	--	1963	09-04-84	61.1
04118465	Rogue River	Grand River	Lat 43°08'47", long 85°33'52", in SE¼ SW¼ sec.24, T.9 N., R.11 W., Kent County, Hydrologic Unit 04050006, at 12 Mile Rd., 1.5 miles north of Rockford, MI.	--	1951 1964 1970 1974	09-04-84	97.6
04121235	Clam River	Muskegon River	Lat 44°15'15", long 85°24'35", in SE¼ SW¼ sec.33, T.22 N., R.9 W., Wexford County, Hydrologic Unit 04060102, downstream of dam at Cadillac, MI.	46.6	1970 1983	11-07-83	*b44.8
04121239	Clam River	Muskegon River	Lat 44°15'49", long 85°24'04", in NE¼ NE¼ sec.33, T.22 N., R.09 W., Wexford County, Hydrologic Unit 04060102, at Smith Rd., at Cadillac, MI.	--	1983	11-07-83	*b47.4
04121241	Clam River	Muskegon River	Lat 44°16'02", long 85°23'48", in SE¼ SE¼ sec.28, T.22 N., R.9 W., Wexford County, Hydrologic Unit 04060102, at Plett Rd., at Cadillac, MI.	--	1975 1983	11-07-83	*b57.6
04121243	Clam River	Muskegon River	Lat 44°16'53", long 85°23'02", in SW¼ SE¼ sec. 22, T.22 N., R.9 W., Wexford County, Hydrologic Unit 04060102, at Boon Rd., 1.0 mile north of Cadillac, MI.	--	1946 1975 1983	11-07-83	*b56.9
04121244	Clam River	Muskegon River	Lat 44°17'17", long 85°21 36", in NE¼ SE¼ sec.23, T.22 N., R.9 W., Wexford County, Hydrologic Unit 04060102, at trailer park off Boon Rd., 2.5 miles northeast of Cadillac, MI.	--	1946 1975 1983	11-07-83	*b46.8
04121247	Clam River	Muskegon River	Lat 44°17'04", long 85°20'13", in SE¼ SE¼ sec.24, T.22 N., R.9 W., Wexford County, Hydrologic Unit 04060102, at County Line Road, 3.0 miles east of Cadillac, MI.	--	1946 1975 1983	11-07-83	*b45.5
04121250	Clam River	Muskegon River	Lat 44°17'06", long 85°17'45", in SE¼ SE¼ sec. 20, T.22 N., R.8 W., Missaukee County, Hydrologic Unit 04060102, at LaChance Rd., 3.0 miles south of Jennings, MI.	--	1945-51 1975 1983	11-07-83	*b49.9
04123706	Fife Lake Outlet	Manistee River	Lat 44°31'36", long 85°21'27", in SE¼ SE¼ sec.26, T.25 N., R.9 W., Grand Traverse County, Hydrologic Unit 04060103, at Ramsay Rd., 3.5 miles south of Fife Lake, MI.	--	--	06-19-84	19.4
04126525	Mason Creek	Duck Lake	Lat 44°37'53", long 85°43'16", in SE¼ SE¼ sec. 23, T.26 N., R.12 W., Grand Traverse County, Hydrologic Unit 04060104, at Lake Shore Rd., 2.8 miles southwest of Grawn, MI.	--	--	06-19-84	16.7
04126532	Duck Lake Outlet	Green Lake	Lat 44°38'29", long 85°46'01", in NW¼ NE¼ sec.21, T.26 N., R.12 W., Grand Traverse County, Hydrologic Unit 04060104, at State Hwy. M-137, 0.2 mile south of Interlochen, MI.	--	--	06-19-84	36.8
04126550	Betsie River	Lake Michigan	Lat 44°35'35", long 85°47'48", in SW¼ NW¼ sec.5, T.25 N., R.12 W., Grand Traverse County, Hydrologic Unit 04060104, at Betsie River Rd., 1.2 miles northwest of Karlin, MI.	59.6	1945-69	06-18-84	66.2
04126950	South Branch Boardman River	Boardman River	Lat 44°40'32", long 85°23'12", in NE¼ SW¼ sec.3, T.26 N., R.9 W., Grand Traverse County, Hydrologic Unit 04060105, 0.5 mile upstream of N. Br. Boardman River, 5.8 miles northwest of South Boardman, MI.	46.7	1971 1975	06-18-84	70.2

See footnotes at end of table.

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1984--CONTINUED

Station No.	Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
			Streams tributary to Lake Michigan--continued				
04126958	North Branch Boardman River	Boardman River	Lat 44°41'24", long 85°22'02", in NE¼ SW¼ sec.35, T.27 N., R.9 W., Grand Traverse County, Hydrologic Unit 04060105, at Broomhead Rd., 5.4 miles northwest of South Boardman, MI.	--	1971	06-18-84	90.6
04126993	Bancroft Creek	East Creek	Lat 44°36'24", long 85°28'08", in SE¼ NW¼ sec.36, T.26 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, at Voice Rd., 3.7 miles northeast of Kingsley, MI.	--	--	06-19-84	3.68
04127019	Jaxon Creek	Boardman River	Lat 44°37'41", long 85°34'38", in NE¼ NE¼ sec.25, T.26 N., R.11 W., Grand Traverse County, Hydrologic Unit 04060105, at Mill Street Rd., 2.3 miles west of Mayfield, MI.	--	--	06-18-84	1.21
			Streams tributary to Lake Huron				
04127955	Mill Creek	Lake Huron	Lat 45°42'57", long 84°41'12", in SW¼ NW¼ sec.4, T.38 N., R.3 W., Cheboygan County, Hydrologic Unit 04070003, at Potter Rd., 5.0 miles southeast of Mackinaw City, MI.	--	1954-57	04-12-84	*b12.5
04138000	East Branch Au Gres River	Lake Huron	Lat 44°14'03", long 83°42'03", in NW¼ NW¼ sec.10, T.21 N., R.6 E., Iosco County, Hydrologic Unit 04080101, at former gaging station at Whittemore Rd., 0.9 mile west of McIvor, MI.	a84.0	1950-73‡ 1973-75	08-24-84	*b33.1
04138500	Au Gres River	Lake Huron	Lat 44°10'26", long 83°44'36", in NE¼ NE¼ sec.31, T.21 N., R.6 E., Iosco County, Hydrologic Unit 04080101, at former gaging station at Cox Rd., 4.4 miles southwest of National City, MI.	169	1950-81‡	08-24-84	*b16.0
04144520	Shiawassee River	Saginaw River	Lat 43°05'06", long 84°11'04", in SW¼ SW¼ sec.13, T.8 N., R.2 E., Shiawassee County, Hydrologic Unit 04080203, at Henderson Rd., 0.6 mile east of Henderson, MI.	--	--	07-17-84 08-10-84 08-21-84 09-12-84 09-18-84	b77.8 *b47.9 b105 b60.0 b87.7
04145760	Shiawassee River	Saginaw River	Lat 43°20'17", long 84°04'20", in SE¼ sec.23, T.11 N., R.3 E., Saginaw County, Hydrologic Unit 04080203, at extension of Miller Rd., 3.0 miles southeast of Swan Creek, MI.	--	--	12-05-83 02-22-84 06-13-84	*777 2,200 *343
04145803	Marsh Creek	Shiawassee River	Lat 43°21'18", long 84°04'20", in NE¼ SE¼ sec.14, T.11 N., R.3 E., Saginaw County, Hydrologic Unit 04080203, at Miller Rd., 5.3 miles northeast of St. Charles, MI.	--	1976 1980-81	12-06-83 02-22-84 06-13-84	*140 689 *36.5
04149010	Flint River	Shiawassee River	Lat 43°19'09", long 83°59'34", in NE¼ NE¼ sec.33, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, at Cresswell Rd., 4.1 miles northwest of Fosters, MI.	--	--	12-06-83 02-23-84 06-14-84	*398 1,440 *498
04149500	Flint River	Shiawassee River	Lat 43°18'40", long 84°02'00", in SE¼ sec.31, T.11 N., R.4E., Saginaw County, Hydrologic Unit 04080204, 100 feet downstream of the Prairie Farms Assc. flood-pumping sta., 2.8 miles north of Alicia, MI.	--	1976	12-07-83 02-21-84 06-12-84	*198 827 *199
04151035	Millington Creek	Cass River	Lat 43°17'13", long 83°32'23", in NE¼ SE¼ sec.8, T.10 N., R.8 E., Tuscola County, Hydrologic Unit 04080205, at Fulmer Rd., 0.6 mile northwest of Millington, MI.	--	--	11-02-83 11-02-83	b3.66 b6.36
04151040	Millington Creek	Cass River	Lat 43°17'45", long 83°33'18", in SW¼ SW¼ sec.5, T.10 N., R.8 E., Tuscola County, Hydrologic Unit 04080205, at Murphy Lake Rd., 1.6 miles northwest of Millington, MI.	--	--	11-02-83	b5.50
04151045	Millington Creek	Cass River	Lat 43°18'27", long 83°34'47", in SW¼ SW¼ sec.31, T.11 N., R.8 E., Tuscola County, Hydrologic Unit 04080205, at Swaffer Rd., 3.1 miles northwest of Millington, MI.	--	--	11-02-83	b8.26
04152002	Cass River	Saginaw River	Lat 43°21'54", long 83°57'18", in NE¼ NE¼ sec.14, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080205, at State Hwy. M-13, 3.7 miles west of Bridgeport, MI.	905	1974 1976	12-05-83 02-21-84 06-12-84	*504 2,100 *448

See footnotes at end of table.

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1984--CONTINUED

Station No.	Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
			Streams tributary to Lake Huron--continued				
04152020	Middle Branch Tittabawassee River	Tittabawassee River	Lat 44°09'21", long 84°17'28", in SE¼ SE¼ sec.1, T.20 N., R.1 E., Gladwin County, Hydrologic Unit 04080201, at State Hwy. M-30, 9.0 miles south of West Branch, MI.	35.5	1958 1964 1966	08-23-84	*b26.1
04152030	East Branch Tittabawassee River	Middle Branch Tittabawassee River	Lat 44°07'44", long 84°13'41", in SE¼ SE¼ sec.16, T.20 N., R.2 E., Gladwin County, Hydrologic Unit 04080201, at Herner Rd., 10.0 miles south of West Branch, MI.	--	1958	08-24-84	*b9.58
04152040	West Branch Tittabawassee River	Tittabawassee River	Lat 44°10'29", long 84°24'06", in SE¼ SW¼ sec.26, T.21 N., R.1 W., Roscommon County, Hydrologic Unit 04080201, at Greenwood Rd., 11.0 miles southwest of West Branch, MI.	28.8	1958 1964-66	08-23-84	*b23.0
04152047	West Branch Tittabawassee River	Tittabawassee River	Lat 44°06'17", long 84°23'15", in SE¼ SE¼ sec.23, T.20 N., R.1 W., Gladwin County, Hydrologic Unit 04080201, at Fitzwater Rd., 2.3 miles northeast of Hockaday, MI.	42.7	--	08-23-84	*b27.6
04152057	Sugar River	Tittabawassee River	Lat 44°02'03", long 84°22'02", in SE¼ SE¼ sec.13, T.19 N., R.1 W., Gladwin County, Hydrologic Unit 04080201, at State Hwy. M-30, 7.0 miles northeast of Gladwin, MI.	70.3	1960	08-23-84	*b15.1
04152070	Molasses River	Tittabawassee River	Lat 43°58'42", long 84°16'37", in SE¼ NW¼ sec.7, T.18 N., R.2 E., Gladwin County, Hydrologic Unit 04080201, at State Hwy. M-61, 10.5 miles east of Gladwin, MI.	46.0	1958	08-23-84	*b1.57
04152078	Lorrabee Creek	Tittabawassee River	Lat 43°54'12", long 84°19'38", in SE¼ SE¼ sec.3, T.17 N., R.1 E., Gladwin County, Hydrologic Unit 04080201, at Wieman Rd., 3.4 miles southeast of Winegars, MI.	11.2	--	08-23-84	*0.09
04152500	Tobacco River	Tittabawassee River	Lat 43°52'43", long 84°28'18", in NW¼ SE¼ sec.7, T.17 N., R.1 W., Gladwin County, Hydrologic Unit 04080201, at former gaging station at Glidden Rd., at Beaverton, MI.	487	1948-82‡	08-23-84	*b146
04152600	Little Cedar River	Tobacco River	Lat 43°51'27", long 84°24'16", in SW¼ SW¼ sec.14, T.17 N., R.1 W., Gladwin County, Hydrologic Unit 04080201, at Dale Rd., 1.6 miles east of Dale, MI.	24.4	--	08-23-84	b0.00
04153300	Tittabawassee River	Saginaw River	Lat 43°40'37", long 84°22'57", in SE¼ NW¼ sec.24, T.15 N., R.1 W., Midland County, Hydrologic Unit 04080201, 600 feet downstream from Sanford Dam, at Sanford, MI.	1,020	--	08-28-84	*b37.2
04156510	Tittabawassee River	Saginaw River	Lat 43°23'37", long 84°00'54", in NW¼ NW¼ sec.4, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080201, at Center Rd., 1.1 miles southwest of Saginaw, MI.	--	1976	12-06-83 02-22-84 06-13-84	*1,510 6,270 *1,090
04157077	Watercourse Creek	Durussell Drain	Lat 43°27'51", long 83°42'06", in NE¼ NE¼ sec.12, T.12 N., R.6 E., Saginaw County, Hydrologic Unit 04080103, at Hack Rd., 1.0 mile northwest of Reese, MI.	--	--	05-02-84	*b2.41
04157080	Squaw Creek	Durussell Drain	Lat 43°28'35", long 83°41'54", in NW¼ NW¼ sec.6, T.12 N., R.7 E., Tuscola County, Hydrologic Unit 04080103, at Reese Rd., 1.8 miles north of Reese, MI.	--	--	05-02-84	*b2.40
04157083	Durussell Drain	Quanicassee River	Lat 43°28'53", long 83°42'32", in NE¼ SW¼ sec.36, T.13 N., R.6 E., Bay County, Hydrologic Unit 04080103, at Merkel Rd., 3.9 miles southeast of Munger, MI.	--	--	05-02-84	*b8.87
04157085	Durussell Drain	Quanicassee River	Lat 43°30'28", long 83°42'32", in NW¼ NE¼ sec.25, T.13 N., R.6 E., Bay County, Hydrologic Unit 04080103, at Brown Rd., 3.7 miles southeast of Munger, MI.	--	--	05-02-84	*b8.21
04157088	Unnamed tributary	Durussell Drain	Lat 43°31'21", long 83°41'56", in SW¼ SW¼ sec.18, T.13 N., R.7 E., Tuscola County, Hydrologic Unit 04080103, at State Hwy. M-138, 4.1 miles east of Munger, MI.	--	--	05-02-84	*b2.31
04157090	Durussell Drain	Quanicassee River	Lat 43°31'21", long 83°42'32", in SW¼ SE¼ sec.13, T.13 N., R.6 E., Bay County, Hydrologic Unit 04080103, at State Hwy. M-138, 3.5 miles east of Munger, MI.	--	--	05-02-84	*b4.58

See footnotes at end of table.

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1984--CONTINUED

Station No.	Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
			Streams tributary to St. Clair River				
04159145	Black River	St. Clair River	Lat 43°31'32", long 82°46'07", in SW¼ sec.25, T.13 N., R.14 E., Sanilac County, Hydrologic Unit 04090001, at Deckerville Rd., 1.6 miles west of Deckerville, MI.	56.4	1967	07-30-84	*b1.60
04159177	Black River	St. Clair River	Lat 43°25'29", long 82°43'19", in NE¼ NW¼ sec.5, T.11 N., R.15 E., Sanilac County, Hydrologic Unit 04090001, at State Hwy. M-46, 4.5 miles east of Sandusky, MI.	120	--	07-30-84	*b5.07
04159235	Elk Creek	Black River	Lat 43°22'55", long 82°42'52", in NW¼ NE¼ sec.20, T.11 N., R.15 E., Sanilac County, Hydrologic Unit 04090001, at Walker Rd., 3.0 miles southwest of Carsonville, MI.	178	--	07-30-84	*b8.47
04159265	Black River	St. Clair River	Lat 43°17'35", long 82°38'05", in NE¼ NE¼ sec.19, T.10 N., R.16 E., Sanilac County, Hydrologic Unit 04090001, at Roach Rd., 1.0 mile northwest of Croswell, MI.	--	--	07-30-84	*b23.1
04159482	Black River	St. Clair River	Lat 43°11'37", long 82°37'20", in SW¼ SW¼ sec.20, T.9 N., R.16 E., Sanilac County, Hydrologic Unit 04090001, at Galbraith Rd., 1.8 miles west of Amadore, MI.	430	--	07-30-84	*b31.3
04160000	Mill Creek	Black River	Lat 43°02'42", long 82°36'50", in NW¼ sec.17, T.7 N., R.16 E., St. Clair County, Hydrologic Unit 0409001, at former gaging station at Abbotsford Rd., 0.5 mile northwest of Ruby, MI.	208	1947-64‡ 1967 1971	07-30-84	*b9.91
04160050	Black River	St. Clair River	Lat 42°59'24", long 82°32'16", in NW¼ sec.2, T.6 N., R.16 E., St. Clair County, Hydrologic Unit 04090001, at Wadhams Rd., 0.3 mile northeast of Wadhams, MI.	684	1967	07-30-84	*b83.3
			Streams tributary to Lake Erie				
04172155	Chilson Creek	Huron River	Lat 42°29'52", long 83°51'33", in NW¼ NE¼ sec.9, T.1 N., R.5 E., Livingston County, Hydrologic Unit 04090005, at Chilson Rd., 1.4 miles north of Pettysville, MI.	--	1973 1980	06-28-84 08-17-84	*b2.89 *b1.22
04172165	Chilson Creek	Huron River	Lat 42°28'40", long 83°51'56", in SW¼ NW¼ sec.16, T.1 N., R.5 E., Livingston County, Hydrologic Unit 04090005, at Kimble Rd., 300 feet below Luetz Mill Pond Dam, at Pettysville, MI.	--	1973 1980	06-28-84 08-17-84	*b2.44 *b1.24
04175228	Swan Creek	Lake Erie	Lat 42°02'17", long 83°19'27", in SE¼ SE¼ sec.23, T.5 S., R.9 E., Monroe County, Hydrologic Unit 04100001, at trailer park off U.S. Hwy. 24, 3.1 miles southwest of South Rockwood, MI.	--	--	08-30-84	b0.00
04175315	Paint Creek	Stony Creek	Lat 42°11'18", long 83°36'25", in NE¼ sec.33, T.3 S., R.7 E., Washtenaw County, Hydrologic Unit 04100001, at Merritt Rd., 3.5 miles south of Ypsilanti, MI.	17.5	--	08-30-84	b7.41
04175330	Paint Creek	Stony Creek	Lat 42°05'44", long 83°35'18", in NE¼ sec.34, T.4 S., R.7 E., Washtenaw County, Hydrologic Unit 04100001, at Liss Rd., 4.9 miles east of Milan, MI.	34.9	--	08-30-84	b4.93
04175338	Stony Creek	Lake Erie	Lat 42°06'39", long 83°35'55", in SE¼ NE¼ sec. 33, T.4 S., R.7 E., Washtenaw County, Hydrologic Unit 04100001, at Whittaker Rd., 4.3 miles east of Milan, MI.	--	--	08-30-84	b1.72
04175340	Stony Creek	Lake Erie	Lat 42°05'05", long 83°34'43", in NE¼ NE¼ sec.3, T.5 S., R.7 E., Monroe County, Hydrologic Unit 04100001, at Tuttle Hill Rd., 0.3 mile northeast of Oakville, MI.	68.0	1970-81‡	08-30-84	b6.26
04175570	River Raisin	Lake Erie	Lat 42°04'27", long 84°13'58", in SE¼ sec.41, T.4, S., R.2 E., Jackson County, Hydrologic Unit 04100002, at State Hwy. M-50, 2.0 miles south of Brooklyn, MI.	16.5	1970	08-30-84	7.88
04175585	Goose Creek	Stony Lake Outlet	Lat 42°06'51", long 84°14'56", in NE¼ sec.24, T.4 S., R.1 E., Jackson County, Hydrologic Unit 04100002, at State Hwy. M-50, at Brooklyn, MI.	39.1	1970	08-30-84	7.27

See footnotes at end of table.

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1984--CONTINUED

Station No.	Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
			Streams tributary to Lake Erie--continued				
04175587	River Raisin	Lake Erie	Lat 42°08'15", long 84°13'15", in NE¼ SW¼ sec.8, T.4 S., R.2 E., Jackson County, Hydrologic Unit 04100002, at Wolf Lake Rd., 2.0 miles southeast of Napoleon, MI.	--	1979	08-07-84	*b12.5
04175600	River Raisin	Lake Erie	Lat 42°10'05", long 84°04'34", in NE¼ SE¼ sec.33, T.3 S., R.3 E., Washtenaw County Hydrologic Unit 04100002, at former gaging station at Sharon Valley Rd., 2.5 miles northwest of Manchester, MI.	--	1955 1963 1970-81‡	08-07-84	*b15.9
04175610	River Raisin	Lake Erie	Lat 42°08'52", long 84°00'56", in SE¼ SE¼ sec.1, T.4 S., R.3 E., Washtenaw County, Hydrologic Unit 04100002, at Austin Rd., 0.5 mile east of Manchester, MI.	148	1970-71 1979	08-07-84	*b17.7
04175630	River Raisin	Lake Erie	Lat 42°05'36", long 83°58'35", in SE¼ sec.29, T.4 S., R.4 E., Washtenaw County, Hydrologic Unit 04100002, at Allen Rd., 1.5 miles north of Clinton, MI.	167	1970-71	08-07-84	*b24.1
04175700	River Raisin	Lake Erie	Lat 41°56'35", long 83°56'45", in NE¼ sec.21, T.6 S., R.4 E., Lenawee County, Hydrologic Unit 04100002, at former gaging station at North Raisin Center Highway, 4.5 miles south of Tecumseh, MI.	267	1956-80‡ 1983	08-07-84	*b65.2
04176000	River Raisin	Lake Erie	Lat 41°54'15", long 83°58'50", in NW¼ sec.5, T.7 S., R.4 E., Lenawee County, Hydrologic Unit 04100002, at former gaging station at Academy Rd., 1.7 miles east of Adrian, MI.	463	1963-78‡	08-13-84	*b96.7
04176140	River Raisin	Lake Erie	Lat 41°50'03", long 83°52'00", in SE¼ SE¼ sec.30, T.7 S., R.5 E., Lenawee County, Hydrologic Unit 04100002, at U.S. Hwy. 223, at Blissfield, MI.	643	1970 1982	08-13-84	*b180
04176200	River Raisin	Lake Erie	Lat 41°57'23", long 83°39'32", in SE¼ sec.13, T.6 S., R.6 E., Monroe County, Hydrologic Unit 04100002, at State Hwy. M-50, at Dundee, MI.	761	1970	08-07-84	*b217
04176330	Macon Creek	River Raisin	Lat 41°58'46", long 83°37'40", in SE¼ NW¼ sec.8, T.6 S., R.7 E., Monroe County, Hydrologic Unit 04100002, at Stowell Rd., 2.2 miles northeast of Dundee, MI.	144	1970	08-30-84	b3.77
04176370	Unnamed tributary	Saline River	Lat 42°10'34", long 83°49'17", in SE¼ sec.34, T.3 S., R.5 E., Washtenaw County, Hydrologic Unit 04100002, at Saline Waterworks Rd., 2.2 miles northwest of Saline, MI.	13.2	1944 1964 1970-72 1980	08-30-84	b0.00
04176380	Wood Outlet Drain	Saline River	Lat 42°10'37", long 83°47'17", in NW¼ sec.36, T.3 S., R.5 E., Washtenaw County, Hydrologic Unit 04100002, at Saline Waterworks Rd., 0.8 mile north of Saline, MI	13.7	1944 1964 1970-72	08-30-84	b2.66
04176390	Saline River	River Raisin	Lat 42°09'35", long 83°47'01", in SE¼ sec.1, T.4 S., R.5 E., Washtenaw County, Hydrologic Unit 04100002, at Monroe St., at Saline, MI.	77.6	1965-73 1980	08-30-84	b9.55
04176400	Saline River	River Raisin	Lat 42°07'50", long 83°46'35", in SW¼ sec.18, T.4 S., R.5 E., Washtenaw County, Hydrologic Unit 04100002, at former gaging station at Maple Rd., 2.8 miles south of Saline, MI.	94.6	1965-77‡ 1980-81	08-30-84	b21.5
04176430	Saline River	River Raisin	Lat 41°59'53", long 83°37'28", in NE¼ sec.5, T.6 S., R.7 E., Monroe County, Hydrologic Unit 04100002, at Day Rd., 3.3 miles northeast of Dundee, MI.	127	1963 1970	08-30-84	b19.8
04177221	Prouty Drain	W. Fork W. Branch St. Joseph River	Lat 41°48'10", long 84°44'52", in NE¼ SE¼ sec.3, T.8 S., R.4 W., Hillsdale County, Hydrologic Unit 04100003, at State Hwy. M-49, 2.5 miles south of Reading, MI	--	1981	10-12-83 05-08-84	*b2.28 *b4.26

See footnotes at end of table.

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1984--CONTINUED

Station No.	Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
						Date	Discharge (ft^3/s)
			Streams tributary to Lake Erie--continued				
04177222	Prouty Drain	W. Fork W. Branch St. Joseph River	Lat 41°47'42", long 84°46'02", in NE¼ NE¼ sec.9, T.8 S., R.4 W., Hillsdale County, Hydrologic Unit 04100003, at Abbott Rd., 3.0 miles southwest of Reading, MI.	--	1981	10-12-83 05-08-84	*b1.63 *b6.08
04177223	Prouty Drain	W. Fork W. Branch St. Joseph River	Lat 41°47'52", long 84°46'56", in SW¼ sec.4, T.8 S., R.4 W., Hillsdale County, Hydrologic Unit 04100003, at Brott Rd., 3.5 miles southwest of Reading, MI.	--	1981	10-12-83 05-08-84	*b1.85 *b7.36

---

* Base flow
‡ Operated as a continuous-record gaging station
a Approximately
b Discharge measurement made by employees of Michigan Department of Natural Resources.

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT

04145760 - SHIAWASSEE RIVER NEAR ST. CHARLES, MI (LAT 43 20 17 LONG 084 04 20)

DATE	DIS-CHARGE, IN CUBIC FEET PER SECOND	SED. SUSP. FALL DIAM. % FINER THAN .002 MM	SED. SUSP. FALL DIAM. % FINER THAN .004 MM	SED. SUSP. FALL DIAM. % FINER THAN .008 MM	SED. SUSP. FALL DIAM. % FINER THAN .016 MM	SED. SUSP. FALL DIAM. % FINER THAN .031 MM	SED. SUSP. FALL DIAM. % FINER THAN .062 MM	SED. SUSP. FALL DIAM. % FINER THAN .125 MM	SED. SUSP. FALL DIAM. % FINER THAN .250 MM	SED. SUSP. FALL DIAM. % FINER THAN .500 MM	SED. SUSP. FALL DIAM. % FINER THAN 1.00 MM	SEDIMENT, SUSPENDED (MG/L)
DEC 05...	777	37	46	57	68	75	79	82	86	95	100	12
FEB 22...	2200	43	51	59	66	70	72	75	84	98	100	11
JUN 13...	343	53	74	87	96	98	99	99	100	--	--	57

04145803 - MARSH CREEK AT S. MILLER RD. NEAR GARFIELD, MI (LAT 43 21 18 LONG 084 04 20)

DATE	DIS-CHARGE, IN CUBIC FEET PER SECOND	SED. SUSP. FALL DIAM. % FINER THAN .002 MM	SED. SUSP. FALL DIAM. % FINER THAN .004 MM	SED. SUSP. FALL DIAM. % FINER THAN .008 MM	SED. SUSP. FALL DIAM. % FINER THAN .016 MM	SED. SUSP. FALL DIAM. % FINER THAN .031 MM	SED. SUSP. FALL DIAM. % FINER THAN .062 MM
DEC 06...	140	31	42	49	56	59	61
FEB 22...	689	59	72	80	86	88	90
JUN 13...	36	56	76	86	93	94	95

DATE	SED. SUSP. FALL DIAM. % FINER THAN .125 MM	SED. SUSP. FALL DIAM. % FINER THAN .250 MM	SED. SUSP. FALL DIAM. % FINER THAN .500 MM	SED. SUSP. FALL DIAM. % FINER THAN 1.00 MM	SED. SUSP. FALL DIAM. % FINER THAN 2.00 MM	SEDIMENT, SUSPENDED (MG/L)
DEC 06...	64	69	91	100	--	20
FEB 22...	92	94	97	100	--	8
JUN 13...	96	96	97	98	100	54

04149010 - FLINT RIVER AT CRESSWELL ROAD NEAR FOSTERS, MI (LAT 43 19 09 LONG 083 59 34)

DATE	DIS-CHARGE, IN CUBIC FEET PER SECOND	SED. SUSP. FALL DIAM. % FINER THAN .002 MM	SED. SUSP. FALL DIAM. % FINER THAN .004 MM	SED. SUSP. FALL DIAM. % FINER THAN .008 MM	SED. SUSP. FALL DIAM. % FINER THAN .016 MM	SED. SUSP. FALL DIAM. % FINER THAN .031 MM	SED. SUSP. FALL DIAM. % FINER THAN .062 MM
DEC 06...	398	35	48	64	74	77	79
FEB 23...	1440	25	37	48	59	69	75
JUN 14...	498	25	40	55	69	82	89

DATE	SED. SUSP. FALL DIAM. % FINER THAN .125 MM	SED. SUSP. FALL DIAM. % FINER THAN .250 MM	SED. SUSP. FALL DIAM. % FINER THAN .500 MM	SED. SUSP. FALL DIAM. % FINER THAN 1.00 MM	SED. SUSP. FALL DIAM. % FINER THAN 2.00 MM	SEDIMENT, SUSPENDED (MG/L)
DEC 06...	82	84	91	96	100	11
FEB 23...	87	94	98	100	--	30
JUN 14...	92	94	99	100	--	39

STREAMS TRIBUTARY TO LAKE HURON

WATER-QUALITY DATA, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT

04149500 - FLINT RIVER NEAR ALICIA, MI (LAT 43 18 40 LONG 084 02 00)

DATE	DIS-CHARGE, IN CUBIC FEET PER SECOND	SED. SUSP. FALL DIAM. % FINER THAN .002 MM	SED. SUSP. FALL DIAM. % FINER THAN .004 MM	SED. SUSP. FALL DIAM. % FINER THAN .008 MM	SED. SUSP. FALL DIAM. % FINER THAN .016 MM	SED. SUSP. FALL DIAM. % FINER THAN .031 MM	SED. SUSP. FALL DIAM. % FINER THAN .062 MM	SED. SUSP. FALL DIAM. % FINER THAN .125 MM	SED. SUSP. FALL DIAM. % FINER THAN .250 MM	SED. SUSP. FALL DIAM. % FINER THAN .500 MM	SEDIMENT, SUSPENDED (MG/L)
DEC 07...	198	27	37	44	51	58	64	82	94	100	26
FEB 21...	827	37	49	60	69	78	83	92	99	100	25
JUN 12...	199	41	58	72	83	90	93	99	100	--	38

04152002 - CASS RIVER NEAR BRIDGEPORT, MI (LAT 43 21 54 LONG 083 57 18)

DATE	DIS-CHARGE, IN CUBIC FEET PER SECOND	SED. SUSP. FALL DIAM. % FINER THAN .002 MM	SED. SUSP. FALL DIAM. % FINER THAN .004 MM	SED. SUSP. FALL DIAM. % FINER THAN .008 MM	SED. SUSP. FALL DIAM. % FINER THAN .016 MM	SED. SUSP. FALL DIAM. % FINER THAN .031 MM	SED. SUSP. FALL DIAM. % FINER THAN .062 MM	SED. SUSP. FALL DIAM. % FINER THAN .125 MM	SED. SUSP. FALL DIAM. % FINER THAN .250 MM	SED. SUSP. FALL DIAM. % FINER THAN .500 MM	SED. SUSP. FALL DIAM. % FINER THAN 1.00 MM	SEDIMENT, SUSPENDED (MG/L)
DEC 05...	504	50	66	81	88	88	90	94	97	100	--	5
FEB 21...	2100	14	21	27	32	37	39	47	67	100	--	36
JUN 12...	448	16	24	31	42	50	55	62	81	98	100	138

04156510 - TITTABAWASSEE RIVER NEAR SAGINAW, MI (LAT 43 23 37 LONG 084 00 54)

DATE	DIS-CHARGE, IN CUBIC FEET PER SECOND	SED. SUSP. FALL DIAM. % FINER THAN .002 MM	SED. SUSP. FALL DIAM. % FINER THAN .004 MM	SED. SUSP. FALL DIAM. % FINER THAN .008 MM	SED. SUSP. FALL DIAM. % FINER THAN .016 MM	SED. SUSP. FALL DIAM. % FINER THAN .031 MM	SED. SUSP. FALL DIAM. % FINER THAN .062 MM	SED. SUSP. FALL DIAM. % FINER THAN .125 MM	SED. SUSP. FALL DIAM. % FINER THAN .250 MM	SED. SUSP. FALL DIAM. % FINER THAN .500 MM	SEDIMENT, SUSPENDED (MG/L)
DEC 06...	1510	53	67	72	79	84	88	94	96	100	4
FEB 22...	6270	30	37	46	56	63	68	75	91	100	33
JUN 13...	1090	45	63	77	89	93	96	97	98	100	14

FIGURE 9.--Map showing location of observation wells published in this report.

ALGER COUNTY

461608086373801. Local number, 45N 19W 25BDDB.
LOCATION.--Lat 46°16'08", long 086°37'38", Hydrologic Unit 04060106, 250 ft northwest of highway M-44, 0.2 mi northeast of Kentucky.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 66 ft.
DATUM.--Altitude of land-surface datum is 850 ft. Measuring point: Top of casing, 3.60 ft above land-surface datum.
PERIOD OF RECORD.--June 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.35 ft below land-surface datum, June 29, 1960; lowest measured, 14.19 ft Apr. 3, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 27	10.48	JAN 24	11.04	APR 20	10.56	JUN 7	10.74	AUG 1	11.04

ALPENA COUNTY

450850083393401. Local number, 32N 6E 23DDDA.
LOCATION.--Lat 45°08'50", long 083°39'34", Hydrologic Unit 04070006, on Graham Road, 3 mi east and 1.5 mi north of Long Rapids.
Owner: U.S. Geological Survey.
AQUIFER: Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table observation well, diameter 6 in, depth 88 ft, screened 79 to 88 ft.
DATUM.--Altitude of land-surface datum is 713 ft. Measuring point: Plywood instrument shelf, 2.7 ft above land-surface.
REMARKS.--Bottom of hole near top of bedrock.
PERIOD OF RECORD.--November 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 13.61 ft below land-surface datum, May 22, 1983; lowest, 30.01 ft Mar. 27, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	22.81	22.84	22.49	22.49	23.70	22.39	21.52	18.42	18.61	18.76	19.66	20.24
10	22.84	22.99	22.44	22.83	23.80	22.79	19.89	18.61	18.76	18.91	19.77	19.86
15	22.84	23.11	22.11	22.95	23.78	23.12	19.48	18.81	18.60	18.98	19.69	19.64
20	22.84	23.08	22.26	23.12	23.26	22.96	17.91	18.80	18.54	19.15	20.04	19.43
25	22.71	23.06	22.21	23.26	22.56	22.65	17.57	18.70	18.56	19.34	20.24	19.36
EOM	22.84	22.82	22.58	23.55	22.18	22.16	18.06	18.55	18.74	19.61	20.38	19.34

WTR YEAR 1984 MAX 16.97 APR 23, 1984 MIN 23.87 FEB 11, 1984

ARENAC COUNTY

440342083542801. Local number, 19N 5E 7DABA1.
LOCATION.--Lat 44°03'42", long 083°54'28", Hydrologic Unit 04080101, 3 mi northeast of Omer.
Owner: U.S. Geological Survey.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 185 ft, screened 180 to 185 ft.
DATUM.--Altitude of land-surface datum is 667 ft. Measuring point: Top of casing, 2.00 ft above land-surface datum.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.28 ft below land-surface datum, July 15, 1980; lowest measured, 10.63 ft Sept. 11, 1984.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	9.84	DEC 13	9.65	APR 10	9.74	JUN 18	10.49	JUL 31	10.58	SEP 11	10.63
NOV 15	9.68	MAR 7	9.75	MAY 15	9.81						

ARENAC COUNTY

440342083542801. Local number, 19N 5E 7DABA2.
LOCATION.--Lat 44°03'42", long 083°54'28", Hydrologic Unit 04080101, 3 mi northeast of Omer.
Owner: U.S. Geological Survey.
AQUIFER.--Lake bed sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 21 ft, screened 16 to 21 ft.
DATUM.--Altitude of land-surface datum is 667 ft. Measuring point: Top of casing, 2.20 ft above land-surface datum.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.57 ft below land-surface datum, June 18, 1984; lowest measured, 6.95 ft Aug. 21, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	4.74	DEC 13	4.36	APR 10	4.50	JUN 18	2.57	JUL 31	2.98	SEP 11	3.53
NOV 15	4.88	MAR 7	4.20	MAY 15	3.58						

BARAGA COUNTY

463353088144301. Local number, 48N 32W 12DDCC.
LOCATION.--Lat 46°33'53", long 088°14'43", Hydrologic Unit 04030107, 95 ft north of U.S. Highway 41 and 0.5 mi southeast of Nestoria Road.
Owner: Michigan State Highway Department.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1½ in, depth 10 ft, screened 7 to 10 ft.
DATUM.--Altitude of land-surface datum is 1,630 ft. Measuring point: Top of casing, 4.78 ft above land-surface datum.
REMARKS.--Measurements made by Wisconsin Electric Power Company.
PERIOD OF RECORD.--September 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.27 ft below land-surface datum, Apr. 30, 1965; lowest measured, 8.09 ft Sept. 2, 1960.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 31	5.89	DEC 31	6.03	FEB 29	6.09	MAY 2	5.28	JUL 9	6.13	SEP 4	6.33
NOV 30	5.78	JAN 31	6.33	APR 2	6.92	JUN 7	5.99	AUG 1	6.46		

BARRY COUNTY

424540085232001. Local number, 4N 9W 5DAAA.
LOCATION.--Lat 42°45'40", long 085°23'20", Hydrologic Unit 04050007, on Soloman Road 4 mi east and 3.5 mi north of Middleville.
Owner: State Department of Natural Resources.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 2 in, depth 131 ft.
DATUM.--Altitude of land-surface datum is 860 ft. Measuring point: Top of casing, 2 ft above land-surface datum.
PERIOD OF RECORD.--December 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 111.5 ft below land-surface datum, Mar. 20, 1978; lowest measured, 122.0 ft Mar. 5, 1965.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	116.5	JAN 10	116.5	APR 5	116.5	JUL 31	116.6

BAY COUNTY

435128083582401. Local number, 17N 4E 22DCAA.
LOCATION.--Lat 43°51'28", long 083°58'24", Hydrologic Unit 04080102, at end of Second Street, Pinconning.
Owner: Pinconning Township.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 110 ft, cased to 60 ft, open end.
DATUM.--Altitude of land-surface datum is 620 ft. Measuring point: Plywood shelter base, 2.00 ft above land-surface datum.
REMARKS.--Water levels affected by regional pumping.
PERIOD OF RECORD.--August 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.05 ft below land-surface datum, Mar. 5, 1976; lowest, 10.53 ft Aug. 8, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	3.46	DEC 13	2.11	MAR 7	1.84	MAY 15	2.09	JUL 31	3.01	SEP 10	5.45
NOV 15	2.69	JAN 26	1.85	APR 10	1.74	JUN 18	2.23				

BRANCH COUNTY

415602084593701. Local number, 6S 6W 22CABA.
LOCATION.--Lat 41°56'02", long 084°59'37", Hydrologic Unit 04050001, at Bennett and Tibbits Streets, Coldwater.
Owner: City of Coldwater.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 113 ft, screened 73 to 113 ft.
DATUM.--Altitude of land-surface datum is 970 ft. Measuring point: Plywood shelter base, 2.50 ft above land-surface datum.
REMARKS.--Water levels affected by nearby pumping.
PERIOD OF RECORD.--January 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.0 ft below land-surface datum, May 6, 1975; lowest, 25.9 ft May 25, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	21.9	13.8	21.6	20.5	13.7	14.0	20.0	11.8	19.2	21.7	13.4	22.0
10	16.4	22.1	14.2	21.0	17.8	12.9	20.1	15.9	11.4	21.8	16.0	21.8
15	21.9	18.0	17.4	13.2	21.0	18.6	12.1	16.1	12.4	14.3	22.3	14.2
20	22.0	13.8	21.9	21.2	20.6	20.5	15.7	12.2	16.3	22.2	23.3	21.8
25	18.1	15.9	20.8	22.5	12.7	12.5	19.7	12.8	21.2	22.0	20.7	22.6
EOM	21.4	22.4	12.8	21.5	21.1	14.4	19.8	15.4	13.5	22.4	23.0	14.2

WTR YEAR 1984 MAX 10.4 JUN 3, 1984 MIN 23.5 OCT 19, 1983

CALHOUN COUNTY

422422085071501. Local number, 1S 7W 10BBAB.
LOCATION.--Lat 42°24'22", long 085°07'15", Hydrologic Unit 04050003, at highways M-78 and M-66, 5 mi north of Battle Creek.
Owner: Rilla Sabin.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Dug water-table well, diameter 15 in, depth 12 ft, open tile bottom.
DATUM.--Land-surface datum is 907.99 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 1.50 ft above land-surface datum.
REMARKS.--Measured by observer.
PERIOD OF RECORD.--September 1946 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.89 ft below land-surface datum, Mar. 28, 1950; lowest, dry, July 29, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	4.20	DEC 7	4.12	FEB 8	4.31	APR 11	3.65	JUN 13	3.80	AUG 8	4.40
12	4.28	14	4.15	15	4.24	18	3.67	20	4.06	15	4.48
19	4.36	21	4.18	22	4.15	25	3.67	27	4.08	22	4.60
26	4.41	28	4.20	29	4.04	MAY 2	3.65	JUL 4	4.10	29	4.70
NOV 2	4.36	JAN 4	4.30	MAR 7	3.83	9	3.61	11	4.20	SEP 5	4.72
9	4.30	11	4.38	14	3.75	16	3.56	18	4.36	12	4.70
16	4.14	18	4.44	21	3.62	23	3.54	25	4.34	19	4.69
23	4.12	25	4.55	28	3.64	30	3.52	AUG 1	4.36	26	4.68
30	4.09	FEB 1	4.40	APR 4	3.64	JUN 6	3.60				

CALHOUN COUNTY

422025085084001. Local number, 1S 7W 32DABA.
LOCATION.--Lat 42°20'25", long 085°08'40", Hydrologic Unit 04050003, at Verona well field, Battle Creek.
Owner: City of Battle Creek.
AQUIFER.--Marshall Formation of Mississippian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in, depth 127 ft, cased to 103 ft.
DATUM.--Land-surface datum is 830.79 ft National Geodetic Vertical Datum of 1929. Measuring point: Recorder base, 2.10 ft above land-surface datum.
REMARKS.--Water levels affected by nearby municipal pumping. Measurements made daily by Water Department.
PERIOD OF RECORD.--October 1939 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.7 ft below land surface datum, Apr. 26-27, 1950; lowest, 16.75 ft July 16, 1959.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	10.80	10.00	8.70	8.70	7.90	7.30	6.70	6.70	8.65	10.90	9.60	10.10
10	10.80	9.55	7.60	7.75	8.60	6.60	6.80	7.30	8.80	9.90	10.50	9.70
15	9.80	9.40	8.00	7.00	7.85	7.45	6.65	7.00	9.60	9.40	10.65	9.40
20	10.40	9.20	7.50	8.60	7.50	7.20	7.10	6.50	10.60	10.50	9.80	10.10
25	10.20	8.30	7.10	9.20	7.00	6.40	6.85	7.10	10.60	10.40	10.60	9.95
EOM	9.10	8.80	7.35	8.50	8.10	6.60	6.90	7.80	10.70	10.25	10.10	9.00

CASS COUNTY

414651085575601. Local number, 8S 14W 17BAAA.
LOCATION.--Lat 41°46'51", long 085°57'56", Hydrologic Unit 04050001, 2 mi east of Adamsville on U.S. Highway 112.
Owner: Ted Little.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Dug water-table well, diameter 28 in, depth 55 ft, cribbed with brick to open bottom.
DATUM.--Altitude of land-surface datum is 840 ft. Measuring point: Top of wooden platform, 1.00 ft above land-surface datum.
REMARKS.--Measured by observer.
PERIOD OF RECORD.--September 1945 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 46.20 ft below land-surface datum, July 16, 1950; lowest, dry, Mar. 10, 1947.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 26	48.50	DEC 28	48.35	FEB 26	50.00	APR 24	50.00	JUN 26	49.95	AUG 26	49.70
NOV 25	48.30	JAN 25	48.55	MAR 27	49.95	MAY 24	49.85	JUL 25	49.45	SEP 25	49.85

CHEBOYGAN COUNTY

454427084424001. Local number, 39N 3W 29CBCB1.
LOCATION.--Lat 45°44'27", long 084°42'40", Hydrologic Unit 04070003, on Stimpson Rd. 3 mi southeast of Mackinaw City.
Owner: U.S. Geological Survey.
AQUIFER.--Dundee Formation of Devonian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 121 ft cased to 104 ft, open end.
DATUM.--Altitude of land-surface datum is 705 ft. Measuring point: Top of casing, 2 ft above land-surface datum.
PERIOD OF RECORD.--January 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.25 ft below land-surface datum, May 12, 1979; lowest measured, 11.68 ft Feb. 11, 1981.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	10.80	DEC 14	7.69	FEB 28	6.19	MAY 9	6.10	JUL 10	8.15	AUG 28	9.55
NOV 10	9.02	JAN 16	7.53	APR 4	5.72	JUN 6	7.09				

CHEBOYGAN COUNTY

454427084424002. Local number, 39N 3W 29CBCB2.
LOCATION.--Lat 45°44'27", long 084°42'40", Hydrologic Unit 04070003, on Stimpson Rd. 3 mi southeast of Mackinaw City.
Owner: U.S. Geological Survey.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 55 ft screened 40 to 55 ft.
DATUM.--Altitude of land-surface datum is 705 ft. Measuring point: Top of casing, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--February 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.03 ft below land-surface datum, Apr. 4, 1984; lowest measured, 6.47 ft Feb. 11, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	5.61	DEC 14	3.70	FEB 28	2.62	MAY 9	2.50	JUL 10	3.97	AUG 28	5.03
NOV 10	4.52	JAN 16	3.74	APR 4	2.03	JUN 6	3.15				

CHIPPEWA COUNTY

462159084442201. Local number, 46N 4W 24DADA.
LOCATION.--Lat 46°21'59", long 084°44'22", Hydrologic Unit 04020203, on trail 0.2 mi south of highway M-28 and 1 mi west of Raco.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 54 ft.
DATUM.--Altitude of land-surface datum is 850 ft. Measuring point: Top of shelter base, 3.07 ft above land-surface datum.
PERIOD OF RECORD.--June 1952 to April 1965. November 1969 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.40 ft below land-surface datum, June 7, 1971; lowest, 28.43 ft Apr. 14, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	24.41	24.84	25.08	25.30	25.69	26.07	26.42	24.98	24.58	24.90	25.27	25.68
10	24.51	24.90	25.11	25.38	25.75	26.13	26.43	24.82	24.62	24.97	25.35	25.74
15	24.60	24.96	25.10	25.42	25.83	26.20	26.26	24.72	24.69	25.01	25.40	25.81
20	24.68	24.99	25.18	25.49	25.89	26.25	25.87	24.64	24.74	25.10	25.46	25.85
25	24.72	25.07	25.20	25.55	25.96	26.32	25.49	24.59	24.80	25.15	25.53	25.90
EOM	24.79	25.10	25.28	25.62	26.01	26.38	25.19	24.57	24.88	25.21	25.60	25.93

WTR YEAR 1984 MAX 24.33 OCT 1, 1983 MIN 26.45 APR 8, 1984

CLINTON COUNTY

425410084323501. Local number, 6N 2W 16DDAD.
LOCATION.--Lat 42°54'10", long 084°32'35", Hydrologic Unit 04050005, at U.S. Highway 27, 6 mi south of St. Johns.
Owner: State Highway Department.
AQUIFER.--Gravel of Pleistocene age.
WELL CHARACTERISTICS.--Driven observation water-table well, diameter 2 in, depth 26 ft, screened 23 to 26 ft.
DATUM.--Land-surface datum is 803.32 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 1.30 ft above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--August 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.84 ft below land-surface datum, Apr. 30, 1974; lowest measured, 19.93 ft Feb. 27, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	18.04	DEC 27	17.66	FEB 22	17.35	APR 20	16.69	JUN 25	17.19	AUG 23	18.18
NOV 21	18.05	JAN 23	17.76	MAR 23	17.16	MAY 22	16.81	JUL 23	17.71	SEP 24	18.27

CRAWFORD COUNTY

443308084245001. Local number, 25N 1W 15DDCD.
LOCATION.--Lat 44°33'08", long 084°24'50", Hydrologic Unit 04070007, 2.6 mi south of Eldorado on Highway M-18.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 56 ft, cased.
DATUM.--Altitude of land-surface datum is 1,190 ft. Measuring point: Top of shelter base, 2.95 ft above land-surface datum.
PERIOD OF RECORD.--November 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 25.71 ft below land-surface datum, May 10, 1976; lowest, 25.97 ft Apr. 4-6, 1951.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	29.15	29.28	29.00	29.02	29.24	29.41	29.22	29.04	28.64	28.43	28.47	28.74
10	29.22	29.22	29.02	29.11	29.30	29.42	29.25	28.98	28.59	28.43	28.50	28.75
15	29.24	29.16	28.94	29.16	29.34	29.40	29.17	28.94	28.56	28.42	28.55	28.81
20	29.28	29.10	29.04	29.16	29.35	29.32	29.18	28.84	28.52	28.43	28.60	28.84
25	29.27	29.05	28.98	29.15	29.39	29.32	29.12	28.78	28.48	28.45	28.65	28.87
EOM	29.30	29.02	29.05	29.23	29.38	29.28	29.10	28.69	28.47	28.46	28.68	28.93

WTR YEAR 1984 MAX 28.40 JUL 17, 1984 MIN 29.42 MAR 5, 1984

DELTA COUNTY

454446087090401. Local number, 39N 23W 28ACC.
LOCATION.--Lat 45°44'46", long 087°09'04", Hydrologic Unit 04030111, 3.5 mi west of Escanaba.
Owner: M. Blake.
AQUIFER.--Munising Sandstone of Cambrian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 5 in, depth 530 ft.
DATUM.--Altitude of land-surface datum is 680 ft. Measuring point: Top of shelter base, 3.39 ft above land-surface datum.
PERIOD OF RECORD.--July 1968 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.5 ft below land-surface datum, May 6, 1960; lowest, 8.9 ft Feb. 6, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	6.02	5.58	5.16	5.55	6.12	5.70	5.49	5.29	5.43	5.87	6.59	6.11
10	5.77	5.42	5.22	5.69	6.20	5.81	5.52	5.07	5.45	6.03	6.50	6.11
15	5.51	5.44	5.31	5.78	5.81	5.90	5.39	5.29	5.51	6.02	6.61	5.62
20	5.51	5.27	5.66	5.85	5.69	5.80	5.39	5.15	5.64	6.01	6.29	5.63
25	5.46	5.10	5.60	5.97	5.71	5.69	5.36	5.18	5.87	6.29	6.44	5.40
EOM	5.55	5.15	5.68	6.09	5.70	5.59	5.07	5.41	5.78	6.54	6.48	5.44

WTR YEAR 1984 MAX 4.87 NOV 23, 1983 MIN 6.61 AUG 14, 1984

DICKINSON COUNTY

460458087493901. Local number, 43N 28W 32ADAB.
LOCATION.--Lat 46°04'58", long 087°49'39", Hydrologic Unit 04030109, 6.25 mi north of Felch.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Augered water-table well, diameter, 1¼ in, depth 31 ft screened 29 to 31 ft.
DATUM.--Altitude of land-surface datum is 1,160 ft. Measuring point: Hole in top of cap, 4.00 ft above land-surface datum.
PERIOD OF RECORD.--October 1966 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.10 ft below land-surface datum, May 17, 1972; lowest measured, 16.50 ft Mar. 2, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	14.55	NOV 30	13.88	FEB 1	14.57	MAR 29	14.69	APR 30	14.04	JUN 1	14.12
27	13.90	DEC 30	14.24								

EATON COUNTY

424435084365001. Local number, 4N 3W 12CDAD.
LOCATION.--Lat 42°44'35", long 084°36'50", Hydrologic Unit 04050004, north of M-43, 0.5 mi west of Lansing.
Owner: F. Wheeler.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 381 ft, cased to 140 ft.
DATUM.--Land-surface datum is 862.91 ft National Geodetic Vertical Datum of 1929. Measuring point: Plywood instrument shelf. 1.00 ft above land-surface datum.
REMARKS.--Water levels affected by pumping.
PERIOD OF RECORD.--October 1953 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 67.5 ft below land-surface datum, Nov. 23, 1953; lowest, 103.6 ft Aug. 28, 1969.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	80.6	86.0	78.3	79.8	82.3	--	73.0	--	--	94.1	91.8	90.3
10	77.4	83.4	76.9	81.5	79.3	--	--	80.1	--	91.3	93.9	86.9
15	78.6	83.7	77.2	81.8	77.1	74.9	--	78.5	--	88.2	--	86.0
20	86.6	83.0	77.1	81.5	75.7	74.7	--	75.1	90.9	89.5	--	85.7
25	86.9	81.0	76.5	81.4	75.9	--	--	--	91.4	88.0	95.7	85.3
EOM	87.4	77.5	78.5	81.2	--	--	--	--	94.1	90.4	96.1	85.1

WTR YEAR 1984 MAX 72.5 APR 9, 1984 MIN 96.2 AUG 28, 1984.

GENESEE COUNTY

425552083382801. Local number, 6N 7E 9DCCC.
LOCATION.--Lat 42°55'52", long 083°38'28", Hydrologic Unit 04080204, at Fisher Body Plant, Grand Blanc.
Owner: General Motors Corporation.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 10 in, depth 385 ft, cased to 150 ft.
DATUM.--Land-surface datum is 837.0 ft National Geodetic Vertical Datum of 1929. Measuring point: Instrument shelf, 1.50 ft above land-surface datum.
REMARKS.--Water levels affected by nearby pumping. Measurements made by Plant Water Department.
PERIOD OF RECORD.--January 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 52.3 ft below land-surface datum, Dec. 29, 1975; lowest, 87.0 ft June 29, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	61.4	61.7	63.0	62.0	61.8	61.1	63.4	61.5	60.3	80.1	70.6	68.7
10	64.0	62.9	65.1	62.2	61.1	61.4	63.1	61.8	63.6	71.2	72.4	69.9
15	64.0	62.6	64.6	61.8	60.2	61.2	60.3	62.8	62.8	71.8	70.5	67.8
20	60.2	62.5	64.9	61.7	59.1	62.9	58.9	61.0	68.0	69.9	71.4	67.6
25	62.9	63.5	65.0	61.9	59.1	61.9	62.0	58.2	67.7	71.8	71.5	64.9
EOM	61.9	63.6	63.7	62.2	61.7	63.6	59.9	60.9	70.3	72.1	70.8	63.8

WTR YEAR 1984 MAX 57.1 APR 27, 1984 MIN 80.5 JUL 6, 1984

GRAND TRAVERSE COUNTY

443921085213501. Local number, 26N 9W 14ABAA.
LOCATION.--Lat 44°39'21", long 085°21'35", Hydrologic Unit 04060105, 5.5 mi north of Fife Lake.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in, depth 80 ft, PVC pipe and screen.
DATUM.--Altitude of land-surface datum is 960 ft. Measuring point: Plywood instrument shelf, 2.85 ft above land-surface datum.
PERIOD OF RECORD.--June 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.32 ft below land-surface datum, June 17, 1976; lowest, 28.05 ft, Apr. 3, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	25.50	25.64	25.66	25.81	25.99	26.10	25.84	25.71	25.53	25.15	25.10	25.39
10	25.56	25.62	25.69	25.84	26.02	26.08	25.84	25.69	25.53	25.08	25.15	25.42
15	25.61	25.62	25.69	25.87	26.06	26.03	25.81	25.66	25.51	25.05	25.22	25.48
20	25.65	25.59	25.74	25.90	26.08	25.96	25.80	25.61	25.46	25.04	25.25	25.52
25	25.65	25.63	25.75	25.92	26.12	25.93	25.77	25.57	25.35	25.06	25.29	25.57
EOM	25.66	25.65	25.80	25.95	26.13	25.88	25.75	25.55	25.25	25.07	25.34	25.61

WTR YEAR 1984 MAX 25.03 JUL 17, 1984 MIN 26.14 MAR 3, 1984

HILLSDALE COUNTY

415154084315401. Local number, 7S 2W 15BCBA1.
LOCATION.--Lat 41°51'54", long 084°31'54", Hydrologic Unit 04100003, at Trail and Bird Lake Roads 7 mi southeast of HIlsdale.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 150 ft, screened 135 to 150 ft.
DATUM.--Altitude of land-surface datum is 1,092 ft. Measuring point: Top of casing, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--November 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 46.14 ft below land-surface datum, Apr. 13, 1982; lowest measured, 49.00 ft Mar. 15, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 8	47.45	JAN 31	47.93	APR 17	47.26	JUN 28	47.33	AUG 7	47.69	SEP 17	48.19
DEC 19	47.62	MAR 13	47.83	MAY 22	47.22						

HILLSDALE COUNTY

415236084313701. Local number, 7S 2W 10BDDD.
LOCATION.--Lat 41°52'36", long 084°31'37", Hydrologic Unit 04100003, 2.5 mi west of Pittsford on M-43.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Augered water-table well, diameter 1¼ in, depth 20 ft, screened 17 to 20 ft.
DATUM.--Altitude of land-surface datum is 1,070 ft. Measuring point: Top of casing, 4.00 ft above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.79 ft below land-surface datum, Apr. 13, 1982; lowest measured, 11.1 ft, Sept. 21, 1967.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 8	8.54	JAN 31	8.54	APR 17	7.26	JUN 28	7.81	AUG 7	8.44	SEP 17	8.56
DEC 19	7.53	MAR 13	8.08	MAY 22	7.45						

INGHAM COUNTY

424424084340301. Local number, 4N 2W 17ABAA.
LOCATION.--Lat 42°44'24", long 084°34'03", Hydrologic Unit 04050004, at Kirby and Logan Streets, Lansing.
Owner: City of Lansing.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 20 in, depth 424 ft.
DATUM.--Land-surface datum is 858.72 ft National Geodetic Vertical DAtum of 1929. Measuring point: Plywood shelter base, 0.5 ft above land-surface datum.
REMARKS.--Water levels affected by regional pumping.
PERIOD OF RECORD.--December 1929 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 34.3 ft below land-surface datum, Dec. 1929; lowest, 168.3 ft May 7, 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	98.3	96.6	95.9	93.5	92.9	91.8	91.0	90.4	89.9	91.6	--	93.3
10	98.6	96.0	96.5	93.8	93.0	92.0	91.7	90.1	90.4	91.8	--	92.6
15	97.9	95.9	95.8	93.9	93.1	92.0	90.9	90.5	90.8	91.9	--	92.6
20	97.7	95.3	96.1	93.6	92.5	90.8	91.2	90.0	91.1	--	--	91.9
25	97.1	95.7	95.1	93.0	92.6	91.2	90.3	90.0	91.3	--	93.3	91.4
EOM	97.2	96.0	94.8	93.1	92.1	91.4	90.4	89.8	91.6	--	93.4	91.5

WTR YEAR 1984 MAX 89.6 MAY 25, 1984 MIN 99.1 OCT 1, 1983.

IOSCO COUNTY

442839083312301. Local number, 24N 7E 13ADAD1.
LOCATION.--Lat 44°28'39", long 083°31'23", Hydrologic Unit 04070007, 10 mi west of Oscoda.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 69 ft, screened 54 to 69 ft.
DATUM.--Altitude of land-surface datum is 760 ft. Measuring point: Top of casing, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--June 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 29.67 ft below land-surface datum, July 14, 1980; lowest measured, 32.71 ft Mar. 23, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 1	30.44	JAN 17	30.73	APR 11	30.91	JUN 25	29.52	AUG 14	29.68	SEP 18	30.01
29	30.60	MAR 27	30.91	MAY 8	30.23	JUL 26	28.90				

IRON COUNTY

461257088542001. Local number, 44N 37W 14BBCA.
LOCATION.--Lat 46°12'57", long 088°54'20", Hydrologic Unit 04030106, 0.5 mi south of Elmwood on FFH 16.
Owner: State Highway Department.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Driven water-table well, diameter 6 in, depth 102 ft.
DATUM.--Altitude of land-surface datum is 1,730 ft. Measuring point: Top of plywood shelter base, 4.21 ft above land-surface datum.
PERIOD OF RECORD.--October 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 91.27 ft below land-surface datum, June 27, 1984; lowest measured, 97.11 ft Aug. 16, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 23	91.39	MAR 15	91.53	JUN 27	91.27	SEP 11	91.35

JACKSON COUNTY

421346084230801. Local number, 3S 1W 11AADD1.
LOCATION.--Lat 42°13'46", long 084°23'08", Hydrologic Unit 04050004, at Belden and Mansion Street, Jackson.
Owner: City of Jackson.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 16 in, depth 360 ft, open bottom.
DATUM.--Altitude of land-surface datum is 935 ft. Measuring point: Plywood recorder shelt, 5.50 ft above land-surface datum.
REMARKS.--Measured by owner; water levels affected by pumping; lowest monthly reading shown.
PERIOD OF RECORD.--June 1957 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.6 ft below land-surface datum, Jan. 2, 1961; lowest measured, 119.1 ft June 30, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 3	73.0	DEC 5	78.6	FEB 3	69.0	APR 27	77.2	JUN 13	94.4	AUG 31	93.6
NOV 3	72.9	JAN 27	69.0	MAR 16	75.5	MAY 17	71.0	JUL 24	88.0	SEP 4	71.9

KALAMAZOO COUNTY

421641085350601. Local number, 2S 11W 22CDBB.
LOCATION.--Lat 42°16'41", long 085°35'06", Hydrologic Unit 04050003, at southwest corner Crosstown Parkway and Stockbridge Avenue, Kalamazoo.
Owner: City of Kalamazoo.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in, depth 137 ft, screened 134 to 137 ft.
DATUM.--Land-surface datum is 764.7 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.00 ft above land surface datum.
REMARKS.--Water levels affected by nearby pumping.
PERIOD OF RECORD.--August 1960 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.81 ft below land-surface datum, Feb. 5, 1975; lowest, 31.08 ft Aug. 19, 1961.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	9.02	9.03	9.03	8.65	7.62	7.17	7.26	7.60	7.90	8.64	9.43	10.00
10	9.02	9.04	9.03	8.50	7.47	7.17	7.31	7.65	7.95	8.78	9.59	10.01
15	9.03	9.04	9.02	8.33	7.39	7.20	7.36	7.70	8.06	8.92	9.70	10.02
20	9.03	9.04	9.02	8.18	7.28	7.20	7.40	7.75	8.19	9.07	9.77	10.03
25	9.03	9.03	8.92	8.03	7.29	7.17	7.46	7.81	8.33	9.20	9.87	10.02
EOM	9.03	9.03	8.78	7.83	7.24	7.22	7.52	7.85	8.47	9.31	9.97	10.02

WTR YEAR 1984 MAX 7.15 MAR 3, 1984 MIN 10.03 SEP 16, 1984.

KALAMAZOO COUNTY

421325085404801. Local number, 3S 12W 11BDAD.
LOCATION.--Lat 42°13'25", long 085°04'48", Hydrologic Unit 04050003, at Kalamazoo Community College.
Owner: City of Kalamazoo
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 3 in, depth 248 ft.
DATUM.--Altitude of land-surface is 880 ft. Measuring point: Top of shelter base, 4.0 ft above land-surface datum.
PERIOD OF RECORD.--March 1961 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, +2.98 ft above land-surface datum, Sept. 4, 1969; lowest, 1.04 ft below land-surface datum, Aug. 4, 1977.

WATER LEVEL, IN FEET ABOVE AND BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	+0.33	+0.40	+0.10	+1.00	+0.40	--	+0.07	--	--	-0.62	-0.88	-0.88
10	+0.34	+0.28	+0.26	--	--	--	+0.07	--	--	-0.63	-0.92	-0.84
15	+0.25	+0.25	+0.29	--	--	+0.08	+0.05	--	--	-0.61	-0.87	-0.80
20	+0.21	+0.23	+0.29	--	--	+0.14	+0.08	-0.30	--	-0.68	-0.90	-0.73
25	+0.20	+0.22	+0.35	+0.94	--	+0.08	+0.12	--	--	-0.75	-0.92	-0.66
EOM	+0.32	+0.20	+0.78	+0.60	--	+0.05	--	--	-0.51	-0.83	-0.95	-0.62

WTR YEAR 1984 MAX +1.00 JAN 5, 1984 MIN -0.96 AUG 30, 1984

KENT COUNTY

425030085434901. Local number, 5N 12W 4DCCD.
LOCATION.--Lat 42°50'30", long 085°43'49", Hydrologic Unit 04050006, 2.1 mi north of Byron Center and 0.4 mi west of Byron Center Road.
Owner: City of Wyoming.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 86 ft.
DATUM.--Land-surface datum is 685.97 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of shelter base, 2.50 ft above land-surface datum.
REMARKS.--Monthly measurements begun August 1978.
PERIOD OF RECORD.--October 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.28 ft below land-surface datum, Apr. 14, 1974; lowest, 12.91 ft Aug. 19, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	10.91	JAN 10	10.52	APR 5	9.90	JUN 10	10.44	JUL 31	11.10	SEP 4	11.32
NOV 29	10.73	FEB 23	9.62	MAY 9	10.17						

LAKE COUNTY

440737085483701. Local number, 20N 13W 13ACAC1.
LOCATION.--Lat 44°07'37", long 085°48'37", Hydrologic Unit 04060103, 5 mi east of Irons.
Owner: U.S. Geological Survey.
AQUIFER.--Outwash deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 57 ft, screened 42 to 57 ft.
DATUM.--Altitude of land-surface datum is 945 ft. Measuring point: Top of casing 9.0 ft above land-surface datum.
PERIOD OF RECORD.--March 1980 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 14.70 ft below land-surface datum, July 22, 1980; lowest measured, 17.71 ft Mar. 14, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	16.09	DEC 27	16.35	MAR 28	16.02	JUN 6	15.55	JUL 19	15.12	AUG 29	15.61
NOV 9	16.17	FEB 15	16.58	MAY 2	15.98						

LEELANAU COUNTY

445020086012201. Local number, 28N 14W 8DDCA1.
LOCATION.--Lat 44°50'20", long 086°01'22", Hydrologic Unit 04060104, 2.5 mi northeast of Empire.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 138 ft, screened 123 to 138 ft.
DATUM.--Altitude of land-surface datum is 750 ft. Measuring point: Top of casing 2.0 ft above land surface datum.
PERIOD OF RECORD.--February 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 113.12 ft below land-surface datum, Mar. 21, 1980; lowest measured, 114.49 ft, June 21, 1983.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	114.08	JAN 4	113.96	MAR 26	114.07	JUN 5	114.02	JUL 19	114.04	SEP 5	114.17
NOV 21	114.01	FEB 1	114.01	MAY 3	114.05						

LEELANAU COUNTY

445011086031401. Local number, 28N 14W 18BABB1.
LOCATION.--Lat 44°50'11", long 086°03'14", Hydrologic Unit 04060104, 2 mi north of Empire.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 60 ft, screened 45 to 60 ft.
DATUM.--Altitude of land-surface datum is 625 ft. Measuring point: Top of casing 2.0 ft above land-surface datum.
PERIOD OF RECORD.--November 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 22.91 below land-surface datum, Apr. 12, 1982; lowest, 24.76 ft Sept. 29, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	24.16	23.99	24.13	24.08	24.18	23.28	23.65	23.91	23.93	23.98	24.09	24.20
10	24.18	24.06	24.16	24.12	24.19	23.34	23.71	23.91	23.95	23.99	24.07	24.20
15	24.07	24.08	24.09	--	24.07	23.45	23.77	23.94	23.96	24.01	24.09	24.21
20	24.02	24.09	24.14	--	23.77	23.51	23.83	23.94	23.96	24.02	24.12	24.20
25	23.95	24.13	24.09	--	23.49	23.59	23.87	23.94	23.96	24.04	24.14	24.22
EOM	23.94	24.13	24.12	24.17	23.33	23.64	23.91	23.93	23.97	24.07	24.17	24.21

WTR YEAR 1984 MAX 23.27 MAR 4, 1984 MIN 24.22 SEP 25, 1984

LENAWEE COUNTY

420246084150601. Local number, 5S 1E 12DDBD.
LOCATION.--Lat 42°02'46", long 084°15'06", Hydrologic Unit 04100002, 2 mi west of Cambridge Junction on the Onsted State Game Area.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in, depth 39 ft, screened 36 to 39 ft.
DATUM.--Altitude of land-surface datum is 1,000 ft. Measuring point: Top of casing, 3.00 ft above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.89 ft below land-surface datum, Mar. 26, 1982; lowest measured, 19.33 ft Sept. 2, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 27	17.26	JAN 20	16.95	APR 5	16.38	JUN 21	17.17	AUG 1	17.73	SEP 10	17.58
DEC 7	16.68	FEB 29	16.71	MAY 10	16.70						

LIVINGSTON COUNTY

422853083402801. Local number, 1N 6E 13DBAB.
LOCATION.--Lat 42°28'53", long 083°40'28", Hydrologic Unit 04090005, 2 mi northwest of South Lyon on Twelve Mile Road.
Owner: American Aggregate Corporation.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 2 in, depth 29 ft, 1¼ in diameter screen.
DATUM.--Altitude of land-surface datum is 930 ft. Measuring point: Plywood instrument shelf, 2.50 ft above land-surface datum.
PERIOD OF RECORD.--April 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 12.1 ft below land-surface datum, Apr. 22, 1974; lowest, 21.58 ft Oct. 30, 31, Nov. 1, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	15.57	15.89	16.03	16.19	16.48	16.42	15.82	15.54	15.46	15.71	16.17	16.61
10	15.62	15.99	16.07	16.26	16.54	16.46	15.80	15.57	15.48	15.77	16.21	16.63
15	15.72	15.99	16.05	16.32	16.33	16.54	15.73	15.57	15.54	15.81	16.29	16.65
20	15.76	16.00	16.07	16.37	16.31	16.34	15.71	15.55	15.58	15.89	16.37	16.67
25	15.82	15.97	16.08	16.39	16.35	15.99	15.65	15.54	15.62	15.97	16.41	16.67
EOM	15.82	16.03	16.18	16.45	16.34	15.87	15.60	15.50	15.64	16.08	16.50	16.67

WTR YEAR 1984 MAX 15.54 OCT 1, 1983 MIN 16.67 SEP 17, 1984

MACKINAC COUNTY

460321084354801. Local number, 42N 2W 7AABB.
LOCATION.--Lat 46°03'21", long 084°35'48", Hydrologic Unit 04070002, 2 mi north of Pontchartrain Shores at Pontchartrain and St. Ignace Roads.
Owner: U.S. Forest Service.
AQUIFER.--Manistique Dolomite of Silurian age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in, depth 102 ft.
DATUM.--Altitude of land-surface datum is 650 ft. Measuring point: Top of shelter floor, 2.3 ft above land-surface datum.
PERIOD OF RECORD.--June 1956 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 13.1 ft below land-surface datum, May 11, 1960; lowest, 32.3 ft Feb. 7, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	29.40	28.28	25.31	26.11	26.98	24.19	19.34	22.10	24.60	24.04	27.04	28.64
10	29.53	28.22	25.57	26.31	27.11	24.75	19.03	22.37	25.02	24.83	27.00	28.75
15	28.20	28.24	25.43	26.54	25.79	25.16	20.04	22.94	23.30	25.38	27.30	25.59
20	28.40	28.02	25.88	26.63	24.09	25.32	20.79	23.31	23.98	25.84	27.64	26.77
25	28.27	24.55	25.80	26.66	22.92	23.21	21.38	23.71	24.55	26.28	28.03	27.28
EOM	28.33	25.14	26.20	26.92	23.43	22.15	21.84	24.22	22.98	26.69	28.31	27.54

WTR YEAR 1984 MAX 18.48 APR 7, 1984 MIN 29.71 OCT 1, 1983

MARQUETTE COUNTY

462938087475901. Local number, 47N 28W 3CCDC.
LOCATION.--Lat 46°29'38", long 087°47'59", Hydrologic Unit 04020105, 4.8 mi west of Ishpeming on U.S. Highway 41 and M-28.
Owner: Ely Township.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in, depth 72 ft, screened 68 to 72 ft.
DATUM.--Land-surface datum is 1,571.99 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of recorder base, 3.0 ft above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--August 1961 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.74 ft below land-surface datum, May 13, 1974; lowest, 19.26 ft Apr. 10-11, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	13.84	13.19	12.70	13.40	14.11	13.66	14.28	12.08	12.52	13.20	14.00	14.16
10	13.92	13.34	12.88	13.57	14.20	13.81	14.09	12.03	12.67	13.33	13.85	14.18
15	13.27	13.44	12.94	13.67	13.98	13.99	12.74	12.12	12.77	13.47	13.89	14.15
20	12.72	13.40	13.12	13.78	13.69	14.03	12.42	12.13	12.89	13.62	13.88	14.13
25	12.84	12.72	13.17	13.87	13.62	14.20	12.42	12.25	13.00	13.76	13.96	14.18
EOM	13.07	12.59	13.37	13.99	13.56	14.29	12.35	12.39	13.11	13.93	14.09	14.13

WTR YEAR 1984 MAX 11.97 MAY 8, 1984 MIN 14.33 APR 2, 1984

MENOMINEE COUNTY

453504087331301. Local number, 37N 26W 19DADA.
LOCATION.--Lat 45°35'04", long 087°33'13", Hydrologic Unit 04030108, on Highway U.S. 41 at Carney.
Owner: State Highway Department.
AQUIFER.--Trenton Limestone and Black River Formation of Middle Ordovician age.
WELL CHARACTERISTICS.--Water-table well, diameter 4 in, depth 17 ft, cased.
DATUM.--Altitude of land-surfacd datum is 800 ft. Measuring point: Top of 2 in reducing nipple, 1.26 ft above land-surface datum.
PERIOD OF RECORD.--September 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.47 ft below land-surface datum, Apr. 12, 1979; lowest measured, 8.62 ft Jan. 17, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 29	4.33	MAR 28	4.53	MAY 31	5.12	SEP 28	4.54

MONROE COUNTY

415206083414401. Local number, 7S 6E 15ACAA.
LOCATION.--Lat 41°52'06", long 083°41'44", Hydrologic Unit 04100002, on Teal Road 2 mi southeast of Petersburg.
Owner: U.S. Geological Survey.
AQUIFER.--Detroit River Group of Devonian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 72 ft, cased to 53 ft, open end.
DATUM.--Altitude of land-surface datum is 680 ft. Measuring point: Top of casing, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--November 1978 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 32.30 ft below land-surface datum, Mar. 26, 1982; lowest measured, 40.55 ft Nov. 2, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 26	39.01	JAN 18	36.65	APR 5	34.60	JUN 21	36.80	AUG 1	39.82	SEP 11	39.54
DEC 7	37.09	FEB 29	35.49	MAY 10	34.27						

MONROE COUNTY

415235083414001. Local number, 7S 6E 15ADBB.
LOCATION.--Lat 41°52'35", long 083°41'50", Hydrologic Unit 04100002, 1.5 mi southeast of Petersburg on Teal Road.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in, depth 17 ft, screened 14 to 17 ft.
DATUM.--Altitude of land-surface datum is 675 ft. Measuring point: Top of casing, 4.00 ft above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.00 ft below land-surface datum, Feb. 14, 1966; lowest measured, 6.69 ft. Dec. 29, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 26	6.11	JAN 18	5.19	APR 5	4.63	JUN 21	4.74	AUG 1	5.75	SEP 10	5.88
DEC 7	5.15	FEB 29	5.10	MAY 10	4.58						

MUSKEGON COUNTY

431806086044401. Local number, 11N 15W 34ADDD.
LOCATION.--Lat 43°18'06", long 086°04'44", Hydrologic Unit 04060102, 8 mi northeast of Holton on Holton-Duck Lake Road.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 1¼ in, depth 31 ft, screened 28 to 31 ft.
DATUM.--Altitude of land-surface datum is 595 ft. Measuring point: Top of casing, 4.00 ft above land-surface datum.
PERIOD OF RECORD.--November 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, +0.16 ft above land-surface datum, May 22, 1974; lowest measured, 4.74 ft below land-surface datum, Sept. 5, 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	1.89	JAN 4	0.35	APR 30	0.76	JUL 17	2.34

OAKLAND COUNTY

425116083321501. Local number, 5N 8E 8ACAC.
LOCATION.--Lat 42°51'16", long 083°32'15", Hydrologic Unit 04080204, 6 mi northeast of Holly on Van Road.
Owner: State Department of Natural Resources.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 1¼ in, depth 42 ft, screened 39 to 42 ft.
DATUM.--Altitude of land-surface datum is 930 ft. Measuring point: Top of casing, 3.00 ft above land-surface datum.
PERIOD OF RECORD.--November 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 22.30 ft below land-surface datum, Apr. 24, 1974; lowest measured, 26.48 ft Sept. 9, 1966.

WATER LEVEL IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 12	25.81	JAN 5	25.15	MAR 30	24.78	JUN 14	24.87	JUL 26	25.64	SEP 7	26.20
NOV 29	25.24	FEB 15	25.05	MAY 3	24.65						

OCEANA COUNTY

433133086082601. Local number, 13N 15W 18AAAA.
LOCATION.--Lat 43°31'33", long 086°08'26", Hydrologic Unit 04060101, approximately 6 mi southwest of Hesperia.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in, depth 79 ft, screened 69 to 79 ft.
DATUM.--Altitude of land-surface datum is 703 ft. Measuring point: Top of casing, 2.5 ft above land-surface datum.
REMARKS.--Continuous recorder installed, July 10, 1979.
PERIOD OF RECORD.--August 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.10 ft below land-surface datum, May 25, 1978; lowest 40.99 ft Mar. 28, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	38.09	38.51	38.92	--	--	--	39.56	39.49	39.36	38.62	38.53	38.92
10	38.17	38.58	39.00	--	--	--	39.56	39.48	39.21	38.58	38.60	38.96
15	38.24	38.64	39.05	--	--	--	39.52	39.50	39.06	38.54	38.66	39.02
20	38.31	38.70	--	--	--	--	39.54	39.45	38.90	38.51	38.73	39.06
25	38.37	38.78	--	--	--	39.67	39.50	39.45	38.78	38.52	38.81	39.13
EOM	38.45	38.86	--	--	--	39.62	39.51	39.43	38.70	38.50	38.87	39.18

WTR YEAR 1984 MAX 38.05 OCT 1, 1983 MIN 39.72 MAR 23, 1984

OGEMAW COUNTY

442514084164702. Local number, 23N 1E 2BAAA.
LOCATION.--Lat 44°25'14", long 084°16'47", Hydrologic Unit 04070007, 8 mi west of Rose City on south side of Rose City Road.
Owner: Ogemaw County Road Commission.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1½ in, depth 20 ft.
DATUM.--Altitude of land-surface datum is 1,265 ft. Measuring point: Top of casing, 2.30 ft above land-surface datum.
PERIOD OF RECORD.--November 1968 to October 1971. April 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 7.62 ft below land-surface datum, Apr. 13, 1976; lowest measured, 13.6 ft December 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	11.37	JAN 16	11.57	APR 18	10.41	AUG 20	10.46

ONTONAGON COUNTY

465002089321601. Local number, 51N 41W 8BDBC.
LOCATION.--Lat 46°50'02", long 089°32'16", Hydrologic Unit 04020101, 325 ft south of M-64, 1.5 mi east of Silver City.
Owner: State Corrections Department.
AQUIFER.--Freda Sandstone of Keweenawan age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 100 ft, cased to 32 ft.
DATUM.--Altitude of land-surface datum is 620 ft. Measuring point: Plywood instrument shelf, 3.50 ft above land-surface datum.
PERIOD OF RECORD.--October 1958 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.20 ft below land-surface datum, Apr. 15, 1959; lowest measured, 21.82 ft Dec. 15, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 23	11.32	MAR 14	10.23	JUN 27	10.30	SEP 12	15.39

OTSEGO COUNTY

445920084425801. Local number, 30N 3W 19ABBB.
LOCATION.--Lat 44°59'20", long 084°42'58", Hydrologic Unit 04070007, on Old Alba Road 3 mi southwest of Gaylord.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 87 ft, screened 72 to 87 ft.
DATUM.--Altitude of land-surface datum is 1307 ft. Measuring point: Top of casing, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--January 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured 30.69 ft below land-surface datum, July 24, 1979; lowest measured, 35.82 ft Apr. 1, 1982.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	33.37	DEC 15	33.77	FEB 27	34.21	MAY 10	33.24	JUL 17	33.25	AUG 27	33.11
NOV 14	33.63	JAN 18	33.99	APR 2	34.21	JUN 12	32.67				

PRESQUE ISLE

451634083441801. Local number, 33N 6E 8BBBB.
LOCATION.--Lat 45°16'34", long 083°44'18", Hydrologic Unit 04070006, south side of Grand Lake Highway, 2 mi west and 1 mi north of Posen.
Owner: A. Styma.
AQUIFER.--Traverse Group.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 61 ft.
DATUM.--Altitude of land-surface datum is 815 ft. Measuring point: Top of casing, 0.5 ft above land-surface datum.
PERIOD OF RECORD.--December 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.10 ft below land-surface datum, Mar. 2, 1979; lowest measured, 16.83 ft Mar. 5, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	12.20	JAN 18	11.31	MAR 28	4.80	JUL 25	12.91

ROSCOMMON COUNTY

442722084350701. Local number, 24N 2W 20BABA.
LOCATION.--Lat 44°27'22", long 084°35'07", Hydrologic Unit 04070007, 2 mi south of Roscommon and 0.5 mi east of highway M-18 on highway M-103.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Jetted water-table well, diameter 8 in, depth 14 ft, open bottom.
DATUM.--Land-surface datum is 1,145.30 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.50 ft above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--December 1934 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.30 ft below land-surface datum, Apr. 23, 1971; lowest, 6.23 ft Dec. 6-11, 1949.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	4.18	3.76	4.01	4.24	4.44	3.96	3.71	3.60	3.48	4.02	4.30	4.59
10	4.13	3.80	4.07	4.27	4.47	3.96	3.65	3.65	3.58	4.10	4.35	4.64
15	3.98	3.86	4.09	4.30	4.37	4.01	3.61	3.73	3.67	3.71	4.45	4.65
20	3.87	3.91	4.14	4.34	4.28	3.98	3.53	3.79	3.73	3.91	4.56	4.71
25	3.80	3.93	4.15	4.36	4.10	3.81	3.52	3.79	3.83	4.10	4.62	4.73
EOM	3.76	3.98	4.20	4.40	3.98	3.79	3.55	3.40	3.91	4.26	4.66	4.75

WTR YEAR 1984 MAX 3.37 MAR 28, 1984 MIN 4.75 SEP 30, 1984

SAGINAW COUNTY

431457084194401. Local number, 10N 1E 22DADA1.
LOCATION.--Lat 43°14'57", long 084°19'44", Hydrologic Unit 04080203, west side of Merrill Road 0.35 mi north of Marion Springs.
Owner: U.S. Geological Survey.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in, depth 210 ft, cased to 170 ft.
DATUM.--Altitude of land-surface datum is 657 ft. Measuring point: Plywood instrument shelf, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--December 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.93 ft below land-usrface datum, Feb. 10, 1981; lowest 10.21 ft Sept. 27, 1984.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	9.81	9.75	9.51	9.19	9.08	9.11	8.95	8.96	9.00	9.33	9.75	10.07
10	10.03	9.63	9.58	9.29	9.17	9.19	9.11	9.00	9.09	9.38	9.82	9.94
15	9.89	9.62	9.30	9.38	9.28	9.21	8.94	9.09	9.28	9.32	9.91	10.06
20	9.95	9.54	9.56	9.29	9.12	8.99	9.04	8.99	9.23	9.48	9.96	10.02
25	9.76	9.52	9.28	9.12	9.20	9.04	8.94	8.98	9.23	9.60	10.04	10.07
EOM	9.88	9.56	9.40	9.17	9.13	9.09	8.95	8.98	9.31	9.66	9.97	10.16

WTR YEAR 1984 MAX 8.59 APR 30, 1984 MIN 10.21 SEP 27, 1984

SANILAC COUNTY

433439082523601. Local number, 13N 13E 12ADAA.
LOCATION.--Lat 43°34'39", long 082°52'36", Hydrologic Unit 04090001, on Wheatland Road 3 mi east and .75 mi north of Argyle.
Owner: U.S. Geological Survey.
AQUIFER.--Marshall Formation of Mississippian age.
WELL CHARACTERISTICS.--Drilled artesian observation well, diameter 6 in, depth 130 ft, cased with plastic pipe to 48 ft, open bottom.
DATUM.--Altitude of land-surface datum is 805 ft. Measuring point: Plywood instrument shelf, 2.5 ft above land-surface datum.
PERIOD OF RECORD.--October 15, 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 16.44 ft below land-surface datum, Apr. 3, 1982; lowest 22.71 ft Nov. 20, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	20.40	19.76	18.67	18.60	18.78	18.08	17.45	17.47	17.02	18.03	19.25	19.15
10	20.47	19.77	18.68	18.68	18.80	18.27	17.44	17.63	17.44	18.19	19.25	19.19
15	19.83	19.69	18.15	18.75	17.82	18.48	17.38	17.45	17.73	18.07	19.37	18.90
20	19.91	18.83	18.44	18.84	17.77	17.75	17.00	17.61	16.98	18.44	19.55	19.11
25	19.74	18.60	18.50	18.84	17.96	17.43	17.11	16.86	17.20	18.76	19.76	19.23
EOM	19.83	18.65	18.68	18.91	18.04	17.48	17.32	16.69	17.67	19.08	19.43	19.25

WTR YEAR 1984 MAX 16.60 MAY 29, 1984 MIN 20.49 OCT 8, 1983

SCHOOLCRAFT COUNTY

461720085565201. Local number, 45N 13W 16CCCB.
LOCATION.--Lat 46°17'20", long 085°56'52", Hydrologic Unit 04060106, at headquarters building Seney Wildlife refuge.
Owner: U.S. Fish and Wildlife Service.
AQUIFER.--Limestones of Upper Ordovician age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 4 in, depth 151 ft, cased to 65 ft.
DATUM.--Altitude of land-surface datum is 710 ft. Measuring point: Top of casing, 3.60 ft below land-surface datum.
PERIOD OF RECORD.--June 1952 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.64 ft below land-surface datum, Apr. 13, 1971; lowest, 6.50 ft Oct. 23, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.99	5.81	5.65	5.46	5.40	5.45	5.35	5.40	5.60	5.61	5.84	5.98
10	5.97	5.73	5.70	5.47	5.40	5.49	5.44	5.42	5.58	5.68	5.82	5.95
15	5.75	5.72	5.54	5.49	5.42	5.50	5.41	5.52	5.62	5.69	5.86	5.85
20	5.75	5.66	5.63	5.45	5.33	5.46	5.47	5.52	5.64	5.72	5.92	5.85
25	5.77	5.60	5.49	5.41	5.40	5.37	5.48	5.51	5.68	5.80	5,98	5.71
EOM	5.82	5.63	5.54	5.42	5.42	5.38	5.38	5.57	5.59	5.84	5.97	5.73

WTR YEAR 1984 MAX 5.28 APR 30, 1984 MIN 6.07 OCT 1, 1983

VAN BUREN COUNTY

421945085481502. Local number, 2S 13W 2BBCB2.
LOCATION.--Lat 42°19'45", long 085°48'15", Hydrologic Unit 04050001, 16 mi east of Bangor on Fish Lake Road, 2.5 mi north of M-43.
Owner: Van Buren County Road Commission
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 4 in, depth 40 ft, screened 36 to 40 ft.
DATUM.--Altitude of land-surface datum is 737 ft. Measuring point: Top of casing, 1.00 ft above land-surface datum.
PERIOD OF RECORD.--May 1981 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 9.04 ft below land-surface datum, Mar. 20, 1982; lowest measured, 12.58 ft Sept. 19, 1984.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	11.73	DEC 20	10.76	MAR 14	10.61	MAY 23	10.52	AUG 22	12.52	SEP 19	12.58
NOV 15	11.52	FEB 1	11.08	APR 18	10.39	JUL 10	11.64				

WASHTENAW COUNTY

421228083331601. Local number, 3S 7E 24CACA.
LOCATION.--Lat 42°12'28", long 083°33'16", Hydrologic Unit 04090005, at Ypsilanti Township waterworks on Bridge Street.
Owner: Ypsilanti Township.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in, depth 80 ft, screened 77 to 80 ft.
DATUM --Land-surface datum is 665.65 ft National Geodetic Vertical Datum of 1929. Measuring point: Top of coupling, 3.00 ft above land-surface datum.
REMARKS.--Water level affected by nearby pumping.
PERIOD OF RECORD.--July 1943 to June 1945, December 1949 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.79 ft below land-surface datum, Jan. 5, 1950; lowest, 22.66 ft Feb. 13, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	14.49	14.43	15.43	15.11	15.68	15.04	15.37	15.36	--	14.11	14.37	14.14
10	14.48	14.36	15.49	15.11	15.66	15.16	15.37	--	--	13.97	14.19	13.91
15	13.92	14.70	14.89	15.13	15.00	15.45	15.37	--	--	13.81	14.09	13.81
20	13.67	15.19	15.20	15.13	14.64	15.37	15.37	--	--	13.99	14.10	13.89
25	14.27	15.83	15.34	15.72	14.76	15.37	15.37	--	--	15.22	14.21	13.86
EOM	14.12	15.54	15.17	15.72	14.86	15.37	15.37	--	--	14.72	14.12	13.90

WTR YEAR 1984 MAX 13.54 JUN 2, 1984 MIN 15.84 NOV 26, 1983

Temperatures of ground water are measured as part of a state-wide water resource investigation in cooperation with Michigan Department of Natural Resources. The purpose of these measurements is to determine the natural ground-water temperature of selected points throughout the State. These data can be used to estimate ground-water temperatures in many areas in the State. Measurements of temperature were made by means of "lazy" thermometers (Heath, 1964).

TEMPERATURE (°C) OF GROUND WATER AT INDICATED DEPTH

DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)
ALGER COUNTY, 45N 19W 25BDCD1 (LAT 46°16'08", LONG 86°37'38") DEPTH 66 FT					
OCT 27, 1983	7.5	APR 20 . . .	7.0	AUG 1 . . .	7.5
JAN 24, 1984	7.5	JUN 7 . . .	7.0		
DICKINSON COUNTY, 43N 28W 32ADAB1 (LAT 46°04'59", LONG 87°49'37") DEPTH 31 FT					
OCT 6, 1983	7.0	DEC 30 . . .	7.5	APR 30 . . .	6.5
OCT 27 . . .	7.5	FEB 1, 1984	7.5	JUN 1 . . .	6.0
NOV 30 . . .	7.5	MAR 29 . . .	7.0		
LENAWEE COUNTY, 5S 1E 12DDBD1 (LAT 42°02'46", LONG 84°15'06") DEPTH 39 FT					
OCT 27, 1983	10.0	FEB 29 . . .	10.0	JUN 21 . . .	8.5
DEC 7 . . .	10.0	APR 5 . . .	9.5	AUG 1 . . .	9.0
JAN 20, 1984	10.0	MAY 10 . . .	9.0	SEP 10 . . .	9.0
MENOMINEE COUNTY, 37N 26W 19DADA1 (LAT 45°35'00", LONG 87°33'15") DEPTH 17 FT					
NOV 29, 1983	10.5	MAY 31 . . .	6.5	SEP 28 . . .	11.5
MAR 28, 1984	6.0				
MUSKEGON COUNTY, 11N 15W 34ADDD1 (LAT 43°18'06", LONG 86°04'44") DEPTH 31 FT					
OCT 4, 1983	10.5	APR 30, 1984	8.5	JUL 17 . . .	9.0
JAN 4, 1984	9.0				
OAKLAND COUNTY, 5N 8E 8ACAC1 (LAT 42°51'16", LONG 83°32'15") DEPTH 42 FT					
OCT 12, 1983	8.0	FEB 15 . . .	9.0	JUN 14 . . .	8.0
NOV 29 . . .	8.0	MAR 30 . . .	8.5	JUL 26 . . .	8.5
JAN 5, 1984	9.0	MAY 3 . . .	8.5	SEP 7 . . .	9.0

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

Station number	Station name	Drainage area (mi^2)	Period of record
	Streams Tributary to Lake Superior		
04028000	Montreal River at Ironwood, MI	63.0	1918-22, 1924-25, 1949-54
04030500	Black River at Ramsay, MI	a82	1924-25
04031000	Black River near Bessemer, MI	200	1954-82
04031500	Presque Isle River at Marenisco, MI	171	1945-82
04032000	Presque Isle River near Tula, MI	261	*1945-73
04032500	Iron River near White Pine, MI	98.1	1952-57
04035000	East Branch Ontonagon River near Mass, MI	272	1942-79
04038000	Cisco Branch Ontonagon River near Watersmeet, MI	62.2	1942-44
04039500	South Branch Ontonagon River at Ewen, MI	348	*1942-71
04041000	Perch River near Sidnaw, MI	63.1	*1912-15
04042000	Sturgeon River near Baraga, MI	379	1927-31, 1942-47
04042500	Otter River near Elo, MI	162	*1942-72
04043000	Sturgeon River near Arnheim, MI	705	1942-74
04043500	Dead River near Negaunee, MI	138	1902-03
04044000	Dead River at Forestville, MI	158	1898-1902
04044500	Carp River near Marquette, MI	a86	1902-03
04044563	Big Creek near Harvey, MI	17.0	1979-81
04044573	Cedar Creek near Harvey, MI	9.04	1979-81
04044583	Cherry Creek near Harvey, MI	4.53	1965-70, 1979-81
04044595	Silver Creek at Harvey, MI	8.58	1979-81
04045000	Tahquamenon River at Newberry, MI	200	1934-36
	Streams Tributary to Lake Michigan		
04046000	Black River near Garnet, MI	a28	*1951-78
04046500	South Manistique Lake Outlet at Curtis, MI	a44	1942-44
04047000	North Manistique Lake Outlet at Helmer, MI	a15	1942-44
04047500	Manistique River near Germfask, MI	a120	1942-50
04048000	Fox River at Seney, MI	107	1942-44
04048500	East Branch Fox River near Germfask, MI	104	1942-44
04049000	Holland Creek near Seney, MI	a13	1938-42
04049500	Manistique River at Germfask, MI	341	*1938-70
04050000	Goose Pen Outlet at Germfask, MI	--	1939-41
04050500	Grays Creek near Germfask, MI	a36	1938-40
04051000	Pine Creek near Germfask, MI	a11	1938-40
04051500	Sand Creek near Germfask, MI	a6	1938-40
04052000	Driggs River near Seney, MI	a70	1938-42
04052500	Walsh Creek near Seney, MI	a12	1938-42
04053000	Driggs River near Germfask, MI	114	1938-41
04053500	Marsh Creek near Shingleton, MI	a20	1938-42
04054000	Marsh Creek near Germfask, MI	a15	1938-41
04054500	Duck Creek near Blaney, MI	a92	1938-54
04055000	Manistique River near Blaney, MI	704	*1938-70
04055500	Creighton River near Shingleton, MI	a35	1938-42
04056000	West Branch Manistique River near Manistique, MI	322	1938-56
04057000	Indian River near Manistique, MI	302	*1938-71
04057500	Sturgeon River near St. Jacques, MI	167	1950-51
04057820	Middle Branch Escanaba River near Greenwood, MI	73.3	*1972-82
04057900	Black River near Republic, MI	34.4	*1961-68
04058000	Middle Branch Escanaba River near Ishpeming, MI	128	1954-75
04058100	Middle Branch Escanaba River near Princeton, MI	210	1961-82
04058130	Green Creek near Princeton, MI	13.8	1976-82
04058300	Warner Creek near Palmer, MI	14.2	*1961-68, 1972-78
04058400	Goose Lake Outlet near Sands Station, MI	37.5	*1965-82
04058500	East Branch Escanaba River at Gwinn, MI	124	1954-80
04060000	Iron River near Iron River, MI	a65	1900-05
04060500	Iron River at Caspian, MI	92.1	1948-80
04062100	Peshekee River near Michigamme, MI	66.5	*1961-68
04062200	Peshekee River near Champion, MI	133	*1961-78
04062230	Michigamme River near Michigamme, MI	194	1968-82
04062270	Michigamme River near Champion, MI	231	1964-69
04062300	Michigamme River at Republic, MI	240	*1961-75
04062400	Michigamme River near Witch Lake, MI	316	1964-80
04065000	Menominee River near Iron Mountain, MI (at Lower Quinnesec Falls)	a2,420	1898-99, 1902-14
04065300	West Branch Sturgeon River near Randville, MI	56.1	1958-81
04065393	East Branch Sturgeon River below Skunk Creek near Felch, MI	61.8	1973-84
04065397	East Branch Sturgeon River near Hardwood, MI	90.8	1977-83
04065500	Sturgeon River near Foster City, MI	237	1954-80
04065600	Pine Creek near Iron Mountain, MI	16.8	1971-81

See footnotes at end of table.

Station number	Station name	Drainage area (mi^2)	Period of record
	Streams Tributary to Lake Michigan--Continued		
04067000	Menominee River below Koss, MI	3,730	1907-09, 1913-81
04095500	Galien River near New Troy, MI	a47	1945-47
04096000	East Branch Galien River near New Troy, MI	19.2	1945-47
04096272	Beebe Creek near Hillsdale, MI	42.4	*1974-78
04096312	Sand Creek at Litchfield, MI	20.6	*1974-77
04096325	Soap Creek near Litchfield, MI	10.9	1974-77
04096340	St. Joseph River at Clarendon, MI	144	*1974-77
04096500	Sauk (East Branch Coldwater) River at Coldwater, MI	--	1937-62
04097000	St. Joseph River at Mendon, MI	918	1902-05
04097060	Little Portage Creek near Fulton, MI	27.0	*1964-67
04097170	Portage River near Vicksburg, MI	68.2	*1946-51, 1964-79
04097200	Gourdneck Creek near Schoolcraft, MI	7.29	1964-72
04097500	St. Joseph River at Three Rivers, MI	1,350	1953-83
04098500	Fawn River near White Pigeon, MI	192	*1903-04, 1957-75
04102000	St. Joseph River at Berrien Springs (at and near Buchanan), MI	4,081	1901-06, 1909-31, 1951-58
04102320	Paw Paw River near Paw Paw, MI	195	1980-82
04102420	Paw Paw River near Hartford, MI	311	1980-82
04102850	South Branch Kalamazoo River near Albion, MI	146	1971-76
04103000	Reed's Springs near Albion, MI	--	1904-06
04103500	Kalamazoo River at Marshall, MI	449	1948-82
04104000	Battle Creek at Charlotte, MI	a67	1948-54
04104500	Battle Creek at Bellevue, MI	178	1948-53
04105800	Gull Creek near Galesburg, MI	38.1	*1964-73
04106000	Kalamazoo River at Comstock, MI	1,010	1931, 1932-79
04106190	Portage Creek near Portage, MI	18.6	1964-67
04107000	Gun River at dam, near Shelbyville, MI	a30	1946-47
04107500	Gun River near Martin, MI	a35	1946-47
04108000	Kalamazoo River near Allegan, MI	a1,470	1903-07
04109500	Portage River below Little Portage Lake, near Munith, MI	a55	1944-56
04110000	Orchard Creek at Munith, MI	a49	1944-56
04110500	Portage River near Munith, MI	118	1944-46
04111000	Grand River near Eaton Rapids, MI	661	1950-82
04112850	Sycamore Creek near Holt, MI	80.6	1975-80
04112904	Mud Lake Drain at Lansing, MI	4.28	1975-76
04113097	Carrier Creek near Lansing, MI	12.1	1975-80
04113500	Sebewa Creek near Sunfield, MI	24.1	1954-56
04114000	Grand River at Portland, MI	1,385	1952-82
04115500	Fish Creek near Carson City, MI	145	1936-38
04118500	Rogue River near Rockford, MI	234	1952-82
04119300	Grand River at Eastmanville, MI	5,230	1976-77
04120000	Crockery Creek at Slocums Grove, MI	--	1902-03
04120500	Higgins Lake Outlet (head of Muskegon River) near Roscommon, MI	a58	1942-50
04121000	Muskegon River near Merritt, MI	355	*1946-73
04123000	Big Sable River near Freesoil, MI	127	*1942-73
04123500	Manistee River near Grayling, MI	159	*1942-73
04124500	East Branch Pine River near Tustin, MI	a63	*1952-63
04125000	Pine River near LeRoy, MI	118	*1953-63
04125500	Pine River near Hoxeyville, MI	251	1952-82
04126200	Little Manistee River near Freesoil, MI	200	*1956-75
04126500	Little Manistee River near Stronach, MI	233	1930-31
04127500	Boardman River at Traverse City, MI	--	1903-04
	Streams Tributary to Lake Huron		
04128500	Indian River at Indian River, MI	583	1942-82
04129500	Pigeon River at Afton, MI	159	1942-81
04130000	Cheboygan River near Cheboygan, MI	865	1942-82
04131000	Rainy River near Onoway, MI	a79	1942-52
04131500	Rainy River near Ocqueoc, MI	85	*1952-79
04132000	Black River near Cheboygan, MI	597	*1942-74
04132500	Thunder Bay River near Hillman, MI	232	*1945-72
04133000	Upper South Branch Thunder Bay River near Lachine, MI	171	1945-53
04133500	Thunder Bay River near Bolton, MI	588	1945-80
04134000	North Branch Thunder Bay River near Bolton, MI	184	1945-80
04134500	Lower South Branch Thunder Bay near Hubbard Lake, MI	146	1945-53
04135000	Thunder Bay River near Alpena, MI	a1,260	1901-08
04135600	East Branch AuSable River at Grayling, MI	76.0	1958-84
04136000	Au Sable River near Red Oak (Lovells), MI	a1,000	1908-16, 1930-31
04137000	Au Sable River at Bamfield, MI	a1,420	1902-13
04137500	Au Sable River near Au Sable, MI	a1,540	1939-40
04138000	East Branch Au Gres River at McIvor, MI	84	*1950-73
04138500	Au Gres River near National City, MI	169	1950-81
04139000	Houghton Creek near Lupton, MI	29.7	*1950-72
04139500	Rifle River at "The Ranch" near Lupton, MI	56.8	1950-71

See footnotes at end of table.

Station number	Station name	Drainage area (mi^2)	Period of record
	Streams Tributary to Lake Huron--Continued		
04140000	Prior Creek near Selkirk, MI	21.4	*1950-72
04140500	Rifle River at Selkirk, MI	117	1950-82
04141000	South Branch Shephards Creek near Selkirk, MI	1.15	*1951-78
04141500	West Branch Rifle River near Selkirk, MI	a52	*1951-63
04143000	Rifle River at Omer, MI	364	1902-03
04143500	North Branch Kawkawlin River near Kawkawlin, MI	101	1951-82
04144000	Shiawassee River at Byron, MI	368	1947-83
04145000	Shiawassee River near Fergus, MI	637	1939-84
04145500	Bad River near Brant, MI	a89	*1948-59
04146500	Flint River at Columbiaville, MI	486	1932-33, 1948-52
04147990	Butternut Creek near Genesee, MI	34.7	1970-84
04148000	Flint River at Genesee, MI	593	1930-52
04148160	Gilkey Creek near Flint, MI	6.43	1970-84
04148300	Swartz Creek at Flint, MI	115	1970-84
04148440	Thread Creek near Flint, MI	54.4	1970-84
04148720	Brent River near Montose, MI	20.8	1970-84
04149000	Flint River near Fosters, MI	1,188	1939-84
04149500	Flint River near Alicia, MI	--	†1948-84
04150000	South Branch Cass River near Cass City, MI	238	1948-80
04151000	Cass River at Vassar, MI	a700	1910-28, 1948-70
04152500	Tobacco River at Beaverton, MI	487	1948-82
04153000	Kinney Creek near Clare, MI	a9	1935-36
04153500	Salt River near North Bradley, MI	138	1934-71
04154500	Chippewa River near Midland, MI	597	*1947-72
04156500	Tittabawassee River at Freeland, MI	a2,530	1903-09, 1912-36
04157500	Sebewaing River (State drain) near Sebewaing, MI	a62	1939-54
04158000	East Fork Sebewaing River (Columbia drain) near Sebewaing, MI	a38	1940-54
04158500	Pigeon River near Owendale, MI	53.2	1952-82
04159000	Pigeon River near Pigeon, MI	a86	1946-52
	Streams Tributary to St. Clair River		
04159488	Silver Creek near Jeddo, MI	20.6	1978-82
04159900	Mill Creek near Avoca, MI	169	*1963-75
04160000	Mill Creek near Abbottsford, MI	208	*1947-64
04160500	Black River near Port Huron, MI	634	1931, 1932-43
	Streams Tributary to Lake St. Clair		
04161000	Clinton River at Auburn Heights, MI	123	*1935-40, 1956-82
04161500	Paint Creek near Lake Orion, MI	38.5	*1955-75
04161820	Clinton River at Sterling Heights, MI	309	1978-83
04162000	Red Run near Royal Oak, MI	36.5	1953-68
04162500	Bear Creek at Warren, MI	17.3	1954-57
04163000	Big Beaver Creek at Warren, MI	25.2	1954-58
04163500	Plum Brook near Utica, MI	22.9	1954-66
04163900	Red Run near Cady, MI	--	†1979-82
04164010	North Branch Clinton River at Almont, MI	9.56	*1962-68
04164050	North Branch Clinton River near Romeo, MI	49.7	*1964-69
04164150	North Branch Clinton River near Meade, MI	89.6	*1967-72
04164200	Coon Creek near Armada, MI	10.0	*1965-70
04164250	Tupper Brook at Ray Center, MI	8.62	*1959-64
04164350	Highbank Creek near Armada, MI	14.9	*1965-70
04164360	East Branch Coon Creek near New Haven, MI	36.1	*1967-72
04164400	Deer Creek near Meade, MI	12.7	*1960-65
04164450	McBride Drain near Macomb, MI	5.79	*1959-64
04164600	Middle Branch Clinton River near Macomb, MI	22.2	*1964-69
04164800	Middle Branch Clinton River at Macomb, MI	41.0	*1962-68, 1969-82
04165000	Middle Branch Clinton River near Mount Clemens, MI	a51	1947-49
04165200	Gloede Ditch near Waldenburg, MI	16.0	*1959-64
04165556	Clinton River By-Pass below weir at Mount Clemens, MI	--	†1979-83
04165557	Clinton River By-Pass at mouth at Mount Clemens, MI	--	†1979-83
	Streams Tributary to Detroit River		
04168500	Lower River Rouge at Dearborn, MI	a96	1930-33
	Streams Tributary to Lake Erie		
04169000	Hayes Creek at Commerce, MI	a8	1946-51
04169500	Huron River at Commerce, MI	57.3	*1946-75
04171000	Davis Creek near Whitmore Lake, MI	a70	1952-54
04171500	Ore Creek near Brighton, MI	a31	1951-68
04172500	Portage River near Pinckney, MI	79.1	*1944-71
04173000	Huron River near Dexter, MI	522	*1904, 1946-72, 1975-77
04173500	Mill Creek near Dexter, MI	128	1952-83
04174000	Huron River at Dexter, MI	--	1904-16
04174800	Huron River at Ypsilanti, MI	807	1974-84
04175340	Stony Creek at Oakville, MI	68.0	1970-81

See footnotes at end of table.

Station number	Station name	Drainage area (mi^2)	Period of record
	Streams tributary to Lake Erie--Continued		
04175500	Huron River at Flat Rock, MI	851	1904-11, †1912-22
04175600	River Raisin near Manchester, MI	132	1970-81
04175700	River Raisin near Tecumseh, MI	267	1956-80
04176000	River Raisin near Adrian, MI	463	*1953-78
04176400	Saline River near Saline, MI	94.6	*1965-77

a Approximately.
* Previous or subsequent operation as a crest-stage partial-record station.
† Stage record only.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1986 - 556-167

October 1, 1978

FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

The following factors may be used to convert the inch-pound units published herein to the International System of Units (SI). This report contains both the inch-pound and SI unit equivalents in the station manuscript descriptions.

Multiply inch-pound units	By	To obtain SI units
	Length	
inches (in)	2.54×10^{1}	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet (ft)	3.048×10^{-1}	meters (m)
miles (mi)	1.609×10^{0}	kilometers (km)
	Area	
acres	4.047×10^{3}	square meters (m^2)
	4.047×10^{-1}	square hectometers (hm^2)
	4.047×10^{-3}	square kilometers (km^2)
square miles (mi^2)	2.590×10^{0}	square kilometers (km^2)
	Volume	
gallons (gal)	3.785×10^{0}	liters (L)
	3.785×10^{0}	cubic decimeters (dm^3)
	3.785×10^{-3}	cubic meters (m^3)
million gallons	3.785×10^{3}	cubic meters (m^3)
	3.785×10^{-3}	cubic hectometers (hm^3)
cubic feet (ft^3)	2.832×10^{1}	cubic decimeters (dm^3)
	2.832×10^{-2}	cubic meters (m^3)
cfs-days	2.447×10^{3}	cubic meters (m^3)
	2.447×10^{-3}	cubic hectometers (hm^3)
acre-feet (acre-ft)	1.233×10^{3}	cubic meters (m^3)
	1.233×10^{-3}	cubic hectometers (hm^3)
	1.233×10^{-6}	cubic kilometers (km^3)
	Flow	
cubic feet per second (ft^3/s)	2.832×10^{1}	liters per second (L/s)
	2.832×10^{1}	cubic decimeters per second (dm^3/s)
	2.832×10^{-2}	cubic meters per second (m^3/s)
gallons per minute (gal/min)	6.309×10^{-2}	liters per second (L/s)
	6.309×10^{-2}	cubic decimeters per second (dm^3/s)
	6.309×10^{-5}	cubic meters per second (m^3/s)
million gallons per day	4.381×10^{1}	cubic decimeters per second (dm^3/s)
	4.381×10^{-2}	cubic meters per second (m^3/s)
	Mass	
tons (short)	9.072×10^{-1}	megagrams (Mg) or metric tons

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF THE INTERIOR
INT 413

U.S. DEPARTMENT OF THE INTERIOR
Geological Survey
6520 Mercantile Way, Suite 5
Lansing, MI 48910

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

SPECIAL 4TH CLASS BOOK RATE