Quality of Surface Waters of the United States 1961

Parts 3 and 4. Ohio River Basin and St. Lawrence River Basin

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1882

Prepared in cooperation with the States of Georgia, Illinois, Indiana, Kentucky, Minnesota, New York, North Carolina, Ohio, Pennsylvania, West Virginia, and with other agencies

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Prepared under the direction of S. K. LOVE, *Chief, Quality of Water Branch*

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PREFACE

This report was prepared by the Geological Survey in cooperation with the States of Georgia, Illinois, Indiana, Kentucky, Minnesota, New York, North Carolina, Ohio, Pennsylvania, West Virginia, and with other agencies by personnel of the Water Resources Division under the direction of L. B. Leopold, chief hydrologist, and S. K. Love, chief, Quality of Water Branch. The data were collected and prepared for publication under the supervision of the following district engineers or district chemists:

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[*Symbols after station name designate type of data: c, chemical; t, water temperature; s, sediment*]

ILLUSTRATION

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1961

PARTS 3 and 4

INTRODUCTION

The quality-of-water investigations of the United States Geological Survey are concerned with chemical and physical characteristics of the surface and ground water supplies of the Nation. Most of the investigations carried on in cooperation with State and Federal agencies deal with the amounts of matter in solution and in suspension in streams.

The records of chemical analysis, suspended sediment, and temperature for surface waters given in this volume serve as a basis for determining the suitability of the waters examined for all uses. The discharge of a stream and (to a lesser extent) the chemical quality are related to variations in rainfall and other forms of precipitation. In general, lower concentrations of dissolved solids may be expected during the periods of high flow than during periods of low flow. The concentration in some streams may change materially with relatively small variations in flow, whereas for other streams the quality may remain relatively uniform throughout large ranges in discharge. The quantities of suspended sediment carried by streams are also related to discharge, and during flood periods the sediment content in streams may vary over wide ranges.

In 1941, the Geological Survey began publishing annual records of chemical quality, suspended sediment, and water temperature. The records prior to 1948 were published each year in a single volume for the entire country, and in two volumes in 1948 and 1949. Beginning in 1950, the records were published in four volumes and beginning in 1959 in five volumes. The drainage basins covered in the five volumes are shown in Figure 1. The data given in this volume were collected during the water year October 1, 1960, to September 30, 1961. The records are arranged by drainage basins in downstream order according to the Geological Survey method of reporting streamflow. Stations on tributary streams are listed between stations on the main stem in the order in which those tributaries enter the main stem.

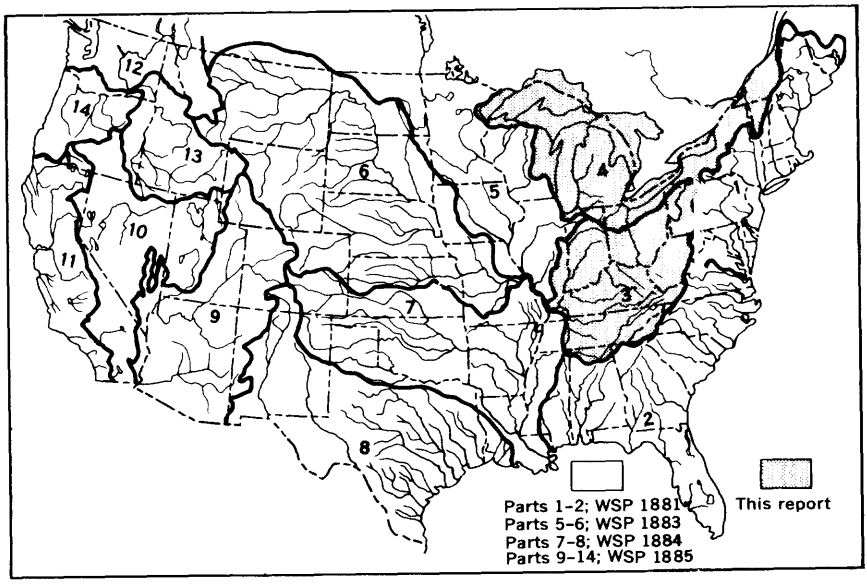

Figure 1. —Map of the conterminous United States showing basins covered by the five water-supply papers on quality of surface waters in 1961. The shaded portion represents the section of the country covered by this volume; the unshaded portion represents the section of the country covered by other water-supply papers.

A station number has been assigned as an added means of identification for each stream location where regular measurements of water quantity or quality have been made. The numbers have been assigned to conform with the standard downstream order of listing gaging stations. The numbering system consists of two digits followed by a hyphen and a six digit number. The notation to the left of the hyphen identifies the Part or hydrologic region used by the Geological Survey for reporting hydrologic data. The number to the right of the hyphen represents the position of the location in the standard downstream order listing measuring stations within each of the 14 parts. The assigned numbers are in numerical order but are not consecutive. They are so selected from the complete 6 digit number scale that intervening numbers will be available for future assignments to new locations. The identification number for each station in this report is printed to the left of the station name and contains only the essential digits. For example, the number is printed as 4-100 for a station whose complete identification number is 04-0100.00.

Descriptive statements are given for each sampling station where chemical analyses, temperature measurements, or sediment determinations have been made. These statements include the location of the station, drainage area, periods of records available, extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling station are included in most tables of analyses.

During the water year ending September 30, 1961. the Geological Survey maintained 141 stations on 88 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 64 of these locations for chemical-quality studies. Samples were also collected less frequently at many other points. Water temperatures were measured daily at 114 stations. Not all analyses of samples of surface water collected during the year have been included. Single analyses of an incomplete nature generally have been omitted. Also, analyses made of the daily samples before compositing have not been reported. The specific conductance of almost all daily samples was determined, and as noted in the table headings this information is available for reference at the district offices listed under Division of Work, on page 27.

Quantities of suspended sediment are reported for 20 stations during the year ending September 30, 1961. Sediment samples were collected one or more times daily at most stations, depending on the rate of flow and changes in stage of the stream. Particle-size distributions of sediments were determined at 19 of the stations.

COLLECTION AND EXAMINATION OF SAMPLES

Samples for analyses are usually collected at or near points on streams where gaging stations are maintained by Surface Water Branch of U. S. Geological Survey for measurement of water discharge. The concentration of solutes and sediments at different locations in the stream-cross section may vary widely with different rates of water discharge depending on the source of the material and the turbulence and mixing of the stream. In general, the distribution of sediment in a stream section is much more variable than the distribution of solutes. It is necessary to sample some streams at several verticals across the channel and especially for sediment, to uniformly traverse the depth of flow. These measurements require special sampling equipment to adequately integrate the vertical and lateral variability of the concentration in the section. These procedures yield a velocity-weighted mean con-

centration for the section in contrast to the average concentration that existed without regard to the variable velocities of the individual fluid elements.

The near uniformly dispersed ions of the solute load move with the velocity of the transporting water. Accordingly, the mean section concentration of solutes determined from samples is a precise measure of the total solute load. The mean section concentration obtained from suspended-sediment samples is a less precise measure of the total sediment load, because the sediment samplers do not traverse the bottom 0.3 foot of the sampling vertical where the concentration of suspended sediment is greatest and because a significant part of the coarser particles in many streams move in essentially continuous contact with the bed and are not represented in the suspended sediment sample. Hence, the computed sediment loads presented in this report are usually less than the total sediment loads. For most streams the difference between the computed and total sediment loads will be small, in the order of a few percent.

CHEMICAL QUALITY

The methods of collecting and compositing water samples for chemical analysis are described in a manual by Rainwater and Thatcher (1960, 301 p.). No single method of compositing samples is applicable to all problems related to the study of water quality. Although generally holding to the principle of 10 day periods or equivalent to three composite samples per month modifications are usually made on the basis of dissolved-solids content as indicated by measurements of conductivity of daily samples, supplemented by other information such as chloride content, river stage, weather conditions and other background information of the stream.

TEMPERATURE

Daily water temperatures were measured at most of the stations at the time samples were collected for chemical quality or sediment content. So far as practicable, the water temperatures were taken at about the same time each day for an individual station in order that the data would be relatively unaffected by diurnal variations in temperature. Most large swiftly flowing streams probably have a small diurnal variation in water temperature, whereas sluggish or shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. The thermometers used for determining water temperature were accurate to plus or minus 0.5°F.

At stations where thermographs are located, the records consist of maximum and minimum temperatures for each day, and the monthly averages of maximum daily and minimum daily temperatures.

SEDIMENT

In general, suspended-sediment samples were collected daily with U. S. depth-integrating cable-suspended samplers (U. S. Interagency, 1963, p. 56–77 and U. S. Interagency, 1952, p. 86-90) from a fixed sampling point at one vertical in the cross section. The US DH-48 hand sampler was used at many stations during periods of low flow. Depth-integrated samples were collected periodically at three or more verticals in the cross section to determine the cross-sectional distribution of the concentration of suspended sediment with respect to that at the daily sampling vertical. In streams where transverse distribution of sediment concentration ranges widely, samples were taken at two or more verticals to define more accurately the average concentration of the cross section. During periods of high or rapidly changing flow, samples were taken two or more times throughout the day at most sampling stations.

Sediment concentrations were determined by filtration-evaporation method. At many stations the daily mean concentration for some days was obtained by plotting the velocity-weighted instantaneous concentrations on the gage-height chart. The plotted concentrations, adjusted, if necessary for cross-sectional distribution were connected or averaged by continuous curves to obtain a concentration graph. This graph represented the estimated velocity-weighted concentration at any time, and for most periods daily mean concentrations were determined from the graph. The days were divided into shorter intervals when the concentration and water discharge were changing rapidly. During some periods of minor variation in concentration, the average concentration of the samples was used as the daily mean concentration. During extended periods of relatively uniform concentration and flow, samples for a number of days were composited to obtain average concentrations and average daily loads for each period.

For some periods when no samples were collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately preceding and following the periods, and suspended-sediment loads for other periods of similar discharge, the estimates were further guided by weather conditions and sediment discharge for other stations.

In many instances where there were no observations for several days, the suspended-sediment loads for individual days are

not estimated, because numerous factors influencing the quantities of transported sediment made it very difficult to make accurate estimates for individual days. However, estimated loads of suspended sediment for missing days in otherwise continuous period of sampling have been included in monthly and annual totals in order to provide a complete record. For some streams, samples were collected weekly, monthly, or less frequently, and only rates of sediment discharge at the time of sampling are shown.

In addition to the records of quantities of suspended sediment transported, records of the particle sizes of sediment are included. The particle sizes of the suspended sediment for many of the stations, and the particle sizes of the bed material for some of the stations were determined periodically.

The size of particles in stream sediments commonly range from colloidal clay (finer than 0.001 mm) to coarse sand or gravel (coarser than 1.0 mm). The common methods of particle-size analyses cannot accommodate such a wide range in particle size. Hence, it was necessary to separate most samples into two parts, one coarser than 0.062 mm and one finer than 0.062 mm. The separations were made by sieve or by a tube containing a settling medium of water. The coarse fractions were classified by sieve separation or by the visual accumulation tube (U. S. Interagency, 1957). The fine fractions were classified by the pipet method (Kilmer and Alexander, 1949) or the bottom withdrawal tube method (U. S. Interagency, 1943, p. 82-90).

EXPRESSION OF RESULTS

Quantities of water for analysis are most conveniently measured in the laboratory by use of volumetric glassware. The analytical results thus obtained in this report are expressed in weights of solute in a given volume of water. To express the results in parts of solute per million (ppm) of water the data must be converted. For most waters this conversion is made by assuming that the liter of water sample weighs 1 kilogram; and thus milligrams per liter are equal to parts per million.

Equivalents per million are not reported, although the expression of analyses in equivalents per million is sometimes preferred. An equivalent per million (epm) is a unit chemical combining weight of a constituent in a million unit weights of water. Chemical equivalence in equivalents per million can be obtained by (a) dividing the concentration in parts per million by the combining weight of that ion, or (b) multiplying the concentration (in ppm) by the reciprocal of the combining weights. The following table lists the reciprocals of the combining weights of cations and anions generally reported in water analyses.

The conversion factors are computed from atomic weights based on carbon-12 (International Union of Pure and Applied Chemistry, 1961).

Conversion factors: Parts per million to equivalents per million

Ion	Multiply by	Ion	Multiply by
Aluminum (Al^{+3})	0.11119	Hydroxide (OH^{-1})	0.05880
Arsenic (As^{+3})	.04004	Iodide (I^{-1})	.00788
Barium (Ba^{+2})	.01456	Iron (Fe^{+3})	.05372
Beryllium (Be^{+2})	.22192	Lead (Pb^{+2})	.00965
Bicarbonate (HCO_3^{-1})	.01639	Lithium (Li^{+1})	.14411
Bromide (Br^{-1})	.01251	Magnesium (Mg^{+2})	.08226
Cadmium (Cd^{+2})	.01779	Manganese (Mn^{+2})	.03640
Calcium (Ca^{+2})	.04990	Nickel (Ni^{+2})	.03406
Carbonate (CO_3^{-2})	.03333	Nitrate (NO_3^{-1})	.01613
Chloride (Cl^{-1})	.02821	Phosphate (PO_4^{-3})	.03159
Chromium (Cr^{+6})	.11539	Potassium (K^{+1})	.02557
Cobalt (Co^{+2})	.03394	Sodium (Na^{+1})	.04350
Copper (Cu^{+2})	.03148	Strontium (Sr^{+2})	.02283
Fluoride (F^{-1})	.05264	Sulfate (SO_4^{-2})	.02082
Hydrogen (H^{+1})	.99209	Zinc (Zn^{+2})	.03060

Results given in parts per million can be converted to grains per United States gallon by dividing by 17.12.

The hardness of water is conventionally expressed in all water analyses in terms of an equivalent quantity of calcium carbonate. Such a procedure is required because hardness is caused by several different cations, present in variable proportions. It should be remembered that hardness is an expression in conventional terms of a property of water. The actual presence of calcium carbonate in the concentration given is not to be assumed. The hardness caused by calcium and magnesium (and other cations if significant) equivalent to the carbonate and bicarbonate is called carbonate hardness; the hardness in excess of this quantity is called noncarbonate hardness. Hardness or alkalinity values expressed in parts per million as calcium carbonate may be converted to equivalents per million by dividing by 50.

The value usually reported as dissolved solids is the residue on evaporation after drying at 180°C for 1 hour. For some waters, particularly those containing moderately large quantities of soluble salts, the value reported is calculated from the quantities of the various determined constituents using the carbonate equivalent of the reported bicarbonate. The calculated sum of the constituents may be given instead of or in addition to the residue. In the

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analyses of most waters used for irrigation, the quantity of dissolved solids is given in tons per acre-foot as well as in parts per million.

Specific conductance is given for most analyses and was determined by means of a conductance bridge and using a standard potassium chloride solution as reference. Specific conductance values are expressed in micromhos per centimeter at 25°C. Specific conductance in micromhos is 1 million times the reciprocal of specific resistance at 25°C. Specific resistance is the resistance in ohms of a column of water 1 centimeter long and 1 square centimeter in cross section.

The discharge of the streams is reported in cubic feet per second (see Streamflow, p. 24) and the temperature in degrees Fahrenheit. Color is expressed in units of the platinum-cobalt scale proposed by Hazen (1892, p. 427-428). A unit of color is produced by one milligram per liter of platinum in the form of the chloroplatinate ion. Hydrogen-ion concentration is expressed in terms of pH units. By definition the pH value of a solution is the negative logarithm of the concentration of gram ions of hydrogen. However, the pH meter that is generally used in Survey laboratories determines the activity of the hydrogen ions as distinguished from concentration.

An average of analyses for the water year is given for most daily sampling stations. Most of these averages are arithmetical, time-weighted, or discharge-weighted; when analyses during a year are all on 10-day composites of daily samples with no missing days, the arithmetical and time-weighted averages are equivalent. 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 river each day for the water year. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all of the water passing a given station during the year after thorough mixing in the reservoir. A discharge-weighted average is computed by multiplying the discharge for the 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. Discharge-weighted averages are usually lower than arithmetical averages for most streams because at times of high discharge the rivers generally have lower concentrations of dissolved solids.

A program for computing these averages on an electronic digital computer was instituted in the 1962 water year. This program extended computations to include averages for pH values expressed in terms of hydrogen ion and averages for the concentration of individual constituents expressed in tons per day. Concentrations in tons per day are computed the same as daily sediment loads.

The concentration of sediment in parts per million is computed as 1,000,000 times the ratio of the weight of sediment to the weight of water-sediment mixture. Daily sediment loads are expressed in tons per day and except for subdivided days are usually obtained by multiplying daily mean sediment concentration in parts per million by the daily mean discharge, and the appropriate conversion factor, normally 0.0027.

Particle-size analyses are expressed in percentages of material finer than indicated sizes in millimeters. The size classification used in this report is that recommended by the American Geophysical Union subcommittee on Terminology (Lane and others, 1947, p. 937). Other data included as pertinent to the size analyses for many streams are the date of collection, the stream discharge, sediment concentration when sample was collected, and the method of analysis.

COMPOSITION OF SURFACE WATERS

All natural waters contain dissolved mineral matter. Water in contact with soils or rock, even for only a few hours, will dissolve some mineral matter. The quantity of dissolved mineral matter in a natural water depends primarily on the type of rocks or soils with which the water has been in contact and the length of time of contact. Some streams are fed by both surface runoff and ground water from spring or seeps. Such streams reflect the chemical character of their concentrated underground sources during dry periods and are more dilute during periods of heavy rainfall. Ground water is generally more highly mineralized than surface runoff because it remains in contact with the rocks and soils for much longer periods. The dissolved-solids content in a river is frequently increased by drainage from mines or oil fields, by the addition of industrial or municipal wastes, or—in irrigated regions--by drainage from irrigated lands.

The mineral constituents and physical properties of natural waters reported in the tables of analyses include those that have a practical bearing on the value of the waters for most purposes. The analyses generally include results for silica, iron, calcium, magnesium, sodium, potassium (or sodium and potassium together calculated as sodium), alkalinity as carbonate and bicarbonate, sulfate, chloride, fluoride, nitrate, boron, pH, dissolved solids and specific conductance. Aluminum, manganese, color, acidity, oxygen consumed, and other dissolved constituents and physical properties are reported for certain streams. Phenolic material and minor elements including strontium, chromium, nickel, copper, lead, zinc, cobalt, arsenic, cadmium, and others are occasionally determined for a few streams in connection with specific

problems in local areas and the results are reported when appropriate. The source and significance of the different constituents and properties of natural waters are discussed in the following paragraphs. The constituents are arranged in the order that they appear on standard analytical statement cards which are used to process the chemical quality data in this report.

MINERAL CONSTITUENTS IN SOLUTION

Silica (SiO_2)

Silica is dissolved from practically all rocks. Some natural surface waters contain less than 5 parts per million of silica and few contain more than 50 parts, but the more common range is from 10 to 30 parts per million. Silica affects the usefulness of a water because it contributes to the formation of boiler scale; it usually is removed from feed water for high-pressure boilers. Silica also forms troublesome deposits on the blades of steam turbines.

Aluminum (Al)

Aluminum is usually present only in negligible quantities in natural waters except in areas where the waters have been in contact with the more soluble rocks of high aluminum content such as bauxite and certain shales. Acid waters often contain large amounts of aluminum. It may be troublesome in feed waters where it tends to be deposited as a scale on boiler tubes.

Iron (Fe)

Iron is dissolved from many rocks and soils. On exposure to the air, normal basic waters that contain more than 1 part per million of iron soon become turbid with the insoluble reddish ferric oxide produced by oxidation. Surface waters, therefore, seldom contain as much as 1 part per million of dissolved iron, although some acid waters carry large quantities of iron in solution. Iron causes reddish-brown stains on white porcelain or enameled ware and fixtures and on fabrics washed in the water.

Manganese (Mn)

Manganese is dissolved in appreciable quantities from rocks in some sections of the country. It resembles iron in its chemical

behavior and in its occurrence in natural waters. However, manganese in rocks is less abundant than iron. As a result the concentration of manganese is much less than that of iron and is not regularly determined in many areas. Waters impounded in large reservoirs may contain manganese that has been dissolved from the mud on the bottom of the reservoir by action of carbon dioxide produced by anaerobic fermentation of organic matter. It is especially objectionable in water used in laundry work and in textile processing. Concentrations as low as 0.2 part per million may cause a dark-brown or black stain on fabrics and porcelain fixtures. Appreciable quantities of manganese are often found in waters containing objectionable quantities of iron.

Calcium (Ca)

Calcium is dissolved from almost all rocks and soils, but the highest concentrations are usually found in waters that have been in contact with limestone, dolomite, and gypsum. Calcium and magnesium make water hard and are largely responsible for the formation of boiler scale. Most waters associated with granite or silicious sands contain less than 10 parts per million of calcium; waters in areas where rocks are composed of dolomite and limestone contain from 30 to 100 parts per million; and waters that have come in contact with deposits of gypsum may contain several hundred parts per million.

Magnesium (Mg)

Magnesium is dissolved from many rocks, particularly from dolomitic rocks. Its effect in water is similar to that of calcium. The magnesium in soft waters may amount to only 1 or 2 parts per million, but water in areas that contain large quantities of dolomite or other magnesium-bearing rocks may contain from 20 to 100 parts per million or more of magnesium.

Strontium (Sr)

Strontium is a typical alkaline-earth element and is similar chemically to calcium. Strontium may be present in natural water in amounts up to a few parts per million much more frequently than the available data indicate. In most surface water the amount of strontium is small in proportion to calcium. However, in sea water the ratio of strontium to calcium is 1:30.

Sodium and potassium (Na and K)

Sodium and potassium are dissolved from practically all rocks. Sodium is the predominant cation in some of the more highly mineralized waters found in the western United States. Natural waters that contain only 3 or 4 parts per million of the two together are likely to carry almost as much potassium as sodium. As the total quantity of these constituents increases, the proportion of sodium becomes much greater. Moderate quantities of sodium and potassium have little effect on the usefulness of the water for most purposes, but waters that carry more than 50 or 100 parts per million of the two may require careful operation of steam boilers to prevent foaming. More highly mineralized waters that contain a large proportion of sodium salts may be unsatisfactory for irrigation.

Lithium (Li)

Data concerning the quantity of lithium in water are scarce. It is usually found in small amounts in thermal springs and saline waters. Lithium also occurs in streams where some industries dump their waste water. The scarcity of lithium in rocks is responsible more than other factors for relatively small amounts present in water.

Bicarbonate, carbonate and hydroxide (HCO_3, CO_3, OH)

Bicarbonate, carbonate, or hydroxide is sometimes reported as alkalinity. The alkalinity of a water is defined as its capacity to consume a strong acid to pH 4.5. Since the major causes of alkalinity in most natural waters are carbonate and bicarbonate ions dissolved from carbonate rocks, the results are usually reported in terms of these constituents. Although alkalinity may suggest the presence of definite amounts of carbonate, bicarbonate or hydroxide, it may not be true due to other ions that contribute to alkalinity such as silicates, phosphates, borates, possibly fluoride, and certain organic anions which may occur in colored waters. The significance of alkalinity to the domestic, agricultural, and industrial user is usually dependent upon the nature of the cations (Ca, Mg, Na, K) associated with it. However, moderate amounts of alkalinity does not adversely affect most users.

Hydroxide may occur in water that has been softened by the lime process. Its presence in streams usually can be taken as an indication of contamination and does not represent the natural chemical character of the water.

Sulfate (SO_4)

Sulfate is dissolved from many rocks and soils--in especially large quantities from gypsum and from beds of shale. It is formed also by the oxidation of sulfides of iron and is therefore present in considerable quantities in waters from mines. Sulfate in waters that contain much calcium and magnesium causes the formation of hard scale in steam boilers and may increase the cost of softening the water.

Chloride (Cl)

Chloride is dissolved from rock materials in all parts of the country. Surface waters in the humid regions are usually low in chloride, whereas streams in arid or semiarid regions may contain several hundred parts per million of chloride leached from soils and rocks, especially where the streams receive return drainage from irrigated lands or are affected by ground-water-inflow carrying appreciable quantities of chloride. Large quantities of chloride may affect the industrial use of water by increasing the corrosiveness of waters that contain large quantities of calcium and magnesium.

Fluoride (F)

Fluoride has been reported as being present in some rocks to about the same extent as chloride. However, the quantity of fluoride in natural surface waters is ordinarily very small compared to that of chloride. Investigations have proved that fluoride concentrations of about 0.6 to 1.7 ppm reduced the incidence of dental caries and that concentrations greater than 1.7 ppm also protect the teeth from cavities but cause an undesirable black stain (Durfor and Becker, 1964). Public Health Service, 1962 (p. 8), states, "When fluoride is naturally present in drinking water, the concentration should not average more than the appropriate upper control limit (0.6 to 1.7 ppm). Presence of fluoride in average concentration greater than two times the optimum values shall constitute grounds for rejection of the supply." Concentration higher than the stated limits may cause mottled enamel in teeth, endemic cumulative fluorosis, and skeletal effects.

Nitrate (NO_3)

Nitrate in water is considered a final oxidation product of nitrogenous material and may indicate contamination by sewage or

other organic matter. The quantities of nitrate present in surface waters are generally less than 5 parts per million (as NO_3) and have no effect on the value of the water for ordinary uses.

It has been reported that as much as 2 parts per million of nitrate in boiler water tends to decrease intercrystalline cracking of boiler steel. Studies made in Illinois indicate that nitrates in excess of 70 parts per million (as NO_3) may contribute to methemoglobinemia ("blue babies") (Faucett and Miller 1946, p. 593), and more recent investigations conducted in Ohio show that drinking water containing nitrates in the range of 44 to 88 ppm (as NO_3) may cause methemoglobinemia (Waring, 1949). In a report published by the National Research Council, Maxcy (1950, p. 271) concludes that a nitrate content in excess of 44 parts per million (as NO_3) should be regarded as unsafe for infant feeding. U. S. Public Health Service (1962) sets 45 ppm as the upper limit.

Phosphate (PO_4)

Phosphorus is an essential element in the growth of plants and animals, and some sources that contribute nitrate, such as organic wastes and leaching of soils, may be important as sources for phosphate in water and its occurrence may add to the apparent alkalinity. The addition of phosphates in water treatment constitutes a possible source, although the dosage is usually small. In some areas, phosphate fertilizers may yield some phosphate to water. A more important source is the increasing use of phosphates in detergents. Domestic and industrial sewage effluents may therefore contain considerable amounts of phosphate.

Boron (B)

Boron in small quantities has been found essential for plant growth, but irrigation water containing more than 1 part per million boron is detrimental to citrus and other boron-sensitive crops. Boron is reported in Survey analyses of surface waters in arid and semiarid regions of the Southwest and West where irrigation is practiced or contemplated, but few of the surface waters analyzed have harmful concentrations of boron.

Dissolved solids

The reported quantity of dissolved solids--the residue on evaporation—consists mainly of the dissolved mineral constituents in the water. It may also contain some organic matter and water of crystallization. Waters with less than 500 parts per million of

dissolved solids are usually satisfactory for domestic and some industrial uses. Water containing several thousand parts per million of dissolved solids are sometimes successfully used for irrigation where practices permit the removal of soluble salts through the application of large volumes of water on well-drained lands, but generally water containing more than about 2,000 ppm is considered to be unsuitable for long-term irrigation under average conditions.

Chromium (Cr)

Few if any waters contain chromium from natural sources. Natural waters can probably contain only traces of chromium as a cation unless the pH is very low. When chromium is present in water, it is usually the result of pollution by industrial wastes. Fairly high concentrations of chromate anions are possible in waters having normal pH levels. Concentrations of more than 0.05 ppm of chromium in the hexavalent form constitute grounds for rejection of a water for domestic use on the basis of the standards of the U.S. Public Health Service (1962).

Nickel and cobalt (Ni, Co)

Nickel and cobalt are very similar in chemical behavior and also closely related to iron. Both are present in igneous rocks in small amounts and are more prevalent in silicic rocks. Any nickel in water is likely to be in small amounts and could be in a colloidal state. Cobalt may be taken into solution more readily than nickel. It may be taken into solution in small amounts through bacteriological activity similar to that causing solution of manganese. However, few data on the occurrence of either nickel or cobalt in natural water are available.

Copper (Cu)

Copper is a fairly common trace constituent of natural water. Small amounts may be introduced into water by solution of copper and brass water pipes and other copper-bearing equipment in contact with the water, or from copper salts added to control algae in open reservoirs. Copper salts such as the sulfate and chloride are highly soluble in waters with a low pH but in water of normal alkalinity these salts hydrolyze and the copper may be precipitated. In the normal pH range of natural water containing carbon dioxide, the copper might be precipitated as carbonate. The oxidized portions of sulfide-copper ore bodies contain other copper compounds. The presence of copper in mine water is common.

Copper imparts a disagreeable metallic taste to water. As little as 1.5 ppm can usually be detected, and 5 ppm can render the water unpalatable. Copper is not considered to be a cumulative systemic poison like lead and mercury; most copper ingested is excreted by the body and very little is retained. The pathological effects of copper are controversial, but it is generally believed very unlikely that humans could unknowingly ingest toxic quantities from palatable drinking water. The U. S. Public Health Service (1962) recommends that copper should not exceed 1.0 ppm in drinking and culinary water.

Lead (Pb)

Lead is only a minor element in most natural waters, but industrial or mine and smelter effluents may contain relatively large amounts of lead. Many of the commonly used lead salts are water soluble.

Traces of lead in water usually are the result of solution of lead pipe through which the water has passed. Amounts of lead of the order of 0.05 ppm are significant, as this concentration is the upper limit for drinking water in the standards adopted by the U. S. Public Health Service (1962). Higher concentrations may be added to water through industrial and mine-waste disposal. Lead in the form of sulfate is reported to be soluble in water to the extent of 31 ppm (Seidell, 1940, p. 1409) at 25°C. In natural water this concentration would not be approached, however, since a pH of less than 4.5 would probably be required to prevent formation of lead hydroxide and carbonate. It is reported (Pleissner, 1907) that at 18°C water free of carbon dioxide will dissolve the equivalent of 1.4 ppm of lead and the solubility is increased nearly four fold by the presence of 2.8 ppm of carbon dioxide in the solution. Presence of other ions may increase the solubility of lead.

Zinc (Zn)

Zinc is abundant in rocks and ores but is only a minor constituent in natural water because the free metal and its oxides are only sparingly soluble. In most alkaline surface waters it is present only in trace quantities, but more may be present in acid water. Chlorides and sulfates of zinc are highly soluble. Zinc is used in many commercial products, and industrial wastes may contain large amounts.

Zinc in water does not cause serious effects on health, but produces undesirable esthetic effects. The U. S. Public Health Service (1962, p. 55) recommends that the zinc content not exceed 5 ppm in drinking and culinary water.

Barium (Ba)

Barium may replace potassium in some of the igneous rock minerals, especially feldspar and barium sulfate (barite) is a common barium mineral of secondary origin. Only traces of barium are present in surface water and sea water. Because natural water contains sulfate, barium will dissolve only in trace amounts. Barium sometimes occurs in brines from oil-well wastes.

The U. S. Public Health Service (1962) states that water containing concentrations of barium in excess of 1 ppm is not suitable for drinking and culinary use because of the serious toxic effects of barium on heart, blood vessels, and nerves.

Bromide (Br)

Bromine is a very minor element in the earth's crust and is normally present in surface waters in only minute quantities. Measurable amounts may be found in some streams that receive industrial wastes, and some natural brines may contain rather high concentrations. It resembles chloride in that it tends to be concentrated in sea water.

Iodide (I)

Iodide is considerably less abundant both in rocks and water than bromine. Measurable amounts may be found in some streams that receive industrial wastes, and some natural brines may contain rather high concentrations. It occurs in sea water to the extent of less than 1 ppm. Rankama and Sahama (1950, p. 767) report iodide present in rainwater to the extent of 0.001 to 0.003 ppm and in river water in about the same amount. Few waters will contain over 2.0 ppm.

PROPERTIES AND CHARACTERISTICS OF WATER

Hardness

Hardness is the characteristic of water that receives the most attention in industrial and domestic use. It is commonly recognized by the increased quantity of soap required to produce lather. The use of hard water is also objectionable because it contributes to the formation of scale in boilers, water heaters, radiators, and pipes, with the resultant decrease in rate of heat transfer, possibility of boiler failure, and loss of flow.

Hardness is caused almost entirely by compounds of calcium and magnesium. Other constituents—such as iron, manganese, aluminum, barium, strontium, and free acid—also cause hardness, although they usually are not present in quantities large enough to have any appreciable effect.

Generally, bicarbonate and carbonate determine the proportions of "carbonate" hardness of water. Carbonate hardness is the amount of hardness chemically equivalent to the amount of bicarbonate and carbonate in solution. Carbonate hardness is approximately equal to the amount of hardness that is removed from water by boiling.

Noncarbonate hardness is the difference between the hardness calculated from the total amount of calcium and magnesium in solution and the carbonate hardness. If the carbonate hardness (expressed as calcium carbonate) equal the amount of calcium and magnesium hardness (also expressed as calcium carbonate) there is no noncarbonate hardness. Noncarbonate hardness is about equal to the amount of hardness remaining after water is boiled. The scale formed at high temperatures by the evaporation of water containing noncarbonate hardness commonly is tough, heat resistant, and difficult to remove.

Although many people talk about soft water and hard water, there has been no firm line of demarcation. Water that seems hard to an easterner may seem soft to a westerner. In this report hardness of water is classified as follows:

Hardness range (calcium carbonate in ppm)	Hardness description
0-60	Soft
61-120	Moderately hard
121-180	Hard
more than 180	Very hard

For public use, water with hardness above 200 parts per million generally requires softening treatment (Durfor and Becker, 1964, p. 23-27).

Acidity (H^{+1})

The use of the terms acidity and alkalinity is widespread in the literature of water analysis and is a cause of confusion to those who are more accustomed to seeing a pH of 7.0 used as a neutral point. Acidity of a natural water represents the content of free carbon dioxide and other uncombined gases, organic acids and salts of strong acids and weak bases that hydrolyze to give hydrogen ions. Sulfates of iron and aluminum in mine and industrial

wastes are common sources of acidity. The presence of acidity is reported in those waters which have a pH below 4.5.

Sodium-adsorption-ratio (SAR)

The term "sodium-adsorption-ratio (SAR)" was introduced by the U. S. Salinity Laboratory Staff (1954). It is a ratio expressing the relative activity of sodium ions in exchange reaction with soil and is an index of the sodium or alkali hazard to the soil. Sodium-adsorption-ratio is expressed by the equation:

$$SAR = \frac{Na^{+}}{\sqrt{\frac{Ca^{++}+Mg^{++}}{2}}}$$

where the concentrations of the ions are expressed in milliequivalents per liter (or equivalents per million for most irrigation waters).

Waters are divided into four classes with respect to sodium or alkali hazard: low, medium, high, and very high, depending upon the SAR and the specific conductance. At a conductance of 100 micromhos per centimeter the dividing points are at SAR values of 10, 18, and 26, but at 5,000 micromhos the corresponding dividing points are SAR values of approximately 2.5, 6.5, and 11. Waters range in respect to sodium hazard from those which can be used for irrigation on almost all soils to those which are generally unsatisfactory for irrigation.

Specific conductance (micromhos per centimeter at 25°C)

Specific conductance is a convenient, rapid determination used to estimate the amount of dissolved solids in water. It is a measure of the ability of water to transmit a small electrical current (see p. 8). The more dissolved solids in water that can transmit electricity the greater the specific conductance of the water. Commonly, the amount of dissolved solids (in parts per million) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream or from well to well and it may even vary in the same source with changes in the composition of the water (Durfor and Becker, 1964, p. 27-29).

Specific conductance of most waters in the eastern United States is less than 1,000 micromhos, but in the arid western parts of the country, a specific conductance of more than 1,000 micromhos is common.

Hydrogen-ion concentration (pH)

Hydrogen-ion concentration is expressed in terms of pH units (see p. 8). The values of pH often are used as a measure of the solvent power of water or as an indicator of the chemical behavior certain solutions may have toward rock minerals.

The degree of acidity or alkalinity of water, as indicated by the hydrogen-ion concentration, expressed as pH, is related to the corrosive properties of water and is useful in determining the proper treatment for coagulation that may be necessary at water-treatment plants. A pH of 7.0 indicates that the water is neither acid nor alkaline. pH readings progressively lower than 7.0 denote increasing acidity and those progressively higher than 7.0 denote increasing alkalinity. The pH of most natural surface waters ranges between 6 and 8. Some alkaline surface waters have pH values greater than 8.0, and waters containing free mineral acid or organic matter usually have pH values less than 4.5.

The investigator who utilizes pH data in his interpretations of water analyses should be careful to place pH values in their proper perspective.

Color

In water analysis the term "color" refers to the appearance of water that is free from suspended solids. Many turbid waters that appear yellow, red, or brown when viewed in the stream show very little color after the suspended matter has been removed. The yellow-to-brown color of some waters is usually caused by organic matter extracted from leaves, roots, and other organic substances in the ground. In some areas objectionable color in water results from industrial wastes and sewage. Clear deep water may appear blue as the result of a scattering of sunlight by the water molecules. Water for domestic use and some industrial uses should be free from any perceptible color. A color less than 15 units generally passes unnoticed (U. S. Public Health Service, 1962). Some swamp waters have natural color in excess of 300 units.

The extent to which a water is colored by material in solution is commonly reported as a part of a water analysis because a significant color in water may indicate the presence of organic material that may have some bearing on the dissolved solids content. Color in water is expressed in terms of units between 0 and 500 or more based on the above standard (see p. 8).

Oxygen consumed

Oxygen consumed is a measure of the amount of oxygen required to oxidize unstable materials in water and may be correlated with natural-water color or with some carbonaceous organic pollution from sewage or industrial wastes.

Tolerances for oxygen consumed in feed water for low-and high-pressure boilers are 15 and 3 ppm, respectively (Northeast Water Works Association, 1940). Wash water containing more than 8 ppm has been reported to import a bad odor to textiles; concentrations for water used in beverages and brewing range from 0.5 to 5.0 ppm (California State Water Pollution Control Board, 1952, 1954).

Organics

Phenols. —Phenolic material in water resources is invariably the result of pollution. Phenols are widely used as disinfectants and in the synthesis of many organic compounds. Waste products from oil refineries, coke areas, and chemical plants may contain high concentrations. Fortunately, phenols decompose in the presence of oxygen and organic material, and their persistence downstream from point of entry is relatively short lived. The rate of decomposition is dependent on the environment.

Very low concentrations impart such a disagreeable taste to water that it is highly improbable that harmful amounts could be consumed unknowingly. Reported thresholds of detection of taste and odor range from 0.001 to 0.01 ppm.

Detergents (ABS). —The chief surfactant in commercial detergents is anionic alkylbenzenesulfonate (ABS). ABS and other anionic surfactants resist chemical oxidation and biological breakdown. Their persistence in water over long periods of time contributes to pollution of both ground water and surface water. Some of the effects produced from detergent pollution are unpleasant taste, odor, and foaming (Wayman, Robertson, and Page, 1962). Although the physiological implications of ABS to human beings is unknown, prolonged ingestion of this material by rats is believed to be nontoxic (Paynter, 1960). The U.S. Public Health Service (1962) recommends that ABS should not exceed 0.5 ppm in drinking and culinary waters.

Temperature

Temperature is an important factor in property determining the quality of water. This is very evident for such a direct use

as an industrial coolant. Temperature is also important, but perhaps not so evident, for its indirect influence upon aquatic biota, concentrations of dissolved gases, and distribution of chemical solutes in lakes and reservoirs as a consequence of thermal stratification and variation.

Surface water temperatures tend to change seasonally and daily with air temperatures, except for the outflow of large springs. Superimposed upon the annual temperature cycle is a daily fluctuation of temperature which is greater in warm seasons than in cold and greater in sunny periods than with a cloud cover. Natural warming is due mainly to absorption of a solar radiation by the water and secondarily to transfer of heat from the air or from the bottom. Condensation of water vapor at the water surface is reported to furnish measurable quantities of heat. Heat loss takes place largely through radiation, with further losses through evaporation and conduction to the air and bottom. Thus the temperature of a small stream generally reaches a maximum in mid-to late afternoon due to solar heating and reaches a minimum from early to mid-morning after nocturnal radiation.

Temperature variations which commonly occur during summer in lakes and reservoirs of temperate regions result in a separation of the water volume into a circulating upper portion and a non-circulating lower portion. Separating the two is a stratum of water of variable vertical thickness in which the temperature decreases rapidly with increasing depth. This physical division of the water mass into a circulating and a stagnant portion is the result of density differences in the water column associated with the temperature distribution. Knowledge of the stratification in a body of water may result in increased utility by locating strata of more suitable characteristics. For example, the elevation of an intake pipe may be changed to obtain water of lower temperature, higher pH, less dissolved iron, or other desirable properties.

Temperature is a major factor in determining the effect of pollution on aquatic organisms. The resistance of fish to certain toxin substances has been shown to vary widely with temperature. The quantity of dissolved oxygen which the water can contain is also temperature dependent. Oxygen is more soluble in cold water than in warm water, hence the reduction of oxygen concentrations by pollution is especially serious during periods of high temperature when oxygen levels are already low. Increased temperatures also accelerate biological activity including that of the oxygen-utilizing bacteria which decompose organic wastes. These pollutional effects may be especially serious when low flow conditions coincide with high temperatures. Summary temperature data of water are essential for planning multiple uses of water resources.

Turbidity

Turbidity is the optical property of a suspension with reference to the extent to which the penetration of light is inhibited by the presence of insoluble material. Turbidity is a function on both the concentration and particle size of the suspended material. Although it is reported in terms of parts per million of silica, it is only partly synonymous with the weight of sediment per unit volume of water.

Turbid water is abrasive in pipes, pumps, and turbine blades. In process water, turbidities much more than 1 ppm are not tolerated by several industries, but others permit up to 50 ppm higher (Rainwater, Thatcher, 1960, p. 289). Although turbidity does not directly measure the safety of drinking water, it is related to the consumers acceptance of the water. A level of 5 units of turbidity becomes objectionable to a considerable number of people (U. S. Public Health, 1962).

Sediment

Fluvial sediment is generally regarded as that sediment which is transported by, suspended in, or deposited by water. Suspended sediment is that part of it which remains in suspension in water owing to the upward components of turbulent currents or by colloidal suspension. Much fluvial sediment results from the natural process of erosion, which in turn is part of the geologic cycle of rock transformation. This natural process may be accelerated by agricultural practices. Sediment is also contributed by a number of industrial and construction activities. In certain sections, waste materials from mining, logging, oil-field, and other industrial operations introduce large quantities of suspended as well as dissolved material.

The quantity of sediment, transported or available for transportation, is affected by climatic conditions, form or nature of precipitation, character of the solid mantle, plant cover, topography, and land use. The mode and rate of sediment erosion, transport, and deposition is determined largely by the size distribution of the particles or more precisely by the fall velocities of the particles in water. Sediment particles in the sandsize (larger than 0.062 mm) range do not appear to be affected by flocculation or dispersion resulting from the mineral constituents in solution. In contrast, the sedimentation diameter of clay and silt particles in suspension may vary considerably from point to point in a stream or reservoir, depending on the mineral matter in solution and in suspension and the degree of turbulence present. The size of sediment particles in transport at any point depends on the type of erodible and soluble material in the drainage area, the

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degree of flocculation present, time in transport, and characteristics of the transporting flow. The flow characteristics include velocity of water, turbulence, and the depth, width, and roughness of the channel. As a result of these variable characteristics, the size of particles transported, as well as the total sediment load, is in constant adjustment with the characteristics and physical features of the stream and drainage area.

STREAMFLOW

Most of the records of stream discharge, used in conjunction with the chemical analyses and in the computation of sediment loads in this volume, are published in Geological Survey State reports on the surface-water supply of the United States. The discharge reported for a composite sample is usually the average of daily mean discharges for the composite period. The discharges reported in the tables of single analyses are either daily mean discharges or discharges for the time at which samples were collected, computed from a stage-discharge relation or from a discharge measurement.

State reports containing more complete records of stream discharge may be obtained by writing to the responsible District Engineer, Surface Water Branch, U. S. Geological Survey. For the area covered in this volume, the States, drainage basins, and locations of the district engineers are listed below.

State	Drainage basin	Surface Water Branch district office
Georgia	Ohio River basin	Room 164 Peachtree-Seventh Bldg. Atlanta, Ga. 30323
Illinois		605 South Neil Street Champaign, Ill. 61820
Indiana		Room 516 611 North Park Avenue Indianapolis, Ind. 46204
Kentucky		Room 310 Center Bldg. 522 West Jefferson Street Louisville, Ky. 40202
Michigan	St. Lawrence River basin	407 Capitol Savings and Loan Bldg. Lansing, Mich. 48933

State	Drainage basin	Surface Water Branch district office
Minnesota		1610 Post Office Bldg. St. Paul, Minn. 55101
New York		P. O. Box 948 Federal Bldg. Albany, N. Y. 12201
North Carolina	Ohio River basin	436 Federal Bldg. Raleigh, N. C. 27602
Ohio		1509 Hess Street Columbus, Ohio 43212
Pennsylvania		1224 Mulberry Street Harrisburg, Pa. 17104
Tennessee		823 Edney Bldg. Chattanooga, Tenn. 37402
West Virginia		Room 3303 New Federal Bldg. Charleston, W. Va. 37402

PUBLICATIONS

Reports giving records of chemical quality and temperatures of surface waters and suspended-sediment loads of streams in the area covered by this volume for the water years 1941-62, are listed below:

Numbers of water-supply papers containing records for Parts 3 and 4, 1941-61

Year	WSP	Year	WSP	Year	WSP	Year	WSP
1941	942	1947	1102	1953	1290	1959	1642
1942	950	1948	1132	1954	1350	1960	1742
1943	970	1949	1162	1955	1400	1961	1882
1944	1022	1950	1186	1956	1450		
1945	1030	1951	1197	1957	1520		
1946	1050	1952	1250	1958	1571		

Geological Survey reports containing chemical quality, temperature, and sediment data obtained before 1941 are listed below.

Publications dealing largely with the quality of ground-water supplies and only incidentally covering the chemical composition of surface waters are not included. Publications that are out of print are preceded by an asterisk.

PROFESSIONAL PAPER

*135. Composition of river and lake waters of the United States, 1924.

BULLETINS

*479. The geochemical interpretation of water analyses, 1911.
770. The data of geochemistry, 1924.

WATER-SUPPLY PAPERS

*108. Quality of water in the Susquehanna River drainage basin, with an introductory chapter on physiographic features, 1904.
*161. Quality of water in the upper Ohio River basin and at Erie, Pa., 1906.
*193. The quality of surface waters in Minnesota, 1907.
*236. The quality of surface waters in the United States, Part 1, Analyses of waters east of the one hundredth meridian, 1909.
*237. The quality of the surface waters of California, 1910.
*239. The quality of the surface waters of Illinois, 1910.
*273. Quality of the water supplies of Kansas, with a preliminary report on stream pollution by mine waters in southeastern Kansas, 1911.
*274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, 1911.
*339. Quality of the surface waters of Washington, 1914.
*363. Quality of the surface waters of Oregon, 1914.
*418. Mineral springs of Alaska, with a chapter on the chemical character of some surface waters of Alaska, 1917.
*596-B. Quality of water of Colorado River in 1925-26, 1928.
*596-D. Quality of water of Pecos River in Texas, 1928.
*596-E. Quality of the surface waters of New Jersey, 1928.
*636-A. Quality of water of the Colorado River in 1926-28, 1930.
*636-B. Suspended matter in the Colorado River in 1925-28, 1930.
*638-D. Quality of water of the Colorado River in 1928-30, 1932.
*839. Quality of water of the Rio Grande basin above Fort Quitman, Tex., 1938.
*889-E. Chemical character of surface water of Georgia, 1944.
*998. Suspended sediment in the Colorado River, 1925-41, 1947.

1048. Discharge and sediment loads in the Boise River drainage basin, Idaho, 1939-40, 1948.
1110-C. Quality of water of Conchas Reservoir, New Mexico, 1939-49, 1952.

Many of the reports listed are available for consultation in the larger public and institutional libraries. Copies of Geological Survey publications still in print may be purchased at a nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402, who will, upon request, furnish lists giving prices.

COOPERATION

Many Municipal, State, and Federal agencies assisted in collecting records for these quality-of-water investigations. In addition to the cooperative programs, many stations were operated from funds appropriated directly to the Geological Survey.

The table on p. 28 lists State and local agencies that cooperated in quality-of-water investigations in the drainage basins included in this volume, and the locations of quality-of-water district offices responsible for the data collected.

DIVISION OF WORK

The quality-of-water program was conducted by the Water Resources Division of the Geological Survey, L. B. Leopold, chief hydrologist, and S. K. Love, chief, Quality of Water Branch. The records were collected and prepared for publication under the supervision of district engineers or district chemists as follows: In Pennsylvania, N. H. Beamer; Minnesota, D. M. Culbertson; North Carolina, G. A. Billingsley; Georgia, J. W. Guerin succeeded by K. A. MacKichan; New York, F. H. Pauszek; Tenneesee, M. E. Schroeder succeeded by J. H. Hubble; and in Illinois, Indiana, Kentucky, Ohio, and West Virginia, G. W. Whetstone.

State	Cooperating agency	Drainage basin	District office
Georgia	Department of Mines, Mining and Geology, Captain Garland Peyton, director.	Ohio River	Room 244, Federal Bldg. Ocala, Fla. 32670
Illinois	Ohio River Valley Water Sanitation Commission, Edward J. Cleary, executive director and chief engineer.		2822 E. Main Street Columbus, Ohio 43209
Indiana	Ohio River Valley Water Sanitation Commission, Edward J. Cleary, executive director and chief engineer.		
Kentucky[a]	University of Kentucky, F. C. Dickey, president, through State Geological Survey, W. W. Hagan, director and State Geologist. Ohio River Valley Water Sanitation Commission, Edward J. Cleary, executive director and chief engineer.		
Minnesota	Minnesota Iron Range Resources and Rehabilitation Commission, A. M. De Yoannes, Commissioner. Minnesota Department of Conservation, Division of Waters, S. A. Frellsen, director.	St. Lawrence River	Cotner Terrace Bldg. 225 North Cotner Blvd. Lincoln, Nebr. 68505
New York	New York State Department of Commerce, Bureau of Industrial Development, Henry Gallien, director.		Room 348, Federal Bldg. P.O. Box 948 Albany, N. Y. 12201

State	Cooperating agency	Drainage basin	District office
North Carolina	North Carolina Department of Water Resources, H. E. Brown, director.	Ohio River	Federal Bldg. P.O. Box 2857 Raleigh, N.C. 27602
Ohio	Department of Natural Resources, Herbert B. Eagon, director. Ohio River Valley Water Sanitation Commission, Edward J. Cleary, executive director and chief engineer.		2822 E. Main Street Columbus, Ohio 43209
Pennsylvania	Pennsylvania Department of Agriculture, Dr. William L. Henning, secretary. Pennsylvania Department of Forests and Waters, Maurice K. Goddard, secretary. Soil Conservation Commission, David Unger, director.		Room 1302 U.S. Custom House, 2nd and Chestnut Streets Philadelphia, Pa. 19106
West Virginia	Ohio River Valley Water Sanitation Commission, Edward J. Cleary, executive director and chief engineer.		2822 E. Main Street. Columbus, Ohio 43209

[a]Financial assistance was provided by the Agricultural Research Service, Soil Conservation Service and Forestry Service of the United States Department of Agriculture for some of the sediment investigations.

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CHEMICAL ANALYSES, WATER TEMPERATURES, AND SEDIEMNT

PART 3. OHIO RIVER BASIN

OHIO RIVER MAIN STEM

3-365. ALLEGHENY RIVER AT KITTANNING, PA.

LOCATION.--At center of bridge on U.S. Highway 422 at Kittanning, Armstrong County, 2,500 feet downstream from gaging station.
DRAINAGE AREA.--8,973 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1944 to June 1953, October 1956 to September 1961.
Water temperatures: October 1944 to June 1953, October 1956 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 498 micromhos Nov. 3; minimum daily, 94 micromhos Apr. 27, 28.
Water temperatures: Maximum, 79°F Sept. 4, 8; minimum, 33°F Jan. 26, 27, Feb. 2-5.
EXTREMES, 1944-53, 1956-61.--Dissolved solids (1944-47, 1958-59): Maximum, 304 ppm Oct. 11-20, 1946, minimum, 63 ppm Mar. 1-10, 1945.
Hardness (1944-47, 1949-53, 1956-59): Maximum, 148 ppm Sept. 11-20, 1952; minimum, 34 ppm Feb. 21-28, Mar. 1-10, 1951.
Specific conductance: Maximum daily, 580 micromhos Oct. 18, 1946; minimum daily, 76 micromhos Apr. 8, 9, 1947.
Water temperatures: Maximum, 86°F July 31, Aug. 4, 1947; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office, Philadelphia, Pa.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-10, 1960		3.6		0.01	0.02	34	9.4	32	3.0	48	79	48	0.2	0.3	246	124	84		402	7.5	4
Nov. 1-10.....		2.7		.00	.02	40	9.7	39	1.6	68	76	66	.1	.4	283	140	85		477	7.3	1
Dec. 1-10.....		2.2		.02	.00	38	8.0	32	2.2	64	66	57	.1	.2	240	128	76		421	7.3	6
Jan. 1-10, 1961		2.2		.02	.00	41	8.8	32	2.2	72	73	57	.1	.4	261	139	80		445	7.3	6
Feb. 1-10.....		5.3		.05	.03	33	7.9	27	1.5	54	64	45	.1	1.6	222	115	71		373	7.4	3
Mar. 1-10.....		5.9		.12	.19	12	3.8	6.5	1.0	16	32	7.6	.7	1.5	86	46	33		129	6.7	2
Apr. 1-10.....		4.6		.04	.05	16	4.7	9.6	1.2	21	40	13	.1	.9	107	60	43		168	6.8	4
May 1-10.....		5.0		.06	.03	15	4.3	5.7	1.5	21	35	8.7	.1	1.0	129	55	38		148	7.0	7
June 1-4, 6-10.		4.5		.04	.00	18	4.6	7.5	1.5	34	36	15	.2	.5	106	64	36		183	7.1	3
July 1-10.....		4.9		.04	.00	23	6.6	13	1.5	44	48	23	.1	.7	143	85	49		248	7.2	3
Aug. 1-10.....		6.0		.00	.00	20	6.1	13	2.0	30	49	23	.1	1.1	137	75	51		235	7.0	2
Sept. 1-10.....		6.4		.00	.00	29	8.9	22	2.0	48	61	38	.2	.4	199	109	70		343	7.2	2

OHIO RIVER MAIN STEM--Continued

3-365. ALLEGHENY RIVER AT KITTANNING, PA.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	65	65	65	65	64	65	65	61	64	53	63	63	63	63	64	64	63	63	62	61	59	58	57	57	54	53	53	53	53	54	54	60
November	54	54	53	52	55	52	49	48	48	48	47	48	48	47	48	48	48	48	50	49	48	47	47	46	43	44	46	48	47	45	--	48
December	45	44	43	41	43	43	43	43	42	40	41	38	37	36	36	36	36	36	35	36	35	35	35	34	34	35	35	35	35	38	36	38
January	35	35	36	35	35	36	36	37	36	36	36	36	35	36	37	35	35	36	36	35	36	36	--	34	34	33	33	35	34	33	34	35
February	34	33	33	33	33	35	34	35	35	35	36	36	36	36	--	37	37	37	39	37	37	36	37	37	38	38	38	39	--	--	--	35
March	39	38	39	40	40	39	40	41	43	42	42	41	41	42	42	42	42	42	41	39	40	41	41	40	42	45	42	45	44	44	44	41
April	45	35	42	43	43	42	42	42	42	42	42	42	41	41	42	42	44	43	44	44	44	45	46	48	50	51	52	51	51	50	--	44
May	51	52	50	50	49	50	51	52	52	53	54	55	56	60	62	63	63	63	63	62	60	56	55	54	55	58	55	55	57	56	57	56
June	58	60	60	62	--	65	67	67	68	68	70	70	71	70	70	69	70	65	67	66	67	67	60	67	67	66	67	66	68	68	--	66
July	70	71	64	72	72	71	72	74	74	73	72	72	73	73	74	75	74	74	75	75	75	75	78	77	77	76	77	64	76	76	77	73
August	77	77	76	76	76	75	58	73	73	74	75	75	77	75	75	76	76	75	78	78	76	75	75	76	76	77	--	76	76	76	77	75
September	62	77	76	79	77	77	78	79	78	77	58	77	--	77	76	74	73	72	72	73	72	72	74	74	73	73	70	70	69	69	--	73

KISKIMINETAS RIVER BASIN

3-485. KISKIMINETAS RIVER AT LEECHBURG (VANDERGRIFT), PA.

LOCATION.--At raw-water intake at West Leechburg plant of Allegheny-Ludlum Steel Corp., 0.2 mile below Brady Run, Armstrong County, and 6.7 miles downstream from gaging station at Vandergrift.
DRAINAGE AREA.--1,860 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1946 to September 1951, October 1958 to July 1959, October 1959 to September 1961.
Water temperatures: October 1946 to September 1951, October 1958 to July 1959, November 1959 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 780 ppm Oct. 15 to Nov. 6; minimum, 158 ppm Mar. 1-9, 11-13.
Hardness: Maximum, 390 ppm Oct. 15 to Nov. 6; minimum, 80 ppm Mar. 1-9, 11-13.
Specific conductance: Maximum daily, 1,490 micromhos Sept. 29, 30; minimum daily, 205 micromhos Mar. 2.
Water temperatures: Maximum, 81°F July 24, 29, Sept. 4, 7, 12-14; minimum, freezing point Dec. 22, 23, Jan. 24.
EXTREMES, 1946-51, 1958-61.--Dissolved solids (1946-47, 1959-61): Maximum, 945 ppm Aug. 27 to Sept. 12, 1960; minimum, 141 ppm Mar. 30 to Apr. 8, 1960.
Hardness (1946-47, 1949-51, 1959-61): Maximum, 514 ppm Oct. 1-10, 1946; minimum, 74 ppm Mar. 30 to Apr. 8, 1960.
Specific conductance: Maximum daily, 5,420 micromhos Aug. 12, 1951; minimum daily, 175 micromhos July 22, 1950.
Water temperatures: Maximum, 90°F July 25, 1950; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Philadelphia, Pa. Records of discharge based on records for Kiskiminetas River at Vandergrift.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-13, 1960		22	11	0.76	13	90	38	35	6.0	0	522	15	0.3	0.9	765	381	381	2.4	1220	3.5	0
Oct. 15-31, Nov. 1-6.....		--	--	--	--	--	--	--	--	0	560	15	--	.2	780	390	390	2.3	1250	3.2	3
Nov. 7-13,15-16		--	--	--	--	--	--	--	--	0	355	13	--	.7	518	270	270	1.4	841	3.5	3
Nov. 22, 23, 25-27, 29....		--	--	--	--	--	--	--	--	0	401	14	--	1.3	576	285	285	1.6	943	3.1	2
Dec. 1-4, 7,13, 14,16, 29....		--	--	--	--	--	--	--	--	0	405	15	--	1.3	630	335	335	1.6	1020	3.0	2
Jan. 15, 26, 28 29, 31, 1961.		--	--	--	--	--	--	--	--	0	252	10	--	2.4	371	225	225	.8	611	3.5	2
Feb. 1,3,4,7,9, 11-12, 14-16.		14	2.2	.11	9.1	55	24	22	6.5	0	315	12	.2	.6	470	236	236	1.0	716	3.8	1
Feb. 18, 19, 21-23, 25-26.		--	--	--	--	--	--	--	--	0	99	6.0	--	1.8	163	86	86	.4	293	4.0	2
Mar. 1-9, 11-13		10	1.8	.04	1.5	21	6.6	6.1	2.5	0	97	4.4	.2	1.3	158	80	80	.4	282	4.0	3
Mar. 15-23, 25, 26,28-31, Apr. 1,2,4-6, 8,9,11,12....		---	--	--	--	--	--	--	--	0	162	6.0	--	2.9	249	126	126	.7	422	3.7	2
Apr. 13-20.....		--	--	--	--	--	--	--	--	0	109	5.5	--	2.6	174	96	96	.4	297	4.0	2

KISKIMINETAS RIVER BASIN--Continued

3-485. KISKIMINETAS RIVER AT LEECHBURG (VANDERGRIFT), PA.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^+	Specific conductance (micromhos at 25°C)	pH	Color
Apr. 22,23,25, 26,28,30, May 1,2,1961		--	--	--	--	--	--	--	--	0	119	4.0	--	3.9	197	100	100	0.5	324	3.8	3
May 3,4,6,7,9, 11-18, 20-24		--	--	--	--	--	--	--	--	0	189	5.5	--	4.3	302	138	138	.9	492	3.4	3
July 6-22.....		--	--	--	--	--	--	--	--	0	447	11	--	2.0	656	320	320	2.2	1050	3.1	2
July 23-31, Aug. 1.....		--	--	--	--	--	--	--	--	0	302	8.0	--	2.0	456	210	210	1.6	784	3.2	3
Aug. 2-7.....		--	--	--	--	--	--	--	--	0	184	5.5	--	2.2	282	142	142	.7	473	3.4	3
Aug. 9-14, 16-18.....		--	--	--	--	--	--	--	--	0	327	9.5	--	2.0	491	230	230	1.5	787	3.4	2
Aug. 19-23....		--	--	--	--	--	--	--	--	0	441	12	--	1.9	622	290	290	2.0	1010	3.2	2
Aug. 24-31, Sept.1-14, 6-18.....		21	12	2.2	8.5	84	36	31	8.5	0	496	14	0.4	2.0	758	358	358	2.4	1200	3.2	2

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day 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	Average
October	65	62	65	63	65	64	62	61	62	62	63	64	64	--	65	65	65	61	61	58	56	54	55	50	48	48	51	53	54	55	54	59
November	53	52	49	49	51	50	45	42	44	45	44	44	45	--	50	51	--	48	46	47	--	46	45	--	42	44	44	--	49	--	--	--
December	39	37	40	41	--	--	41	--	--	--	--	--	40	35	--	36	--	34	--	35	35	32	32	--	--	--	35	34	34	33	35	--
January.....	--	--	34	34	34	35	35	--	--	--	--	34	--	34	33	--	35	--	--	33	--	--	--	32	--	33	--	33	33	--	33	--
February.....	33	--	33	33	--	--	33	--	34	--	36	37	--	34	34	35	36	37	38	--	36	38	41	--	43	42	--	42	--	--	--	--
March.....	44	44	44	46	47	47	48	46	46	--	46	47	47	--	44	43	44	40	44	44	43	43	46	--	44	45	--	51	49	48	45	45
April.....	45	43	--	41	43	44	--	43	42	--	44	43	43	47	47	49	46	46	44	44	--	52	53	--	59	55	--	54	--	56	--	--
May.....	54	50	49	49	--	54	53	--	60	--	61	62	63	65	68	68	64	65	--	59	60	58	57	61	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July.....	--	--	--	--	--	71	73	71	72	71	73	74	72	77	77	76	75	76	76	73	73	78	80	81	79	80	78	79	81	80	79	76
August.....	79	78	79	72	74	72	75	--	76	77	77	78	76	72	--	74	77	77	79	78	73	73	75	75	76	75	78	79	78	76	76	71
September	79	80	80	81	--	80	81	80	80	78	79	81	81	81	75	69	68	69	--	--	--	--	--	--	--	--	68	--	65	65	--	--

MONONGAHELA RIVER BASIN

3-504. TYGART RIVER AT ELKINS, W. VA.

LOCATION.--At city waterplant at Elkins, Randolph County, 2.5 miles upstream from gaging station.
DRAINAGE AREA.--268 square miles upstream from waterplant; 272 square miles upstream from gaging station.
RECORDS AVAILABLE.--Water temperatures: January 1947 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 76°F Aug. 1, 2, Sept. 5, 6, 9, 13; minimum, 33°F Dec. 13-24, Jan. 22 to Feb. 4.
EXTREMES, 1947-61.--Water temperatures: Maximum, 92°F July 22, 1952; minimum, freezing point on many days during winter months.
REMARKS.--Records of discharge are given for Tygarts River near Elkins. No appreciable inflow between waterplant and gaging station except during periods of heavy local rains. During flood periods part of the flow is diverted around the waterplant in a flood by-pass channel.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	62	63	63	62	62	61	61	60	61	61	60	60	60	61	62	62	62	63	61	57	56	52	50	49	48	48	48	48	48	52	52	57
November	50	50	48	46	44	42	40	39	42	44	42	42	43	44	48	48	48	44	42	42	42	42	40	40	41	42	43	44	45	40	--	44
December	40	36	35	36	38	38	36	36	36	37	34	34	33	33	33	33	33	33	33	33	33	33	33	33	34	34	34	34	34	34	34	35
January	34	34	34	34	34	34	34	34	34	34	34	34	34	34	36	36	36	36	36	34	34	33	33	33	33	33	33	33	33	33	33	34
February	33	33	33	33	34	34	34	34	34	34	34	34	34	34	35	35	35	38	40	40	40	40	44	44	44	40	40	40	--	--	--	37
March	40	40	42	42	42	44	48	48	46	40	38	42	43	48	48	44	40	40	40	42	44	45	45	45	46	44	45	49	49	51	50	44
April	43	39	41	41	42	44	42	43	42	42	42	43	41	45	48	46	44	42	42	46	48	51	52	56	59	54	52	50	48	44	--	46
May	48	48	48	51	51	53	51	55	57	56	54	57	59	62	66	64	64	62	60	58	56	57	57	60	63	60	55	52	56	60	62	57
June	65	66	65	61	65	65	67	67	61	62	62	66	64	63	58	57	60	61	63	65	65	65	66	65	62	64	64	66	67	70	--	64
July	71	72	72	72	68	67	67	66	67	68	69	68	69	71	71	68	69	69	70	68	69	70	70	72	74	74	73	73	74	74	75	70
August	76	76	75	74	74	74	73	72	73	73	72	66	64	64	64	69	70	71	72	70	70	70	71	72	72	72	72	73	73	74	73	71
September	74	74	74	75	76	76	75	75	76	74	75	75	76	74	70	67	64	66	66	65	65	65	66	66	68	67	66	64	63	63	--	70

MONONGAHELA RIVER BASIN--Continued

3-605. SALEM FORK AT SALEM, W. VA.

LOCATION.--At wire-weight gage at bridge, 0.4 mile downstream from recorder gage, 0.6 mile downstream from Dog Run, 0.4 mile upstream from Cherrycamps Run, and 1.4 miles northeast of Salem, Harrison County.
DRAINAGE AREA.--8.32 square miles at gaging station.
RECORDS AVAILABLE.--Sediment records: October 1954 to September 1961, periodic.
REMARKS.--Published and unpublished data are on file in district office at Columbus, Ohio. Flow partly controlled by seven floodwater detention reservoirs having a combined capacity of 376 acre-feet.

Periodic determinations of suspended-sediment discharge, water year October 1960 to September 1961

Date	Time (24 hr)	Water temperature (°F)	Discharge (cfs)	Suspended sediment	
				Mean concentration (ppm)	Discharge (tons per day)
Oct. 4, 1960	0930		0.3	14	(t)
Oct. 11	0930		.9	12	(t)
Oct. 18	0915		.3	18	(t)
Oct. 26	0915		.9	10	(t)
Nov. 1	0845		19	28	1.4
Nov. 8	0900		12	12	.4
Nov. 16	1450		3.8	9	.1
Nov. 22	0900		1.4	12	(t)
Nov. 29	0900		2.6	16	.1
Dec. 6	0830		1.1	9	(t)
Dec. 13	0900		1.7	11	.1
Dec. 20	0915		2.6	9	.1
Dec. 27	0830		49	50	6.6
Jan. 3, 1961	0900		23	15	.9
Jan. 10	0900		11	11	.3
Jan. 17	0900		25	13	.9
Jan. 24	0900		5.0	6	.1
Jan. 31	0900		42	9	1.0
Feb. 14	1130		476	119	153
Feb. 21	1145		12	43	1.4
Feb. 28	0900		31	27	2.2
Mar. 6	1315		64	120	21
Mar. 7	0845		173	40	19
Mar. 14	0900		63	20	3.4
Mar. 21	1215		362	650	635
Mar. 21	1615		664	494	886
Mar. 28	0930		8.9	19	.4
Apr. 4	1115		14	16	.6
Apr. 11	0945		35	22	2.1
Apr. 18	0900		11	12	.4
Apr. 25	0845		12	11	.4
May 2	0945		8.3	10	.2
May 9	0915		36	36	3.5
May 16	0845		6.1	47	.8
May 23	0900		4.0	15	.2
May 31	1035		1.3	17	.1
June 6	0930		4.3	29	.3
June 13	0845		7.8	24	.5
June 20	0900		1.7	18	.1
June 27	1340		3.0	16	.1
July 5	0900		.7	16	(t)
July 11	0915		.4	17	(t)
July 18	1125		3.7	16	.2
July 25	0930		3.7	18	.2
Aug. 1	0845		1.0	14	(t)
Aug. 8	0930		.5	16	(t)
Aug. 15	0945		3.4	19	.2
Aug. 22	0900		1.1	16	(t)
Aug. 29	0845		.5	26	(t)
Sept. 5	1100		.6	35	.1
Sept. 12	1100		.2	28	(t)
Sept. 19	1525		1.0	26	.1
Sept. 23	0925		.2	24	(t)
Sept. 26	0930		.2	19	(t)

t Less than 0.05 ton.

309-919 O - 68 - 4

3-630. MONONGAHELA RIVER AT LOCK AND DAM 8, AT POINT MARION, PA.

LOCATION.--About 750 feet upstream from dam, lock and dam 8 (mile 90.8) at Point Marion, Fayette County, and 1.5 miles upstream from Cheat River.
DRAINAGE AREA.--2,720 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1961.
Water temperatures: October 1955 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 444 ppm June 1-4; minimum, 126 ppm Nov. 11-30.
Hardness: Maximum, 215 ppm June 1-4; minimum, 66 ppm Nov. 11-30.
Specific conductance: Maximum daily, 821 micromhos June 2; minimum daily, 125 micromhos June 15.
Water temperatures: Maximum, 80°F Sept. 4; minimum, freezing point on several days during December to February.
EXTREMES, 1955-61.--Dissolved solids: Maximum, 620 ppm July 21-27, 29-31, 1959; minimum, 100 ppm Aug. 2-7, 9-10, 1958.
Hardness: Maximum, 287 ppm Nov. 7-8, 1959; minimum, 54 ppm June 1-10, 1956.
Specific conductance: Maximum daily, 1,200 micromhos June 19, 1958; minimum daily, 124 micromhos Aug. 7, 1958.
Water temperatures: Maximum, 82°F on several days during July to September 1959, July, Aug. 1960; minimum, freezing point on many days during winter months.
REMARKS.--Acidity determined to pH 7.0. Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio.
No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 9,10, 15, 1960...	6.5	--	0.40	0.63	22	7.3	12	1.7		0		108	5.0	0.1	0.4	0.40	165	85	85	0.4	288		--		--
Nov. 11-30...	5.8	--	1.3	.41	18	5.0	6.7	1.8		0		78	4.0	.1	.7	.50	126	66	66	.5	211		4		.1
Dec. 1-31....	6.3	1.3	2.0	.69	27	9.0	14	1.5		0		132	5.0	.2	.5	.10	212	105	105	.5	333		1		.1
Jan. 1-31, 1961	6.0	1.2	2.1	.25	20	6.1	6.5	1.3		0		89	4.0	.3	1.4	.15	147	75	75	.3	230		1		.0
Feb. 1-28....	6.0	2.7	3.0	.30	27	9.0	9.7	.9		0		132	4.0	.0	.9	.15	203	105	105	.3	326		3		.1
Mar. 1-31....	5.6	1.0	2.1	.33	20	6.5	6.7	1.2		0		96	3.0	.3	.7	.36	144	76	76	.3	246		1		.1
Apr. 1-30....	5.8	1.5	2.1	.68	27	8.5	9.4	1.1		0		127	2.0	.1	.4	.50	185	103	103	.2	315		2		.0
May 1-19.....	5.2	--	2.0	.16	20	6.7	7.5	1.0		0		97	2.0	.2	.3	.10	144	78	78	--	252		7		.0
May 20-23....	6.3	--	3.2	.56	31	11	15	1.4		0		172	3.5	.2	.2	.20	246	123	123	--	445		3		.0
May 24-31....	7.8	4.4	4.3	.97	48	16	24	1.4		0		265	5.0	.2	.4	.30	376	186	186	1.0	640		2		.0
June 1-4.....	8.4	4.8	2.3	1.5	58	17	29	2.0		0		312	5.0	.4	.3	.20	444	215	215	1.0	720		3		--
June 5-30....	6.0	1.0	.92	.62	24	6.4	9.1	1.2		0		116	2.0	.2	.2	.10	170	86	86	--	302		3		.0
July 1-21....	7.9	3.0	1.0	1.1	47	14	24	1.9		0		240	6.0	.4	.4	.10	335	175	175	.6	565		5		.0
July 22-29...	6.1	--	.58	.54	25	7.4	10	1.6		0		120	4.0	.2	.8	.13	171	93	93	.3	308		5		.0
Aug. 8-31....	6.4	1.3	.56	.70	25	6.9	11	1.9		0		122	3.0	.2	.8	.06	175	91	91	.3	311		5		.0
Sept. 1-30...	8.1	3.8	1.1	.32	45	14	28	2.2		0		262	6.5	.3	.2	.10	359	170	170	.8	653		3		.0
Time-weighted average [a]..	6.4	2.0	1.8	0.53	29	9	13	1.4		--		146	3.9	0.2	0.6	0.20	211	108	108	0.4	359		3		--

a Represents 87 percent of days.

MONONGAHELA RIVER BASIN--Continued

3-630. MONONGAHELA RIVER AT LOCK AND DAM 8, AT POINT MARION, PA.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	--	--	--	--	--	--	--	--	66	66	--	--	--	--	65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
November	--	--	--	--	--	--	--	--	--	--	44	47	46	48	48	51	48	48	48	48	47	48	48	44	47	48	--	47	52	44	--	--
December	45	44	44	42	43	43	44	44	42	42	41	40	38	32	36	36	36	36	36	36	34	32	33	32	33	34	34	34	34	34	33	38
January	41	41	40	36	36	38	39	38	38	36	39	38	37	39	38	37	38	38	38	38	37	32	33	33	34	33	33	32	36	36	35	37
February	34	33	35	35	33	32	--	38	32	32	33	34	34	38	37	39	39	41	44	44	41	44	44	48	48	43	44	43	--	--	--	38
March	42	46	44	45	46	44	46	47	46	46	46	46	47	48	47	46	43	44	46	44	43	46	45	46	46	46	48	45	52	49	50	46
April	50	43	43	46	49	44	43	43	47	47	44	44	44	45	46	44	48	48	47	46	50	50	54	50	57	54	57	58	58	46	--	48
May	52	52	52	55	55	56	55	57	59	58	59	58	58	60	61	62	62	61	62	62	59	60	61	61	62	62	62	60	61	60	60	59
June	61	62	66	65	68	68	63	68	68	67	66	66	66	66	64	64	64	67	65	67	68	65	68	69	64	64	65	71	65	70	--	66
July	74	72	76	71	72	72	72	72	65	70	71	73	72	72	73	74	72	74	74	74	74	76	76	76	78	76	76	76	--	--	--	73
August	--	--	--	--	--	--	--	--	76	76	76	75	73	71	71	73	72	73	74	75	74	74	74	75	75	76	76	77	77	76	76	--
September	78	78	78	80	79	78	79	79	79	78	78	69	79	79	77	73	77	75	74	72	74	73	74	74	76	73	72	71	69	69	--	75

MONONGAHELA RIVER BASIN--Continued

3-690. SHAVERS FORK AT PARSONS, W. VA.

LOCATION.--At intake to industrial water-supply system, Armour Leather Company plant at Parsons, Tucker County, 0.3 mile upstream from confluence with Black Fork, and 0.4 mile downstream from gaging station.
DRAINAGE AREA.--214 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1946 to December 1948, April to September 1949, January to September 1950, October 1952 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 75°F Sept. 7, 8; minimum, freezing point many days during December to February.
EXTREMES, 1946-50, 1952-61.--Water temperatures: Maximum, 87°F Aug. 26, 1959; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	--	--	58	58	59	58	--	--	--	--	--	58	55	52	--	--	49	44	44	44	46	--	--	44	44	44	42	42	--	--	44	--
November	44	44	44	44	--	--	44	44	44	43	42	--	--	44	44	44	44	42	--	--	42	42	42	40	40	--	--	--	--	--	--	--
December	--	--	--	--	38	36	34	34	34	--	--	--	32	32	32	--	--	--	--	--	--	32	32	--	--	--	32	32	32	32	--	--
January	--	--	32	32	32	--	--	--	--	32	32	32	32	--	--	32	32	32	32	32	--	--	32	32	32	32	32	--	--	32	32	--
February	32	32	32	--	--	32	32	32	32	32	--	--	32	--	--	32	32	--	--	32	32	32	32	32	--	--	34	34	--	--	--	--
March	--	33	33	--	--	--	--	--	--	--	--	--	34	34	34	34	34	--	--	34	34	34	34	34	--	--	34	34	34	34	--	--
April	--	--	34	34	34	34	34	--	--	37	38	41	44	45	--	--	46	48	48	49	51	--	--	50	50	50	51	52	--	--	--	--
May	54	54	55	56	56	--	--	56	56	56	56	56	--	--	59	61	62	62	62	--	--	62	62	62	62	62	--	--	63	--	64	--
June	64	64	--	--	65	66	66	66	66	--	--	68	68	69	69	68	--	--	69	69	69	69	69	--	--	--	--	--	--	--	--	--
July	--	--	68	67	66	66	66	--	--	68	69	69	68	68	--	--	70	70	70	70	70	--	--	70	70	70	70	--	--	--	70	--
August	70	70	70	70	--	--	70	70	70	70	70	--	72	74	74	--	74	74	--	--	70	70	70	70	70	--	--	70	70	70	70	--
September	70	--	--	--	74	74	75	75	--	--	72	72	72	72	72	--	--	71	71	70	72	72	--	--	70	68	67	66	66	--	--	--

MONONGAHELA RIVER BASIN--Continued

3-716. CHEAT RIVER AT LAKE LYNN, PA.

LOCATION.--At the Lake Lynn hydroelectric plant of the West Penn Power Company at Lake Lynn, Fayette County, 3 miles upstream from the mouth.
DRAINAGE AREA.--1,411 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1948 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 82°F Sept. 5-8; minimum, 33°F Jan. 2-6, 9, 10, 12, 13, 16-20, 23-27.
EXTREMES, 1948-61.--Water temperatures: Maximum, 85°F July 30, 1949, July 28, 1952 and Aug. 6, 1955; minimum, 33°F on many days during January and February most years.
REMARKS.--Records furnished by the West Penn Power Company. No discharge records available.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	--	--	66	64	64	63	63	--	--	64	64	67	66	66	--	--	66	65	64	63	62	--	--	61	60	60	60	60	--	--	59	--
November	59	58	--	--	--	--	57	55	53	53	--	--	--	50	50	50	50	49	--	--	48	47	47	47	47	--	--	47	44	43	--	--
December	43	43	--	--	43	43	42	42	42	--	41	41	41	40	40	--	--	--	39	39	37	35	34	--	--	--	35	36	36	36	--	--
January	--	33	33	33	33	33	--	--	33	33	34	33	33	--	--	33	33	33	33	33	--	--	33	33	33	33	33	--	--	34	34	--
February	34	34	34	--	--	34	34	34	34	34	--	--	34	34	34	34	34	--	--	36	38	40	40	--	--	--	40	40	--	--	--	--
March	39	39	40	--	--	44	45	47	46	46	--	--	40	39	39	39	39	--	--	--	41	40	40	42	--	--	44	44	--	--	--	--
April	--	--	44	44	44	44	44	--	--	42	42	42	42	43	--	--	43	43	44	45	--	--	--	46	46	48	51	--	--	--	--	--
May	54	54	50	50	54	--	--	56	58	58	58	59	--	--	61	61	62	62	61	--	--	61	61	61	60	60	--	--	61	--	62	--
June	60	60	--	--	62	64	66	66	66	--	--	76	77	76	70	--	--	--	74	74	72	70	70	--	--	70	74	76	76	77	--	--
July	--	--	72	--	72	74	74	--	--	74	74	75	75	75	--	--	76	77	77	78	80	--	--	80	80	80	80	81	--	--	81	--
August	81	80	79	80	--	--	80	80	80	80	80	--	--	77	77	78	80	80	--	--	76	78	78	80	80	--	--	81	80	80	80	--
September	80	--	--	--	82	82	82	82	--	--	81	81	81	80	78	--	--	76	76	74	74	73	--	--	78	76	77	75	70	--	--	--

3-940. MAHONING RIVER AT LEAVITTSBURG, OHIO

LOCATION.--Temperature recorder at gaging station at highway bridge at Leavittsburg, Trumbull County, 300 feet downstream from Duck Creek, and 1.2 miles downstream from Eagle Creek.
DRAINAGE AREA.--580 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1951 to September 1953.
Water temperatures: April 1943 to December 1945, October 1946 to September 1948, unpublished, October 1948 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 78°F July 23, Aug. 12; minimum, freezing point on many days during December to February.
EXTREMES, 1948-61.--Water temperatures: Maximum, 86°F July 2, 1949; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	64	63	61	61	61	61	61	60	60	60	60	61	61	62	62	63	63	62	60	58	56	55	54	54	52	51	51	51	52	52	52	58
Minimum	63	61	60	60	60	61	60	60	59	58	59	60	60	61	62	62	62	60	58	56	55	54	53	52	51	51	50	51	51	52	52	57
November																																
Maximum	52	51	51	48	48	47	46	45	44	44	44	44	44	44	46	48	48	48	47	45	45	45	45	45	44	43	43	45	46	45	--	46
Minimum	51	51	48	48	47	46	45	44	44	44	44	44	43	43	44	46	48	47	45	44	44	44	45	44	43	43	42	43	45	42	--	45
December																																
Maximum	42	40	38	37	37	38	38	38	38	37	36	35	35	35	34	34	34	34	34	34	34	34	33	33	33	32	33	33	33	32	32	35
Minimum	40	38	37	37	37	37	38	38	37	36	35	35	35	34	34	34	34	34	34	34	34	33	33	33	32	32	32	33	32	32	32	35
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	33	34	39	41	42	39	38	38	--	--	--	34
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	33	34	38	39	36	36	38	--	--	--	33
March																																
Maximum	38	38	42	44	47	49	49	45	42	38	38	39	39	39	40	40	39	39	39	39	39	40	40	40	41	44	47	47	47	47	46	42
Minimum	37	36	38	41	44	46	45	42	38	36	35	37	39	39	39	39	39	38	38	37	39	39	40	40	39	41	43	46	46	43	43	40
April																																
Maximum	43	38	39	39	42	42	42	42	42	39	41	41	41	43	45	46	44	42	43	45	46	47	51	53	54	54	52	51	49	49	--	45
Minimum	38	37	37	38	38	41	41	41	39	38	38	41	40	40	43	44	41	40	41	42	45	46	47	50	53	52	50	48	47	47	--	43
May																																
Maximum	52	51	50	51	52	52	56	58	58	--	59	62	63	64	64	63	60	59	59	59	58	57	58	60	62	62	59	58	59	61	61	58
Minimum	49	50	49	48	49	51	52	55	57	--	57	58	60	60	62	58	56	58	57	57	57	56	55	56	59	59	57	55	57	57	59	56
June																																
Maximum	63	67	67	67	69	70	70	70	69	69	71	74	75	74	69	64	66	68	70	70	69	69	68	68	68	68	69	71	72	74	--	69
Minimum	59	63	66	64	66	67	68	69	67	67	68	70	72	69	64	63	63	64	67	68	67	66	67	66	67	66	66	67	69	70	--	66
July																																
Maximum	76	75	74	72	71	71	72	71	71	70	72	72	72	73	73	73	74	75	74	74	75	77	78	77	75	74	74	75	76	77	77	74
Minimum	72	73	71	71	70	69	69	69	68	68	69	71	71	71	72	72	71	72	73	72	72	74	76	75	74	73	73	73	74	75	75	72
August																																
Maximum	77	76	76	76	76	76	76	75	76	76	77	78	77	75	75	76	75	75	75	73	72	71	71	72	73	74	74	75	75	75	75	75
Minimum	75	75	74	74	74	74	74	73	73	75	75	76	75	73	72	74	72	72	72	72	71	70	70	70	71	72	73	73	74	73	73	73
September																																
Maximum	74	75	76	76	76	76	76	76	75	75	75	76	76	76	76	72	70	68	68	69	71	72	73	74	73	73	70	69	66	65	--	73
Minimum	73	74	74	75	74	74	75	74	74	73	73	74	75	76	72	70	68	66	67	67	69	70	71	72	73	70	69	66	65	64	--	71

BEAVER RIVER BASIN--Continued

3-995. MAHONING RIVER AT LOWELLVILLE, OHIO

LOCATION.--At Washington Street Bridge at Lowellville, Mahoning County, 300 feet downstream from gaging station, 1 mile upstream from Ohio-Pennsylvania State line, and 3 miles downstream from Yellow Creek.
DRAINAGE AREA.--1,076 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1951 to September 1953, October 1956 to September 1961.
Water temperatures: October 1943 to September 1944 (incomplete), October 1949 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 588 ppm Feb. 1-9; minimum, 221 ppm Apr. 1-23.
Hardness: Maximum, 282 ppm Feb. 1-9; minimum, 138 ppm Feb. 10-28.
Specific conductance: Maximum daily, 1,020 micromhos Feb. 8; minimum daily, 342 micromhos Apr. 20.
Water temperatures: Maximum, 97°F Sept. 8; minimum, 46°F Feb. 27, 28, Mar. 11.
EXTREMES, 1949-61.--Dissolved solids (1951-53, 1956-61): Maximum, 629 ppm Jan. 1-10, 1953; minimum, 145 ppm Feb. 11, 13, 15, 17, 1959.
Hardness (1951-53, 1956-61): Maximum, 328 ppm Jan. 1-10, 1953; minimum, 96 ppm Feb. 11, 13, 15, 17, 1959.
Specific conductance (1951-53, 1956-61): Maximum daily, 1,160 micromhos May 30, 1952; minimum daily, 160 micromhos Feb. 11, 1959.
Water temperatures: Maximum, 112°F Aug. 19, 1955; minimum, freezing point Dec. 5, 1960.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. Water temperatures affected by cooling water return from steel mills.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Alkyl benzene sulfonate (ABS)	Ammonia nitrogen as NH_4	Nitrite (NO_2)
Oct. 1-31, 1960	383	8.6	60	14	32	8.1		42		212	34	0.9	2.3	0.15	403	207	173		643		5	0.7	7.2	0.20
Nov. 1-11	413	8.0	63	15	33	8.5		68		199	37	.7	7.2	.15	408	219	163		665		12	.5	6.2	.20
Dec. 22-31	278	6.2	68	18	42	7.4		116		196	44	1.1	5.2	.70	451	244	149		756		16	1.1	9.5	2.5
Jan. 1-31, 1961	297	6.5	78	21	56	11		54		300	56	.4	7.1	.20	565	281	237		914		5	1.4	9.8	2.0
Feb. 1-9	281	6.6	80	20	60	12		56		325	63	.5	1.3	.30	588	282	236		968		5	2.2	12	.00
Feb. 10-28	1,306	7.3	37	11	17	5.3		36		121	23	.2	3.9	.90	247	138	108		426		10	.6	2.0	.40
Mar. 1-31	1,554	6.6	49	12	23	4.8		62		129	28	.4	9.5	1.0	291	172	121		476		20	.3	1.4	.30
Apr. 1-23	2,530	5.9	41	9.6	12	3.3		60		92	13	.3	5.8	.30	221	142	92		346		10	.1	.2	.00
May 1-19, 25-31	1,279	6.4	48	12	20	5.6		48		134	22	.6	12	.50	293	170	130		453		2	.2	.2	.00
June 1-30	888	8.5	50	11	21	5.9		48		142	24	.6	9.8	.50	307	170	131		473		10	.3	1.1	1.0
July 1-31	696	6.5	49	11	21	6.0		58		138	24	.6	5.9	1.0	305	167	120		473		32	.5	2.5	.75
Aug. 1-31	536	6.4	55	14	28	9.4		44		188	31	3.0	9.7	.20	356	195	159		586		5	.6	5.2	.15
Sept. 1-30	446	6.8	61	14	32	9.8		42		204	36	3.0	27	.20	386	210	175		627		5	.6	5.6	.15
Weighted average	a964	6.8	49	12	22	5.9		53		143	25	0.7	8.6	0.56	304	173	129		487		12	0.4	2.3	0.37
Time-weighted average	--	7.0	55	14	29	7.3		53		177	32	1.0	9.1	0.47	358	194	151		576		11	0.6	4.2	0.57
Tons per day	--	16	116	28	53	14		126		338	60	2.0	20	1.3	717	407	304		--		--	1.0	5.5	0.88

a Mean discharge for 365 days; mean discharge for 313 days of chemical analyses, 874 cfs.

3-995. MAHONING RIVER AT LOWELLVILLE, OHIO--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	84	82	81	81	82	83	83	83	83	84	85	84	85	87	87	87	81	80	79	79	78	77	76	73	71	72	72	74	74	72	70	80
Minimum	82	80	80	80	80	82	82	82	82	81	82	82	82	85	85	81	80	79	78	78	77	76	73	71	69	70	70	72	72	70	67	78
November																																
Maximum	68	69	69	68	68	65	63	65	67	67	65	65	64	65	68	69	69	67	67	66	65	65	65	65	64	64	64	66	65	63	--	66
Minimum	67	67	68	67	65	63	62	63	65	64	64	63	63	64	65	68	67	67	66	64	63	63	65	63	63	63	63	64	63	59	--	64
December																																
Maximum	61	62	62	62	64	64	63	60	60	59	59	58	56	58	58	58	58	57	58	59	58	57	56	55	55	55	55	56	57	57	58	59
Minimum	60	61	61	61	61	63	61	59	58	58	59	56	55	55	57	58	57	56	57	58	57	55	55	55	54	54	55	53	56	57	57	57
January																																
Maximum	58	57	59	59	61	63	62	61	61	62	64	66	66	67	66	66	67	67	64	64	63	62	60	60	61	62	63	63	62	62	63	63
Minimum	57	57	57	57	59	61	61	59	59	61	62	64	65	65	65	65	66	64	64	62	62	60	60	60	59	61	62	61	62	61	61	61
February																																
Maximum	64	64	62	61	63	64	66	67	67	67	67	66	65	66	65	64	61	60	54	49	52	55	57	59	59	53	47	47	--	--	--	60
Minimum	60	61	59	60	61	62	63	63	64	65	65	65	63	63	62	61	60	54	49	47	48	52	55	57	53	47	46	46	--	--	--	58
March																																
Maximum	48	51	54	54	52	50	51	51	50	48	48	49	49	48	48	48	48	48	48	48	47	48	49	49	49	50	52	54	56	56	56	50
Minimum	47	48	51	52	5	50	5	50	48	47	46	48	48	48	48	48	48	47	48	47	47	47	48	49	48	48	50	52	54	54	55	49
April																																
Maximum	55	52	48	47	48	49	50	50	50	50	48	47	49	51	53	53	51	50	52	54	55	55	55	59	60	60	59	58	57	56	--	53
Minimum	52	48	47	47	47	48	49	49	50	48	47	47	47	49	51	51	50	50	50	52	54	55	54	55	59	59	58	57	56	56	--	51
May																																
Maximum	58	60	60	62	63	63	63	65	65	66	69	71	73	74	74	74	73	73	73	73	74	74	74	79	82	82	78	78	78	78	82	71
Minimum	56	58	59	60	62	63	63	63	64	65	66	68	71	72	73	72	71	72	73	73	73	73	73	74	78	78	76	76	76	75	78	69
June																																
Maximum	83	78	79	78	80	83	86	86	86	86	77	80	84	84	82	80	78	80	81	82	82	83	83	81	81	80	82	84	86	86	--	82
Minimum	78	74	78	75	78	80	83	85	86	76	76	77	80	82	80	77	76	78	79	80	81	81	81	81	79	79	80	82	84	81	--	80
July																																
Maximum	86	87	85	83	82	85	86	85	84	84	88	89	89	88	88	87	85	87	87	88	89	89	89	89	89	88	88	89	88	89	88	87
Minimum	84	85	83	81	81	82	83	84	83	82	83	87	87	87	87	83	83	84	84	85	85	85	87	87	86	85	85	86	87	87	87	85
August																																
Maximum	88	90	91	91	91	89	89	89	92	91	91	89	88	86	90	91	91	92	93	91	88	88	91	92	91	90	89	92	91	92	92	90
Minimum	87	88	88	89	86	88	87	86	88	89	88	86	86	86	86	88	87	88	90	86	86	86	88	89	88	89	88	88	89	88	89	88
September																																
Maximum	92	92	92	92	92	95	94	97	95	95	94	96	96	95	92	90	89	88	88	91	91	94	94	94	93	88	91	89	88	87	--	92
Minimum	90	89	88	89	90	91	92	92	92	92	91	93	93	90	89	88	87	86	86	87	87	88	90	91	87	86	87	87	86	84	--	89

OHIO RIVER MAIN STEM

3-1097. OHIO RIVER AT LOCK AND DAM 8, AT NEWELL, W. VA.

LOCATION.--About 1,000 feet upstream from dam, lock and dam 8 (mile 46.4), at Newell, Hancock County, 2,500 feet upstream from Rowes Run, and 3,300 feet downstream from Muckmores Run.
DRAINAGE AREA.--23,500 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1954 to November 1960 (discontinued).
Water temperatures: October 1954 to November 1960 (discontinued).
EXTREMES, 1954-60.--Dissolved solids: Maximum, 504 ppm Oct. 21-23, 30-31, 1957; minimum, 82 ppm Mar. 25-31, 1960.
Hardness: Maximum, 246 ppm Oct. 21-23, 30-31, 1957; minimum, 46 ppm Mar. 25-31, 1960.
Specific conductance: Maximum daily, 797 micromhos Oct. 15, 1957; minimum daily, 133 micromhos Apr. 2, 1960.
Water temperatures: Maximum, 88°F July 31, 1955; minimum, freezing point on many days during winter months.
REMARKS.--Samples for iron and manganese filtered clear when collected. Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. No discharge records available for this station.

Chemical analyses, in parts per million, October to November 1960

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 1-10, 1960.....	6.4		0.25	0.31	48	11	28	3.4		16	175	21	0.4	4.1	0.50	310	165	152		488		3		0.1
Oct. 11-20...	6.6		.31	.30	46	11	31	3.0		16	175	23	.5	5.2	.35	311	160	147		492		3		.1
Oct. 21-31...	7.4	0.1	.13	1.1	51	12	38	4.0		6	206	24	.5	9.1	.50	364	177	172		562		3		.2
Nov. 1-15....	12		.29	.79	49	13	36	4.1		12	205	26	.4	5.0	.10	370	176	166		546		0		.2

Analyses, of additional samples

Date of collection	Acidity (H^{+1})	Aluminum (Al)	Chromium (Cr): Hexavalent	Chromium (Cr): Total	Nickel (Ni)	Copper (Cu)	Lead (Pb)	Zinc (Zu)	Cobalt (Co)	Arsenic (As)	Cadmium (Cd)
Nov. 1-6, 1960...	0.0	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.0
July 26-27, 1961.	.1	.2	.00	.00	.00	.00	.00	.29	.00	.00	.0
Aug. 22-24.....	.0	.2	.00	.00	.06	.09	.00	.18	.00	.00	.0

Temperature (°F) of water, October and November, 1960

Month	Day 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	Average
October.....	72	72	72	72	70	70	68	70	69	68	68	68	68	68	68	67	67	65	66	65	64	64	63	61	59	57	59	59	57	59	58	66
November.....	57	57	55	55	55	59	59	58	58	58	58	57	54	53	52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

OHIO RIVER MAIN STEM--Continued

3-1107. OHIO RIVER AT NEW CUMBERLAND DAM, AT STRATTON, OHIO

LOCATION.--About 600 feet upstream from New Cumberland Dam (mile 54.3), 0.2 mile upstream from Stratton, Jefferson County, and about 1.1 mile downstream from Goose Run.
DRAINAGE AREA.--23,866 square miles.
RECORDS AVAILABLE.--Chemical analyses: January to September 1961.
Water temperatures: January to September 1961.
EXTREMES, January to September 1961.--Dissolved solids: Maximum, 305 ppm Sept. 1-30; minimum, 134 ppm Mar. 1-31.
Hardness: Maximum, 155 ppm Sept. 1-30; minimum, 80 ppm Mar. 1-31.
Specific conductance: Maximum daily, 516 micromhos Sept. 30; minimum daily, 168 micromhos Mar. 1.
Water temperatures: Maximum, 83°F Aug. 31, Sept. 4, 9, 13; minimum, 33°F Jan. 29, Feb. 2.
REMARKS.--Acidity determined to pH 7.0. Samples for iron and manganese filtered clear when collected. Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. No discharge records available. This station moved from lock and dam 8, at Newell, W. Va., which was discontinued November 1960.

Chemical analyses, in parts per million, January to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Jan. 12-31, 1961.....	7.1		0.20	0.94	36	9.5	22	1.8		20		122	23	0.2	4.4	0.10	252	129	113		388		1		0.2
Feb. 1-28....	6.1		.70	.37	33	9.2	20	2.6		18		116	18	.3	6.1	.12	238	121	106		369		7		.2
Mar. 1-31....	6.0		.34	.25	22	6.0	7.3	1.4		11		72	8.5	.1	3.2	.40	134	80	70		224		3		.0
Apr. 1-30....	5.4		.18	.31	25	6.6	7.9	1.3		16		76	10	.2	2.9	.20	143	90	76		240		5		.0
May 1-31.....	5.3		.10	.37	24	8.4	10	1.6		16		90	9.0	.2	2.4	.15	166	94	82		262		5		.0
June 1-30....	5.9		.20	.57	27	7.0	12	1.9		14		97	10	.2	2.9	.16	176	96	85		284		2		.1
July 1-31....	6.5		.16	.93	38	11	23	2.5		8		160	15	.2	4.1	.23	274	140	134		418		1		.1
Aug. 1-31....	6.4		.14	.82	36	9.4	20	3.0		8		142	16	.3	4.2	.08	236	129	122		376		4		.1
Sept. 1-30...	6.5		.06	1.1	44	11	30	3.8		10		174	24	.5	6.7	.19	305	155	147		488		3		.1
Time-weighted average....	6.1		0.23	0.62	31	8.6	17	2.2		13		116	14	0.2	4.1	0.19	212	114	103		336		4		--

OHIO RIVER MAIN STEM--Continued

3-1107. OHIO RIVER AT NEW CUMBERLAND DAM, AT STRATTON, OHIO--Continued

Temperature (°F) of water, January to September 1961

Month	Day																															Average
	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	
January	--	--	--	--	--	--	--	--	--	--	--	39	39	38	38	38	39	37	37	37	36	35	37	35	34	34	34	34	33	34	37	--
February	35	33	35	34	34	34	34	35	35	35	35	34	38	39	39	39	36	37	37	37	35	35	37	38	39	40	40	41	--	--	--	36
March	41	42	41	42	43	48	44	47	46	44	44	43	44	44	39	41	41	42	44	42	42	44	45	47	44	45	45	47	46	47	47	44
April	44	45	45	45	45	45	45	45	45	46	45	45	44	45	45	45	45	45	45	47	47	47	53	54	55	55	55	54	54	51	--	48
May	52	53	52	52	52	53	54	52	50	56	58	59	61	64	62	55	62	64	65	65	63	62	61	60	60	59	59	60	61	59	61	58
June	62	65	65	66	--	68	68	69	69	70	72	73	74	74	73	70	70	69	71	70	71	70	70	71	71	71	71	72	73	--	--	70
July	72	75	79	78	77	76	76	77	76	75	75	76	76	75	77	77	77	78	78	78	79	80	81	81	81	81	81	81	82	82	80	78
August	82	81	81	82	82	82	81	82	81	80	80	79	78	79	80	80	80	80	82	80	79	78	79	80	79	79	79	80	80	82	83	80
September	82	82	82	83	82	82	82	82	83	82	82	82	83	82	81	80	80	78	78	77	77	77	77	79	77	78	77	76	75	74	--	80

MUSKINGUM RIVER BASIN

3-1290. TUSCARAWAS RIVER AT NEWCOMERSTOWN, OHIO

LOCATION.--At gaging station at highway bridge, 0.8 mile south of Newcomerstown, Tuscarawas County, 2 miles upstream from Buckhorn Creek, and 4 miles downstream from Dunlap Creek.
DRAINAGE AREA.--2,436 square miles.
RECORDS AVAILABLE.--Chemical analyses: July 1946 to September 1948, October 1955 to September 1959, October 1960 to September 1961.
Chloride: July 1946 to May 1949, Oct. 1957 to September 1961.
Hardness: October 1957 to September 1960.
Specific conductance: July 1946 to September 1948, October 1955 to September 1961.
Water temperatures: July 1946 to May 1949, October 1955 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 3,400 micromhos Oct. 24; minimum daily, 333 micromhos Apr. 27.
Water temperatures: Maximum, 81°F Sept. 4, 6, 13; minimum, not determined.
EXTREMES, 1946-49, 1955-61.--Hardness (1946-48, 1955-60): Maximum, 1,780 ppm Oct. 20, 1955; minimum, 91 ppm Jan. 23, 1959.
Specific conductance: Maximum daily, 6,530 micromhos Sept. 21, 1948; minimum daily, 232 micromhos May 9, 1947.
Water temperatures: Maximum, 86°F Aug. 22, 1959; minimum, freezing point on many days during winter months.
REMARKS.--Ohio Canal diverts small amount of water from river at Portage Lake, 3 miles south of Akron. Part of diverted water goes into the Cuyahoga River basin. Flow regulated by 8 flood-control reservoirs. Samples for iron and manganese filtered clear when collected.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed: Filtered	Oxygen consumed: Unfiltered
Oct. 26, 1960	335	11		0.23	0.86	312	24	261	7.6		172		190	790	3.3	6.4		1690	878	737		3080	6.6	8	2.4	2.9
Nov. 2-11....	489	14		a.01	--	283	28	270	11		138		226	715	2.1	14		b1630	822	709		2870	7.4	2	--	--
Nov. 15.....	428	11		.29	2.0	279	22	214	8.8		124		218	680	1.2	12		b1510	787	686		2710	6.8	13	2.9	2.9
Dec. 5-12....	395	12		.02	--	277	20	253	8.1		149		197	675	1.7	15		b1530	774	652		2770	7.4	4	--	--
Jan. 20-25, 1961.....	940	9.6		.02	--	127	17	97	4.8		94		157	245	1.1	9.0		822	387	310		1300	7.4	5	--	--
Feb. 1.....	500	13		.71	1.3	229	22	225	7.1		172		180	570	1.6	7.2		1550	663	522		2490	7.1	5	2.3	2.4
Feb. 17-22...	4330	8.2		a.01	--	72	12	39	3.8		64		115	94	.6	9.4		457	229	177		682	7.0	4	--	--
Mar. 2.....	8120	7.2		1.8	1.0	66	11	37	2.8		46		102	95	.1	9.4	0.40	b356	210	172		641	6.7	12	3.0	5.0
Mar. 30.....	2340	7.6		.55	.81	121	16	84	3.6		94		148	212	.4	5.0		713	368	291		1160	6.9	18	2.0	4.0
Apr. 27-29...	5113	7.2		--	--	42	12	12	2.2		35		120	25	.2	1.7		b242	155	126		399	6.8	3	--	--
May 17.....	3430	6.4		.78	.80	98	18	56	3.0		86		154	140	.5	3.8		594	319	248		910	7.0	8	2.0	3.0
June 12.....	3840	7.9		.42	1.0	77	15	44	2.8		58		132	114	.6	5.3		505	254	206		747	6.8	6	2.0	2.0
July 10.....	705	.0		.20	.51	166	21	129	4.1		72		214	338	1.3	4.9		1046	501	442		1630	6.9	8	2.0	4.0
Aug. 10.....	1100	9.6		.33	.62	132	21	100	5.1		102		181	248	1.6	11		888	416	333		1320	7.2	9	--	--
Sept. 6.....	866	.2		.67	a.11	144	24	100	5.7		77		257	252	1.4	5.0		898	458	395		1380	6.9	11	2.0	2.0

a In solution when analyzed.
b Calculated from determined constituents.

MUSKINGUM RIVER BASIN--Continued

3-1290. TUSCARAWAS RIVER AT NEWCOMERSTOWN, OHIO--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Dissolved oxygen		Organics		Ammonia nitrogen as NH_4	Nitrite (NO_2)	Cyanide (CN)	Turbidity	Threshold odor
	Parts per million	Percent saturation	Phenols as C_6H_5OH	Alkyl benzene sulfonate (ABS)					
Oct. 26, 1960	11.0	95		0.4				8	M-4
Nov. 15	8.8	76		.5				6	M-8
Feb. 1, 1961	8.2	57		.5				2	M-1
Mar. 2	8.6	66		.0				80	M-3
Mar. 30	8.0	68		.1				35	E-1
May 17	6.1	63		.2				30	E-1
June 12	5.9	68		.1				30	E-1
July 10	--	--		.2				8	Bs-1
Aug. 10	5.8	67		.2				20	E-3
Sept. 6	--	--		.2				25	M-2

MUSKINGUM RIVER BASIN--Continued

3-1290. TUSCARAWAS RIVER AT NEWCOMERSTOWN, OHIO--Continued

Specific conductance and chloride (Cl), water year October 1960 to September 1961

Day	October		November		December		January	
	Specific conductance (micromhos at 25°C)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Chloride (Cl)
1	2,600	640	2,510	600	1,460	285	--	--
2	2,600	650	3,030	780	1,860	410	--	--
3	2,910	760	3,030	780	2,120	480	--	--
4	2,760	700	3,030	770	2,290	530	--	--
5	2,840	740	2,910	730	2,400	570	--	--
6	2,740	690	2,760	690	2,750	690	--	--
7	2,780	700	2,800	720	2,930	740	--	--
8	2,700	680	3,110	800	2,810	690	--	--
9	2,700	680	2,760	700	2,930	720	--	--
10	2,890	750	2,820	720	3,000	740	--	--
11	2,870	740	2,640	670	2,730	660	--	--
12	2,760	700	2,280	560	2,730	670	--	--
13	2,690	680	2,210	510	--	--	--	--
14	2,670	670	2,820	740	--	--	--	--
15	3,030	790	2,700	700	--	--	--	--
16	2,840	750	2,490	600	--	--	--	--
17	2,780	720	1,680	360	--	--	1,660	350
18	2,890	750	994	164	--	--	1,310	255
19	2,910	750	978	164	--	--	--	--
20	2,820	740	978	169	--	--	1,170	215
21	2,960	760	1,040	182	--	--	1,180	212
22	3,220	870	1,030	178	--	--	1,200	215
23	3,140	840	1,010	178	--	--	1,310	250
24	3,400	930	984	170	--	--	1,350	258
25	2,800	710	1,020	178	--	--	1,450	280
26	3,030	800	1,020	180	--	--	1,920	440
27	3,080	820	955	164	--	--	2,150	500
28	--	--	1,260	252	--	--	2,120	490
29	--	--	1,410	282	--	--	2,200	520
30	2,730	690	1,360	255	--	--	2,530	620
31	2,280	520	--	--	--	--	--	--

	February		March		April		May	
1	2,460	560	596	85	1,100	200	832	145
2	--	--	668	110	730	102	775	130
3	--	--	685	111	621	84	640	88
4	--	--	706	122	568	68	634	88
5	--	--	622	92	650	90	658	94
6	--	--	452	55	730	108	683	97
7	3,040	760	496	69	828	134	619	71
8	2,830	680	686	116	986	175	757	106
9	2,760	660	747	132	1,030	182	616	66
10	2,660	640	836	165	813	129	691	99
11	2,580	620	836	160	857	154	742	114
12	2,410	580	815	145	755	124	734	104
13	2,500	620	706	116	714	109	780	104
14	2,410	580	681	96	874	164	955	159
15	1,920	405	978	178	726	132	846	119
16	1,500	292	840	141	779	110	881	126
17	778	104	862	140	600	81	919	141
18	668	86	963	174	524	66	965	158
19	770	117	830	129	629	95	1,060	184
20	590	66	874	140	504	54	1,110	194
21	728	106	838	136	621	--	965	152
22	637	82	1,120	220	664	100	1,110	196
23	912	160	1,210	232	475	52	1,050	172
24	1,080	200	1,040	198	469	54	1,140	200
25	679	102	1,030	188	542	74	1,240	225
26	799	134	992	172	356	26	1,230	224
27	547	63	989	180	333	18	1,220	219
28	476	50	1,120	210	381	20	1,100	180
29	--	--	1,150	215	463	25	1,140	199
30	--	--	1,210	230	741	124	1,180	205
31	--	--	1,080	195	--	--	1,510	312

MUSKINGUM RIVER BASIN--Continued

3-1290. TUSCARAWAS RIVER AT NEWCOMERSTOWN, OHIO--Continued

Specific conductance and chloride (Cl), water year October 1960 to September 1961--Continued

Day	June		July		August		September	
	Specific conductance (micromhos at 25°C)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Chloride (Cl)
1	1,270	230	1,780	365	638	104	2,370	565
2	1,140	202	1,770	370	601	82	1,880	395
3	835	148	1,730	355	539	72	1,850	392
4	592	76	1,740	350	650	89	1,860	402
5	659	94	1,730	350	830	128	2,130	495
6	692	94	1,770	372	799	105	1,400	255
7	829	138	1,750	372	915	138	1,680	355
6	992	188	1,990	440	1,010	155	1,650	330
9	823	132	1,840	400	1,240	230	1,990	460
10	650	89	1,680	345	1,310	250	1,900	430
11	638	87	1,700	362	1,490	298	1,850	430
12	742	116	1,760	385	1,510	295	2,130	515
13	791	118	1,840	415	1,510	295	2,060	485
14	796	112	1,850	415	1,590	332	2,040	465
15	882	132	1,880	425	1,680	350	2,260	545
16	1,000	190	2,010	460	1,700	350	2,190	510
17	940	165	2,010	465	1,390	250	2,440	585
18	904	141	2,210	530	1,470	270	2,430	590
19	1,150	212	1,840	420	1,520	280	2,600	645
20	1,240	232	1,410	300	1,740	340	2,620	670
21	1,110	182	1,120	240	1,840	380	2,700	675
22	1,190	206	828	148	2,120	480	2,760	700
23	1,310	242	746	110	2,010	440	2,620	655
24	1,490	300	809	122	2,260	520	2,620	640
25	1,450	280	811	124	2,530	600	2,570	645
26	1,450	276	1,110	205	1,690	340	2,660	680
27	1,560	309	1,320	268	1,560	290	2,940	785
28	1,570	315	1,450	305	1,950	420	2,870	740
29	1,490	288	1,270	255	1,850	380	2,810	710
30	1,580	311	1,160	222	1,970	420	2,720	670
31	--	--	638	104	2,150	490	--	--

MUSKINGUM RIVER BASIN--Continued

3-1290. TUSCARAWAS RIVER AT NEWCOMERSTOWN, OHIO--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement, usually at 6 p.m.)

Month	Day																															Average
	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	
October	63	63	62	63	64	64	62	62	62	64	64	65	65	66	66	64	65	63	59	56	55	54	54	49	50	48	49	--	--	57	51	60
November	50	50	49	49	48	45	43	43	44	44	43	43	44	47	50	52	49	47	46	47	47	47	47	45	45	45	48	49	45	40	--	46
December	38	38	38	39	40	43	40	37	35	33	--	32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	33	33	--	32	32	32	32	32	32	32	32	--	32	32	--	--
February	32	--	--	--	--	--	32	32	32	32	33	33	33	33	33	38	38	41	40	40	40	40	43	47	40	40	39	39	--	--	--	37
March	40	41	43	46	53	53	51	50	45	43	43	44	43	43	45	43	44	43	42	44	44	45	45	45	47	49	51	51	51	52	47	46
April	45	42	42	43	44	44	45	47	45	43	44	44	44	47	48	47	45	43	45	48	48	50	53	57	58	55	55	54	52	53	--	48
May	54	54	54	55	53	55	--	59	59	60	62	62	64	65	67	62	62	60	60	57	58	60	60	63	65	59	57	60	55	61	63	60
June	67	69	68	68	68	69	70	70	70	70	71	75	76	72	69	68	68	69	71	71	69	71	69	68	66	68	70	72	75	78	--	70
July	79	79	80	71	70	75	74	71	72	74	76	73	74	77	75	76	77	78	73	74	75	77	78	77	77	76	76	78	75	75	75	75
August	75	75	75	74	76	75	76	76	78	78	78	75	75	76	77	77	78	78	78	74	73	74	75	76	75	75	76	78	78	78	79	76
September	78	79	79	81	80	81	79	80	79	77	79	80	81	75	69	69	69	68	68	71	73	78	73	73	77	70	70	68	66	64	--	74

MUSKINGUM RIVER BASIN--Continued

3-1423. SALT FORK AT MOUTH, NEAR CAMBRIDGE, OHIO

LOCATION.--At bridge on U.S. Highway 21, 0.3 mile upstream from mouth, and 4 miles north of Cambridge, Guernsey County.
DRAINAGE AREA.--160 square miles.
RECORDS AVAILABLE.--Chemical analyses: June 1959 to September 1961.
REMARKS.--Samples for iron and manganese filtered clear when collected. No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed: Filtered	Oxygen consumed: Unfiltered
Oct. 13, 1960	4.5		0.48	0.16	46	12	21	4.0		140		52	31	0.4	0.5		241	165	50		447	6.9	8	--	--
Nov. 16.....	7.4		.49	.12	57	15	18	3.0		96		125	25	.3	.1		325	204	125		517	6.9	13	2.2	2
Dec. 29.....	7.6		.66	.03	59	15	17	1.4		126		112	24	.2	.5		313	209	106		508	7.0	5	.7	1
Feb. 2, 1961.	7.9		.59	.10	47	11	14	1.4		100		81	18	.1	1.1		242	162	80		424	6.8	5	.8	1
Mar. 2.....	6.9		.46	.74	24	6.3	3.4	.9		34		59	6.0	.2	2.9	0.40	130	86	58		215	6.8	27	2	3
Mar. 30.....	5.5		.37	.21	33	9.6	8.8	1.3		66		69	10	.1	.9		179	122	68		293	7.0	20	1	2
May 17.....	6.0		.36	.25	33	10	8.0	1.2		70		67	10	.2	.4		176	124	66		285	7.1	8	1	2
June 26.....	5.9		.51	.27	43	11	12	1.4		98		73	22	.2	.6		236	152	72		366	7.2	27	1	2
July 10.....	6.9		.72	.57	43	11	14	1.7		85		88	19	.2	.6		241	152	82		379	7.2	18	2	5
Aug. 10.....	8.4		.60	.25	38	10	16	1.9		94		62	24	.3	1.1		216	136	59		368	7.3	6	--	--
Sept. 7.....	5.8		.66	a.13	42	13	24	3.4		105		64	42	.3	.8		248	159	72		430	7.1	8	3	3

a In solution when analyzed.

Date of collection	Dissolved oxygen: Parts per million	Dissolved oxygen: Percent saturation	Alkyl benzene sulfonate (ABS)	Turbidity
Oct. 13, 1960.....	--	--	--	--
Nov. 16.....	7.8	69	0.0	10
Dec. 29.....	8.8	61	0.0	2
Feb. 2, 1961.....	8.8	61	0.0	2
Mar. 2.....	8.8	66	0.0	45
Mar. 30.....	11.2	92	0.0	15
May 17.....	8.0	80	0.1	30
June 26.....	8.1	80	0.0	20
July 10.....	6.6	71	0.0	15
Aug. 10.....	6.9	77	0.0	25
Sept. 7.....	5.4	62	0.0	70

3-1445. MUSKINGUM RIVER AT DRESDEN, OHIO

LOCATION.--At gaging station at bridge on State Highway 208, 0.5 mile east of Dresden, Muskingum County, and 0.5 mile downstream from Wakatomika Creek.
DRAINAGE AREA.--5,982 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1952 to September 1961.
Sediment records: October 1952 to September 1961.
EXTREMES, 1960-61.--Sediment concentrations: Maximum daily, 653 ppm Feb. 26; minimum daily, 1 ppm Dec. 16, 17.
Sediment loads: Maximum daily, 34,900 tons Apr. 26; minimum daily 3 tons Dec. 16, 17.
EXTREMES, 1952-61.--Water temperatures (1952-60): Maximum, 88°F Aug. 4, 1955; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 1,600 ppm Jan. 22, 1959; minimum daily, 1 ppm on several days during 1952, 1954, 1956, and 1960.
Sediment loads: Maximum daily, 160,000 tons Jan. 22, 1959; minimum daily, 3 tons on several days during 1952, 1954, 1956, 1960.
REMARKS.--Flow regulated by 14 flood-control resevoirs.

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement at approximately 2 p.m.)

Month	Day																															Average
	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	
October	67	65	62	63	63	65	--	--	--	60	--	--	--	--	--	--	62	--	--	--	--	--	--	52	--	--	--	--	--	--	53	--
November	--	--	--	--	--	--	42	--	--	--	--	--	--	--	--	--	--	--	--	--	48	--	--	--	--	--	--	49	--	--	--	--
December	--	--	--	--	43	--	--	--	--	--	--	--	--	--	38	--	--	--	--	--	--	--	--	36	--	--	--	36	--	--	--	--
January	--	--	--	--	--	--	39	--	--	--	--	--	37	--	--	--	--	--	34	--	--	--	--	--	--	--	--	--	--	--	35	--
February	--	--	--	--	--	32	35	--	--	--	--	--	--	38	--	35	33	38	40	39	39	40	42	44	46	41	41	40	--	--	--	--
March	39	41	41	44	46	49	49	49	48	45	46	45	45	44	44	44	43	--	43	44	44	46	45	--	44	46	51	51	50	49	48	46
April	47	43	43	43	43	43	44	46	45	44	44	45	44	46	47	46	45	44	45	46	48	50	52	56	57	57	56	56	54	54	--	48
May	53	53	55	54	53	56	56	56	57	57	57	60	61	63	64	64	63	62	62	63	57	56	56	59	61	60	59	57	60	--	--	58
June	--	68	68	66	66	68	68	69	69	69	70	--	73	72	69	65	66	67	67	69	--	--	--	--	--	65	--	--	--	--	--	--
July	--	--	76	--	--	--	--	--	--	69	--	--	--	--	--	--	74	--	--	73	75	74	77	76	76	76	75	--	78	76	74	--
August	76	75	74	73	73	73	72	73	--	--	--	--	--	74	--	--	--	--	--	--	74	--	--	--	--	--	--	75	--	--	--	--
September	--	--	--	--	80	--	--	--	--	--	76	--	--	--	--	--	--	65	--	--	--	--	--	--	76	--	--	--	--	--	--	--

MUSKINGUM RIVER BASIN--Continued

3-1445. MUSKINGUM RIVER AT DRESDEN, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961

Day	OCTOBER				NOVEMBER				DECEMBER			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	830	23		52	1010	12		35	1800	9	B	45
2..	848	22		50	1040	11	B	30	1730	7	B	35
3..	890	20		48	1060	9	B	25	1600	6	B	25
4..	917	28		69	1030	8	B	20	1520	4	B	16
5..	899	22		53	1010	6	B	16	1470	2		8
6..	873	27		64	1030	5	B	14	1440	2	B	8
7..	848	25	B	55	1090	4		12	1420	2	B	8
8..	830	25	B	55	1190	4		13	1430	2	B	8
9..	935	25		65	1230	5	B	17	1410	2	B	8
10..	1030	26		72	1420	5	B	19	1270	2	B	7
11..	1010	25	B	70	1690	5	B	25	1170	2	B	6
12..	935	25	B	65	1710	5	B	25	1090	2	B	6
13..	908	25	B	60	1570	6	B	25	830	2	B	4
14..	856	25	B	55	1410	6		23	864	2	B	5
15..	873	25	B	60	1280	7	B	25	953	2		5
16..	830	25	B	55	1250	7	B	25	1060	1	B	3
17..	789	21		45	2070	30	B	170	990	1	B	3
18..	789	20	B	40	2620	40	B	280	980	2	B	5
19..	805	25	B	55	2780	40	B	300	1000	2	B	5
20..	822	25	B	55	2840	40	B	310	926	2	B	5
21..	856	30	B	70	2870	42		325	953	2	B	5
22..	917	30	B	75	2860	40	B	310	805	2	B	4
23..	890	30	B	70	2760	45	B	340	773	2	B	4
24..	864	32		75	2600	40	B	280	805	2		4
25..	839	30	B	70	2510	35	B	240	873	2	B	5
26..	822	25	B	55	2370	30	B	190	935	3	B	8
27..	830	25	B	55	2130	20	B	120	990	3	B	8
28..	848	20	B	45	1830	12		59	980	3		8
29..	856	19	B	45	1810	12	B	60	1040	3	B	8
30..	890	17	B	40	1790	12	B	60	1030	3	B	8
31..	1010	13		35	--	--		--	1030	3	B	8
Total	27139	--		1778	53850	--		3393	35167	--		285

Day	JANUARY				FEBRUARY				MARCH		
1..	1090	3	B	9	1280	3	B	10	23300	161	10100
2..	1080	3	B	9	1200	3	B	10	22800	113	6960
3..	1090	3	B	9	1210	3	B	10	22600	103	6280
4..	1070	3	B	9	1170	3	B	9	22600	118	7400
5..	1060	4	B	11	1160	3	B	9	25200	194	13200
6..	1110	5	B	15	1150	3		9	27400	214	15800
7..	1140	5		15	1160	3		9	25900	153	10700
8..	1270	5	B	17	1170	3	B	9	26600	130	9340
9..	1490	4	B	16	1160	3	B	9	27200	108	7930
10..	1680	3	B	14	1190	3	B	10	27600	96	7150
11..	1870	3	B	15	1190	3	B	10	27400	80	5920
12..	1870	3	B	15	1230	3	B	10	26700	79	5700
13..	1790	2		10	1260	3	B	10	25500	81	5580
14..	1730	3	B	14	1520	14	S	60	23300	76	4780
15..	1720	3	B	14	2880	100	K	850	22000	81	4810
16..	2130	7	B	40	6040	368		6000	21000	81	4590
17..	2910	20	B	160	7470	215		4340	19700	77	4100
18..	3830	45	B	460	8600	190		4410	17700	74	3540
19..	4170	60		676	12600	393		13400	13800	129	4810
20..	3910	55	B	600	13900	398		14900	12600	96	3270
21..	3420	45	B	410	10800	202		5890	12900	99	3450
22..	2610	25	B	180	8360	125		2820	12000	87	2820
23..	1950	12	B	65	6830	73		1350	12700	85	2910
24..	1920	9	B	45	6810	63		1160	14100	92	3500
25..	1840	8	B	40	7150	100		1930	14500	79	3090
26..	1580	8	B	35	15400	653		27200	12800	66	2280
27..	1460	7	B	30	19300	405		21100	11100	58	1740
28..	1340	6	B	20	22400	271		16400	9980	63	1700
29..	1310	4	B	14	--	--		--	8580	58	1340
30..	1310	3	B	11	--	--		--	7450	49	986
31..	1310	3		11	--	--		--	6630	44	788
Total	58060	--		2989	165590	--		121934	583640	--	166364

S Computed by subdividing day.
B Computed from estimated-concentration graph.
K Computed from estimated-concentration graph and subdividing day.

MUSKINGUM RIVER BASIN--Continued

3-1445. *MUSKINGUM RIVER AT DRESDEN*, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961--Continued

Day	APRIL Mean discharge (cfs)	APRIL Suspended sediment Mean concentration (ppm)	APRIL Suspended sediment Tons per day	MAY Mean discharge (cfs)	MAY Suspended sediment Mean concentration (ppm)	MAY Suspended sediment Tons per day	JUNE Mean discharge (cfs)	JUNE Suspended sediment Mean concentration (ppm)	JUNE Suspended sediment Tons per day
1..	7270	52	1020	21700	112	6560	4070	17	B 190
2..	11900	104	3340	21900	89	5260	6990	299	5640
3..	15500	124	5190	21700	72	4220	13000	426	15000
4..	15700	108	4580	21500	69	4000	11800	213	6790
5..	14600	95	B 3800	21000	81	4590	11200	146	4420
6..	12800	95	B 3200	21600	79	4610	10200	113	3110
7..	10600	84	2400	21500	64	3720	9060	85	2080
8..	8670	59	1380	21200	67	3840	7640	63	1300
9..	7600	42	862	22000	111	6590	7700	95	1980
10..	10300	102	2840	21400	84	4850	9540	158	4070
11..	15600	129	5430	21500	73	4240	11600	198	6200
12..	17100	127	5860	21200	59	3380	10500	138	3910
13..	18100	104	5080	19900	57	3060	8930	90	2170
14..	18600	110	5520	18700	57	2880	7640	65	B 1300
15..	16500	118	5260	17500	52	2460	7770	87	1820
16..	16300	124	5460	15200	55	2260	9240	160	3990
17..	19500	172	9060	14000	62	2340	8080	126	2750
18..	21900	173	10200	13400	48	1740	6570	86	1520
19..	21900	128	7570	12700	42	1440	5650	64	976
20..	21600	103	6010	11100	46	1380	5010	49	663
21..	21800	80	4710	7740	90	1880	4640	40	501
22..	21700	139	8140	7210	49	954	4450	40	B 480
23..	22300	169	10200	6830	42	774	4130	35	B 390
24..	19500	117	6160	6400	38	657	3740	35	B 350
25..	21600	134	7810	5740	33	511	3460	30	B 280
26..	27300	473	34900	5530	35	522	3270	25	221
27..	20800	182	10200	5420	25	366	3040	25	B 200
28..	13200	139	4950	5350	23	332	2840	25	B 190
29..	11100	105	3150	5050	22	300	2610	25	B 180
30..	17700	102	4870	4740	20	B 260	2410	25	B 160
31..	--	--	--	4410	18	B 210	--	--	--
Total	499040	--	189152	445120	--	80186	206780	--	72831

Day	JULY Mean discharge (cfs)	JULY Suspended sediment Mean concentration (ppm)	JULY Suspended sediment Tons per day	AUGUST Mean discharge (cfs)	AUGUST Suspended sediment Mean concentration (ppm)	AUGUST Suspended sediment Tons per day	SEPTEMBER Mean discharge (cfs)	SEPTEMBER Suspended sediment Mean concentration (ppm)	SEPTEMBER Suspended sediment Tons per day
1..	2250	25	B 150	8930	205	4940	1280	18	B 60
2..	2140	25	B 140	9750	264	6950	1250	19	B 65
3..	2040	27	149	10400	242	6800	1470	20	B 80
4..	2030	25	B 140	9110	207	5090	1950	20	B 110
5..	2030	25	B 140	7600	116	2380	1860	21	105
6..	2110	25	B 140	6100	81	1330	1800	20	B 95
7..	2170	25	B 150	4950	57	762	1830	20	B 100
8..	2450	25	B 160	4010	48	520	2310	19	B 120
9..	2440	25	B 160	3370	40	B 360	2140	18	B 100
10..	2150	25	145	2970	30	B 240	1860	18	B 90
11..	1910	25	B 130	2660	25	B 180	1690	17	78
12..	1780	25	B 120	2570	25	B 170	1520	18	B 75
13..	1710	25	B 120	2690	25	B 180	1410	18	B 70
14..	1710	25	B 120	2600	23	161	1320	18	B 65
15..	1740	25	B 120	2330	25	B 160	1260	19	B 65
16..	1910	30	B 150	2080	20	B 110	1220	20	B 65
17..	1870	28	141	1990	20	B 110	1180	20	B 65
18..	1800	30	B 140	1890	20	B 100	1140	20	62
19..	2270	50	K 350	1780	20	B 95	1090	18	B 55
20..	7070	407	S 8300	1770	20	96	1070	17	B 50
21..	9660	448	11700	1810	20	98	1070	16	B 45
22..	9360	243	6140	1900	19	B 95	1060	14	B 40
23..	7540	194	3950	1870	18	B 90	1030	13	B 35
24..	5690	131	2010	1740	18	B 85	1010	12	B 35
25..	5830	232	3650	1680	18	B 80	1000	12	32
26..	4830	122	1590	1710	17	B 80	1020	12	B 35
27..	4010	78	844	1870	17	B 85	1250	12	B 40
28..	3210	60	B 500	1750	17	80	1240	12	B 40
29..	4410	131	S 1780	1590	17	B 75	1170	12	B 40
30..	6080	254	4170	1470	17	B 65	1100	12	B 35
31..	8380	323	7310	1390	17	B 65	--	--	--
Total	114580	--	54809	108330	--	31632	41600	--	1952

Total discharge for year (cfs-days)..... 2338896
Total load for year (tons)..... 727305

S Computed by subdividing day.
B Computed from estimated-concentration graph.
K Computed from estimated-concentration graph and subdividing day.

MUSKINGUM RIVER BASIN--Continued

3-1445. MUSKINGUM RIVER AT DRESDEN, OHIO--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Feb. 26, 1961.....	0945			14900	886		45	53	67	81	95	98	100					SBWC
Feb. 27.....	1530			19400	336		47	54	66	80	87	93	96	100				SHWC
Apr. 26.....	0845			27800	787		59	70	83	91	95	97	100					SBWC
Apr. 26.....	0845			27800	787		24	42	72	90	94	95	100					SBN
July 21.....	1235			9660	431		55	64	79	90	96	98	100					SBWC
July 21.....	1235			9660	431		11	18	35	69	92	92	100					SBN

MUSKINGUM RIVER BASIN--Continued

3-1500. MUSKINGUM RIVER AT McCONNELSVILLE, OHIO

LOCATION.--At bridge on State Highway 37 at McConnelsville, Morgan County, 0.5 mile upstream from gaging station and dam 7, and 3 miles downstream from Oilspring Run.
DRAINAGE AREA.--7,411 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1951, October 1954 to September 1961.
Specific conductance and chloride: October 1960 to September 1961.
Water temperatures: October 1950 to September 1951, July 1954 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,700 micromhos Nov. 21; minimum daily, 321 micromhos Apr. 28.
Water temperatures: Maximum, 84°F Sept. 8-10; minimum, freezing point Dec. 23, Jan. 25-29, Feb. 1-4, 6.
EXTREMES, 1950-51, 1954-61.--Dissolved solids (1950-51, 1954-60): Maximum, 2,070 ppm Oct. 13-15, 1954; minimum, 152 ppm Jan. 22-29, 1959.
Hardness (1950-51, 1954-60): Maximum, 916 ppm Oct. 13-15, 1954; minimum, 109 ppm Jan. 22-29, 1959.
Specific conductance: Maximum daily, 3,410 micromhos Oct. 14, 1954; minimum daily, 242 micromhos Jan. 24, 1959.
Water temperatures: Maximum, 94°F Aug. 4, 1955; minimum, freezing point on several days during winter months in 1951, 1955, 1959, and 1960.
REMARKS.--Flow regulated by 14 flood-control reservoirs.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed: Filtered	Oxygen consumed: Unfiltered
Oct. 26, 1960	922	2.4		0.25	0.58	133	26	103	5.5		139		172	255	1.1	2.6		760	439	325		1400	6.0	17	2.1	2.4
Nov. 1-9.....	1248	6.0		a.01	--	152	26	115	1.2		160		164	300	1.0	6.8		934	486	355		1510	7.4	3	--	--
Nov. 15.....	1450	6.6		.35	.86	130	22	98	5.9		152		156	234	.7	5.6		788	415	291		1320	7.1	11	3.0	3.4
Dec. 1-11....	1507	5.8		.01	--	95	17	51	3.0		136		122	116	.6	3.5		501	307	196		865	7.7	3	--	--
Dec. 28.....	994	6.9		.79	.88	166	26	121	6.1		166		159	318	.9	8.5		978	522	385		1620	6.8	7	1.9	2.6
Jan. 1-10, 1961.....	1260	8.1		.02	--	154	23	119	5.8		165		157	298	1.0	8.3		972	479	344		1540	7.6	4	--	--
Feb. 19-28...	15500	8.0		a.02	--	54	12	20	3.3		86		84	42	.4	6.6		300	184	114		471	7.1	5	--	--
Mar. 1.....	28400	6.4		.67	.95	40	8.8	10	2.3		64		71	22	.2	6.6	0.25	206	136	84		347	7.0	24	3.0	7.0
Mar. 29.....	10100	6.0		.27	.24	59	13	24	2.3		96		93	54	.2	3.9		333	201	122		531	7.0	8	2.0	4.0
Apr. 24-30...	22510	7.4		--	--	38	10	11	2.0		52		84	24	.2	2.8		b205	136	94		341	7.2	6	--	--
May 17.....	15000	5.5		.16	.17	54	11	19	2.2		96		91	38	.3	1.6		304	180	101		459	7.0	5	2.0	4.0
June 12.....	12300	6.6		.68	.54	56	12	19	2.5		82		102	44	.3	2.4		b286	189	122		476	7.0	6	2.0	2.0
July 10.....	2500	.0		.11	.39	95	20	52	3.0		109		162	132	.7	.3		555	319	230		898	7.3	9	2.0	4.0
Aug. 9.....	4410	7.8		.26	.21	67	14	24	3.3		104		112	59	.5	2.6		356	225	140		539	7.3	10	--	--
Sept. 6.....	1930	.6		.12	a.11	107	24	72	4.6		128		170	174	.9	3.0		638	366	261		1080	7.1	6	3.0	3.0

a In solution when analyzed.
b Calculated from determined constituents.

MUSKINGUM RIVER BASIN--Continued

3-1500. MUSKINGUM RIVER AT McCONNELSVILLE, OHIO--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Dissolved oxygen		Organics		Ammonia nitrogen as NH_4	Nitrite (NO_2)	Cyanide (CN)	Turbidity	Threshold odor
	Parts per million	Percent saturation	Phenols as C_6H_5OH	Alkyl benzene sulfonate (ABS)					
Oct. 26, 1960	8.6	83		0.3				8	0
Nov. 15	10.4	90		.3				9	M-2
Dec. 28	9.0	63		.2				5	E-2
Mar. 1, 1961	10.6	81		.1				200	0
Mar. 29	9.2	82		.1				20	0
May 17	7.3	76		.1				30	E-4
June 12	7.4	85		.1				25	0
July 10	--	--		.1				8	0
Aug. 9	7.8	95		.1				45	E-1
Sept. 6	5.0	65		.1				7	M-3

MUSKINGUM RIVER BASIN--Continued

3-1500. MUSKINGUM RIVER AT McCONNELSVILLE, OHIO--Continued

Specific conductance and chloride (Cl), water year October 1960 to September 1961

Day	October		November		December		January	
	Specific conductance (micromhos at 25°C)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Chloride (Cl)
1	1,310	250	1,500	280	867	123	1,590	310
2	1,310	260	1,510	282	872	122	1,560	300
3	1,330	270	1,580	300	847	114	1,560	298
4	1,350	280	1,650	322	822	107	1,530	285
5	1,360	280	1,630	315	867	120	1,530	288
6	1,390	280	1,490	272	863	118	1,550	298
7	1,400	280	1,540	290	865	120	1,670	335
8	1,350	270	1,540	290	872	114	1,510	285
9	1,400	280	1,400	248	865	114	1,500	285
10	1,440	290	1,200	190	902	119	1,480	280
11	1,430	275	1,190	190	893	120	1,390	245
12	1,400	270	1,380	250	1,000	150	1,360	235
13	1,310	250	1,320	225	1,030	162	1,340	242
14	1,360	270	1,270	208	1,060	172	1,190	200
15	1,410	280	1,320	230	1,080	176	1,110	175
16	1,440	290	1,400	255	1,120	182	910	150
17	1,430	280	1,410	260	1,210	210	1,180	198
18	1,410	280	1,380	248	1,310	240	960	132
19	1,340	260	1,380	240	1,360	250	897	124
20	1,300	240	1,290	220	1,380	250	880	130
21	1,280	240	1,700	342	1,400	250	865	130
22	1,310	260	1,220	205	1,410	255	847	126
23	1,330	260	866	117	1,480	270	843	126
24	1,400	280	838	110	1,480	275	742	93
25	1,460	290	858	116	1,490	275	727	86
26	1,390	270	870	116	1,500	288	780	108
27	1,370	260	862	114	1,520	295	797	114
28	1,460	280	896	124	1,620	--	733	86
29	1,510	310	908	132	1,670	335	773	98
30	1,450	290	883	126	1,640	322	--	--
31	1,450	290	--	--	--	--	--	--

Day	February		March		April		May	
1	841	105	372	23	571	61	327	14
2	850	110	373	26	521	53	431	48
3	899	120	424	41	521	52	424	41
4	1,000	150	427	42	490	50	424	42
5	1,000	152	350	23	410	33	426	43
6	1,060	170	408	35	409	30	431	44
7	1,150	192	340	26	504	52	419	42
8	1,220	210	324	22	516	48	420	40
9	1,310	240	365	32	526	50	454	38
10	1,260	225	434	50	550	56	422	32
11	1,320	240	435	50	496	52	457	21
12	1,350	248	456	52	519	61	420	32
13	1,360	252	499	64	433	36	442	37
14	1,200	208	473	53	449	48	427	36
15	1,210	215	469	47	447	44	428	34
16	938	145	488	48	434	42	472	43
17	875	132	528	60	431	42	465	38
18	728	100	504	52	433	40	476	38
19	470	40	551	59	368	29	506	45
20	456	37	551	59	384	30	522	50
21	443	34	561	60	416	40	523	48
22	501	48	566	58	376	24	606	61
23	487	34	484	45	390	36	648	74
24	467	35	523	59	353	25	632	68
25	481	40	521	61	350	24	676	80
26	538	58	519	54	350	26	659	72
27	469	49	519	55	336	30	677	78
28	453	43	523	53	321	16	681	78
29	--	--	543	55	350	16	697	81
30	--	--	565	58	356	16	699	82
31	--	--	596	68	--	--	697	81

MUSKINGUM RIVER BASIN--Continued

3-1500. MUSKINGUM RIVER AT McCONNELSVILLE, OHIO--Continued

Specific conductance and chloride (Cl), water year October 1960 to September 1961--Continued

Day	June		July		August		September	
	Specific conductance (micromhos at 25°C)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Chloride (Cl)	Specific conductance (micromhos at 25°C)	Chloride (Cl)
1	672	74	848	105	484	50	1,200	220
2	577	53	883	112	503	56	1,230	230
3	571	52	913	125	381	34	1,180	218
4	449	41	915	125	487	47	957	138
5	536	67	904	110	421	34	1,030	155
6	424	39	904	108	408	34	1,080	175
7	438	37	952	140	464	34	1,120	195
8	437	36	927	135	542	46	1,250	235
9	490	42	922	125	586	57	1,130	188
10	460	37	894	122	577	48	1,120	190
11	506	48	870	125	598	54	1,280	252
12	478	42	818	110	715	68	1,040	170
13	475	42	685	78	719	70	793	105
14	513	46	724	85	651	66	800	110
15	534	50	724	86	776	92	962	158
16	534	50	788	104	826	105	968	150
17	561	51	899	120	858	108	970	155
18	697	97	856	125	860	108	1,030	180
19	618	72	930	135	894	115	1,040	182
20	627	68	947	135	918	120	981	162
21	624	66	908	135	957	135	1,020	172
22	717	86	877	122	992	148	1,100	192
23	718	87	698	96	934	130	1,130	198
24	690	78	622	88	879	115	1,140	200
25	680	72	535	54	908	120	1,160	210
26	703	76	641	70	908	125	1,220	208
27	760	91	537	54	910	120	1,220	208
28	838	112	638	70	1,010	152	1,280	240
29	842	113	767	102	1,150	200	1,280	240
30	834	110	770	102	1,160	200	1,320	255
31	--	--	726	94	1,200	220	--	--

MUSKINGUM RIVER BASIN--Continued

3-1500. MUSKINGUM RIVER AT McCONNELSVILLE, OHIO--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement at approximately 4 p.m.)

Month	Day																															Average
	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	
October	72	71	71	71	70	68	68	65	67	68	67	67	68	68	67	67	68	67	66	65	64	62	62	61	60	58	57	57	57	58	57	65
November	57	57	57	55	54	52	52	51	50	50	48	48	48	48	49	50	50	50	51	50	50	48	48	48	48	48	49	49	48	46	--	50
December	46	44	44	42	42	41	41	40	40	40	40	38	37	37	36	35	35	35	36	35	34	34	32	33	33	34	34	34	35	34	--	37
January	35	36	35	35	35	36	38	38	37	35	37	37	37	37	37	37	37	37	37	35	33	33	33	33	32	32	32	32	32	--	--	35
February	32	32	32	32	33	32	35	34	34	36	36	37	38	39	41	40	37	37	40	41	41	41	44	45	41	42	42	41	--	--	--	38
March	41	41	42	44	46	50	52	51	48	44	44	45	45	45	45	46	45	43	44	44	45	45	46	45	47	50	50	56	51	52	51	47
April	48	44	44	44	44	44	45	46	46	46	45	46	46	46	46	46	46	45	45	46	48	50	53	55	57	58	57	56	55	54	--	48
May	54	57	57	57	57	57	57	57	59	59	60	61	63	65	66	65	65	65	64	62	60	59	61	62	63	62	60	60	62	62	64	61
June	65	67	67	69	70	69	70	71	71	71	73	74	75	74	70	70	70	70	71	71	72	72	71	71	69	69	69	72	73	75	--	71
July	78	79	79	79	78	78	76	76	76	76	76	76	76	76	76	78	78	78	78	79	78	78	79	78	77	77	80	80	80	80	78	78
August	78	77	75	75	76	76	76	76	78	78	78	78	78	78	77	78	80	80	80	79	78	78	78	78	77	78	78	79	79	79	81	78
September	81	82	82	82	83	83	83	84	84	84	82	81	81	80	78	76	76	76	75	75	75	75	76	76	77	75	76	75	73	73	--	79

LITTLE KANAWHA RIVER BASIN

3-1520. LITTLE KANAWHA RIVER AT GLENVILLE, W. VA.

LOCATION.--At waterplant at Glenville, Gilmer County, 0.5 mile upstream from gaging station, and 0.7 mile upstream from Sycamore Run.
DRAINAGE AREA.--386 square miles (at gage).
RECORDS AVAILABLE.--October 1946 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 80°F July 1, 25, 26, 28, Aug. 31; minimum, freezing point many days during December to February.
EXTREMES, 1946-61.--Water temperatures: Maximum, 86°F Aug. 22, 1947, July 31, Aug. 1-6, 1955; minimum freezing point on many days during winter months.
REMARKS.--Temperature records furnished by West Virginia Water Service Company.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	64	64	64	65	65	64	64	65	65	65	64	64	64	64	64	64	63	62	60	62	64	57	53	50	49	50	50	50	51	52	53	60
November	53	52	51	51	50	47	45	46	44	43	45	44	43	45	48	49	48	48	47	46	42	43	44	43	43	44	46	48	49	46	--	46
December	42	39	37	36	38	37	36	35	34	34	33	33	33	33	32	32	32	32	32	33	33	33	33	33	34	34	34	34	34	35	36	34
January	36	38	38	38	36	37	36	35	36	35	34	34	35	35	35	36	36	37	36	34	34	33	33	32	32	32	32	32	32	32	32	35
February	32	32	32	32	32	32	32	32	32	33	34	36	38	41	41	41	41	41	43	45	45	45	47	47	48	42	43	43	--	--	--	39
March	44	44	44	45	50	50	52	50	48	45	45	45	45	40	45	48	45	45	45	48	48	48	48	48	50	50	53	54	54	52	50	48
April	48	46	46	46	46	44	48	50	48	46	48	46	44	48	50	52	48	48	50	54	48	54	54	56	62	60	58	52	54	52	--	50
May	52	54	54	56	56	60	57	60	62	62	62	62	64	66	66	66	66	64	62	60	64	62	62	64	66	60	60	62	64	66	66	62
June	70	70	70	70	72	72	72	74	74	72	71	70	71	70	70	70	65	66	67	68	68	70	70	70	70	70	72	74	75	76	--	71
July	80	78	78	75	72	70	71	72	72	72	74	74	74	74	72	66	68	68	70	70	74	76	76	78	80	80	78	80	78	78	78	74
August	78	76	71	72	72	74	75	76	78	78	78	69	67	68	70	71	72	74	74	74	74	74	75	75	75	75	76	78	78	78	80	74
September	78	78	77	77	72	76	78	78	78	78	79	76	77	77	77	74	65	65	64	64	64	66	68	68	67	66	64	62	60	60	--	71

3-1556. LITTLE KANAWHA RIVER AT PARKERSBURG, W. VA.

LOCATION.--At East Street Bridge at Parkersburg, Wood County, 0.9 mile upstream from Neal Run, and 1.3 miles upstream from mouth.
DRAINAGE AREA.--2,297 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1961.
Water temperatures: October 1959 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 167 ppm Oct. 1-31; minimum, 62 ppm Apr. 1-30.
Hardness: Maximum, 60 ppm Sept. 1-30; minimum, 32 ppm Mar. 1-31, Aug. 1-6.
Specific conductance: Maximum daily, 394 micromhos Sept. 25, 26; minimum daily, 69 micromhos Mar. 9.
Water temperatures: Maximum, 83°F Sept. 5-7; minimum, freezing point Dec. 19-22, Jan. 24, 25.
EXTREMES, 1959-61.--Dissolved solids: Maximum, 167 ppm Oct. 1-31, 1960; minimum, 56 ppm Feb. 1-15, 18-29, 1960.
Hardness: Maximum, 60 ppm Sept. 1-30, 1960; minimum, 29 ppm Apr. 1-15, 1960.
Specific conductance: Maximum daily, 394 micromhos Sept. 25, 26, 1961; minimum daily, 66 micromhos Apr. 2, 1960.
Water temperatures: Maximum, 83°F Sept. 5-7, 1961; minimum, freezing point Dec. 19-22, 1960, Jan. 24, 25, 1961.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 1-31, 1960.....	8.4				17	3.8	28	2.7		34		68	15	0.2	1.1	0.28	167	58	30		275		6		0.0
Nov. 1-30....	6.1				14	3.6	11	2.4		35		28	14	.2	.9	.40	106	50	22		178		9		.0
Dec. 1-31....	4.8				14	3.6	12	1.3		35		28	16	.1	.7	.12	104	50	22		184		5		.0
Jan. 1-27, 1961.....	5.7				10	2.7	6.7	.6		24		21	7.5	.1	1.9	.20	76	36	16		118		32		.0
Feb. 1-28....	5.1				10	3.2	6.7	1.1		24		23	7.5	.1	2.2	.20	83	38	18		120		36		.0
Mar. 1-31....	6.1				8.6	2.4	3.8	1.3		21		18	3.5	.1	1.2	.45	64	32	14		90		29		.0
Apr. 1-30....	5.6				9.4	2.5	4.4	1.3		24		17	4.0	.1	.9	.20	62	34	14		94		30		.0
May 1-31.....	5.2				10	2.5	5.9	1.2		28		20	5.0	.1	.6	.20	72	36	12		116		5		.0
June 1-30....	4.6				11	2.5	6.9	1.6		30		20	7.0	.1	.8	.30	73	38	14		126		16		.0
July 1-31....	5.0				13	2.7	9.0	2.0		35		24	8.5	.1	1.0	.15	94	44	15		143		5		.0
Aug. 1-6.....	6.9				9.7	1.8	3.4	2.3		27		14	3.5	.1	1.0	.21	63	32	10		86		64		.0
Aug. 7-31....	6.7				10	2.7	7.5	2.1		30		24	4.5	.1	1.2	.18	79	36	12		119		30		.0
Sept. 1-30...	4.7				17	4.3	29	2.1		41		66	18	.2	.9	.30	161	60	26		273		4		.0
Time-weighted average [a]..	5.7				12	3.1	11	1.7		30		30	9.2	0.1	1.1	0.25	95	43	18		153		18		--

a Represents 99 percent of days.

LITTLE KANAWHA RIVER BASIN--Continued

3-1556. LITTLE KANAWHA RIVER AT PARKERSBURG, W. VA.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement at approximately 9:30 a.m.)

Month	Day																															Average
	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	
October	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	60	60	60	60	60	60	60	60	60	60	60	60	65	63
November	65	65	65	65	50	45	40	40	40	40	45	45	45	60	50	50	60	60	60	60	60	60	60	65	65	65	65	65	60	60	--	56
December	60	60	60	65	60	60	60	55	50	50	40	35	35	35	40	40	35	45	32	32	32	32	--	--	35	35	--	35	35	35	35	44
January	35	35	40	35	35	35	40	40	35	35	35	35	35	35	35	35	40	40	40	40	40	40	35	32	32	--	35	--	--	--	--	36
February	35	34	34	33	33	33	34	34	34	33	33	34	35	38	40	43	45	42	43	42	43	44	45	48	48	49	45	42	--	--	--	39
March	43	48	48	45	45	45	49	50	50	51	47	47	46	47	47	47	47	47	46	46	46	47	47	47	48	48	49	49	49	50	50	47
April	48	48	47	47	47	46	46	46	45	45	46	45	45	47	47	47	48	48	48	50	53	53	55	57	58	57	57	56	55	55	--	50
May	55	52	52	53	55	52	52	58	59	59	--	61	63	63	67	65	67	67	67	66	66	65	65	65	65	65	63	65	65	65	65	62
June	65	68	67	67	68	70	70	72	69	67	67	68	69	68	70	71	70	70	70	70	72	71	70	71	72	70	71	72	74	74	--	70
July	75	76	77	77	77	75	75	75	75	73	77	76	76	78	78	78	75	70	70	72	72	72	73	77	78	78	82	80	80	79	79	76
August	--	73	73	74	74	74	75	75	76	76	77	74	74	73	73	73	73	76	75	76	75	76	76	75	75	80	80	77	75	80	80	75
September	80	80	80	82	83	83	83	82	81	81	82	82	82	82	76	76	76	74	74	75	75	77	77	77	77	75	74	72	70	72	--	78

HOCKING RIVER BASIN

3-1595. HOCKING RIVER AT ATHENS, OHIO

LOCATION.--At gaging station at Mill Street Bridge at Athens, Athens County, 3.5 miles downstream from Margaret Creek.
DRAINAGE AREA.--944 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1954 to September 1961.
Water temperatures: October 1954 to September 1961.
Sediment records: October 1956 to September 1961.
EXTREMES, 1960-61.--Specific conductance: Maximum daily, 1,640 micromhos Oct. 14; minimum daily, 235 micromhos May 9.
Water temperatures: Maximum, 76°F July 24, Sept. 7; minimum, freezing point on many days during December to February.
Sediment concentrations: Maximum daily, 831 ppm Aug. 11; minimum daily, 1 ppm Oct. 6-9, 23.
Sediment loads: Maximum daily, 11,700 tons May 9; minimum daily, less than 0.5 ton on several days in October.
EXTREMES, 1954-61.--Dissolved solids: Maximum, 1,320 ppm Oct. 4, 1957; minimum, 150 ppm Feb. 7-8, 1955.
Hardness: Maximum, 702 ppm Oct. 4, 1957; minimum, 86 ppm Jan. 22-24, 1959.
Specific conductance: Maximum daily, 1,680 micromhos Oct. 4, 1957; minimum daily, 192 micromhos Jan. 22, 1959.
Water temperatures: Maximum, 84°F Aug. 7, 1955; minimum, freezing point on many days during winter months.
Sediment concentrations (1956-61): Maximum daily, 1,320 ppm July 8, 1958; minimum daily, 1 ppm many days each year.
Sediment loads (1956-61): Maximum daily, 21,200 tons Jan. 22, 1959; minimum daily, less than 0.5 ton on many days each year.
REMARKS.--Records of specific conductance of daily samples available in district office at Columbus, Ohio. Flow affected by ice Dec. 13, 18, 22, 23, 31, Jan. 4, 5, 9-13, 21 to Feb. 2.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 10-20, 1960.....	106	9.8		0.01	3.6	116	46	84	5.6	36	449	110	0.3	3.4	906	479	449		1,270	6.6	3
Nov. 16-30....	112	9.4		a.02	a.49	102	44	72	3.8	51	382	101	.2	2.8	776	436	394		1,140	6.4	4
Dec. 9-21.....	104	10		.01	2.7	102	40	78	3.8	78	367	107	.2	2.4	806	419	355		1,160	6.8	2
Jan. 11-15, 1961.....	387	8.9		a.01	2.2	82	29	50	3.6	55	238	100	.2	3.0	590	324	279		898	6.7	1
Feb. 15-25....	1,849	7.5		a.04	a.04	48	16	21	2.4	48	128	40	.1	4.4	297	186	147		497	6.7	7
Mar. 6-11.....	6,157	7.7		a.02	a.04	32	12	9.7	2.3	38	95	18	.2	3.6	214	130	98		330	7.2	3
Apr. 7-10.....	1,488	8.0		a.03	a.38	56	22	22	2.1	52	178	36	.1	2.8	377	230	188		564	6.9	5
May 9-11.....	11,460	7.4		a.02	a.09	25	8.9	6.8	2.5	26	75	13	.2	2.0	158	99	78		251	6.6	7
June 22-27....	437	10		a.00	a.78	84	35	35	2.6	49	295	52	.2	2.3	585	354	314		839	6.6	3
July 16-19....	701	10		a.00	a2.2	77	34	37	3.3	16	307	60	.1	1.8	559	332	319		804	6.5	2
Aug. 20-24....	342	12		a.00	a.00	89	33	38	2.7	138	238	60	.2	1.8	569	358	245		841	7.3	3
Sept. 22-30...	109	9.4		a.01	a.00	106	47	66	4.0	72	456	60	.3	1.6	822	458	399		1,120	6.9	3

a In solution when analyzed.

HOCKING RIVER BASIN--Continued

3-1595. HOCKING RIVER AT ATHENS, OHIO--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement at 7 a.m.)

Month	Day																															Average
	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	
October	62	62	61	61	59	62	60	60	60	60	58	58	58	59	60	61	60	58	58	58	53	50	50	57	56	56	56	57	49	51	52	57
November	51	50	48	47	48	46	46	42	43	42	40	48	37	42	42	47	46	--	45	42	41	39	43	40	42	40	42	45	46	42	--	44
December	38	35	33	33	33	35	36	35	33	33	33	32	32	32	33	33	33	32	33	33	33	32	32	32	32	33	33	33	33	33	33	33
January	--	33	33	33	32	33	33	33	33	32	32	33	32	32	33	33	--	34	35	--	32	32	32	32	32	32	32	--	32	32	32	32
February	32	32	32	32	32	32	32	33	33	33	33	33	33	33	33	35	35	40	43	40	38	40	43	40	48	42	40	40	--	--	--	36
March	40	39	40	43	48	50	50	50	46	40	39	43	45	48	40	45	43	43	42	42	44	45	45	45	43	45	48	51	49	50	49	45
April	45	40	40	42	44	45	44	43	46	45	42	45	46	43	47	48	46	43	43	43	49	50	51	53	58	57	53	54	52	49	--	47
May	49	50	49	51	53	53	57	56	58	58	58	59	60	60	--	--	60	--	58	56	55	54	55	55	53	60	53	55	58	58	58	56
June	61	64	67	65	65	66	67	69	65	65	66	68	70	71	68	63	62	62	63	65	66	64	65	64	63	62	63	63	65	68	--	65
July	69	72	74	72	71	70	69	69	67	67	68	69	70	70	71	70	69	70	70	69	70	72	74	76	75	74	73	73	74	75	75	71
August	75	74	73	73	72	72	71	71	72	72	73	70	70	69	69	69	70	70	70	71	69	68	68	70	70	70	71	72	73	72	72	71
September	73	72	74	74	75	75	76	75	75	74	74	74	75	--	70	65	63	61	63	64	66	66	68	69	70	67	67	66	61	59	--	69

HOCKING RIVER BASIN--Continued

3-1595. HOCKING RIVER AT ATHENS, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961

Day	OCTOBER				NOVEMBER				DECEMBER			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	66	4		1	147	2	B	1	179	2	B	1
2..	65	2		T	139	2	B	1	172	4	B	2
3..	67	3		1	137	2	B	1	149	8	B	3
4..	74	2		T	121	2	B	1	127	10		3
5..	78	2		T	114	2	B	1	121	10	B	3
6..	78	1		T	106	2		1	120	10	B	3
7..	72	1		T	106	2	B	1	121	10	B	3
8..	68	1		T	112	2	B	1	123	10	B	3
9..	72	1		T	121	2	B	1	114	10	B	3
10..	231	30	K	20	130	2	B	1	104	10	B	3
11..	156	10	B	4	270	11	K	9	107	10		3
12..	112	7	B	2	270	7	B	5	96	10	B	2
13..	92	5	B	1	186	5		2	110	10	B	3
14..	87	5	B	1	149	5	B	2	102	9	B	2
15..	80	4	B	1	130	5	B	2	106	8	B	2
16..	78	3		1	123	3	B	1	107	6	B	2
17..	78	3	B	1	121	3	B	1	106	4	B	1
18..	79	2		M	118	2	B	1	100	4	B	1
19..	82	2		M	112	2	B	1	100	4	B	1
20..	91	3	B	1	107	2		1	98	5	B	1
21..	126	2	B	1	106	2	B	1	109	5	B	1
22..	172	2	B	1	104	2	B	1	110	5	B	1
23..	149	1		T	107	2	B	1	100	9	B	2
24..	137	2	B	1	107	3	B	1	92	13	B	3
25..	135	2	B	1	111	3	B	1	94	16	B	4
26..	135	2	B	1	107	3	B	1	104	18		5
27..	137	2	B	1	104	2		1	123	17	B	6
28..	137	2	B	1	104	2	B	1	130	17	B	6
29..	137	2	B	1	112	2	B	1	142	20	B	8
30..	137	2		1	132	2	B	1	147	20	B	8
31..	142	2	B	1	--	--		--	150	20	B	8
Total	3350	--		47	3913	--		45	3663	--		97

Day	JANUARY				FEBRUARY				MARCH			
1..	149	23		9	193	20	B	10	2790	147		1110
2..	175	20	B	9	190	19	B	10	2290	120		742
3..	175	20	B	9	172	17	B	8	1660	100		448
4..	170	20	B	9	159	15	B	6	1770	135	S	728
5..	170	20	B	9	152	15	B	6	5250	610		8650
6..	169	20	B	9	152	16	B	6	8400	450		10200
7..	224	25	B	15	149	17	B	7	8230	190		4220
8..	448	55		66	156	17		7	6230	246		4140
9..	600	35	B	55	162	17	B	7	6420	244		4230
10..	500	25	B	35	172	17	B	8	4760	193		2480
11..	410	25	B	25	169	17	B	8	2900	152		1190
12..	360	25	B	25	190	19		10	1910	123		634
13..	330	25	B	20	388	45	B	45	1560	114		480
14..	313	25	B	20	1690	294	S	1520	2280	250		1540
15..	523	47	S	77	3370	568		5170	1830	92		454
16..	1720	521	S	2640	2280	288		1770	1430	70		270
17..	2270	535		3280	1460	115		453	1170	58		183
18..	1500	130		526	1650	77		343	1020	46		127
19..	1190	69		222	2500	230		1550	1040	43		121
20..	963	50	B	130	1760	185		879	1070	48		139
21..	550	45	B	65	1280	84		290	1240	66	S	239
22..	480	40	B	50	1020	47		129	3050	282	S	2400
23..	450	35	B	40	1480	91		364	3430	217		2010
24..	430	30	B	35	1450	87		341	3090	164		1370
25..	400	30	B	30	2090	404	S	3300	2130	121		696
26..	320	25	B	20	4280	508		5870	1630	82		361
27..	270	25	B	18	4180	370		4180	1380	63		235
28..	250	25	B	17	3100	230		1920	1210	65		212
29..	230	25	B	16	--	--		--	1090	53		156
30..	210	25	B	14	--	--		--	951	45		116
31..	200	20	B	11	--	--		--	879	40		95
Total	16149	--		7506	35994	--		28217	84090	--		49976

S Computed by subdividing day.
T Less than 0.50 ton.
B Computed from estimated-concentration graph.
K Computed from estimated-concentration graph and subdividing day.
M Less than 0.50 ton, computed from estimated-concentration graph.

HOCKING RIVER BASIN--Continued

3-1595. HOCKING RIVER AT ATHENS, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961--Continued

Day	APRIL Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day	MAY Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day	JUNE Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day
1..	3620	393	S 4570	1770	82	392	419	18	20
2..	6140	266	4410	1550	82	343	396	10	11
3..	4170	174	S 1960	1340	70	253	899	70	S 246
4..	2390	124	800	1190	59	190	1660	225	1010
5..	1900	77	395	951	57	146	1160	178	S 608
6..	1550	68	284	975	57	150	630	18	31
7..	1190	48	154	2210	220	S 1910	531	18	26
8..	1040	43	121	7550	305	6220	1010	298	S 1360
9..	1020	43	118	11200	388	11700	3320	820	S 7470
10..	2700	154	S 1200	13900	205	7690	5270	620	8820
11..	3190	144	1240	9290	104	2610	6680	280	5050
12..	2150	85	493	4680	148	1870	3240	195	1700
13..	3370	144	1310	2630	147	1040	1440	115	447
14..	3670	165	1630	2080	115	646	1320	82	292
15..	2470	90	600	1460	103	406	1910	208	1070
16..	3150	182	S 1670	1480	139	555	1300	113	397
17..	4400	277	3290	1230	96	319	906	42	103
18..	3410	150	1380	1000	76	205	718	37	72
19..	2480	93	623	932	70	176	620	31	52
20..	1940	76	398	840	67	152	531	22	32
21..	2080	146	S 882	777	64	134	531	33	47
22..	3020	146	1190	765	62	128	575	38	59
23..	3770	205	2090	713	61	117	488	34	45
24..	3140	177	1500	635	58	99	437	25	29
25..	2530	122	833	585	48	76	396	23	24
26..	5410	390	5700	570	48	74	375	20	20
27..	6390	238	4110	590	50	80	349	17	16
28..	4650	168	2110	531	40	57	312	12	10
29..	2520	170	1160	483	30	39	290	9	7
30..	2040	110	606	493	25	33	275	6	4
31..	--	--	--	465	27	34	--	--	--
Total	91500	--	46827	74865	--	37844	37988	--	29078

Day	JULY Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	AUGUST Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	SEPTEMBER Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	268	5	4	814	102	224	180	10	5
2..	241	7	4	1070	45	130	176	12	6
3..	268	7	5	1570	98	415	169	10	4
4..	290	7	5	1160	67	210	160	10	4
5..	268	7	5	655	28	50	158	9	B 4
6..	353	35	33	630	57	97	169	6	3
7..	451	15	18	410	40	44	153	6	2
8..	341	9	8	345	20	19	149	5	2
9..	264	6	4	290	19	15	144	6	2
10..	232	5	3	410	30	33	136	6	2
11..	205	4	2	2400	831	S 7510	130	7	2
12..	202	4	2	5420	751	S 10600	126	6	2
13..	205	4	2	6100	308	5070	124	5	2
14..	406	9	10	2380	220	1410	122	5	B 2
15..	419	7	8	1140	92	283	120	4	B 1
16..	521	22	31	834	58	131	118	4	B 1
17..	432	12	14	660	48	86	114	5	2
18..	670	38	69	531	38	54	110	4	B 1
19..	1180	270	J 1400	446	34	41	109	4	B 1
20..	4050	650	J 7700	392	30	32	109	4	B 1
21..	1040	81	S 263	370	29	29	107	4	B 1
22..	615	28	46	345	26	24	105	5	B 1
23..	460	12	15	312	23	19	105	5	B 1
24..	396	13	14	290	19	15	103	5	B 1
25..	469	16	20	271	16	12	101	5	B 1
26..	370	10	10	258	15	10	118	5	B 2
27..	293	7	6	251	14	9	142	5	B 2
28..	251	6	4	232	13	8	110	5	1
29..	227	6	4	213	15	9	101	5	B 1
30..	213	6	3	205	11	6	96	5	B 1
31..	232	13	8	190	11	6	--	--	--
Total	15832	--	9720	30594	--	26601	3864	--	61

Total discharge for year (cfs-days)..... 401802
Total load for year (tons)..... 236019

S Computed by subdividing day.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.

HOCKING RIVER BASIN--Continued

3-1595. HOCKING RIVER AT ATHENS, OHIO--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Jan. 16, 1961.....	1530			2000	794		54	65	78	88	95	98	100	--				SBWC
Mar. 5.....	1210			5200	773		41	50	63	78	93	95	99	100				SBWC
Mar. 5.....	1210			5200	773		9	11	28	50	88	89	98	100				SBN
Apr. 26.....	1205			5830	502		41	50	62	71	89	93	97	100				SBWC
June 9.....	1820			4160	914		45	56	68	84	91	98	100	--				SBWC
June 9.....	1820			4160	914		7	13	27	46	92	93	98	100				SBN
July 20.....	1215			4820	414		57	67	79	89	94	97	100	--				SBWC
Aug. 12.....	1315			5520	630		58	63	73	85	94	97	99	100				SBWC

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OHIO RIVER MAIN STEM

3-1596. OHIO RIVER AT LOCK AND DAM 22, AT RAVENSWOOD, W. VA.

LOCATION.--About 650 feet upstream from dam (mile 220.9) at Ravenswood, Jackson County, 450 feet downstream from Sandy Creek, and 7,600 feet downstream from Turkey Run.
DRAINAGE AREA.--39,840 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1954 to September 1961.
Water temperatures: October 1954 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 425 ppm Oct. 1-31, Nov. 1-30; minimum, 139 ppm Mar. 1-3, 13-16, 19-23.
Hardness: Maximum, 212 ppm Oct. 1-31; minimum, 78 ppm Feb. 22-27.
Specific conductance: Maximum daily, 801 micromhos Dec. 4; minimum daily, 128 micromhos Apr. 2.
Water temperatures: Maximum, 82°F Sept. 5-15; minimum, freezing point on several days during December to February.
EXTREMES, 1954-61.--Dissolved solids: Maximum, 675 ppm Nov. 11-15, 17, 1957; minimum, 76 ppm Mar. 28-31, 1960.
Hardness: Maximum, 309 ppm Nov. 11-15, 17, 1957; minimum, 41 ppm Mar. 28-31, 1960.
Specific conductance: Maximum daily, 1,230 micromhos Oct. 1, 1957; minimum daily, 102 micromhos Apr. 29, 30, 1958.
Water temperatures: Maximum, 87°F Aug. 5-8, 1955; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 1-31, 1960.....	7.8				62	14	49	3.8		20		200	63	0.4	5.3	0.20	425	212	196		683		2		0.1
Nov. 1-30....	6.6				60	13	50	3.8		26		189	64	.5	5.3	.15	425	203	182		674		5		.1
Dec. 1-31....	5.9				52	13	40	3.2		34		158	57	.4	3.8	.15	371	183	155		584		2		.2
Jan. 1-24, 28-31, 1961	5.9				42	11	33	2.1		30		130	41	.3	3.6	.00	305	150	126		487		8		.1
Feb. 1-21....	7.2				37	9.0	26	2.4		34		102	35	.3	4.7	.19	255	130	102		422		1		.1
Feb. 22-27...	6.9				22	5.5	9.2	2.0		29		55	11	.2	3.8	.19	142	78	54		222		9		.0
Mar. 1-3, 13-16,19-23	5.8				23	6.1	8.8	1.7		25		62	12	.1	3.1	.30	139	82	62		232		5		.0
Apr. 2-30....	5.5				26	6.7	8.7	1.5		28		69	14	.1	2.9	.18	148	92	70		250		4		.0
May 1-31.....	5.5				34	8.0	18	1.6		42		94	20	.1	2.8	1.5	215	118	84		340		1		.1
June 1-30....	5.8				33	7.7	13	1.9		28		94	17	.2	2.5	.40	200	114	91		324		6		.1
July 1-31....	5.6				41	10	22	2.4		37		120	30	.3	2.6	.10	263	143	113		419		5		.1
Aug. 1-31....	6.4				41	10	23	2.8		34		122	28	.3	2.8	.10	252	143	115		414		6		.0
Sept. 1-30...	4.3				55	13	40	3.5		32		170	55	.5	3.7	.11	361	191	165		595		5		.1
Time-weighted average [a]..	6.0				43	10	28	2.6		31		129	37	0.3	3.6	0.29	286	150	125		461		4		--

a Represents 93 percent of days.

OHIO RIVER MAIN STEM--Continued

3-1596. OHIO RIVER AT LOCK AND DAM 22, AT RAVENSWOOD, W. VA.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement at 6 a.m.)

Month	Day																															Average
	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	
October	70	72	70	70	70	67	67	67	67	66	66	65	67	68	66	67	66	66	65	65	63	62	62	60	59	57	58	58	57	57	57	64
November	57	57	76	76	75	74	74	72	73	72	70	70	67	65	60	59	57	55	54	56	50	50	50	50	50	50	50	50	52	48	--	61
December	48	47	46	45	45	46	46	45	40	40	40	38	38	38	38	37	37	36	36	35	34	34	33	33	32	33	33	33	34	34	34	38
January	35	35	35	35	35	35	35	34	34	34	34	33	33	33	33	33	33	33	33	33	33	33	33	32	32	32	33	33	33	33	33	33
February	32	32	32	32	32	32	33	33	33	34	34	35	35	37	37	36	35	35	36	36	38	40	40	40	40	40	40	--	--	--	--	36
March	42	42	40	--	--	--	--	--	--	--	--	--	45	46	49	45	--	--	49	45	45	44	45	--	--	--	--	--	--	--	--	--
April	--	45	47	47	47	47	47	46	46	46	46	46	47	47	46	46	47	46	46	46	47	47	47	48	47	48	48	48	48	48	--	47
May	48	48	48	48	48	48	49	50	50	51	51	58	59	51	51	59	59	59	59	59	59	59	59	59	59	63	63	60	60	60	60	55
June	--	65	66	67	67	68	68	68	69	69	69	69	70	70	70	70	70	71	71	71	71	72	72	72	72	72	72	72	72	73	--	70
July	74	74	75	75	75	75	78	76	75	75	74	75	75	75	74	74	74	75	75	75	77	78	80	80	80	80	80	80	80	80	80	76
August	80	80	80	80	80	80	80	79	79	79	79	79	79	78	77	79	79	80	80	79	79	78	80	80	80	80	80	80	80	81	80	79
September	81	81	81	81	82	82	82	82	82	82	82	82	82	82	82	80	79	78	77	75	75	75	75	78	78	75	75	75	74	75	--	79

KANAWHA RIVER BASIN

3-1765. NEW RIVER AT GLENLYN, VA.

LOCATION.--At the steam electric plant of the Appalachian Electric Power Company at Glenlyn, Giles County, across the river from the gaging station, 0.3 mile upstream from East River, and 6.3 miles downstream from Wolf Creek.
DRAINAGE AREA.--3,768 square miles.
RECORDS AVAILABLE.--Chemical analyses: April 1930 to March 1931, October 1949 to September 1950, October 1951 to September 1956. Water temperatures: October 1950 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 77°F Aug. 2, 3, 24, Sept. 12; minimum, freezing point on several days during December to February.
EXTREMES, 1950-61.--Water temperatures: Maximum, 84°F June 28, 1952; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	66	67	68	67	66	66	67	65	64	64	64	63	66	65	66	66	66	64	67	63	57	54	55	55	51	50	53	53	54	55	54	61
November	54	54	54	51	50	45	47	43	43	47	46	45	46	47	49	49	50	48	47	46	45	45	47	48	46	46	46	47	49	44	--	47
December	39	36	34	34	36	37	41	43	39	36	36	36	32	32	35	35	35	35	35	35	34	32	32	32	33	33	35	36	38	39	38	36
January	39	38	38	37	36	38	36	39	36	34	35	35	35	38	40	40	38	39	38	35	33	32	32	32	33	33	33	33	33	33	33	36
February	32	33	32	32	32	32	33	32	33	35	36	35	39	39	37	37	39	40	42	42	40	39	41	42	42	39	40	42	--	--	--	37
March	42	42	42	45	48	51	50	52	46	40	41	43	47	47	45	47	44	43	41	43	44	43	43	45	44	45	47	50	48	50	50	45
April	46	42	42	42	42	45	47	46	46	45	42	46	43	43	48	50	48	46	44	44	49	47	51	55	56	55	55	51	50	--	--	47
May	--	52	52	55	54	50	54	57	61	59	55	56	54	57	58	58	58	59	58	59	59	60	60	59	59	62	56	53	58	59	60	57
June	62	64	67	68	68	69	69	68	68	66	67	67	69	70	68	63	62	65	65	66	68	66	66	65	65	65	64	65	67	67	--	66
July	70	71	73	71	73	74	72	69	68	67	68	70	68	70	71	73	73	73	71	72	73	73	74	75	74	74	72	73	74	75	75	72
August	75	77	77	75	75	74	75	75	69	74	74	74	74	73	73	75	75	76	76	74	72	76	72	77	74	74	73	73	75	75	75	74
September	74	74	74	76	75	75	76	75	74	74	76	77	75	76	75	65	64	63	64	65	69	68	70	72	72	73	70	69	69	68	--	72

3-1800. NEW RIVER AT BLUESTONE DAM, W. VA.

LOCATION.--Temperature recorder at Bluestone Dam Stilling Basin, 1,000 feet upstream from gaging station, 0.9 mile upstream from mouth of Greenbrier River, and 2.2 miles upstream from Hinton, Summers County.
DRAINAGE AREA.--4,604 square miles.
RECORDS AVAILABLE.--Water temperatures: May 1953 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 82°F Aug. 2; minimum, freezing point Jan. 29, 31, Feb. 1, 2, 10, 11.
EXTREMES, 1953-61.--Water temperatures: Maximum, 85°F Aug. 26, 1959; minimum, freezing point on several days during February 1958, January and February 1961.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	70	70	70	70	70	70	70	69	69	68	68	68	68	68	68	67	67	67	66	66	65	64	64	62	61	59	57	56	55	55	55	65
Minimum	70	69	70	69	69	69	69	69	68	68	68	68	68	68	67	67	67	66	66	65	64	64	62	61	59	57	56	55	54	54	55	65
November																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December																																
Maximum	48	47	46	45	45	44	43	42	42	41	40	40	39	39	38	36	34	34	35	35	36	36	36	36	36	36	35	35	35	35	35	39
Minimum	47	46	45	45	44	43	42	42	41	40	40	39	39	38	36	34	34	34	34	35	35	36	36	36	36	35	35	35	34	34	35	38
January																																
Maximum	35	36	36	37	37	37	37	37	38	38	38	38	38	37	37	37	40	40	39	39	38	37	36	36	35	34	34	34	34	33	33	37
Minimum	35	35	36	36	37	36	36	37	37	38	38	37	37	37	37	37	37	38	39	38	37	36	36	35	34	34	34	33	32	33	32	36
February																																
Maximum	33	33	33	34	34	34	33	33	33	33	33	34	35	36	37	38	38	39	41	42	42	42	41	43	44	44	42	42	--	--	--	37
Minimum	32	32	33	33	33	33	33	33	33	32	32	33	34	35	36	36	38	38	39	41	42	41	40	41	43	42	40	41	--	--	--	36
March																																
Maximum	43	44	44	45	47	49	51	53	53	50	44	44	46	48	49	49	49	49	48	47	45	46	45	46	46	46	48	50	53	53	53	48
Minimum	42	43	44	44	45	47	49	51	50	44	42	43	44	46	48	49	48	48	47	45	45	45	45	45	46	46	46	48	50	52	53	46
April																																
Maximum	53	51	47	46	45	46	48	48	49	49	48	47	47	46	49	52	52	51	50	48	47	49	51	53	55	58	58	58	58	58	--	51
Minimum	51	47	46	45	44	44	46	48	48	48	47	47	46	45	46	49	51	50	48	47	47	47	49	51	53	55	58	50	58	57	--	49
May																																
Maximum	58	56	55	55	55	56	56	57	59	61	60	61	59	59	60	62	62	62	62	62	62	62	63	64	66	66	64	64	63	62	64	61
Minimum	56	55	55	54	54	55	56	55	57	59	59	59	56	56	59	60	61	62	62	62	62	62	62	63	64	64	64	62	62	60	61	59
June																																
Maximum	66	68	68	69	70	71	72	73	74	73	74	76	76	76	76	74	69	67	69	70	70	71	70	70	70	70	70	70	70	72	--	71
Minimum	64	65	66	68	69	70	71	72	73	73	73	73	75	75	74	69	66	66	67	68	69	69	70	69	69	69	69	69	70	70	--	70
July																																
Maximum	74	76	75	76	76	76	76	76	75	75	75	75	75	76	76	76	77	77	78	78	78	80	80	79	80	80	80	80	80	80	80	77
Minimum	72	74	74	74	75	75	75	75	75	74	74	74	74	74	74	76	76	76	76	78	77	78	79	79	79	79	79	79	79	80	80	76
August																																
Maximum	80	82	81	81	81	81	81	81	81	80	80	80	79	79	79	78	78	79	79	78	78	77	77	76	76	77	77	77	78	78	79	79
Minimum	79	80	80	80	81	81	80	80	80	80	79	79	79	78	78	78	77	78	78	78	77	77	76	76	76	76	76	76	76	77	78	78
September																																
Maximum	79	80	80	80	79	80	80	80	80	80	80	80	80	80	79	77	75	73	72	70	70	70	70	71	73	73	72	72	71	72	--	76
Minimum	79	78	79	79	79	79	80	80	80	80	80	79	79	79	77	75	73	72	70	70	69	69	69	70	71	71	71	71	71	71	--	75

KANAWHA RIVER BASIN--Continued

3-1820. KNAPP CREEK AT MARLINTON, W. VA.

LOCATION.--At city waterplant, at Marlinton, Pocahontas County, 1 mile upstream from mouth.
DRAINAGE AREA.--108 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1946 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 75°F Aug. 2, 3, Sept. 7, 12, 13; minimum, freezing point on several days during December to February.
EXTREMES, 1946-61.--Water temperatures: Maximum, 82°F July 24, 1952, July 2, 1959; minimum, freezing point on many days during winter months.
REMARKS.--No discharge records available.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day 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	Average
October	62	64	62	62	60	60	60	60	60	59	59	57	54	54	55	55	54	54	55	54	52	50	47	48	44	42	46	42	44	44	45	54
November	45	43	44	42	44	43	40	37	37	40	40	36	36	37	37	38	38	36	36	37	36	36	40	40	42	40	40	40	42	36	--	39
December	32	--	--	--	32	35	38	36	32	--	32	32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January	--	--	--	--	--	--	--	32	--	--	--	--	33	34	--	--	--	34	33	--	--	--	--	--	--	--	--	--	--	--	--	--
February	--	--	--	--	--	--	32	32	33	33	33	--	--	--	--	--	--	34	34	33	34	35	35	33	36	35	37	38	--	--	--	--
March	39	38	37	40	40	40	41	40	38	37	35	40	45	46	40	40	35	37	37	38	38	38	36	36	36	43	45	48	47	48	45	40
April	42	36	37	35	36	37	35	35	40	37	37	40	38	39	44	44	40	38	42	42	44	44	50	55	57	57	55	49	45	45	--	42
May	45	47	46	48	47	44	45	47	56	55	52	53	55	55	56	56	54	56	54	54	55	56	57	58	59	63	55	54	58	57	56	53
June	58	60	62	63	65	65	66	70	69	70	70	70	68	70	69	68	68	64	65	67	67	66	65	59	59	60	60	62	63	65	--	65
July	68	71	73	70	69	68	66	66	64	64	68	68	70	70	70	72	72	73	73	72	70	72	72	70	70	69	69	70	72	72	73	70
August	73	75	75	74	73	72	72	70	72	71	72	71	70	68	70	72	72	70	72	71	69	68	69	70	69	69	68	70	72	74	74	71
September	74	73	74	74	73	73	75	73	73	74	74	75	75	74	72	60	58	58	60	63	65	65	66	64	64	63	62	62	60	60	--	68

3-1930. KANAWHA RIVER AT KANAWHA FALLS, W. VA.

LOCATION.--Temperature recorder at gaging station, 150 feet downstream from toll bridge, 0.8 mile downstream from Kanawha Falls, Fayette County, 2 miles downstream from Gauley Bridge, and 2 miles downstream from confluence of New River and Gauley River.
DRAINAGE AREA.--8,367 square miles.
RECORDS AVAILABLE.--Water temperatures: December 1957 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 81°F Sept. 6-8; minimum, 34°F Dec. 23-31, Jan. 12-14, 25 to Feb. 13.
EXTREMES, 1957-61.--Water temperatures: Maximum, 83°F Aug. 20, 1959; minimum, freezing point many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	70	70	70	70	69	69	69	69	68	68	68	68	67	67	67	67	67	67	67	65	64	63	61	59	58	56	55	55	55	55	55	64
Minimum	70	70	70	69	68	69	69	68	68	68	68	67	66	67	67	67	67	67	65	64	63	61	59	58	56	55	55	55	55	55	55	64
November																																
Maximum	55	55	55	54	53	52	51	49	47	47	45	44	44	44	45	46	47	47	47	47	46	46	45	45	46	46	46	46	47	47	--	48
Minimum	55	55	54	53	52	51	49	47	47	45	44	44	44	44	44	45	46	47	47	46	46	45	45	45	45	46	46	46	46	46	--	47
December																																
Maximum	46	45	43	41	40	39	41	40	40	40	39	39	39	38	36	36	36	36	36	36	35	35	35	35	34	34	34	34	34	34	35	38
Minimum	45	43	41	40	39	39	39	40	40	39	39	39	38	36	36	35	35	36	36	35	35	35	34	34	34	34	34	34	34	34	34	37
January																																
Maximum	36	36	36	36	36	36	36	36	36	36	36	35	35	35	36	38	39	39	39	39	37	36	35	35	35	35	34	35	35	34	34	36
Minimum	35	36	36	36	36	36	36	36	36	36	35	34	34	34	35	36	38	39	39	37	36	35	35	35	34	34	34	34	34	34	34	35
February																																
Maximum	34	34	34	34	34	34	34	34	34	34	34	34	36	37	38	38	38	40	41	41	41	42	44	44	45	45	42	42	--	--	--	38
Minimum	34	34	34	34	34	34	34	34	34	34	34	34	34	36	37	37	38	38	40	41	41	41	42	44	44	42	41	42	--	--	--	37
March																																
Maximum	42	42	43	44	46	47	48	50	50	46	42	42	44	46	46	45	44	42	42	43	44	44	44	44	44	45	47	47	48	49	49	45
Minimum	42	42	42	43	44	46	47	48	46	42	40	41	42	44	45	44	42	42	42	42	43	44	44	44	44	44	45	47	47	48	49	44
April																																
Maximum	49	47	46	44	43	43	44	45	45	45	45	44	44	44	46	47	47	45	44	45	46	47	50	54	55	56	56	55	53	50	--	47
Minimum	47	46	44	43	42	42	43	44	45	45	44	44	44	42	43	46	45	44	43	43	45	46	47	50	54	55	55	53	50	48	--	46
May																																
Maximum	49	48	49	50	50	52	52	53	56	56	56	57	59	59	60	61	62	62	62	61	60	61	61	62	63	63	63	61	59	61	63	58
Minimum	48	48	48	49	50	50	52	52	53	55	55	55	58	58	59	60	61	62	61	60	60	60	60	61	62	63	61	59	59	59	61	57
June																																
Maximum	64	66	67	69	69	70	70	69	68	68	69	72	74	73	72	64	62	63	64	66	66	67	67	67	67	67	68	69	71	73	--	68
Minimum	63	64	66	67	68	69	68	68	68	68	68	69	72	72	64	61	61	62	63	64	66	66	67	67	67	67	67	68	69	71	--	67
July																																
Maximum	74	74	75	75	75	75	74	74	74	73	73	73	73	74	74	75	75	76	76	76	70	75	76	76	76	75	76	77	78	78	78	75
Minimum	72	73	74	74	74	74	74	74	73	72	72	72	72	73	74	74	75	75	75	69	68	70	75	76	74	74	75	76	76	77	77	74
August																																
Maximum	79	79	80	80	79	79	78	78	79	79	79	79	79	75	76	76	77	77	77	77	76	76	76	76	76	76	76	77	79	79	79	78
Minimum	78	78	79	78	78	78	78	77	78	78	78	78	75	73	74	75	76	76	76	76	76	76	76	76	75	76	76	76	77	78	78	77
September																																
Maximum	79	79	79	80	80	81	81	81	80	80	80	80	80	80	79	76	75	72	71	70	70	70	71	71	72	72	72	71	71	70	--	76
Minimum	78	78	78	79	80	80	80	80	80	79	80	80	80	79	76	75	72	71	70	70	70	70	70	71	71	72	71	71	70	69	--	75

KANAWHA RIVER BASIN--Continued

3-1937.7. KANAWHA RIVER AT CABIN CREEK, W. VA.

LOCATION.--At the Cabin Creek steam electric plant of the Appalachian Electric Power Company at Cabin Creek, Kanawha County.
DRAINAGE AREA.--8,661 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1950 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 86°F Sept. 6-10; minimum, 33°F Jan. 26.
EXTREMES, 1950-61.--Water temperatures: Maximum, 92°F Aug. 1-4, 6, 1955, Aug. 25, 26, 1959; minimum, freezing point Feb. 10, 1951, Feb. 14-16, 1958.
REMARKS.--Water temperature records furnished by the Appalachian Electric Power Company. No discharge records available.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	--	--	75	74	75	75	75	--	--	73	73	72	71	71	--	--	71	72	71	70	69	--	--	66	64	62	61	60	59	--	59	--
November	60	60	59	58	--	--	54	53	53	50	48	--	--	47	48	49	49	50	51	--	51	51	51	--	50	--	--	50	50	48	--	--
December	47	47	--	--	45	45	45	44	41	--	--	41	40	39	37	37	--	--	36	36	36	36	35	--	--	--	36	36	36	35	--	--
January	--	--	37	37	36	37	38	--	37	37	37	37	37	--	--	37	37	37	38	38	--	--	34	34	34	33	34	--	--	34	34	--
February	34	34	35	--	--	35	35	35	34	34	--	--	36	39	38	38	39	--	--	41	42	43	45	45	--	--	44	43	--	--	--	--
March	44	44	--	--	--	49	51	52	51	48	--	--	46	48	48	47	47	--	--	46	47	48	48	48	--	--	49	51	51	52	53	--
April	--	--	48	47	45	47	47	48	--	48	48	49	47	48	--	--	50	49	48	48	48	--	--	55	58	60	60	58	56	--	--	--
May	53	54	54	55	55	55	--	58	59	59	59	61	--	--	64	64	64	65	65	--	--	66	66	66	66	65	--	--	66	--	65	--
June	67	70	--	--	71	75	75	74	72	--	--	76	78	78	74	68	--	--	70	71	71	70	70	--	--	72	72	73	74	74	--	--
July	--	--	78	--	79	78	78	--	--	77	78	78	79	78	--	--	78	74	80	80	77	--	--	79	81	80	82	81	--	--	82	--
August	83	83	83	84	--	--	84	83	83	82	83	--	--	82	80	80	81	81	--	--	81	82	82	81	81	--	--	81	81	83	84	--
September	84	--	--	--	85	86	86	86	86	86	85	85	85	85	83	--	--	79	78	77	76	77	--	--	78	78	77	77	76	--	--	--

3-1955. ELK RIVER AT SUTTON, W. VA.

LOCATION.--Temperature recorder at gaging station on highway bridge at Sutton, Braxton County, 0.5 mile upstream from Granny Creek, and 2.5 miles downstream from Wolf Creek.
DRAINAGE AREA.--543 square miles.
RECORDS AVAILABLE.--Water temperatures: March 1960 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 73°F Sept. 12-14; minimum, 34°F Dec. 28-30, Jan. 11-15, Jan. 21 to Feb. 13.
EXTREMES, March 1960 to September 1961.--Water temperatures: Maximum, 85°F Aug. 30, Sept. 1, 1960; minimum, 33°F Mar. 10-13, 1960.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	69	70	70	69	70	68	69	68	67	68	68	68	69	69	69	69	68	68	67	66	64	64	57	55	54	54	52	52	53	54	54	64
Minimum	67	66	68	67	66	67	66	66	67	66	65	65	66	66	66	66	66	65	65	63	62	57	55	54	52	52	52	51	51	52	53	62
November																																
Maximum	55	54	53	52	51	49	47	46	44	45	46	46	45	45	47	50	51	51	50	48	47	46	46	45	45	46	46	47	48	46	--	48
Minimum	54	53	52	51	49	47	46	44	44	44	45	45	44	44	45	47	50	50	48	47	46	45	45	44	44	45	45	46	46	46	--	47
December																																
Maximum	46	43	40	39	38	37	38	39	40	40	39	38	38	37	36	36	36	37	37	36	36	37	36	36	36	36	36	36	34	38	38	38
Minimum	43	40	39	38	37	37	37	38	39	39	38	38	37	36	36	36	36	36	36	36	36	36	36	36	36	36	36	34	34	34	37	37
January																																
Maximum	38	38	38	37	36	35	36	36	36	36	35	34	34	34	36	39	39	39	39	38	35	34	34	34	34	34	34	34	34	34	34	36
Minimum	37	38	37	36	35	35	35	36	36	35	34	34	34	34	34	36	39	39	38	35	34	34	34	34	34	34	34	34	34	34	34	35
February																																
Maximum	34	34	34	34	34	34	34	34	34	34	34	34	36	40	41	40	41	44	44	45	44	46	47	47	48	48	42	43	--	--	--	39
Minimum	34	34	34	34	34	34	34	34	34	34	34	34	34	36	39	39	40	41	43	43	43	44	46	47	47	40	40	42	--	--	--	38
March																																
Maximum	43	43	43	44	47	48	49	50	50	46	40	42	45	47	47	47	43	41	42	44	46	46	46	46	45	45	46	48	50	51	50	46
Minimum	42	42	42	42	44	47	48	48	46	40	40	40	42	45	47	43	41	41	41	42	44	45	45	45	44	44	45	46	48	49	47	44
April																																
Maximum	47	45	45	44	45	44	44	46	43	44	46	45	44	47	47	45	44	44	44	44	44	44	44	44	45	49	49	48	47	45	--	45
Minimum	45	43	43	43	43	42	42	42	42	43	43	43	43	43	43	43	43	43	43	44	44	44	44	44	44	44	44	44	43	44	--	43
May																																
Maximum	45	46	47	47	47	48	48	49	49	49	50	50	51	51	52	52	53	52	51	52	52	57	55	55	54	52	52	55	56	58	57	51
Minimum	45	45	46	47	47	47	48	48	49	49	49	50	50	51	51	51	51	51	51	51	51	51	50	51	51	52	51	51	52	52	52	50
June																																
Maximum	59	58	55	57	57	58	58	57	58	59	60	61	61	61	61	61	62	63	61	62	60	61	61	60	63	61	63	63	63	64	--	60
Minimum	53	54	54	54	54	55	55	55	57	58	59	60	60	61	61	61	61	61	60	60	60	60	59	59	60	60	60	60	60	60	--	58
July																																
Maximum	68	70	64	62	62	63	63	66	65	65	66	64	66	66	64	64	65	65	65	65	65	66	66	65	65	66	67	67	68	68	68	65
Minimum	61	61	61	61	62	62	62	62	62	62	62	62	63	63	63	63	64	64	64	64	64	64	65	65	65	65	66	66	66	67	67	63
August																																
Maximum	69	69	69	70	70	70	70	70	71	71	71	71	71	71	68	67	67	68	68	66	67	67	68	68	68	69	70	70	70	70	71	69
Minimum	68	69	69	69	69	69	69	69	70	70	70	70	71	68	66	66	66	66	66	66	66	66	66	66	67	67	67	67	68	68	68	68
September																																
Maximum	71	71	71	71	71	72	72	72	71	72	72	73	73	73	71	72	72	72	72	72	72	72	72	71	70	69	70	70	71	72	--	72
Minimum	69	69	69	69	70	70	70	70	70	71	71	71	71	71	70	70	70	70	71	71	71	72	71	69	68	68	68	68	69	69	--	70

KANAWHA RIVER BASIN--Continued

3-1966. ELK RIVER NEAR FRAMETOWN, W. VA.

LOCATION.--Temperature recorder at gaging station, opposite mouth of Birch River, at Glendon, 2.2 miles upstream from Strange Creek, and 3.2 miles southwest of Frametown, Braxton County.
DRAINAGE AREA.--752 square miles, including that of Birch River.
RECORDS AVAILABLE.--Water temperatures: November 1960 to September 1961.
EXTREMES, November 1960 to September 1961.--Water temperatures: Maximum, 71°F Sept. 3-7; minimum, freezing point Feb. 9-13.

Temperature (°F) of water, November 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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																																
Maximum	--	--	--	--	--	--	--	--	44	43	43	43	43	43	43	44	44	44	44	44	44	44	44	43	43	43	43	43	45	45	--	--
Minimum	--	--	--	--	--	--	--	--	43	43	43	43	43	43	43	43	44	44	44	44	44	44	43	43	43	43	42	42	42	43	--	--
December																																
Maximum	43	40	40	39	37	36	36	36	36	36	36	36	35	35	34	34	34	34	34	34	33	33	33	33	33	33	33	34	34	35	36	35
Minimum	40	40	39	37	36	36	36	36	36	35	35	35	35	34	34	34	34	34	34	33	33	33	33	33	33	33	33	33	34	34	35	35
January																																
Maximum	36	36	36	36	36	36	36	36	36	36	36	35	34	34	34	36	37	37	37	37	36	34	34	33	33	33	34	34	34	34	33	35
Minimum	36	36	36	36	36	35	35	36	36	35	35	34	34	34	34	34	36	37	37	36	34	34	33	33	33	33	33	33	33	33	33	35
February																																
Maximum	33	34	34	34	34	34	33	33	33	33	32	32	34	37	38	38	38	40	42	42	42	43	44	44	44	44	40	41	--	--	--	38
Minimum	33	33	34	34	33	33	33	33	32	32	32	32	32	34	37	38	38	38	40	42	42	42	43	44	44	40	40	40	--	--	--	37
March																																
Maximum	41	41	41	42	44	46	48	48	48	48	42	40	42	44	45	45	44	43	40	42	43	44	44	44	44	44	44	45	48	48	48	44
Minimum	40	41	41	41	42	44	46	48	48	42	40	40	40	42	44	44	43	40	40	40	42	43	44	44	44	44	44	44	45	48	48	43
April																																
Maximum	48	46	44	43	43	43	44	45	45	45	45	45	45	45	47	48	48	46	45	44	43	44	44	44	44	46	47	48	48	48	--	45
Minimum	46	44	43	43	42	42	43	44	45	44	44	45	44	44	45	47	46	45	44	43	43	43	44	44	44	44	46	47	48	46	--	44
May																																
Maximum	46	48	48	48	48	49	49	49	49	49	49	50	52	52	52	52	52	52	54	54	54	53	56	56	57	57	55	52	54	59	59	52
Minimum	46	46	47	47	48	48	48	48	49	49	49	49	50	51	52	52	52	52	52	53	53	52	53	55	56	55	52	51	52	54	58	51
June																																
Maximum	62	65	65	64	60	62	63	63	58	56	58	59	59	59	59	60	60	60	62	63	62	61	60	61	61	60	62	64	65	65	--	61
Minimum	59	62	64	60	60	60	62	58	56	56	56	58	59	59	59	59	60	60	60	62	61	60	60	60	60	60	60	62	64	65	--	60
July																																
Maximum	67	68	69	69	66	62	62	63	64	64	65	65	66	68	68	66	64	64	64	64	64	64	66	66	66	65	64	66	66	67	67	65
Minimum	65	67	68	66	62	62	62	62	63	64	64	65	65	66	66	64	64	64	64	64	64	64	64	66	65	64	64	64	66	66	67	65
August																																
Maximum	67	66	66	67	68	68	68	68	68	68	68	68	68	68	68	67	66	66	67	67	67	66	67	68	68	67	68	70	70	70	70	68
Minimum	66	66	66	66	67	68	68	68	68	68	68	68	68	68	67	66	66	66	66	67	66	66	66	67	67	67	67	69	70	70	70	67
September																																
Maximum	70	70	71	71	71	71	71	70	70	70	70	70	70	70	70	68	67	66	65	66	67	67	68	68	68	68	68	66	65	64	--	69
Minimum	69	69	70	71	71	71	70	69	69	70	69	69	70	70	68	67	66	64	64	65	66	67	67	68	68	68	66	65	64	64	--	68

3-1968. ELK RIVER AT CLAY, W. VA.

LOCATION.--Temperature recorder at gaging station, at highway bridge at Clay, Clay County, 0.9 mile downstream from Buffalo Creek, 2.1 miles downstream from Lower Two Run Creek, and 53.2 miles upstream from mouth.
DRAINAGE AREA.--994 square miles.
RECORDS AVAILABLE.--Water temperatures: November 1960 to September 1961.
EXTREMES, November 1960 to September 1961.--Water temperatures: Maximum, 79°F July 2; minimum, freezing point Feb. 8-13.

Temperature (°F) of water, November 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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																																
Maximum	--	--	--	--	--	--	--	--	44	44	44	44	45	45	46	46	47	47	46	46	45	45	46	46	47	46	46	47	48	46	--	--
Minimum	--	--	--	--	--	--	--	--	44	44	44	44	44	45	45	46	46	46	45	45	45	45	45	46	46	46	46	46	46	43	--	--
December																																
Maximum	43	40	39	38	38	38	39	39	38	36	35	35	35	35	35	35	35	35	35	35	34	34	34	34	34	34	34	34	34	36	36	36
Minimum	40	39	38	37	37	37	37	38	36	35	35	35	35	35	35	35	35	35	35	34	34	34	34	34	34	34	34	34	34	34	36	35
January																																
Maximum	37	37	37	37	36	36	36	36	36	35	34	34	34	35	36	38	38	39	39	38	37	36	34	34	34	34	34	34	34	34	34	36
Minimum	36	37	37	36	36	36	36	36	35	34	34	34	34	34	35	36	38	38	38	37	36	34	34	34	34	34	34	34	34	34	34	35
February																																
Maximum	34	34	34	34	34	33	33	33	32	32	32	32	35	36	36	36	36	38	40	40	40	40	42	42	42	42	41	40	--	--	--	37
Minimum	34	34	34	34	33	33	33	32	32	32	32	32	32	35	36	36	36	36	38	40	40	40	40	42	42	41	40	40	--	--	--	36
March																																
Maximum	41	41	41	43	45	46	47	48	48	45	43	42	42	44	44	44	44	43	43	44	44	46	46	47	48	48	48	48	48	48	48	45
Minimum	40	41	41	41	43	45	46	47	45	43	42	42	42	42	44	44	43	43	43	43	44	44	46	46	47	47	48	48	48	48	47	44
April																																
Maximum	47	46	44	42	43	43	43	47	46	45	47	47	47	48	48	48	48	46	45	45	45	47	48	49	49	50	50	50	50	50	--	47
Minimum	46	44	42	42	41	43	43	43	45	45	45	45	45	45	47	48	46	45	45	45	45	45	47	48	49	49	50	50	50	49	--	46
May																																
Maximum	49	49	48	48	48	48	50	51	51	51	51	51	52	53	53	54	56	56	58	58	58	58	60	63	65	65	60	61	62	63	63	55
Minimum	48	48	48	47	48	48	48	50	51	51	51	51	51	52	53	53	54	56	56	57	58	57	57	58	60	60	58	56	59	59	59	54
June																																
Maximum	66	69	69	69	70	70	73	71	70	62	62	65	65	65	64	63	64	64	66	67	67	66	67	68	67	67	68	72	73	74	--	67
Minimum	61	64	67	66	66	68	69	69	62	60	60	62	64	64	62	62	63	63	63	65	66	65	65	66	66	66	64	66	68	70	--	65
July																																
Maximum	77	79	78	75	75	73	70	70	72	74	74	74	74	77	76	72	70	70	71	71	71	71	71	71	71	69	69	71	71	72	73	73
Minimum	73	75	75	73	73	69	68	69	69	68	70	70	72	74	72	70	69	69	70	67	69	71	71	71	69	69	69	69	71	71	72	71
August																																
Maximum	73	72	71	71	71	72	73	73	73	74	74	74	73	71	72	71	72	73	74	74	73	73	74	74	74	73	73	74	74	74	75	73
Minimum	72	70	71	71	71	71	72	73	73	73	74	73	71	71	71	70	70	71	72	73	72	72	72	73	73	72	72	72	74	74	74	72
September																																
Maximum	75	76	77	77	78	78	78	78	78	77	76	76	76	76	74	71	69	68	67	67	68	68	69	71	73	73	71	69	68	68	--	73
Minimum	75	75	76	76	77	78	78	78	77	76	76	75	75	74	71	69	67	66	67	67	67	68	68	69	71	71	69	68	67	67	--	72

KANAWHA RIVER BASIN--Continued

3-1970. ELK RIVER AT QUEEN SHOALS, W. VA.

LOCATION.--Temperature recorder at gaging station, 50 feet upstream from Queen Shoals Creek, 100 feet downstream from highway bridge at Queen Shoals, Kanawha County, and 4 miles upstream from Big Sandy Creek.
DRAINAGE AREA.--1,145 square miles, including that of Queen Shoals Creek.
RECORDS AVAILABLE.--Water temperatures: November 1960 to September 1961.
EXTREMES, November 1960 to September 1961.--Water temperatures: Maximum, 80°F Sept. 13, 14; minimum, 33°F Dec. 30.

Temperature (°F) of water, November 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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																																
Maximum	--	--	--	--	--	--	--	--	--	45	45	45	44	44	44	45	46	46	45	45	45	45	44	44	44	44	44	45	46	46	--	--
Minimum	--	--	--	--	--	--	--	--	--	45	45	44	44	44	44	44	45	45	45	45	44	44	44	44	44	44	44	44	45	45	--	--
December																																
Maximum	45	43	40	39	38	37	37	37	37	38	37	37	36	36	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	36	36	37
Minimum	43	40	39	37	37	37	37	37	37	37	37	36	36	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	34	35	36	36
January																																
Maximum	37	37	37	37	37	37	37	37	37	37	36	35	35	35	37	40	40	39	39	38	37	36	35	34	34	34	34	34	34	34	34	36
Minimum	36	37	37	37	37	37	37	37	37	36	35	35	35	35	35	37	39	39	38	37	36	35	34	34	34	34	34	34	34	34	34	36
February																																
Maximum	34	34	34	34	34	34	34	34	34	34	34	34	36	38	39	40	40	40	42	42	42	42	44	44	44	44	43	42	--	--	--	38
Minimum	34	34	34	34	34	34	34	34	34	34	34	34	34	36	38	39	40	40	40	42	42	42	43	44	44	43	42	42	--	--	--	38
March																																
Maximum	42	44	44	44	45	47	48	48	49	48	46	45	45	45	45	45	45	44	44	44	44	45	46	46	46	47	48	48	48	48	48	46
Minimum	42	42	44	44	44	45	47	48	48	46	45	44	44	45	45	45	44	44	44	44	44	44	45	46	46	46	47	48	48	48	48	45
April																																
Maximum	48	48	47	46	45	45	46	47	47	47	47	47	47	47	48	49	49	48	47	47	47	48	49	50	51	51	52	52	52	51	--	48
Minimum	48	47	46	45	44	45	45	46	47	47	47	47	47	46	47	48	48	47	46	46	47	47	48	49	50	51	51	52	51	50	--	48
May																																
Maximum	50	49	49	49	49	49	51	52	52	52	52	52	52	54	54	54	54	54	55	56	56	57	57	57	60	60	60	60	60	60	62	54
Minimum	49	49	49	49	49	49	49	51	52	52	52	52	52	52	54	54	54	54	54	55	56	56	57	57	57	60	60	60	60	60	60	54
June																																
Maximum	63	65	66	66	68	69	70	70	70	68	63	63	64	64	64	64	64	64	64	64	64	64	64	64	64	64	65	66	68	70	--	66
Minimum	62	63	65	66	66	68	69	70	68	63	63	63	63	64	64	64	64	64	64	64	64	64	64	64	64	64	64	65	66	68	--	65
July																																
Maximum	72	74	74	74	74	74	74	74	72	72	72	72	72	72	72	72	70	69	69	68	66	68	68	69	69	68	68	69	70	71	72	71
Minimum	70	72	74	74	74	74	74	72	72	72	72	72	72	72	72	70	68	68	68	66	66	66	68	68	68	68	68	68	69	70	71	70
August																																
Maximum	72	72	72	72	72	72	72	72	72	72	73	73	73	72	71	72	72	72	72	72	72	72	72	72	72	72	72	74	79	77	77	73
Minimum	72	72	72	72	72	72	72	72	72	72	72	73	72	71	71	71	72	72	72	72	72	72	72	72	72	72	72	72	70	77	77	72
September																																
Maximum	77	77	77	77	78	78	79	79	79	79	79	79	80	80	78	75	73	72	71	71	71	71	71	71	72	72	72	71	70	69	--	75
Minimum	77	77	77	77	77	78	78	79	79	79	79	79	79	78	75	73	72	71	71	71	71	71	71	71	71	72	71	70	69	68	--	74

3-1980. KANAWHA RIVER AT CHARLESTON, W. VA.

LOCATION.--Temperature recorder at gaging station at old lock 6, at Charleston, Kanawha County, 1.0 mile upstream from Davis Creek, 1.5 miles downstream from Twomile Creek, and 3.5 miles downstream from Elk River.
DRAINAGE AREA.--10,419 square miles.
RECORDS AVAILABLE.--Water temperatures: March 1953 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 88°F Sept. 8, 9, 12, 13; minimum, 33°F Dec. 22.
EXTREMES, 1953-61.--Water temperatures: Maximum, 95°F Aug. 25, 26, 1959; minimum, 33°F Dec. 22, 1961.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
November																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42	42	39	39	42	42	35	36	37	41	42	43	43	42	40	37	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	36	35	35	35	35	33	34	34	34	36	37	35	37	37	36	--
January																																
Maximum	36	38	39	40	40	41	42	42	43	43	42	43	44	44	44	43	40	41	41	42	42	41	41	37	37	35	34	34	34	35	35	40
Minimum	36	36	38	38	38	38	39	39	38	36	36	36	36	38	42	40	40	40	41	41	41	39	36	35	35	34	34	34	34	34	34	37
February																																
Maximum	35	35	38	35	37	36	40	41	40	39	39	40	40	40	40	40	40	41	42	42	42	44	44	45	45	45	44	44	--	--	--	40
Minimum	34	35	35	34	35	36	35	36	35	36	36	37	39	40	40	40	40	40	41	42	42	42	44	44	45	44	44	44	--	--	--	39
March																																
Maximum	44	43	44	47	47	48	49	51	51	51	49	49	48	49	50	50	49	49	48	49	49	49	49	48	48	48	50	50	51	52	52	49
Minimum	43	43	43	44	47	47	48	49	51	49	49	48	48	48	49	49	49	48	48	48	49	49	48	48	48	48	48	50	50	51	52	48
April																																
Maximum	52	52	51	51	51	49	49	50	50	50	50	50	50	49	49	50	50	50	50	50	50	51	51	54	57	58	59	59	59	58	--	52
Minimum	52	51	51	51	49	47	49	49	49	49	49	50	49	49	49	49	50	50	50	50	50	50	51	51	54	57	58	59	58	57	--	51
May																																
Maximum	57	56	54	55	55	55	55	55	56	59	59	60	61	62	62	63	65	65	65	65	65	65	65	66	66	66	66	65	66	67	66	62
Minimum	56	54	54	54	55	55	55	55	55	56	59	59	60	61	62	62	63	65	65	65	64	64	65	65	66	66	64	64	65	65	66	61
June																																
Maximum	68	70	70	73	74	75	75	75	75	75	71	72	73	74	74	74	69	69	69	70	70	70	71	71	72	72	72	72	72	74	--	72
Minimum	66	68	69	69	71	73	73	74	75	71	71	71	72	73	74	69	69	69	68	69	70	70	70	71	71	72	72	71	72	72	--	71
July																																
Maximum	75	80	80	81	81	79	79	79	78	79	80	80	79	80	80	75	74	75	76	76	74	74	74	76	77	77	77	77	79	79	80	78
Minimum	74	75	77	79	78	78	77	78	78	78	78	77	77	78	75	74	73	73	75	70	74	74	74	74	76	76	77	77	77	79	79	76
August																																
Maximum	80	80	80	80	80	80	83	83	83	82	84	83	83	82	79	79	81	82	82	83	83	83	82	83	84	82	82	80	81	81	81	82
Minimum	80	80	80	79	80	80	80	82	81	82	82	83	82	77	77	79	79	80	82	80	80	82	80	81	82	82	80	80	81	80	81	80
September																																
Maximum	82	84	85	86	86	87	87	88	88	87	86	88	88	86	85	82	81	81	81	81	81	80	80	80	81	81	79	77	76	76	--	83
Minimum	81	82	82	83	85	86	85	85	85	86	86	85	84	84	82	80	80	80	80	79	77	78	78	77	79	78	77	75	75	75	--	81

KANAWHA RIVER BASIN--Continued

3-2013. KANAWHA RIVER AT WINFIELD DAM, AT WINFIELD, W. VA.

LOCATION.--About 1,200 feet upstream from Winfield Dam at Winfield, Putnam County, 0.7 mile upstream from Little Hurricane Creek, 2.6 miles downstream from Little Guano Creek, 4.7 miles downstream from Guano Creek, and 31.3 miles upstream from mouth.
DRAINAGE AREA.--11,809 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1961.
Water temperatures: October 1956 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 1,460 ppm Apr. 21; minimum, 67 ppm Mar. 3.
Hardness: Maximum, 118 ppm Oct. 1-31; minimum, 24 ppm Apr. 21.
Specific conductance: Maximum daily, 2,700 micromhos Apr. 21; minimum daily, 96 micromhos Mar. 2, May 10.
Water temperatures: Maximum, 87°F Sept. 10-15; minimum, 33°F Jan. 28.
EXTREMES, 1956-61.--Dissolved solids: Maximum, 1,460 ppm Apr. 21, 1961; minimum, 63 ppm May 1-10, 1958.
Hardness: Maximum, 155 ppm Oct. 21-31, 1958; minimum, 24 ppm Apr. 21, 1961.
Specific conductance: Maximum daily, 2,700 micromhos Apr. 21, 1961; minimum daily, 77 micromhos Jan. 31, 1957.
Water temperatures: Maximum, 88°F Sept. 2, 1959; minimum, freezing point Feb. 14, 1958, Mar. 12, 1960.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Alkyl benzene sulfonate (ABS)	Ammonia nitrogen as NH_4	Nitrite (NO_2)
Oct. 1-31, 1960.....	6.8				37	6.2	31	2.5		70	48	64	0.2	1.8	0.45	239	118	60		431		6	0.1	3.1	0.30
Nov. 1-30....	4.8				30	5.8	21	1.8		56	40	46	.1	.7	.30	185	99	53		347		5	.1	2.3	.05
Dec. 1-31....	3.6				35	5.5	26	1.5		62	46	50	.1	1.3	.50	227	110	59		389		8	.1	3.0	.25
Jan. 1-17, 19-31, 1961	5.3				18	4.4	11	1.0		34	29	21	.1	4.2	.30	112	63	35		203		5	.1	.8	.01
Feb. 1-28....	5.2				18	3.6	21	.9		29	32	35	.1	8.1	.20	144	60	36		251		7	.1	.2	.00
Mar. 1-2,4-31	5.6				13	3.2	5.8	1.0		21	25	9.0	.1	4.3	.45	78	46	28		134		3	.0	.1	.00
Mar. 3.....	--	0.2	a0.36	a0.40	9.5	2.6	3.5	.8		0	43	5.0	--	1.2	--	67	34	34		138		--	--	--	--
Apr. 1-20, 22-30.....	5.5				15	3.7	6.7	1.1		28	26	11	.2	4.1	.30	91	52	30		151		5	.0	.1	.00
Apr. 21.....	16				9.5	.2	564	.7		250	10	725	--	3.4	--	1,460	24	0		2,700		--	--	--	--
May 1-31.....	5.7				14	4.7	8.5	1.3		30	26	14	.1	5.5	.15	102	54	30		163		5	.0	.2	.00
June 1-30....	5.6				20	4.8	12	1.6		40	32	23	.2	3.8	.80	128	70	37		222		2	.1	.5	.05
July 1-31....	5.6				21	4.6	15	2.0		42	35	28	.2	2.2	.45	142	72	37		245		10	.1	1.0	.00
Aug. 1-31....	4.8				24	5.0	17	1.8		46	36	33	.2	2.8	.35	150	80	43		269		5	.1	1.1	.00
Sept. 1-30...	5.2				32	5.9	29	2.1		70	40	57	.1	4.3	.36	203	104	46		388		5	.1	2.7	.20
Time-weighted average...	5.3				20	4.7	18	1.6		45	35	35	0.1	3.5	0.39	154	77	41		273		6	0.1	1.3	0.07

a In solution when analyzed.

KANAWHA RIVER BASIN--Continued

3-2013. KANAWHA RIVER AT WINFIELD DAM, AT WINFIELD, W. VA.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement at approximately 6 a.m.)

Month	Day																															Average
	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	
October	73	73	73	73	73	71	71	73	73	73	73	73	73	73	75	75	75	74	74	74	71	70	70	69	68	67	66	66	65	64	63	71
November	63	64	64	63	65	63	61	61	59	58	56	55	55	52	50	50	49	49	49	50	50	51	51	51	53	53	52	52	52	51	--	55
December	51	50	50	50	51	50	50	48	48	48	48	46	45	45	48	45	44	44	44	44	42	40	40	40	38	38	39	39	39	39	39	44
January	37	37	38	38	38	39	39	40	39	39	39	40	40	40	40	41	41	--	41	40	40	40	39	39	39	37	38	33	35	35	36	38
February	36	36	36	36	37	37	37	37	38	37	38	38	38	40	42	41	41	41	43	43	44	45	45	45	47	47	44	--	--	--	--	40
March	45	44	45	46	46	48	50	52	52	49	48	47	48	48	47	48	49	48	48	47	48	48	49	49	49	48	49	50	51	51	52	48
April	53	50	50	49	49	49	49	49	49	49	50	50	50	50	50	50	51	50	50	50	50	51	53	54	56	57	59	59	60	59	--	52
May	59	55	53	54	50	56	56	59	59	59	59	60	60	62	64	64	64	64	64	65	65	66	66	66	66	68	67	67	68	68	67	62
June	68	70	70	69	70	74	74	74	77	76	75	75	74	74	74	70	68	67	67	67	70	70	71	70	71	71	72	72	74	75	--	72
July	76	78	78	78	78	79	79	78	79	79	79	80	80	80	81	80	78	74	75	75	73	75	77	78	79	79	78	78	79	80	81	78
August	81	81	82	82	81	81	80	82	82	82	83	84	83	83	83	82	81	81	81	82	81	82	82	82	83	83	83	83	83	83	82	82
September	82	82	84	84	84	85	85	85	86	87	87	87	87	87	87	84	84	84	82	81	80	80	79	80	81	81	80	80	79	79	--	83

RACCOON CREEK BASIN

3-2018. SANDY RUN NEAR LAKE HOPE, OHIO

LOCATION.--At gaging station at bridge on King Hollow Road, 500 feet east of State Highway 278, and 0.5 mile upstream from upper end of Lake Hope, Vinton County.
DRAINAGE AREA.--4.98 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1959 to September 1961.
REMARKS.--Acidity (potential free) determined to pH 7.0.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Acidity (H^+)	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 4, 1960..	--		1.2	17					0	606							2.4	1110	3.8	
Oct. 10.....	0.1		a.30	a16					0	574							1.6	1100	3.6	
Oct. 24.....	.1		2.0	21					0	726							2.5	1300	3.6	
Oct. 31.....	.1		1.6	20					0	715							2.4	1280	3.7	
Nov. 14.....	.2		4.5	19					0	945							5.2	1590	3.4	
Nov. 21.....	.2		3.5	22					0	924					712	712	4.4	1540	3.4	
Dec. 6.....	.3		4.5	19					0	786							4.6	1320	3.4	
Jan. 16, 1961.	11		2.4	3.2					0	152							1.0	405	3.8	
Feb. 20.....	4.2		3.3	2.7					0	177							1.0	458	3.6	
Mar. 2.....	12		3.4	1.8					0	120							.7	348	3.8	
Mar. 6.....	81		2.0	1.1					0	56							.2	157	4.2	
Mar. 14.....	37		1.4	.78					0	60							.2	163	4.3	
Mar. 21.....	51		.08	.85					0	59							.3	164	4.2	
Mar. 27.....	5.0		2.9	1.7					0	61							.2	168	4.2	
Apr. 3.....	14		3.2	1.1					0	93							.5	262	3.8	
Apr. 17.....	20		2.7	.71					0	78							.5	228	3.9	
Apr. 25.....	9.8		2.1	.90					0	65							.3	185	4.2	
May 2.....	4.5		4.0	1.6					0	124							1.0	361	3.6	
May 8.....	275		.98	.15					--	31							.1	85	5.2	
May 17.....	2.8		2.8	2.0					0	152							1.0	438	3.4	
May 24.....	1.2		2.7	3.1					0	223							1.4	573	3.4	
May 29.....	1.0		4.9	3.9					0	265							1.7	676	3.4	
June 7.....	.8		6.0	4.1					0	266							2.0	695	3.4	
June 11.....	9.8		2.2	1.7					0	125							.7	354	3.6	
June 20.....	1.0		3.0	1.4					0	190							1.2	520	3.4	
June 28.....	.5		1.5	a4.8					0	267							1.4	632	3.4	
July 10.....	.5		2.2	6.0					0	338							2.0	781	3.2	
July 18.....	4.5		3.1	3.0					0	175							1.2	481	3.3	

July 25, 1961.	5.5		1.3	2.2					0	113							0.6	301	3.7	
Aug. 2.....	8.3		2.5	a4.0					0	183							1.2	503	3.4	
Aug. 15.....	1.3		1.8	a3.6					0	172							.9	437	3.7	
Aug. 28.....	.5		.73	a7.4					0	310							1.4	659	3.7	
Sept. 6.....	.8		12	a16					0	786							6.9	1510	3.0	
Sept. 11.....	.1		2.0	11					0	446							2.1	895	3.6	

a In solution when analyzed.

GUYANDOTTE RIVER BASIN

3-2052. GUYANDOTTE RIVER AT HUNTINGTON, W. VA.

LOCATION.--At highway bridge at Huntington, Cabell County, 2.9 miles upstream from mouth, and 0.1 mile upstream from Russell Creek.
DRAINAGE AREA.--1,674 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1961.
Water temperatures: October 1959 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 478 ppm Sept. 1-30; minimum, 104 ppm June 9-17.
Hardness: Maximum, 185 ppm Sept. 1-30; minimum, 48 ppm June 9-17.
Specific conductance: Maximum daily, 870 micromhos Sept. 22; minimum daily, 119 micromhos Feb. 23.
Water temperatures: Maximum, 83°F Aug. 23; minimum, freezing point on many days during November to February.
EXTREMES, 1959-61.--Dissolved solids: Maximum, 478 ppm Sept. 1-30, 1961; minimum, 98 ppm Dec. 9-15, 1959.
Hardness: Maximum, 185 ppm Sept. 1-30, 1961; minimum, 48 ppm June 9-17, 1961.
Specific conductance: Maximum daily, 992 micromhos Oct. 5, 1959; minimum daily, 119 micromhos Feb. 23, 1961.
Water temperatures: Maximum, 83°F Aug. 23, 1961; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 1-31, 1960.....	6.5				38	14	72	4.8		100		180	30	0.2	2.3	0.20	401	153	70		649		3		0.4
Nov. 1-27....	8.1				34	13	57	3.6		91		147	27	.2	1.9	.43	358	139	64		551		5		1.2
Dec. 10-22, 27, 29.....	7.8				28	11	45	2.9		76		124	21	.0	2.2	.10	284	115	53		450		1		.1
Dec. 30-31...	7.7				18	7.3	15	2.2		24		74	10	--	2.7	--	204	75	56		237		3		.1
Jan. 1-22, 1961.....	6.7				16	8.3	17	1.8		30		71	10	.1	2.8	.04	159	74	50		248		12		.0
Feb. 8-25....	6.5				13	5.0	9.9	1.9		19		51	5.5	.2	2.4	.30	110	53	38		174		6		.0
Mar. 1-8.....	7.3				14	5.6	8.3	1.6		17		54	5.5	.1	2.3	.20	108	58	44		180		5		.0
Apr. 1-30....	7.0				15	6.2	13	1.6		25		64	5.5	.1	1.2	.15	146	63	42		209		5		.0
May 1-14.....	7.2				12	5.3	3.9	1.7		21		49	4.5	.1	1.2	.20	110	52	35		170		16		.0
May 15-31....	7.0				30	12	40	2.4		52		135	26	.1	1.5	.20	282	125	82		453		2		.0
June 1-8.....	6.1				28	9.5	37	3.0		55		119	17	.0	1.4	1.0	255	109	64		407		3		.0
June 9-17....	7.4				12	4.4	9.8	2.4		24		46	4.0	.1	1.7	.30	104	48	28		161		30		.0
June 20-30...	11				29	12	39	3.0		44		134	28	.2	1.7	.30	282	122	86		447		5		.0
July 1, 5-13, 1961.....	5.3				32	13	55	3.2		74		146	30	.1	1.0	.11	321	134	73		532		5		.0
July 2-4.....	6.9				16	5.4	16	2.6		40		47	12	.0	2.5	.06	134	62	29		218		44		.0
Aug. 1-14....	9.1				20	9.9	27	2.8		47		95	13	.1	1.7	.10	204	90	52		327		9		.0
Aug. 15-31...	6.4				34	14	61	3.5		81		165	30	.2	1.1	.15	353	143	76		567		7		.0
Sept. 1-30...	6.0				46	17	94	4.7		104		227	43	.3	1.1	.48	478	185	100		757		3		.0

GUYANDOTTE RIVER BASIN--Continued

3-2052. GUYANDOTTE RIVER AT HUNTINGTON, W. VA.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement at 5 p.m.)

Month	Day																															Average
	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	
October	63	62	65	67	68	67	66	65	65	65	64	66	65	64	62	63	61	62	59	55	50	49	50	51	50	50	49	48	44	43	42	58
November	42	41	41	41	39	39	40	41	40	36	38	37	36	39	40	34	34	34	32	34	35	32	33	33	34	35	34	--	--	--	--	37
December	--	--	--	--	--	--	--	--	--	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	--	32	--	33	32	32	--
January	32	32	32	33	33	34	33	34	33	35	36	34	34	35	34	35	33	34	33	32	36	32	--	--	--	--	--	--	--	--	--	--
February	--	--	--	--	--	--	--	32	32	32	32	35	35	34	35	35	35	35	36	38	38	37	36	37	36	--	--	--	--	--	--	--
March	36	38	36	37	37	37	36	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
April	37	38	37	38	35	36	34	36	37	38	37	38	38	37	38	38	42	43	44	44	46	46	47	50	50	48	47	47	47	48	--	41
May	46	46	47	48	49	49	48	49	52	54	60	62	61	63	60	61	62	60	61	62	62	63	62	62	63	64	65	66	68	67	67	58
June	68	68	68	69	69	60	61	62	65	66	66	60	59	60	62	64	65	--	--	65	66	66	68	69	68	69	70	69	71	70	--	66
July	71	72	73	71	71	72	71	70	71	70	70	71	70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
August	77	76	74	75	76	79	79	79	78	79	79	78	76	76	80	80	75	80	78	74	74	78	83	76	77	79	78	77	79	78	78	78
September	76	76	80	78	75	78	77	80	76	76	76	74	67	60	55	55	57	60	62	58	58	70	69	67	60	58	55	52	60	54	--	67

BIG SANDY RIVER BASIN

3-2095. LEVISA FORK AT PIKEVILLE, KY.

LOCATION.--At Middle Bridge in Pikeville, Pike County, 0.5 mile upstream from Ferguson Fork, and 7.6 miles downstream from Shelby Creek.
DRAINAGE AREA.--1,237 square miles.
RECORDS AVAILABLE.--Chemical analyses: November 1960 to September 1961 (discontinued).
REMARKS.--Samples for iron and manganese filtered clear when collected except as noted.

Chemical analyses, in parts per million, November 1960 to September 1961

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color	Turbidity
															Calcium, magnesium	Noncarbonate				
Nov. 16, 1960.	203	5.9	a0.07	a0.02	30	14	16	2.6	48	111	9.0	0.1	0.4	202	133	93	348	6.6	2	7
Jan. 25, 1961.	1030	8.3	.18	.22	15	6.2	6.9	1.5	20	54	5.6	.1	2.3	104	63	46	182	6.5	5	20
Mar. 1.....	8820	7.3	.35	.80	12	5.0	4.2	1.4	12	46	2.5	.1	1.5	98	50	40	130	6.2	6	55
Apr. 19.....	2990	7.6	.15	.23	13	6.7	6.8	1.4	20	56	2.0	.1	1.0	108	60	44	172	7.0	9	50
May 17.....	1650	7.8	.06	.14	21	7.5	8.8	1.5	28	74	3.0	.2	.7	157	84	60	229	6.8	1	7
June 14.....	865	7.4	.15	.02	30	14	14	2.8	37	129	4.5	.1	1.6	221	133	102	340	7.4	8	270
July 19.....	990	7.3	a.18	a.46	24	11	12	2.4	26	102	5.0	.2	2.3	182	105	84	289	6.5	6	260
Aug. 23.....	409	3.9	.22	.00	37	15	22	3.1	60	141	10	.1	1.2	275	154	105	422	6.9	8	8
Sept. 27.....	65	3.7	.28	.04	54	21	32	4.1	73	218	12	.2	1.7	389	221	161	585	7.0	6	30

a In solution when analyzed.

3-2115. JOHNS CREEK NEAR VAN LEAR, KY.

LOCATION.--Temperature recorder at gaging station, 100 feet upstream from Long Branch, 0.3 mile upstream from Daniels Creek, 0.7 mile downstream from Dewey Dam, and 2.5 miles southeast of Van Lear, Johnson County.
DRAINAGE AREA.--206 square miles.
RECORDS AVAILABLE.--Water temperatures: April 1954 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 83°F July 31; minimum, 34°F Feb. 8.
EXTREMES, 1954-61.--Water temperatures: Maximum, 90°F July 3, 1956; minimum, 34°F Feb. 2, 6, 1955, Feb. 26, 1960, Feb. 8, 1961.
REMARKS.--Flow regulated by Dewey Reservoir.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	73	71	71	72	69	69	67	66	68	66	66	66	65	65	65	65	67	66	65	65	65	63	63	63	63	62	62	62	61	61	61	66
Minimum	71	70	70	69	69	66	66	66	66	66	66	65	65	65	65	65	65	65	65	64	63	63	63	63	62	62	62	61	61	61	61	65
November																																
Maximum	61	61	60	60	60	59	58	58	58	58	57	57	56	56	54	54	54	54	54	54	53	52	52	52	51	51	50	50	50	50	--	55
Minimum	61	60	60	60	58	58	58	58	58	57	56	56	56	54	54	54	54	54	54	53	52	52	52	51	51	50	50	50	50	49	--	55
December																																
Maximum	49	47	47	47	47	46	46	46	45	46	44	44	42	42	42	44	43	41	40	42	40	42	40	40	39	39	39	39	39	39	42	43
Minimum	47	46	47	46	46	46	46	45	44	44	44	42	41	42	42	41	41	40	40	40	37	40	40	39	39	39	39	37	37	36	37	42
January																																
Maximum	40	40	40	41	43	39	40	39	39	43	39	39	38	38	40	39	40	41	42	40	42	43	39	40	42	38	38	39	39	39	39	40
Minimum	37	40	38	38	38	36	38	39	39	39	39	38	38	36	36	39	39	39	39	39	40	38	37	38	38	38	37	37	38	38	38	38
February																																
Maximum	39	38	38	39	39	39	39	37	38	39	39	39	36	40	42	40	44	41	42	44	40	41	43	44	44	45	45	45	--	--	--	41
Minimum	38	38	37	36	38	38	35	34	35	35	35	36	36	36	37	40	40	40	41	40	40	40	41	43	43	44	45	45	--	--	--	39
March																																
Maximum	45	46	46	46	47	47	48	49	49	50	50	50	50	50	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	52	50
Minimum	45	45	45	46	46	47	47	48	49	49	50	50	50	50	50	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	49
April																																
Maximum	53	52	52	52	52	52	52	52	51	51	51	52	52	55	52	52	52	52	52	51	51	52	52	52	55	54	54	55	55	57	--	53
Minimum	52	52	52	52	52	52	52	51	51	51	51	51	50	50	51	52	52	52	51	51	51	51	52	52	52	54	54	54	55	54	--	52
May																																
Maximum	56	56	56	56	58	58	59	59	60	60	60	61	63	60	62	66	61	66	62	62	62	62	62	63	63	64	64	64	64	65	65	61
Minimum	56	56	56	56	56	58	58	59	59	60	60	59	59	60	60	60	61	61	62	62	62	62	62	62	63	63	64	63	63	64	65	60
June																																
Maximum	65	65	65	66	67	66	72	68	72	75	66	65	64	65	72	68	66	66	65	65	68	68	68	68	71	66	65	65	66	68	--	67
Minimum	65	65	65	65	66	66	66	66	66	65	65	63	63	63	65	66	66	65	65	65	65	68	65	68	64	65	65	64	65	66	--	65
July																																
Maximum	72	72	71	74	72	72	71	71	70	69	69	70	68	70	71	71	69	68	63	65	73	64	65	65	65	65	71	73	73	78	83	70
Minimum	68	68	68	71	72	71	70	70	69	69	69	68	68	68	64	65	63	63	63	63	63	64	64	65	65	65	65	71	72	69	68	67
August																																
Maximum	77	82	75	77	75	74	73	70	74	74	72	72	70	70	70	71	71	71	66	72	70	70	74	71	71	72	72	72	72	72	74	72
Minimum	71	71	74	74	74	73	70	69	69	69	69	69	67	69	66	70	70	66	66	66	70	70	70	70	70	71	71	71	71	72	71	70
September																																
Maximum	71	72	73	73	77	70	72	74	73	75	73	73	73	72	71	70	70	70	69	69	68	69	69	69	71	68	67	67	67	67	--	71
Minimum	70	70	72	72	69	69	70	72	72	72	72	72	72	71	70	70	69	68	69	68	68	68	68	69	68	66	66	67	67	67	--	69

BIG SANDY RIVER BASIN--Continued

3-2125. LEVISA FORK AT PAINTSVILLE, KY.

LOCATION.--At bridge on State Highway 40 at Paintsville, Johnson County, 200 feet downstream from Paint Creek, and 700 feet upstream from gaging station.
DRAINAGE AREA.--2,143 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to March 1953, November 1960 to September 1961 (discontinued).
Water temperatures: October 1949 to March 1953, November 1960 to September 1961.
Sediment records: October 1952 to March 1953, October 1960 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 78°F Aug. 18, 20, Sept. 7, 8, 11-13; minimum, freezing point Dec. 23, 24, Jan. 28-30.
Sediment concentrations: Maximum daily, 2,360 ppm June 10; minimum daily, 3 ppm Nov. 22.
Sediment loads: Maximum daily, 87,100 tons Aug. 1; minimum daily, 3 tons Nov. 22, 23.
EXTREMES, 1949-53, 1960-61.--Water temperatures: Maximum, 89°F July 21, 23, 1952; minimum, freezing point on several days during November 1950, December 1960, and January 1961.
Sediment concentrations (1952-53, 1960-61): Maximum daily, 2,360 ppm June 10, 1961; minimum daily, 2 ppm Feb. 6, 1953.
Sediment loads (1952-53, 1960-61): Maximum daily, 87,100 tons Aug. 1, 1961; minimum daily, 1 ton on many days during October and November 1952.
REMARKS.--Samples for iron and manganese filtered clear when collected. Flow affected by ice Dec. 21-27, Jan. 27-31.

Chemical analyses, in parts per million, November 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color	Turbidity
Nov. 4, 1960.	295	4.8	a0.00	--	26	12	23	2.4	54	94	17	0.1	0.5	267	115	70	348	6.8	2	4
Dec. 29.....	660	6.6	.29	0.19	18	9.2	14	2.2	42	66	9.0	.2	1.1	142	83	48	251	6.7	5	8
Jan. 31, 1961	1200	8.6	.45	.37	17	8.1	12	1.9	32	65	6.5	.1	2.3	140	76	50	236	6.7	6	20
Feb. 27.....	15300	7.4	.58	.50	8.8	5.7	5.1	1.8	12	41	3.0	.2	2.0	92	46	36	129	6.4	6	55
Mar. 28.....	4200	7.4	.36	.12	14	6.8	8.4	1.7	23	58	3.5	.1	1.1	115	63	44	186	7.0	5	30
Apr. 25.....	7640	7.7	.31	.24	12	6.0	7.3	1.7	21	49	2.0	.1	.6	107	54	38	161	6.8	24	100
May 24.....	1050	7.0	.23	.15	25	14	18	2.4	44	114	9.4	.1	.8	230	120	84	336	7.0	3	4
June 15.....	3370	7.2	.66	.06	23	11	18	2.9	41	90	14	.2	1.2	186	103	69	313	7.3	20	180
July 18.....	3730	7.0	.43	.06	17	8.5	13	2.6	38	69	5.0	.3	1.5	148	78	46	236	6.9	7	95
Aug. 15.....	520	8.5	.32	.24	22	9.6	14	2.6	48	78	8.0	.3	1.2	174	94	55	278	6.8	6	60
Sept. 28.....	128	4.3	.63	.38	43	16	51	4.5	86	166	38	.1	.8	379	173	103	599	7.0	16	20

a In solution when analyzed.

BIG SANDY RIVER BASIN--Continued

3-2125. LEVISA FORK AT PAINTSVILLE, KY.--Continued

Temperature (°F) of water, November 1960 to September 1961

Month	Day 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	Average
October	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
November	--	--	--	54	46	55	50	52	49	52	50	51	47	50	53	53	53	54	52	50	53	54	54	52	54	53	48	46	46	40	--	51
December	39	34	43	44	43	44	--	44	43	43	45	45	39	35	--	35	34	36	38	38	40	33	32	32	34	40	40	--	41	41	40	39
January	39	37	40	40	40	38	42	38	38	38	42	40	42	42	43	42	42	44	44	40	38	36	35	34	33	33	33	32	32	32	33	38
February	34	36	36	38	39	38	39	40	41	37	38	40	41	40	41	45	46	46	42	44	44	44	45	44	47	45	48	47	--	--	--	42
March	44	45	46	47	50	50	49	47	47	45	44	45	46	46	50	50	47	50	48	51	51	50	51	50	50	51	50	50	48	48	48	48
April	47	48	51	50	47	48	49	48	50	48	48	50	49	50	50	48	47	49	46	50	51	51	51	51	51	51	51	52	51	51	--	49
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	75	75	75	76	72	70	70	71	72	71	70	72	73	73	74	74	74	74	75	76	75	76	74	75	75	76	75	74	74
August	76	76	77	76	77	77	76	77	77	77	77	77	77	76	75	76	77	78	76	78	76	75	75	76	76	76	77	76	77	77	77	76
September	77	77	77	77	77	77	78	78	77	78	78	78	78	70	74	74	73	74	74	75	74	74	75	76	76	76	74	73	74	74	--	76

BIG SANDY RIVER BASIN--Continued

3-2125. LEVISA FORK AT PAINTSVILLE, KY.--Continued

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	115		5	271	--	10	610	57	94
2..	120		5	289	--	11	840	44	100
3..	110		4	316	--	11	735	24	48
4..	105		4	298	13	10	595	9	14
5..	120		5	292	13	10	466	10	12
6..	150		6	326	17	15	380	12	12
7..	115		5	350	18	17	350	13	12
8..	135		12	354	19	18	325	12	10
9..	530		200	358	20	19	315	9	8
10..	358		100	382	22	23	309	9	8
11..	338		65	446	30	36	352	23	S 25
12..	414		70	540	62	90	1090	170	500
13..	310		30	730	139	274	1930	267	1390
14..	230		14	710	313	600	2090	239	1350
15..	170		8	605	194	317	1570	159	674
16..	150		6	525	130	B 180	1360	95	B 350
17..	135		5	466	75	B 95	1110	40	B 120
18..	130		5	430	30	B 35	806	16	35
19..	150		16	394	10	11	635	12	20
20..	271		40	366	8	8	615	13	22
21..	309		30	342	12	11	690	31	58
22..	660		260	326	3	3	620	18	30
23..	540		380	323	4	3	580	11	17
24..	380		140	326	7	6	560	11	17
25..	300		35	334	11	10	610	11	18
26..	230		13	346	14	13	540	12	17
27..	200		9	346	8	7	550	8	12
28..	190		7	338	7	6	570	8	12
29..	210		8	500	23	S 37	720	27	S 62
30..	265		10	635	26	44	2600	240	S 1770
31..	256		10	--	--	--	5040	605	8230
Total	7696		1500	12264	--	1930	29563	--	15047
	JANUARY			FEBRUARY			MARCH		
1..	6470	788	13800	1180	25	80	14400	263	10200
2..	6840	794	14700	1230	23	76	13600	244	8960
3..	5400	530	7730	1390	25	94	8570	184	4260
4..	3530	316	3010	1580	27	115	5870	159	2520
5..	2410	182	1180	1880	33	168	5580	123	1850
6..	1770	100	478	1830	37	183	4670	138	1740
7..	1490	70	B 280	1640	19	84	5570	153	2300
8..	1270	50	B 170	4500	214	S 3500	8070	168	3660
9..	1080	32	93	11000	422	12500	13400	366	13200
10..	928	18	45	10500	195	5530	15000	366	14800
11..	720	23	45	7120	114	2190	9240	188	4690
12..	600	32	52	5690	60	B 900	5810	110	1720
13..	555	43	64	5400	84	1220	4990	70	943
14..	698	65	S 135	5360	99	1430	4340	61	715
15..	7520	534	S 13500	4730	92	1170	3780	54	551
16..	14500	734	28700	3540	40	382	3600	48	466
17..	12700	267	9160	2640	30	B 210	4400	72	855
18..	7610	116	2380	2170	24	141	5260	113	1600
19..	5250	93	1320	2120	19	109	5690	106	1630
20..	4760	79	1020	1850	20	B 100	5780	96	1500
21..	6230	110	1850	1590	20	B 85	5320	60	862
22..	4830	90	B 1200	2720	41	S 382	5240	92	1300
23..	3270	65	B 550	7660	238	S 5270	4890	103	1360
24..	2830	121	924	14100	685	26100	4740	100	1280
25..	2330	95	B 600	15000	660	26700	4970	109	1460
26..	1790	55	B 270	18400	896	44500	5080	111	1520
27..	1300	35	B 120	24600	1180	78400	4820	80	B 1000
28..	1200	25	B 80	17200	288	13400	4190	41	464
29..	1150	22	68	--	--	--	3620	34	332
30..	1150	35	109	--	--	--	3240	46	402
31..	1100	33	98	--	--	--	3000	66	535
Total	113281	--	103731	178620	--	225019	196730	--	88675

S Computed by subdividing day.
B Computed from estimated-concentration graph.

BIG SANDY RIVER BASIN--Continued

3-2125. LEVISA FORK AT PAINTSVILLE, KY.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	APRIL Mean discharge (cfs)	APRIL Suspended sediment Mean concentration (ppm)	APRIL Suspended sediment Tons per day	MAY Mean discharge (cfs)	MAY Suspended sediment Mean concentration (ppm)	MAY Suspended sediment Tons per day	JUNE Mean discharge (cfs)	JUNE Suspended sediment Mean concentration (ppm)	JUNE Suspended sediment Tons per day
1..	7810	599	14300	5170	152	2120	520	13	18
2..	11700	526	16600	9610	112	2910	478	19	24
3..	9500	152	3900	15100	468	19100	585	25	39
4..	6920	79	1480	11300	234	7140	570	14	22
5..	5300	77	1100	7120	110	B 2100	474	13	17
6..	4420	58	692	5640	90	B 1400	520	21	29
7..	4190	66	747	7110	269	S 6640	740	32	64
8..	3860	55	573	10900	582	17100	894	54	130
9..	3540	42	401	7710	118	2460	2180	1080	S 9460
10..	3380	50	456	6250	84	1420	3740	2360	23800
11..	4130	50	558	5320	69	991	2660	968	6950
12..	5050	44	600	4740	65	832	1730	447	2090
13..	6700	249	4500	10600	557	15900	1220	271	893
14..	9750	313	8240	11200	358	10800	1150	194	602
15..	10300	196	5450	6540	138	2440	3480	378	S 4100
16..	9430	157	4000	4420	74	883	11100	1070	32100
17..	10600	323	9240	3340	69	577	9480	780	S 21200
18..	9840	134	3560	2690	25	182	4320	312	3640
19..	7200	68	1320	2350	32	203	2430	206	1350
20..	5060	56	765	1810	25	B 120	1550	130	B 550
21..	3880	48	503	1530	17	70	1290	87	303
22..	3300	43	383	1330	25	90	1320	67	239
23..	3550	59	566	1180	17	54	1270	47	161
24..	6620	222	3970	1050	16	45	1080	36	105
25..	7470	143	2880	944	27	69	894	32	77
26..	8420	193	4390	856	29	67	801	23	50
27..	10500	298	8450	806	28	61	695	21	39
28..	7280	182	3580	770	24	50	610	25	B 40
29..	5350	130	B 1900	735	36	71	515	28	39
30..	4480	130	B 1600	635	22	38	470	28	36
31..	--	--	--	570	22	34	--	--	--
Total	199530	--	106704	149326	--	95967	58766	--	108167

Day	JULY Mean discharge (cfs)	JULY Suspended sediment Mean concentration (ppm)	JULY Suspended sediment Tons per day	AUGUST Mean discharge (cfs)	AUGUST Suspended sediment Mean concentration (ppm)	AUGUST Suspended sediment Tons per day	SEPTEMBER Mean discharge (cfs)	SEPTEMBER Suspended sediment Mean concentration (ppm)	SEPTEMBER Suspended sediment Tons per day
1..	410	28	31	16700	1770	S 87100	320	31	27
2..	366	37	36	18900	1180	60200	298	33	26
3..	338	33	30	10700	270	7800	259	26	18
4..	346	20	19	7570	248	5070	229	27	17
5..	338	20	18	4540	202	2480	227	26	16
6..	350	22	21	3060	240	1980	227	26	16
7..	306	26	21	1770	156	746	238	28	18
8..	292	18	14	1450	126	493	247	24	16
9..	274	21	16	1410	146	556	244	24	16
10..	241	22	14	1440	105	408	232	23	14
11..	221	18	11	1620	101	442	207	32	18
12..	218	16	9	1530	113	467	185	18	9
13..	253	14	10	1220	102	336	169	15	7
14..	244	17	11	911	79	194	162	18	8
15..	378	82	S 92	755	57	116	156	20	8
16..	1410	211	S 803	575	47	73	150	28	11
17..	2930	466	3690	474	31	40	147	25	10
18..	3700	330	3300	430	26	30	145	26	10
19..	3110	204	1710	505	152	207	136	24	9
20..	2390	181	1170	418	140	158	166	29	13
21..	6470	243	4240	575	140	B 220	241	20	13
22..	4910	210	B 2800	434	92	108	215	22	13
23..	4310	240	B 2800	390	75	79	169	27	12
24..	3240	254	2220	635	45	77	159	23	10
25..	2650	220	1570	535	59	85	162	27	12
26..	2190	276	1630	446	57	69	147	17	7
27..	2090	316	1780	458	49	60	139	27	10
28..	1580	239	1020	645	25	44	132	30	11
29..	1170	170	B 550	490	30	40	124	17	6
30..	8340	1190	S 40200	382	33	34	122	32	10
31..	11600	989	31000	316	23	20	--	--	--
Total	66665	--	100836	81284	--	169732	5754	--	391

Total discharge for year (cfs-days)..... 1099479
Total load for year (tons)..... 1017699

S Computed by subdividing day.
B Computed from estimated-concentration graph.

BIG SANDY RIVER BASIN--Continued

3-2125. LEVISA FORK AT PAINTSVILLE, KY.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Dec. 31, 1960	1600			5430	719		49	63	78	92	97	98	100	--	--			SBWC
Jan. 2, 1961	1600			6890	846		39	51	67	84	95	96	99	100	--			SBWC
Jan. 16	1400			14700	734		35	46	61	78	96	96	100	--	--			SBWC
Feb. 24	1400			15000	936		38	52	67	85	94	97	100	--	--			SBWC
Feb. 26	1425			18900	1200		32	44	59	77	86	90	93	95	100			SBWC
Feb. 26	1425			18900	1200		15	22	44	64	89	91	96	97	100			SBN
June 10	1200			3600	2320		35	43	58	74	79	83	88	95	100			SBWC
June 10	1200			3600	2320		16	23	40	58	73	75	83	92	100			SBN
Aug. 1	1400			18400	2090		45	60	77	92	98	99	100	--	--			SBWC
Aug. 1	1400			18400	2090		30	43	65	86	98	98	100	--	--			SBN

BIG SANDY RIVER BASIN--Continued

3-2140. TUG FORK NEAR KERMIT, W. VA.

LOCATION.--At gaging station, 2 miles upstream from Wolf Creek, 3 miles upstream from Kermit, Mingo County, and 3 miles downstream from Pigeon Creek.
DRAINAGE AREA.--1,185 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1960 to September 1961 (discontinued).
REMARKS.--Samples for iron and manganese filtered clear when collected.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color	Turbidity
Oct. 4, 1960..	85	3.1		0.22	--	51	26	100	5.0	216	253	18	0.2	0.8	566	234	57	870	7.5	1	8
Dec. 5.....	179	6.0		.08	0.29	34	16	53	2.5	112	160	12	.5	2.0	336	151	59	539	7.4	4	9
Jan. 10, 1961.	310	8.4		.29	.86	28	11	26	2.0	58	110	7.0	.1	3.2	252	115	68	361	6.7	2	15
Feb. 13.....	3730	7.7	0.0	1.5	1.5	12	6.8	8.6	1.8	22	57	4.0	.1	1.7	120	58	40	179	6.2	2	15
Mar. 15.....	1690	7.6		.08	.04	24	12	20	1.9	54	102	4.5	.1	1.6	202	110	66	320	7.4	5	45
Apr. 19.....	2850	7.5		.37	.12	18	8.6	13	1.5	42	74	3.5	.1	1.0	154	80	46	238	6.9	2	25
May 22.....	1000	7.8		.14	.00	40	17	39	2.7	106	162	5.0	.2	1.3	332	170	83	505	7.1	3	11
June 12.....	980	7.9		.76	1.4	26	12	34	2.4	85	113	4.5	.2	1.8	241	115	45	394	7.9	5	55
Sept. 13.....	141	3.8		.09	.01	50	19	75	4.6	168	215	10	.2	.6	463	203	66	713	7.8	5	8

BIG SANDY RIVER BASIN--Continued

3-2145. TUG FORK AT KERMIT, W. VA.

LOCATION.--At city waterplant at Kermit, Mingo County, 0.8 mile downstream from Wolf Creek, and 3 miles downstream from gaging station near Kermit.
DRAINAGE AREA.--1,274 square miles at waterplant; 1,185 square miles at gaging station.
RECORDS AVAILABLE.--Water temperatures: October 1946 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 82°F Sept. 10; minimum, 34°F Jan. 25.
EXTREMES, 1946-61.--Water temperatures: Maximum, 90°F July 29, 1949; minimum, freezing point on several days during winter months.
REMARKS.--Records of discharge are given for Tug Fork near Kermit.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	67	67	68	67	65	69	68	68	68	69	67	67	68	67	67	69	68	64	62	61	55	55	55	56	50	50	55	52	56	57	57	62
November	57	53	52	49	51	48	46	44	45	45	44	43	43	48	48	51	51	49	46	45	47	48	47	48	49	49	47	50	55	48	--	48
December	41	39	35	36	37	38	44	42	38	36	37	38	36	36	37	38	36	38	38	38	36	37	37	37	37	38	37	38	40	41	44	38
January	44	41	42	42	41	41	44	44	39	36	36	37	36	39	41	46	44	47	47	49	48	36	38	36	34	35	35	35	36	36	36	40
February	37	39	38	37	38	36	37	38	40	40	41	44	44	48	49	47	46	48	52	48	49	50	52	52	54	48	48	40	--	--	--	44
March	48	48	48	49	50	56	56	58	54	50	46	49	52	54	51	51	50	50	54	51	54	52	55	56	56	52	54	52	54	55	56	52
April	56	49	49	49	48	49	49	48	52	54	54	52	54	52	53	54	52	50	49	50	55	55	55	51	54	57	57	57	54	54	--	52
May	55	54	54	55	53	55	60	57	64	62	62	64	62	62	64	66	63	65	65	63	63	64	64	64	66	67	60	59	63	64	65	61
June	68	72	75	72	74	74	75	76	75	74	72	75	78	76	74	65	63	66	68	70	71	69	70	68	68	72	69	72	74	76	--	72
July	78	79	80	75	78	78	76	75	74	71	72	74	72	75	78	75	74	74	75	76	76	76	76	75	77	77	77	78	79	79	74	76
August	74	76	76	77	76	77	77	77	78	76	77	79	76	77	76	78	77	78	78	76	73	73	75	77	77	74	77	77	79	80	79	77
September	80	77	79	80	81	80	81	81	80	82	80	80	77	74	76	77	65	65	68	69	70	71	73	75	76	74	68	66	66	67	--	75

3-2157. BIG SANDY RIVER AT CATLETTSBURG, KY.

LOCATION.--At the Catlettsburg, Kenova, and Ceredo Water Company intake at Catlettsburg, Boyd County, 300 feet upstream from bridge on U.S. Highway 60, 0.3 mile upstream from Ice Dam Creek, and 0.9 mile upstream from mouth.
DRAINAGE AREA.--4,281 square miles (approximately).
RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1961.
Water temperatures: October 1956 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 359 ppm Oct. 1-31; minimum, 98 ppm Aug. 1-5.
Hardness: Maximum, 153 ppm Oct. 1-31; minimum, 47 ppm Aug. 1-5.
Specific conductance: Maximum daily, 813 micromhos Oct. 14; minimum daily, 121 micromhos May 9.
Water temperatures: Maximum, 83°F Sept. 9-14; minimum, freezing point Dec. 13, Feb. 8.
EXTREMES, 1956-61.--Dissolved solids: Maximum, 499 ppm Oct. 21-31, 1958; minimum, 88 ppm May 1-9, 1958.
Hardness: Maximum, 208 ppm Nov. 2-10, 1958; minimum, 44 ppm May 1-9, 1958.
Specific conductance: Maximum daily, 876 micromhos Sept. 10, 1957; minimum daily, 109 micromhos Apr. 10, 1957, Apr. 29, 1958.
Water temperatures: Maximum, 88°F Aug. 25, 26, 1959; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 1-31, 1960.....	6.8				38	14	62	4.4		96	124	54	0.1	2.6	0.15	359	153	74		601		3		0.1
Nov. 1-30....	7.0				34	14	51	2.9		76	110	56	.3	1.8	.08	332	143	80		549		4		.1
Dec. 1-31....	6.7				27	12	38	2.5		56	82	45	.1	2.0	.05	263	117	71		430		3		.1
Jan. 1-31, 1961.....	8.3				14	6.4	13	1.5		25	49	16	.2	2.1	.08	138	62	41		215		8		.0
Feb. 1-27....	7.3				14	6.4	13	2.0		24	49	13	.2	2.1	.31	128	62	42		202		5		.0
Mar. 1-31....	7.7				13	6.0	9.9	1.8		24	50	7.0	.1	1.4	.30	112	57	38		183		8		.0
Apr. 1-30....	7.6				14	6.5	10	1.5		26	51	8.0	.1	1.2	.20	113	62	40		188		12		.0
May 1-19.....	8.0				14	5.9	10	1.6		29	47	7.5	.2	1.0	.20	117	59	35		183		22		.0
May 22-31....	8.2				32	14	29	2.2		76	112	20	.1	2.2	.20	266	138	76		423		36		.0
June 1-9.....	6.2				31	14	38	2.8		76	115	29	.2	1.5	.20	276	135	73		465		8		.0
June 12-30...	8.2				18	7.5	18	2.3		43	60	13	.2	1.8	.50	158	76	41		259		17		.1
July 3-15....	6.1				34	13	48	3.4		88	124	35	.1	.8	.15	312	139	66		513		3		.1
July 17-29,31	7.9				16	5.9	18	2.5		40	50	17	.1	1.4	.15	150	64	31		239		22		.1
Aug. 1-5.....	8.2				11	4.7	7.3	2.3		25	35	5.0	.0	2.0	.12	98	47	26		146		54		.0
Aug. 7-31....	10				21	9.1	24	2.7		54	71	21	.1	1.8	.14	188	90	46		310		6		.0
Sept. 1-30...	4.9				37	14	50	3.5		37	129	40	.2	2.2	.14	321	150	78		539		3		.1
Time-weighted average [a]..	7.4				23	9.7	29	2.5		52	79	26	0.2	1.8	0.18	212	98	55		347		9		--

a Represents 97 percent of days.

BIG SANDY RIVER BASIN--Continued

3-2157. BIG SANDY RIVER AT CATLETTSBURG, KY.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement at approximately 8 a.m.)

Month	Day																															Average
	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	
October	64	68	68	78	65	70	68	68	69	69	68	68	68	67	66	66	66	65	67	60	58	56	55	55	58	51	55	56	55	55	55	63
November	51	52	52	52	53	49	47	44	48	48	44	44	45	45	46	41	47	42	48	46	45	45	48	47	48	48	49	50	53	47	--	47
December	42	38	37	38	38	40	40	38	35	35	35	35	32	33	34	35	35	34	34	34	34	34	--	--	--	--	--	35	34	34	33	36
January	34	34	36	38	36	38	38	38	37	34	35	34	34	38	38	38	43	42	40	38	35	34	33	33	33	33	33	33	33	33	33	36
February	33	33	33	33	33	33	34	32	33	35	37	38	39	44	44	43	43	45	45	45	45	46	48	48	47	46	44	--	--	--	--	40
March	44	44	44	46	48	51	50	53	48	48	47	47	48	49	48	48	46	47	48	48	49	49	49	49	48	49	50	53	50	51	51	48
April	42	44	47	46	46	45	45	46	47	48	48	48	49	49	50	50	49	47	47	47	50	51	53	57	62	59	58	58	58	57	--	50
May	55	53	54	55	56	54	57	60	59	60	60	61	61	62	63	64	63	64	63	--	--	63	65	65	64	65	60	62	64	64	64	61
June	68	73	72	72	72	72	72	73	73	--	--	72	75	73	66	64	64	64	65	67	67	68	70	68	68	69	69	70	72	74	--	70
July	--	--	76	77	78	78	77	73	72	72	74	77	76	76	77	--	72	68	72	72	73	74	75	75	76	75	75	75	78	--	74	75
August	73	72	72	76	74	--	75	75	76	76	76	76	74	72	75	75	77	75	77	75	74	73	72	75	75	75	76	77	78	79	79	75
September	80	80	81	82	82	82	82	82	83	83	83	83	83	83	78	73	71	70	70	70	69	70	70	72	74	72	65	67	68	68	--	76

TYGARTS CREEK BASIN

3-2170. TYGARTS CREEK NEAR GREENUP, KY.

LOCATION.--At gaging station at bridge on State Highway 7, 100 feet downstream from Lick Run, 0.4 mile upstream from Whiteoak Creek, and 6.5 miles west of Greenup, Greenup County.
DRAINAGE AREA.--242 square miles (revised).
RECORDS AVAILABLE.--Water temperatures: October 1956 to September 1961.
Sediment records: October 1956 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 83°F Sept. 11; minimum, freezing point several days during December to February.
Sediment concentrations: Maximum daily, 1,260 ppm June 6; minimum daily, 1 ppm Dec. 13, 20, Jan. 30, Feb. 7, 8.
Sediment loads: Maximum daily, 16,300 tons June 6; minimum daily, 0.1 ton on several days during October, December and September.
EXTREMES, 1956-61.--Water temperatures: Maximum, 83°F July 16, 23, 31, 1957, Sept. 11, 1961; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 1,500 ppm May 27, 1960; minimum daily, 1 ppm on many days during 1956-61.
Sediment loads: Maximum daily, 21,900 tons July 4, 1960; minimum daily, less than 0.05 ton on many days 1957-60.
REMARKS.--Occasional regulation of low flow caused by withdrawal of water for cooling purposes by gas transmission plant above gage. Flow affected by ice Jan. 23-31.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day 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	Average
October	66	69	64	67	64	67	62	65	66	64	67	65	68	66	66	--	63	63	59	59	54	56	56	53	52	54	52	53	55	58	55	61
November	53	52	52	51	51	52	46	48	47	44	45	44	46	48	52	52	49	49	47	47	46	47	46	44	49	46	50	50	45	41	--	48
December	40	39	40	41	39	40	39	32	32	36	35	32	32	34	35	33	32	33	32	32	32	32	32	33	35	34	33	33	34	35	34	35
January	34	33	33	34	36	38	36	--	37	37	39	39	39	39	43	40	41	41	--	38	32	32	33	32	33	33	32	32	34	33	33	36
February	34	32	33	34	36	35	34	34	35	35	35	39	44	45	42	42	43	46	44	42	43	47	49	46	43	44	43	45	--	--	--	40
March	42	40	43	49	50	51	50	50	47	43	47	51	53	49	48	49	47	48	47	51	49	50	48	47	51	53	55	54	52	52	51	49
April	46	46	39	40	49	47	47	50	47	46	45	50	47	46	50	50	48	46	48	52	52	54	58	62	63	62	61	56	56	55	--	51
May	56	55	56	58	55	55	57	59	59	57	57	60	66	65	68	64	65	64	64	63	62	63	64	66	67	61	61	63	64	67	65	61
June	69	72	72	74	70	64	64	69	68	65	70	70	73	70	64	61	62	67	68	68	67	70	71	70	70	70	72	73	73	76	--	69
July	77	78	78	76	74	74	76	74	75	75	76	71	73	72	72	69	71	73	74	74	73	78	78	80	76	79	77	77	78	77	76	75
August	77	73	75	76	76	77	78	75	75	--	74	76	75	75	76	75	79	77	78	--	72	76	75	75	73	75	77	78	77	77	78	76
September	77	79	80	79	79	82	79	80	80	82	83	82	81	74	71	--	69	69	68	71	71	73	74	75	70	71	70	68	68	68	--	75

TYGARTS CREEK BASIN--Continued

3-2170. TYGARTS CREEK NEAR GREENUP, KY.--Continued

Suspended sediment, water year October 1960 to September 1961

Day	OCTOBER Mean discharge (cfs)	OCTOBER Suspended sediment Mean concentration (ppm)	OCTOBER Suspended sediment Tons per day	NOVEMBER Mean discharge (cfs)	NOVEMBER Suspended sediment Mean concentration (ppm)	NOVEMBER Suspended sediment Tons per day	DECEMBER Mean discharge (cfs)	DECEMBER Suspended sediment Mean concentration (ppm)	DECEMBER Suspended sediment Tons per day
1..	7.2	12	0.2	27	11	0.8	70	6	1.1
2..	5.8	22	.3	25	13	.9	68	8	1.5
3..	5.4	17	.2	24	10	.6	53	6	.8
4..	2.4	13	.1	25	7	.5	42	3	.3
5..	1.5	17	.1	26	5	.4	37	2	.2
6..	3.0	13	.1	25	5	.3	33	2	.2
7..	3.3	11	.1	26	5	.4	31	2	.2
8..	3.6	11	.1	27	5	.4	29	3	.2
9..	3.9	12	.1	31	4	.3	26	7	.5
10..	11	11	.3	42	4	.4	25	4	.3
11..	70	15	2.8	90	5	1.2	24	3	.2
12..	74	16	3.2	132	6	2.1	25	2	.1
13..	44	13	1.5	96	5	1.3	25	1	.1
14..	32	12	1.0	68	5	.9	26	2	.1
15..	26	12	.8	54	5	.7	26	4	.3
16..	23	12	B .7	43	4	.5	26	3	.2
17..	20	12	.6	40	4	.4	26	3	.2
18..	16	12	.5	40	5	.5	25	6	.4
19..	16	16	.7	38	5	.5	24	2	.1
20..	44	14	1.7	36	3	.3	22	1	.1
21..	102	9	2.5	30	4	.3	45	3	.4
22..	108	9	2.6	27	5	.4	310	13	11
23..	64	8	1.4	26	4	.3	178	19	9
24..	45	12	1.4	25	3	.2	134	16	5.8
25..	36	15	1.4	24	3	.2	108	8	2.3
26..	28	15	1.1	23	3	.2	84	5	1.1
27..	26	14	1.0	25	3	.2	86	8	1.8
28..	24	12	.8	24	3	.2	96	14	3.6
29..	23	12	.7	24	3	.2	96	11	2.8
30..	22	11	.6	27	3	.2	249	23	15
31..	24	9	.6	--	--	--	470	54	68
Total	914.1	--	29.2	1170	--	15.8	2519	--	128.0

	JANUARY			FEBRUARY			MARCH		
1..	250	52	35	74	5	B 1	1600	100	432
2..	192	46	24	84	4	B .9	993	59	158
3..	156	25	10	96	3	B .8	608	32	52
4..	134	18	6.5	98	3	B .8	644	40	S 82
5..	118	16	5.1	80	2	B .4	2680	420	3040
6..	120	14	4.5	76	2	B .4	1780	167	803
7..	160	15	6.5	78	1	B .2	1730	159	743
8..	200	14	7.6	86	1	.2	1250	122	412
9..	178	14	6.7	340	11	10	1290	83	289
10..	146	13	5.1	580	23	36	884	47	112
11..	118	10	3.2	620	19	32	664	29	52
12..	100	10	2.7	825	--	E 110	496	25	33
13..	88	10	2.4	1460	186	733	438	19	22
14..	78	12	2.5	1170	76	240	520	22	31
15..	1260	377	S 2360	620	25	42	470	22	28
16..	3760	409	4150	406	12	13	452	19	23
17..	2330	172	1080	313	8	6.8	520	22	31
18..	776	68	142	277	6	4.5	403	24	26
19..	480	34	44	271	7	5.1	428	16	18
20..	389	21	22	238	7	4.5	431	11	13
21..	283	16	12	205	5	2.8	496	16	21
22..	190	10	5.1	386	--	E 120	944	48	122
23..	150	9	3.6	1360	190	B 700	979	51	135
24..	120	8	2.6	825	66	147	780	30	63
25..	100	4	1.1	1120	240	S 1050	536	17	25
26..	90	2	.5	1930	310	1620	428	10	12
27..	75	3	.6	1630	120	528	354	9	8.6
28..	65	5	.9	1300	79	277	319	12	10
29..	55	2	.3	--	--	--	283	44	S 80
30..	60	1	.2	--	--	--	488	47	62
31..	70	4	.8	--	--	--	417	36	40
Total	12291	--	7947.5	16548	--	5686.4	24305	--	6978.6

E Estimated.
S Computed by subdividing day.
B Computed from estimated-concentration graph.

TYGARTS CREEK BASIN--Continued

3-2170. TYGARTS CREEK NEAR GREENUP, KY.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued

Day	APRIL				MAY				JUNE			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	3120	788	S	7180	250	11		7.4	58	5		0.8
2..	3740	232	S	2500	304	10		8.2	51	4		.6
3..	1110	102		306	328	9		8.0	54	7		1.0
4..	700	48		91	253	12		8.2	64	7		1.2
5..	500	33		44	251	15	S	13	658	430	S	2020
6..	410	28		31	1680	424		1920	4780	1260		16300
7..	325	26		23	2720	526	S	5230	1280	405		1400
8..	274	29		21	7240	438		8560	424	107		122
9..	265	33		24	3100	161		1350	1020	167	S	597
10..	1190	119	S	423	1120	83		251	3200	418		3610
11..	1270	98	S	349	688	40		74	1110	170	S	606
12..	814	52		114	500	23		31	452	52		63
13..	1990	230	S	1300	417	18		20	310	38		32
14..	1410	108	S	445	334	17		15	1510	259	S	1910
15..	814	48		105	268	18		13	5630	516		7840
16..	1760	255	S	1400	226	14		8.5	5920	179	S	3140
17..	1520	217	S	1040	180	9		4.4	1060	81		232
18..	800	42		91	162	7		3.1	492	43		57
19..	556	25		38	164	7		3.1	350	31		29
20..	452	22		27	154	4		1.7	259	33		23
21..	403	21		23	132	4		1.4	212	23		13
22..	406	22		24	122	5		1.6	185	20		10
23..	392	28		30	106	6		1.7	156	17		7.2
24..	358	23		22	92	5		1.2	128	13		4.5
25..	322	18		16	78	5		1.0	106	12		3.4
26..	466	27		34	110	12		3.6	88	10		2.4
27..	540	27		39	128	12		4.1	78	10		2.1
28..	424	21		24	102	21		5.8	67	8		1.4
29..	347	18		17	84	16		3.6	58	8		1.2
30..	289	12		9.4	78	11		2.3	53	8		1.1
31..	--	--		--	67	9		1.6	--	--		--
Total	26967	--		15790.4	21438	--		17557.5	29813	--		38030.9

Day	JULY				AUGUST				SEPTEMBER			
1..	47	8		1.0	592	220	S	378	43	24		2.8
2..	42	8		.9	2220	715	S	4560	37	19		1.9
3..	39	8		.8	712	254	S	519	33	23		2.0
4..	38	8		.8	396	93		99	30	17		1.4
5..	40	6		.6	256	54		37	29	12		1.0
6..	173	13		6.1	190	33		17	27	11		.8
7..	116	6		1.9	168	27		12	25	9		.6
8..	70	4		.8	120	24		7.8	23	7		.4
9..	58	4		.6	195	34		18	21	8		.4
10..	48	5		.6	134	39		14	19	6		.3
11..	41	4		.4	150	36		14	18	5		.2
12..	37	3		.3	265	33		24	17	4		.2
13..	36	5		.5	470	62		79	14	4		.2
14..	40	135	S	20	265	34		24	13	6		.2
15..	590	212	S	562	160	26		11	11	7		.2
16..	1630	391	S	1820	110	26		7.7	9.6	8	B	.2
17..	1020	212		584	86	22		5.1	9.0	9		.2
18..	958	169	S	469	61	16		2.6	9.6	8		.2
19..	382	71		73	53	9		1.3	9.0	9		.2
20..	268	38		27	47	8	B	1	10	6		.2
21..	1250	928	S	3630	50	8		1.1	162	30	B	13
22..	473	174	S	237	51	7		1.0	102	16		4.4
23..	301	58		47	49	5		.7	43	54		6.3
24..	198	57		30	218	9	S	6.3	29	26		2.0
25..	154	62		26	229	45		28	23	4		.2
26..	668	153	S	318	114	32		9.8	24	2		.1
27..	476	256		329	76	14		2.9	25	2		.1
28..	241	121		79	56	8		1.2	20	3		.2
29..	164	82		36	44	16		1.9	16	5		.2
30..	721	235	S	805	41	31		3.4	16	4		.2
31..	1240	552	S	1940	44	33		3.9	--	--		--
Total	11559	--		11047.3	7622	--		5891.7	867.2	--		40.3

Total discharge for year (cfs-days)..... 156013.3
Total load for year (tons)..... 109143.6

S Computed by subdividing day.
B Computed from estimated-concentration graph.

TYGARTS CREEK BASIN--Continued

3-2170. TYGARTS CREEK NEAR GREENUP, KY.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Jan. 15, 1961.....	0730			2540	1000		47	56	67	79	91	96	100					SBWC
Feb. 26.....	0015			2110	430		49	57	67	79	93	97	100					SBWC
Feb. 26.....	0015			2110	430		22	32	51	71	89	93	100					SBN
May 8.....	1645			8010	351		58	70	80	88	93	96	100					SBWC
May 8.....	1645			8010	351		27	44	71	88	93	94	97	100				SBN
June 6.....	1130			5210	1580		63	75	89	96	98	99	100					SBWC
July 30.....	1130			1690	894		47	58	74	90	98	99	100					SBWC
July 30.....	2330			1690	894		22	34	54	81	98	98	100					SBN

3-2255. OLENTANGY RIVER NEAR DELAWARE, OHIO

LOCATION.--Temperature recorder at gaging station, 500 feet upstream from highway bridge, 1,000 feet downstream from Delaware Dam, 1,300 feet upstream from Pennsylvania Railroad bridge, and 4 miles north of Delaware, Delaware County.
DRAINAGE AREA.--387 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1946 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum 79°F Sept. 9, 12; minimum, 34°F Dec. 12-14.
EXTREMES, 1946-61.--Water temperatures: Maximum, 93°F June 29, 1952; minimum, freezing point on several days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	67	66	65	66	65	65	65	64	64	65	64	64	64	64	64	64	63	63	61	61	59	58	58	57	55	54	54	53	54	54	53	61
Minimum	65	64	64	64	64	64	63	63	63	62	62	62	62	62	62	63	61	61	61	59	58	57	57	55	54	53	53	53	53	53	53	60
November																																
Maximum	53	53	51	51	51	49	48	47	47	46	45	45	45	45	45	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	--	46
Minimum	52	51	51	51	49	48	47	47	46	45	45	44	44	45	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	--	46
December																																
Maximum	42	40	40	39	40	39	39	40	39	39	38	36	34	35	35	35	36	37	37	37	37	37	38	38	40	40	40	40	40	40	40	38
Minimum	40	40	39	39	39	39	39	39	39	38	36	34	34	34	35	35	35	36	37	36	36	37	37	38	38	40	39	39	40	39	40	38
January																																
Maximum	40	40	40	40	40	41	41	40	40	41	41	40	41	40	39	39	39	39	39	39	39	40	40	39	40	39	39	39	40	40	40	40
Minimum	40	40	40	39	39	40	40	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
February																																
Maximum	40	39	39	39	40	40	40	39	39	39	38	39	39	39	38	38	38	38	38	38	37	37	37	37	38	38	39	39	--	--	--	39
Minimum	38	38	38	39	39	39	39	38	38	38	38	38	37	37	38	38	38	38	38	37	37	37	37	37	37	38	38	39	--	--	--	38
March																																
Maximum	40	40	41	42	46	49	50	50	50	46	44	42	42	42	43	44	44	43	42	41	41	40	40	41	43	43	43	45	45	47	47	44
Minimum	39	40	40	41	42	46	49	50	46	44	42	42	42	42	42	43	43	42	41	41	40	40	40	40	41	43	43	43	45	45	46	43
April																																
Maximum	47	46	45	44	44	44	44	44	44	44	44	43	43	43	44	44	44	44	44	44	44	52	57	60	58	55	58	53	53	51	--	47
Minimum	46	45	44	44	44	44	44	43	44	43	43	43	43	43	43	44	44	43	43	44	44	44	46	51	53	51	49	50	46	46	--	45
May																																
Maximum	53	53	53	55	55	54	54	54	55	57	57	57	57	57	57	59	62	61	61	61	61	62	62	62	63	61	62	62	62	63	62	59
Minimum	51	53	53	53	54	54	54	54	54	55	56	57	57	57	57	57	59	60	60	61	61	61	62	62	61	61	60	60	61	61	61	58
June																																
Maximum	62	63	65	65	65	65	65	69	69	69	68	67	67	71	71	70	70	69	67	66	68	68	67	68	67	68	68	68	68	68	--	67
Minimum	61	61	62	62	63	64	64	64	69	68	67	67	67	67	70	70	69	67	66	66	66	66	66	66	66	66	66	66	66	66	--	66
July																																
Maximum	68	68	69	66	66	69	68	67	68	68	67	66	67	67	67	68	68	69	68	69	71	71	71	71	72	72	72	73	75	76	77	69
Minimum	66	66	66	66	65	65	65	65	65	65	66	66	66	66	67	67	68	68	68	68	69	70	70	70	71	71	71	72	73	75	76	68
August																																
Maximum	77	78	78	78	78	78	78	78	78	77	77	78	78	77	77	78	78	78	78	76	76	76	76	76	76	76	76	76	76	76	76	77
Minimum	77	77	78	77	77	77	77	77	77	77	77	77	77	77	77	77	76	76	76	76	76	76	73	75	74	74	74	74	74	74	74	76
September																																
Maximum	75	76	76	76	76	78	78	78	79	77	78	79	78	77	76	74	73	73	72	75	72	74	72	72	72	71	70	69	69	67	--	74
Minimum	71	74	74	75	75	75	75	76	76	77	77	77	77	71	73	72	71	71	71	69	70	69	70	70	69	69	68	67	67	67	--	72

SCIOTO RIVER BASIN--Continued

3-2268. OLENTANGY RIVER NEAR WORTHINGTON, OHIO

LOCATION.--Temperature recorder at gaging station, 30 feet downstream from Wilson Bridge Road Bridge, 1.5 miles northwest of Worthington, Franklin County, and 2.8 miles upstream from Rush Run.
DRAINAGE AREA.--493 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1955 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 85°F July 1, 23; minimum, freezing point on many days during December to February.
EXTREMES, 1955-61.--Water temperatures: Maximum 86°F Aug. 22, 23, 1959; minimum freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	60	60	60	60	60	63	62	60	61	61	61	62	64	64	63	64	62	59	58	55	52	51	53	52	47	47	51	52	54	55	54	58
Minimum	56	56	56	56	55	60	58	57	59	57	57	59	60	60	60	62	58	56	55	52	48	48	50	47	44	46	47	51	51	52	52	54
November																																
Maximum	52	51	50	49	48	48	43	43	44	44	43	41	44	47	51	53	52	47	45	43	42	43	45	43	42	44	46	51	51	42	--	46
Minimum	50	49	49	48	47	43	42	40	43	43	41	39	40	44	47	51	47	44	42	41	40	40	43	40	40	41	43	46	42	37	--	43
December																																
Maximum	37	36	34	37	39	40	40	38	35	34	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34
Minimum	35	34	32	34	37	39	38	35	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	39	42	42	38	37	38	41	42	42	39	40	40	--	--	--	36
Minimum	32	32	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	39	38	36	36	37	38	39	39	37	38	39	--	--	--	34
March																																
Maximum	40	42	44	46	47	50	49	49	47	45	45	43	46	46	44	44	43	43	42	44	43	43	42	42	46	47	49	49	49	49	48	45
Minimum	39	38	40	42	46	47	48	47	44	42	42	41	42	42	42	42	41	41	41	39	42	42	42	42	42	43	45	48	46	45	45	43
April																																
Maximum	45	44	46	47	47	46	45	49	48	44	46	46	45	47	46	46	43	43	45	47	47	50	51	53	57	57	54	54	51	52	--	48
Minimum	43	42	41	44	46	44	43	43	44	43	41	44	43	42	43	43	40	41	41	42	44	46	48	50	53	53	50	51	49	48	--	45
May																																
Maximum	55	53	55	56	54	56	55	56	56	58	61	64	67	69	69	65	64	63	60	59	58	63	64	67	70	69	61	66	66	67	66	62
Minimum	49	50	50	51	53	53	54	54	55	54	54	60	59	63	64	61	59	60	58	56	55	56	59	59	62	58	54	57	63	59	61	57
June																																
Maximum	71	74	76	74	74	73	72	72	70	72	74	78	79	77	71	73	73	74	75	74	72	70	72	69	70	71	74	77	81	83	--	74
Minimum	64	68	71	67	68	71	69	69	69	68	69	70	74	70	66	68	69	70	70	72	66	63	68	66	65	65	66	69	72	75	--	69
July																																
Maximum	85	84	83	78	73	78	78	76	76	78	79	76	75	76	75	76	77	77	76	77	80	83	85	83	82	80	81	80	81	81	80	79
Minimum	77	79	77	73	71	71	72	71	69	70	73	72	72	72	73	73	73	73	73	71	73	76	79	80	78	75	75	75	77	77	77	74
August																																
Maximum	79	77	78	78	78	77	76	78	80	80	79	80	77	78	80	79	79	79	79	77	73	74	74	76	78	78	79	80	79	79	79	78
Minimum	77	75	76	75	75	74	72	73	74	76	77	76	73	72	74	74	74	72	74	73	71	71	71	72	74	73	73	74	75	73	73	74
September																																
Maximum	78	79	79	82	81	82	79	77	76	77	78	78	79	77	71	67	67	67	67	71	73	74	76	77	76	72	66	66	63	65	--	74
Minimum	75	74	76	76	78	78	75	73	72	73	75	75	76	71	65	63	61	61	63	67	68	69	70	72	72	66	62	62	57	58	--	69

SCIOTO RIVER BASIN--Continued

3-2290. ALUM CREEK AT COLUMBUS, OHIO

LOCATION.--At Livingston Avenue Bridge, 0.2 mile upstream from gaging station at Columbus, Franklin County, and 6 miles upstream from mouth.
DRAINAGE AREA.--190 square miles.
RECORDS AVAILABLE.--Sediment records: Octoher 1960 to September 1961.
EXTREMES, 1960-61.--Sediment concentrations: Maximum daily, 700 ppm June 8; minimum daily, 2 ppm Oct. 28, Dec. 14, 15, Feb. 2.
Sediment loads: Maximum daily, 6,960 tons Apr. 26; minimum daily, less than 0.05 ton on several days.

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	1.6	--	0.1	15	22	0.9	10	6	B 0.2
2..	35	--	9	9.9	11	B .3	8.9	6	B .1
3..	8.0	--	1	8.9	13	.3	8.0	6	B .1
4..	4.1	--	.4	12	11	.4	8.0	5	B .1
5..	2.9	26	.2	12	13	.4	8.0	4	.1
6..	3.5	16	.2	15	18	.7	9.4	7	B .2
7..	2.3	23	.1	13	13	.4	9.4	11	.3
8..	1.4	24	.1	9.9	18	.5	8.9	9	B .2
9..	25	--	6	24	18	1.2	8.9	5	.1
10..	24	39	2.5	30	10	.8	8.5	5	B .1
11..	13	29	1.0	30	5	B .4	8.9	6	B .1
12..	6.3	20	.3	29	5	B .4	8.5	9	.2
13..	4.5	25	.3	21	6	B .3	7.5	4	.1
14..	3.8	30	.3	15	8	.3	5.9	2	T
15..	3.5	30	B .3	12	9	.3	5.5	2	M
16..	3.2	24	.2	12	10	.3	6.3	3	.1
17..	4.1	42	.5	12	10	B .3	5.5	3	M
18..	6.3	40	.7	10	12	.3	5.2	3	M
19..	8.9	48	1.2	9.4	12	B .3	5.2	3	M
20..	6.3	40	.7	9.9	9	B .2	5.9	4	B .1
21..	4.1	25	.3	11	6	.2	8.0	5	B .1
22..	3.2	18	B .2	10	6	.2	8.0	5	B .1
23..	3.8	18	.2	14	10	.4	6.7	5	B .1
24..	3.5	25	.2	10	10	B .3	8.0	5	B .1
25..	3.8	27	.3	9.9	8	.2	8.0	5	B .1
26..	4.8	20	B .2	11	9	B .3	9.0	5	B .1
27..	5.9	8	.1	11	10	B .3	9.9	5	B .1
28..	6.3	2	T	12	8	.2	8.9	12	.3
29..	8.0	4	B .1	12	8	B .2	8.0	10	.2
30..	5.5	5	B .1	11	7	B .2	8.5	7	B .2
31..	18	--	.2	--	--	--	8.5	6	B .1
Total	234.6	--	27.0	421.9	--	11.5	243.9	--	3.8

T Less than 0.05 ton.
B Computed from estimated-concentration graph.
M Less than 0.05 ton, computed from estimated-concentration graph.

SCIOTO RIVER BASIN--Continued

3-2290. ALUM CREEK AT COLUMBUS, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	JANUARY				FEBRUARY				MARCH			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	9.9	6	B	0.2	12	3		0.1	510	57		78
2..	10	8	B	.2	12	2		.1	324	33		29
3..	10	10		.3	12	3	B	.1	239	25	B	16
4..	10	12		.3	12	3	B	.1	496	160	K	410
5..	9.9	16	B	.4	12	6	B	.2	2530	650		4440
6..	11	18	B	.5	12	12	B	.4	2670	360		2600
7..	18	17	B	.8	13	20		.7	1010	130		354
8..	18	14	B	.7	13	21		.7	1000	138		373
9..	16	11		.5	14	19	B	.7	1140	110		338
10..	15	11		.4	14	17		.6	550	58		86
11..	15	10		.4	13	15	B	.5	332	30	B	25
12..	14	10	B	.4	16	15	B	.6	240	30	B	19
13..	15	10	B	.4	23	18	B	1	216	27		16
14..	16	10	B	.4	113	--		14	760	144	S	336
15..	32	10	B	.9	210	38		22	545	122		180
16..	56	11		1.7	236	30	B	19	289	47		37
17..	66	7		1.2	177	25	B	12	182	24		12
18..	80	7		1.5	276	--		70	144	18	B	7
19..	76	6		1.2	620	381		638	248	46		31
20..	66	6	B	1	336	211	S	211	362	36		35
21..	44	8	B	1	159	60	B	25	457	93	S	129
22..	40	7	B	.8	127	39		13	480	89		115
23..	34	7		.6	154	48		20	810	89	S	214
24..	29	6	B	.5	177	40	B	19	1070	155		448
25..	23	5	B	.3	521	--		470	550	95	B	140
26..	18	6	B	.3	1760	--		1800	312	55	B	45
27..	17	4		.2	1200	175		567	210	28		16
28..	16	3	B	.1	735	95		188	165	27		12
29..	15	7	B	.3	--	--		--	130	24		8.4
30..	13	8		.3	--	--		--	110	16	B	5
31..	12	5	B	.2	--	--		--	104	10		2.8
Total	824.8	--		18.0	6979	--		4093.8	18185	--		10557.2

Day	APRIL				MAY				JUNE			
1..	147	19	B	8	155	30		12	35	10	B	0.9
2..	244	25	B	16	125	30		10	212	--		55
3..	188	17		8.6	108	26		7.6	152	--		20
4..	142	23		8.8	92	25		6.2	80	--		7
5..	118	20	B	6	85	25		5.7	57	--		4
6..	108	17		5.0	83	23		5.2	63	35	J	8
7..	100	15		4.0	114	25	B	8	156	--		340
8..	91	14	B	3	601	230	S	627	531	700	J	1300
9..	128	45	J	20	1400	300	S	1270	455	300	K	420
10..	617	130	B	220	525	110		156	560	380	J	550
11..	430	59		68	244	55		36	246	112		74
12..	339	--		60	157	42		18	121	85		28
13..	1100	200	B	600	121	35	B	11	82	60	B	13
14..	560	110	B	170	98	25	B	7	78	42		8.8
15..	296	--		55	89	17		4.1	241	69	S	55
16..	805	--		800	108	13	B	4	181	95		46
17..	980	290	B	750	92	18		4.5	94	60		15
18..	1110	165		494	91	20		4.9	68	50	B	9
19..	545	57		84	85	20	B	5	53	53		7.6
20..	308	45	B	35	83	20	B	4	43	55	B	6
21..	332	61	S	65	89	20	B	5	42	55	B	6
22..	1010	--		1000	94	18	B	5	47	55	B	7
23..	1820	450	K	2400	80	15		3.2	40	50	B	5
24..	555	110		165	68	14	B	3	34	40	B	4
25..	1240	405	S	1920	60	14	B	2	31	25	B	2
26..	3980	648	S	6960	54	13	B	2	28	13		1.0
27..	760	198		406	48	13	B	2	27	8	B	.6
28..	354	95		91	46	13	B	2	25	5	B	.3
29..	258	58		40	42	13	B	2	22	6	B	.4
30..	197	40	B	20	40	12	B	1	19	8	B	.4
31..	--	--		--	39	10		1.0	--	--		--
Total	18862	--		16482.4	5116	--		2234.4	3823	--		2994.0

S Computed by subdividing day.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.
K Computed from estimated-concentration graph and subdividing day.

SCIOTO RIVER BASIN--Continued

3-2290. ALUM CREEK AT COLUMBUS, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	JULY				AUGUST				SEPTEMBER			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	17	11		0.5	261	180		127	39	32		4.7
2..	17	11	B	.5	414	--		150	20	13	B	.7
3..	15	12	B	.5	197	--		60	12	12	B	.4
4..	11	13	B	.4	121	87		28	69	--		9
5..	18	13		.6	71	80	B	15	71	36		6.9
6..	36	19		1.8	62	65	B	11	101	140	K	50
7..	18	20	B	1	65	50	B	9	267	180	J	160
8..	24	20	B	1	66	40	B	7	356	210	B	200
9..	19	15	B	.8	44	33		3.9	121	110	B	35
10..	15	13	B	.5	35	30	B	3	71	95	B	18
11..	11	13	B	.4	93	30		7.5	48	77		10
12..	11	14	B	.4	40	25	B	3	34	60		5.5
13..	13	14		.5	28	17	B	1	26	54		3.8
14..	11	13	B	.4	21	15	B	.8	21	49		2.8
15..	9.9	13	B	.3	17	15	B	.7	17	37		1.7
16..	8.7	15	B	.4	13	16	B	.6	14	30	B	1
17..	17	27		1.2	9.9	15	B	.4	12	30	B	1
18..	22	--		3	8.7	13	B	.3	11	25	B	.7
19..	60	53	S	9.0	16	--		2	9.9	25		.7
20..	53	25	B	4	37	35	K	4	9.9	26		.7
21..	78	50	J	16	20	12	B	.6	9.9	37		1.0
22..	56	--		9	24	13	B	.8	8.7	45		1.0
23..	25	35	B	2	18	26	S	1.5	8.0	45	B	1
24..	18	30	B	1	22	41	S	2.6	9.3	40	B	1
25..	15	23		.9	24	25	B	2	26	47	S	3.9
26..	17	13	B	.6	18	25	B	1	15	40		1.6
27..	12	12	B	.4	17	25	B	1	11	40		1.2
28..	9.9	14	B	.4	32	25	B	2	43	--		6
29..	164	420	J	240	25	25	B	1	31	30	B	2
30..	51	--		16	17	27		1.2	22	30	B	2
31..	164	82	S	46	13	30	B	1	--	--		--
Total	1016.5	--		359.5	1849.6	--		448.9	1513.7	--		533.3

Total discharge for year (cfs-days)..... 59070
Total load for year (tons)..... 37763.8

S Computed by subdividing day.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.
K Computed from estimated-concentration graph and subdividing day.

SCIOTO RIVER BASIN--Continued

3-2290. ALUM CREEK AT COLUMBUS, OHIO--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Feb. 19, 1961.....	1440			740	452		54	69	78	89	96	98	100	--				SBWC
Mar. 5.....	1150			2420	654		61	67	81	90	95	97	99	100				SBWC
Mar. 5.....	1150			2420	654		21	34	53	83	90	91	97	100				SBN
Apr. 26.....	1320			4780	570		61	73	82	90	93	94	97	100				SBWC
Apr. 26.....	1320			4780	570		32	48	69	85	88	89	96	100				SBN
May 8.....	1715			905	608		35	45	59	77	90	95	100	--				SBWC
May 9.....	0840			920	317		56	70	81	91	95	98	100	--				SBWC

3-2315. SCIOTO RIVER AT CHILLICOTHE, OHIO

LOCATION.--Temperature recorder at gaging station at north end of Chillicothe, Ross County, 450 feet downstream from Bridge Street Bridge on U.S. Highway 23.
DRAINAGE AREA.--3,847 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1951.
Water temperatures: October 1950 to September 1951, October 1953 to February 1959, June 1960 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum 83°F July 31; minimum, freezing point on many days during December to February.
EXTREMES, 1950-51, 1953-61.--Water temperatures: Maximum, 89°F July 14, 1954, Aug. 2, 3, 1955; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	66	64	64	64	63	64	63	63	62	63	63	64	65	65	64	64	64	63	62	60	58	56	56	56	53	52	52	53	54	55	55	60
Minimum	63	63	62	62	61	63	61	62	62	62	61	62	63	63	63	63	62	61	60	57	55	54	55	53	51	51	51	52	53	53	54	59
November																																
Maximum	54	54	53	52	52	51	49	48	47	47	47	46	46	48	49	51	51	49	48	47	46	45	47	46	46	46	47	48	49	46	--	48
Minimum	54	52	52	51	51	49	48	46	47	47	46	45	45	46	48	49	49	48	47	45	45	45	45	45	45	45	46	47	46	43	--	47
December																																
Maximum	43	42	41	41	41	42	42	42	40	39	38	37	35	35	34	34	34	33	33	33	33	33	33	33	33	32	32	32	32	32	32	36
Minimum	42	40	40	40	40	41	42	40	39	37	37	35	35	34	33	33	33	33	33	33	33	33	33	33	32	32	32	32	32	32	32	35
January																																
Maximum	32	32	32	33	33	34	35	35	35	34	34	35	35	36	36	36	36	35	35	34	33	32	32	32	32	32	32	32	32	32	32	34
Minimum	32	32	32	32	33	33	34	35	34	33	33	34	34	35	35	36	35	34	34	33	32	32	32	32	32	32	32	32	32	32	32	33
February																																
Maximum	32	32	32	32	32	32	33	32	32	32	33	37	39	40	40	39	39	42	43	42	40	40	42	45	46	45	43	41	--	--	--	38
Minimum	32	32	32	32	32	32	32	32	32	32	32	33	37	39	38	38	38	39	42	40	39	39	39	42	45	43	41	41	--	--	--	37
March																																
Maximum	41	41	42	45	47	48	48	48	48	44	44	45	46	46	46	45	44	44	43	44	44	44	44	44	44	45	47	48	49	49	49	45
Minimum	41	41	41	42	45	47	48	48	44	43	44	44	45	46	45	44	44	43	43	43	44	44	44	44	43	43	45	47	48	48	49	45
April																																
Maximum	49	47	45	46	47	47	47	49	49	48	47	46	46	46	47	48	48	45	45	46	47	49	50	54	56	56	56	56	55	55	--	49
Minimum	47	45	44	45	46	47	47	47	48	47	46	46	46	46	46	47	45	44	44	45	46	47	49	50	54	56	55	55	53	52	--	48
May																																
Maximum	53	54	54	56	55	56	57	59	59	59	58	61	63	65	66	66	65	64	63	62	60	61	61	64	65	65	61	63	63	65	64	61
Minimum	52	53	53	54	55	54	56	57	59	58	58	58	61	63	65	65	64	63	62	60	59	58	59	60	61	61	60	59	62	61	62	59
June																																
Maximum	66	67	69	70	70	70	70	71	70	68	69	72	75	76	74	69	71	71	71	71	70	69	69	68	68	68	70	72	73	76	--	70
Minimum	62	65	66	66	67	68	69	70	68	68	68	69	72	74	69	67	67	67	68	69	68	66	67	66	66	65	66	67	69	71	--	68
July																																
Maximum	79	80	80	78	74	74	74	75	74	75	76	75	73	74	74	73	72	75	76	76	78	80	81	80	81	80	80	80	82	82	83	77
Minimum	74	77	76	74	73	72	72	72	72	71	72	73	72	72	73	72	71	71	74	74	74	76	79	79	78	77	78	78	78	80	79	75
August																																
Maximum	82	81	79	79	79	78	78	78	78	78	78	74	74	74	74	74	75	75	76	75	73	73	73	73	74	75	76	77	77	77	78	76
Minimum	80	78	77	78	78	77	75	76	76	76	74	74	74	72	72	72	73	73	74	73	72	71	71	71	72	73	73	74	75	75	74	74
September																																
Maximum	77	79	79	80	80	80	80	81	80	80	79	80	80	80	73	70	67	67	67	68	69	71	73	75	75	71	69	69	65	65	--	74
Minimum	76	76	77	78	78	79	79	79	78	78	77	77	78	73	70	66	65	65	65	67	67	68	69	71	71	69	67	65	63	63	--	72

SCIOTO RIVER BASIN--Continued

3-2340. PAINT CREEK NEAR BOURNEVILLE, OHIO

LOCATION.--At gaging station at highway bridge, 1.2 miles southwest of Bourneville, Ross County, and 1.2 miles upstream from Upper Twin Creek.
DRAINAGE AREA.--808 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1956 to September 1961.
Sediment records: October 1956 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 77°F July 24; minimum, freezing point Jan. 8.
Sediment concentrations: Maximum daily, 2,000 ppm July 15; minimum daily, 3 ppm on several days during December and February.
Sediment loads: Maximum daily, 36,900 tons May 8; minimum daily, less than 0.5 ton Dec. 4, 15, 17, 25, 26.
EXTREMES, 1956-61.--Water temperatures: Maximum, 80°F June 30, July 1, 1959; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 2,010 ppm Jan. 21, 1959; minimum daily, 2 ppm on several days during November and December 1956, January 1957.
Sediment loads: Maximum daily, 77,900 tons Jan. 22, 1959; minimum daily, less than 0.5 ton on several days during November, December 1956, December 1960.
REMARKS.--Flow regulated by Rocky Fork Reservoir (capacity 34,100 acre-feet). Flow affected by ice Jan. 27, 28, Feb. 1-3.

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement at 7:00 a.m.)

Month	Day																															Average
	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	
October	57	60	58	59	54	63	57	58	61	59	58	58	59	59	59	62	57	54	57	52	51	46	52	48	44	48	50	49	50	50	48	55
November	50	51	47	46	49	45	41	39	45	43	39	38	39	45	50	53	48	43	43	42	40	43	45	42	45	42	47	50	48	42	--	45
December	34	36	36	38	38	43	41	40	34	--	34	--	--	--	34	--	--	--	--	--	--	--	--	--	--	35	33	--	--	34	34	--
January	34	33	35	34	--	33	33	32	--	34	36	36	36	34	34	34	34	34	34	--	--	--	--	--	--	--	--	--	--	--	--	--
February	--	--	--	--	34	34	34	34	34	33	37	35	33	34	35	36	37	41	39	40	39	41	45	47	48	40	39	42	--	--	--	38
March	45	45	43	48	52	47	49	48	43	40	40	39	--	47	45	43	41	41	39	41	40	46	40	39	44	46	46	54	50	48	51	45
April	44	47	42	43	45	45	43	42	45	45	42	46	44	43	47	48	43	43	41	45	51	52	53	55	61	54	48	54	50	50	--	47
May	51	49	50	50	53	53	59	58	59	57	56	59	60	65	65	64	59	60	58	58	57	55	55	50	58	59	55	58	60	58	60	57
June	64	68	66	64	65	69	69	68	69	69	71	71	73	74	66	63	60	64	65	66	67	63	67	63	65	64	65	66	68	70	--	67
July	72	76	75	70	70	70	70	68	67	68	70	70	70	71	69	70	70	71	73	72	73	74	76	77	75	73	74	73	76	76	76	72
August	76	76	74	73	73	73	70	71	68	73	73	73	73	70	70	70	72	70	72	72	70	69	70	70	72	71	71	73	73	72	71	72
September	73	73	75	74	74	75	74	74	74	73	73	73	73	73	64	59	59	59	61	65	63	65	65	68	69	63	61	61	56	60	--	68

SCIOTO RIVER BASIN--Continued

3-2340. PAINT CREEK NEAR BOURNEVILLE, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1..	28	88	7	47	23	3	55	18	3
2..	30	92	7	48	25	3	50	15	2
3..	30	82	7	44	23	3	50	18	2
4..	30	86	7	43	18	2	49	3	T
5..	31	81	7	43	28	3	48	19	2
6..	34	64	6	48	22	3	48	34	4
7..	32	69	6	48	15	2	52	7	1
8..	34	61	6	46	8	1	54	6	1
9..	37	53	5	48	13	2	49	13	2
10..	40	44	5	69	11	2	48	11 B	1
11..	40	42	4	87	11	2	54	5	1
12..	37	43	4	76	7	1	60	5 B	1
13..	35	46	4	69	6	1	55	5 B	1
14..	32	33	3	58	16	2	50	4 B	1
15..	30	44	4	55	26	4	49	3	T
16..	30	53	4	55	23	3	50	4 B	1
17..	30	67	5	55	16	2	44	4	M
18..	30	65	5	54	12	2	46	5 B	1
19..	34	62	6	52	13	2	43	5 B	1
20..	40	42	4	49	6	1	48	5 B	1
21..	42	31	4	49	9	1	57	5 B	1
22..	39	34	4	50	10	1	58	5 B	1
23..	40	37	4	52	16	2	54	5 B	1
24..	40	38	4	52	16	2	52	4 B	1
25..	39	20	2	52	10	1	54	3	M
26..	39	21	2	50	12	2	57	3	T
27..	39	29	3	49	21	3	168	15	7
28..	40	36	4	49	24	3	183	14 B	7
29..	40	35	4	55	23	3	85	14 B	3
30..	39	33	3	55	27	4	74	18	4
31..	40	31	3	--	--	--	67	19	3
Total	1101	--	143	1607	--	66	1911	--	56

Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1..	64	8	1	85	11 B	2	2210	94	561
2..	64	7	1	85	10 B	2	2310	110	686
3..	58	9	1	85	8 B	2	1810	64	313
4..	55	8	1	85	8 B	2	1860	-- E	1300
5..	55	8 B	1	85	7	2	3800	702 S	8780
6..	57	11	2	85	5	1	6080	700 A	11000
7..	78	11	2	85	4	1	4560	302	3720
8..	413	108 S	131	85	5	1	4850	331	4330
9..	245	90 B	60	89	3	1	4280	205	2370
10..	135	73	27	89	4	1	3140	97	822
11..	114	44	14	89	6	1	2290	74	458
12..	110	17	5	100	3	1	1770	64	306
13..	123	13	4	241	71 S	110	1570	60	254
14..	131	9	3	1480	524 S	2380	1770	88	420
15..	655	208 S	600	736	102	203	1920	76	394
16..	1070	329 S	1050	673	42	76	1620	52	227
17..	405	82	90	540	39	57	1190	34	109
18..	312	35	29	748	62	125	940	24	61
19..	290	16	12	1220	93	306	980	22	58
20..	253	13 B	9	866	50	117	1100	28	83
21..	205	13 B	7	610	22	36	2220	216 S	1770
22..	190	13 B	7	515	24	33	3270	242	2140
23..	176	13 B	6	624	33	56	3280	155	1370
24..	156	13 B	5	574	28	43	2740	81	599
25..	147	14 B	6	1470	-- E	2400	2120	53	303
26..	123	15 B	5	2940	544	4320	1690	43	196
27..	110	15 B	4	2820	286	2180	1380	43	160
28..	100	14 B	4	2270	134	821	1120	47	142
29..	95	13 B	3	--	--	--	848	40	92
30..	90	12 B	3	--	--	--	680	29	53
31..	90	11 B	3	--	--	--	580	23	36
Total	6169	--	2096	19374	--	13280	69978	--	43113

E Estimated.
S Computed by subdividing day.
T Less than 0.5 ton.
A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.
M Less than 0.5 ton, computed from estimated-concentration graph.

SCIOTO RIVER BASIN--Continued

3-2340. PAINT CREEK NEAR BOURNEVILLE, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	1430	101	S 450	1430	46	178	255	34	23
2..	1740	87	409	1120	46	139	250	36	24
3..	1180	28	89	848	39	89	320	48	41
4..	920	23	57	680	32	59	426	37	42
5..	722	23	45	574	31	48	412	20	22
6..	610	22	36	920	46	114	326	15	13
7..	510	17	23	5760	798	S 19700	764	95	J 230
8..	451	15	18	14900	918	36900	550	80	B 120
9..	436	23	27	18100	742	36300	1130	130	S 431
10..	1240	49	164	12300	472	15700	2240	285	1720
11..	1520	47	193	5470	275	4060	2250	272	1650
12..	1800	120	J 750	3620	146	1430	1520	152	624
13..	3730	304	3060	2850	103	792	893	105	253
14..	3220	113	982	2280	108	665	1490	--	E 3500
15..	2460	92	611	1900	127	652	2100	717	4060
16..	6460	1040	S 19800	1660	118	529	1790	183	884
17..	4210	218	2480	1280	93	321	1100	127	377
18..	3450	113	1050	1060	76	218	722	98	191
19..	2740	66	488	920	44	109	540	95	138
20..	2100	50	284	743	41	82	444	82	98
21..	1990	91	489	652	40	70	419	78	88
22..	1890	130	663	617	40	67	366	73	72
23..	1720	61	283	540	34	50	320	63	54
24..	1620	61	267	471	37	47	284	58	44
25..	2290	260	J 3100	422	36	41	255	66	45
26..	8140	1110	24400	405	38	42	232	59	37
27..	5600	431	6520	382	28	29	212	66	38
28..	3320	186	1670	344	22	20	198	64	34
29..	2340	97	613	318	26	22	176	52	25
30..	1770	57	272	301	27	22	160	57	25
31..	--	--	--	274	27	20	--	--	--
Total	71609	--	69293	83141	--	118515	22144	--	14903

	JULY			AUGUST			SEPTEMBER		
1..	145	52	20	248	68	46	116	34	11
2..	131	52	18	1020	--	E 650	108	42	12
3..	139	50	19	1590	340	A 1500	106	31	9
4..	120	51	16	857	165	382	102	33	9
5..	139	65	24	535	110	159	97	33	9
6..	440	137	163	1260	361	S 1300	102	37	10
7..	451	112	136	598	172	278	89	37	9
8..	405	128	140	419	83	94	83	43	10
9..	304	84	69	335	73	66	74	35	7
10..	245	68	45	290	64	50	70	43	8
11..	202	73	40	2740	1140	S 10900	70	42	8
12..	176	66	31	3550	563	5400	69	43	8
13..	193	73	38	4390	386	4580	65	35	6
14..	548	400	J 2100	2750	153	1140	69	41	8
15..	1830	2000	J 13000	1550	97	406	64	41	7
16..	920	334	830	884	70	167	60	44	7
17..	1190	--	E 1500	592	72	115	58	41	6
18..	2110	432	2460	447	74	89	55	36	5
19..	1520	210	862	369	70	70	55	42	6
20..	1210	210	686	315	60	51	55	35	5
21..	980	133	352	274	48	36	62	43	7
22..	708	107	204	253	42	29	57	43	7
23..	574	103	160	230	49	30	54	35	5
24..	550	102	151	240	44	28	48	38	5
25..	462	108	135	228	33	20	48	44	6
26..	382	90	93	198	39	21	80	50	11
27..	338	84	77	178	38	18	57	35	5
28..	293	64	51	164	28	12	44	33	4
29..	245	61	40	151	28	11	57	38	6
30..	220	64	38	139	32	12	99	37	10
31..	210	58	33	129	25	9	--	--	--
Total	17380	--	23531	26923	--	27669	2173	--	226

Total discharge for year (cfs-days).....323510
Total load for year (tons).....312891

E Estimated.
S Computed by subdividing day.
A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.

SCIOTO RIVER BASIN--Continued

3-2340. PAINT CREEK NEAR BOURNEVILLE, OHIO--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Jan. 16, 1961.....	0700			1400	425		59	70	85	94	98	99	100	--	--			SBWC
Feb. 26.....	0700			2980	519		48	57	70	86	95	97	99	100	--			SBWC
Mar. 6.....	1320			6080	492		38	45	57	72	89	93	97	98	100			SBWC
Apr. 26.....	1800			6670	594		51	59	66	77	87	93	96	98	100			SBWC
Apr. 26.....	1800			6670	594		21	33	49	70	85	90	95	98	100			SBN
May 8.....	1145			13100	742		39	47	58	73	86	92	97	100	--			SBWC
May 8.....	1145			13100	742		19	23	42	61	81	88	95	98	100			SBN

SCIOTO RIVER BASIN--Continued

3-2345. SCIOTO RIVER AT HIGBY, OHIO

LOCATION.--At gaging station at highway bridge, 0.8 mile downstream from Walnut Creek, and 1.2 miles north of Higby, Ross County.
DRAINAGE AREA.--5,129 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1953 to September 1961.
Sediment records: October 1953 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 83°F July 23, Sept. 10, 11; minimum, freezing point on many days during December to March.
Sediment concentrations: Maximum daily, 962 ppm Apr. 16; minimum daily, 2 ppm Nov. 13, 15, 16.
Sediment loads: Maximum daily, 87,300 tons May 10; minimum daily, 3 tons Nov. 15, 16.
EXTREMES, 1953-61.--Water temperatures: Maximum, 84°F July 20, 1957, Sept. 7, 1960; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 2,130 ppm July 21, 1954; minimum daily, 1 ppm on several days during 1955 and 1956.
Sediment loads: Maximum daily, 550,000 tons Jan. 23, 1959; minimum daily, 1 ton on several days during 1955 and 1956.
REMARKS.--Flow slightly regulated by O'Shaughnessy, Griggs, Delaware, Hoover, and Rocky Fork Reservoirs. Flow affected by ice Jan. 26 to Feb. 9.

Temperature (°F) of water, water year October 1960 to September 1961
(Once daily measurement, usually between 5 p.m. and 6 p.m.)

Month	Day																															Average
	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	
October	67	67	64	62	67	68	68	66	67	67	65	66	--	67	66	64	--	61	59	53	54	59	--	--	52	55	54	56	64	--	50	62
November	55	53	51	52	--	45	--	44	46	46	49	50	50	52	48	48	53	51	50	46	48	48	47	50	50	--	--	--	--	--	--	--
December	40	--	41	--	41	42	43	40	40	38	37	38	41	43	43	42	41	34	34	32	32	32	32	32	32	33	34	44	46	46	34	38
January	34	32	34	34	36	37	--	35	34	33	--	36	34	34	41	32	36	34	37	32	32	32	32	32	32	33	32	32	34	--	36	34
February	37	35	34	32	32	32	33	37	38	43	43	44	45	46	42	41	42	44	46	48	47	43	43	48	44	41	42	32	--	--	--	40
March	33	34	37	41	48	54	37	36	38	39	39	40	38	37	39	37	34	33	32	39	39	41	41	40	39	44	34	34	36	36	36	38
April	35	38	41	39	49	38	48	39	41	37	39	41	45	46	48	47	38	39	41	45	47	46	49	--	--	60	48	48	48	48	--	44
May	55	53	48	49	49	53	54	56	58	55	50	61	64	67	67	67	66	64	--	--	--	63	62	66	--	59	60	65	64	--	--	57
June	--	70	69	71	70	71	72	71	73	74	76	75	--	71	73	73	73	--	77	--	--	77	76	74	80	--	78	77	79	81	--	74
July	80	--	76	77	74	73	75	76	76	79	--	--	--	75	75	75	79	77	75	76	--	80	83	80	80	81	82	--	--	82	--	--
August	81	81	79	--	--	80	79	80	--	80	80	80	79	--	--	74	79	82	80	75	74	79	78	78	78	78	80	82	81	79	82	79
September	80	79	80	--	--	82	81	81	81	83	83	82	81	75	71	69	--	--	77	70	72	72	73	79	75	76	77	78	79	79	--	78

SCIOTO RIVER BASIN--Continued

3-2345. SCIOTO RIVER AT HIGBY, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	426	20	23	456	12	15	532	8	11
2..	409	24	26	600	6	10	500	8	B 11
3..	404	18	20	545	7	10	480	8	10
4..	559	13	20	526	12	17	456	8	B 10
5..	512	27	37	512	19	B 25	456	8	10
6..	474	22	28	506	23	31	462	6	7
7..	450	26	32	512	19	B 25	468	8	10
8..	444	28	34	512	12	16	468	11	14
9..	438	32	38	532	4	6	474	8	10
10..	493	20	27	573	4	6	456	7	9
11..	730	17	34	722	4	8	462	10	12
12..	601	24	39	730	3	6	468	7	9
13..	552	20	B 30	652	2	4	432	9	10
14..	519	13	18	594	5	8	450	5	6
15..	500	8	11	552	2	3	456	3	4
16..	480	6	8	552	2	3	450	4	5
17..	468	5	B 6	545	6	9	444	5	6
18..	462	6	7	559	13	20	438	5	6
19..	493	7	9	559	16	24	426	5	6
20..	519	10	14	538	8	12	426	6	7
21..	532	15	22	526	6	8	450	6	7
22..	545	12	18	526	5	7	404	7	8
23..	506	7	10	538	4	6	426	13	15
24..	480	12	B 16	566	8	12	420	13	B 15
25..	468	23	29	622	7	12	404	12	13
26..	450	9	11	573	5	B 8	404	10	11
27..	456	8	10	552	6	B 9	438	7	8
28..	468	13	16	545	6	B 9	512	16	22
29..	480	30	39	538	7	B 10	545	12	18
30..	474	20	B 25	538	7	B 10	512	17	24
31..	468	15	19	--	--	--	493	18	24
Total	15260	--	676	16801	--	349	14212	--	338

	JANUARY			FEBRUARY			MARCH		
1..	500	15	20	500	12	18	17900	284	13700
2..	486	13	17	500	15	20	15900	248	10600
3..	480	20	26	500	17	23	11100	246	7370
4..	468	35	44	500	13	18	8560	176	4070
5..	456	47	58	500	14	19	13400	478	17300
6..	468	18	23	500	12	16	25400	695	47700
7..	512	10	B 14	500	17	23	27900	253	19000
8..	930	11	28	550	17	25	30100	193	15700
9..	870	25	59	600	11	18	30500	304	25000
10..	797	57	123	621	16	27	25500	282	19400
11..	706	40	B 75	642	18	31	20400	142	7820
12..	660	32	57	642	14	24	13100	111	3930
13..	638	35	60	895	18	43	10200	103	2840
14..	645	22	38	3290	386	S 3620	8820	98	2330
15..	1050	35	S 112	3680	189	1880	11700	134	4230
16..	2920	305	2400	3690	228	2270	12600	135	4590
17..	2990	210	1700	3210	247	2140	10400	110	3090
18..	2300	108	671	3550	124	1190	8000	83	1790
19..	1950	58	305	5180	80	B 1100	6410	73	1260
20..	1710	37	171	5070	85	1160	6470	84	1470
21..	1420	34	130	5390	123	1790	9400	273	S 7740
22..	1180	53	169	4430	88	1050	15200	342	14000
23..	1160	27	84	3960	80	B 850	16200	195	8530
24..	1060	30	86	3930	88	934	15700	141	5980
25..	797	25	54	4350	124	1460	15700	115	4870
26..	700	13	24	9990	540	S 15600	13900	96	3600
27..	650	10	18	15900	720	30900	10600	93	2660
28..	600	10	16	17400	380	17800	8310	80	1790
29..	550	9	13	--	--	--	6350	72	1230
30..	550	10	B 15	--	--	--	5230	66	932
31..	550	13	19	--	--	--	4610	57	709
Total	30753	--	6629	100520	--	84049	435560	--	265231

S Computed by subdividing day.
B Computed from estimated-concentration graph.

SCIOTO RIVER BASIN--Continued

3-2345. SCIOTO RIVER AT HIGBY, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	6370	98	1680	9170	182	4510	1960	47	249
2..	8780	118	2800	8630	282	6570	1960	57	302
3..	8360	72	1620	7690	171	3550	2590	107	748
4..	5300	51	730	6690	155	2800	3050	136	1120
5..	4540	45	552	6020	157	2550	2600	140	983
6..	3960	42	449	6330	158	2700	2190	76	449
7..	3560	36	346	12000	652	S 23400	2920	129	S 1090
8..	3240	30	262	30400	868	71200	3120	78	657
9..	3050	28	230	48000	548	71000	6430	371	S 6890
10..	4190	44	498	46400	697	87300	10800	419	12200
11..	8630	123	2870	26100	205	14400	11700	318	10000
12..	10200	133	3660	12400	243	8140	7770	230	4820
13..	13700	238	8800	9070	211	5170	5120	75	B 1000
14..	17400	291	13700	7310	153	3020	5000	293	S 4030
15..	17500	706	33400	6060	117	1910	5630	239	3630
16..	22000	962	57100	5390	93	1350	4850	133	1740
17..	21800	294	17300	4780	78	1010	5340	93	1340
18..	19000	172	8820	4270	64	738	4040	53	578
19..	18500	131	6540	4000	50	B 540	3200	40	346
20..	16800	107	4850	3770	40	B 400	2730	40	B 290
21..	14200	134	5140	3520	35	B 330	2410	50	B 320
22..	13000	128	4490	3420	33	305	2220	104	623
23..	13700	149	5510	3290	42	373	2060	120	667
24..	17700	203	9700	3050	42	346	1900	141	723
25..	17600	145	6890	2810	40	B 300	1760	137	651
26..	31300	745	S 64500	2650	38	272	1630	140	B 610
27..	33000	145	12900	2540	40	274	1530	135	558
28..	34600	52	4860	2440	38	250	1450	127	497
29..	24800	63	4220	2240	44	266	1360	98	360
30..	12200	83	2730	2160	47	274	1260	98	333
31..	--	--	--	2080	45	B 250	--	--	--
Total	428980	--	287147	294680	--	315498	110580	--	57804

Day	JULY			AUGUST			SEPTEMBER		
1..	1160	101	316	1730	140	S 855	1100	53	157
2..	1100	100	B 300	3880	150	1570	1060	24	69
3..	1060	109	312	6770	422	7710	1080	16	47
4..	950	108	277	5300	275	3940	1080	17	B 50
5..	924	101	252	3820	161	1660	1200	17	B 55
6..	2220	469	S 3190	3600	172	1670	1420	17	65
7..	2080	168	943	2730	150	1100	1420	18	69
8..	1710	65	300	2280	82	505	2060	73	406
9..	1390	43	161	1930	100	B 500	2030	45	247
10..	1180	59	188	1660	183	820	2090	27	152
11..	1070	50	B 140	9610	505	S 15700	1640	14	62
12..	980	45	119	18500	598	29900	1440	12	47
13..	1040	46	129	14400	350	13600	1310	12	42
14..	1520	146	S 805	7150	292	5640	1200	12	39
15..	2600	212	S 1540	4490	255	3090	1120	13	39
16..	1930	190	990	3290	233	2070	1100	15	44
17..	3810	692	S 9550	2650	139	994	1060	14	B 40
18..	4360	475	5590	2240	63	381	937	13	33
19..	3120	253	2130	1960	43	228	774	14	29
20..	3020	165	1340	1760	35	166	740	15	30
21..	2670	120	B 850	1720	32	149	716	17	33
22..	2330	98	616	1640	32	142	705	16	30
23..	2780	91	683	1550	33	138	716	15	29
24..	2060	82	456	1530	35	144	705	14	27
25..	1820	66	324	1560	47	198	716	15	29
26..	1610	38	165	1600	51	220	740	18	36
27..	1390	30	112	1600	48	207	740	17	34
28..	1230	30	B 100	1420	41	157	705	18	34
29..	1100	28	83	1290	43	150	674	20	B 35
30..	1450	45	176	1240	39	130	663	17	30
31..	1640	61	270	1150	28	87	--	--	--
Total	57304	--	32407	116050	--	93821	32941	--	2039

Total discharge for year (cfs-days)..... 1653641
Total load for year (tons)..... 1145988

S Computed by subdividing day.
B Computed from estimated-concentration graph.

SCIOTO RIVER BASIN--Continued

3-2345. SCIOTO RIVER AT HIGBY, OHIO--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Jan. 16, 1961.....	1700			2910	314		47	59	75	94	96	99	100	--	--			SBWC
Mar. 6.....	1600			26000	544		48	56	67	80	92	96	98	100	--			SBWC
Apr. 26.....	1545			35400	929		54	64	73	83	90	94	96	98	100			SBWC
Apr. 26.....	1545			35400	929		19	36	52	72	88	90	95	97	100			SBN
May 8.....	1405			32100	857		41	49	57	70	88	94	98	100	--			SBWC
May 8.....	1405			32100	857		16	25	40	54	81	90	97	100	--			SBN

SCIOTO RIVER BASIN--Continued

3-2371. SCIOTO RIVER AT LUCASVILLE, OHIO

LOCATION.--At bridge on State Highway 348 at Lucasville, Scioto County, 0.4 mile downstream from Miller Run, and 4.9 miles upstream from Scioto Brush Creek.
DRAINAGE AREA.--6,176 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1961.
Water temperatures: October 1956 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 463 ppm Nov. 1-30; minimum, 252 ppm Apr. 1-30.
Hardness: Maximum, 309 ppm Oct. 1-31; minimum, 188 ppm Apr. 1-30.
Specific conductance: Maximum daily, 783 micromhos Dec. 15; minimum daily, 207 micromhos May 8.
Water temperatures: Maximum, 80°F Aug. 2; minimum, freezing point on several days in December and January.
EXTREMES, 1956-61.--Dissolved solids: Maximum, 479 ppm Nov. 11-20, 1956; minimum, 194 ppm Jan. 21-23, 30-31, 1959.
Hardness: Maximum, 329 ppm Nov. 1-10, 1958; minimum, 143 ppm Jan. 21-23, 30-31, 1959.
Specific conductance: Maximum daily, 784 micromhos Nov. 19, 1956; minimum daily, 207 micromhos May 8, 1961.
Water temperatures: Maximum, 85°F July 22, 1957; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 1-31, 1960.....	9.8				76	29	40	5.1		264		111	42	0.7	3.0	1.8	451	309	92		747		25		0.2
Nov. 1-30....	7.6				78	26	39	4.8		259		108	39	.7	4.3	2.2	463	302	90		738		25		.2
Dec. 1-31....	5.2				76	25	41	4.2		246		111	41	.7	6.5	2.2	447	293	91		729		20		.3
Jan. 1-24, 1961.....	5.9				59	23	28	3.6		188		92	32	.4	8.5	1.0	366	242	88		590		20		.2
Feb. 11-28...	7.1				56	21	21	3.2		175		82	26	.4	11	1.4	350	226	82		529		10		.2
Mar. 1-31....	7.9				52	18	7.8	2.2		152		66	12	.2	14	.50	264	204	79		426		20		.1
Apr. 1-30....	6.9				49	16	7.3	1.9		150		59	12	.2	9.4	.60	252	188	65		399		15		.1
May 1-8,12-31	6.9				62	23	9.3	1.9		217		67	14	.3	7.5	.70	318	249	71		506		10		.1
June 1-30....	6.0				59	22	11	2.4		206		70	15	.3	6.3	.80	308	238	68		503		10		.1
July 1-31....	7.1				69	17	14	3.0		220		66	18	.4	5.9	.70	319	242	62		517		10		.1
Aug. 1-31....	9.5				63	21	14	3.0		224		62	16	.1	4.8	.91	302	244	60		508		10		.1
Sept. 1-30...	8.7				75	27	25	3.5		266		89	26	.5	4.6	1.1	392	298	80		647		10		.1
Time-weighted average [a]..	7.4				65	22	21	3.2		216		82	24	0.4	7.0	1.2	353	254	77		572		16		0.2

a Represents 94 percent of days.

SCIOTO RIVER BASIN--Continued

3-2371. SCIOTO RIVER AT LUCASVILLE, OHIO--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement at approximately 10:30 a.m.)

Month	Day																															Average
	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	
October	69	64	64	63	62	65	62	63	65	65	63	63	63	60	64	65	64	62	62	58	55	52	54	53	50	50	52	53	53	53	54	60
November	54	54	51	48	51	49	46	45	46	45	42	42	42	46	48	52	48	47	46	45	44	45	47	45	46	45	47	50	48	46	--	47
December	43	38	37	37	38	40	41	39	35	34	36	33	33	32	33	33	32	32	32	33	32	32	32	32	32	32	32	32	33	33	32	34
January	33	33	34	33	32	--	36	37	33	32	32	33	34	37	38	37	36	--	37	33	32	32	32	32	--	--	--	--	--	--	--	--
February	--	--	--	--	--	--	--	--	--	--	36	37	37	38	38	38	40	42	43	42	42	41	43	44	47	43	43	41	--	--	--	--
March	41	41	41	44	47	50	50	50	47	43	42	43	46	47	47	45	47	42	44	42	45	45	45	45	44	45	47	50	48	49	49	46
April	45	43	42	44	45	46	45	45	46	46	45	47	44	45	47	47	46	44	43	45	47	48	51	55	57	57	57	56	55	53	--	48
May	53	52	54	55	54	54	57	57	--	--	--	60	60	62	64	63	62	62	60	59	58	58	58	59	60	61	58	57	60	59	60	58
June	62	65	64	65	66	67	67	68	68	66	66	68	69	69	62	60	60	62	63	64	64	62	62	62	61	61	61	63	64	66	--	64
July	68	69	70	70	67	64	63	63	62	62	63	64	64	64	63	61	62	63	64	64	64	66	68	69	69	72	75	76	76	77	77	67
August	79	80	77	76	77	75	74	75	75	76	75	74	73	72	72	73	75	74	75	75	73	72	72	72	73	73	74	75	76	76	76	75
September	77	77	78	79	79	78	78	77	78	78	79	79	79	78	71	--	66	66	67	67	68	70	72	75	74	70	67	62	62	64	--	73

LICKING RIVER BASIN

3-2495. LICKING RIVER AT FARMERS, KY.

LOCATION.--At gaging station at bridge on U.S. Highway 60, 300 feet upstream from Chesapeake and Ohio Railway bridge, 0.8 mile west of Farmers, Rowan County, and 1.1 miles upstream from Triplett Creek.
DRAINAGE AREA.--831 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1949 to August 1950.
Water temperatures: October 1949 to September 1961.
Sediment records: October 1960 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum and minimum not determined for the year.
Sediment concentrations: Maximum daily, 1,070 ppm June 10; minimum daily, 1 ppm Dec. 11.
Sediment loads: Maximum daily, 24,800 tons June 10; minimum daily, less than 0.50 ton Dec. 11, Sept. 21.
EXTREMES, 1949-61.--Water temperatures: Maximum, 92°F July 19, 1951; minimum, freezing point on many days during winter months.
Sediment concentrations (1960-61): Maximum daily, 1,070 ppm June 10, 1961; minimum daily, 1 ppm Dec. 11, 1960.
Sediment loads: Maximum daily, 24,800 tons June 10, 1961; minimum daily, less than 0.50 ton Dec. 11, 1960, Sept. 21, 1961.
REMARKS.--Temperature recorder stopped Dec. 1 to Jan. 11, July 10 to Aug. 16; range 32°F to 42°F and 67°F to 78°F, respectively. Flow affected by ice Dec. 15-19.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	67	65	65	66	66	66	66	66	66	66	66	66	64	63	63	63	63	63	61	59	57	55	54	54	54	52	52	52	52	51	52	
Minimum	65	64	65	65	64	65	66	66	66	66	66	64	62	62	63	63	62	60	59	57	55	54	54	54	51	51	51	52	52	51	51	
November																																
Maximum	52	52	52	51	49	49	48	47	45	46	45	44	43	42	43	44	44	44	44	44	44	43	43	43	43	43	44	46	47	46	--	
Minimum	52	52	51	49	49	48	46	45	45	45	43	42	42	42	42	42	44	44	44	44	43	43	43	43	43	43	43	44	45	44	--	
December																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
January																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	34	34	34	37	39	39	39	39	39	39	37	35	34	34	34	34	34	35	35	35	
Minimum	--	--	--	--	--	--	--	--	--	--	--	34	34	34	34	37	39	39	39	38	37	35	34	34	34	34	34	34	35	35	34	
February																																
Maximum	34	34	34	34	34	35	35	35	35	35	37	39	41	45	46	46	46	46	46	46	46	46	48	49	49	49	47	46	--	--	--	
Minimum	34	34	34	34	34	35	35	35	35	35	35	37	39	42	45	46	45	45	46	46	46	46	46	48	49	47	46	46	--	--	--	
March																																
Maximum	46	46	46	48	49	50	51	52	52	52	49	48	49	49	49	49	49	49	47	49	49	49	49	49	49	49	51	51	51	51	51	
Minimum	46	46	46	46	48	49	50	51	52	49	48	47	48	48	49	49	49	47	47	47	49	49	49	49	49	49	49	51	51	51	51	
April																																
Maximum	51	49	49	48	47	47	47	48	48	48	48	48	48	48	50	50	50	50	48	48	51	52	55	58	60	60	60	60	59	57	--	
Minimum	49	49	48	47	47	47	47	47	48	48	47	47	48	48	48	50	50	48	47	47	49	51	52	55	58	60	60	59	57	56	--	

May																														
Maximum	56	55	54	55	55	55	57	58	59	59	59	59	59	61	62	62	62	62	62	62	62	62	62	63	63	62	61	62	63	63
Minimum	55	54	54	54	55	55	55	57	57	59	59	58	58	59	61	62	62	62	62	61	61	61	60	61	62	59	59	60	61	61
June																														
Maximum	65	69	69	69	69	69	70	70	70	66	65	67	68	68	68	64	62	61	62	62	63	63	64	64	64	63	64	65	67	69	--
Minimum	62	65	69	68	68	68	69	70	66	65	65	66	67	68	64	62	61	60	61	61	62	63	62	64	63	63	63	63	65	67	--
July																														
Maximum	71	72	72	72	72	72	72	72	70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	68	70	71	70	71	72	71	70	67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
August																														
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	72	72	72	72	72	71	68	68	69	69	71	72	74	75	75
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	69	72	72	72	71	68	68	68	69	68	69	70	72	73	74
September																														
Maximum	75	76	76	77	77	78	78	78	78	78	78	78	78	78	76	71	68	67	67	67	69	70	71	72	72	72	70	68	66	67	--
Minimum	75	74	76	76	76	76	77	77	77	78	78	78	78	76	71	67	66	66	66	66	67	69	70	70	72	70	68	66	65	65	--

LICKING RIVER BASIN--Continued

3-2495. LICKING RIVER AT FARMERS, KY.--Continued

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	39		1	113	9	3	685	113	209
2..	38		1	113	9	3	642	48	83
3..	36		1	108	12	4	438	39	46
4..	34		1	102	13	4	338	30	27
5..	34		1	97	13	3	284	15	12
6..	38		1	104	8	2	251	11	7
7..	36		1	125	8	3	230	8	5
8..	38		1	134	8	3	209	4	2
9..	106		6	142	12	5	188	4	2
10..	308		30	176	18	8	167	2	1
11..	293		10	374	30	30	154	1	T
12..	185		5	395	22	23	165	2	1
13..	115		3	335	20	18	162	3	1
14..	120		3	302	20	16	430	6	7
15..	102		3	263	19	13	350	16	15
16..	82		2	236	15	10	300	31	25
17..	67		2	215	17	10	250	32	22
18..	59		2	209	15	8	220	17	10
19..	59		2	182	13	6	200	10	5
20..	67		2	162	15	6	185	6	3
21..	147		6	144	16	6	320	5	4
22..	162		5	132	17	6	600	5	8
23..	137		4	130	15	5	1000	6	B 16
24..	137		4	127	10	3	700	6	B 11
25..	137		4	127	10	3	538	9	B 13
26..	113		3	122	11	4	502	11	15
27..	115		3	115	10	3	494	8	11
28..	115		4	113	10	3	486	5	6
29..	139		5	125	9	3	430	5	6
30..	130		4	520	80	S 153	825	39	S 107
31..	115	8	2	--	--	--	1820	156	766
Total	3303	--	120	5542	--	367	13563	--	1446

	JANUARY			FEBRUARY			MARCH		
1..	1980	193	1030	450	9	11	6780	128	2340
2..	1720	192	892	498	8	11	5590	107	1610
3..	1920	187	969	522	7	10	3910	104	1100
4..	1820	221	1080	665	8	14	3170	106	907
5..	1260	81	276	655	7	12	6060	299	4890
6..	980	39	103	655	9	16	5850	148	2340
7..	830	26	58	630	9	15	6250	153	2580
8..	710	15	29	1350	68	S 310	5740	126	1950
9..	646	11	19	4700	216	2740	5200	113	1590
10..	558	10	15	4400	242	2870	4670	102	1290
11..	466	8	10	3720	195	1960	4240	104	1190
12..	407	6	6	3190	120	1030	3310	66	590
13..	371	5	5	3160	100	853	2240	56	339
14..	350	8	8	2680	99	716	1880	49	249
15..	1630	113	S 864	2140	88	508	1600	34	147
16..	6340	488	8350	1600	59	255	1600	28	121
17..	7180	268	5200	1240	36	120	1540	25	104
18..	5960	167	2690	1050	18	51	1440	20	78
19..	4710	131	1660	980	9	24	1700	27	124
20..	2950	84	669	850	7	16	1750	34	161
21..	1700	53	243	730	3	6	1910	42	216
22..	1220	34	112	943	32	S 119	3000	90	729
23..	1100	20	59	2030	260	S 1540	3600	105	1020
24..	900	15	B 35	3930	260	2760	3230	84	732
25..	700	13	B 25	4180	202	2280	2560	54	373
26..	600	10	B 16	6170	272	4530	2210	44	262
27..	500	10	B 14	6210	164	2750	1900	36	185
28..	450	10	B 12	6230	125	2100	1700	35	161
29..	400	10	B 11	--	--	--	1860	33	166
30..	400	10	B 11	--	--	--	1760	29	138
31..	450	9	B 11	--	--	--	1620	28	122
Total	51208	--	24482	65558	--	27627	99870	--	27804

S Computed by subdividing day.
T Less than 0.50 ton.
B Computed from estimated-concentration graph.

LICKING RIVER BASIN--Continued

3-2495. LICKING RIVER AT FARMERS, KY.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	APRIL Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day	MAY Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day	JUNE Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day
1..	4990	244	S 3940	1940	54	283	239	7	4
2..	7790	398	8370	3670	102	1010	215	6	3
3..	6810	176	3240	3280	75	664	260	10	7
4..	5050	102	1390	2550	45	310	690	23	43
5..	2960	64	511	1940	38	199	590	30	48
6..	1920	45	233	2220	26	156	434	35	41
7..	1500	28	113	3720	328	S 4310	380	17	17
8..	1240	18	60	9150	366	9040	365	16	16
9..	1140	16	49	9470	134	3430	1900	207	S 2020
10..	2260	26	159	7390	76	1520	8590	1070	24800
11..	2490	43	289	5310	65	932	8570	248	5740
12..	2300	45	279	3470	69	646	5180	281	3930
13..	3360	68	617	2700	81	590	1720	146	678
14..	4120	122	1360	2110	43	245	2120	156	893
15..	3410	94	865	1710	32	148	4760	303	3890
16..	4740	122	1560	1430	26	100	7030	268	5090
17..	4680	103	1300	1180	20	64	4530	129	1580
18..	3630	128	1250	1020	18	50	2440	177	1170
19..	2790	68	512	915	10	25	1460	90	355
20..	2080	43	241	785	8	17	1080	49	143
21..	1640	33	146	665	5	9	850	32	73
22..	1470	23	91	578	6	9	775	20	42
23..	1390	21	79	510	5	7	642	17	29
24..	2000	39	211	442	4	5	550	19	28
25..	2470	70	467	395	6	6	458	12	15
26..	2800	156	1180	362	8	8	401	11	12
27..	3110	92	772	386	9	9	356	9	9
28..	3120	118	994	362	7	7	314	8	7
29..	2830	130	993	314	9	8	284	9	7
30..	1980	61	326	284	11	8	251	7	5
31..	--	--	--	266	7	5	--	--	--
Total	92070	--	31597	70524	--	23820	57434	--	50695

Day	JULY Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day	AUGUST Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day	SEPTEMBER Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day
1..	224	7	4	8810	971	23100	251	8	5
2..	200	6	3	8520	378	8700	218	10	6
3..	188	10	5	5610	202	S 2860	203	12	6
4..	197	7	4	2280	245	1510	182	8	4
5..	182	8	4	1280	117	404	165	15	7
6..	162	7	3	920	58	144	149	16	6
7..	173	13	6	710	34	65	165	6	3
8..	245	10	7	546	23	34	152	6	2
9..	227	9	6	446	16	19	127	7	2
10..	152	7	3	395	20	21	113	10	3
11..	127	8	3	610	31	51	104	12	3
12..	113	13	4	2180	425	S 3020	99	7	2
13..	165	17	8	2380	327	S 2250	90	6	1
14..	290	13	10	1150	98	S 321	84	5	1
15..	410	32	35	750	46	93	79	8	B 2
16..	800	40	86	522	26	37	75	7	1
17..	3590	516	S 5840	404	15	16	71	8	2
18..	4150	310	3470	344	13	12	69	4	1
19..	3530	280	2670	293	10	8	65	5	1
20..	2480	168	1120	260	10	7	61	5	1
21..	1850	175	874	439	--	100	61	3	T
22..	2260	262	1600	1680	210	B 950	63	3	1
23..	1900	248	1270	780	100	211	82	5	1
24..	1250	112	378	629	74	S 151	95	4	1
25..	975	54	142	1800	284	1380	90	6	1
26..	900	44	107	785	194	411	73	7	1
27..	695	38	71	542	52	76	63	7	1
28..	542	35	51	410	29	32	57	5	1
29..	522	87	123	347	17	16	52	4	1
30..	1300	97	S 580	329	16	14	49	4	1
31..	7740	952	19900	299	12	10	--	--	--
Total	37539	--	38387	46450	--	46023	3205	--	68

Total discharge for year (cfs-days)..... 546266
Total load for year (tons)..... 272436

S Computed by subdividing day.
T Less than 0.50 ton.
B Computed from estimated-concentration graph.

LICKING RIVER BASIN--Continued

3-2495. LICKING RIVER AT FARMERS, KY.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Feb. 24, 1961.....	1140			3980	260		34	49	62	78	91	94	100	--				SBWC
Feb. 26.....	0355			5990	219		33	41	53	70	85	91	96	100				SBWC
Feb. 26.....	0355			5990	219		11	21	40	70	84	88	96	100				SBN
Mar. 5.....	1330			6310	444		46	56	72	87	93	97	100	--				SBWC
Apr. 2.....	0650			7740	491		43	55	71	84	91	94	97	100				SBWC
June 10.....	1100			8980	1130		50	62	78	90	94	97	100	--				SBWC
June 10.....	1100			8980	1130		36	47	71	88	94	95	100	--				SBN
July 31.....	1430			8280	1090		54	68	84	94	97	99	100	--				SBWC
July 31.....	1430			8280	1090		38	53	77	93	97	97	100	--				SBN

LICKING RIVER BASIN--Continued

3-2515. LICKING RIVER AT McKINNEYSBURG, KY.

LOCATION.--At gaging station at county highway bridge at McKinneysburg, Pendleton County, 6.5 miles southeast of Falmouth, 9.0 miles upstream from Blanket Creek, and 12.8 miles upstream from South Fork.
DRAINAGE AREA.--2,326 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1952 to September 1961.
Water temperatures: October 1952 to September 1961.
Sediment records: October 1952 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 186 ppm Dec. 18-20; minimum, 87 ppm Aug. 2-5.
Hardness: Maximum, 132 ppm Dec. 18-20; minimum 39 ppm Aug. 2-5.
Specific conductance: Maximum daily, 440 micromhos Oct. 19; minimum daily, 91 micromhos Aug. 3.
Water temperatures: Maximum, 80°F Sept. 10, 12; minimum, freezing point on many days during December to February.
Sediment concentrations: Maximum daily, 1,500 ppm July 21; minimum daily, 3 ppm Oct. 8, 9.
Sediment loads: Maximum daily, 70,500 tons Mar. 6; minimum daily, 1 ton Oct. 8, 9, Sept. 25, 30.
EXTREMES, 1952-61.--Dissolved solids: Maximum, 219 ppm Nov. 7-22, 1959; minimum, 57 ppm Apr. 16-17, 1953.
Hardness: Maximum, 170 ppm Nov. 17-30, 1955, Nov. 7-22, 1959; minimum, 39 ppm Aug. 2-5, 1961.
Specific conductance: Maximum daily, 440 micromhos Oct. 19, 1960; minimum daily, 90 micromhos Mar. 9, 1953.
Water temperatures: Maximum, 87°F July 31, Aug. 1, 1953; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 4,230 ppm Feb. 25, 1956; minimum daily, 1 ppm many days during 1952-56.
Sediment loads: Maximum daily, 223,000 tons Feb. 25, 1956; minimum daily, less than 0.5 ton many days during 1952-56.
REMARKS.--Records of specific conductance of daily samples available in district office at Columbus, Ohio. Flow affected by ice Dec. 18-21.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-17,1960	224	6.6	0.03	0.00	32	6.4	9.8	3.0	102	22	19	0.1	1.1	158	107	23		273	7.3	6
Oct. 18-31....	349	--	--	--	--	--	--	--	--	--	--	--	--	178	125	--		322	--	--
Dec. 18-20....	683	--	--	--	--	--	--	--	--	--	--	--	--	186	132	--		325	--	--
Jan. 2-17,1961	4,450	--	--	--	--	--	--	--	--	--	--	--	--	147	109	--		243	--	--
Jan. 18-23....	4,620	--	--	--	--	--	--	--	--	--	--	--	--	104	71	--		165	--	--
Jan. 18.....	14,100	6.2	.06	.01	21	3.8	1.4	1.7	58	18	3.5	.1	4.0	102	68	20		155	6.9	12
Feb. 10-11....	7,400	--	--	--	--	--	--	--	--	--	--	--	--	149	111	--		243	--	--
Feb. 12-18....	6,370	--	--	--	--	--	--	--	--	--	--	--	--	120	84	--		188	--	--
Feb. 19-26....	6,830	--	--	--	--	--	--	--	--	--	--	--	--	158	113	--		243	--	--
Feb. 27.....	15,800	6.3	--	--	27	4.7	6.5	2.3	80	20	5.0	.4	4.2	124	87	22		187	7.2	--
Feb. 28-Mar.13	15,200	--	--	--	--	--	--	--	--	--	--	--	--	92	76	--		169	--	--
Mar. 14-29....	5,120	--	--	--	--	--	--	--	--	--	--	--	--	112	98	--		211	--	--
Apr. 1-3.....	13,400	--	--	--	--	--	--	--	--	--	--	--	--	124	94	--		193	--	--
Apr. 4-8.....	7,590	--	--	--	--	--	--	--	--	--	--	--	--	94	70	--		155	--	--
Apr. 10-28....	8,450	--	--	--	--	--	--	--	--	--	--	--	--	130	93	--		202	--	--

LICKING RIVER BASIN--Continued

3-2515. LICKING RIVER AT McKINNEYSBURG, KY.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color
															Calcium, magnesium	Noncarbonate				
Apr. 29-May 6, 1961.....	5,230	--	--	--	--	--	--	--	--	--	--	--	--	102	72	--		162	--	--
May 7-13.....	27,400	5.7	0.17	--	21	3.0	1.6	1.5	67	12	2.0	0.2	2.2	88	65	10		140	7.6	20
May 14-June 4.	1,790	--	--	--	--	--	--	--	--	--	--	--	--	137	103	--		225	7.7	--
June 5-11.....	4,910	--	--	--	--	--	--	--	--	--	--	--	--	138	102	--		232	--	--
June 12-19....	13,200	--	--	--	--	--	--	--	--	--	--	--	--	90	61	--		142	--	--
June 20-July 9	1,000	--	--	--	--	--	--	--	--	--	--	--	--	128	89	--		209	--	--
July 10-18....	2,100	--	--	--	--	--	--	--	--	--	--	--	--	150	106	--		241	--	--
July 19-25....	4,410	--	--	--	--	--	--	--	--	--	--	--	--	112	68	--		167	--	--
July 26-Aug. 1	4,090	--	--	--	--	--	--	--	--	--	--	--	--	132	85	--		196	--	--
Aug. 2-5.....	7,540	--	--	--	--	--	--	--	--	--	--	--	--	87	39	--		102	--	--
Aug. 6-11.....	1,840	--	--	--	--	--	--	--	--	--	--	--	--	104	67	--		159	--	--
Aug. 12-16....	4,650	--	--	--	--	--	--	--	--	--	--	--	--	124	84	--		188	--	--
Aug. 17-Sept. 14.....	757	--	--	--	--	--	--	--	--	--	--	--	--	128	88	--		202	--	--
Sept. 15-30...	109	4.9	.00	--	29	5.6	8.1	2.2	97	15	17	.2	.4	142	96	16		231	7.5	4
Weighted average....	4,831	--	--	--	--	--	--	--	--	--	--	--	--	113	82	--		183	--	--
Time-weighted average....	--	--	--	--	--	--	--	--	--	--	--	--	--	129	92	--		212	--	--

LICKING RIVER BASIN--Continued

3-2515. LICKING RIVER AT McKINNEYSBURG, KY.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	52	54	56	51	--	51	50	53	52	52	50	51	52	51	50	51	--	51	50	42	44	41	40	39	37	39	40	41	40	39	41	47
November	39	38	37	39	37	38	36	--	37	34	36	35	34	36	35	35	34	33	34	34	35	34	35	34	36	37	37	--	--	--	--	36
December	33	32	32	33	34	--	32	32	32	32	32	--	32	32	32	--	32	32	32	32	--	--	--	--	--	--	--	--	--	--	--	--
January	--	32	32	32	--	32	32	32	32	32	32	33	34	33	32	33	34	35	--	32	32	32	32	--	--	--	--	--	--	--	--	--
February	--	--	--	--	--	--	--	--	--	32	32	32	34	36	35	36	37	40	39	38	38	42	40	42	--	38	40	39	--	--	--	--
March	37	40	42	43	45	47	46	47	--	42	41	43	44	44	--	43	40	42	41	40	41	--	39	40	41	42	44	45	46	--	--	42
April	41	41	40	38	39	40	39	45	--	44	45	44	46	48	49	--	44	46	47	49	50	51	54	57	50	49	48	55	54	56	--	47
May	56	55	55	54	--	55	58	59	59	58	57	60	60	61	61	64	62	63	--	62	63	62	62	64	63	62	59	60	65	62	65	60
June	68	67	69	68	70	69	70	69	--	69	70	68	69	69	68	66	67	66	64	65	64	67	66	66	67	--	67	68	70	72	--	68
July	75	76	77	76	--	73	74	73	73	71	73	74	73	--	74	75	72	73	72	73	71	72	74	75	75	74	73	75	76	78	76	74
August	74	74	73	73	74	73	74	--	75	74	72	75	74	74	72	72	73	73	74	74	73	72	73	72	71	71	70	72	74	73	74	73
September	75	76	76	78	77	--	77	78	79	80	79	80	78	76	71	71	66	65	66	65	63	62	61	61	59	55	51	52	46	48	--	68

LICKING RIVER BASIN--Continued

3-2515. LICKING RIVER AT McKINNEYSBURG, KY.--Continued

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	112	17	5	395	31	33	968	112	293
2..	107	18	5	385	19	20	986	48	128
3..	100	11	3	314	10	8	1140	29	89
4..	94	9	2	285	10	8	1020	18	50
5..	91	18	B 4	269	9	6	812	16	B 35
6..	90	17	4	251	6	4	668	14	25
7..	90	10	2	248	8	5	610	12	20
8..	94	3	1	244	10	6	585	23	36
9..	94	3	1	314	18	S 19	515	18	25
10..	118	6	2	2170	178	1040	460	13	16
11..	728	34	67	1630	68	299	425	8	9
12..	600	20	32	1300	55	193	540	9	B 13
13..	490	12	16	1200	36	117	610	12	20
14..	385	27	28	998	32	86	525	10	14
15..	265	50	36	800	34	73	550	8	12
16..	195	34	18	824	38	84	615	7	B 12
17..	165	20	B 9	788	41	87	920	7	17
18..	150	13	5	615	17	28	750	11	22
19..	143	15	6	525	17	24	650	11	19
20..	220	24	14	480	14	18	650	6	10
21..	734	48	95	435	12	14	1000	--	16
22..	500	27	36	390	10	10	1200	--	19
23..	346	32	30	440	13	15	1200	--	19
24..	420	13	15	535	15	22	1400	--	25
25..	385	8	8	520	10	14	1400	--	25
26..	305	8	6	490	10	13	1300	--	20
27..	273	11	8	440	10	12	1700	--	30
28..	328	18	16	420	10	11	1700	--	30
29..	415	17	19	1760	--	1000	1600	--	40
30..	332	17	15	1140	140	A 430	2000	--	160
31..	336	14	13	--	--	--	3000	--	600
Total	8705	--	521	20605	--	3699	31499	--	1849
	JANUARY			FEBRUARY			MARCH		
1..	4000	--	1200	1000	--	85	15400	235	9770
2..	5150	145	2020	1100	--	70	13900	167	6270
3..	5450	237	3490	1200	--	70	11600	142	4450
4..	4750	188	2410	1100	--	65	10700	198	S 6300
5..	3620	140	B 1400	1050	--	60	20700	872	48700
6..	2900	128	1000	1000	--	60	30000	870	70500
7..	3040	132	1080	1000	--	60	25300	372	25400
8..	2990	108	872	1500	--	95	19500	238	12500
9..	2350	62	393	3500	--	290	15600	190	B 8000
10..	1870	43	217	7000	86	1620	12100	137	4480
11..	1550	25	105	7800	192	4040	9360	113	2860
12..	1310	16	56	8460	291	6650	7520	98	1990
13..	1130	11	34	9780	268	7080	6240	100	1680
14..	1030	12	33	8610	221	5140	5580	99	1490
15..	6200	498	S 10300	6670	141	2540	4780	99	1280
16..	13200	644	23000	4850	85	1110	4160	85	955
17..	14700	582	23100	3430	80	741	3770	69	702
18..	14100	367	14000	2800	74	559	3750	62	628
19..	11400	220	B 6800	3020	152	1240	3640	52	511
20..	9010	133	3240	2510	63	427	3860	48	500
21..	6440	82	1420	2160	33	192	6270	221	S 4270
22..	3850	83	863	2920	252	S 3000	6400	140	B 2400
23..	2600	58	407	6100	552	9090	7510	164	3320
24..	2050	--	150	7910	440	9400	7460	118	2380
25..	1600	--	85	13800	--	33000	6980	107	2020
26..	1200	--	60	16200	788	34500	5800	93	1460
27..	1100	--	55	15800	350	14900	4660	67	843
28..	1000	--	55	14900	296	11900	3850	53	551
29..	900	--	50	--	--	--	3400	52	477
30..	850	--	45	--	--	--	3620	62	606
31..	850	--	55	--	--	--	3690	62	618
Total	132190	--	97995	157170	--	147984	287100	--	227911

S Computed by subdividing day.
A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.

LICKING RIVER BASIN--Continued

3-2515. LICKING RIVER AT McKINNEYSBURG, KY.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1..	10400	656	S 20600	4070	90	989	545	8	12
2..	14600	490	19300	3390	78	714	490	8	10
3..	15200	398	16300	5800	140	2190	465	9	11
4..	13000	238	8350	5820	126	1980	510	7	10
5..	10400	152	4270	4640	100	B 1200	878	12	28
6..	7160	102	1970	7540	151	3070	1370	48	178
7..	4350	74	869	18400	630	S 44200	3370	--	4600
8..	3050	62	510	40700	580	63700	3520	--	8800
9..	3700	75	S 879	43600	332	39100	4560	--	13000
10..	8300	225	5040	35300	228	21700	9380	--	23000
11..	8260	182	4060	24500	153	10100	11300	430	13100
12..	9340	177	4460	18000	108	5250	11900	600	19300
13..	10800	166	4840	11600	82	2570	10100	275	7500
14..	8620	105	2440	6390	87	1500	6700	219	3960
15..	8240	88	1960	4710	83	1060	15800	717	S 33300
16..	14700	--	54000	3500	72	680	19900	452	24300
17..	15400	--	24000	2830	67	512	18300	230	11400
18..	12400	228	7630	2940	155	1230	14200	168	6440
19..	8940	118	2850	2730	150	B 1100	8440	108	2460
20..	6550	99	1750	2200	53	315	3670	107	1060
21..	5320	122	1750	1940	32	168	2330	96	604
22..	5340	115	1660	1670	24	108	1870	67	338
23..	4910	195	2580	1450	19	74	1550	44	184
24..	4490	120	1450	1180	16	51	1300	35	123
25..	5390	71	1030	1080	13	38	1060	28	80
26..	8610	451	10500	944	12	30	932	20	B 50
27..	7640	250	5160	860	8	18	782	17	36
28..	7350	176	3490	800	8	17	662	15	27
29..	5680	112	1720	776	9	19	575	13	20
30..	4900	87	1150	704	8	15	495	12	16
31..	--	--	--	605	6	10	--	--	--
Total	253040	--	216568	260669	--	203708	156954	--	173947

Day	JULY			AUGUST			SEPTEMBER		
1..	425	12	14	5100	414	5700	525	78	110
2..	360	11	11	7520	774	15700	450	62	75
3..	301	10	8	8280	860	19200	405	43	47
4..	269	11	8	8310	505	11300	360	23	22
5..	692	--	1800	6060	229	3750	305	35	29
6..	1010	743	2030	2910	188	1480	277	65	B 50
7..	812	177	388	1720	135	627	323	68	59
8..	560	60	91	1320	68	242	240	38	25
9..	440	45	53	1570	96	407	200	41	22
10..	336	42	38	1500	67	271	185	30	15
11..	314	43	36	2040	80	B 440	185	27	13
12..	277	28	21	3470	335	S 3610	173	24	11
13..	262	31	22	7920	972	20800	154	27	11
14..	350	60	J 85	6610	485	8660	140	38	14
15..	3160	650	J 7500	3350	256	2320	128	27	9
16..	5600	700	A 11000	1890	152	776	119	20	6
17..	4200	360	4080	1320	78	278	113	17	5
18..	4370	314	3700	992	50	134	106	7	2
19..	5130	360	4990	794	42	90	101	8	2
20..	5100	691	S 11500	656	30	53	98	8	2
21..	7300	1500	29600	550	29	43	95	7	2
22..	4780	164	2120	470	27	34	98	6	2
23..	3140	100	B 850	711	36	69	102	8	2
24..	2910	132	1040	2510	138	935	106	12	3
25..	2500	146	986	1810	175	855	106	4	1
26..	2950	750	5970	1780	251	1210	114	5	2
27..	1940	244	1280	2400	228	1480	116	7	2
28..	1530	113	467	1580	91	388	118	6	2
29..	1120	72	218	1030	60	167	114	5	2
30..	3980	772	S 10200	782	55	116	108	4	1
31..	2000	394	2130	640	75	130	--	--	--
Total	68118	--	102236	87595	--	101265	5664	--	548

Total discharge for year (cfs-days)..... 1469309
Total load for year (tons)..... 1278231

S Computed by subdividing day.
A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.

LICKING RIVER BASIN--Continued

3-2515. LICKING RIVER AT McKINNEYSBURG, KY.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Jan. 17, 1961.....	1500			15000	627		44	53	64	78	92	96	98	100				SBWC
Jan. 18.....	1450			13900	346		46	57	67	81	94	98	100	--				SBWC
Feb. 27.....	1900			15400	318		47	53	66	80	93	97	100	--				SBWC
Feb. 27.....	1900			15400	318		18	32	49	73	86	92	98	100				SBN
Mar. 6.....	1730			30600	740		50	59	70	82	95	99	100	--				SBWC
May 7.....	1920			31200	1080		45	52	65	80	94	98	100	--				SBWC
May 11.....	0955			25000	147		54	63	71	85	93	98	100	--				SBWC
May 11.....	0955			25000	147		30	45	62	78	89	92	100	--				SBN

3-2525. SOUTH FORK LICKING RIVER AT CYNTHIANA, KY.

LOCATION.--At gaging station at bridge on State Highways 356 and 36, at Cynthiana, Harrison County, 0.4 mile downstream from Grays Run, and in pool formed by old milldam 2.6 miles downstream.
DRAINAGE AREA.--621 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to August 1951.
Water temperatures: October 1949 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 81°F Sept. 6, 7; minimum, freezing point on several days during December to February.
EXTREMES, 1949-61.--Water temperatures: Maximum, 87°F June 30, 1952, July 14, 1954; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Twice-daily measurements at approximately 7 a.m. and 6 p.m.)

Month	Day 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	Average
October																																
a.m.	64	62	62	63	64	66	64	65	66	66	65	66	67	67	67	67	63	62	63	61	53	52	52	52	50	51	52	51	50	50	51	60
p.m.	63	64	65	66	67	67	67	67	67	67	68	69	68	68	68	67	64	64	63	58	54	53	54	53	52	52	52	52	51	51	50	61
November																																
a.m.	50	51	47	46	52	46	41	40	40	40	40	40	41	44	45	47	44	45	44	42	41	43	43	41	40	40	43	45	42	39	--	43
p.m.	51	50	49	53	50	45	42	41	41	41	42	43	45	46	48	49	47	47	44	44	45	44	43	42	41	44	46	46	40	39	--	45
December																																
a.m.	38	36	35	35	36	38	37	36	35	35	34	33	33	33	33	33	33	33	33	33	33	32	32	32	32	33	33	33	33	33	33	34
p.m.	38	37	36	37	38	38	37	36	36	34	34	33	33	33	33	33	33	33	33	33	32	32	32	32	33	33	32	33	33	33	33	34
January																																
a.m.	33	33	33	33	33	33	34	34	33	33	33	33	33	34	34	34	34	33	34	33	33	33	33	33	33	33	33	33	32	32	32	33
p.m.	33	33	33	33	33	34	35	34	33	33	34	34	34	34	34	34	34	34	33	33	33	33	33	33	33	33	33	33	32	32	32	33
February																																
a.m.	32	32	32	33	32	32	32	32	32	33	33	33	33	34	34	34	34	35	34	34	34	36	37	38	38	34	34	35	--	--	--	34
p.m.	32	32	33	32	33	32	32	32	33	33	33	33	34	34	35	35	35	34	34	35	36	37	39	39	34	35	36	35	--	--	--	34
March																																
a.m.	34	34	35	37	37	36	36	37	35	34	34	36	39	41	40	41	40	40	43	42	43	44	42	41	42	43	46	49	52	51	53	41
p.m.	34	35	37	37	36	37	37	36	35	34	36	39	42	40	42	41	41	43	42	43	44	43	42	42	44	46	50	53	52	53	52	42
April																																
a.m.	50	47	47	47	45	45	44	44	46	45	43	45	44	44	46	44	42	42	43	45	50	51	52	54	59	60	60	60	59	58	--	49
p.m.	49	48	48	47	46	46	44	47	46	44	45	45	44	47	47	42	42	44	46	50	51	53	54	60	61	61	61	60	59	61	--	50
May																																
a.m.	60	59	57	56	59	58	60	60	60	58	59	61	62	62	64	66	65	64	63	63	62	60	58	67	67	68	64	61	62	62	62	62
p.m.	61	59	58	59	58	61	61	60	59	60	62	62	63	64	67	66	65	64	64	63	62	60	69	68	69	67	65	63	63	63	65	63
June																																
a.m.	64	66	67	66	66	68	70	70	70	69	67	67	70	70	68	66	65	66	68	70	70	69	71	70	71	70	71	71	72	72	--	69
p.m.	66	68	68	67	69	71	70	71	70	71	68	70	71	70	67	67	66	68	70	71	71	71	72	71	71	72	72	72	73	75	--	70
July																																
a.m.	75	75	75	73	72	74	74	75	72	70	72	73	74	73	72	72	72	72	74	75	75	77	76	76	74	73	72	71	72	72	72	73
p.m.	75	76	75	74	74	75	75	74	73	73	73	74	74	72	73	73	73	75	75	76	78	77	77	76	75	74	73	73	73	74	74	74
August																																
a.m.	74	75	73	72	71	72	70	69	70	71	73	71	71	69	68	69	71	72	72	73	70	68	69	70	71	72	73	74	75	75	77	72
p.m.	75	75	74	74	73	72	71	71	72	73	72	73	71	70	71	72	72	73	74	72	70	70	70	71	72	73	75	76	76	77	78	73
September																																
a.m.	76	76	78	78	79	80	80	79	80	79	79	78	78	77	72	69	66	63	62	62	63	65	68	68	68	65	62	61	60	62	--	71
p.m.	76	78	79	79	80	81	81	80	80	80	80	79	79	75	72	68	66	64	63	63	65	68	69	69	67	65	63	61	62	63	--	72

MIAMI RIVER BASIN

3-2715. MIAMI RIVER AT MIAMISBURG, OHIO

LOCATION.--Temperature recorder at gaging station, 600 feet downstream from bridge on State Highway 725 at Miamisburg, Montgomery County, and 0.3 mile downstream from Bear Creek.
DRAINAGE AREA.--2,718 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1959 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 87°F July 29; minimum, 40°F Dec. 23, Jan. 22, 23.
EXTREMES, 1959-61.--Water temperatures: Maximum, 88°F July 24-26, Sept. 2, 3, 1960; minimum, 37°F Feb. 8, 9, 13-15, 1960.
REMARKS.--Recorder stopped; range in temperature Feb. 2-6, 42°F to 47°F. No temperature record Apr. 21, 22.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	75	72	72	70	70	72	72	71	70	70	70	70	71	71	71	71	71	69	68	67	63	61	62	62	60	63	66	68	66	66	65	68
Minimum	72	72	70	69	69	70	70	70	69	69	69	69	70	71	71	71	69	68	67	63	61	60	61	60	59	60	63	66	65	63	63	67
November																																
Maximum	63	60	60	61	61	59	54	54	55	55	53	52	53	54	57	59	58	56	55	55	55	58	58	57	58	58	59	61	61	56	--	57
Minimum	60	60	59	59	58	54	52	53	54	53	51	51	51	51	54	57	56	55	54	53	52	55	57	55	57	57	58	59	56	51	--	55
December																																
Maximum	51	50	50	51	53	55	55	53	50	49	49	45	43	44	46	46	46	46	47	48	45	43	42	42	46	46	45	45	47	48	48	48
Minimum	50	49	49	49	51	53	53	50	49	48	45	43	41	42	43	45	45	45	46	45	43	41	40	41	42	45	45	44	45	47	47	46
January																																
Maximum	48	48	47	48	49	50	50	49	47	47	50	50	51	52	52	49	48	50	50	48	46	41	43	43	43	43	43	42	42	45	48	47
Minimum	48	46	46	46	47	49	49	47	46	44	47	49	49	51	48	48	47	48	48	46	41	40	40	42	41	42	42	41	41	41	45	45
February																																
Maximum	48	--	--	--	--	--	48	49	49	50	50	52	51	52	52	52	51	52	52	48	46	48	50	54	53	44	42	43	--	--	--	49
Minimum	47	--	--	--	--	--	47	47	48	48	49	50	46	48	50	49	48	50	48	46	46	46	48	50	44	41	41	42	--	--	--	47
March																																
Maximum	43	45	48	50	50	51	51	50	48	44	45	47	49	49	47	46	46	45	44	44	46	46	46	46	47	51	55	56	56	56	54	48
Minimum	43	43	45	48	50	50	50	48	44	43	43	45	47	47	46	45	44	44	44	43	44	46	46	45	45	47	51	55	56	53	52	47
April																																
Maximum	52	49	50	51	52	52	51	54	53	52	48	47	47	46	49	50	48	45	48	52	--	--	55	59	59	59	58	57	55	54	--	52
Minimum	49	47	47	50	51	51	50	52	52	48	46	47	46	45	46	48	44	43	45	48	--	--	55	55	58	58	57	56	54	53	--	50
May																																
Maximum	55	56	57	59	59	61	63	63	61	61	60	63	66	69	71	71	70	69	67	67	65	64	65	67	67	67	65	66	67	69	69	64
Minimum	53	55	55	57	59	59	61	60	61	59	58	60	63	66	69	70	69	67	66	65	64	63	64	65	67	65	63	65	66	67	69	63
June																																
Maximum	71	75	76	79	80	79	77	74	73	72	74	77	77	77	73	69	69	71	73	74	74	74	74	75	75	75	78	82	84	86	--	76
Minimum	69	71	75	75	77	77	73	73	70	70	72	74	77	73	69	67	67	69	71	73	70	69	72	72	72	72	73	75	77	80	--	72
July																																
Maximum	86	83	84	81	79	76	78	80	81	82	84	81	80	79	80	79	82	83	83	83	85	82	84	84	86	86	86	86	87	86	85	83
Minimum	80	79	79	78	76	74	74	76	75	76	79	79	77	75	78	77	77	80	81	80	76	78	81	82	81	81	82	84	83	84	82	79
August																																
Maximum	85	83	81	81	83	81	83	84	85	84	82	76	75	75	79	82	83	83	84	83	79	79	79	80	78	82	83	84	84	85	85	82
Minimum	82	81	80	81	81	80	79	80	81	82	76	75	73	73	75	79	81	80	81	79	77	77	77	78	77	78	79	80	82	82	83	79
September																																
Maximum	85	81	82	83	85	86	85	83	83	83	85	85	85	85	80	78	76	76	77	79	80	80	82	83	83	80	76	75	74	74	--	81
Minimum	80	79	80	82	83	84	81	81	81	81	81	83	83	79	78	75	75	74	75	77	78	78	80	82	80	76	75	74	72	72	--	79

3-2740. MIAMI RIVER AT HAMILTON, OHIO

LOCATION.--Temperature recorder at gaging station, 1,000 feet downstream from Columbia Bridge at Hamilton, Butler County, and 3 miles downstream from Fourmile Creek (revised).
DRAINAGE AREA.--3,639 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1951.
Water temperatures: October 1950 to September 1951, October 1957 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 84°F July 27; minimum, 37°F Dec. 23, 24.
EXTREMES, 1950-51, 1957-61.--Water temperatures: Maximum, 93°F Aug. 23, 24, 1959, Sept. 2, 1960; minimum, freezing point on several days during December 1950, January and February 1951.
REMARKS.--No minimum temperatures Oct. 2-5; thermal unit out of water.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	77	75	74	75	75	74	74	72	73	75	74	74	74	75	75	74	74	71	70	67	65	64	64	62	61	59	60	62	64	64	65	70
Minimum	72	--	--	--	--	72	71	70	71	70	69	70	70	71	72	73	70	67	67	64	62	61	61	60	58	58	59	60	62	62	64	66
November																																
Maximum	64	61	59	60	59	58	56	55	54	54	53	53	53	56	58	60	60	58	57	55	55	55	54	54	55	56	56	59	59	53	--	57
Minimum	61	59	57	57	58	56	54	53	54	52	52	52	52	53	56	58	58	57	55	54	55	53	53	53	54	54	55	56	53	48	--	55
December																																
Maximum	48	48	48	50	51	52	51	51	50	48	47	46	43	42	44	44	44	44	43	43	41	39	39	39	41	41	42	43	43	43	45	45
Minimum	48	48	48	48	49	51	51	49	48	47	46	43	41	41	42	43	43	42	41	41	39	38	37	37	39	40	41	42	41	43	43	44
January																																
Maximum	45	45	45	45	44	46	48	46	46	45	46	47	47	48	48	43	44	45	46	46	44	42	42	42	40	40	40	40	40	40	42	44
Minimum	43	45	45	44	43	44	46	45	44	44	44	44	46	46	38	40	43	44	45	44	42	39	39	40	39	39	39	38	38	38	38	42
February																																
Maximum	42	41	40	42	42	43	44	45	46	47	48	50	50	46	48	49	49	50	50	48	46	48	51	53	53	43	42	42	--	--	--	46
Minimum	40	40	39	40	41	42	43	44	44	44	46	48	41	38	46	48	49	49	48	46	46	46	48	50	43	42	42	42	--	--	--	44
March																																
Maximum	42	43	46	48	50	52	51	50	46	44	44	46	47	47	45	43	43	43	42	42	42	43	43	42	43	45	49	51	51	50	50	46
Minimum	42	42	43	46	48	49	50	46	44	42	42	44	45	45	43	43	42	41	42	41	41	42	42	42	41	43	45	49	50	48	48	44
April																																
Maximum	48	47	47	49	49	50	49	50	50	49	48	48	46	45	47	47	45	43	46	50	52	54	54	58	59	58	58	58	56	54	--	50
Minimum	47	45	45	46	48	48	48	48	49	48	47	46	44	44	45	45	43	42	43	46	50	52	54	54	58	57	57	56	54	53	--	49
May																																
Maximum	56	56	58	60	60	63	63	61	59	59	61	63	67	69	69	70	69	68	68	67	66	66	67	69	70	70	66	67	69	69	69	65
Minimum	53	54	55	57	57	58	61	59	59	57	58	61	63	67	69	68	68	66	64	66	64	64	64	65	67	66	64	66	67	67	68	63
June																																
Maximum	72	75	76	76	77	78	78	78	77	71	71	72	74	74	73	71	70	71	72	73	73	72	72	72	72	73	74	76	78	79	--	74
Minimum	68	72	74	75	75	76	76	76	70	70	71	71	72	72	71	70	70	70	70	72	72	71	72	72	72	72	73	74	76	78	--	72
July																																
Maximum	81	81	81	81	79	79	80	80	79	79	79	79	79	79	77	78	79	80	80	80	82	83	83	83	83	83	84	83	83	83	83	81
Minimum	79	81	81	79	79	78	79	79	79	79	79	79	78	77	76	76	78	79	80	80	80	82	82	83	82	83	83	83	82	83	83	80
August																																
Maximum	83	80	80	80	80	80	78	78	78	78	78	77	77	76	76	76	76	79	79	79	79	77	77	77	77	77	80	80	81	82	83	79
Minimum	80	80	80	80	80	78	77	77	78	78	77	77	76	75	75	75	76	76	79	78	77	77	77	77	77	77	77	80	80	81	82	78
September																																
Maximum	83	82	82	83	83	83	83	83	83	83	82	82	82	82	80	78	77	76	75	75	75	76	77	77	77	76	76	74	73	72	--	79
Minimum	82	82	82	82	83	83	82	83	83	82	82	82	82	80	78	77	76	75	74	74	75	75	76	76	76	75	73	73	72	71	--	78

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MIAMI RIVER BASIN--Continued

3-2766. MIAMI RIVER AT ELIZABETHTOWN, OHIO

LOCATION.--At Lost Bridge on Lawrenceburg Road, 0.6 mile southeast of Elizabethtown, Hamilton County, 0.9 mile downstream from Whitewater River, and 5.4 miles upstream from mouth.
DRAINAGE AREA.--5,385 square miles (at mouth).
RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1961.
Water temperatures: October 1956 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 525 ppm Oct. 1-31, Jan. 1-31; minimum 272 ppm Apr. 12-30.
Hardness: Maximum, 365 ppm Oct. 1-31; minimum, 221 ppm Apr. 12-30.
Specific conductance: Maximum daily, 1,040 microhos Jan. 3; minimum daily, 340 microhos June 14.
Water temperature: Maximum, 86°F July 23, Sept. 5, 6, 10, 11; minimum, 33°F Dec. 23, Jan. 26-30.
EXTREMES, 1956-61.--Dissolved solids: Maximum, 525 ppm Oct. 1-31, 1960, Jan. 1-31, 1961; minimum, 232 June 11-20, 1958.
Hardness: Maximum, 372 ppm Oct. 21-31, 1956; minimum, 188 ppm June 11-20, 1958.
Specific conductance: Maximum daily, 1,040 micromhos Jan. 3, 1961; minimum daily, 303 micromhos July 20, 1958.
Water temperatures: Maximum, 89°F June 29, Aug. 23, 24, 1959; minimum, freezing point on several days during winter months each year.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkyl benzene sulfonate (ABS)
Oct. 1-31, 1960.....	11				90	34	36	4.3		234		164	43	0.5	17	0.46	525	365	173		832		6		0.3
Nov. 1-30....	7.1				86	31	31	3.5		238		138	39	.6	22	.30	499	342	147		791		10		.5
Dec. 1-31....	7.1				88	32	39	3.6		248		134	49	.5	21	.28	516	351	148		829		5		.3
Jan. 1-31, 1961.....	6.5				87	33	42	2.9		256		132	56	.5	17	.60	525	353	143		844		6		.4
Feb. 1-28....	7.6				83	28	37	3.7		239		109	47	.4	19	.82	480	322	126		757		5		.2
Mar. 14-20, 22-31.....	7.4				68	22	8.8	2.1		206		70	16	.2	18	.80	321	260	91		525		12		.1
Apr. 1-11....	6.5				88	28	14	2.0		268		97	22	.3	15	.50	421	335	115		670		5		.1
Apr. 12-30...	6.8				59	18	5.4	2.0		182		56	12	.3	14	.60	272	221	72		448		20		.1
May 1-7, 12, 14-31.....	5.0				75	30	12	2.5		266		83	18	.2	12	.50	422	311	92		622		7		.1
June 1-30....	6.0				76	26	14	2.6		254		82	20	.3	12	.44	371	297	88		610		6		.1
July 1-31....	6.0				84	25	20	3.2		252		98	25	.4	9.8	.66	397	313	106		653		5		.1
Aug. 1-31....	7.1				76	23	17	3.3		232		87	23	.4	10	.54	363	284	94		601		10		.1
Sept. 1-30...	6.6				82	28	26	3.9		252		113	33	.4	15	.54	428	320	113		699		5		.2
Time-weighted average [a]..	7.0				81	28	25	3.2		242		109	33	0.4	16	0.53	436	317	119		699		7		0.2

a Represents 95 percent of days.

MIAMI RIVER BASIN--Continued

3-2766. MIAMI RIVER AT ELIZABETHTOWN, OHIO--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	70	70	65	69	72	72	70	66	68	72	70	72	72	70	70	68	68	66	62	61	60	60	61	58	57	55	55	56	58	60	52	65
November	55	56	55	55	56	50	50	50	51	51	50	50	51	55	56	58	56	54	55	54	53	52	53	52	52	53	55	57	50	44	--	53
December	42	41	43	45	44	50	57	44	42	41	41	39	41	42	36	36	36	36	37	40	34	34	33	35	35	37	38	38	39	39	38	40
January	40	40	41	41	42	44	45	43	41	39	42	43	44	45	40	40	42	43	43	39	36	36	36	35	35	33	33	33	33	33	35	39
February	36	34	34	35	36	37	40	40	42	44	44	47	47	47	45	49	48	53	49	46	46	48	52	52	48	42	42	43	--	--	--	44
March	--	--	--	--	--	--	--	--	--	--	--	--	--	50	46	47	46	45	47	46	46	47	47	46	48	49	57	55	54	54	53	--
April	50	48	51	50	52	52	50	48	50	49	50	48	46	46	48	46	43	44	46	56	54	56	57	60	63	58	59	56	56	57	--	52
May	57	58	59	62	65	68	61	--	--	--	--	60	--	70	70	70	70	65	67	65	65	65	56	68	68	65	65	68	69	70	67	65
June	73	73	75	76	76	73	76	77	73	70	75	78	77	73	68	70	72	73	73	75	70	72	74	70	75	75	75	76	76	81	--	74
July	83	83	83	80	78	79	81	80	79	80	81	80	78	77	77	80	80	83	80	81	83	84	86	83	84	84	82	83	84	85	85	81
August	83	81	84	83	83	81	82	83	83	80	80	80	77	78	79	81	80	83	83	80	78	78	79	79	80	81	82	84	84	85	85	81
September	83	81	85	85	86	86	83	85	85	86	86	85	83	77	73	74	74	74	74	75	76	75	75	74	73	74	76	74	71	73	--	79

OHIO RIVER MAIN STEM

3-2772. OHIO RIVER AT MARKLAND DAM, NEAR WARSAW, KY.

LOCATION.--About 1,000 feet upstream from Dam (mile 531.5), 0.2 mile upstream from site of lock and dam 39, 0.4 mile upstream from Stevens Creek, 1.4 miles downstream from Craigs Creek, and 3.5 miles west of Warsaw, Gallatin County.
DRAINAGE AREA.--83,200 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1961.
Water temperatures: October 1959 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 363 ppm Dec. 1-31; minimum, 153 ppm Mar. 1-4, 6-31.
Hardness: Maximum, 192 ppm Dec. 1-31; minimum, 101 ppm Mar. 1-4, 6-31.
Specific conductance: Maximum daily, 656 micromhos Dec. 25; minimum daily, 190 micromhos Mar. 2.
Water temperatures: Maximum, 82°F Aug. 31, Sept. 2; minimum, freezing point Jan. 28 to Feb. 4.
EXTREMES, 1959-61.--Dissolved solids: Maximum, 366 ppm Oct. 1-31, 1959; minimum, 152 ppm Apr. 1-2, 4-30, 1960.
Hardness: Maximum, 199 ppm Oct. 1-31, 1959; minimum, 96 ppm Apr. 1-2, 4-30, 1960.
Specific conductance: Maximum daily, 791 micromhos Oct. 21, 1959; minimum daily, 176 micromhos Apr. 7, 1960.
Water temperatures: Maximum, 86°F on several days during July and September 1960; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 1-31, 1960.....	1.4				54	12	35	3.7		66		140	40	0.5	6.2	0.40	334	184	130		554		4		0.1
Nov. 1-30....	3.0				54	13	42	3.5		61		139	55	.4	6.5	.08	362	188	138		592		6		.3
Dec. 1-31....	6.2				54	14	39	2.7		60		138	52	.4	7.2	.19	363	192	143		594		5		.2
Jan. 1-31, 1961.....	5.9				35	8.3	22	1.6		52		83	30	.3	5.8	.30	224	122	79		376		6		.1
Feb. 1-28....	5.9				34	9.2	19	2.1		54		75	27	.2	4.9	.32	224	123	79		353		5		.1
Mar. 1-4,6-31	6.1				28	7.4	8.0	1.8		51		57	12	.1	4.7	.50	153	101	58		252		10		.0
Mar. 5.....	6.4	1.8			26	15	9.2	2.3		0		114	10	--	14	--	213	127	127	0.4	367		--		--
Apr. 1-30....	6.1				31	8.1	8.7	1.7		56		64	13	.2	4.1	.20	164	111	65		275		7		.0
May 1-31.....	6.0				33	8.1	9.5	1.7		67		63	14	.1	3.1	.30	185	116	61		291		6		.0
June 1-30....	5.5				35	8.7	12	2.0		67		73	16	.2	3.4	.40	196	124	68		322		6		.1
July 1-31....	5.0				37	9.4	16	2.1		67		78	22	.3	3.2	.20	224	131	76		355		7		.1
Aug. 1-31....	6.7				40	10	17	2.9		76		83	21	.3	3.9	.17	224	141	79		373		7		.0
Sept. 1-30...	1.7				44	12	22	2.6		90		90	29	.3	5.0	.26	255	160	86		439		3		.1
Time-weighted average....	5.0				40	10	21	2.4		64		91	28	0.3	4.9	0.28	243	141	89		399		6		--

OHIO RIVER MAIN STEM--Continued

3-2772. OHIO RIVER AT MARKLAND DAM, NEAR WARSAW, KY.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement, usually between 4:30 p.m. and 7:30 p.m.)

Month	Day																															Average
	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	
Ocrober	70	71	71	71	72	70	70	71	71	71	71	72	72	70	72	72	72	72	68	68	70	70	63	62	63	62	61	60	60	60	57	68
November	59	59	59	59	59	55	49	48	48	48	48	50	50	50	55	55	55	55	55	55	53	52	52	52	51	52	55	54	50	49	--	53
December	42	40	39	46	46	46	45	44	42	44	45	43	42	41	42	39	39	39	39	38	38	35	36	34	34	34	34	33	34	35	34	39
January	34	35	35	35	35	35	36	36	38	38	35	38	40	40	39	41	41	40	39	37	37	36	36	35	33	33	33	32	32	32	32	36
February	32	32	32	32	33	33	33	33	33	35	34	33	38	38	40	40	41	41	41	41	42	42	43	45	44	44	44	44	--	--	--	38
March	44	44	44	46	46	46	46	46	47	47	47	48	48	49	47	47	47	47	47	48	48	49	48	47	46	47	48	48	48	50	50	47
April	50	50	49	50	48	48	50	49	48	47	48	49	48	48	49	48	47	47	48	48	48	49	50	51	52	53	55	56	56	56	--	50
May	56	52	57	56	55	56	57	58	58	58	59	60	61	60	61	62	63	63	63	64	65	65	65	62	66	65	65	65	65	67	67	61
June	68	69	71	72	71	71	72	72	72	72	72	74	74	73	72	73	71	71	71	71	71	70	72	71	71	73	--	--	--	--	--	72
July	78	78	77	78	79	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
August	--	--	--	--	--	--	--	--	80	80	80	80	80	79	79	79	79	79	79	79	79	79	79	70	70	--	--	80	80	80	82	--
September	80	82	78	79	81	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	61	--	--	--

KENTUCKY RIVER BASIN

3-2775. NORTH FORK KENTUCKY RIVER AT HAZARD, KY.

LOCATION.--At gaging station at Woodland Park bridge at eastern limits of Hazard, Perry County, 150 feet upstream from city waterworks dam, and 4.0 miles upstream from Lotts Creek.
DRAINAGE AREA.--466 square miles.
RECORDS AVAILABLE.--Chemical analyses: November 1949 to August 1950, August 1957 to September 1959.
Water temperatures: October 1949 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 85°F Sept. 2, 13; minimum, freezing point on many days during December to February.
EXTREMES, 1949-61.--Water temperatures: Maximum, 93°F Aug. 1, 1953; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Twice-daily measurements at approximately 7 a.m. and 5 p.m.)

Month	Day 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	Average
October																																
a.m.	70	69	70	68	67	68	68	68	68	67	66	63	62	63	64	63	64	62	60	59	52	53	55	54	52	51	52	52	53	52	52	61
p.m.	72	73	72	70	72	71	70	70	70	70	69	67	65	67	67	66	67	65	62	56	55	57	57	57	54	55	54	55	54	54	55	63
November																																
a.m.	51	51	50	49	49	47	45	44	45	46	40	41	41	42	43	45	48	46	45	44	43	44	45	44	45	44	46	45	46	45	--	45
p.m.	54	53	53	52	51	49	47	47	48	44	44	43	44	45	48	49	49	48	47	46	47	47	46	47	48	47	48	50	51	46	--	48
December																																
a.m.	40	33	32	33	33	32	36	35	34	32	37	34	32	32	34	32	32	33	32	32	33	32	32	32	33	33	34	34	34	33	33	33
p.m.	38	36	34	35	35	36	38	36	35	35	38	33	33	33	34	35	34	35	34	36	32	32	32	33	35	35	33	36	36	35	36	35
January																																
a.m.	37	34	34	33	35	36	35	39	36	32	36	33	32	36	41	40	36	40	36	33	33	32	32	34	32	32	32	32	32	32	32	34
p.m.	36	38	35	39	39	40	39	39	40	36	37	37	38	39	42	42	39	35	36	34	33	32	34	33	32	32	32	32	32	32	32	36
February																																
a.m.	32	32	32	33	32	32	34	34	34	33	34	41	40	44	40	41	42	46	49	46	44	45	44	44	46	41	42	44	--	--	--	39
p.m.	32	32	35	35	34	33	36	35	34	35	37	44	47	49	47	46	49	50	50	48	48	46	47	49	42	43	46	43	--	--	--	42
March																																
a.m.	42	41	42	43	51	49	54	52	46	43	42	48	47	46	45	44	43	44	50	48	47	46	45	44	44	48	47	52	54	52	52	47
p.m.	44	43	46	46	53	50	55	56	45	45	45	50	49	50	48	45	45	46	51	50	49	48	46	46	50	52	54	56	56	57	54	49
April																																
a.m.	52	45	40	36	40	42	44	43	49	46	45	47	44	43	47	50	48	46	45	46	49	51	56	54	58	61	62	64	60	60	--	49
p.m.	52	46	38	42	46	47	46	46	48	48	50	51	44	49	53	50	50	47	49	52	53	56	58	62	66	64	66	64	62	58	--	52
May																																
a.m.	54	54	53	54	58	58	60	60	60	58	58	58	59	64	64	65	64	66	65	64	65	65	62	60	59	63	59	58	59	61	59	60
p.m.	57	56	58	60	60	62	62	62	61	60	60	60	66	66	67	68	68	68	67	66	67	66	64	64	65	61	58	61	63	59	64	63
June																																
a.m.	61	55	67	70	71	69	--	--	74	68	70	69	73	69	65	64	64	65	64	65	64	65	65	64	68	66	62	63	65	65	--	66
p.m.	70	72	73	72	73	--	--	76	75	72	72	76	77	74	67	66	67	68	69	68	67	68	67	67	68	68	66	67	68	66	--	70
July																																
a.m.	66	76	76	74	76	75	76	78	77	76	75	74	74	76	74	74	75	74	74	75	75	77	77	76	78	77	77	76	77	75	76	75
p.m.	74	78	79	79	78	79	80	80	79	79	78	75	77	79	76	77	78	76	78	78	80	76	78	81	80	81	80	81	79	78	79	78
August																																
a.m.	77	76	77	76	75	75	76	76	77	76	77	76	77	76	75	74	75	76	75	76	75	74	75	76	75	74	76	76	78	79	80	76
p.m.	81	82	80	78	78	78	78	79	79	79	80	79	78	78	79	78	79	78	78	79	77	78	78	79	78	79	78	81	83	84	84	79
September																																
a.m.	81	80	79	78	79	78	77	76	77	78	77	78	79	77	76	71	73	73	73	--	--	72	73	72	73	71	70	68	67	66	--	--
p.m.	84	85	80	82	83	82	80	82	83	84	83	83	85	84	79	75	76	75	77	--	75	75	76	76	78	73	71	7	69	68	--	78

3-2875. KENTUCKY RIVER AT LOCK 4, AT FRANKFORT, KY.

LOCATION.--At gaging station at Broadway Street Bridge at Frankfort, Franklin County, 300 feet upstream from Benson Creek, 0.9 mile upstream from lock 4, and at mile 65.9.
DRAINAGE AREA.--5,412 square miles, including that of Benson Creek, of which about 120 square miles does not contribute directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to September 1961.
Water temperatures: October 1949 to September 1961.
Sediment: October 1952 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 250 ppm Dec. 1-14; minimum, 85 ppm Mar. 13-14.
Hardness: Maximum, 166 ppm Dec. 1-14; minimum, 64 ppm Mar. 13-14.
Specific conductance: Maximum daily, 480 micromhos Dec. 11; minimum daily, 151 micromhos Mar. 14.
Water temperatures: Maximum, 78°F Sept. 12; minimum, freezing point on several days during January and February.
Sediment concentrations: Maximum daily, 850 ppm May 8; minimum daily, 6 ppm Nov. 2, Dec. 11.
Sediment loads: Maximum daily, 130,000 tons May 8; minimum daily, 7 tons Oct. 8.
EXTREMES, 1949-61.--Dissolved solids: Maximum, 250 ppm Dec. 1-14, 1960; minimum, 65 ppm Feb. 1-5, 1957.
Hardness: Maximum, 166 ppm Dec. 1-14, 1960; minimum, 42 ppm May 10-13, 1953, Mar. 3, 1955.
Specific conductance: Maximum daily, 555 micromhos Dec. 7, 1952; minimum daily, 80 micromhos Feb. 4, 1951.
Water temperatures: Maximum, 88°F July 22, 1957, minimum, freezing point on several days during January and February 1961.
Sediment concentrations (1952-61): Maximum daily, 2,420 ppm Jan. 31, 1956; minimum daily, 1 ppm on many days during 1952-56.
Sediment loads (1952-61): Maximum daily, 248,000 tons Feb. 2, 1957; minimum daily, 1 ton on many days during 1952-56.
REMARKS.--Records of specific conductance of daily samples available in district office at Columbus, Ohio. Flow regulated by Herrington Lake and by hydroelectric plant at lock 7 on Kentucky River.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 1-28, 1960.....	644	7.5	0.01	41	6.2	4.7	2.3	126	21	9.0	0.2	3.8	158	128	24	277	7.0	3
Oct. 29-Nov. 30.....	1,630	--	--	--	--	--	--	--	--	--	--	--	185	153	--	338	--	--
Dec. 1-14.....	3,090	--	--	--	--	--	--	--	--	--	--	--	250	166	--	436	--	--
Dec. 15-31.....	4,280	--	--	--	--	--	--	--	--	--	--	--	170	112	--	290	--	--
Jan. 1-3, 1961.....	18,700	--	--	--	--	--	--	--	--	--	--	--	160	102	--	253	--	--
Jan. 4-5.....	15,300	--	--	--	--	--	--	--	--	--	--	--	100	69	--	161	--	--
Jan. 9-20.....	11,900	--	--	--	--	--	--	--	--	--	--	--	134	100	--	223	--	--
Jan. 21-Feb. 2.....	7,400	--	--	--	--	--	--	--	--	--	--	--	104	68	--	164	--	--
Feb. 3-12.....	10,300	--	--	--	--	--	--	--	--	--	--	--	122	85	--	209	--	--
Feb. 13-26.....	13,300	--	--	--	--	--	--	--	--	--	--	--	118	81	--	189	--	--
Feb. 27-Mar. 6.....	36,300	--	--	--	--	--	--	--	--	--	--	--	106	84	--	186	--	--
Mar. 13-14.....	13,800	--	--	--	--	--	--	--	--	--	--	--	85	64	--	152	--	--
Mar. 27-28.....	10,600	--	--	--	--	--	--	--	--	--	--	--	94	82	--	186	--	--
Apr. 8-12.....	14,200	--	--	--	--	--	--	--	--	--	--	--	112	77	--	180	--	--
May 2-4.....	18,600	--	--	--	--	--	--	--	--	--	--	--	109	77	--	172	--	--

KENTUCKY RIVER BASIN--Continued

3-2875. KENTUCKY RIVER AT LOCK 4, AT FRANKFORT, KY.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
May 8-12, 1961.....	40,700	--	--	--	--	--	--	--	--	--	--	--	120	83	--	180	--	--
May 13-31.....	4,820	--	--	--	--	--	--	--	--	--	--	--	114	84	--	192	--	--
June 1-30.....	7,120	--	--	--	--	--	--	--	--	--	--	--	154	112	--	255	--	--
July 1-24.....	4,170	6.2	0.01	34	5.6	5.0	1.8	106	25	6.2	0.2	2.2	138	108	21	241	7.4	6
July 27-Aug. 15.....	4,970	--	--	--	--	--	--	--	--	--	--	--	133	87	--	217	--	--
Aug. 16-Sept. 4.....	2,400	--	--	--	--	--	--	--	--	--	--	--	134	89	--	212	--	--
Sept. 5-30.....	818	6.3	.02	32	7.2	7.2	2.6	107	25	13	.2	1.8	145	110	22	258	7.5	7
Weighted average..	[a]8,371	--	--	--	--	--	--	--	--	--	--	--	130	93	--	216	--	--
Time-weighted average.....	--	--	--	--	--	--	--	--	--	--	--	--	146	107	--	250	--	--

a Mean discharge for 365 days; mean discharge for 310 days of chemical analyses, 6,600 cfs.

KENTUCKY RIVER BASIN--Continued

3-2875. KENTUCKY RIVER AT LOCK 4, AT FRANKFORT, KY.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	69	69	69	70	67	67	67	67	67	68	67	67	67	67	68	67	66	65	64	63	62	61	60	60	58	58	58	58	57	57	57	64
Minimum	68	68	68	66	66	67	66	66	67	67	66	66	66	66	66	66	64	63	63	62	60	60	59	58	57	57	58	57	57	57	57	63
November																																
Maximum	57	56	56	55	54	54	53	52	51	51	50	50	49	49	50	50	50	50	50	49	48	48	49	49	49	49	49	50	50	50	--	51
Minimum	56	56	55	54	54	53	52	51	51	50	50	49	48	48	49	50	50	50	49	48	48	48	48	49	49	48	48	49	50	48	--	50
December																																
Maximum	48	47	46	44	45	45	45	45	45	43	43	43	42	41	41	41	41	40	40	40	40	40	38	37	36	36	37	37	36	35	35	41
Minimum	47	46	44	44	45	45	45	45	43	43	43	42	41	41	41	41	40	39	39	40	40	38	37	36	36	36	36	36	35	34	34	40
January																																
Maximum	34	34	34	37	37	36	37	38	38	37	37	37	36	36	37	37	37	37	36	36	36	36	35	35	35	34	34	33	32	32	32	36
Minimum	34	34	34	34	35	35	36	37	37	36	36	35	35	36	36	37	37	35	35	36	36	35	35	35	34	33	33	32	32	32	32	35
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	34	35	36	37	37	38	38	38	39	41	42	43	42	42	43	--	--	--	36
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34	35	36	37	37	38	38	38	39	41	42	41	42	42	--	--	--	35
March																																
Maximum	42	41	40	41	42	44	44	45	45	45	45	45	45	45	44	44	44	43	43	43	44	45	45	44	44	45	46	46	46	46	46	44
Minimum	41	40	40	40	41	42	44	44	45	44	45	45	45	44	43	43	43	42	42	43	43	44	44	44	44	44	45	46	46	46	46	43
April																																
Maximum	46	46	45	45	44	44	44	44	44	44	43	43	43	44	44	45	45	45	44	45	45	45	48	50	52	52	53	54	55	55	--	47
Minimum	45	44	45	44	44	44	44	44	44	43	43	43	43	43	44	44	45	44	44	44	45	45	45	48	50	52	52	53	54	55	--	46
May																																
Maximum	56	56	54	54	55	54	55	56	56	56	57	58	59	60	61	62	63	63	63	63	64	64	64	65	68	68	68	67	69	70	69	61
Minimum	55	54	54	54	53	54	54	55	56	56	56	57	58	59	60	61	62	63	62	63	63	64	63	64	65	66	64	65	67	67	67	60
June																																
Maximum	71	73	72	71	71	71	72	72	72	70	69	69	69	69	69	66	66	65	66	65	65	65	64	64	63	64	64	66	66	66	--	68
Minimum	68	70	70	70	70	70	70	72	70	68	69	69	69	69	65	64	64	64	65	65	65	64	64	63	62	62	63	64	64	64	--	67
July																																
Maximum	67	69	70	71	71	70	69	68	68	70	72	70	68	69	68	67	67	68	70	69	69	70	70	70	70	70	72	72	75	73	72	70
Minimum	65	66	68	68	68	68	68	66	66	67	68	68	68	68	67	67	65	64	68	68	68	68	68	68	67	68	70	71	72	72	70	68
August																																
Maximum	72	73	74	74	73	73	74	73	73	73	72	71	72	71	72	72	73	73	77	73	71	71	70	70	70	72	72	73	74	74	75	73
Minimum	69	72	73	73	73	72	72	72	72	72	71	70	71	70	70	70	70	71	71	71	70	70	70	69	67	70	70	70	71	71	71	71
September																																
Maximum	74	73	74	75	75	76	76	75	76	77	77	78	77	76	73	72	71	71	70	71	71	71	71	72	72	70	69	68	68	67	--	73
Minimum	72	71	72	72	73	74	74	74	74	75	75	75	75	73	70	68	68	68	67	69	69	69	69	69	70	68	66	66	65	66	--	71

KENTUCKY RIVER BASIN--Continued

3-2875. KENTUCKY RIVER AT LOCK 4, AT FRANKFORT, KY.--Continued

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER				NOVEMBER				DECEMBER			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	600	13		21	804	7		15	5450	--		750
2..	497	12		16	766	6	B	12	5490	--		460
3..	484	8		10	823	7	B	16	3880	--		190
4..	582	8		12	747	8	B	16	2890	8		62
5..	582	12	B	19	747	9	B	18	2520	7	B	65
6..	636	13		22	672	12	B	20	2300	7	B	45
7..	419	8		9	747	17	B	35	2300	7	B	45
8..	419	--		7	690	23		43	2140	7	B	40
9..	484	--		10	1920	--		340	1540	7	B	30
10..	618	--		17	3840	--		390	1210	7	B	25
11..	804	--		30	3520	--		160	1370	6	B	20
12..	747	--		45	2810	12		91	2380	7		45
13..	766	--		60	2380	12	B	75	3680	--		90
14..	528	--		50	2100	13	B	75	6100	--		210
15..	471	--		45	1820	14	B	70	6490	--		240
16..	471	--		45	2300	15	B	95	5490	--		210
17..	471	--		40	2270	14	B	85	4210	--		160
18..	419	--		35	1970	13	B	70	3320	--		120
19..	471	--		30	1820	13		64	2580	13		90
20..	582	--		30	1540	14	B	60	2240	13	B	80
21..	880	--		30	1370	15	B	55	2200	13	B	75
22..	940	8		20	1430	16	B	60	2550	14	B	95
23..	804	7	B	15	1460	16	B	65	3200	16	B	140
24..	804	7	B	15	1540	17	B	70	3040	18	B	150
25..	980	8	B	20	1430	17	B	65	2920	18	B	140
26..	900	9	B	20	1180	17	B	55	3160	18	B	150
27..	880	11	B	25	1260	17	B	60	3480	17		160
28..	804	12	B	25	1160	18	B	55	3440	17	B	160
29..	823	13		29	3520	--		550	3520	18	B	170
30..	804	11	B	25	2700	--		250	7660	60	K	1400
31..	920	10	B	25	--	--		--	13200	170	B	6100
Total	20590	--		800	51336	--		3000	115950	--		11717
	JANUARY				FEBRUARY				MARCH			
1..	16400	180	B	8000	3400	35	B	320	42600	418		48100
2..	18000	280		13600	3800	35	B	360	36500	363		35800
3..	21800	394		23200	3920	35	B	370	32400	375		32800
4..	18700	472		23800	3920	30	B	320	26900	387		28100
5..	11900	310		9960	3800	31		318	35500	307		29400
6..	9260	120	B	3000	3920	--		320	35900	319		30900
7..	7930	65	B	1400	4380	--		360	32000	300	B	26000
8..	6800	45	B	800	7700	--		650	28400	292		22400
9..	6140	30	B	500	15000	--		4700	31300	260	B	22000
10..	5490	25	B	370	21600	--		9000	34000	210	B	19000
11..	4420	19	B	230	21900	102		6030	34200	140	B	13000
12..	4130	17	B	190	17200	102		4740	24900	160	B	11000
13..	3640	15	B	150	13900	90	B	3400	15300	205		8470
14..	3200	15	B	130	12000	86		2790	12400	210		7030
15..	8500	37	K	900	10100	95		2590	10800	--		5400
16..	16000	102		4410	8160	110	B	2400	9740	--		3700
17..	26000	255		17900	7020	110	B	2100	9070	--		2200
18..	28100	320	B	24000	6490	90		1580	9740	--		1500
19..	21800	210	B	12000	6140	80	B	1300	10500	--		1200
20..	15500	160	B	6700	5320	70	B	1000	10700	--		1100
21..	14800	130	B	5200	4890	50	B	650	12400	--		1200
22..	15200	110	B	4500	7120	58	S	1280	12900	--		1300
23..	12100	95		3100	15700	87		3690	17600	--		4000
24..	9700	--		2200	21300	117		6730	16100	--		2500
25..	8070	--		1600	30800	--		48000	13400	--		1600
26..	7020	--		1200	37800	--		77000	11800	--		1400
27..	5790	--		850	39300	565		60000	10900	38		1120
28..	4890	--		600	41200	466		51800	10300	40		1110
29..	4170	37		416	--	--		--	9260	--		1000
30..	3800	35	B	369	--	--		--	8830	--		950
31..	3520	35	B	330	--	--		--	8300	--		1000
Total	342770	--		171596	377780	--		293798	614640	--		366280

S Computed by subdividing day.
B Computed from estimated-concentration graph.
K Computed from estimated-concentration graph and subdividing day.

KENTUCKY RIVER BASIN--Continued

3-2875. KENTUCKY RIVER AT LOCK 4, AT FRANKFORT, KY.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	APRIL				MAY				JUNE			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	20000	--		7600	11200	--		2200	1260	19	B	65
2..	29800	--		21000	13300	90		3230	1110	18	B	55
3..	32700	--		34000	18300	139		6870	2340	59	S	439
4..	31200	--		27000	24300	173		11400	3080	35	B	290
5..	22200	--		16000	21400	160	B	9200	2550	21		144
6..	16500	--		9900	15200	120	B	4900	2340	--		100
7..	13200	--		6300	29500	--		57000	2620	--		160
8..	11200	138		4170	56100	850	A	130000	3200	--		210
9..	10800	110	B	3200	56200	430		65200	7100	--		3500
10..	14800	98		3920	45800	310	B	38000	23800	441		28000
11..	16000	85		3670	28100	370		28100	18200	223		11000
12..	18200	--		3800	17500	192		9070	11400	75		2310
13..	22500	--		7400	13900	120		4500	6800	30	B	550
14..	20200	--		4500	11900	90	B	2900	6760	25	B	460
15..	21400	--		4400	10300	78		2170	10900	60	K	2100
16..	27900	--		16000	8590	50		1160	23500	200	A	13000
17..	28900	--		16000	6840	25	B	460	21300	223		12800
18..	27800	--		6900	6540	20	B	350	14500	180	B	7000
19..	25500	--		4700	5280	25	B	360	9600	140	B	3600
20..	17500	--		2700	4130	25		279	6710	102		1850
21..	12400	--		1600	3720	25	B	250	5700	80	B	1200
22..	10400	--		1300	3160	25	B	210	5230	65	B	900
23..	16300	--		1800	2810	25	B	190	4720	55	B	700
24..	24000	--		2900	2480	25	B	170	4090	39		431
25..	20600	--		3100	2010	25	B	140	3240	35	B	390
26..	22700	--		3800	1910	25	B	130	1970	45	B	240
27..	21600	--		3000	1820	25	B	120	2700	45	B	330
28..	23500	--		2700	1880	25	B	130	2300	45	B	280
29..	20200	--		2700	1570	23		97	2550	45	B	310
30..	13700	--		2600	1430	20	B	75	2100	30	B	170
31..	--	--		--	1370	20	B	75	--	--		--
Total	613700	--		230000	428540	--		378936	213670	--		92584

Day	JULY				AUGUST				SEPTEMBER			
1..	1940	30	B	160	13400	--		8500	1430	50	B	190
2..	920	30	B	75	11300	160	A	4900	1210	50	B	160
3..	1000	46		124	8260	130	B	2900	1180	53		169
4..	980	--		120	7200	120	B	2300	1260	60	B	200
5..	1130	--		110	6580	100	B	1800	785	60	B	130
6..	1500	--		130	5020	85	B	1200	1510	60	B	240
7..	2010	--		340	3880	78		817	1400	60	B	230
8..	1340	--		190	2960	--		550	1080	55	B	160
9..	940	47		119	2410	--		380	1060	45	B	130
10..	766	33		68	2410	--		360	785	37		78
11..	340	--		20	3680	--		600	980	30	B	80
12..	635	--		60	5450	--		1100	980	30	B	80
13..	2010	--		210	3520	--		480	1110	30	B	90
14..	1730	--		170	2850	39		300	690	30	B	55
15..	4670	96		1210	2100	30	B	170	672	25	B	45
16..	4000	70		756	1370	30	B	110	546	25	B	35
17..	9890	--		4700	1460	35	B	140	340	22		20
18..	15900	--		7200	1290	35	B	120	654	20	B	35
19..	12600	--		2900	1040	25	B	70	654	20	B	35
20..	10400	--		1500	766	35	B	70	747	20	B	40
21..	8070	--		950	1370	45	J	190	842	20	B	45
22..	6490	--		900	6840	--		2000	747	19	B	40
23..	6010	--		950	5280	--		1100	672	18	B	35
24..	4890	75		990	4550	--		650	636	15		26
25..	4170	60	B	700	3840	--		550	690	15	B	30
26..	3560	50	B	480	4630	--		450	510	15	B	20
27..	2920	40	B	320	3280	--		340	980	14	B	35
28..	2520	45	B	310	2440	33		217	672	13	B	25
29..	1630	35	B	150	2300	30	B	190	785	12	B	25
30..	3150	40	B	340	1480	35	B	140	740	10	B	20
31..	8110	130	J	3100	980	45	B	120	--	--		--
Total	126221	--		29000	123936	--		33000	26347	--		2503

Total discharge for year (cfs-days).....3055480
Total load for year (tons).....1613214

S Computed by subdividing day.
A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.
K Computed from estimated-concentration graph and subdividing day.

KENTUCKY RIVER BASIN--Continued

3-2875. KENTUCKY RIVER AT LOCK 4, AT FRANKFORT, KY.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Jan. 5, 1961.....	1655			10100	256		50	65	80	92	97	99	100	--				SBWC
Feb. 28.....	1030			40000	570		43	51	66	81	88	94	100	--				SBWC
Feb. 28.....	1030			40000	570		13	25	45	71	87	90	96	100				SBN
Mar. 6.....	2025			35400	315		49	59	72	86	96	98	100	--				SBWC
May 9.....	1415			54600	339		45	54	68	82	92	96	99	100				SBWC
May 9.....	1415			54600	339		14	25	47	69	87	89	98	100				SBN

3-2915. EAGLE CREEK AT GLENCOE, KY.

LOCATION (revised).--At gaging station, 600 feet upstream from bridge on State Highway 16, 0.5 mile south of Glencoe, Gallatin County, 5.7 miles downstream from Tenmile Creek and 21 miles upstream from mouth.
DRAINAGE AREA.--437 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1949 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 86°F July 1; minimum, freezing point on many days during December to February.
EXTREMES, 1949-61.--Water temperatures: Maximum, 93°F Sept. 1, 2, 1953; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Twice-daily measurements at approximately 7:30 a.m. and 4:30 p.m.)

Month	Day 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	Average
October																																
a.m.	63	63	62	62	60	65	60	62	63	63	62	60	61	61	62	62	60	57	59	55	53	52	54	52	50	52	53	53	53	54	55	58
p.m.	68	68	65	68	65	68	67	--	65	65	67	66	68	68	68	67	65	65	59	--	56	--	55	54	54	55	54	54	55	57	55	62
November																																
a.m.	53	52	49	49	52	47	45	44	--	44	43	40	41	45	47	56	49	47	48	45	44	43	45	41	44	43	46	50	50	44	--	46
p.m.	--	53	52	52	53	48	47	47	42	45	45	43	--	52	57	54	--	48	48	47	47	47	47	46	47	47	49	56	45	43	--	48
December																																
a.m.	40	38	39	36	39	43	40	37	37	32	34	32	32	32	32	32	33	32	32	34	32	32	32	35	32	32	32	32	32	32	32	34
p.m.	43	39	38	--	42	44	41	39	34	--	35	33	32	33	33	32	33	33	35	34	33	33	33	39	33	32	32	32	32	33	33	35
January																																
a.m.	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	34	40	43	39	34	32	32	32	32	32	32	32	32	32	32	32	33
p.m.	33	33	33	33	33	33	34	32	33	33	32	33	35	35	35	39	43	49	38	35	32	32	32	32	32	32	32	32	32	32	33	34
February																																
a.m.	32	32	32	32	32	32	32	32	32	32	32	32	33	33	38	38	41	--	34	34	43	43	46	47	43	44	40	41	--	--	--	36
p.m.	32	32	32	32	33	33	33	33	33	33	34	34	34	34	42	41	42	45	35	44	43	45	49	50	42	44	43	43	--	--	--	38
March																																
a.m.	42	40	42	42	50	54	52	51	--	43	42	45	46	49	44	44	44	44	46	44	47	47	47	46	45	47	50	54	52	50	50	47
p.m.	43	44	43	49	52	54	52	51	42	40	43	47	--	43	45	47	46	45	45	47	48	49	48	47	49	51	55	56	54	--	50	48
April																																
a.m.	47	43	43	44	47	46	45	44	47	44	44	44	45	45	49	47	47	44	44	47	54	54	54	56	61	59	60	59	55	56	--	49
p.m.	47	46	47	47	49	49	47	50	--	45	47	46	46	49	51	49	45	45	49	52	54	55	56	62	64	63	64	59	59	58	--	52
May																																
a.m.	57	56	57	57	53	55	57	59	59	51	57	59	62	67	68	67	65	65	64	59	60	61	61	61	64	64	59	59	64	60	65	60
p.m.	61	59	--	61	55	59	60	59	54	59	61	64	69	70	70	70	66	66	67	64	65	--	65	66	70	65	64	67	70	72	68	64
June																																
a.m.	67	70	70	70	70	72	70	70	70	70	68	72	72	72	68	62	61	64	65	68	69	64	69	64	68	68	70	71	73	74	--	69
p.m.	72	75	75	77	76	75	--	72	71	70	75	76	78	77	67	63	67	--	72	72	70	76	74	75	74	74	77	79	--	82	--	74
July																																
a.m.	76	78	79	77	76	78	76	76	74	74	74	74	78	74	78	70	71	72	75	75	70	74	76	78	76	77	77	77	77	75	75	75
p.m.	86	84	81	79	81	80	79	79	77	--	81	77	80	76	76	73	74	76	77	77	74	79	84	82	--	81	82	82	84	77	77	79
August																																
a.m.	76	75	75	74	75	75	74	74	75	74	76	76	74	72	74	74	79	75	74	75	70	69	70	71	71	72	72	74	74	75	76	74
p.m.	78	77	77	77	79	79	78	79	78	--	77	78	78	76	78	78	--	81	83	75	72	71	74	74	75	75	75	78	81	80	81	77
September																																
a.m.	75	76	79	77	83	80	79	78	78	78	77	79	77	77	71	66	65	65	63	67	66	68	67	71	73	67	65	65	62	64	--	72
p.m.	79	81	--	83	84	84	82	83	83	83	84	82	82	76	72	68	69	--	69	72	70	72	75	75	--	70	68	66	68	70	--	76

SALT RIVER BASIN

3-2975. PLUM CREEK AT WATERFORD, KY.

LOCATION.--At gaging station, 0.7 mile downstream from Little Plum Creek, 1 mile north of Waterford, Spencer County, and 3.2 miles upstream from Salt River.
DRAINAGE AREA.--31.8 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1954 to September 1961 (discontinued).
Sediment records: October 1954 to September 1961 (discontinued).
EXTREMES, 1960-61.--Water temperatures: Maximum, 91°F June 13; minimum, freezing point Dec. 21-23.
Sediment concentrations: Maximum daily, 1,200 ppm Mar. 6, May 7; minimum daily, no flow on many days during October and September.
Sediment loads: Maximum daily, 14,000 tons May 7; minimum daily, 0 tons on many days during October and September.
EXTREMES, 1954-61.--Water temperatures: Maximum, 92°F July 19, 1957; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 2,350 ppm Jan. 21, 1959; minimum daily, no flow on many days during 1955 to 1961.
Sediment loads: Maximum daily, 27,000 tons June 23, 1960; minimum daily, 0 tons on many days during 1955 to 1961.
REMARKS.--Flow affected by ice Dec. 14, 15, 23-25, Jan. 22 to Feb. 5. This station operated as part of the SCS Demonstration Project.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day 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	Average
October	--	72	70	69	68	70	70	67	70	--	69	70	71	71	65	65	65	65	63	--	61	--	60	60	59	59	53	54	--	59	54	65
November	55	55	54	54	51	49	47	48	50	47	44	38	49	51	--	52	49	49	42	44	45	50	48	50	--	38	50	51	38	37	--	48
December	38	--	34	39	40	42	40	37	35	35	36	34	33	36	39	39	36	39	40	41	32	32	32	36	--	40	38	36	36	38	36	37
January	38	35	35	37	38	38	38	37	37	38	38	39	38	38	40	37	40	44	40	39	35	35	37	34	35	35	36	35	33	33	33	37
February	34	34	33	33	36	36	37	35	34	41	40	47	52	53	52	52	50	50	48	50	52	54	55	56	--	42	50	47	--	--	--	45
March	44	50	52	52	55	58	58	50	48	48	44	52	57	50	49	50	47	44	49	50	52	51	52	50	49	47	--	60	60	59	52	51
April	47	55	54	61	54	--	58	44	50	46	52	50	--	60	--	50	45	52	--	--	57	55	63	70	70	71	71	63	50	65	--	57
May	65	69	67	67	65	55	64	65	--	68	70	77	60	80	79	80	74	72	74	70	75	80	80	81	75	72	--	76	75	--	77	72
June	81	81	70	76	--	74	71	79	70	72	89	90	91	88	78	75	80	82	84	89	88	80	80	70	75	78	80	81	85	87	--	80
July	84	84	86	84	86	86	85	80	85	84	85	78	80	81	80	80	81	82	82	84	85	80	86	88	88	90	88	89	79	89	90	84
August	90	89	86	85	74	80	81	84	84	84	82	74	--	85	87	88	88	89	79	79	77	80	78	79	80	80	81	80	83	--	85	82
September	85	74	83	86	86	87	88	89	87	86	87	87	85	75	70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

SALT RIVER BASIN--Continued

3-2975. PLUM CREEK AT WATERFORD, KY.--Continued

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	0	--	0	.2	13	T	13	17	0.6
2..	0	--	0	.2	11	T	9.4	14	B .4
3..	0	--	0	.1	8	T	8.6	10	.2
4..	0	--	0	.1	10	T	7.4	9	.2
5..	0	--	0	.2	15	T	7.0	7	.1
6..	0	--	0	.2	8	T	35	34	3.2
7..	.1	15	T	.1	4	T	35	40	3.8
8..	.6	32	0.1	.1	5	T	19	23	1.2
9..	.5	18	T	142	210	J 170	1 3	17	.6
10..	.3	16	T	31	51	4.3	11	22	.6
11..	.1	10	T	8.4	29	.6	17	31	1.4
12..	.1	7	T	5.6	20	.3	14	15	.6
13..	.1	4	T	3.6	13	.1	9.6	4	.1
14..	0	--	0	3.0	16	.1	9.0	2	T
15..	0	--	0	2.2	15	.1	8.0	1	T
16..	.1	14	T	64	120	J 40	7.4	3	.1
17..	.1	10	T	13	51	1.8	6.5	8	.1
18..	.1	10	T	8.0	110	2.4	5.6	14	.2
19..	1.6	123	S .9	5.6	30	.4	6.3	7	.1
20..	1.5	120	.5	4.4	13	.2	14	14	.6
21..	.6	28	T	3.6	60	.6	31	43	3.6
22..	.4	30	T	13	--	4	24	63	4.1
23..	.2	25	T	45	52	S 8.5	16	15	.6
24..	.1	15	T	14	18	.7	16	5	.2
25..	.1	7	T	10	15	.4	20	8	B .4
26..	.1	10	T	8.0	14	.3	70	90	17
27..	.2	14	T	6.5	18	.3	44	41	4.9
28..	.1	9	T	45	--	70	27	6	.4
29..	.1	20	T	64	--	45	28	4	.3
30..	.1	9	T	19	32	1.6	28	17	1.3
31..	.2	15	T	--	--	--	44	17	2.0
Total	7.4	--	1.6	52 .1	--	351.7	603.8	--	49.0

Day	JANUARY			FEBRUARY			MARCH		
1..	93	45	11	8.0	3	0.1	145	38	15
2..	57	20	3.1	8.5	1	T	99	24	6.4
3..	43	11	1.3	8.0	2	T	70	21	4.0
4..	37	10	1.0	9.0	5	.1	423	227	S 487
5..	48	5	.6	7.0	12	.2	1830	1050	S 8440
6..	68	16	2.9	10	15	B .4	1160	1200	J 9000
7..	62	14	2.3	112	--	160	115	111	34
8..	43	5	.6	139	63	S 29	300	150	J 150
9..	28	4	.3	74	57	11	89	67	16
10..	24	3	.2	57	33	5.1	59	42	6.7
11..	21	3	.2	43	12	1.4	47	22	2.8
12..	19	2	B .1	41	10	1.1	38	20	2.0
13..	15	3	.1	44	8	1.0	49	28	3.7
14..	29	--	6	35	6	.6	37	26	2.6
15..	269	180	J 170	27	5	.4	34	22	2.0
16..	154	39	16	21	5	.3	31	18	1.5
17..	66	13	2.3	23	3	.2	24	15	1.0
18..	47	10	1.3	89	121	S 43	35	--	7
19..	41	5	.6	64	31	5.4	73	65	K 16
20..	33	4	.4	41	5	.6	44	24	2.8
21..	22	15	.9	35	3	.3	579	--	1700
22..	18	6	.3	475	734	S 2590	153	89	S 48
23..	15	19	.8	95	48	12	103	45	12
24..	13	8	.3	57	28	4.3	75	38	7.7
25..	11	2	.1	795	492	S 2230	57	23	3.5
26..	10	3	.1	200	72	39	46	17	2.1
27..	9.0	3	.1	407	126	S 214	40	11	1.2
28..	8.5	13	.3	628	146	S 318	38	10	1.0
29..	8.0	2	T	--	--	--	30	9	.7
30..	7.5	2	T	--	--	--	24	6	.4
31..	7.5	3	.1	--	--	--	148	--	370
Total	1326.5	--	223.4	3553.5	--	5667.6	5995	--	20347.1

S Computed by subdividing day.
T Less than 0.05 ton.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.
K Computed from estimated-concentration graph and subdividing day.

SALT RIVER BASIN--Continued

3-2975. PLUM CREEK AT WATERFORD, KY.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	304	--	360	23	3	0.2	1.3	3	T
2..	68	16	2.9	17	8	.4	1.0	5	T
3..	51	14	1.9	14	32	1.2	118	314	S 225
4..	40	7	.8	12	10	.3	14	23	.9
5..	33	7	.6	108	76	S 39	7.4	7	B .1
6..	24	5	.3	70	31	5.9	245	850	J 1800
7..	21	2	.1	2800	1200	J 14000	166	897	S 764
8..	18	3	.1	2160	--	8700	93	198	50
9..	181	97	S 96	510	231	S 400	155	193	S 137
10..	123	52	S 23	85	85	20	59	42	6.7
11..	55	13	1.9	57	37	5.7	30	17	1.4
12..	371	164	S 287	40	24	2.6	18	13	.6
13..	115	53	16	30	20	1.6	12	14	.4
14..	68	15	2.8	23	13	.8	82	--	155
15..	79	--	9	21	7	.4	335	--	440
16..	148	64	S 31	15	5	.2	64	32	5.5
17..	62	13	2.2	11	12	.4	34	24	2.2
18..	47	11	1.4	57	130	K 35.	21	16	.9
19..	38	9	.9	24	30	1.9	15	15	.6
20..	33	22	2.0	16	3	.1	11	8	.2
21..	93	111	S 40	13	3	.1	12	10	.3
22..	85	60	S 17	10	3	.1	8.4	8	.2
23..	965	692	S 5220	8.0	11	.2	6.0	8	.1
24..	95	48	12	6.5	6	.1	4.0	8	.1
25..	144	--	160	5.2	4	.1	3.3	7	.1
26..	102	90	K 45	6.0	6	.1	2.7	7	.1
27..	52	17	2.4	4.4	3	M	2.4	7	T
28..	41	8	.9	3.3	2	T	1.9	6	T
29..	31	7	.6	2.7	3	T	1.5	9	T
30..	26	4	.3	2.2	3	M	1.2	8	T
31..	--	--	--	1.7	6	M	--	--	--
Total	3513	--	6338.1	6156.0	--	23216.5	1525.1	--	3591.6

Day	JULY			AUGUST			SEPTEMBER		
1..	.8	13	T	18	159	S 10	0.9	16	T
2..	.9	16	T	6.0	67	1.1	1.2	26	0.1
3..	1.5	9	T	6.0	17	.3	4.3	18	.2
4..	.7	12	T	3.6	22	.2	4.9	14	.2
5..	.5	11	T	2.2	23	.1	.6	9	T
6..	.4	8	T	1.7	75	.3	.2	23	T
7..	.4	10	T	1.5	21	.1	.4	16	T
8..	.5	12	T	1.3	14	T	.1	12	T
9..	.4	12	T	1.5	15	.1	.1	38	T
10..	.3	8	T	2.4	19	.1	0	--	0
11..	.2	16	T	4.6	355	S 9	0	--	0
12..	3.6	26	0.2	4.8	61	.8	.1	18	T
13..	2.4	13	.1	3.6	14	B .1	0	--	0
14..	49	336	S 159	2.2	14	.1	0	--	0
15..	89	308	S 90	1.3	35	.1	.1	30	T
16..	29	70	5.5	1.0	17	T	0	--	0
17..	40	37	4.0	1.0	4	T	0	--	0
18..	12	18	.6	.9	8	T	0	--	0
19..	14	27	1.0	1.0	19	.1	0	--	0
20..	13	47	1.6	1.9	13	.1	0	--	0
21..	6.0	17	.3	1.0	9	T	0	--	0
22..	4.0	20	.2	.9	6	T	0	--	0
23..	3.0	17	.1	.9	12	T	0	--	0
24..	2.4	19	.1	1.7	28	.1	.3	19	M
25..	12	34	1.1	1.2	23	.1	.4	18	M
26..	5.2	20	.3	.7	50	.1	.6	21	M
27..	2.7	18	.1	.6	15	T	.3	16	M
28..	1.7	33	.2	.5	10	T	.1	15	M
29..	1.3	43	.2	.4	20	T	.1	13	M
30..	1.5	18	.1	.3	19	M	0	--	0
31..	8.2	48	1.1	.3	15	T	--	--	--
Total	306.6	--	266.0	75.0	--	23.2	14.7	--	0.7

Total discharge for year (cfs-days)..... 23596.7
Total load for year (tons)..... 60076.5

S Computed by subdividing day.
T Less than 0.05 ton.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.
K Computed from estimated-concentration graph and subdividing day.
M Less than 0.05 ton, computed from estimated-concentration graph.

SALT RIVER BASIN--Continued

3-2975. PLUM CREEK AT WATERFORD, KY.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Feb. 22, 1961	0830			1150	1900		41	50	59	73	89	96	98	100				SBWC
Mar. 5	1230			5020	2420		41	50	60	75	93	97	100	--				SBWC
Mar. 5	1230			5020	2420		19	30	45	66	86	93	100	--				SBN
Mar. 6	1015			3730	1740		38	47	56	69	82	99	100	--				SBWC
Apr. 23	0815			4570	1670		52	59	68	80	93	98	99	100				SBWC
June 6	1830			395	2080		53	57	78	93	98	99	100	--				SBWC
June 6	1830			395	2080		26	38	60	86	97	98	100	--				SBN

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SALT RIVER BASIN--Continued

3-2985. SALT RIVER AT SHEPHERDSVILLE, KY.

LOCATION.--Temperature recorder at gaging station at bridge on State Highway 61 at Shepherdsville, Bullitt County, 500 feet downstream from Louisville and Nashville Railroad bridge, and 2.5 miles downstream from Floyds Fork.
DRAINAGE AREA.--1,197 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to September 1950, October 1952 to September 1959.
Water temperatures: October 1952 to September 1961.
Sediment records: October 1952 to September 1961 (discontinued).
EXTREMES, 1960-61.--Water temperatures: Maximum, 83°F July 7; minimum, freezing point Jan. 29 to Feb. 1, Feb. 5-12.
Sediment concentrations: Maximum daily, 2,010 ppm Mar. 21; minimum daily, 3 ppm Jan. 26, 27, Feb. 5.
Sediment loads: Maximum daily, 103,000 tons Mar. 6; minimum daily, less than 0.5 ton on several days in September.
EXTREMES, 1952-61.--Water temperatures: Maximum, 92°F June 27, 1954; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 3,430 ppm June 23, 1960; minimum daily, no flow on many days during September to November 1953, September 1954.
Sediment loads: Maximum daily, 139,000 tons June 23, 1960; minimum daily, 0 tons on many days during September to November 1953, September 1954.
REMARKS.--Flow affected by ice Dec. 21-23, Jan. 24-29.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	69	68	67	67	65	66	67	67	64	62	62	63	63	63	63	61	64	63	59	58	56	52	51	52	52	50	51	51	52	52	51	60
Minimum	64	64	63	63	63	63	62	63	58	59	62	62	61	61	60	59	58	57	58	56	52	51	51	50	50	50	50	50	50	50	50	57
November																																
Maximum	51	50	51	51	49	50	49	48	46	46	45	43	41	40	43	49	49	48	47	45	43	43	45	45	44	43	44	47	50	48	--	46
Minimum	50	50	49	48	48	47	46	46	45	45	43	41	40	40	40	43	48	47	45	43	42	43	43	44	43	43	43	44	47	45	--	45
December																																
Maximum	45	41	38	36	36	39	42	42	40	38	37	37	37	35	34	35	35	35	34	34	35	35	35	34	34	34	34	34	34	34	34	36
Minimum	41	38	36	35	35	36	39	40	38	37	36	36	35	34	34	34	34	34	34	34	34	34	34	33	33	33	33	34	33	33	33	35
January																																
Maximum	33	34	35	35	35	36	37	38	38	36	34	34	34	35	39	40	40	41	40	39	37	35	33	33	33	33	33	34	33	33	33	36
Minimum	33	33	34	34	34	35	36	37	36	33	33	33	33	34	35	39	40	40	39	37	35	33	33	33	33	33	33	33	32	32	32	35
February																																
Maximum	33	33	33	33	33	33	33	32	32	32	32	33	36	41	42	42	42	45	47	46	44	45	48	49	49	40	40	42	--	--	--	39
Minimum	32	33	33	33	32	32	32	32	32	32	32	32	33	36	41	42	42	42	45	44	42	42	45	48	40	38	38	40	--	--	--	37
March																																
Maximum	42	42	45	50	52	54	54	54	53	50	47	46	49	51	51	49	48	47	48	48	49	49	49	48	49	51	53	55	54	54	53	50
Minimum	41	42	42	45	50	52	54	53	50	47	45	45	46	49	49	48	47	47	47	48	48	49	48	47	47	49	51	53	54	53	51	48
April																																
Maximum	51	46	46	48	49	50	50	50	50	48	46	48	48	48	51	51	49	46	48	51	54	55	56	60	62	62	60	61	60	58	--	52
Minimum	45	45	46	46	48	49	50	50	48	46	45	46	47	47	48	49	46	45	45	48	51	54	55	56	60	60	60	60	58	57	--	50
May																																
Maximum	58	58	58	58	58	56	60	60	60	59	58	60	61	63	66	68	68	66	63	63	63	64	64	64	65	65	64	63	64	66	65	62
Minimum	57	58	58	58	56	55	56	60	59	58	58	58	59	61	63	66	66	63	63	62	62	63	62	63	64	64	62	61	62	63	64	61

June																															
Maximum	69	71	71	71	69	68	68	68	69	67	69	71	73	75	75	66	64	65	67	68	68	68	70	71	72	72	73	74	75	76	--	70
Minimum	65	67	69	69	67	66	67	68	67	66	67	69	71	73	66	63	63	64	65	67	67	67	68	68	70	70	70	71	71	73	--	68
July																															
Maximum	77	79	80	79	79	80	83	79	76	76	76	74	73	73	71	70	70	72	73	74	74	74	75	75	76	76	77	77	77	79	80	76
Minimum	74	75	76	75	76	76	76	75	74	74	73	72	72	70	70	69	69	70	71	72	72	73	74	75	75	75	76	76	76	77	78	74
August																															
Maximum	80	80	78	77	76	76	76	76	74	74	74	74	72	71	71	72	73	74	75	74	73	72	72	71	70	71	72	73	75	81	77	74
Minimum	79	78	77	76	76	76	75	74	74	74	73	72	71	70	71	71	72	72	73	73	72	71	71	70	69	69	70	71	72	73	74	73
September																															
Maximum	75	76	76	79	79	79	76	75	76	76	76	76	76	75	73	76	74	73	73	73	73	75	75	77	73	72	77	70	71	72	--	75
Minimum	74	74	74	75	76	75	75	74	74	75	74	74	74	71	69	67	66	65	65	68	65	67	67	68	69	63	62	63	61	64	--	70

SALT RIVER BASIN--Continued

3-2985. SALT RIVER AT SHEPHERDSVILLE, KY.--Continued

Suspended sediment, water year October 1960 to September 1961

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	42	78	9	68	50	9	1010	124	338
2..	40	48	5	60	45	7	616	87	145
3..	36	25	2	52	33	5	452	58	71
4..	35	20	2	47	25	3	370	37	37
5..	34	18	2	44	30	B 4	320	28	24
6..	34	11	1	42	28	3	328	25	22
7..	33	10	B 1	42	21	2	850	33	76
8..	165	67	S 197	46	23	3	859	27	63
9..	826	669	S 1830	1070	328	S 2140	586	22	35
10..	470	278	S 401	4280	998	11500	452	23	28
11..	216	46	27	1980	213	1140	464	18	22
12..	110	33	10	769	71	147	632	15	26
13..	70	37	7	434	47	55	1100	17	50
14..	48	70	9	315	38	32	900	18	44
15..	40	141	15	246	48	32	512	22	30
16..	33	96	8	928	108	271	405	13	14
17..	30	43	3	1570	172	729	310	17	14
18..	27	41	3	656	103	182	262	17	12
19..	69	60	11	416	82	92	254	19	13
20..	254	65	44	328	53	47	262	17	12
21..	400	82	88	262	40	28	350	22	21
22..	212	54	31	230	30	19	300	25	20
23..	119	35	11	1000	67	181	310	17	14
24..	78	32	7	1300	96	337	320	16	14
25..	60	45	7	648	60	105	360	15	14
26..	50	53	7	458	42	52	648	17	30
27..	47	53	7	360	37	36	1170	27	85
28..	46	33	4	351	43	41	1000	20	54
29..	44	45	5	2000	244	S 1470	940	21	53
30..	47	47	6	2120	348	1990	1080	13	38
31..	62	56	9	--	--	--	1220	28	92
Total	3777	--	2769	22122	--	20662	18642	--	1511
	JANUARY			FEBRUARY			MARCH		
1..	1890	70	357	320	15	13	13900	280	10500
2..	1830	52	257	315	7	6	8340	116	2610
3..	1490	23	92	300	5	B 4	4820	67	872
4..	1250	12	40	290	8	6	4700	130	1650
5..	1220	14	46	279	3	2	15700	1150	48800
6..	1580	17	72	254	5	3	30600	1250	103000
7..	1980	33	176	400	45	49	26600	545	39100
8..	2080	48	270	2300	215	1340	16100	280	12200
9..	1610	30	130	2870	147	1140	10200	203	5590
10..	1070	20	58	2750	141	1050	6690	112	2020
11..	886	15	36	2540	115	789	3110	58	487
12..	752	15	30	2260	88	537	2620	42	297
13..	624	12	20	1920	58	301	2360	37	236
14..	593	10	16	1770	37	177	2780	42	315
15..	3570	251	S 3260	1440	30	117	1700	47	216
16..	7040	614	11700	1100	24	71	1710	58	268
17..	4790	225	2910	940	24	61	1890	62	316
18..	2570	93	645	1370	87	S 414	1360	95	349
19..	1940	51	267	2820	224	1700	1650	124	552
20..	1610	29	126	2220	133	797	1770	126	602
21..	1280	18	62	1630	70	308	7640	2010	S 45600
22..	958	10	26	3690	1915	2520	7400	670	13400
23..	712	7	13	8430	860	19600	5490	189	2800
24..	600	4	6	4540	376	4610	4020	118	1280
25..	500	5	7	6080	305	5010	2900	78	611
26..	450	3	4	12200	--	E 14000	2340	60	379
27..	400	3	3	10600	306	8760	1960	50	265
28..	370	5	5	13900	260	9760	1680	45	204
29..	350	4	4	--	--	--	1490	46	185
30..	320	13	11	--	--	--	1230	27	90
31..	300	17	14	--	--	--	1170	53	S 183
Total	46615	--	20663	89528	--	73145	195920	--	294977

E Estimated.
S Computed by subdividing day.
B Computed from estimated-concentration graph.

SALT RIVER BASIN--Continued

3-2985. SALT RIVER AT SHEPHERDSVILLE, KY.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	6560	781	13800	1540	73	304	178	22	10
2..	6160	343	5700	1600	54	233	160	23	10
3..	3180	143	1230	1500	50	202	701	-- E	800
4..	2400	72	466	921	40	99	1740	-- E	2900
5..	1910	42	216	1220	80 B	260	1300	440 J	2100
6..	1550	30	126	3420	246	2270	2390	666 S	5270
7..	1240	23	77	13600	691 S	33100	3000	888 S	7690
8..	1010	22	60	38600	912	95000	2000	1590 S	18200
9..	1710	117 S	810	53100	470	67400	4000	534	5770
10..	6150	392	6510	28500	276	21200	6500	1060 S	25600
11..	4200	192	2180	14500	132	5170	3900	333 S	3940
12..	4190	148	1670	9590	70	1810	1380	105	391
13..	8340	281	6330	6440	37	643	868	65	152
14..	5190	144	2020	3920	32	339	656	54	96
15..	3140	86	729	2770	26	194	3290	620 S	6490
16..	6160	508	8450	2620	39	276	4490	583	7070
17..	4510	188 S	2510	1250	140	472	2170	202	1180
18..	2760	70	522	1170	200	632	1160	107	335
19..	2190	42	248	1970	164	872	805	65	141
20..	1810	37	181	1170	65	205	600	58	94
21..	2010	68	369	796	41	88	500	54	73
22..	2900	98	767	640	39	67	410	52	58
23..	9950	651 S	24800	524	35	50	342	48	44
24..	12600	251	8540	428	35	40	279	44	33
25..	5550	356	5330	365	35	34	234	39	25
26..	8120	749	16400	328	36	32	202	43	23
27..	4430	300	3590	292	30	24	178	39	19
28..	2630	158	1120	258	25	17	178	38	18
29..	1960	88	466	234	27	17	178	37	18
30..	1670	67	302	212	32	18	142	25	10
31..	--	--	--	195	23	12	--	--	--
Total	126180	--	115519	193673	--	231080	43931	--	92560

Day	JULY			AUGUST			SEPTEMBER		
1..	116	24	8	664	87	156	48	27	3
2..	98	33	9	1150	190	590	44	25 B	3
3..	88	44	10	616	157	261	42	20 B	2
4..	88	38	9	696	123	231	40	20 B	2
5..	98	28	7	390	118	124	38	18	2
6..	85	45	10	246	102	68	34	18 B	2
7..	75	56	11	170	78	36	104	56	16
8..	230	62	38	128	69	24	261	78	55
9..	198	60	30	128	58	20	220	58	34
10..	167	51	23	230	63	39	122	46	15
11..	110	40	12	170	47	22	75	40	8
12..	110	38	11	1760	528 S	3500	54	39	6
13..	128	42	14	1620	383	1860	42	38	4
14..	699	-- E	1000	506	123	168	33	30 B	3
15..	3500	794 S	8800	351	101	96	28	19	1
16..	3990	895 S	10900	230	76	47	23	14 B	1
17..	2490	430	2890	160	65	28	20	13 B	1
18..	1670	150	676	116	48	15	16	13 B	1
19..	2490	577 S	5040	101	48	13	13	10	M
20..	2680	832 S	6590	164	49	22	9.0	11	M
21..	1220	272	896	110	46	14	4.8	11	M
22..	1400	180	680	85	42	10	2.6	15	M
23..	640	138	238	78	33	7	2.6	18	T
24..	736	137	272	156	42	18	2.3	18	T
25..	346	114	106	188	47	24	4.1	32	T
26..	342	88	81	262	45	32	6.4	47	1
27..	258	84	58	170	38	17	4.1	37	T
28..	188	72	36	107	29	8	3.5	32	T
29..	150	48	19	85	21	5	3.5	35	T
30..	119	30	10	68	20 B	4	3.0	37	T
31..	254	67	46	58	36	6	--	--	--
Total	24763	--	38530	10963	--	7465	1302.9	--	163

Total discharge for year (cfs-days).....777416.9
Total load for year (tons).....899044

E Estimated.
S Computed by subdividing day.
T Less than 0.50 ton.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.
M Less than 0.50 ton computed from estimated-concentration graph.

SALT RIVER BASIN--Continued

3-2985. SALT RIVER AT SHEPHERDSVILLE, KY.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Jan. 16, 1961.....	0645			7230	699		52	57	69	82	96	99	100					SBWC
Feb. 23.....	1145			9150	1070		43	53	65	80	97	99	100					SBWC
Mar. 7.....	1640			23700	534		69	78	88	95	99	100	--					SBWC
Mar. 7.....	1640			23700	534		46	61	82	96	98	98	100					SBN
May 9.....	1000			58800	497		75	84	90	95	98	99	100					SBWC
May 9.....	1000			58800	497		49	68	88	97	98	98	100					SBN

3-3015. ROLLING FORK NEAR BOSTON, KY.

LOCATION.--At gaging station at bridge on U.S. Highway 62 and State Highway 61, 0.4 mile downstream from Beech Fork, and 2.3 miles southwest of Boston, Nelson County.
DRAINAGE AREA.--1,299 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1952.
Water temperatures: October 1949 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 81°F Aug. 5; minimum, freezing point on many days during December to February.
EXTREMES, 1949-61.--Water temperatures: Maximum, 87°F July 4, 1950, June 22, 25, 28, 1954; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Twice-daily measurements at approximately 7 a.m. and 5 p.m.)

Month	Day 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	Average
October																																
a.m.	64	62	61	61	60	60	61	64	61	60	60	61	62	60	60	59	58	57	58	57	55	50	51	52	53	54	53	51	50	51	49	57
p.m.	67	67	67	66	67	68	70	68	65	64	62	67	65	64	62	62	62	62	60	61	57	56	57	55	61	63	59	57	56	55	52	62
November																																
a.m.	50	54	49	47	45	43	40	43	43	40	39	39	40	42	45	50	46	50	47	45	45	43	44	46	45	45	46	44	42	40	--	45
p.m.	56	53	48	48	45	42	42	46	44	42	40	41	46	46	54	54	48	54	48	48	49	48	45	47	44	45	47	45	44	41	--	47
December																																
a.m.	42	40	41	44	41	44	43	40	40	41	40	41	41	35	36	35	35	32	32	32	32	32	32	32	32	32	32	32	32	32	32	36
p.m.	41	43	43	42	43	42	42	41	42	40	40	40	39	37	34	34	33	35	32	32	32	32	32	32	32	33	32	32	32	33	32	36
January																																
a.m.	32	32	32	32	32	32	33	35	36	32	34	33	37	40	42	40	36	37	35	34	33	32	33	35	32	32	32	32	32	33	35	34
p.m.	33	32	32	32	33	32	32	37	38	35	32	35	39	41	41	39	35	34	36	36	32	32	32	32	32	32	32	32	32	32	35	34
February																																
a.m.	37	36	33	34	32	32	34	37	36	37	35	38	40	41	42	41	40	41	41	42	43	47	49	55	50	50	51	50	--	--	--	41
p.m.	36	36	36	34	32	34	35	35	36	36	37	38	43	43	44	43	43	44	44	44	46	50	53	54	53	50	50	51	--	--	--	42
March																																
a.m.	51	50	50	54	55	58	58	57	56	56	55	49	49	49	48	47	46	47	45	45	46	45	46	43	46	47	46	45	46	47	47	49
p.m.	50	53	52	56	57	57	57	56	55	56	52	50	52	50	49	48	48	46	43	45	45	45	45	45	49	46	47	47	48	45	49	50
April																																
a.m.	49	49	52	50	54	52	52	51	53	52	50	48	48	47	47	48	45	46	47	51	52	52	58	58	59	58	60	60	59	61	--	52
p.m.	52	50	51	52	51	54	50	56	57	50	49	49	49	48	49	47	47	48	49	56	54	57	59	60	58	57	62	61	60	59	--	53
May																																
a.m.	60	59	59	59	60	62	60	60	58	58	59	58	58	63	60	59	59	60	58	59	63	60	60	61	60	61	61	61	63	60	64	60
p.m.	61	63	60	63	59	59	59	58	57	61	61	63	60	62	61	62	62	63	61	60	65	63	64	64	65	60	63	65	65	66	68	62
June																																
a.m.	65	66	65	68	71	72	70	70	71	72	70	70	70	74	69	65	64	67	65	64	66	64	65	64	65	69	69	68	69	72	--	68
p.m.	69	72	69	76	74	72	71	75	76	76	77	75	73	74	68	67	67	68	68	69	68	68	69	72	68	71	73	75	76	77	--	72
July																																
a.m.	70	73	72	70	71	73	72	70	69	70	67	69	71	70	71	72	70	71	70	71	70	70	73	74	75	74	72	71	71	78	76	71
p.m.	77	77	76	76	78	77	77	76	75	76	76	73	73	74	73	75	75	73	73	72	73	74	75	73	76	73	74	73	72	77	78	75
August																																
a.m.	76	75	78	79	78	76	75	76	76	73	71	74	73	70	73	74	75	74	74	73	72	71	72	71	70	70	70	71	73	72	73	73
p.m.	78	76	80	78	81	79	79	78	78	76	72	78	75	76	76	76	77	77	76	75	73	74	73	75	74	76	74	75	77	78	76	76
September																																
a.m.	70	72	77	75	74	76	75	73	73	73	74	75	73	68	62	60	63	62	63	62	64	65	66	64	65	59	60	55	58	56	--	67
p.m.	76	75	76	77	79	78	78	78	77	78	79	79	79	73	68	65	65	66	68	69	71	78	77	72	70	67	67	64	65	67	--	73

GREEN RIVER BASIN

3-3064.9. GREEN RIVER NEAR GREENSBURG, KY.

LOCATION.--At Sardins Fork bridge on Kentucky Highway 487, 1.4 miles east of Greensburg, Green County, and 2 miles upstream from gaging station.
DRAINAGE AREA.--736 square miles at gage.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1961.
REMARKS.--Samples for iron and manganese filtered clear when collected. Records of discharge are given for Green River at Greensburg.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color	Turbidity
															Calcium, magnesium	Noncarbonate				
Oct. 11, 1960	16	5.7	0.28	--	25	7.1	5.9	2.1	92	14	16	0.1	0.4	123	92	16	215	7.2	2	4
Nov. 7.....	51	4.9	.20	--	55	15	121	3.1	113	20	240	.2	.7	566	199	106	1020	6.8	5	1
Dec. 20.....	203	6.0	.12	0.12	23	6.0	3.1	1.3	73	16	8.0	.2	2.4	98	82	22	180	6.7	7	10
Feb. 15, 1961	842	4.3	.17	.11	18	5.4	2.7	.7	58	15	3.5	.2	2.1	95	67	20	143	6.8	7	10
Mar. 15.....	1260	5.8	.11	.18	16	4.1	2.1	1.0	57	13	3.0	.1	3.3	80	57	10	133	7.7	15	20
Apr. 11 a	3390	5.5	.22	.27	14	3.7	2.5	.9	49	13	2.0	.2	1.6	81	50	10	112	7.2	17	65
May 9.....	5760	6.0	.91	.27	13	3.3	1.7	1.5	46	11	2.0	.2	1.8	98	46	8	105	6.9	27	65
June 6.....	125	1.9	.09	.04	22	5.4	2.8	1.4	81	13	4.5	.0	.8	102	77	10	168	7.2	3	3
July 11.....	80	4.0	b .00	b .00	22	5.3	4.1	1.1	84	13	4.5	.1	.9	96	77	8	147	7.4	2	3
Aug. 8.....	110	6.0	.32	.10	23	5.2	3.8	1.5	85	12	4.0	.2	1.3	98	79	10	173	7.2	4	10
Sept. 6.....	155	6.1	.24	.22	22	3.8	2.9	1.8	75	13	2.5	.2	1.0	98	70	9	157	7.3	16	25

a Additional determinations for this date: Dissolved oxygen 10.6 ppm (94 percent saturation) and phenols as C_6H_5OH 0.008 ppm.
b In solution when analyzed.

GREEN RIVER BASIN--Continued

3-3078. LITTLE BARREN RIVER NEAR MONROE, KY.

LOCATION.--At bridge on State Highway 88, 1.2 miles east of Monroe, Hart County, and 6.3 miles upstream from mouth.
DRAINAGE AREA.--256 square miles (at mouth).
RECORDS AVAILABLE.--Chemical analyses: December 1960 to Setpember 1961.
REMARKS.--No discharge records available.

Chemical analyses, in parts per million, December 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color
															Calcium, magnesium	Noncarbonate				
Dec. 20, 1960.			a0.07						184	28	80	0.2	2.0		214	63		602	7.3	
Jan. 10, 1961.			a.03						164	23	44	.2	2.6		172	38		463	7.1	
Feb. 14.....			a.04						156	24	28	.1	--		160	32		376	7.3	
Mar. 14.....			a.07						143	18	16	.1	2.3		137	20		309	7.9	
Apr. 12 b.....	5.5		.21	0.67	41	6.0	11	0.7	128	17	22	.0	1.9	174	127	22		302	7.4	20
May 10.....			a.23						128	14	9.5	.1	2.0		123	18		261	7.6	
June 6.....			.02						176	28	26	.1	2.6		180	36		421	7.5	
July 11.....			a.02						174	30	58	.1	1.8		192	50		521	8.1	
Aug. 8.....			a.02						138	24	40	.0	1.9		186	73		459	7.8	
Sept. 6.....			a.02						150	24	75	.2	1.8		172	49		537	7.4	

a In solution when analyzed.
b Additional determinations for this date are dissolved oxygen, 10.0 ppm (91 percent saturation); phenols as C_6H_5OH 0.000 ppm; turbidity 40 ppm.

GREEN RIVER BASIN--Continued

3-3085. GREEN RIVER AT MUNFORDVILLE, KY.

LOCATION.--At gaging station at bridge on U.S. Highway 31W, at Munfordville, Hart County.
DRAINAGE AREA.--1,673 square miles, of which about 180 square miles does not contribute directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to September 1961.
Water temperatures: October 1950 to September 1961.
Sediment records: April 1951 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 2,760 ppm Nov. 12; minimum, 124 ppm Feb. 28.
Hardness: Maximum, 648 ppm Nov. 12; minimum, 75 ppm June 10-12.
Specific conductance: Maximum daily, 4,710 micromhos Nov. 12; minimum daily, 213 micromhos June 10-12.
Water temperatures: Maximum, 77°F Sept. 2, 5-7; minimum, freezing point on Dec. 23-25, Jan. 25, 27.
Sediment concentrations: Maximum daily, 1,010 ppm June 10; minimum daily, 1 ppm on Oct. 30, Nov. 7, Aug. 13, 23.
Sediment loads: Maximum daily, 30,800 tons June 10; minimum daily, 1 ton on several days during October, November, August and September.
EXTREMES, 1950-61.--Dissolved solids: Maximum, 5,830 ppm Oct. 10, 1959; minimum, 73 ppm Feb. 19-21, 1956.
Hardness: Maximum, 1,220 ppm Oct. 10, 1959; minimum, 44 ppm Jan. 30 to Feb. 2, 1957.
Specific conductance: Maximum daily, 9,420 micromhos Oct. 10, 1959; minimum daily, 59 micromhos Mar. 25, 1952.
Water temperatures: Maximum, 82°F July 20, 1957; minimum, freezing point on several days 1957-61.
Sediment concentrations (1951-61): Maximum daily, 3,180 ppm June 14, 1952; minimum daily, 1 ppm on many days during 1952-57, 1960-61.
Sediment loads (1951-61): Maximum daily, 153,000 tons Mar. 23, 24, 1952; minimum daily, less than 0.5 ton on many days in 1953-56.
REMARKS.--Records of specific conductance and chloride of daily samples available in district office at Columbus, Ohio.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 1-16, 1960.....	164	--	--	84	23	219		154	18	450	--	1.8	948	304	178	1,760	7.0	1
Oct. 17-27.....	171	--	--	102	30	324		152	24	660	--	1.7	1,320	378	254	2,400	7.3	1
Oct. 28-30.....	196	--	--	137	36	482		162	20	980	--	3.4	1,920	490	357	3,310	7.7	5
Oct. 31-Nov. 11.....	320	--	--	112	27	355		158	28	710	--	2.2	1,440	391	261	2,540	7.5	5
Nov. 12.....	685	--	--	177	50	712		142	32	1,450	--	--	2,760	648	531	4,710	7.5	10
Nov. 13-Dec. 2.....	528	--	--	75	18	171		140	21	350	--	2.3	774	261	147	1,420	7.7	7
Dec. 3-12.....	1,174	--	--	64	14	124		136	20	250	--	2.1	594	217	106	1,060	7.3	5
Dec. 13-16.....	3,002	--	--	39	8.5	37		98	16	80	--	3.2	269	133	52	486	7.3	22
Dec. 17-Jan. 5, 1961	2,024	--	--	48	10	72		116	20	141	--	2.6	378	161	66	704	7.2	3
Jan. 6-12.....	1,651	--	--	42	11	52		112	19	106	--	2.5	318	150	58	580	7.1	2
Jan. 13.....	1,030	7.6	a0.03	48	11	67	0.8	122	18	132	0.4	2.5	365	165	65	668	7.4	2
Jan. 14-17.....	1,655	--	--	51	10	68		128	20	133	--	2.4	383	168	63	692	7.4	4
Jan. 18-27.....	2,998	--	--	36	7.6	33		100	16	65	--	2.3	235	121	39	410	7.2	9
Jan. 28-Feb. 9.....	1,434	--	--	47	11	58		113	21	122	--	2.1	366	162	70	641	8.2	3
Feb. 10-14.....	3,214	--	--	33	7.2	30		97	16	57	--	2.7	219	112	32	377	7.7	5
Feb. 15-22.....	1,611	--	--	42	8.6	53		118	17	100	--	1.7	310	141	44	548	8.0	5
Feb. 23-27.....	8,848	--	--	32	5.9	22		100	14	38	--	2.6	190	104	22	308	8.1	30
Feb. 28.....	14,900	6.2	a.16	24	4.6	12	1.4	77	13	21	.5	3.0	b124	79	16	217	7.9	30

a In solution when analyzed.
b Calculated from determined constituents.

Mar. 1-6, 1961.....	14,310	--	--	27	5.2	14		82	11	27	--	3.0	155	89	22	246	7.8	30
Mar. 7.....	16,800	6.2	a0.22	25	4.8	12	1.5	80	11	22	0.4	2.7	125	82	17	221	8.0	35
Mar. 8-13.....	10,580	--	--	29	5.1	16		86	12	30	--	3.0	154	94	23	267	7.7	7
Mar. 14-Apr. 1.....	3,678	--	--	37	6.9	34		108	14	63	--	2.4	233	121	32	411	7.8	5
Apr. 2-11.....	5,874	--	--	34	4.9	21		96	14	40	--	2.3	179	105	26	324	7.8	5
Apr. 12-19.....	7,508	--	--	27	5.3	15		86	13	26	--	2.1	145	90	19	252	7.7	10
Apr. 20-May 9.....	4,769	--	--	34	5.9	25		100	14	46	--	2.2	196	109	27	343	7.7	10
May 10.....	13,200	6.0	a.12	28	5.6	10	1.3	86	11	20	--	2.6	140	93	22	222	7.3	--
May 11-22.....	3,822	--	--	37	6.3	30		108	13	57	.1	2.3	207	119	30	386	7.3	5
May 23-June 5.....	1,028	--	--	50	10	66		132	15	130	.1	2.2	345	166	58	662	7.4	6
June 7-9.....	1,922	--	--	53	9.5	74		132	19	144	--	1.9	398	171	63	706	7.1	5
June 10-12.....	1,116	--	--	24	3.6	12		74	12	18	--	3.1	125	75	14	213	6.9	21
June 13-19.....	7,418	--	--	31	4.5	18		96	12	30	--	2.8	158	96	18	272	7.1	21
June 20-28.....	1,647	--	--	45	7.4	37		126	14	73	--	2.8	259	143	40	464	7.2	5
June 29-July 16.....	722	--	--	55	10	71		140	16	142	--	2.1	406	178	64	709	7.7	5
July 17-20.....	5,008	--	--	30	4.6	17		86	12	32	--	3.2	160	94	24	276	7.4	15
July 21-Aug. 4.....	1,411	--	--	42	7.0	38		120	14	72	--	2.8	264	134	36	454	7.3	10
Aug. 5-9.....	488	--	--	51	8.9	61		139	15	117	--	2.3	363	164	50	633	7.3	5
Aug. 10-22.....	331	--	--	59	11	80		153	16	158	--	2.8	455	192	66	780	7.4	5
Aug. 23-24.....	1,028	--	--	67	9.8	115		142	22	225	--	1.6	575	208	91	978	7.6	5
Aug. 25-Sept. 3.....	810	--	--	41	7.3	46		109	14	90	--	2.0	289	132	42	503	7.4	15
Sept. 4-12.....	396	--	--	47	8.3	54		129	15	104	--	1.5	327	151	46	569	7.4	10
Sept. 13-30.....	186	--	--	62	12	82		160	18	164	--	1.0	476	204	73	815	7.5	5
Weighted average..	c2,599	--	--	37	6.9	36		102	14	69	--	2.5	239	120	37	420	7.5	12
Time-weighted average.....	--	--	--	52	11	87		123	17	175	--	2.3	446	176	76	796	7.4	7
Tons per day.....	--	--	--	249	47	243		692	97	470	--	17	1,620	--	--	--	--	--

a In solution when analyzed.
c Mean discharge based on 365 days; mean discharge for 364 days of chemical analyses, 2,522 cfs.

GREEN RIVER BASIN--Continued

3-3085. GREEN RIVER AT MUNFORDVILLE, KY.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement at 8 a.m.)

Month	Day																															Average
	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	
October	64	64	65	--	63	65	64	64	65	64	63	62	62	62	62	63	61	59	59	56	54	53	55	54	52	53	55	54	53	55	56	59
November	54	53	51	50	51	48	47	47	49	42	45	43	43	45	47	51	50	48	47	46	45	47	47	47	47	47	47	50	50	46	--	48
December	44	40	39	43	40	40	43	42	41	39	41	43	40	37	37	37	37	35	35	36	35	--	32	32	32	34	35	34	35	35	37	38
January	37	38	38	38	38	39	40	40	39	37	37	36	37	38	40	41	43	43	42	40	36	36	34	35	32	33	32	--	--	--	--	38
February	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	56	46	46	48	46	51	50	50	50	48	47	51	50	53	52	51	49	49	51	54	55	53	52	52	--
April	49	47	48	50	50	50	50	49	49	48	48	49	49	52	55	50	50	48	50	51	56	67	61	62	64	61	61	61	57	58	--	53
May	58	--	60	58	56	60	63	63	60	58	57	59	63	61	67	65	63	64	63	63	63	64	59	--	61	60	57	60	62	63	64	61
June	67	68	70	70	69	71	71	72	70	68	70	71	71	71	65	67	67	67	65	67	66	65	68	67	67	67	67	66	67	68	--	68
July	70	72	72	70	73	73	72	70	70	68	67	69	70	71	71	70	70	72	72	73	71	71	73	74	75	75	74	74	74	75	76	72
August	76	76	76	75	76	76	74	74	74	73	74	73	73	72	72	72	73	74	72	72	69	68	70	69	70	70	73	73	72	73	74	73
September	74	77	76	75	77	77	77	76	75	75	76	75	76	71	65	62	64	65	64	65	65	66	--	68	70	64	64	63	62	64	--	70

GREEN RIVER BASIN--Continued

3-3085. GREEN RIVER AT MUNFORDVILLE, KY.--Continued

Suspended sediment, water year October 1960 to September 1961

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	185	8	4	194	2	1	905	62	151
2..	185	12	6	191	2	1	792	40	86
3..	179	5	2	191	2	1	695	64	120
4..	176	4	2	197	4	2	625	23	39
5..	173	4	2	203	2	1	556	13	20
6..	170	5	2	209	2	1	506	17	23
7..	167	6	3	218	1	1	502	11	15
8..	164	5	2	221	3	2	497	25	34
9..	161	6	3	254	7	5	492	34	45
10..	158	5	2	765	22	45	474	9	12
11..	158	5	2	1000	47	127	1700	240	S 2060
12..	155	6	2	685	27	50	5690	707	10900
13..	152	4	2	610	24	40	4860	258	3380
14..	152	4	2	524	25	35	3450	150	1400
15..	149	6	2	452	18	22	2120	72	412
16..	146	7	3	456	15	18	1580	37	158
17..	152	8	3	620	11	18	1240	22	74
18..	149	7	3	590	13	21	1010	18	49
19..	161	10	4	506	16	22	842	19	43
20..	173	12	6	460	8	10	738	6	12
21..	167	8	4	430	11	13	748	10	20
22..	167	5	2	380	9	9	929	11	28
23..	185	5	2	368	15	15	640	12	21
24..	185	6	3	368	14	14	1010	13	35
25..	182	6	3	376	14	14	1040	13	36
26..	182	5	2	376	8	8	1040	9	25
27..	182	2	1	380	7	7	1110	9	27
28..	191	2	1	368	3	3	1230	7	23
29..	197	2	1	538	16	S 27	1320	13	46
30..	200	1	1	1060	56	160	3550	141	S 1590
31..	194	2	1	--	--	--	4950	209	2790
Total	5297	--	78	13190	--	693	46841	--	23674

Day	JANUARY			FEBRUARY			MARCH		
1..	5040	148	2010	965	51	133	17900	344	16600
2..	4480	87	1050	941	48	122	18000	213	10400
3..	3990	65	700	959	13	34	15300	117	4830
4..	3080	43	358	1170	50	B 160	9480	172	4400
5..	2490	25	168	1180	65	B 210	11600	380	11900
6..	2200	23	137	1230	58	193	13600	263	9660
7..	2020	16	87	1280	12	41	16800	413	18700
8..	1860	17	85	2710	88	S 838	16000	167	7210
9..	1650	13	58	4170	182	2050	15000	152	6160
10..	1440	8	31	4520	113	1380	13200	91	3240
11..	1260	6	20	3770	65	662	9340	53	1340
12..	1130	7	21	3010	35	284	5600	48	726
13..	1030	5	14	2550	23	158	4320	36	420
14..	971	3	8	2220	12	72	3850	33	343
15..	1060	6	17	1960	19	100	3380	35	319
16..	1880	26	S 141	1730	16	75	2960	30	240
17..	2710	37	271	1530	14	58	2720	23	169
18..	2900	42	329	1420	13	50	2670	23	166
19..	2650	37	265	1420	20	77	2540	23	158
20..	4120	94	1040	1390	9	34	2380	28	180
21..	5050	92	1250	1350	12	44	2940	73	S 615
22..	4460	65	783	2090	54	S 381	5350	130	1880
23..	3140	30	254	5880	210	3330	6050	85	1390
24..	2580	17	118	6620	157	2810	5370	46	667
25..	2080	12	67	7240	182	S 3700	4430	29	347
26..	1580	9	38	11400	534	16400	3840	25	259
27..	1420	9	34	13100	326	11500	3380	22	201
28..	1120	9	27	14900	222	8930	3010	22	179
29..	917	7	17	--	--	--	2770	19	142
30..	989	6	16	--	--	--	2540	17	116
31..	1010	12	33	--	--	--	2700	37	270
Total	72307	--	9447	102705	--	53826	229020	--	103227

S Computed by subdividing day.
B Computed from estimated-concentration graph.

GREEN RIVER BASIN--Continued

3-3085. GREEN RIVER AT MUNFORDVILLE, KY.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued

Day	APRIL Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day	MAY Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day	JUNE Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)	Suspended sediment Tons per day
1..	7000	139	2630	3310	120	J 1300	726	8	16
2..	10100	163	4440	8490	--	E 7400	670	12	22
3..	9930	100	2680	9010	104	2530	630	13	22
4..	7570	49	1000	6790	50	917	670	12	22
5..	6070	38	623	4240	31	355	610	17	28
6..	4940	27	360	3290	22	195	600	11	18
7..	3800	20	205	4950	930	S 13200	935	20	50
8..	3060	20	165	7600	695	14300	1260	34	116
9..	2720	33	242	11600	458	14300	3570	365	S 5800
10..	4470	52	628	13200	218	7770	11300	1010	30800
11..	6080	75	1230	9490	83	2130	12700	241	8260
12..	6580	72	1280	5690	72	1110	9480	164	4200
13..	9040	141	3440	4140	65	726	4790	255	3300
14..	8990	83	2010	3230	55	480	3120	333	2800
15..	7740	65	1360	2960	93	743	6200	750	J 14000
16..	6600	62	1100	2830	95	726	12000	468	15200
17..	8000	105	2270	2320	42	263	12100	310	10100
18..	7860	95	2020	2440	50	329	9400	168	4260
19..	5250	40	567	3840	138	1430	4320	83	968
20..	3810	26	267	3680	60	596	2830	49	374
21..	3110	20	168	2930	40	316	2350	37	235
22..	2710	18	132	2320	25	157	2150	29	168
23..	2520	20	136	1930	19	99	1840	22	109
24..	2430	21	138	1640	17	75	1520	21	86
25..	2410	22	143	1430	16	62	1250	16	54
26..	3430	97	S 981	1280	16	55	1060	13	37
27..	4910	165	2190	1180	17	54	971	13	34
28..	4690	82	1040	1030	11	30	853	13	30
29..	3400	43	395	947	9	23	754	10	20
30..	2680	32	232	864	8	19	675	8	14
31..	--	--	--	792	8	17	--	--	--
Total	161900	--	34072	129443	--	71707	111334	--	101143

Day	JULY Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	AUGUST Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	SEPTEMBER Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	615	8	13	1240	100	335	360	6	6
2..	565	11	17	911	57	140	1030	50	139
3..	575	15	23	748	27	54	935	38	96
4..	560	8	12	721	16	31	726	23	45
5..	570	7	11	655	21	37	560	10	15
6..	542	8	12	529	15	21	461	8	10
7..	479	7	9	456	11	14	389	8	8
8..	448	7	8	412	2	2	336	7	6
9..	416	6	7	389	2	2	304	7	6
10..	394	7	7	389	3	3	279	6	4
11..	368	8	8	394	2	2	258	4	3
12..	398	10	11	376	2	2	248	4	3
13..	524	10	14	356	1	1	234	5	3
14..	515	10	14	328	3	3	224	5	3
15..	1150	76	S 304	312	2	2	212	4	2
16..	3450	386	3600	296	3	2	203	3	2
17..	5200	346	4860	286	8	6	197	4	2
18..	6180	353	5890	268	2	1	191	4	2
19..	4520	166	2020	279	7	5	186	4	2
20..	4130	294	3280	276	16	12	186	4	2
21..	2940	288	2290	258	9	6	182	5	2
22..	2180	125	736	484	3	4	179	5	2
23..	2200	127	754	506	1	1	173	4	B 2
24..	1570	63	267	1550	337	S 2260	170	3	1
25..	1560	53	223	1740	341	1600	170	3	1
26..	1560	53	223	1220	150	494	179	4	2
27..	1230	39	130	905	47	115	173	2	1
28..	947	28	72	640	32	55	167	2	1
29..	782	32	68	497	28	38	164	3	1
30..	1070	85	J 270	412	13	14	161	10	4
31..	1500	285	1150	356	7	7	--	--	--
Total	49138	--	26303	18189	--	5269	9237	--	376

Total discharge for year (cfs-days).....948601
Total load for year (tons).....429815

E Estimated.
S Computed by subdividing day.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.

GREEN RIVER BASIN--Continued

3-3085. GREEN RIVER AT MUNFORDVILLE, KY.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Mar. 7, 1961.....	1145			17200	602		45	56	69	85	96	98	100					SBWC
Mar. 7.....	1145			17200	602		18	26	44	62	80	96	99	100				SBN
May 7.....	0700			4080	1120		35	43	56	81	96	99	100					SBWC
May 10.....	1235			13400	168		56	65	77	87	95	97	100					SBWC
June 10.....	0700			11000	1310		49	56	73	87	96	98	100					SBWC
June 10.....	0700			11000	1310		29	40	62	86	95	96	100					SBN

GREEN RIVER BASIN--Continued

3-3090. GREEN RIVER AT MAMMOTH CAVE, KY.

LOCATION.--At Mammoth Cave Ferry crossing, 350 feet upstream from gaging station, which is 0.2 mile downstream from Echo River, and 0.8 mile southwest of Mammoth Cave, Edmonson County.
DRAINAGE AREA.--1,983 square miles, of which about 444 square miles do not contribute directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: September 1959 to September 1961.
Water temperatures: October 1959 to September 1961 (discontinued).
EXTREMES, 1960-61.--Water temperatures: Maximum, not determined; minimum, 34°F Dec. 22, Jan. 25, 30.
EXTREMES, 1959-61.--Water temperatures: Maximum, 82°F Aug. 3, 6, 1960; minimum, 34°F Dec. 2, 3, 1959, Dec. 22, 1960, Jan. 25, 30, 1961.
REMARKS.--Records of specific conductance and chloride of daily samples available in district office at Columbus, Ohio. No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 6, 1960			0.16					164	20	300	0.1	1.9		259	124	1270	7.5	
Oct. 13			.27					160	22	370	.1	1.5		282	151	1510	7.7	
Oct. 21			.19					166	24	420	.1	1.6		299	163	1610	7.7	
Oct. 28			.19					164	26	520	.2	1.5		340	205	1950	7.6	
Nov. 4			.29					168	26	560	.1	2.0		356	218	2060	7.3	
Nov. 17			.17					138	19	159	.0	1.5		190	77	796	7.6	
Dec. 13			.95					108	18	78	.0	3.4		143	54	489	7.3	
Dec. 28			.28					130	20	130	.2	2.7		176	70	696	7.5	
Jan. 10, 1961[a]		5.2	.22	21	4.8	2.3	1.3	65	16	6.8	.1	3.3	90	72	20	166	7.1	5
Jan. 11			.27					120	18	94	.2	3.0		163	64	556	7.5	
Feb. 6			.15					132	19	124	.1	2.4		174	66	667	7.2	
Mar. 8			.59					86	10	16	.1	3.0		88	18	217	7.2	
Apr. 4			.34					92	12	23	.1	2.7		103	28	246	7.2	
May 4			.29					94	11	19	.1	2.2		102	25	236	7.5	
May 31			.20					146	17	87	.1	2.6		164	44	552	7.4	
June 26			.24					144	14	57	.0	3.6		152	34	449	7.7	
July 25			.96					130	12	45	.1	3.6		138	32	386	7.4	
Aug. 29			.20					120	14	50	.2	2.1		126	28	389	7.5	
Sept. 27			.12					172	20	126	.1	2.1		203	62	717	7.8	

a Includes 0.12 ppm manganese (Mn) and 6 ppm turbidity (as SiO_2).

GREEN RIVER BASIN--Continued

3-3090. GREEN RIVER AT MAMMOTH CAVE, KY.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day 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	Average
October	68	68	67	68	67	68	68	68	68	68	68	68	66	67	66	66	65	63	59	69	59	57	58	66	56	55	56	55	57	57	55	63
November	55	56	52	51	52	50	48	44	48	48	46	48	49	48	46	--	50	50	48	47	43	50	48	46	50	46	49	51	50	46	--	49
December	45	43	42	42	42	50	45	43	41	41	45	42	41	41	--	40	40	40	39	44	38	34	35	36	35	40	40	40	41	44	41	41
January	40	40	41	40	42	41	42	45	40	40	39	38	44	42	40	43	46	45	44	43	40	39	37	35	34	38	38	35	35	34	36	40
February	38	41	38	36	36	36	38	42	42	41	40	44	43	45	48	50	50	50	50	48	50	55	53	54	50	49	50	49	--	--	--	45
March	48	49	50	50	58	58	54	57	52	52	54	53	55	53	55	52	54	50	52	54	55	55	52	54	52	50	55	55	58	57	55	53
April	55	50	50	52	53	52	53	56	52	55	52	54	55	53	53	53	52	54	53	55	55	58	57	62	64	60	65	64	62	60	--	56
May	59	64	61	--	57	58	58	62	59	64	62	59	62	63	65	63	63	64	64	63	62	62	65	65	61	62	60	62	64	65	65	62
June	65	68	70	--	--	--	--	--	--	67	--	--	--	--	--	--	65	--	--	--	--	--	--	68	--	--	--	--	--	--	--	--
July	72	--	--	--	--	--	--	--	72	--	--	--	--	--	70	--	--	--	--	--	--	66	--	--	--	--	--	--	72	--	--	--
August	--	--	--	--	70	--	--	--	--	--	--	74	--	--	--	--	--	--	75	--	--	--	--	--	--	--	--	--	--	--	--	--
September	--	75	--	--	--	--	--	--	--	78	--	--	--	--	--	68	--	--	--	--	--	--	--	--	--	--	--	--	--	68	--	--

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GREEN RIVER BASIN--Continued

3-3105. NOLIN RIVER AT WAX, KY.

LOCATION.--At gaging station at bridge on Kentucky Highway 88, at Wax, Grayson County, 5.3 miles upstream from Dog Creek, 14 miles northwest of Munfordville, and 28 miles upstream from mouth.
DRAINAGE AREA.--600 square miles, of which 220 square miles does not contribute directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1960.
Sediment records: December 1959 to September 1961 (discontinued).
EXTREMES, 1960-61.--Sediment concentrations: Maximum daily, 1,000 ppm Mar. 4; minimum daily, 5 ppm Nov. 4-8.
Sediment loads: Maximum daily, 14,700 tons Mar. 6; minimum daily, 1 ton Sept. 24.
EXTREMES, 1959-61.--Sediment concentrations: Maximum daily, 1,120 ppm June 30, 1960; minimum daily, 5 ppm Nov. 4-8, 1960.
Sediment loads: Maximum daily, 14,700 tons Mar. 6, 1961; minimum daily, 1 ton Sept. 24, 1961.

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER				DECEMBER			
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	188	--	7	125	7	B	2	627			220
2..	177	--	6	123	7	B	2	498			90
3..	171	--	6	125	6	B	2	430			50
4..	162	--	4	128	5	B	2	390			30
5..	156	--	4	129	5	B	2	370			20
6..	152	--	4	127	5	B	2	354			16
7..	148	--	4	122	5	B	2	376			35
8..	146	--	4	119	5	B	2	508			140
9..	142	--	4	225	30	K	25	458			80
10..	141	--	4	768	131		272	412			50
11..	138	--	4	918	105		260	1060		S	474
12..	133	--	4	555	--		50	1400	180	A	700
13..	129	--	3	420	--		25	1220			360
14..	127	--	3	360	--		16	855			160
15..	123	--	3	314	--		8	723			80
16..	138	--	4	438	--		65	636			50
17..	121	--	3	654	--		130	564			30
18..	117	--	3	651	--		150	505			18
19..	123	--	7	485	--		65	465			12
20..	135	--	16	410	--		35	428			12
21..	147	--	16	362	--		25	440			12
22..	172	--	40	332	--		20	450			12
23..	148	--	10	330	--		20	435			10
24..	129	--	5	364	--		55	400			10
25..	122	--	4	384	--		80	400			9
26..	117	--	3	354	--		20	400			9
27..	125	--	4	330	--		10	500			11
28..	150	--	13	336	--		16	450			9
29..	136	--	5	594	95	A	150	450			9
30..	138	8	3	729	--		315	850			16
31..	135	8	3	--	--		--	800			15
Total	4386	--	200	11311	--		1800	17854	--		2700

S Computed by subdividing day.
A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.
K Computed from estimated-concentration graph and subdividing day.

GREEN RIVER BASIN--Continued

3-3105. NOLIN RIVER AT WAX, KY.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	JANUARY				FEBRUARY				MARCH			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	750	--		14	395	10	B	11	4680	272		3440
2..	700	--		13	395	9	B	10	3680	225		2240
3..	650	--		12	415	8	B	9	2340	170	B	1100
4..	600	--		11	405	8	B	9	3350	1000	J	12000
5..	600	--		10	384	8	B	8	6040	813		13200
6..	650	--		10	364	8	B	8	8550	635		14700
7..	650	--		10	412	20	B	20	9440	431		11000
8..	600	--		13	1000	105		284	8530	300	B	6900
9..	550	--		15	1390	151		567	5080	210	B	2900
10..	500	--		14	938	88		223	3170	140	B	1200
11..	500	--		14	904	58		142	2420	90	B	590
12..	450	--		12	774	40	B	85	2050	75	B	420
13..	450	--		12	714	30	B	55	1810	75	B	370
14..	450	--		12	675	25	B	45	1690	72		328
15..	700	--		19	624	20	B	35	1480	70	B	280
16..	840	32		72	564	18	B	25	1350	60	B	220
17..	928	33		83	530	15	B	20	1240	60	B	200
18..	840	25	B	55	549	21		31	1120	50	B	150
19..	858	36		83	618	30	B	50	1080	50	B	140
20..	888	40	B	95	654	45	B	80	1050	50	B	140
21..	876	30	B	70	606	26		42	2500	246		1660
22..	768	18	B	35	1310	228	S	903	3000	353		2860
23..	690	10	B	19	2510	387		2620	2500	203		1370
24..	645	10	B	17	2170	240	B	1400	1920	100	B	520
25..	594	10	B	16	2440	254		1670	1650	65	B	290
26..	538	10	B	14	3420	400	B	3800	1440	45	B	180
27..	508	10	B	14	3620	332		3240	1310	35	B	120
28..	478	10	B	13	4260	195		2240	1210	25	B	80
29..	465	10	B	12	--	--		--	1110	17	B	50
30..	430	9	B	10	--	--		--	1030	14	B	40
31..	408	10	B	11	--	--		--	974	18	B	50
Total	19554	--		810	33040	--		17632	88794	--		78738

Day	APRIL				MAY				JUNE			
1..	2040	109	S	638	1410	106	S	425	525	10	B	14
2..	2820	--		1400	1610	93		404	505	10	B	14
3..	1990	106		570	1370	75	B	280	482	9	B	12
4..	2140	97		560	1080	55	B	160	468	8	B	10
5..	1810	75	B	370	960	38	B	100	475	8	B	10
6..	1540	45	B	190	907	28		68	468	7	B	9
7..	1330	30	B	110	4370	952	S	12400	495	7	B	9
8..	1160	20	B	60	6440	578		10000	468	7	B	9
9..	1200	25	B	80	10700	486		14000	573	412	S	715
10..	1730	97		453	10700	355		10200	654	188		340
11..	1850	104		519	8390	200		4530	600	20	B	30
12..	1850	111		554	3260	180	B	1600	555	220	J	370
13..	2980	134		1080	2280	168		1030	561	468		709
14..	2280	100		616	1880	150	B	750	600	170	B	280
15..	2000	87		470	1650	130	B	600	2000	504		2720
16..	3000	240		1940	1490	110	B	440	2000	160	B	850
17..	2500	220		1480	1310	80	B	280	1500	130	B	550
18..	2000	170	B	920	1360	178		654	1100	110	B	330
19..	1700	120	B	550	1500	75		304	900	95	B	230
20..	1500	90	B	360	1300	30	B	100	700	80	B	150
21..	1400	65	B	240	1150	25	B	80	600	70	B	110
22..	1400	50	B	190	1000	20	B	55	500	60		81
23..	1300	35	B	120	900	20	B	50	460	60	B	75
24..	1200	30	B	100	850	19	B	45	435	58		68
25..	1100	20	B	60	765	18	B	35	398	55	B	60
26..	1700	155		711	744	14	B	30	374	50	B	50
27..	1720	181		840	699	12	B	25	352	40	B	40
28..	1260	110	B	370	660	11	B	20	336	35	B	30
29..	1080	70	B	200	621	10	B	17	318	30	B	25
30..	956	40	B	100	585	10	B	17	304	20	B	16
31..	--	--		--	552	10	B	15	--	--		--
Total	52536	--		15851	72493	--		58714	19706	--		7916

S Computed by subdividing day.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.

GREEN RIVER BASIN--Continued

3-3105. NOLIN RIVER AT WAX, KY.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	JULY				AUGUST				SEPTEMBER			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	284	17	B	13	290	--		9	207			11
2..	268	12	B	9	262	--		7	282			60
3..	258	6	B	4	252	--		7	226			30
4..	256	7	B	5	342	95	J	100	207			14
5..	258	30	B	20	288	114		89	195			18
6..	236	30	B	19	236	75	B	45	170	35	A	16
7..	226	30	B	18	208	55		32	160			16
8..	218	30	B	18	201	45	B	25	160			11
9..	210	25	B	14	254	35	B	25	140			8
10..	202	25	B	14	262	35	B	25	130			6
11..	195	23		12	214	35	B	20	120			5
12..	214	21		12	523	180	J	320	115			4
13..	226	20		12	1160	390	B	1220	110			4
14..	278	90	J	80	636	273		469	105			3
15..	418	139		157	438	220	B	260	105			3
16..	615	75	B	120	350	200	B	190	105			3
17..	654	138		244	304	180	B	150	105			3
18..	855	204		471	268	170	B	120	100			2
19..	693	170	B	320	244	150	B	100	95			2
20..	1540	536		2230	238	140	B	90	90			2
21..	1130	534		1630	232	120		78	85			2
22..	732	--		750	276	--		85	85			2
23..	735	--		490	314	--		85	85			2
24..	502	--		220	254	--		60	85			1
25..	438	--		140	298	--		60	85			4
26..	398	--		95	254	--		40	85			5
27..	350	--		65	220	--		30	85			2
28..	316	--		45	201	--		25	85			2
29..	318	--		40	188	--		18	85			2
30..	490	--		160	180	--		14	80			2
31..	342	--		30	174	--		9	--			--
Total	13855	--		7457	9561	--		3807	3772	--		250

Total discharge for year (cfs-days)..... 346862
Total load for year (tons)..... 195875

A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.

GREEN RIVER BASIN--Continued

3-3105. NOLIN RIVER AT WAX, KY.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Mar. 5, 1961.....	1600			6560	637		44	54	65	83	96	99	100					SBWC
Mar. 5.....	1600			6560	637		22	34	52	80	92	95	100					SBN
Mar. 7.....	1200			9550	386		52	63	70	83	94	97	100					SBWC
May 9.....	1700			9490	538		65	77	87	96	99	100	--					SBWC

GREEN RIVER BASIN--Continued

3-3145. BARREN RIVER AT BOWLING GREEN, KY.

LOCATION.--Temperature recorder at gaging station at College Street Bridge, 600 feet downstream from bridge on U.S. Highways 31W and 68 at Bowling Green, Warren County, 800 feet upstream from Louisville and Nashville Railroad bridge, 6 miles downstream from Drakes Creek, and 8.9 miles upstream from Jennings Creek.
DRAINAGE AREA.--1,848 square miles, of which about 490 square miles is noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to September 1950, October 1959 to September 1960.
Water temperatures: October 1949 to September 1961.
Sediment records: November 1952 to September 1960.
EXTREMES, 1960-61.--Water temperatures: Maximum, 81°F Aug. 1, 5, Sept. 8, 10; minimum, freezing point on several days during December to February.
EXTREMES, 1949-61.--Water temperatures: Maximum, 87°F July 1, 2, 22, 29, 1952; minimum, freezing point on several days during winter months in 1951, 1958-61.

Temperature (°F) of water, water year October 1960 to September 1961
(Twice-daily measurements at about 6:30 a.m. and 5:00 p.m.)

Month	Day 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	Average
October																																
a.m.	68	68	65	68	68	67	66	68	67	68	67	65	65	65	66	66	64	63	64	60	60	57	--	--	--	--	--	--	--	55	54	--
p.m.	71	71	70	69	69	68	70	71	70	69	70	67	68	67	68	67	68	66	63	65	61	61	--	--	--	--	--	--	--	59	56	--
November																																
a.m.	56	55	54	52	54	53	50	49	50	49	46	44	45	45	45	50	49	50	49	48	48	48	49	48	48	47	48	48	48	49	--	49
p.m.	57	55	55	55	55	53	50	53	52	48	49	49	50	52	52	53	52	52	52	50	52	50	50	49	50	50	50	51	50	49	--	52
December																																
a.m.	46	42	42	41	42	46	43	43	42	40	42	40	41	39	40	39	38	37	37	38	33	32	32	35	34	35	34	36	37	38	34	39
p.m.	48	45	45	46	47	47	46	45	45	44	43	40	41	41	41	40	40	39	39	39	35	33	33	35	35	36	34	37	38	40	36	40
January																																
a.m.	38	40	40	40	41	42	42	41	41	39	40	40	40	42	43	41	42	44	42	40	40	34	35	35	35	33	32	32	32	32	32	38
p.m.	39	41	40	41	43	43	44	41	40	42	42	42	43	44	42	42	44	44	41	41	35	35	37	35	34	34	32	32	32	33	34	39
February																																
a.m.	32	34	34	34	34	35	35	35	41	40	41	42	43	43	44	50	49	50	50	50	50	50	49	49	50	--	--	--	--	--	--	43
p.m.	34	35	35	35	35	37	36	37	42	42	43	47	49	49	50	51	51	51	51	50	50	51	51	51	49	--	--	--	--	--	--	44
March																																
a.m.	--	--	--	--	54	56	53	52	52	51	53	53	50	53	52	50	49	50	52	51	52	49	52	50	49	51	53	53	53	55	54	52
p.m.	--	--	--	--	56	57	56	55	54	54	56	55	54	55	55	53	54	53	54	55	54	52	53	51	52	55	56	54	55	55	53	54
April																																
a.m.	53	50	50	50	50	52	52	50	50	50	50	50	50	50	52	53	51	50	50	51	53	54	55	60	60	62	63	61	60	60	--	53
p.m.	54	53	53	53	53	55	54	54	53	53	53	53	55	55	55	54	53	54	54	55	56	56	60	64	65	65	65	63	64	63	--	57
May																																
a.m.	60	57	55	55	56	60	62	63	60	58	58	58	60	64	61	64	63	60	58	60	64	63	61	61	61	62	59	63	63	63	63	60
p.m.	59	58	59	58	60	64	65	64	58	63	65	65	67	66	66	66	67	64	65	66	66	65	65	66	65	63	63	65	65	66	66	64
June																																
a.m.	65	70	70	69	70	71	69	68	68	68	70	69	69	69	68	67	68	68	68	64	65	63	63	64	67	63	62	62	62	63	--	67
p.m.	70	71	71	72	72	73	71	69	68	70	72	71	72	70	70	70	71	71	71	70	68	66	70	71	65	69	70	70	71	73	--	70
July																																
a.m.	--	66	69	66	70	74	72	73	74	70	71	70	72	72	71	74	73	72	72	71	72	71	72	69	73	75	75	76	75	76	77	70
p.m.	--	74	75	76	77	75	75	76	77	78	74	75	75	75	76	76	75	75	76	75	75	75	75	76	76	77	78	77	78	77	80	74
August																																
a.m.	77	78	77	79	78	77	76	75	76	75	76	75	74	74	74	74	74	74	74	75	75	71	70	70	71	70	72	72	73	74	75	74
p.m.	81	80	80	80	81	80	80	80	78	80	80	79	79	77	77	79	78	79	78	75	74	74	72	73	74	75	75	76	77	78	78	78
September																																
a.m.	76	75	77	74	76	77	74	76	78	78	77	77	76	75	71	69	69	68	70	66	65	65	70	71	71	66	67	67	67	65	--	72
p.m.	77	78	78	79	79	79	78	81	80	81	80	80	79	77	74	74	73	70	71	70	70	72	78	79	77	71	75	68	69	70	--	76

3-3155. GREEN RIVER AT LOCK 4, AT WOODBURY, KY.

LOCATION.--Temperature recorder at gaging station, 0.1 mile upstream from lock 4, at Woodbury, Butler County, 0.4 mile downstream from Barren River, and at mile 149.1.
DRAINAGE AREA.--5,403 square miles of which about 1,360 square miles does not contribute directly to surface runoff.
RECORDS AVAILABLE.--Water temperatures: October 1958 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 84°F Sept. 10-12; minimum, 33°F Jan. 28 to Feb. 5.
EXTREMES, 1958-61.--Water temperatures: Maximum, 87°F Aug. 25, 1959; minimum, 33°F Jan. 28 to Feb. 5, 1961.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	72	71	71	71	71	71	71	70	70	70	70	70	70	70	70	69	69	69	68	67	66	65	64	64	64	63	62	62	61	61	61	68
Minimum	71	71	71	71	71	71	70	70	70	70	70	70	70	70	69	69	69	68	67	66	65	64	64	64	63	62	62	61	61	61	61	67
November																																
Maximum	61	60	60	59	58	57	56	56	55	54	52	51	51	50	50	51	50	50	50	50	50	49	49	49	49	48	48	49	49	49	--	52
Minimum	60	60	59	58	57	56	56	55	54	52	50	50	50	50	50	50	49	50	49	49	49	49	49	49	48	47	47	48	49	49	--	52
December																																
Maximum	49	48	47	47	47	46	46	46	45	44	44	42	44	44	43	43	42	42	42	42	40	40	37	37	36	37	37	37	36	37	38	42
Minimum	48	47	47	47	46	46	46	45	44	44	42	42	42	43	43	42	42	41	41	39	39	37	37	36	36	36	37	36	36	36	37	41
January																																
Maximum	39	40	41	41	41	41	41	41	41	41	41	41	41	41	41	40	41	41	41	40	40	39	38	37	36	36	35	35	33	33	33	39
Minimum	38	39	40	41	41	40	41	41	41	41	41	41	41	41	40	40	40	41	40	40	40	38	37	36	36	35	35	33	33	33	33	39
February																																
Maximum	34	34	34	33	34	34	35	36	39	39	39	41	41	42	43	43	43	44	44	44	44	44	46	47	47	47	48	46	--	--	--	41
Minimum	33	33	33	33	33	34	34	34	36	38	39	39	41	41	42	43	43	43	44	44	44	44	44	46	47	47	46	46	--	--	--	40
March																																
Maximum	46	46	46	47	48	49	50	52	51	50	49	49	49	49	49	49	50	50	50	50	50	50	50	50	51	50	51	51	52	52	52	50
Minimum	46	46	46	46	47	48	49	50	50	49	48	49	49	49	49	49	49	50	50	50	50	50	50	50	50	50	50	51	51	52	52	49
April																																
Maximum	52	52	52	51	50	50	50	50	50	50	50	50	50	51	52	52	52	52	52	52	52	52	53	55	59	59	60	60	60	60	--	53
Minimum	52	52	51	50	50	50	50	50	50	50	50	50	50	50	51	52	52	52	52	52	52	52	52	53	55	59	59	60	60	60	--	53
May																																
Maximum	60	60	60	59	59	59	59	60	60	60	60	60	60	61	62	63	63	63	63	63	63	63	64	64	64	64	64	64	64	64	66	62
Minimum	60	60	59	59	59	59	59	59	60	60	60	60	60	60	61	62	63	63	63	63	63	63	63	64	64	64	64	64	64	64	64	62
June																																
Maximum	66	69	70	70	70	71	72	72	72	72	71	71	70	71	71	71	70	69	69	69	69	69	69	69	69	69	70	71	71	71	--	70
Minimum	66	66	69	70	70	70	71	72	72	71	71	70	70	70	71	70	69	69	69	68	68	69	69	69	69	69	69	71	71	71	--	70
July																																
Maximum	72	73	74	74	76	76	76	76	76	77	77	77	77	77	77	77	77	77	76	76	76	76	76	76	76	77	77	78	79	81	81	76
Minimum	71	72	73	74	74	76	76	76	76	76	77	77	77	77	77	77	77	76	76	76	76	76	76	76	76	76	77	77	78	79	81	76
August																																
Maximum	81	81	81	81	81	81	81	81	81	81	81	82	82	82	82	81	82	82	82	82	80	80	80	79	79	79	79	79	79	80	80	81
Minimum	81	81	81	81	81	81	81	81	81	81	81	81	82	82	81	80	80	81	80	80	80	80	79	79	79	79	79	79	79	79	80	80
September																																
Maximum	80	80	80	80	82	82	83	83	83	84	84	84	83	83	81	80	79	79	78	77	77	77	79	79	79	77	75	75	74	74	--	80
Minimum	80	80	80	80	80	82	82	83	83	83	83	83	83	81	80	79	79	78	77	77	77	77	77	78	77	75	75	74	74	74	--	79

GREEN RIVER BASIN--Continued

3-3155.2. *GREEN RIVER AT ABERDEEN, KY.*

LOCATION.--At auxiliary gage at Aberdeen-Morgantown Bridge on U.S. Highway 231, 7.7 miles downstream from lock 4, and 2.5 miles downstream from Welch Creek at Aberdeen, Butler County.
DRAINAGE AREA.--5,403 square miles at base gage at Woodbury, of which about 1,360 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1961.
Water temperatures: October 1959 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 373 ppm Oct. 3-31; minimum, 62 ppm Nov. 9-11.
Hardness: Maximum, 195 ppm Nov. 1-8; minimum, 39 ppm Nov. 9-11.
Specific conductance: Maximum daily, 916 micromhos Oct. 9; minimum daily, 103 micromhos Nov. 11.
Water temperatures: Maximum, 80°F Sept. 9, 12-14; minimum, freezing point Jan. 30.
EXTREMES, 1959-61.--Dissolved solids: Maximum, 806 ppm Oct. 15-18, 1959; minimum, 62 ppm Nov. 9-11, 1960.
Hardness: Maximum, 271 ppm Nov. 10-19, 1959; minimum, 39 ppm Nov. 9-11, 1960.
Specific conductance: Maximum daily, 1,860 micromhos Oct. 24, 1959; minimum daily, 103 micromhos Nov. 11, 1960.
Water temperatures: Maximum, 85°F on several days during August and September 1960; minimum, freezing point Jan. 30, 1961.
REMARKS.--Records of specific conductance of daily samples available in district office at Columbus, Ohio. Records of discharge are given for Green River at Woodbury.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-2, 1960	680	7.6		a0.01	--	--	--	--	128	14	65	--	--	246	160	55		455	7.1	--
Oct. 3-31.....	592	7.5		a.02	56	10	61	3.3	148	16	122	0.2	2.9	373	181	60		686	7.4	7
Nov. 1-8.....	656	7.7		.01	--	--	--	--	166	20	114	--	--	356	195	59		700	7.5	--
Nov. 9-11.....	2,453	.9		.06	--	--	--	--	40	13	3.0	--	--	62	39	6		117	6.6	--
Nov. 12-14, 29	9,148	8.0		.01	--	--	--	--	130	22	62	--	--	264	148	42		470	7.4	--
Dec. 30-31....	7,660	7.4		.05	--	--	--	--	112	20	50	--	--	228	131	39		403	7.4	--
Jan. 1-5, 1961	10,980	6.2		a.08	--	--	--	--	102	18	34	--	--	180	114	30		312	7.1	--
Jan. 6-18.....	4,588	6.7		a.04	--	--	--	--	122	18	51	--	--	225	137	37		409	7.0	--
Jan. 24-30....	4,636	6.5		a.07	--	--	--	--	110	17	24	--	--	170	116	26		290	7.2	--
Feb. 4-14.....	8,345	6.4		a.08	--	--	--	--	120	35	20	--	--	196	141	42		332	7.3	--
Feb. 15-20, 23-28.....	15,500	6.6		a.04	--	--	--	--	102	15	18	--	--	138	107	24		259	7.6	--
Mar. 1-24, 29.	27,920	7.7		a.09	--	--	--	--	86	16	12	--	--	122	90	20		214	7.4	--
Apr. 1-2.....	18,850	7.6		.02	--	--	--	--	104	13	17	--	--	154	102	17		251	7.7	--
Apr. 19-May 8.	13,810	6.7		.03	--	--	--	--	104	12	16	--	--	148	100	15		249	7.7	--
May 9-14.....	28,720	6.2		.11	24	5.2	6.4	1.1	86	10	11	.1	2.3	112	82	11		191	7.9	6
May 15-28.....	8,402	8.3		a.01	--	--	--	--	123	12	20	--	--	168	119	18		294	7.4	--

a In solution when analyzed.

May 29-June 12 1961.....	8,080	7.0		a0.02	--	--	--	--	134	13	30	--	--	195	132	22		342	7.5	--
June 13-21....	25,570	7.5		a.06	--	--	--	--	95	11	8.0	--	--	124	88	10		204	7.5	--
June 22-July 3	4,429	9.4		a.03	--	--	--	--	140	12	22	--	--	185	135	20		322	7.6	--
July 4-19.....	3,322	6.8		a.03	--	--	--	--	150	14	42	--	--	230	152	29		407	7.6	--
July 20-28....	6,234	7.2		a.06	--	--	--	--	112	11	19	--	--	160	109	17		270	7.4	--
July 29-Aug.13	2,254	8.4		a.00	--	--	--	--	138	14	37	--	--	214	138	25		367	7.5	--
Aug. 14-Sept.1	1,662	8.4		a.00	--	--	--	--	148	14	48	--	--	242	157	36		412	7.4	--
Sept. 2-4.....	1,933	5.7		a.00	--	--	--	--	142	17	93	--	--	311	169	52		559	7.3	--
Sept. 5-30....	939	6.6		a.00	45	7.1	23	2.1	134	16	44	0.2	1.9	217	141	31		393	7.2	10
Weighted average.....	b 8,159	7.2		0.06	--	--	--	--	104	15	20	--	--	168	106	21		267	7.4	--
Time-weighted average.....	--	7.3		0.03	--	--	--	--	124	15	41	--	--	236	132	30		370	7.4	--
Tons per day..	--	164		1.3	--	--	--	--	2,370	336	458	--	--	3,810	--	--		--	--	--

a In solution when analyzed.
b Mean discharge based on 365 days; mean discharge for 288 days of chemical analyses, 8,407 cfs.

GREEN RIVER BASIN--Continued

3-3155.2. GREEN RIVER AT ABERDEEN, KY.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	72	72	72	72	72	72	72	73	73	74	--	--	74	74	74	74	74	73	73	73	72	71	71	68	66	65	64	64	64	64	63	71
November	60	62	61	60	59	57	57	56	56	56	55	55	54	55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	33	34	--
January	37	39	37	40	42	39	39	37	40	40	45	--	39	40	40	43	45	44	--	--	--	--	--	40	39	41	39	35	33	32	--	--
February	--	--	--	33	34	34	33	38	36	37	40	42	45	49	--	--	33	35	--	--	--	--	35	39	42	49	47	45	--	--	--	--
March	52	52	52	52	35	33	--	47	45	50	--	50	49	48	48	50	49	47	48	50	51	47	50	52	51	50	--	--	47	--	--	48
April	55	55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50	52	62	58	53	58	62	60	58	62	60	62	--	--
May	62	60	60	58	57	58	58	63	62	60	60	62	60	65	65	65	65	65	65	62	65	66	62	62	62	65	62	60	62	65	65	62
June	68	68	70	70	72	74	75	74	70	68	70	70	70	70	68	68	68	63	65	65	65	65	65	68	65	68	68	68	62	68	--	68
July	65	70	70	70	72	73	70	72	70	70	70	73	68	69	70	70	70	68	65	65	66	68	65	65	65	64	65	64	67	68	68	68
August	67	68	67	66	68	68	66	66	66	65	65	66	64	65	64	64	64	62	62	78	76	78	76	76	--	74	76	76	77	76	78	69
September	78	77	78	78	78	77	77	77	80	79	79	80	80	80	74	75	74	74	75	74	74	75	75	75	75	72	72	72	72	72	--	76

3-3195. ROUGH RIVER AT DUNDEE, KY.

LOCATION.--At auxiliary gaging station at bridge on State Highway 69 at Dundee, Ohio County, 7.1 miles downstream from Caney Creek and 5.6 miles downstream from gaging station near Dundee.
DRAINAGE AREA.--770 square miles, of which about 122 square miles are noncontributing to surface runoff.
RECORDS AVAILABLE.--Water temperatures: October 1949 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 77°F July 1; minimum, freezing point several days during December to February.
EXTREMES, 1949-61.--Water temperatures: Maximum, 89°F Aug. 3, 1955; minimum, freezing point on many days during winter months.
REMARKS.--Records of discharge are given for Rough River near Dundee, Kentucky.

Temperature (°F) of water, water year October 1960 to September 1961
(Twice-daily measurements at approximately 7 a.m. and 5 p.m.)

Month	Day 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	Average
October																																
a.m.	68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
p.m.	67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
November																																
a.m.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	54	50	48	45	42	43	44	42	43	43	45	48	50	48	46	--	--
p.m.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	53	52	49	48	46	44	42	45	44	46	44	46	49	50	47	45	--	--
December																																
a.m.	43	41	38	39	41	45	44	41	40	38	38	38	35	36	35	34	36	33	33	35	33	32	32	32	32	32	35	34	35	34	?4	36
p.m.	44	40	39	40	43	46	43	42	40	38	37	38	34	36	36	35	35	34	34	33	32	32	32	32	32	33	34	36	36	35	34	35
January																																
a.m.	34	35	34	34	34	35	36	36	35	35	35	36	35	37	39	38	39	38	39	37	35	33	33	33	32	32	32	32	32	32	32	35
p.m.	36	36	36	35	36	37	37	37	34	36	37	37	38	39	40	40	40	40	38	37	33	34	34	33	32	32	32	32	32	32	32	36
February																																
a.m.	32	32	32	32	32	32	33	34	34	33	35	36	36	40	42	39	42	46	45	44	43	45	46	48	47	42	39	43	--	--	--	39
p.m.	32	32	32	32	32	33	34	35	35	35	37	37	38	43	43	40	45	48	46	45	44	47	49	50	44	41	42	44	--	--	--	40
March																																
a.m.	44	44	43	47	53	56	55	55	48	44	44	47	49	49	48	48	46	47	47	47	49	48	47	46	45	47	50	56	53	57	59	49
p.m.	43	44	44	53	55	57	56	52	46	45	46	48	52	50	49	48	46	48	47	48	49	48	46	47	46	49	53	54	58	58	58	50
April																																
a.m.	46	45	47	46	50	48	49	48	48	48	47	49	47	48	52	48	45	45	44	47	52	56	55	56	58	56	57	56	53	53	--	50
p.m.	46	46	48	49	49	50	47	50	50	49	50	48	49	51	51	47	44	46	48	49	54	59	47	59	60	59	59	54	55	55	--	51
May																																
a.m.	54	52	55	55	55	57	60	60	57	56	57	61	64	63	65	63	64	58	57	56	56	57	56	57	58	57	55	56	58	58	57	58
p.m.	49	54	56	56	55	59	61	61	57	59	62	63	64	64	66	65	62	60	58	57	58	58	60	59	61	56	57	58	60	60	64	59
June																																
a.m.	61	66	64	59	60	63	63	62	63	63	63	64	64	66	64	63	62	64	64	65	64	63	63	62	62	63	64	67	68	67	--	64
p.m.	65	67	63	63	62	65	64	63	64	65	65	65	67	65	63	64	64	66	67	66	65	66	65	64	64	66	68	69	68	70	--	65
July																																
a.m.	71	73	73	70	71	72	69	70	69	70	69	68	70	69	69	69	71	70	66	65	67	66	65	65	66	65	67	70	70	72	73	69
p.m.	77	75	74	74	74	71	72	69	71	73	71	69	71	69	71	72	73	69	67	66	68	67	67	70	69	69	71	72	72	76	76	71
August																																
a.m.	71	69	71	71	70	71	72	72	73	71	70	72	65	65	65	66	68	73	71	71	68	67	68	68	69	68	68	70	70	73	73	70
p.m.	73	70	73	72	72	73	74	75	74	73	74	73	66	63	68	69	76	75	74	69	70	69	69	70	69	71	71	72	75	76	--	72
September																																
a.m.	72	73	73	73	74	66	66	67	68	68	67	68	69	68	66	62	63	62	64	65	64	66	68	68	69	68	66	63	64	66	--	67
p.m.	--	--	74	76	72	69	70	71	70	70	69	71	71	67	64	63	64	65	65	67	68	70	71	71	67	67	67	66	67	66	--	68

GREEN RIVER BASIN--Continued

3-3211. POND RIVER NEAR SACRAMENTO, KY.

LOCATION.--At bridge on State Highway 85, 12 miles upstream from mouth, 3.0 miles southwest of Sacramento, McLean County, 3.9 miles downstream from Log Creek, and 45.5 miles downstream from gaging station near Apex.
DRAINAGE AREA.--523 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1961.
REMARKS.--Acidity determined to pH 7.0. Samples for iron and manganese filtered clear when collected. Stream receives drainage from strip mine areas. No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Acidity as H^+	Specific conductance (micromhos at 25°C)	pH	Color	Turbidity
Oct. 10, 1960.	7.8	6.4	0.17	7.6	119	58	83	4.6	3	552	104	1.1	0.3	1,010	536	534	0.2	1,340	5.3	1	--
Nov. 19.....	13	12	7.0	8.4	110	44	52	4.4	0	650	30	2.1	.5	984	456	456	5.0	1,380	3.2	0	--
Jan. 3, 1961..	6.2	.5	1.6	2.4	75	19	58	2.0	44	216	81	.2	1.2	507	265	229	.0	831	6.4	3	65
Mar. 3.....	7.0	.3	.52	.76	25	7.1	6.3	2.0	16	87	8.0	.1	.4	165	92	78	.0	245	6.2	30	8
Apr. 13 [a].....	6.8	.0	1.7	1.7	39	14	13	1.5	8	157	10	.2	.4	250	155	149	.0	388	5.9	3	20
May 1.....	5.5	.0	.31	.57	31	9.5	7.8	1.4	29	102	8.5	.1	.2	200	117	92	--	290	6.5	2	2
June 2.....	10	3.2	.28	6.2	83	43	26	2.0	0	422	28	.6	.3	653	384	384	--	843	4.5	1	2
July 7.....	11	6.5	.40	1.7	105	50	38	2.8	0	542	28	.9	.4	840	468	468	.8	1,060	4.5	2	1
Sept. 6.....	4.5	.0	.26	.96	53	14	33	2.9	44	180	34	.2	1.3	354	190	154	.0	544	6.8	10	8

a Additional determinations for this date include dissolved oxygen 7.6 ppm (67 percent saturation), and phenols as C_6H_5OH 0.002 ppm.

GREEN RIVER BASIN--Continued

3-3215. GREEN RIVER AT LOCK AND DAM 1, AT SPOTTSVILLE, KY.

LOCATION.--At lock and dam 1, at Spottsville, Henderson County, 9.1 miles upstream from mouth.
DRAINAGE AREA.--9,181 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1961.
Water temperatures: October 1956 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 424 ppm Dec. 1-13; minimum, 130 ppm Mar. 1-31.
Hardness: Maximum, 196 ppm Dec. 1-13; minimum, 83 ppm Mar. 1-31.
Specific conductance: Maximum daily, 926 micromhos Dec. 13; minimum daily, 154 micromhos May 16.
Water temperatures: Maximum, 82°F Aug. 5, Sept. 9-13; minimum, 33°F Feb. 7.
EXTREMES, 1956-61.--Dissolved solids: Maximum, 572 ppm Nov. 19-30, 1959; minimum, 88 ppm Nov. 21-30, 1957.
Hardness: Maximum, 225 ppm Nov. 3-12, 1959; minimum, 58 ppm Nov. 21-30, 1957.
Specific conductance: Maximum daily, 1,320 micromhos July 28, 1959; minimum daily, 113 micromhos Nov. 25, 1957.
Water temperatures: Maximum, 85°F Aug. 14, 1960; minimum, 33°F Feb. 7, 1961.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^+	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 1-31, 1960.....	10				51	11	58	2.5		139		21	116	0.1	1.6	0.15	371	172	58		657		3		0.1
Nov. 1-30....	6.7				49	10	52	3.2		131		28	98	.2	1.4	.48	331	163	56		593		5		.1
Dec. 1-13....	6.8				57	13	76	2.1		128		52	133	.3	1.1	.14	424	196	90		750		5		.1
Dec. 14-23, 28-31.....	6.4				41	10	35	1.8		104		43	64	.3	1.6	.06	286	143	58		472		9		.1
Jan. 1-31, 1961.....	6.7				38	8.1	20	.9		98		43	32	.2	2.8	.20	218	129	48		357		10		.0
Feb. 1-28....	6.6				34	8.2	16	1.3		90		39	26	.2	2.8	.38	203	119	44		317		8		.0
Mar. 1-31....	6.5				25	5.0	6.8	1.5		67		28	10	.1	2.5	.25	130	83	28		206		35		.0
Apr. 1-30....	7.1				31	5.1	8.9	1.0		84		31	14	.1	2.2	.15	150	98	30		247		7		.0
May 1-31.....	6.3				27	5.6	7.9	1.4		70		34	12	.1	2.0	.15	144	90	33		227		28		.0
June 1-30	7.2				32	6.7	8.5	1.3		85		39	13	.3	2.8	.01	161	108	38		261		7		.0
July 1-31....	8.4				44	6.6	14	1.8		108		45	24	.2	3.2	.10	209	137	48		344		3		.0
Aug. 1-31....	8.5				37	8.1	15	2.0		107		34	24	.2	2.7	.07	185	126	38		324		8		.0
Sept. 1-30...	7.6				47	11	24	2.0		114		62	36	.2	2.5	.32	246	162	68		425		3		.0
Time-weighted average [a]..	7.4				39	8.1	24	1.7		101		37	41	0.2	2.3	0.20	224	129	47		378		10		--

a Represents 99 percent of days.

GREEN RIVER BASIN--Continued

3-3215. GREEN RIVER AT LOCK AND DAM 1, AT SPOTTSVILLE, KY.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement at 8 a.m.)

Month	Day																															Average
	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	
October	74	74	74	74	73	72	75	75	75	75	71	70	71	70	70	70	69	69	69	66	65	65	65	64	63	64	63	63	63	63	63	69
November	63	62	61	60	60	59	56	56	56	56	55	55	56	56	56	--	56	55	55	55	55	55	55	54	54	59	55	55	53	52	--	56
December	52	50	50	49	49	48	47	46	45	45	45	45	44	43	43	41	41	40	39	39	38	37	34	35	35	37	37	37	37	38	40	42
January	38	37	37	37	37	37	38	38	38	38	38	39	39	39	38	39	39	40	39	39	40	39	38	38	38	38	37	35	36	35	35	38
February	35	35	35	35	35	35	33	35	35	35	35	35	37	39	40	40	40	44	40	42	46	47	47	48	47	47	48	48	--	--	--	40
March	47	47	49	49	50	50	52	53	51	53	--	53	53	53	53	53	53	53	53	52	52	51	51	51	50	51	51	52	52	52	51	51
April	51	51	51	52	52	52	51	51	51	50	50	50	50	50	50	50	52	50	50	52	54	54	51	56	57	56	57	60	60	57	--	53
May	60	60	60	60	60	60	60	61	61	61	61	63	63	63	64	64	65	65	65	65	65	65	65	65	63	63	64	65	65	65	65	63
June	65	65	70	68	70	70	70	71	71	72	72	73	70	70	70	68	67	68	68	66	68	66	68	68	68	68	70	70	70	72	--	69
July	73	72	74	74	75	75	75	75	76	76	75	75	75	76	76	76	76	78	78	78	77	77	79	78	77	77	77	78	78	79	80	76
August	80	81	81	81	82	80	80	80	81	80	80	80	80	80	80	80	80	80	81	81	80	79	79	79	79	79	79	80	80	79	80	80
September	80	80	80	80	80	81	81	81	82	82	82	82	82	80	77	77	76	75	75	75	75	77	77	77	77	75	74	74	73	73	--	78

3-3355. WABASH RIVER AT LAFAYETTE, IND.

LOCATION.--Temperature recorder at gaging station, 20 feet downstream from Brown Street Bridge in Lafayette, Tippecanoe County, 5.1 miles downstream from Wildcat Creek, and at mile 311.9.
DRAINAGE AREA.--7,247 square miles.
RECORDS AVAILABLE.--Water temperatures: July 1954 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 80°F July 30 to Aug. 3; minimum, freezing point on Dec. 15-17, Feb. 16-19.
EXTREMES, 1954-61.--Water temperatures: Maximum, 90°F July 30, 31, 1954; minimum, freezing point on many days during winter months.
REMARKS.--Some regulation at low stages caused by powerplants above station.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	66	64	63	63	61	61	61	60	58	58	58	57	58	58	58	57	57	57	55	54	52	50	49	49	49	48	48	48	49	49	49	56
Minimum	64	63	63	61	61	61	60	58	58	58	57	57	57	58	57	57	57	55	54	52	50	49	49	49	48	48	48	48	48	49	49	55
November																																
Maximum	49	49	47	47	46	46	46	45	45	44	43	42	41	43	45	46	46	46	46	45	45	45	45	45	43	43	42	42	42	42	--	45
Minimum	49	47	47	46	46	46	45	45	44	43	42	41	41	41	43	45	46	46	45	45	45	45	45	43	43	42	42	42	42	39	--	44
December																																
Maximum	39	37	35	34	35	37	37	37	36	35	34	34	34	33	33	32	33	33	33	33	33	33	34	34	33	33	33	33	34	34	34	34
Minimum	37	35	34	34	34	35	37	36	35	34	34	34	33	33	32	32	32	33	33	33	33	33	33	33	33	33	33	33	33	33	34	34
January																																
Maximum	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Minimum	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
February																																
Maximum	34	34	34	34	34	34	34	34	33	33	33	33	33	33	33	33	32	32	34	34	34	34	34	35	36	36	36	36	--	--	--	34
Minimum	34	34	34	34	34	34	34	33	33	33	33	33	33	33	33	32	32	32	32	34	34	34	34	34	35	36	36	36	--	--	--	34
March																																
Maximum	36	36	36	37	39	41	42	42	42	42	42	42	42	42	42	42	42	43	43	42	42	42	42	42	43	44	44	45	45	45	45	42
Minimum	36	36	36	36	37	39	41	42	42	41	41	42	42	42	42	42	42	42	42	42	42	42	42	42	42	43	44	44	45	45	45	41
April																																
Maximum	46	46	46	48	47	48	48	49	49	49	49	49	48	48	49	49	49	49	48	48	50	53	54	55	57	59	59	59	59	58	--	51
Minimum	45	46	46	46	47	48	48	48	49	49	48	48	48	48	48	49	49	48	48	48	48	50	53	54	55	57	59	59	58	58	--	50
May																																
Maximum	58	58	56	56	56	56	58	58	58	58	59	60	61	61	62	62	62	62	61	61	61	61	62	62	63	63	60	60	62	63	63	60
Minimum	58	56	56	56	56	56	56	58	58	58	58	59	60	61	61	62	62	61	61	61	61	61	61	62	62	60	59	60	60	62	63	60
June																																
Maximum	65	66	68	68	69	70	70	70	70	70	72	73	74	74	73	71	70	70	70	70	70	69	69	69	69	70	70	72	75	75	--	70
Minimum	63	65	66	68	68	69	70	70	70	70	70	72	73	73	71	70	70	70	70	70	69	69	69	69	69	69	70	70	72	75	--	70
July																																
Maximum	77	77	77	75	74	74	75	75	74	74	76	76	76	76	76	77	77	78	78	78	78	78	78	78	78	78	79	79	79	80	80	77
Minimum	75	77	75	74	73	73	74	74	74	74	74	76	76	76	76	76	77	77	78	78	78	78	78	78	78	78	78	79	79	79	80	76
August																																
Maximum	80	80	80	79	79	78	77	76	76	76	76	77	77	77	77	78	78	78	78	78	78	76	75	74	74	74	75	75	76	76	77	77
Minimum	80	80	79	79	78	77	76	76	76	76	76	76	77	77	77	77	78	78	78	78	76	75	74	74	73	74	74	74	75	76	76	76
September																																
Maximum	77	77	77	77	78	78	78	77	77	77	77	77	77	77	74	71	70	70	70	70	70	71	72	72	72	70	69	68	67	66	--	73
Minimum	77	77	77	77	77	78	77	76	76	77	77	77	77	74	71	70	70	70	70	70	70	70	71	72	70	69	68	67	66	66	--	73

WABASH RIVER BASIN--Continued

3-3369. SALT FORK NEAR ST. JOSEPH, ILL.

LOCATION.--Temperature recorder at gaging station at township highway bridge, 2.5 miles north and 0.7 mile east of St. Joseph, Champaign County.
DRAINAGE AREA.--134 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1958 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 94°F July 30; minimum, freezing point on many days during December to February.
EXTREMES, 1958-61.--Water temperatures: Maximum, 96°F July 30, 1959; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	69	74	65	71	70	76	70	64	73	74	74	75	75	74	68	70	68	64	60	56	53	59	58	57	56	56	55	60	58	59	59	65
Minimum	51	58	54	53	58	59	54	55	58	56	56	58	61	61	65	60	55	57	48	45	46	46	52	46	45	54	52	53	51	54	51	54
November																																
Maximum	54	55	54	50	55	48	49	44	46	45	45	47	55	60	60	59	52	50	50	52	51	50	49	47	51	54	60	59	49	40	--	51
Minimum	49	46	43	48	48	44	40	41	40	40	40	39	44	50	59	51	46	45	42	43	44	45	41	40	42	46	53	49	40	39	--	45
December																																
Maximum	39	39	39	46	50	50	43	39	34	32	32	32	32	32	32	32	32	32	32	33	33	33	33	32	32	32	32	32	32	32	32	35
Minimum	39	39	38	38	45	42	39	34	32	32	32	32	32	32	32	32	32	32	32	32	33	33	32	32	32	32	32	32	32	32	32	34
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	22	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	35	48	44	39	41	44	50	47	36	41	43	47	--	--	--	37
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	35	37	35	36	40	43	36	34	34	37	39	--	--	--	34
March																																
Maximum	45	49	52	57	54	51	49	45	42	44	49	46	43	43	43	44	43	40	39	42	42	42	42	42	50	53	56	50	44	50	47	46
Minimum	39	38	40	50	45	45	42	38	35	36	38	41	41	41	41	39	37	37	38	38	41	41	41	41	40	44	47	43	40	38	42	41
April																																
Maximum	50	50	54	57	54	48	51	53	49	51	53	51	59	59	56	44	45	53	60	57	70	66	57	56	57	55	55	54	53	56	--	54
Minimum	38	38	42	44	47	45	43	43	43	42	46	47	45	49	44	41	40	44	47	50	56	57	54	55	54	52	53	52	50	51	--	47
May																																
Maximum	57	58	59	62	58	63	63	60	58	58	60	62	66	66	65	65	62	63	67	63	68	65	68	70	69	59	69	66	72	74	72	64
Minimum	51	50	51	51	52	52	58	57	53	52	53	56	58	59	58	55	56	56	54	57	57	54	53	56	59	52	50	57	60	56	62	55
June																																
Maximum	79	75	79	80	82	76	70	68	67	69	71	72	72	70	65	66	71	74	75	72	72	72	70	70	76	77	77	81	84	84	--	74
Minimum	67	69	65	61	67	68	67	65	64	63	66	67	69	65	61	57	61	64	65	65	63	65	65	63	63	66	67	69	71	72	--	65
July																																
Maximum	86	80	80	75	79	83	83	77	77	82	80	79	79	80	83	81	83	84	84	86	86	83	78	83	87	88	81	83	91	94	93	83
Minimum	73	74	68	68	71	71	69	65	64	66	68	70	69	70	71	71	69	72	74	74	75	73	73	71	71	70	72	74	74	78	78	71
August																																
Maximum	92	86	92	82	86	83	87	91	90	82	81	87	86	88	88	90	85	92	88	82	82	74	75	75	84	88	90	91	92	90	89	86
Minimum	78	76	73	73	73	71	69	72	73	74	74	69	66	67	68	71	73	72	72	66	61	64	67	68	65	67	70	71	73	70	75	70
September																																
Maximum	87	84	88	90	93	92	88	89	89	89	89	83	84	75	69	73	74	74	75	76	75	80	81	76	70	72	75	70	69	73	--	80
Minimum	75	75	74	74	75	76	70	71	74	75	74	74	74	63	58	58	60	60	60	68	66	68	70	68	60	55	57	55	51	60	--	67

3-3420. WABASH RIVER AT RIVERTON, IND.

LOCATION.--Temperature recorder at gaging station on downstream side of Illinois Central Railroad bridge at Riverton, Sullivan County, 0.6 mile downstream from Turtle Creek, and at mile 162.0.
DRAINAGE AREA.--13,100 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: July 1954 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 84°F Aug. 8-10, 16-22; minimum, freezing point on several days during January and February.
EXTREMES, 1954-61.--Water temperatures: Maximum, 91°F July 20 and Aug. 29, 1954; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	73	71	71	70	69	70	70	69	68	69	69	69	69	69	69	68	68	67	66	63	61	60	59	58	58	58	58	57	57	58	58	65
Minimum	71	71	70	69	69	69	69	68	68	68	69	69	69	69	68	68	67	66	63	61	60	59	58	58	57	57	57	56	56	57	58	64
November																																
Maximum	58	56	55	54	53	52	50	49	49	48	46	46	47	48	50	51	51	51	50	50	50	50	49	48	48	47	46	47	47	46	--	50
Minimum	56	55	54	53	52	50	49	49	48	46	46	45	46	47	48	50	51	50	50	50	50	49	48	48	47	46	46	46	46	44	--	49
December																																
Maximum	44	42	42	41	42	42	42	42	41	40	39	39	39	38	37	37	36	36	35	35	35	35	35	35	34	34	34	34	34	34	34	38
Minimum	42	42	41	41	41	42	42	41	40	39	39	39	38	37	37	36	36	35	35	35	35	35	35	34	34	34	34	34	34	34	34	37
January																																
Maximum	34	34	34	34	35	36	37	37	37	35	35	36	36	36	36	36	37	37	38	38	38	38	37	36	34	34	33	33	33	32	32	35
Minimum	34	34	34	34	34	35	36	37	35	35	34	35	36	36	36	36	36	37	37	38	38	37	36	34	34	33	33	33	32	32	32	35
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	33	34	36	36	37	38	38	38	38	38	38	38	38	39	40	40	40	39	--	--	--	36
Minimum	32	32	32	32	32	32	32	32	32	32	32	33	34	36	36	37	38	38	38	38	38	38	38	38	39	40	39	39	--	--	--	35
March																																
Maximum	39	39	40	40	41	43	44	45	45	45	44	43	44	44	44	44	44	44	44	44	43	43	43	44	44	44	45	46	47	48	48	44
Minimum	39	39	39	40	40	41	43	44	45	44	43	43	43	44	44	44	44	44	44	43	43	43	43	43	44	44	44	45	46	47	48	43
April																																
Maximum	49	49	49	50	50	50	50	51	51	51	52	52	52	53	53	53	53	53	53	52	54	54	56	59	61	62	62	62	62	62	--	54
Minimum	48	49	49	49	50	50	50	50	51	51	51	52	52	52	53	53	53	53	52	52	52	54	54	56	59	61	62	62	62	62	--	53
May																																
Maximum	63	63	63	63	63	63	64	64	64	64	64	65	67	69	70	70	70	70	70	70	69	68	68	67	67	67	67	68	68	68	68	67
Minimum	62	63	63	63	63	63	63	64	64	64	64	64	65	67	69	70	70	70	70	69	68	68	67	67	67	67	67	67	68	68	68	66
June																																
Maximum	69	69	69	70	70	70	72	72	75	75	75	76	76	77	77	77	75	74	74	74	74	73	74	74	74	74	73	73	74	74	--	73
Minimum	68	69	69	69	70	70	70	72	72	75	75	75	75	75	77	75	74	74	74	74	73	73	73	74	74	73	73	73	73	74	--	73
July																																
Maximum	75	76	76	76	76	76	77	77	77	77	77	77	77	78	78	78	78	79	79	79	78	78	78	78	79	80	80	80	80	81	82	78
Minimum	74	75	76	76	76	76	76	77	77	77	77	77	77	77	78	78	78	78	79	78	78	78	78	78	78	79	80	80	80	80	81	78
August																																
Maximum	83	82	82	83	83	83	83	84	84	84	83	83	83	83	83	84	84	84	84	84	84	84	83	82	82	81	81	81	80	80	81	83
Minimum	82	82	82	82	83	83	83	83	84	83	83	83	83	83	83	83	84	84	84	84	84	83	82	82	81	81	81	80	80	80	80	82
September																																
Maximum	81	80	80	80	80	79	79	80	80	79	79	79	79	78	77	76	75	74	73	72	72	71	71	71	71	70	70	69	68	67	--	75
Minimum	80	80	80	80	79	79	79	79	79	79	79	79	78	77	76	75	74	73	72	72	71	71	71	71	70	70	69	68	67	67	--	75

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WABASH RIVER BASIN--Continued

3-3490. WHITE RIVER AT NOBLESVILLE, IND.

LOCATION.--Temperature recorder at gaging station on downstream side of Logan Street Bridge in Noblesville, Hamilton County, 1.5 miles upstream from Cicero Creek, and 3.5 miles downstream from dam at Clare.
DRAINAGE AREA.--837 square miles.
RECORDS AVAILABLE.--Water temperatures: November 1952 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 84°F July 31; minimum, freezing point on Feb. 2-8.
EXTREMES, 1952-61.--Water temperatures: Maximum, 94°F Aug. 1, 1953; minimum, freezing point on many days during winter months.
REMARKS.--Flow regulated by powerplant above station.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	68	66	65	63	64	68	66	63	63	63	62	64	64	64	64	64	64	62	61	58	56	54	53	53	51	52	52	52	52	54	54	60
Minimum	64	63	61	61	60	64	61	62	61	60	60	62	62	61	63	64	60	60	58	56	54	53	52	50	49	50	51	51	51	52	52	58
November																																
Maximum	52	52	50	49	49	49	47	47	49	46	44	42	44	50	53	53	53	53	50	47	49	50	50	47	46	49	48	51	51	46	--	49
Minimum	52	50	48	49	49	47	45	46	46	44	42	40	41	44	50	52	51	50	47	46	46	49	47	45	43	46	47	48	46	43	--	47
December																																
Maximum	43	41	39	40	44	49	47	45	40	39	38	34	34	34	35	36	34	34	33	33	34	34	34	33	33	33	33	35	36	34	33	37
Minimum	41	39	38	38	40	44	44	40	37	38	33	33	34	34	34	34	34	33	33	33	33	34	33	33	33	33	33	33	34	33	33	35
January																																
Maximum	33	33	36	36	36	37	36	35	34	36	37	37	35	35	35	38	39	38	38	37	36	34	33	33	34	36	37	34	34	33	33	35
Minimum	33	33	33	35	33	36	34	34	33	33	35	35	33	34	35	35	38	36	36	36	34	33	33	33	33	34	34	34	33	33	33	34
February																																
Maximum	33	33	32	32	32	32	32	33	33	35	36	35	37	37	38	40	41	45	45	44	43	44	48	47	46	40	39	41	--	--	--	38
Minimum	33	32	32	32	32	32	32	32	33	33	35	33	34	34	35	37	40	41	43	41	40	42	44	46	40	38	38	39	--	--	--	37
March																																
Maximum	42	42	45	48	49	51	51	49	46	43	44	44	46	46	45	44	44	43	42	42	45	45	45	45	45	48	52	52	50	49	49	46
Minimum	41	41	42	45	48	49	49	46	43	42	42	44	44	45	44	43	43	42	42	41	42	45	45	44	44	45	48	50	48	47	48	45
April																																
Maximum	48	46	47	50	50	48	47	49	47	45	44	44	47	47	48	48	43	42	46	50	54	55	56	58	58	58	57	56	53	53	--	50
Minimum	46	45	44	46	48	46	45	45	44	43	42	44	44	47	47	43	41	41	42	46	50	54	53	56	58	56	56	53	51	52	--	48
May																																
Maximum	55	55	56	60	57	58	60	60	58	55	58	62	64	67	68	67	65	63	63	62	61	62	63	65	62	63	61	63	66	67	65	62
Minimum	53	53	53	54	55	54	58	58	55	54	55	58	62	64	66	64	63	61	60	60	59	59	59	61	62	58	57	58	61	61	62	59
June																																
Maximum	70	73	74	74	74	74	73	73	71	68	71	74	76	75	70	66	67	69	71	70	69	70	70	70	70	71	73	75	77	79	--	72
Minimum	63	68	70	69	69	71	71	71	68	67	68	71	73	70	65	63	64	66	68	66	65	66	68	66	66	66	67	69	71	73	--	68
July																																
Maximum	81	78	78	75	74	76	77	76	76	76	78	75	76	75	75	77	81	81	80	77	78	78	79	78	78	80	80	78	79	80	84	78
Minimum	75	76	74	72	71	71	72	72	71	71	72	73	73	73	73	73	73	76	76	74	75	75	77	77	76	75	75	76	76	77	78	74
August																																
Maximum	82	79	77	76	75	76	76	76	78	76	76	75	74	75	77	78	78	78	78	76	72	72	71	72	73	75	77	79	81	81	81	76
Minimum	78	75	74	74	73	72	71	72	73	75	74	74	73	72	73	73	74	74	75	72	69	68	69	70	70	70	72	73	76	75	75	73
September																																
Maximum	80	80	80	80	82	80	79	79	79	80	82	82	82	79	70	69	68	68	68	70	70	72	74	74	73	68	65	64	63	65	--	74
Minimum	78	76	78	78	77	78	76	75	76	76	76	78	78	70	67	65	64	63	64	67	66	69	70	71	68	64	63	62	60	61	--	70

3-3655. EAST FORK WHITE RIVER AT SEYMOUR, IND.

LOCATION.--Temperature recorder at gaging station, 1,700 feet downstream from highway bridge, 1 mile north of Seymour, Jackson County, 9.6 miles downstream from Sand Creek, and at mile 219.2.
DRAINAGE AREA.--2,333 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1954 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 81°F July 31, Aug. 1; minimum, freezing point on several days during February.
EXTREMES, 1954-61.--Water temperatures: Maximum, 84°F Aug. 2-7, 1955; minimum, freezing point on many days during winter months.
REMARKS.--Maximum temperature known but not published, 90°F July 19, 1954. Regulation at low flow by pumping plant 1,200 feet upstream from recorder.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	66	66	65	64	64	64	64	62	63	65	65	65	65	66	66	67	64	62	61	58	56	55	55	55	53	53	54	54	54	56	55	61
Minimum	65	64	63	62	63	63	62	62	62	63	63	63	63	64	64	64	62	60	58	56	54	53	54	53	52	52	53	53	53	54	54	59
November																																
Maximum	54	54	53	52	53	51	48	47	46	46	45	45	46	49	51	54	53	50	49	48	47	47	48	47	47	47	49	52	52	46	--	49
Minimum	53	52	51	50	51	48	47	46	46	45	44	44	44	46	49	51	50	49	48	47	47	47	47	46	46	47	47	49	46	43	--	48
December																																
Maximum	43	40	39	40	42	43	43	43	40	38	37	37	35	34	34	34	34	34	34	35	34	35	34	34	33	33	33	33	33	33	33	36
Minimum	40	39	39	39	40	42	43	40	38	36	37	35	34	33	33	34	33	33	33	34	33	34	34	33	33	33	33	33	33	33	33	35
January																																
Maximum	34	35	36	36	36	37	39	39	38	36	36	36	37	38	38	38	37	37	37	36	35	33	33	33	33	33	33	33	33	33	33	36
Minimum	33	34	35	35	35	36	37	38	36	36	35	36	36	37	38	37	36	36	36	35	33	33	33	33	33	33	33	33	33	33	33	35
February																																
Maximum	33	33	33	33	33	33	32	32	32	32	34	37	38	38	38	39	40	44	44	44	43	44	47	49	49	41	38	38	--	--	--	38
Minimum	33	33	33	33	33	32	32	32	32	32	32	34	37	37	36	38	39	40	44	43	42	43	44	47	41	38	38	38	--	--	--	37
March																																
Maximum	40	42	44	47	51	55	55	53	48	44	45	46	50	50	48	46	45	45	44	45	46	47	47	46	47	49	52	54	54	52	51	48
Minimum	38	40	42	44	47	51	53	48	44	42	43	45	46	48	46	45	44	44	44	44	45	46	46	46	45	47	49	52	52	51	49	46
April																																
Maximum	50	49	50	51	52	51	50	50	50	48	48	48	47	48	49	49	45	44	47	51	52	54	57	61	62	62	61	60	57	56	--	52
Minimum	49	48	48	48	50	49	48	47	48	47	46	47	46	46	48	45	43	43	43	47	51	52	54	57	61	61	59	57	56	54	--	50
May																																
Maximum	56	57	58	58	58	58	61	61	60	60	60	63	66	67	67	67	66	63	62	62	61	61	62	63	65	64	61	62	65	66	65	62
Minimum	55	56	56	57	56	56	58	60	58	57	57	60	62	65	67	66	63	61	60	61	60	60	60	60	61	60	58	59	61	62	63	60
June																																
Maximum	67	67	71	72	71	71	70	71	71	72	73	76	76	76	74	69	66	68	69	70	69	69	70	70	71	71	71	72	74	75	--	71
Minimum	64	67	67	68	69	70	69	70	71	69	72	73	75	74	69	66	65	65	67	68	67	66	67	68	68	69	69	70	71	73	--	69
July																																
Maximum	76	76	76	76	75	75	75	75	74	73	74	74	72	72	71	73	75	76	76	75	75	78	79	79	79	79	79	79	78	79	81	76
Minimum	74	76	75	74	74	75	74	74	72	72	72	71	70	71	70	71	73	74	75	75	74	75	77	77	77	77	78	78	77	77	79	74
August																																
Maximum	81	80	80	79	77	76	76	76	77	77	75	76	76	76	76	77	77	77	77	77	72	72	72	72	72	74	75	76	76	77	79	76
Minimum	80	79	77	77	75	75	74	74	76	75	75	75	75	74	74	76	76	76	76	72	70	71	71	72	72	72	74	75	76	76	77	75
September																																
Maximum	79	78	79	80	79	79	78	78	78	79	80	80	79	78	73	68	68	68	68	70	70	72	74	75	74	70	68	66	66	66	--	74
Minimum	78	77	77	78	79	78	78	78	78	78	78	79	78	73	68	67	67	66	66	67	68	69	72	73	70	67	66	66	64	64	--	72

WABASH RIVER BASIN--Continued

3-3788. WABASH RIVER NEAR NEW HAVEN, ILL.

LOCATION.--At bridge connecting Illinois State Highway 141 and Indiana State Highway 762, 5.2 miles northeast of New Haven, Gallatin County, 2.1 miles upstream from Mackeys Ferry, and 9.2 miles upstream from Little Wabash River.
DRAINAGE AREA.--29,500 square miles (approximately).
RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1961.
Water temperatures: October 1956 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 480 ppm Jan. 1-24; minimum, 199 ppm May 12-31.
Hardness: Maximum, 331 ppm Jan. 1-24; minimum, 16 ppm May 11.
Specific conductance: Maximum daily, 809 micromhos Jan. 22; minimum daily, 40 micromhos May 11.
Water temperatures: Maximum, 86°F Aug. 3, Sept. 7; minimum, freezing point on several days during December to February.
EXTREMES, 1956-61.--Dissolved solids: Maximum, 480 ppm Jan. 1-24, 1961; minimum, 176 ppm Dec. 21-31, 1957.
Hardness: Maximum, 331 ppm Jan. 1-24, 1961; minimum, 16 ppm May 11, 1961.
Specific conductance: Maximum daily, 809 micromhos Jan. 22, 1961; minimum daily, 40 micromhos May 11, 1961.
Water temperatures: Maximum, 94°F Sept. 6, 1960; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 1-31, 1960.....	5.2		--		68	25	22	2.4		254		68	28	0.3	2.0	0.40	350	273	64		604		5		0.1
Nov. 1-30....	5.1		--		76	26	26	2.1		268		80	32	.3	3.1	.43	387	297	77		654		4		.2
Dec. 1-31....	6.5		--		80	24	30	2.0		260		90	38	.3	3.7	.42	417	298	85		686		3		.1
Jan. 1-24, 1961.....	5.0		--		83	30	37	2.0		282		100	45	.2	5.6	.80	480	331	100		753		5		.2
Feb. 1-28....	6.4		--		73	24	29	2.3		244		83	40	.2	6.5	.80	382	281	80		655		6		.1
Mar. 1-31....	7.9		--		46	13	10	2.5		142		51	16	.1	9.0	.30	218	169	52		380		16		.1
Apr. 1-30....	7.8		--		57	17	11	1.9		182		59	16	.2	8.4	.50	262	212	63		450		9		.1
May 1-9.....	6.9		--		46	11	4.7	1.7		144		38	9.0	.1	7.8	.35	204	160	42		340		10		.0
May 10.....	6.9		a3.3	a0.00	40	10	7.4	5.7		148		32	8.0	--	.8	1.8	--	141	20		336		--		--
May 11.....	4.3		a.96		3.7	.0	1.3	3.1		18		5.2	2.0	--	3.1	--	--	16	2		40		--		--
May 12-31....	7.2		--		42	10	6.7	1.9		138		36	9.0	.1	4.0	.50	199	146	33		322		35		.0
June 1-30....	7.7		--		63	19	11	1.8		202		63	16	.2	6.7	.22	305	235	70		487		11		.0
July 1-31....	6.5		--		66	19	14	2.1		220		69	20	.2	2.8	.30	322	243	62		524		10		.1
Aug. 1-31....	9.8		--		59	18	14	2.6		200		55	18	.1	4.4	.48	279	221	57		472		10		.0
Sept. 1-30...	5.2		--		68	23	17	2.5		244		70	22	.3	2.0	.35	328	264	64		565		6		.0
Time-weighted average b..	6.7		--		65	20	19	2.2		218		68	24	0.2	4.9	0.45	325	246	67		541		9		--

a In solution when analyzed.
b Represents 98 percent of days.

WABASH RIVER BASIN--Continued

3-3788. WABASH RIVER NEAR NEW HAVEN, ILL.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	73	71	70	71	71	69	70	79	79	69	70	69	69	69	69	69	69	69	59	60	59	59	58	59	58	60	59	59	59	55	54	66
November	59	58	56	55	51	52	50	49	50	50	48	49	51	50	58	57	60	59	54	53	51	50	49	49	58	59	55	42	40	44	--	52
December	41	45	44	49	50	47	45	46	47	42	43	39	38	37	37	35	36	35	35	34	35	34	34	34	34	33	34	33	34	32	32	38
January	33	33	33	34	33	35	38	37	39	40	39	38	38	40	40	40	40	40	41	39	39	38	33	34	--	--	--	--	--	--	--	--
February	33	32	32	33	32	34	34	34	33	37	36	38	39	40	41	44	43	44	44	46	47	45	44	48	47	47	45	44	--	--	--	40
March	42	41	48	47	47	50	55	43	47	54	54	53	54	58	50	52	49	50	49	49	48	47	48	48	50	56	53	53	52	53	51	50
April	54	54	50	54	54	49	51	51	48	49	49	48	51	53	49	48	49	51	59	53	51	69	61	63	65	64	71	69	63	64	--	55
May	59	64	61	64	58	63	64	62	61	62	69	69	69	68	65	61	68	69	70	69	70	69	69	68	67	66	67	69	73	81	72	67
June	74	77	75	74	75	75	76	77	79	79	78	78	79	73	72	72	74	74	73	73	72	74	75	74	74	72	77	78	78	79	--	75
July	82	83	81	81	80	79	81	81	79	78	79	72	79	79	79	78	80	81	81	80	83	81	82	82	83	83	83	82	83	84	84	81
August	85	85	86	85	85	85	84	85	85	83	84	83	81	80	80	81	82	82	82	80	77	78	78	78	79	80	80	81	82	81	80	82
September	81	81	83	83	82	79	86	85	76	82	83	84	84	74	71	72	73	72	73	74	76	75	77	79	74	74	73	72	65	70	--	77

TRADEWATER RIVER BASIN

3-3830. TRADEWATER RIVER AT OLNEY, KY.

LOCATION.--At gaging station at highway bridge at Olney, Hopkins County, 1.1 miles upstream from Cave Creek, 5.1 miles downstream from Flynn Creek, and 9.5 miles northeast of Princeton.
DRAINAGE AREA.--255 square miles, of which about 9 square miles is noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to August 1950, October 1951 to September 1961.
Water temperatures: October 1951 to September 1961.
Sediment records: October 1952 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 1,180 ppm Dec. 13; minimum, 68 ppm Feb. 23-25.
Hardness: Maximum, 720 ppm Dec. 13; minimum, 40 ppm June 16-18.
Specific conductance: Maximum daily, 1,310 micromhos Dec. 13; minimum daily, 78 micromhos June 16.
Water temperatures: Maximum, 81°F July 31 to Aug. 2; minimum, freezing point on many days during December to February.
Sediment concentrations: Maximum daily, 293 ppm June 15; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 950 tons May 8; minimum daily, 0 tons on many days.
EXTREMES, 1951-61.--Dissolved solids: Maximum, 1,700 ppm Nov. 22-24, 1958; minimum, 54 ppm Sept. 21-30, 1954.
Hardness: Maximum, 1,000 ppm Nov. 22-24, 1958; minimum, 31 ppm Sept. 21-30, 1954.
Specific conductance: Maximum daily, 2,040 micromhos Nov. 23, 1958; minimum daily, 51 micromhos Mar. 23, 1952.
Water temperatures: Maximum, 87°F July 26, 29, 1952; minimum, freezing point on many days during winter months.
Sediment concentrations (1952-61): Maximum daily, 764 ppm June 5, 1954; minimum daily, no flow on many days during 1952-57, 1960.
Sediment loads (1952-61): Maximum daily, 2,220 tons Jan. 22, 1959; minimum daily, 0 tons on many days during 1952-57, 1960.
REMARKS.--Records of specific conductance of daily samples available in district office at Columbus, Ohio. Flow affected by ice Dec. 22-27, Jan. 24 to Feb. 5. Additional samples were collected to further define the quality of water at this station.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 1-31, 1960.....	0.1	--	--	--	--	--	--	--	--	--	--	--	361	245	--	523	6.1	--
Nov. 1-30.....	2.0	--	--	--	--	--	--	--	--	--	--	--	343	238	--	515	6.5	--
Dec. 1-12.....	27.8	--	--	--	--	--	--	--	--	--	--	--	370	248	--	545	6.9	--
Dec. 13.....	279	--	--	--	--	--	--	--	--	--	--	--	1,180	720	--	1,310	4.3	--
Dec. 14-21.....	57.5	--	--	--	--	--	--	--	--	--	--	--	339	215	--	493	4.8	--
Dec. 26-31.....	38.2	--	--	--	--	--	--	--	--	--	--	--	534	326	--	702	4.5	--
Jan. 1-3, 1961.....	126	--	--	--	--	--	--	--	--	--	--	--	672	404	--	836	4.5	--
Jan. 4-15.....	95.4	--	--	--	--	--	--	--	--	--	--	--	365	227	--	511	4.8	--
Jan. 16-27.....	170	--	--	--	--	--	--	--	--	--	--	--	273	134	--	406	5.5	--
Feb. 1-8.....	148	--	--	--	--	--	--	--	--	--	--	--	359	234	--	514	5.3	--
Feb. 9-19.....	600	--	--	--	--	--	--	--	--	--	--	--	200	119	--	298	5.9	--
Feb. 20-22.....	1,146	--	--	--	--	--	--	--	--	--	--	--	136	91	--	230	6.2	--
Feb. 23-25.....	2,140	--	--	--	--	--	--	--	--	--	--	--	68	44	--	112	6.8	--
Feb. 26-Mar. 5.....	1,775	--	--	--	--	--	--	--	--	--	--	--	126	88	--	212	6.1	--
Mar. 6-10.....	2,430	--	--	--	--	--	--	--	--	--	--	--	84	54	--	135	6.4	--
Mar. 11-16.....	1,665	--	--	--	--	--	--	--	--	--	--	--	130	90	--	215	6.5	--
Mar. 17-23.....	550	--	--	--	--	--	--	--	--	--	--	--	179	134	--	313	6.5	--
Mar. 24-31.....	425	--	--	--	--	--	--	--	--	--	--	--	224	132	--	305	6.4	--

Apr. 2-12, 1961.....	527	--	--	--	--	--	--	--	--	--	--	--	--	186	120	--	286	6.9	--
Apr. 13-20.....	1,530	--	--	--	--	--	--	--	--	--	--	--	--	109	69	--	177	7.0	--
Apr. 21-May 2.....	829	--	--	--	--	--	--	--	--	--	--	--	--	156	104	--	245	6.9	--
May 3-7.....	981	--	--	--	--	--	--	--	--	--	--	--	--	116	74	--	184	6.5	--
May 8-11.....	3,148	6.5	0.07	11	4.2	2.0	1.0	14	37	1.5	0.2	0.5		82	44	33	117	7.3	17
May. 12-19.....	1,101	--	--	--	--	--	--	--	--	--	--	--	--	215	134	--	312	6.3	--
May 20-25.....	297	--	--	--	--	--	--	--	--	--	--	--	--	241	148	--	342	6.1	--
May 26-June 10.....	70.8	--	--	--	--	--	--	--	--	--	--	--	--	453	280	--	600	4.9	--
June 11-15.....	391	--	--	--	--	--	--	--	--	--	--	--	--	241	143	--	336	5.4	--
June 16-18.....	1,617	--	--	--	--	--	--	--	--	--	--	--	--	83	40	--	109	5.8	--
June 19-22.....	1,092	--	--	--	--	--	--	--	--	--	--	--	--	172	104	--	255	5.6	--
June 23-July 13.....	35.8	12	a.04	46	36	8.1	1.5	2	266	3.8	.3	.5		426	263	262	567	4.8	2
July 14-16.....	178	--	--	--	--	--	--	--	--	--	--	--	--	274	174	--	392	6.0	--
July 17-19.....	185	--	--	--	--	--	--	--	--	--	--	--	--	741	420	--	902	3.9	--
July 20-23.....	237	--	--	--	--	--	--	--	--	--	--	--	--	182	114	--	277	6.3	--
July 24-Aug. 5.....	33.5	--	--	--	--	--	--	--	--	--	--	--	--	244	160	--	358	6.6	--
Aug. 6-9.....	35.0	--	--	--	--	--	--	--	--	--	--	--	--	605	399	--	775	5.2	--
Aug. 10-13.....	8.9	--	--	--	--	--	--	--	--	--	--	--	--	688	441	--	858	4.7	--
Aug. 14-17.....	10.8	--	--	--	--	--	--	--	--	--	--	--	--	359	234	--	501	5.9	--
Aug. 18-28.....	14.0	--	--	--	--	--	--	--	--	--	--	--	--	207	148	--	323	6.5	--
Aug. 29-31.....	14.0	--	--	--	--	--	--	--	--	--	--	--	--	383	261	--	537	6.4	--
Sept. 1-9.....	8.6	--	--	--	--	--	--	--	--	--	--	--	--	507	344	--	668	6.0	--
Sept. 10-12.....	16.0	--	--	--	--	--	--	--	--	--	--	--	--	796	542	--	976	5.7	--
Sept. 13-30.....	2.8	--	--	--	--	--	--	--	--	--	--	--	--	609	424	--	784	6.0	--
Weighted average..	b382	--	--	--	--	--	--	--	--	--	--	--	--	157	99	--	237	5.8	--
Time-weighted average.....	--	--	--	--	--	--	--	--	--	--	--	--	--	325	212	--	456	5.3	--
Tons per day.....	--	--	--	--	--	--	--	--	--	--	--	--	--	164	--	--	--	--	--

a In solution when analyzed.
b Mean discharge based on 365 days; mean discharge for 356 days of chemical analyses, 389 cfs.

Analyses of additional samples.

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Turbidity
															Calcium, magnesium	Noncarbonate					
Dec. 21, 1960.	8.9	--	0.22	6.7	42	33	7.0	2.6	0	245	9.0	0.3	0.2	365	241	241	--	528	4.5	1	3
Feb. 22, 1961.	7.6	--	.56	1.7	19	8.5	4.3	.6	10	81	2.5	.1	.8	152	82	74	--	209	6.2	32	15
May 17.....	11	0.1	.42	4.2	35	23	5.2	1.2	6	185	3.0	.2	.3	301	182	177	0.1	405	6.1	3	2
Sept. 13.....	5.7	.1	.14	10	44	48	6.4	3.1	11	296	4.0	.2	.6	451	308	299	.0	621	6.1	3	--

TRADEWATER RIVER BASIN--Continued

3-3830. TRADEWATER RIVER AT OLNEY, KY.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Twice-daily measurements at approximately 8 a.m. and 5 p.m.)

Month	Day																															Average
	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	
October																																
a.m.	66	66	65	65	65	65	64	64	65	64	64	63	62	63	64	64	61	60	61	57	54	53	55	53	52	54	54	52	52	54	51	60
p.m.	67	67	66	66	66	66	66	66	66	66	65	65	64	65	64	65	62	62	60	58	57	55	56	55	55	55	54	54	54	56	55	61
November																																
a.m.	53	52	50	49	50	48	46	46	47	45	41	41	43	45	48	49	46	47	45	44	44	45	45	44	43	44	46	49	46	44	--	46
p.m.	54	53	52	51	50	49	48	48	47	45	44	45	46	47	50	49	49	48	47	46	45	45	46	45	45	46	49	49	47	44	--	48
December																																
a.m.	40	38	38	39	41	43	42	40	37	36	39	37	36	33	35	35	34	32	33	34	32	--	--	--	--	36	34	33	33	32	32	36
p.m.	41	39	40	42	42	43	42	40	--	38	40	38	36	35	34	37	35	33	34	34	32	--	--	--	--	34	34	34	33	33	32	37
January																																
a.m.	32	33	32	32	32	33	35	37	33	33	33	33	33	36	38	39	38	38	40	36	34	32	32	32	32	32	32	--	--	--	--	34
p.m.	32	33	33	33	33	36	37	38	36	34	34	36	36	36	39	39	40	40	39	37	33	32	32	32	32	32	32	--	--	--	--	35
February																																
a.m.	33	32	32	32	32	32	32	33	32	32	33	33	41	43	44	45	48	50	49	46	46	46	48	50	46	41	44	45	--	--	--	40
p.m.	34	32	32	32	32	32	32	33	33	33	35	34	46	46	47	48	50	53	51	48	45	47	51	50	45	46	47	44	--	--	--	41
March																																
a.m.	44	43	46	49	52	55	56	56	49	48	49	51	52	51	51	49	48	49	49	48	49	49	48	47	46	48	51	54	53	53	54	50
p.m.	45	46	47	51	54	57	57	53	51	51	52	52	53	52	51	50	49	50	50	49	50	49	48	48	48	50	54	56	54	54	53	51
April																																
a.m.	--	46	48	48	49	48	48	48	49	47	47	50	48	50	54	49	47	47	49	49	57	57	59	61	65	63	59	59	58	58	--	52
p.m.	--	49	48	49	49	50	50	50	49	49	50	49	51	53	53	51	47	49	53	56	58	59	61	64	66	64	62	60	62	60	--	54
May																																
a.m.	59	57	57	57	57	57	61	60	62	60	61	62	64	67	67	65	63	64	63	62	62	63	61	61	61	62	59	58	61	62	63	61
p.m.	59	58	58	58	57	60	62	64	63	62	63	65	67	68	67	66	64	64	64	63	64	64	63	63	64	63	61	61	63	64	66	63
June																																
a.m.	66	68	71	71	72	72	72	73	72	72	71	71	72	73	67	64	65	66	67	68	66	65	66	66	63	68	68	68	69	70	--	69
p.m.	69	71	72	73	73	73	74	73	73	73	72	75	75	73	67	65	67	68	69	68	67	67	68	68	65	70	70	72	72	73	--	70
July																																
a.m.	72	73	74	74	74	74	74	74	73	72	72	71	69	69	72	71	72	73	74	73	73	75	76	77	76	77	76	77	76	78	78	74
p.m.	75	75	76	76	76	76	76	76	75	74	73	72	70	72	72	73	74	76	73	74	76	77	77	78	78	78	78	78	79	80	81	76
August																																
a.m.	78	79	79	78	77	75	74	75	75	76	76	78	75	74	74	74	75	74	74	73	71	70	69	71	71	72	71	71	72	73	73	74
p.m.	81	81	80	79	77	76	77	77	77	77	78	78	77	76	76	76	76	75	76	73	73	71	71	71	72	73	72	73	74	74	74	76
September																																
a.m.	73	75	75	76	76	76	76	75	75	75	75	75	76	74	74	67	66	65	64	65	65	67	67	68	69	65	64	64	63	64	--	70
p.m.	75	76	77	78	78	78	78	76	76	77	76	77	76	75	76	68	67	66	66	67	67	69	69	70	68	66	65	64	65	67	--	72

TRADEWATER RIVER BASIN--Continued

3-3830. TRADEWATER RIVER AT OLNEY, KY.--Continued

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	.2	27	T	0	--	0	12	10 B	0.3
2..	.2	12	T	0	--	0	15	10 B	.4
3..	.2	16	T	0	--	0	14	11 B	.4
4..	.2	13	T	0	--	0	10	12 B	.3
5..	.2	19	M	0	--	0	8.0	11	.2
6..	.2	23	T	0	--	0	7.5	10 B	.2
7..	.2	8	T	0	--	0	7.0	10 B	.2
8..	.2	16	T	0	--	0	8.5	9 B	.2
9..	.2	15	M	.1	5	M	20	8 B	.4
10..	.1	7	T	.2	5	M	23	8 B	.5
11..	.1	6	T	.2	6	M	54	11 K	2
12..	0	--	0	.1	8	M	155	21	8.8
13..	0	--	0	0	--	0	279	22	16
14..	0	--	0	0	--	0	156	20 B	8
15..	0	--	0	0	--	0	90	20 B	5
16..	0	--	0	.6	10	M	62	19 B	3
17..	0	--	0	.6	11	M	47	18 B	2
18..	0	--	0	.8	12	M	36	18 B	2
19..	0	--	0	1.0	13	M	27	17	1.2
20..	0	--	0	1.4	14 B	.1	23	16 B	1
21..	0	--	0	1.6	17	.1	19	15 B	.8
22..	0	--	0	1.8	15 B	.1	16	13 B	.6
23..	0	--	0	2.7	13 B	.1	15	12 B	.5
24..	0	--	0	2.9	12 B	.1	14	12 B	.4
25..	0	--	0	3.3	12 B	.1	13	11 B	.4
26..	0	--	0	3.8	11 B	.1	13	10 B	.4
27..	0	--	0	5.6	10 B	.2	15	10 B	.4
28..	0	--	0	10	9	.2	22	10 B	.6
29..	0	--	0	13	9 B	.3	31	12 B	1
30..	0	--	0	10	10 B	.3	52	13 B	2
31..	0	--	0	--	--	--	96	18 B	5
Total	2.0	--	0.1	59.9	--	1.8	1360.0	--	64.2

Day	JANUARY			FEBRUARY			MARCH		
1..	134	17 B	6	30	5 B	0.4	1800	28	136
2..	128	11	3.8	35	4 B	.4	1590	37	159
3..	116	9 B	3	40	3 B	.3	1470	17	67
4..	110	7 B	2	50	5 B	.7	1330	28	100
5..	113	6 B	2	75	4 B	.8	1370	74	274
6..	122	7	2.3	86	3 B	.7	1480	88	352
7..	136	9 B	3	113	8 K	3	2060	82	456
8..	128	12 B	4	758	40 K	90	2740	60	444
9..	109	13	3.8	1130	95 A	290	3040	52	427
10..	88	11 B	3	1090	146	430	2830	25	191
11..	73	9 B	2	967	90	235	2410	12	78
12..	62	7 B	1	678	43	79	1780	11	53
13..	54	5 B	.7	466	16	20	1600	24	104
14..	50	5 B	.7	314	15	13	1620	47	206
15..	100	8 K	2	206	8	4.4	1470	24	95
16..	284	18	14	161	20	8.7	1110	17	51
17..	371	13	13	140	17 B	6	746	9	18
18..	287	11 B	8	353	60 S	85	507	9	12
19..	185	10 B	5	1090	195	574	346	12	11
20..	178	10 B	5	1010	168	458	253	9 B	6
21..	188	13 B	7	947	78	199	330	17 S	16
22..	156	17 B	7	1480	81	324	688	41	76
23..	119	19	6.1	1820	122	600	983	56	149
24..	90	17 B	4	2180	72	424	921	38	94
25..	75	15 B	3	2420	48	314	709	25	48
26..	60	15 B	2	2450	25	165	505	18	24
27..	50	14 B	2	2230	17	102	356	12	12
28..	45	12 B	1	1960	15	79	277	9 B	7
29..	40	10 B	1	--	--	--	230	8 B	5
30..	35	8 B	.8	--	--	--	199	7 B	4
31..	30	7 B	.6	--	--	--	203	5 B	3
Total	3716	--	118.8	24279	--	4506.4	36953	--	3678

S Computed by subdividing day.
T Less than 0.05 ton.
A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.
K Computed from estimated-concentration graph and subdividing day.
M Less than 0.05 ton, computed from estimated-concentration graph.

TRADEWATER RIVER BASIN--Continued

3-3830. TRADEWATER RIVER AT OLNEY, KY.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	APRIL				MAY				JUNE			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	757	57	S	137	333	13	S	13	61	9	B	2
2..	962	57		148	894	60		145	54	7	B	1
3..	842	39		89	995	48		129	48	6	B	.8
4..	669	33		60	990	35	B	95	40	6	B	.6
5..	514	23		32	715	20	B	40	36	8	B	.8
6..	388	16	B	17	776	25	B	50	33	6	B	.5
7..	308	12	B	10	1430	--		650	30	6	B	.5
8..	240	10	B	6	2150	--		950	31	5	B	.4
9..	224	8	B	5	3320	--		360	40	3	B	.3
10..	378	10		10	3770	--		170	177	29	S	23
11..	428	10		12	3350	--		65	442	110		131
12..	840	44	S	119	2830	--		40	239	13		8.4
13..	1440	87		338	2220	--		35	114	5	B	2
14..	1330	47		169	1490	--		20	100	5	B	1
15..	1450	26		102	734	--		8	1060	293	S	929
16..	1630	32		141	474	--		4	1500	148		599
17..	1850	37		185	213	6		3.4	1560	84		354
18..	1780	17		82	226	26	S	18	1790	48		232
19..	1600	7		30	622	121		203	1860	26		130
20..	1160	9		28	656	158		280	1400	19		72
21..	899	5		12	399	63		68	682	15		28
22..	1020	12		33	228	30	B	18	424	4		4.6
23..	1150	37		115	185	20	B	10	142	4	B	2
24..	1080	28		82	168	14	B	6	91	4	B	1
25..	872	14		33	144	12	B	5	70	5	B	.9
26..	934	20		50	125	11	B	4	55	6		.9
27..	986	46		122	114	9	B	3	44	5	B	.6
28..	839	23		52	103	15	B	4	34	8		.7
29..	575	8		12	90	14		3.4	28	9	B	.7
30..	364	3		2.9	80	11	B	2	22	8	B	.5
31..	--	--		--	71	8	B	2	--	--		--
Total	27509	--		2233.9	29895	--		3400.8	12207	--		2528.2

	JULY				AUGUST				SEPTEMBER			
1..	18	8	B	0.4	15	9	B	0.4	6.7	8	B	0.1
2..	16	9	B	.4	12	10		.3	5.5	7	B	.1
3..	14	12		.4	12	9	B	.3	5.2	6	B	.1
4..	12	8	B	.2	18	10	B	.5	4.9	5		.1
5..	11	8	B	.2	113	22		6.7	4.3	5	B	.1
6..	11	8	B	.2	70	20	B	4	6.0	7	B	.1
7..	10	7	B	.2	34	15		1.4	13	30	B	1
8..	9.5	5	B	.1	21	13	B	.7	18	38		1.8
9..	9.0	4	B	.1	15	11	B	.4	14	25	B	.9
10..	9.0	2		T	12	10	B	.3	14	13	B	.5
11..	11	4	B	.1	9.0	8	B	.2	19	7		.4
12..	31	12	S	1.7	7.5	8	B	.2	15	6	B	.2
13..	104	73		20	7.0	7	B	.1	12	5	B	.2
14..	71	35	B	7	7.0	6		.1	9.0	5	B	.1
15..	148	14	S	6.6	10	6	B	.2	6.4	5	B	.1
16..	316	50		43	14	5	B	.2	4.9	6	B	.1
17..	191	5		2.6	12	5	B	.2	3.8	6	B	.1
18..	114	4	B	1	8.5	4	B	.1	3.3	4		T
19..	249	231	S	215	17	8	B	.4	2.7	5		M
20..	286	192		148	26	11	B	.8	2.2	7		M
21..	323	120	B	100	13	6		.2	1.8	6		M
22..	237	45	B	30	7.0	5	B	.1	1.4	5		M
23..	103	12	B	3	10	5	B	.1	1.0	5		M
24..	66	7		1.2	10	4	B	.1	.8	5		M
25..	47	7	B	.9	7.0	4	B	.1	.6	4		T
26..	35	7	B	.7	5.5	3		M	.4	4		M
27..	26	6	B	.4	12	5	B	.2	.2	4		M
28..	24	5	B	.3	38	4		.4	.2	4		M
29..	24	5	B	.3	21	6	B	.3	.1	5		M
30..	25	7	B	.5	13	7	B	.2	.2	5		M
31..	18	8	B	.4	9.0	8	B	.2	--	--		--
Total	2568.5	--		585.0	585.5	--		19.4	176.6	--		6.2

Total discharge for year (cfs-days)..... 139311.5
Total load for year (tons)..... 17142.0

S Computed by subdividing day.
T Less than 0.05 ton.
B Computed from estimated-concentration graph.
M Less than 0.05 ton, computed from estimated-concentration graph.

TRADEWATER RIVER BASIN--Continued

3-3830. TRADEWATER RIVER AT OLNEY, KY.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Feb. 20, 1961.....	0730			1040	180		65	76	84	91	96	97	100					SBWC
Feb. 23.....	0755			1760	145		76	86	89	93	99	99	100					SBWC
June 15.....	0905			691	690		57	72	83	95	99	99	100					SBWC
June 15.....	0905			691	690		40	57	81	95	98	99	100					SBN
July 19.....	1720			368	538		64	78	91	98	99	99	100					SBWC

OHIO RIVER MAIN STEM

3-3845. OHIO RIVER AT LOCK AND DAM 51, AT GOLCONDA, ILL.

LOCATION.--About 950 feet upstream from dam and gaging station at lock and dam 51, at Golconda, Pope County, 0.5 mile upstream from McGilligan Creek, 0.7 mile downstream from Lusk Creek, and at mile 903.1.
DRAINAGE AREA.--143,900 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1954 to September 1961.
Water temperatures: October 1954 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 353 ppm Nov. 1-30, Dec. 1-31; minimum, 174 ppm May 1-31.
Hardness: Maximum, 206 ppm Nov. 1-30; minimum, 112 ppm May 1-31.
Specific conductance: Maximum, 647 micromhos Dec. 10; minimum daily, 178 micromhos May 8.
Water temperatures: Maximum, 86°F Aug. 5; minimum, freezing point Feb. 5, 6.
EXTREMES, 1954-61.--Dissolved solids: Maximum, 356 ppm Sept. 21-30, 1959; minimum, 132 ppm Feb. 1-10, 1957.
Hardness: Maximum, 228 ppm Oct. 21-31, 1957; minimum, 88 ppm Feb. 1-10, 1957.
Specific conductance: Maximum daily, 722 micromhos Nov. 6, 1959; minimum daily, 129 micromhos Feb. 19, 1958.
Water temperatures: Maximum, 89°F July 31 to Aug. 3, Aug. 5, 1955; minimum, freezing point on several days during winter months in 1955, 1958, 1959, and 1961.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. Records of discharge not computed when navigation dam 51 is partly or entirely in raised position; discharge less than 100,000 cfs on days for which no discharge is shown.

Chemical analyses, in parts per million, water year October 1961 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 1-31, 1960.....	--	4.5				53	14	27	2.8	122		86	36	0.4	2.7	0.35	295	190	90		503		5		0.1
Nov. 1-30....	--	4.6				58	15	36	2.6	108		116	48	.3	3.8	.08	353	206	118		580		6		.1
Dec. 1-31....	--	2.9				56	15	36	3.3	110		103	55	.4	4.2	.22	353	201	111		576		6		.1
Jan. 1-27, 1961.....	107,000	6.1				46	11	25	1.6	92		86	36	.3	5.5	.30	279	160	84		457		6		.1
Feb. 1-28....	146,000	6.0				36	10	18	2.0	76		62	28	.2	4.4	.30	215	131	69		351		5		.2
Mar. 1-31....	561,500	6.3				33	8.8	8.8	2.0	78		52	13	.2	5.4	.30	174	119	54		286		17		.0
Apr. 1-30....	377,300	6.4				37	9.7	9.3	1.7	90		55	17	.2	5.8	.30	188	133	58		310		6		.0
May 1-31.....	555,000	6.4				30	9.0	6.3	1.7	86		41	8.5	.2	3.8	.25	164	112	42		256		28		.0
June 1-30....	193,000	7.0				41	12	11	1.6	108		64	15	.2	4.2	.23	226	152	63		354		4		.1
July 1-31....	--	4.3				42	12	13	2.0	108		66	18	.2	3.1	.16	225	155	66		366		5		.0
Aug. 1-31....	--	7.0				41	10	15	2.6	94		66	20	.2	3.5	.20	219	143	66		364		8		.0
Sept. 1-30...	--	2.8				46	14	18	2.6	123		75	23	.3	2.6	.19	246	173	72		424		5		.0
Time-weighted average....	--	5.3				43	12	19	2.2	100		73	26	0.3	4.1	0.24	245	156	74		402		9		--

OHIO RIVER MAIN STEM

3-3845. OHIO RIVER AT LOCK AND DAM 51, AT GOLCONDA, ILL.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day 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	Average
October	72	75	73	74	73	74	73	73	73	70	70	70	70	70	70	70	70	68	70	66	65	65	65	66	64	64	60	60	60	61	61	68
November	58	--	54	58	57	55	53	54	54	50	48	48	49	50	51	54	52	56	55	54	53	54	53	54	53	54	54	53	52	50	--	53
December	50	46	47	47	47	48	48	45	43	43	42	41	42	41	40	43	41	37	36	38	35	--	36	36	34	35	35	35	35	36	36	41
January	35	35	35	34	35	36	37	--	34	36	35	36	38	38	36	38	38	--	--	37	35	35	35	35	34	34	34	--	--	--	--	--
February	--	--	35	34	32	32	33	33	34	34	--	35	35	35	36	38	--	--	42	42	42	--	--	46	46	45	45	44	--	--	--	--
March	44	45	45	55	--	--	50	51	49	47	47	49	50	51	50	50	--	--	50	50	50	49	48	47	46	49	49	50	50	50	50	49
April	51	48	49	50	51	50	50	50	50	49	50	50	50	48	50	49	47	46	48	49	51	51	51	54	57	55	56	56	57	58	--	51
May	58	56	57	58	59	60	60	60	58	59	59	65	65	63	66	65	65	65	66	65	64	65	65	64	65	65	64	64	65	65	65	62
June	63	68	69	69	69	69	72	74	69	68	74	74	74	76	77	73	73	72	73	73	74	74	74	70	69	70	70	70	71	70	--	71
July	76	78	71	71	79	80	78	80	78	77	78	76	78	78	78	78	79	79	79	79	79	79	79	80	78	80	80	82	81	81	81	78
August	84	84	84	84	86	82	83	83	82	82	82	84	80	84	84	83	83	82	82	80	78	80	78	76	76	76	79	74	79	79	79	81
September	82	81	79	79	79	80	79	82	81	80	80	84	83	84	78	77	76	76	78	76	75	75	75	76	76	75	75	76	75	76	--	78

CUMBERLAND RIVER BASIN

3-4035. CUMBERLAND RIVER AT BARBOURVILLE, KY.

LOCATION.--At gaging station at bridge on State Highway 11, at Barbourville, Knox County, 0.4 mile upstream from Richland Creek.
DRAINAGE AREA.--960 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to August 1950.
Water temperatures: October 1949 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 82°F Sept. 6; minimum, not determined.
EXTREMES, 1949-61.--Water temperatures: Maximum, 91°F June 28, 1952; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Twice-daily measurements at approximately 8 a.m. and 5 p.m.)

Month	Day																															Average
	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	
October																																
a.m.....	69	70	70	68	67	68	69	68	68	69	68	62	66	65	66	66	66	65	65	57	55	56	56	55	54	52	51	52	51	52	53	62
p.m.....	71	72	73	70	69	71	70	71	71	71	72	68	68	69	69	67	71	67	59	60	59	60	58	56	55	53	53	53	54	55	56	64
November																																
a.m.....	54	54	51	50	50	50	45	45	43	46	45	44	46	45	45	45	45	46	45	45	45	47	46	45	47	45	48	47	45	--	--	47
p.m.....	57	53	55	53	53	51	47	47	45	50	49	45	50	48	48	49	49	47	47	49	48	49	47	49	49	53	49	48	46	--	--	49
December																																
a.m.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
p.m.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January																																
a.m.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
p.m.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
February																																
a.m.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	49	48	47	47	45	52	47	47	43	45	47	--	--	--	--
p.m.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	51	50	49	49	48	47	57	55	45	46	52	49	--	--	--	--
March																																
a.m.....	44	43	42	45	44	44	45	44	43	44	45	44	44	46	45	43	41	42	45	44	44	43	42	44	45	46	47	47	47	48	47	44
p.m.....	50	49	49	49	47	49	50	49	48	50	50	47	46	49	47	45	44	45	48	47	46	46	45	47	48	49	50	51	52	51	48	48
April																																
a.m.....	43	46	45	45	44	43	44	45	45	44	43	44	43	42	43	43	42	43	45	45	44	45	45	45	48	49	53	54	53	53	--	46
p.m.....	46	49	47	48	46	46	48	49	48	47	46	47	46	46	47	46	45	46	48	48	47	47	49	49	51	57	61	61	58	60	--	49
May																																
a.m.....	55	53	54	53	54	55	54	56	55	54	54	55	54	57	56	57	58	59	58	57	64	63	63	64	61	55	54	56	60	62	70	57
p.m.....	59	55	57	60	59	60	58	59	58	57	56	58	59	61	60	62	64	61	60	61	66	67	66	67	64	60	60	65	64	67	73	61
June																																
a.m.....	67	70	71	75	73	69	70	71	70	69	68	69	68	65	64	67	68	67	69	70	68	69	70	68	69	70	71	72	73	74	--	69
p.m.....	73	74	76	77	76	73	74	73	75	74	72	71	70	67	66	70	71	72	73	73	72	72	72	71	72	73	73	75	76	77	--	73
July																																
a.m.....	71	70	71	72	71	71	72	70	73	73	72	73	70	69	70	70	71	72	71	71	70	70	74	73	72	73	72	74	73	74	73	72
p.m.....	75	73	74	75	76	74	75	72	76	75	77	76	73	73	72	74	75	76	74	75	73	74	76	77	74	76	75	76	75	77	76	75
August																																
a.m.....	74	72	73	70	71	74	73	73	72	74	73	72	71	71	70	70	70	72	70	74	75	73	74	75	75	74	73	74	73	74	75	73
p.m.....	77	75	76	73	75	76	76	75	75	76	75	76	75	74	70	72	70	70	68	78	79	77	79	80	81	79	79	81	76	77	80	76
September																																
a.m.....	76	75	74	75	74	75	74	73	74	74	73	74	73	70	69	68	69	68	69	71	73	69	75	69	70	70	69	68	69	69	--	72
p.m.....	81	79	79	80	81	82	79	78	79	79	78	77	76	72	70	71	72	71	72	73	76	78	77	74	73	73	72	71	72	72	--	72

3-4040. CUMBERLAND RIVER AT WILLIAMSBURG, KY.

LOCATION.--At gaging station at bridge on State Highway 92 at Williamsburg, Whitley County, and 2.1 miles downstream from Clear Fork.
DRAINAGE AREA.--1,607 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1951 to September 1961.
Water temperatures: October 1951 to September 1961.
Sediment records: October 1953 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 210 ppm Sept. 2-30; minimum, 70 ppm Feb. 23 to Mar. 3, Mar. 9-12.
Hardness: Maximum, 94 ppm Sept. 2-30; minimum, 29 ppm Feb. 23 to Mar. 3.
Specific conductance: Maximum daily, 406 micromhos Sept. 29, 30; minimum daily, 82 micromhos Feb. 26.
Water temperatures: Maximum, 89°F Sept. 6, 8, 11; minimum, 33°F Jan. 25 to Feb. 2, 4-6.
Sediment concentrations: Maximum daily, 904 ppm Feb. 23; minimum daily, 1 ppm Sept. 24, 25.
Sediment loads: Maximum daily, 48,100 tons Feb. 24; minimum daily, less than 0.5 ton Sept. 22, 24, 25, 29.
EXTREMES, 1951-61.--Dissolved solids: Maximum, 409 ppm Dec. 9-14, 1953; minimum, 55 ppm Jan. 1-2, 1955.
Hardness: Maximum, 126 ppm Dec. 9-14, 1953; minimum, 26 ppm Jan. 26 to Feb. 5, 1957.
Specific conductance: Maximum daily, 754 micromhos Dec. 11, 1953; minimum daily, 60 micromhos Mar. 24, 25, 1952.
Water temperatures: Maximum, 91°F on several days during June and July 1952; minimum, freezing point Jan. 9, 1958, Mar. 13, 1960.
Sediment concentrations (1953-61): Maximum daily, 1,590 ppm Jan. 23, 1959; minimum daily, 1 ppm on many days during 1953-59, 1961.
Sediment loads (1953-61): Maximum daily, 113,000 tons Jan. 23, 1959; minimum daily, less than 0.5 ton on many days during 1953-59, 1961.
REMARKS.--Records of specific conductance of daily samples available in district office at Columhus, Ohio. Flow affected by ice Dec. 22-24, Jan. 27 to Feb. 1.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-21, 1960.....	530	6.5	a0.04	17	9.6	24	2.5	73	60	8.0	0.2	0.6	154	82	22	268	7.0	5
Oct. 22-Nov. 1.....	782	--	--	--	--	--	--	--	--	--	--	--	120	84	--	209	--	--
Dec. 15-21.....	1,653	--	--	--	--	--	--	--	--	--	--	--	71	37	--	126	--	--
Dec. 22-29.....	1,352	--	--	--	--	--	--	--	--	--	--	--	98	46	--	160	--	--
Dec. 30-31.....	8,850	--	--	--	--	--	--	--	--	--	--	--	82	36	--	120	--	--
Jan. 1-4, 1961.....	11,810	--	--	--	--	--	--	--	--	--	--	--	71	31	--	102	--	--
Jan. 5-16.....	2,237	--	--	--	--	--	--	--	--	--	--	--	100	46	--	154	--	--
Jan. 17-25.....	5,507	--	--	--	--	--	--	--	--	--	--	--	94	38	--	122	--	--
Jan. 26-Feb. 9.....	1,788	--	--	--	--	--	--	--	--	--	--	--	114	50	--	169	--	--
Feb. 10-15.....	4,290	--	--	--	--	--	--	--	--	--	--	--	81	34	--	114	--	--
Feb. 16-22.....	2,536	--	--	--	--	--	--	--	--	--	--	--	102	46	--	152	--	--
Feb. 23-Mar. 3.....	18,570	--	--	--	--	--	--	--	--	--	--	--	70	29	--	91	--	--
Mar. 4-8.....	6,222	--	--	--	--	--	--	--	--	--	--	--	90	45	--	143	--	--
Mar. 9-12.....	13,810	--	--	--	--	--	--	--	--	--	--	--	70	32	--	101	--	--
Mar. 13-Apr. 1.....	4,182	--	--	--	--	--	--	--	--	--	--	--	91	47	--	148	--	--
Apr. 2-6.....	8,152	--	--	--	--	--	--	--	--	--	--	--	74	35	--	110	--	--
Apr. 7-11.....	4,732	--	--	--	--	--	--	--	--	--	--	--	94	47	--	146	--	--
Apr. 12-20.....	10,270	--	--	--	--	--	--	--	--	--	--	--	72	33	--	102	--	--

a In solution when analyzed.

CUMBERLAND RIVER BASIN--Continued

3-4040. CUMBERLAND RIVER AT WILLIAMSBURG, KY.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Apr. 21-May 1, 1961.	2,809	--	--	--	--	--	--	--	--	--	--	--	106	51	--	167	--	--
May 2-6.....	9,546	--	--	--	--	--	--	--	--	--	--	--	74	35	--	105	--	--
May 7-20.....	2,845	--	--	--	--	--	--	--	--	--	--	--	94	48	--	151	--	--
May 21-31.....	850	--	--	--	--	--	--	--	--	--	--	--	139	63	--	224	--	--
June 1-16.....	772	--	--	--	--	--	--	--	--	--	--	--	181	79	--	289	--	--
June 17-29.....	1,405	--	--	--	--	--	--	--	--	--	--	--	110	50	--	169	--	--
June 30-July 16.....	372	--	--	--	--	--	--	--	--	--	--	--	192	68	--	247	--	--
July 17-28.....	1,669	--	--	--	--	--	--	--	--	--	--	--	119	51	--	174	--	--
July 29-Aug. 13.....	655	--	--	--	--	--	--	--	--	--	--	--	136	62	--	215	--	--
Aug. 14-Sept. 1.....	275	--	--	--	--	--	--	--	--	--	--	--	164	66	--	251	--	--
Sept. 2-30.....	107	1.7	a0.02	21	10	42	3.1	114	68	11	0.2	0.2	210	94	0	362	7.3	10
Weighted average..	b 2,740	--	--	--	--	--	--	--	--	--	--	--	89	41	--	131	--	--
Time-weighted average.....	--	--	--	--	--	--	--	--	--	--	--	--	126	58	--	198	--	--

a In solution when analyzed.
b Mean discharge based on 365 days; mean discharge for 322 days of chemical analyses, 2,954 cfs.

CUMBERLAND RIVER BASIN--Continued

3-4040. CUMBERLAND RIVER AT WILLIAMSBURG, KY.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Twice-daily measurements at approximately 7 a.m. and 5:30 p.m.)

Month	Day 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	Average
October																																
a.m.	68	67	69	68	67	68	68	68	68	68	67	65	66	65	66	65	65	64	63	61	53	55	55	54	52	52	54	53	52	56	56	62
p.m.	72	72	73	72	72	72	71	73	73	71	72	71	70	71	70	70	70	69	66	64	59	59	59	57	55	55	58	56	56	60	60	66
November																																
a.m.	53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
p.m.	56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December																																
a.m.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	36	35	35	34	--	--	--	--	--	--	--	--	--	--	--	--	--	--
p.m.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	40	39	36	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January																																
a.m.	40	42	41	40	40	40	38	40	36	37	35	34	34	37	39	40	42	42	42	35	34	35	34	34	33	33	33	33	33	33	33	37
p.m.	42	42	42	41	41	40	40	39	36	37	36	35	39	38	41	42	42	44	44	43	42	40	39	39	38	36	35	34	34	34	34	39
February																																
a.m.	33	33	34	33	33	33	35	36	37	35	37	42	42	46	46	46	47	48	48	47	48	48	50	49	51	47	46	47	--	--	--	42
p.m.	36	37	38	34	34	35	35	36	36	36	38	40	40	42	44	45	47	48	49	50	50	52	53	52	53	49	49	49	--	--	--	43
March																																
a.m.	49	47	46	48	51	54	55	55	50	48	44	45	50	50	48	47	45	48	50	50	53	51	51	50	48	49	51	54	52	53	53	50
p.m.	50	51	49	50	52	56	58	57	56	51	50	50	53	54	50	50	49	49	51	52	54	54	52	52	51	50	53	55	56	56	57	53
April																																
a.m.	52	48	48	47	47	48	46	47	50	51	47	48	49	47	49	50	49	48	45	47	53	54	57	59	62	62	62	61	58	58	--	52
p.m.	54	52	52	51	52	52	50	51	53	52	51	51	52	51	52	53	53	52	50	52	56	56	62	61	64	65	66	66	65	65	--	55
May																																
a.m.	57	54	52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	65	65	63	63	64	66	61	60	63	65	64	--
p.m.	64	62	60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	69	70	68	67	67	68	67	66	66	67	68	--
June																																
a.m.	68	70	70	72	73	72	74	75	75	74	75	76	76	75	74	69	68	66	67	69	68	66	67	66	66	68	68	69	71	72	--	71
p.m.	70	73	74	76	76	75	75	77	78	78	77	78	78	78	77	76	76	72	72	73	74	72	72	71	70	72	71	74	76	76	--	75
July																																
a.m.	74	76	77	75	76	77	77	76	75	73	73	74	74	75	75	75	72	72	73	74	75	76	77	77	77	78	77	77	77	78	78	75
p.m.	77	77	79	78	78	79	79	78	78	79	78	78	79	79	78	78	76	76	76	78	78	77	80	81	80	83	81	80	80	81	80	79
August																																
a.m.	78	80	80	78	78	78	78	78	76	76	77	78	77	76	76	75	76	74	75	76	73	72	72	74	74	74	76	76	77	78	79	76
p.m.	81	83	82	80	80	81	81	80	79	79	82	81	84	79	80	81	81	80	81	72	80	73	78	78	79	79	80	83	82	84	86	80
September																																
a.m.	80	80	80	81	80	80	81	80	80	80	80	79	79	78	72	67	65	66	68	71	69	70	72	76	74	71	69	67	68	68	--	74
p.m.	88	87	87	88	88	89	88	89	88	88	89	87	88	84	78	74	73	76	74	74	78	79	78	79	76	82	71	71	71	72	--	81

CUMBERLAND RIVER BASIN--Continued

3-4040. CUMBERLAND RIVER AT WILLIAMSBURG, KY.--Continued

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER Mean discharge (cfs)	OCTOBER Suspended sediment Mean concentration (ppm)	OCTOBER Suspended sediment Tons per day	NOVEMBER Mean discharge (cfs)	NOVEMBER Suspended sediment Mean concentration (ppm)	NOVEMBER Suspended sediment Tons per day	DECEMBER Mean discharge (cfs)	DECEMBER Suspended sediment Mean concentration (ppm)	DECEMBER Suspended sediment Tons per day
1..	702	20	38	640	18	31	2360	--	340
2..	525	12	17	762	25	51	2070	--	270
3..	382	13	13	726	16 B	30	1600	--	170
4..	342	12	11	675	12 B	20	1280	--	110
5..	354	20	19	615	10 B	17	1090	29	85
6..	372	29	29	580	8 B	12	958	25 B	65
7..	368	25	25	590	8 B	13	864	20 B	45
8..	500	33	44	570	5	8	786	20 B	40
9..	570	63	97	525	--	7	714	18 B	35
10..	690	67	125	575	--	14	640	15 B	25
11..	792	--	120	888	--	65	906	25 K	75
12..	702	--	85	1500	--	250	3340	203 S	2020
13..	635	--	60	1600	--	220	5120	230 B	3200
14..	515	--	35	1350	30	109	3970	150	1610
15..	413	--	17	1090	20 B	60	2770	90 B	650
16..	372	--	8	918	25 B	60	2240	60 B	360
17..	334	8	7	840	20 B	50	1810	40 B	200
18..	310	--	6	762	17 B	35	1430	25 B	100
19..	310	--	6	685	14 B	25	1180	17 B	55
20..	614	--	110	615	15 B	25	1050	12	34
21..	1340	--	550	550	20	30	1090	--	30
22..	1630	--	850	515	20 B	30	1280	--	35
23..	1260	145	493	410	28	38	1260	--	60
24..	944	96	245	555	--	35	1240	--	60
25..	744	--	120	665	--	25	1450	--	80
26..	615	--	60	690	--	20	1470	22	87
27..	550	--	40	660	--	12	1390	20 B	80
28..	535	--	25	660	8	14	1210	20 B	65
29..	590	--	20	708	--	15	1520	60 K	290
30..	565	--	18	1570	--	130	6200	492 S	9510
31..	525	--	16	--	--	--	11500	565	17500
Total	19100	--	3309	23589	--	1451	65788	--	37286

Day	JANUARY Mean discharge (cfs)	JANUARY Suspended sediment Mean concentration (ppm)	JANUARY Suspended sediment Tons per day	FEBRUARY Mean discharge (cfs)	FEBRUARY Suspended sediment Mean concentration (ppm)	FEBRUARY Suspended sediment Tons per day	MARCH Mean discharge (cfs)	MARCH Suspended sediment Mean concentration (ppm)	MARCH Suspended sediment Tons per day
1..	13100	361	12800	1400	--	110	20300	255	14000
2..	14900	398	16000	1320	--	95	17100	228	10500
3..	12300	275	9130	1340	--	100	12100	125	4080
4..	6930	118	2210	1480	--	100	6560	113	2000
5..	4050	75	820	1390	--	90	4430	89	1060
6..	2940	53	421	1350	--	80	3740	78	788
7..	2390	41	264	1500	--	80	5180	272	3800
8..	2030	30 B	150	2300	--	140	11200	422	12800
9..	1740	25 B	110	6000	262	4240	19000	565	29000
10..	1490	20 B	80	7590	338	6930	17300	510	23800
11..	1290	16 B	55	5590	134	2020	12200	141 S	5000
12..	1180	15 B	50	4060	66	723	6740	91	1660
13..	1080	14 B	40	3170	33	282	4760	101	1300
14..	1080	11 B	30	2730	18 B	130	4900	92	1220
15..	1860	30 K	160	2600	14 B	100	5620	93	1410
16..	5710	198 S	3560	2460	15 B	100	5850	101	1600
17..	9480	450	11500	2150	17 B	100	6310	90	1530
18..	7580	108	2210	1920	14 B	70	6000	70	1130
19..	5390	109	1590	1960	12 B	65	5260	52	738
20..	5460	100	1470	1960	12 B	65	4300	34	395
21..	6300	44	748	2270	30 B	180	3720	34	341
22..	5610	53	803	5030	260 K	4300	3510	39	370
23..	3910	45	475	15600	904	38100	3300	32	285
24..	3230	82	715	20700	860	48100	3200	25 B	220
25..	2600	--	400	19800	816	43600	3220	25 B	220
26..	2090	--	250	21500	502	29100	3250	25 B	220
27..	1800	--	220	20000	839	45300	3160	25 B	210
28..	1400	--	160	20000	378	20400	2980	20 B	160
29..	1150	--	110	--	--	--	2840	20 B	150
30..	1100	--	95	--	--	--	2660	18 B	130
31..	1200	--	95	--	--	--	2470	19 B	130
Total	132370	--	66721	179170	--	244700	213160	--	120247

S Computed by subdividing day.
B Computed from estimated-concentration graph.
K Computed from estimated-concentration graph and subdividing day.

CUMBERLAND RIVER BASIN--Continued

3-4040. CUMBERLAND RIVER AT WILLIAMSBURG, KY.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	APRIL Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)		Suspended sediment Tons per day	MAY Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)		Suspended sediment Tons per day	JUNE Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)		Suspended sediment Tons per day
1..	6320	450	K	10000	4310	--		3900	480	10	B	13
2..	13500	861		31400	12800	547		18900	435	10	B	12
3..	11800	226		7200	14600	263		10400	400	10	B	11
4..	7000	77		1460	10700	110		3180	386	9	B	9
5..	4720	41		522	5880	52		826	400	8	B	9
6..	3740	28		283	3750	38		385	381	8	B	8
7..	3330	24		216	3000	--		240	420	8	B	9
8..	2910	25	B	200	2490	--		190	450	10	B	12
9..	2790	30	B	230	2340	--		130	450	--		17
10..	5340	119	S	1890	3170	29		248	630	--		30
11..	9290	140		3510	3730	40	B	420	834	--		50
12..	8090	102		2230	3900	53		558	774	--		40
13..	7490	168		3400	3950	54		576	612	--		25
14..	11200	358		10800	3910	61		644	984	--		90
15..	10900	201		5920	3260	57		502	1550	--		320
16..	12500	417		14100	2700	40	B	290	3170	--		1600
17..	16200	348		15200	2220	35	B	210	2940	--		800
18..	13200	257		9160	1880	30	B	150	1900	--		340
19..	7880	86		1830	1740	25	B	120	1230	--		170
20..	4950	77		1030	1540	25	B	100	918	--		90
21..	3690	60		598	1320	25	B	90	1310	--		240
22..	3050	--		330	1160	20	B	60	2420	--		550
23..	2670	--		220	1040	20	B	55	2020	--		230
24..	2410	--		180	948	19	B	50	1460	--		120
25..	2190	--		150	846	18	B	40	1150	--		60
26..	2270	--		140	780	15	B	30	918	--		30
27..	2860	--		190	744	13	B	25	774	--		25
28..	2740	--		160	726	11	B	20	660	--		25
29..	2490	--		100	666	10	B	18	564	--		20
30..	2220	--		95	594	10	B	16	505	--		15
31..	--	--		--	530	10	B	14	--	--		--
Total	189740	--		122744	101224	--		42387	31125	--		4970
	JULY				AUGUST				SEPTEMBER			
1..	425			11	690	--		85	178	3	B	1
2..	363			10	774	45	B	95	160	3	B	1
3..	325			9	738	--		95	136	5		2
4..	301			8	960	--		200	128	5	B	2
5..	297			8	744	--		120	115	5	B	2
6..	285			6	546	--		60	110	5	B	1
7..	262			6	510	--		45	110	5	B	1
8..	237			4	525	--		40	100	5	B	1
9..	226			4	490	--		30	95	5	B	1
10..	269			9	546	--		30	120	5		2
11..	240			6	576	--		35	128	5	B	2
12..	212			4	582	--		30	115	4	B	1
13..	198			3	455	--		20	105	4	B	1
14..	244			4	363	21		20	92	4	B	1
15..	354			19	313	20	B	17	82	4	B	1
16..	1580			850	262	18	B	13	74	5	B	1
17..	3800			4700	251	19	B	13	88	5		1
18..	4130			4900	234	17	B	11	139	5	B	2
19..	2600	270	B	1900	223	10	B	6	130	5	B	2
20..	1750			550	285	5		4	110	4	B	1
21..	1210			250	281	5	B	4	92	3	B	1
22..	960			120	297	6	B	5	85	2		M
23..	900			75	363	8	B	8	100	2	B	1
24..	970			60	297	10	B	8	105	1		M
25..	894			35	313	8	B	7	102	1		T
26..	960			35	340	7	B	6	108	2	B	1
27..	936			65	281	4		3	98	2	B	1
28..	918			95	251	3	B	2	85	3	B	1
29..	840			40	258	3	B	2	80	2		M
30..	770			50	237	3	B	2	102	2	B	1
31..	738			50	202	3	B	2	--	--		--
Total	28194	--		14000	13187	--		1018	3272	--		34

Total discharge for year (cfs-days).....999919
Total load for year (tons).....658867

S Computed by subdividing day.
T Less than 0.50 ton.
B Computed from estimated-concentration graph.
K Computed from estimated-concentration graph and subdividing day.
M Less than 0.50 ton computed from estimated-concentration graph.

CUMBERLAND RIVER BASIN--Continued

3-4040. CUMBERLAND RIVER AT WILLIAMSBURG, KY.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment											Method of analysis
							Percent finer than size indicated, in millimeters											
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Dec. 31, 1960.....	0730			11400	648		39	52	70	88	95	97	100	--				SBWC
Feb. 25, 1961.....	1230			19800	922		40	55	71	88	96	98	99	100				SBWC
Feb. 25.....	1230			19800	922		19	33	55	79	93	94	98	100				SBN
Apr. 2.....	0730			13600	1010		41	54	71	88	96	98	100	--				SBWC

3-4071. CANE BRANCH NEAR PARKERS LAKE, KY.

LOCATION.--At gaging station, 2,100 feet upstream from confluence with West Fork, 2.5 miles northeast of Parkers Lake, and 2.6 miles east of Greenwood, McCreary County.
DRAINAGE AREA.--0.67 square mile.
RECORDS AVAILABLE.--Chemical analyses: January 1956 to September 1961.
Water temperatures: January to September 1956, unpublished; October 1956 to September 1961.
Sediment records: January 1956 to September 1961.
EXTREMES, 1960-61.--Sediment concentrations: Maximum daily, 2,530 ppm July 14; minimum daily, 2 ppm on several days during October, November, August and September.
Sediment loads: Maximum daily, 121 tons Mar. 6; minimum daily, less than 0.005 ton on many days.
EXTREMES, 1956-61.--Sediment concentrations: Maximum daily, 18,000 ppm Oct. 28, 1958; minimum daily, 1 ppm on several days during 1956 and 1957.
Sediment loads: Maximum daily, 520 tons Apr. 24, 1958; minimum daily, less than 0.005 ton on many days.
REMARKS.--Acidity (potential free) determined to pH 7.0. Flow affected by ice Dec. 22, 23, Jan. 25-31.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Discharge (cfs)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Acidity as H^+	Specific conductance (micromhos at 25°C)	pH
Oct. 4, 1960..	0.1	22	17	12					0	359				552	310	--	4.2	965	3.0
Oct. 11.....	.1	--	--	--					0	252				377	--	--	2.0	698	3.2
Oct. 18.....	.1	--	--	--					0	274				402	--	--	2.6	797	3.0
Oct. 25.....	.1	--	--	--					0	244				345	--	--	2.0	718	3.0
Nov. 1.....	.1	7.5	9.6	2.3					0	204				282	136	136	2.0	608	3.2
Nov. 8.....	.1	--	--	--					0	231				340	--	--	1.9	682	3.0
Nov. 15.....	.1	--	--	--					0	222				343	--	--	1.8	645	3.1
Nov. 22.....	.1	--	--	--					0	215				322	--	--	1.9	629	3.2
Nov. 29.....	2.2	5.0	5.8	4.9					0	106				176	68	68	1.1	350	3.4
Dec. 6.....	.2	4.4	11	12					0	186				267	--	--	1.6	557	3.2
Dec. 13.....	.3	--	--	--					0	139				196	--	--	1.2	413	3.4
Dec. 27.....	.3	--	--	--					0	162				223	--	--	1.4	465	3.4
Jan. 3, 1961..	1.2	2.8	a1.2	2.7					0	91				12,	65	65	.8	288	3.7
Jan. 10.....	.3	--	--	--					0	216				320	--	--	2.4	664	3.0
Jan. 17.....	.8	--	--	--					0	108				161	--	--	1.4	337	3.5
Jan. 24.....	.7	--	--	--					0	113				160	--	--	1.2	311	3.6
Jan. 31.....	.2	--	--	--					0	165				255	--	--	1.8	460	3.4
Feb. 7.....	.6	3.1	6.3	6.1					0	117				156	84	--	.4	355	3.2
Feb. 14.....	.8	--	--	--					0	114				156	--	--	.9	340	3.5
Feb. 21.....	.8	--	--	--					0	153				227	--	--	1.4	439	3.4
Feb. 28.....	14.9	--	--	--					0	84				131	--	--	1.0	281	3.6
Mar. 7.....	5.2	2.0	2.9	2.6					0	61				83	43	43	.6	188	3.9
Mar. 21.....	9.9	--	--	--					0	106				152	--	--	1.6	315	3.6
Mar. 28.....	1.4	--	--	--					0	123				174	--	--	1.2	360	3.5

a In solution when analyzed.

CUMBERLAND RIVER BASIN--Continued

3-4071. CANE BRANCH NEAR PARKERS LAKE, KY.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Discharge (cfs)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH
Apr. 4, 1961..	1.7	2.6	6.2	3.8					0	94				132	72	--	0.7	284	3.7
Apr. 11.....	2.8	--	--	--					0	69				90	--	--	.5	211	3.8
Apr. 18.....	1.8	--	--	--					0	91				142	--	--	.4	268	3.9
Apr. 25.....	.6	--	--	--					0	167				239	--	--	1.0	472	3.4
May 2.....	5.4	1.1	2.6	1.9					0	47				72	36	--	.4	145	4.0
May 9.....	1.1	--	--	--					0	116				199	--	--	.8	351	3.6
May 16.....	.4	--	--	--					0	164				256	--	--	1.0	487	3.4
May 23.....	.2	--	--	--					0	238				363	--	--	1.4	654	3.2
May 30.....	.2	--	--	--					0	267				417	--	--	1.5	740	3.3
June 6.....	.2	6.0	14	12					0	281				408	360	360	1.9	778	3.2
June 13.....	1.6	--	--	--					0	265				407	--	--	2.3	717	3.2
June 20.....	.2	--	--	--					0	206				321	--	--	1.3	606	3.4
June 27.....	.1	--	--	--					0	255				392	--	--	1.5	726	3.1
July 4.....	.1	5.8	11	15					0	284				484	194	194	1.9	809	3.0
July 11.....	.1	--	--	--					0	283				442	--	--	1.9	796	3.2
July 18.....	.3	--	--	--					0	172				254	--	--	.2	539	3.1
July 25.....	.2	--	--	--					0	248				374	--	--	1.6	739	2.9
Aug. 1.....	.1	4.6	5.4	a17					0	274				397	189	189	1.8	820	3.2
Aug. 3.....	.1	18	9.3	11	39	26	1.8	3.1	0	395	0.5	0.9	0.9	574	205	205	3.9	1050	3.0
Aug. 8.....	.1	--	--	--					0	280				406	--	--	1.8	322	3.1
Aug. 15.....	.1	--	--	--					0	286				408	--	--	1.8	800	3.2
Aug. 22.....	.1	--	--	--					0	277				409	--	--	1.8	781	3.2
Aug. 29.....	.1	--	--	--					0	266				395	--	--	1.8	744	3.1
Sept. 5.....	.1	5.0	3.1	a12					0	253				401	230	230	1.7	735	3.2
Sept. 12.....	.1	--	--	--					0	586				926	--	--	7.2	1270	3.0
Sept. 19.....	.1	--	--	--					0	217				306	--	---	.8	630	3.3
Sept. 26.....	.1	--	--	--					0	560				768	--	--	6.5	1200	3.0

a In solution when analyzed.

CUMBERLAND RIVER BASIN--Continued

3-4071. CANE BRANCH NEAR PARKERS LAKE, KY.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	--	--	62	61	--	--	--	--	59	--	55	--	--	--	--	--	--	48	55	49	--	--	--	--	--	40	48	--	--	--	53	--
November	45	--	--	--	45	--	--	33	45	--	--	--	--	--	44	--	--	--	--	--	--	39	45	--	--	--	--	45	--	--	--	--
December	--	--	--	--	--	38	--	--	--	--	36	--	32	--	--	--	--	--	--	32	--	--	--	--	--	32	32	--	35	35	34	--
January	36	--	35	36	--	--	--	--	--	32	--	--	--	38	40	36	39	--	35	32	--	--	--	32	--	--	--	--	--	--	32	--
February	--	--	32	--	--	--	33	35	34	33	--	--	--	43	--	--	37	42	--	39	42	45	44	43	46	43	--	45	--	--	--	--
March	--	--	40	--	--	54	47	51	--	36	--	--	46	44	--	--	--	--	--	--	49	46	46	42	--	--	--	48	--	--	43	--
April	44	--	--	39	46	--	--	--	43	42	40	44	42	40	54	42	--	42	--	--	--	--	--	--	57	53	--	--	--	52	--	--
May	50	45	--	--	--	--	--	--	55	--	52	--	--	--	54	55	--	55	--	--	--	--	47	--	--	--	--	--	--	52	--	--
June	--	--	--	--	57	59	--	65	63	65	--	--	65	--	64	--	--	--	--	56	58	--	--	--	--	--	53	--	--	--	--	--
July	--	--	--	55	--	--	--	--	--	--	55	60	--	65	65	65	--	63	--	--	--	--	--	--	65	--	--	--	--	--	--	--
August	65	72	--	--	--	--	--	64	--	--	--	--	--	--	57	--	--	--	--	--	--	60	--	--	--	--	--	--	63	--	--	--
September	--	--	--	--	65	--	--	--	--	--	68	64	--	--	--	--	--	--	53	--	--	--	--	--	65	55	--	--	--	--	--	--

CUMBERLAND RIVER BASIN--Continued

3-4071. CANE BRANCH NEAR PARKERS LAKE, KY.--Continued

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER				NOVEMBER				DECEMBER			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	0.08	12		M	0.11	7		T	0.22	15	B	0.01
2..	.08	11		M	.11	8		M	.17	11		M
3..	.31	1450	S	5.75	.10	7		M	.16	8		M
4..	.10	6		T	.08	4		M	.16	10		M
5..	.10	3		M	.12	11		T	.15	8		M
6..	.10	5		M	.10	8		M	.16	4		T
7..	.08	7		M	.10	10		M	.16	5		M
8..	.10	9		M	.09	12		M	.13	5		M
9..	.44	2310	S	7.09	.20	8		T	.12	5		M
10..	.13	25	B	.01	.22	8		M	.12	5		M
11..	.11	9		T	.11	7		M	1.68	518	S	4.38
12..	.10	9		M	.10	7		M	.64	7	B	.01
13..	.10	8		M	.08	7		M	.34	11		.01
14..	.10	7		M	.08	6		M	.32	8	B	.01
15..	.10	5		M	.08	3		T	.34	6	B	.01
16..	.11	5		M	.16	10		T	.26	5		M
17..	.11	7		M	.13	9		M	.18	5		M
18..	.10	2		T	.12	9		M	.17	5		M
19..	.29	61	S	.16	.11	8		M	.17	6		M
20..	.17	24		.01	.11	6		M	.32	25	A	.02
21..	.10	6		M	.11	3		M	.60	40	B	.06
22..	.10	5		M	.12	2		T	.45	12	B	.01
23..	.11	5		M	.30	14		0.01	.35	10	B	.01
24..	.11	6		M	.15	7		M	.32	10	B	.01
25..	.10	7		M	.13	7		M	.32	8	B	.01
26..	.11	4		T	.12	7		M	.34	--		.07
27..	.39	350	J	.9	.12	6		M	.28	--		.01
28..	.16	26	B	.01	.18	--		.4	.30	5		T
29..	.13	5		M	2.6	700	J	14	2.4	910	S	9.94
30..	.12	6		M	.41	18	B	.02	2.4	90	S	.69
31..	.44	253	S	1.52	--	--		--	3.0	680	S	13.0
Total	4.68	--		15.49	6.58	--		14.49	16.73	--		28.30
	JANUARY				FEBRUARY				MARCH			
1..	5.2	226	S	4.19	0.12	12		T	4.7	100	K	1.4
2..	1.98	17	B	.09	.39	20	B	0.02	2.6	12	B	.08
3..	1.18	16		.05	.74	45	B	.09	1.71	12		.06
4..	.80	19		.04	.48	30	B	.04	1.32	13	B	.05
5..	.67	18		.03	.59	20	B	.03	1.06	12	B	.03
6..	.52	17	B	.02	.55	14	B	.02	9.8	1900	S	121
7..	.45	12	B	.01	1.97	421	S	4.18	5.4	190	S	3.18
8..	.36	13	B	.01	4.1	226	S	2.73	17.0	--		73
9..	.28	13	B	.01	2.6	42		.29	4.4	90	K	1.2
10..	.26	10		.01	1.80	22		.11	2.6	25		.18
11..	.26	9	B	.01	1.25	15	B	.05	1.89	25	B	.1
12..	.22	9	B	.01	1.06	11	B	.03	1.39	25	B	.09
13..	.22	10	B	.01	.90	9	B	.02	1.71	44	S	.22
14..	.62	82	J	.3	.76	9		.02	1.32	15		.05
15..	1.06	42		.12	.63	9	B	.02	1.39	10	B	.04
16..	.90	21		.05	.52	9	B	.01	1.47	15	B	.06
17..	.85	13		.03	.48	3		T	1.12	15	B	.04
18..	.80	11	B	.02	.67	27		.05	1.18	8	B	.02
19..	2.8	470	S	4.50	.48	20	B	.02	1.00	5	B	.01
20..	2.4	74		.48	.56	25		.04	.85	5	B	.01
21..	1.47	35	B	.1	.71	35		.07	6.0	600	K	12
22..	1.31	25	B	.09	4.2	715	S	9.63	4.0	38		.41
23..	.95	15	B	.04	3.8	82		.93	2.8	24		.18
24..	.63	10		.02	2.26	22		.13	2.26	24		.15
25..	.50	9	B	.01	6.2	549	S	11.8	1.71	18	B	.08
26..	.40	9	B	.01	4.4	94		1.12	1.39	13	B	.05
27..	.30	8	B	.01	3.5	30	B	.3	1.12	14	B	.04
28..	.25	8	B	.01	10.6	858	S	35.1	1.88	107	S	.89
29..	.20	6		M	--	--		--	1.47	13	B	.05
30..	.16	4		M	--	--		--	1.32	5	B	.02
31..	.13	3		T	--	--		--	3.1	520	S	15.1
Total	28.13	--		10.29	56.32	--		66.86	90.96	--		229.79

S Computed by subdividing day.
T Less than 0.005 ton.
A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.
K Computed from estimated-concentration graph and subdividing day.
M Less than 0.005 ton, computed from estimated-concentration graph.

CUMBERLAND RIVER BASIN--Continued

3-4071. CANE BRANCH NEAR PARKERS LAKE, KY.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	APRIL				MAY				JUNE			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	7.6	470	S	13.1	10.9	700	J	25	0.11	8		M
2..	3.4	25	B	.2	5.1	180	S	1.40	.11	7		M
3..	2.4	25	B	.2	2.6	13	B	.09	.12	7		M
4..	1.63	14		.06	1.55	10	B	.04	.11	6		M
5..	1.32	17		.06	1.12	8	B	.02	.45	822	S	3.29
6..	1.06	10	B	.03	.90	5	B	.01	.17	46		.02
7..	.80	7	B	.02	.76	5	B	.01	.13	13		M
8..	.76	7	B	.01	.66	--		.9	.27	1160	S	9.64
9..	3.6	358	S	6.31	1.12	160	J	.8	1.93	1350	S	19.4
10..	5.0	95	S	1.49	.67	13	B	.02	.45	33		.04
11..	2.8	25		.19	.90	270	J	1.4	.26	7		M
12..	3.6	331	S	3.88	.71	40	B	.08	.17	5		M
13..	3.7	84	S	.93	.55	15	B	.02	.53	370	J	1.7
14..	2.6	17		.12	.48	15	B	.02	.30	--		.02
15..	2.8	--		3.3	.55	20		.03	2.4	--		24
16..	3.4	107		1.10	.39	13		.01	.88	25	B	.06
17..	2.4	18	B	.1	.34	14	B	.01	.45	10	B	.01
18..	1.71	15		.07	.63	62	S	.15	.28	10	B	.01
19..	1.32	14	B	.05	.39	25	B	.02	.21	9	B	.01
20..	1.00	10	B	.03	.30	13	B	.01	.25	30	A	.02
21..	.95	17	B	.04	.26	13	B	.01	.57	55	J	.1
22..	.80	8	B	.02	.22	13	B	.01	.24	18	B	.01
23..	.76	7	B	.01	.21	12		.01	.18	18		.01
24..	.63	7	B	.01	.17	12	B	.01	.17	17	B	.01
25..	.90	--		1.1	.17	12	B	.01	.15	15	B	.01
26..	1.32	150	J	.9	.18	13	B	.01	.16	12	B	.01
27..	.90	10	B	.02	.16	13	B	.01	.13	12		T
28..	.80	10	B	.02	.15	13	B	.01	.13	12		M
29..	.71	10	B	.02	.13	12		M	.13	10		M
30..	.99	66	S	.59	.12	8		T	.12	10		M
31..	--	--		--	.12	8		M	--	--		--
Total	61.66	--		33.98	32.51	--		30.13	11.56	--		58.40

Day	JULY				AUGUST				SEPTEMBER			
1..	0.11	9		M	0.11	5		T	0.12	7		M
2..	.11	7		M	.21	556	S	0.91	.08	2		M
3..	.20	--		0.8	.12	75	B	.02	.08	3		M
4..	.11	56		.02	.10	15		M	.08	3		M
5..	.10	45	B	.01	.08	10		M	.08	3		T
6..	.11	40	B	.01	.08	10		M	.06	3		M
7..	.14	35	B	.01	.08	10		M	.06	3		M
8..	.12	25	B	.01	.30	--		.7	.06	3		M
9..	.11	20	B	.01	.13	5		M	.06	3		M
10..	.10	19	B	.01	.10	5		M	.06	3		M
11..	.10	22		.01	.08	5		M	.20	1440	S	5.33
12..	.79	1180	S	17.3	.08	5		M	.08	36		.01
13..	.21	444	S	1.30	.06	5		M	.06	16		M
14..	.92	2530	S	24.1	.06	5		M	.08	15		M
15..	.26	92	S	.08	.06	5		M	.08	15		M
16..	3.9	2000		63	.06	5		M	.08	12		M
17..	.61	10	B	.02	.06	5		M	.08	8		M
18..	.24	10		.01	.08	5		M	.08	5		M
19..	.18	10		M	.08	5		M	.08	3		T
20..	.16	10		M	.08	5		M	.08	2		M
21..	.15	9		M	.10	5		M	.08	2		M
22..	.16	9		M	.08	7		T	.08	2		M
23..	.15	8		M	.10	18		T	.08	2		M
24..	.13	7		M	.11	2		T	.08	2		M
25..	.13	5		T	.10	2		T	.20	899	S	2.36
26..	.13	5		M	.08	2		M	.06	153		.03
27..	.13	5		M	.08	2		M	.05	12		M
28..	.12	5		M	.08	2		M	.05	9		M
29..	.13	5		M	.08	2		T	.05	6		M
30..	.13	5		M	.08	2		M	.05	5		M
31..	.12	5		M	.08	2		M	--	--		--
Total	10.06	--		106.74	3.02	--		1.66	2.52	--		7.76

Total discharge for year (cfs-days)..... 324,726
Total load for year (tons)..... 603,89

S Computed by subdividing day.
T Less than 0.005 ton.
A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.
M Less than 0.005 ton, computed from estimated-concentration graph.

CUMBERLAND RIVER BASIN--Continued

3-4071. CANE BRANCH NEAR PARKERS LAKE, KY.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Dec. 29, 1960.....	1330			1.98	1860		67	79	91	97	99	100	--					SBWC
Feb. 22, 1961.....	0905			4.6	3240		51	62	77	91	96	98	100					SBWC
Feb. 22.....	0905			4.6	3240		4	7	10	35	95	97	100					SBN
Mar. 6.....	1125			5.6	1460		27	33	42	82	93	95	100					SBWC
June 5.....	0900			4.1	4340		55	70	83	95	99	100	--					SBWC
Aug. 2.....	1700			1.98	3320		42	50	62	75	88	96	100					SBWC
Aug. 2.....	1700			1.98	3320		1	3	4	27	87	91	98	100				SBN

3-4141.1. CUMBERLAND RIVER NEAR BURKESVILLE, KY.

LOCATION.--At Neelys Ferry on State Highway 61, 0.5 mile downstream from Raft Creek, 3.2 miles south of Burkesville, Cumberland County, and about 37 miles downstream from gaging station near Rowena.
DRAINAGE AREA.--6,050 square miles.
RECORDS AVAILABLE.--Chemical analyses: January 1952 to September 1954.
Water temperatures: October 1949 to September 1951 (at Burkesville), January 1952 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 64°F Oct. 1-3, 10-13; minimum, 40°F Jan. 22-30, Feb. 23-25.
EXTREMES, 1949-61.--Water temperatures: Maximum, 84°F July 30, 1956; minimum, 34°F Feb. 2-4, 1951, Jan. 22, 1956.
REMARKS.--No discharge records available.

Temperature (°F) of water, water year October 1960 to September 1961
(Twice-daily measurements at approximately 7 a.m. and 3 p.m.)

Month	Day																															Average
	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	
October																																
a.m.	63	63	63	63	62	61	62	62	63	63	63	63	63	63	62	62	62	62	62	62	62	61	61	62	60	59	59	60	59	59	60	62
p.m.	64	64	64	62	62	62	63	63	63	64	64	64	64	63	62	62	63	62	62	62	62	62	62	62	60	60	60	60	60	60	61	62
November																																
a.m.	60	59	59	59	59	59	60	60	59	59	59	59	59	60	58	58	58	58	58	59	60	59	58	58	58	58	57	57	56	54	--	58
p.m.	60	60	60	60	60	60	61	60	60	60	60	60	60	60	59	59	59	59	59	59	61	59	59	59	59	59	58	57	56	54	--	59
December																																
a.m.	54	54	53	53	53	53	53	53	52	50	48	48	48	48	48	48	48	48	48	48	48	48	48	48	47	47	48	48	48	48	48	49
p.m.	55	54	54	54	53	53	53	53	52	50	49	49	49	49	49	49	48	48	49	49	49	49	49	49	48	48	48	48	48	48	48	50
January																																
a.m.	47	48	47	46	46	46	46	46	47	47	46	46	46	46	46	47	47	46	45	44	43	40	40	40	40	40	40	40	40	40	41	44
p.m.	47	48	47	47	46	46	47	47	48	47	46	46	47	47	47	48	47	46	46	44	42	41	40	40	40	41	40	41	40	40	41	45
February																																
a.m.	42	42	42	42	42	42	42	42	42	41	41	41	43	43	43	42	42	42	41	41	41	41	40	40	40	41	42	43	--	--	--	42
p.m.	42	42	43	43	43	42	42	42	42	42	41	43	43	43	43	43	42	42	41	41	41	41	40	40	41	42	43	43	--	--	--	42
March																																
a.m.	42	42	42	42	43	43	44	43	43	43	43	43	43	43	43	43	43	43	43	42	43	43	42	42	43	44	43	43	43	42	43	43
p.m.	42	42	42	43	43	44	44	43	43	43	43	45	43	43	43	43	43	43	43	43	43	43	42	43	44	44	43	43	43	43	43	43
April																																
a.m.	42	43	43	42	42	43	44	45	45	44	44	43	43	43	43	44	45	45	45	45	45	45	46	45	43	43	43	43	44	45	--	44
p.m.	43	43	43	42	43	44	45	45	45	44	44	43	43	43	44	45	45	45	45	45	45	46	46	45	43	43	43	44	45	45	--	44
May																																
a.m.	44	43	44	45	45	45	45	44	43	43	43	43	43	43	43	43	43	43	43	43	44	45	45	46	46	46	46	46	46	45	45	44
p.m.	44	43	44	45	45	45	45	44	43	43	43	43	43	43	43	43	43	43	43	44	45	45	46	46	46	46	46	46	46	45	45	44
June																																
a.m.	45	45	45	46	46	47	47	47	47	47	47	46	46	46	46	46	46	46	45	45	46	46	46	46	46	46	45	45	45	45	--	46
p.m.	45	45	45	46	47	47	47	47	47	47	47	46	46	46	46	46	46	46	45	46	46	46	46	46	46	46	45	45	45	45	--	46
July																																
a.m.	45	46	46	46	45	45	45	45	46	47	46	46	46	46	46	47	47	46	46	46	46	46	46	47	46	46	46	46	46	47	48	46
p.m.	45	46	46	46	45	45	45	46	47	47	46	46	46	46	46	47	47	46	46	46	46	46	47	47	46	46	46	46	46	48	48	46
August																																
a.m.	48	50	52	53	53	54	54	54	54	54	54	54	54	55	54	54	53	53	53	54	55	56	55	54	54	54	55	56	54	53	53	54
p.m.	50	52	53	53	54	54	54	54	54	54	54	54	55	55	54	54	53	53	54	55	56	56	55	54	54	55	56	56	54	53	53	54
September																																
a.m.	53	54	55	56	54	54	54	54	54	55	56	56	55	54	54	54	55	56	54	54	54	54	54	54	55	55	54	54	54	54	--	54
p.m.	54	55	56	56	54	54	54	54	55	56	56	56	55	54	54	55	56	56	54	54	54	54	54	55	55	55	54	54	54	54	--	55

CUMBERLAND RIVER BASIN--Continued

3-4380.1. LITTLE RIVER ABOVE CADIZ, KY.

LOCATION.--At bridge on State Highway 272, 0.8 mile upstream from Sinking Fork, 3.7 miles southeast of Cadiz, Trigg County, and 10.5 miles downstream from Casey Creek and gaging station.
DRAINAGE AREA.--244 square miles (at gage).
RECORDS AVAILABLE.--Chemical analyses: October 1959 to August 1961.
REMARKS--Samples for iron and manganese filtered clear when collected.

Chemical analyses, in parts per million, October 1960 to August 1961

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color	Turbidity
															Calcium, magnesium	Noncarbonate				
Oct. 7, 1960..	29	9.9	0.14	--	68	7.8	4.6	2.0	232	9.6	6.0	0.2	3.5	235	202	12	397	7.3	2	10
Nov. 18.....	53	8.2	.26	--	57	5.8	5.3	2.9	187	12	8.6	.2	3.5	201	166	13	345	7.3	6	6
Dec. 28.....	79	8.8	.09	0.16	70	6.0	6.3	1.7	222	16	9.0	.2	6.0	219	199	17	405	7.4	2	5
Jan. 30, 1961.	90	6.4	.11	.07	62	5.2	4.9	.9	192	13	5.5	.1	5.8	217	176	18	354	7.2	0	3
Mar. 8.....	2900	--	.52	.04	--	--	--	--	107	11	4.0	--	--	--	101	14	216	7.5	--	--
Apr. 12[a].....	1350	5.6	.92	.10	20	2.1	1.9	1.1	63	9.0	1.0	.5	2.5	90	58	7	128	7.3	35	250
May 26.....	284	8.5	.17	.26	55	4.5	3.1	1.0	176	8.4	4.5	.2	6.6	197	156	12	310	7.5	2	7
June 29.....	137	8.9	.05	.00	61	5.0	3.3	.9	196	7.4	4.2	.1	5.8	199	173	12	339	7.4	3	6
Aug. 10.....	52	8.3	.28	.00	63	5.9	8.3	2.0	204	14	8.0	.2	7.4	228	181	14	378	7.5	4	15

a Includes determination of dissolved oxygen - 9.0 ppm, 80 percent saturation; phenols - 0.000 ppm.

3-4385. CUMBERLAND RIVER AT SMITHLAND, KY.

LOCATION.--At gaging station at bridge on U.S. Highway 60 at Smithland, Livingston County, 1 mile downstream from McCormick Creek, and 2.8 miles upstream from mouth.
DRAINAGE AREA.--17,913 square miles, of which 355 square miles in Kentucky is noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to September 1950, October 1956 to September 1961.
Water temperatures: October 1949 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 130 ppm Feb. 1-28; minimum, 101 ppm Sept. 1-30.
Hardness: Maximum, 101 ppm Feb. 1-28; minimum, 75 ppm Oct. 1-31.
Specific conductance: Maximum daily, 246 micromhos Mar. 1; minimum daily, 141 micromhos May 12.
Water temperatures: Maximum, 82°F Aug. 1, 10, 11; minimum, 34°F Feb. 5, 6.
EXTREMES, 1949-61.--Dissolved solids (1949-50, 1956-61): Maximum, 253 ppm Sept. 8-13, 1960; minimum, 77 ppm Feb. 11-20, 1950.
Hardness (1949-50, 1956-61): Maximum, 161 ppm Sept. 8-13, 1960; minimum, 53 ppm Feb. 11-20, 1950.
Specific conductance (1949-50, 1956-61): Maximum daily, 416 micromhos Sept. 10, 1960; minimum daily, 112 micromhos Feb. 13, 1950.
Water temperatures: Maximum, 90°F Aug. 3, 1955; minimum, 34°F on several days during February 1951, February 1958, and February 1961.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 1-31, 1960.....	8,554	5.6			24	3.6	3.7	0.8	72		21	4.0	0.1	2.2	0.35	102	75	16		176		3		0.0
Nov. 1-30....	11,820	5.6			27	4.0	2.2	.5	82		18	3.5	.2	2.1	.42	114	84	17		191		4		.0
Dec. 1-31....	18,950	5.3			28	3.9	4.2	.9	86		17	4.0	.2	2.6	.39	118	86	16		194		5		.1
Jan. 1-31, 1961.....	25,290	6.1			32	4.6	4.0	.5	103		19	2.5	.2	2.9	.40	129	99	14		219		7		.0
Feb. 1-28....	28,700	6.5			33	4.4	4.3	1.2	103		19	3.0	.2	2.9	.46	130	101	16		218		5		.0
Mar. 1-31....	76,020	5.9			32	4.1	2.8	1.1	101		17	2.0	.1	3.4	.70	121	97	14		204		12		.0
Apr. 1-30....	59,200	6.0			28	3.3	3.1	1.0	88		16	2.5	.2	2.6	.30	118	84	12		186		5		.0
May 1-31.....	39,900	5.7			24	4.7	3.3	1.1	80		18	3.0	.1	2.2	.25	113	80	14		180		15		.0
June 1-30....	28,350	6.5			27	3.8	3.5	.9	79		16	2.5	.2	3.0	.20	112	83	18		184		5		.0
July 1-31....	15,550	5.5			29	3.8	3.9	1.4	90		15	3.0	.2	2.9	.20	117	88	14		194		5		.1
Aug. 1-31....	10,790	6.8			26	4.9	4.5	1.3	86		19	3.0	.1	2.6	.27	112	85	14		190		7		.0
Sept. 1-30...	12,740	5.8			24	3.8	4.8	1.0	75		20	3.5	.2	2.3	.31	101	76	14		175		3		.0
Weighted average....	27,980	6.0			29	4.1	3.4	1.0	90		17	2.7	0.2	2.8	0.40	118	89	14		195		8		--
Time-weighted average....	--	5.9			28	4.1	3.7	1.0	87		18	3.0	0.2	2.6	0.35	116	86	15		192		6		--
Tons per day.	--	450			2172	308	260	76	6,830		1,310	206	12	211	30	8,910	6,700	1,090		--		--		--

CUMBERLAND RIVER BASIN--Continued

3-4385. CUMBERLAND RIVER AT SMITHLAND, KY.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Twice-daily measurements at approximately 8 a.m. and 5 p.m.)

Month	Day																															Average
	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	
October																																
a.m.....	70	71	70	70	70	70	69	69	70	69	69	69	68	69	69	69	68	67	67	64	64	63	63	61	61	62	60	60	60	61	60	66
p.m.....	72	73	71	72	71	71	70	70	71	71	71	70	70	70	70	70	69	69	66	65	64	64	64	63	63	63	62	62	62	62	60	67
November																																
a.m.....	59	60	58	57	58	57	55	55	55	52	50	51	53	53	54	54	53	53	52	51	51	52	51	51	50	51	53	54	51	49	--	53
p.m.....	60	60	60	59	58	57	57	55	54	54	54	53	53	55	55	55	54	54	54	53	53	52	52	53	52	53	54	54	51	50	--	55
December																																
a.m.....	48	47	48	49	50	50	48	48	45	44	46	44	42	43	44	43	42	41	42	43	39	37	36	39	39	42	40	40	39	39	39	43
p.m.....	50	49	50	50	50	50	49	48	47	46	45	43	44	44	45	43	43	43	43	42	39	38	36	40	41	41	41	40	40	41	39	44
January																																
a.m.....	40	40	41	41	41	42	42	42	40	40	42	41	41	43	42	41	43	43	43	40	38	39	40	40	38	38	36	35	35	35	36	40
p.m.....	40	40	42	42	43	44	42	42	42	43	43	44	44	43	42	43	44	44	41	41	38	41	41	39	39	38	36	36	36	37	39	41
February																																
a.m.....	38	38	36	35	34	34	37	37	36	38	39	41	44	44	45	45	48	49	48	47	48	49	49	51	48	49	50	50	--	--	--	43
p.m.....	39	37	35	36	35	36	37	37	40	41	42	45	45	46	47	48	49	50	48	48	48	49	50	50	49	51	51	49	--	--	--	44
March																																
a.m.....	49	50	50	51	52	53	55	54	52	52	52	53	52	51	52	50	49	50	49	50	49	49	49	49	50	50	51	52	51	52	52	51
p.m.....	50	51	50	52	53	55	55	53	53	53	53	53	52	53	51	50	50	50	50	50	49	50	49	50	50	51	52	54	52	53	53	52
April																																
a.m.....	52	50	51	51	51	51	51	50	51	50	50	51	50	50	53	50	51	52	52	52	53	55	56	57	58	58	59	59	58	60	--	53
p.m.....	52	52	52	52	52	52	52	51	51	51	50	51	52	54	52	51	52	53	53	54	55	56	56	59	58	59	60	59	60	60	--	54
May																																
a.m.....	60	59	59	59	59	60	60	62	61	60	60	61	62	68	64	64	63	64	65	65	66	65	65	65	65	65	64	65	65	65	66	63
p.m.....	60	60	60	60	60	60	62	62	61	62	62	62	64	64	64	64	64	65	65	66	66	65	66	66	66	65	66	66	66	67	68	64
June																																
a.m.....	67	68	69	69	69	70	70	70	71	70	69	70	71	72	72	70	69	68	68	68	69	68	69	69	70	70	70	71	71	72	--	70
p.m.....	69	70	70	70	71	72	72	72	71	71	71	--	73	73	71	70	70	69	69	70	70	70	70	71	72	71	72	73	74	74	--	71
July																																
a.m.....	74	75	74	74	74	74	75	74	74	73	74	74	74	74	74	74	75	75	74	75	75	77	78	77	77	77	78	78	78	79	80	75
p.m.....	75	75	75	76	76	76	76	75	75	75	76	75	75	76	75	76	77	76	77	77	77	78	77	78	78	79	79	79	80	81	81	77
August																																
a.m.....	80	81	80	80	78	79	79	79	80	80	80	80	79	78	78	78	78	79	79	78	76	76	75	75	74	76	76	77	77	78	79	78
p.m.....	82	81	81	80	80	80	80	81	81	82	82	81	79	79	80	79	80	80	80	77	77	76	75	75	76	77	77	79	79	79	79	79
September																																
a.m.....	78	79	78	78	78	78	78	78	78	79	79	79	79	75	74	74	73	72	72	72	73	73	74	74	74	72	72	71	70	71	--	75
p.m.....	80	80	78	80	80	80	79	80	80	81	81	80	80	77	76	76	75	75	75	75	75	75	75	76	73	72	73	71	73	73	--	77

TENNESSEE RIVER BASIN

3-4390. FRENCH BROAD RIVER AT ROSMAN, N. C.

LOCATION.--At gaging station at bridge on U.S. Highway 178 at Rosman, Transylvania County, 1.0 mile upstream from East Fork.
DRAINAGE AREA.--67.9 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1957 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 4, 1960.....	142	7.7	0.00	1.6	0.3	1.8	0.9	9	1.6	2.5	0.0	0.7	24	5	0	26	6.4	10
Nov. 2.....	150	7.7	.01	1.6	.1	1.5	.4	8	1.8	1.0	.0	.8	21	4	0	16	6.7	10
Dec. 5.....	104	8.3	.02	.8	.5	1.7	.4	9	.4	.5	.0	.1	21	4	0	16	6.8	10
Jan. 4, 1961.....	127	7.5	.03	1.4	.3	1.5	.5	8	.8	1.0	.0	.1	20	4	0	17	7.0	5
Feb. 2.....	114	7.5	.00	.8	.5	1.4	.2	8	.8	.5	.0	.0	17	4	0	17	6.2	10
Mar. 2.....	347	6.6	.03	1.4	.5	1.0	1.0	8	2.4	2.0	.0	.2	20	6	0	17	6.2	2
Apr. 5.....	267	6.5	.01	1.1	.2	1.0	.3	6	2.0	1.4	.1	.2	19	4	0	14	6.5	5
Apr. 28.....	249	6.8	.01	1.0	.4	1.2	.3	7	.8	1.5	.1	.0	18	4	0	14	6.6	5
June 6.....	180	7.5	.03	1.4	.2	1.2	.5	8	2.6	.7	.0	.3	22	4	0	16	6.2	10
July 3.....	199	7.7	.00	1.4	.2	.9	.4	9	.8	1.0	.0	.2	20	4	0	15	6.7	10
Aug. 2.....	169	7.2	.03	1.3	.6	1.2	.7	9	1.0	1.1	.0	.2	18	6	0	19	6.3	10
Sept. 5.....	377	7.3	.03	1.1	.2	1.3	.7	9	.4	1.9	.0	.1	24	4	0	17	6.4	5

TENNESSEE RIVER BASIN--Continued

3-4430. FRENCH BROAD RIVER AT BLANTYRE, N. C.

LOCATION.--At gaging station at highway bridge, 700 feet east of Blantyre Railroad Station, Transylvania County, and 3.5 miles downstream from Little River.
DRAINAGE AREA.--296 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1952 to September 1953, October 1957 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 4, 1960	772	9.1	0.01	4.3	0.7	17	1.0	14	34	3.5	0.0	0.4	79	14	2	120	6.2	20
Nov. 2	679	8.5	.00	4.2	.5	17	.9	17	30	4.5	.0	1.3	78	12	0	115	7.1	20
Dec. 5	399	9.3	.08	4.6	.3	29	1.0	19	50	5.5	.1	.6	114	12	0	180	6.6	30
Jan. 4, 1961	537	8.5	.09	4.3	.6	25	1.2	24	40	5.3	.1	.9	103	14	0	160	7.2	30
Feb. 2	472	9.2	.08	3.4	1.2	23	.7	20	38	3.5	.1	2.2	98	14	0	142	6.6	40
Mar. 2	1,540	7.2	.02	2.6	.4	8.7	1.4	9	15	3.0	.1	.1	43	8	0	67	6.4	3
Apr. 7	984	7.4	.03	2.2	.9	13	.6	12	21	3.7	.1	.3	a55	9	0	89	6.0	10
May 2	1,040	8.2	.04	2.1	.3	11	.8	12	19	2.5	.0	.2	52	6	0	77	6.3	10
June 8	752	8.0	.04	3.7	.5	21	.9	18	35	5.5	.1	.5	93	11	0	130	6.1	35
July 3	900	8.3	.04	2.8	.7	13	.7	14	22	2.5	.0	.2	a57	10	0	90	6.0	17
Aug. 2	728	8.2	.14	2.7	.6	15	1.0	12	25	5.0	.0	.3	70	10	0	103	5.9	25
Sept. 6	1,380	8.0	.04	2.2	.4	9.2	.8	14	14	2.6	.0	.3	49	8	0	64	6.4	20

a Calculated from determined constituents.

TENNESSEE RIVER BASIN--Continued

3-4480. FRENCH BROAD RIVER AT BENT CREEK, N. C.

LOCATION.--At gaging station, 50 feet downstream from Bent Creek, 6.2 miles upstream from Hominy Creek, 6.7 miles south of Asheville, Buncombe County.
DRAINAGE AREA.--676 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1957 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 10, 1960.....	2,440	8.7	0.00	2.7	0.8	6.6	1.1	13	10	2.0	0.0	0.7	40	10	0	57	6.7	10
Nov. 14.....	845	10	.01	3.9	.6	15	.9	21	25	4.3	.0	.5	77	12	0	110	6.5	30
Dec. 8.....	763	10	.05	3.9	.4	20	1.0	20	32	4.0	.0	.4	85	12	0	130	7.3	20
Jan. 12, 1961.....	796	9.5	.04	3.7	.6	14	.9	21	20	3.3	.0	.3	65	12	0	94	6.9	20
Feb. 13.....	1,050	8.2	.02	3.5	.6	12	.8	16	20	4.4	.1	.2	62	12	0	94	6.3	10
Mar. 27.....	1,670	8.4	.04	2.6	.4	8.2	1.2	13	14	3.5	.0	.1	46	8	0	64	6.3	5
Apr. 24.....	1,920	8.2	.05	1.5	.5	3.0	1.4	10	4.0	2.5	.0	.1	28	6	0	30	6.5	3
May 17.....	1,930	8.8	.02	2.6	.6	9.4	2.1	17	11	3.5	.1	.1	47	9	0	74	6.2	3
June 23.....	4,030	6.3	.05	2.4	.5	4.1	.7	9	7.4	1.7	.1	1.1	30	8	0	41	6.0	10
July 18.....	1,330	8.9	.07	2.0	.6	4.5	.7	14	5.0	1.7	.0	.1	38	8	0	41	6.4	13
Aug. 14.....	1,970	9.3	.09	2.3	1.3	7.3	1.0	16	10	3.2	.0	.3	52	12	0	62	6.4	17
Sept. 20.....	1,810	9.1	.02	3.0	.6	7.9	1.1	15	10	3.5	.0	.5	52	10	0	66	6.4	25

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TENNESSEE RIVER BASIN--Continued

3-4515. FRENCH BROAD RIVER AT ASHEVILLE, N. C.

LOCATION.--At gaging station at downstream side of Pearson Bridge at Asheville, Buncombe County, 2.3 miles downstream from Southern Railway Station, 3.2 miles downstream from Swannanoa River.
DRAINAGE AREA.--945 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1951, October 1956 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 10, 1960.....	2,940	8.8	0.00	3.4	1.0	5.9	1.4	13	11	2.3	0.0	1.2	41	12	2	59	6.2	5
Nov. 4.....	1,240	10	.02	4.2	1.2	16	1.2	25	25	5.8	.0	1.5	83	16	0	120	7.2	20
Dec. 6.....	846	11	.03	4.3	1.1	25	1.6	25	37	7.2	.0	2.2	104	16	0	160	6.6	15
Jan. 12, 1961.....	909	10	.05	4.6	1.7	25	1.5	31	32	7.4	.1	3.2	102	18	0	160	6.3	20
Feb. 13.....	1,240	9.0	.01	4.0	1.0	13	1.0	16	23	5.7	.1	1.9	72	14	1	106	6.5	5
Mar. 28.....	1,900	9.0	.03	2.9	1.1	11	1.6	16	19	4.5	.1	.4	a58	12	0	67	6.1	3
Apr. 24.....	2,210	6.0	.04	3.5	1.0	13	1.8	16	18	8.0	.1	.9	60	13	0	98	7.0	2
May 17.....	2,380	8.9	.04	3.0	1.3	11	1.9	18	16	5.0	.1	.7	57	12	0	88	6.1	2
June 30.....	1,950	8.7	.06	2.8	1.0	9.0	1.0	13	16	4.3	.1	.9	50	11	0	70	6.4	20
July 18.....	1,540	8.9	.03	4.8	1.6	13	2.0	22	23	6.3	.0	2.0	76	18	0	118	6.1	9
Aug. 14.....	2,150	9.5	.06	3.8	1.1	9.1	1.4	20	14	4.8	.2	.5	66	14	0	85	6.3	10
Sept. 20.....	2,180	9.5	.02	3.5	1.1	11	1.6	24	13	5.1	.0	1.8	63	14	0	90	6.4	25

a Calculated from determined constituents.

3-4535. FRENCH BROAD RIVER AT MARSHALL, N. C.

LOCATION.--At gaging station, 0.7 mile upstream from Hayes Creek, 1.0 mile downstream from Ivy River, and 1.5 miles southeast of Marshall, Madison County.
DRAINAGE AREA.--1,332 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1961.
Water temperatures: October 1957 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 102 ppm Dec. 1-31; minimum, 51 ppm Apr. 1-30.
Hardness: Maximum, 18 ppm Oct. 13-31, Nov. 1-30, Dec. 1-31; minimum, 12 ppm June 22-30.
Specific conductance: Maximum daily, 156 micromhos Dec. 4; minimum daily, 43 micromhos Feb. 28.
Water temperatures: Maximum, 76°F July 29, Sept. 8, 18; minimum, freezing point on several days during winter months.
EXTREMES, 1957-61.--Dissolved solids: Maximum, 135 ppm Aug. 1-12, 1960; minimum, 42 ppm Apr. 11-20, 1958, Mar. 28-31, 1960.
Hardness: Maximum, 26 ppm Oct. 12, 1957; minimum, 12 ppm Apr. 11-20, 1958, June 11-20, Nov. 1-3, 1959, Mar. 28-31, 1960, June 22-30, 1961.
Specific conductance: Maximum daily, 219 micromhos Oct. 12, 1957; minimum daily, 39 micromhos Mar. 31, 1960.
Water temperatures: Maximum, 79°F June 18, July 11, Aug. 6, 7, 1960; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance of samples collected from October 1957 to September 1961 and records of suspended matter of composite samples from October 1957 to September 1960 available in district office at Raleigh, N. C.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-6, 1960.....	1,708	11	0.02	4.3	1.5	13	1.7	20	22	4.7	0.0	3.0	74	17	0	116	7.3	20
Oct. 7-12.....	2,912	10	.04	3.6	1.7	8.2	2.0	17	16	4.5	.0	3.5	60	16	2	85	7.2	18
Oct. 13-31.....	1,560	11	.03	3.8	2.0	15	1.5	24	25	5.0	.0	2.4	79	18	0	119	6.8	12
Nov. 1-30.....	1,292	12	.08	4.6	1.6	18	1.4	23	26	5.5	.1	2.3	96	18	0	128	7.5	23
Dec. 1-31.....	1,195	12	.06	4.6	1.5	18	1.4	22	24	5.5	.1	2.4	102	18	0	132	7.1	18
Jan. 1-14, 1961.....	1,294	11	.10	4.5	1.2	17	1.3	20	26	4.5	.1	2.6	89	16	0	118	6.8	25
Jan. 15-18.....	2,703	9.5	.00	3.4	1.5	9.5	1.2	16	15	4.0	.1	1.1	a53	14	2	80	6.9	15
Jan. 19-31.....	1,380	9.2	.05	4.5	.9	14	1.3	21	21	5.2	.1	2.4	75	14	0	109	6.6	15
Feb. 1-19.....	1,513	11	.06	3.8	1.5	14	1.6	20	21	4.8	.0	3.4	80	16	1	110	7.4	20
Feb. 20-28.....	8,092	8.1	.04	4.9	.7	5.4	1.9	13	10	1.8	.1	3.5	52	15	4	64	6.1	10
Mar. 1-15.....	3,502	10	.11	3.4	1.5	6.8	1.2	15	8.0	3.0	.1	2.2	54	14	2	68	7.2	20
Mar. 16-31.....	2,605	11	.09	4.6	1.1	8.9	1.2	20	14	3.5	.1	1.5	58	16	0	79	7.3	10
Apr. 1-30.....	3,457	8.7	.09	3.7	1.2	8.6	1.0	17	14	3.0	.1	.3	51	14	0	72	7.1	20
May 1-31.....	2,651	9.7	.10	3.4	1.2	10	1.2	17	17	3.2	.1	1.1	63	14	0	85	7.0	20
June 1-21.....	1,967	10	.05	4.2	1.0	13	1.4	18	24	3.5	.1	1.7	69	14	0	101	7.1	10
June 22-30.....	3,400	9.5	.00	3.4	.9	8.3	2.1	15	14	2.8	.1	1.4	58	12	0	73	7.1	30
July 1-31.....	1,957	11	.16	2.6	2.0	11	1.5	19	22	3.6	.1	1.8	74	15	0	96	6.8	30
Aug. 1-4.....	1,910	11	.01	4.1	1.4	15	1.7	27	17	4.5	.0	2.0	80	16	0	128	7.3	23
Aug. 5-15.....	3,583	9.3	.11	3.7	1.0	7.8	1.5	16	14	3.2	.0	1.6	66	13	0	76	6.9	38
Aug. 16-24.....	2,824	11	.07	3.9	1.5	12	1.5	20	17	4.9	.0	1.1	81	16	0	97	7.0	33
Aug. 25-31.....	11,203	9.2	.03	3.5	1.2	5.2	1.6	16	8.8	2.0	.1	1.3	55	14	1	58	6.6	20
Sept. 1-16.....	2,819	11	.01	3.8	1.3	15	1.3	21	25	5.7	.1	.5	75	15	0	110	6.7	10
Sept. 17-30.....	1,844	11	.04	3.7	1.1	10	1.4	19	18	4.2	.0	.5	60	14	0	89	6.2	5
Time-weighted average.....	2,510	10	0.07	3.9	1.4	12	1.4	19	19	4.1	0.1	1.8	72	15	0	98	--	19

a Calculated from determined constituents.

TENNESSEE RIVER BASIN--Continued

3-4535. FRENCH BROAD RIVER AT MARSHALL, N. C.--Continued

Temperature °F of water, water year October 1980 to September 1961
/Once-daily measurement between 8:45 a.m. and 5:45 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1..	65	53	40	40	--	50	--	56	73	75	75	70
2..	66	54	40	39	38	50	46	56	75	70	75	70
3..	67	51	35	38	35	48	50	55	70	70	75	71
4..	65	50	33	38	32	51	47	57	70	68	73	69
5..	65	49	38	38	35	53	47	58	70	70	71	71
6..	65	44	39	38	35	55	50	58	66	70	71	70
7..	65	46	44	38	38	--	47	61	68	70	70	68
8..	64	42	43	39	37	--	48	61	68	69	75	76
9..	65	45	42	35	38	48	51	66	69	70	70	74
10..	64	49	38	32	36	45	48	61	70	70	70	69
11..	64	45	42	34	39	45	46	60	71	68	69	71
12..	61	45	39	34	40	47	51	58	71	65	71	71
13..	--	41	34	33	43	52	45	58	70	69	70	71
14..	62	45	33	43	45	52	48	60	70	70	70	--
15..	62	46	35	36	47	52	52	63	70	7[illegible]	67	71
16..	62	49	35	43	--	52	51	69	65	70	67	71
17..	62	50	32	--	47	48	48	64	63	72	69	71
18..	62	48	39	--	50	48	48	65	64	72	70	76
19..	62	50	35	41	48	48	50	63	65	7[illegible]	68	61
20..	59	47	38	35	48	49	51	64	66	72	66	62
21..	54	45	37	34	49	52	55	63	65	73	70	64
22..	54	46	33	32	48	50	57	65	65	73	65	64
23..	59	50	34	34	52	50	60	61	65	73	67	68
24..	55	55	32	34	50	50	60	60	66	7[illegible]	69	--
25..	52	50	32	34	52	48	60	61	65	73	65	74
26..	50	52	38	34	46	50	60	62	65	7[illegible]	66	--
27..	53	52	39	34	47	51	60	54	65	73	68	66
28..	54	48	34	32	50	53	58	56	65	7[illegible]	70	62
29..	53	55	39	32	--	53	60	60	75	75	70	64
30..	54	45	43	34	--	--	53	61	75	73	70	64
31..	55	--	39	34	--	--	--	61	--	73	72	--
Average	60	48	37	36	43	50	52	61	68	71	70	69

TENNESSEE RIVER BASIN--Continued

3-4545. FRENCH BROAD RIVER AT HOT SPRINGS, N. C.

LOCATION.--At Hot Springs, Madison County, at bridge on U.S. Highways 25 and 70, a quarter of a mile upstream from Spring Creek.
DRAINAGE AREA.--1,567 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1946, October 1957 to September 1961.
REMARKS.--No discharge records available for this station.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 15, 1960.....		10	0.00	4.5	1.0	12	1.4	19	20	3.7	0.1	1.8	66	15	0	97	6.9	10
Nov. 15.....		11	.02	4.8	.9	15	1.3	22	25	4.3	.0	.9	77	16	0	110	6.9	20
Dec. 15.....		10	.01	3.5	1.4	13	1.4	18	22	3.8	.1	.8	65	14	0	103	6.3	15
Jan. 16, 1961.....		8.3	.05	3.6	1.1	8.8	1.8	13	16	2.5	.1	3.1	61	14	3	76	7.0	20
Feb. 15.....		9.5	.00	5.8	2.0	10	1.2	21	21	4.3	.1	.4	70	22	6	100	7.0	5
Mar. 17.....		9.8	.02	3.5	1.3	6.1	2.1	18	12	2.5	.0	.3	54	14	0	67	6.8	2
Apr. 18.....		9.0	.04	2.7	1.0	5.1	1.6	13	12	3.0	.0	.1	42	11	0	53	6.7	2
May 15.....		9.1	.04	3.0	1.2	6.1	1.7	14	13	3.0	.0	.0	a44	12	1	60	6.2	3
July 17.....		9.9	.09	3.8	1.1	9.6	1.5	19	18	3.1	.1	.3	58	14	0	86	6.2	10
Aug. 16.....		9.9	.08	4.0	1.2	9.8	1.4	18	16	3.2	.0	.8	73	15	0	85	6.6	18
Sept. 18.....		10	.02	3.4	1.1	11	1.2	17	18	3.9	.0	.3	60	13	0	82	6.6	18

a Calculated from determined constituents.

TENNESSEE RIVER BASIN--Continued

3-4570. PIGEON RIVER AT CANTON, N. C.

LOCATION.--At gaging station, 100 feet upstream from small tributary, 0.5 mile upstream from U.S. Highways 19 and 23 at Canton, Haywood County.
DRAINAGE AREA.--133 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1957 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 5, 1960	125	7.2	0.00	2.4	0.3	0.5	0.6	10	2.4	0.7	0.0	0.7	22	7	0	22	6.4	10
Nov. 2	132	7.0	.04	1.8	.4	.9	.7	10	2.0	.8	.0	.7	20	6	0	23	6.6	20
Dec. 6	89	7.5	.02	2.2	.2	1.7	.6	10	.8	.7	.0	.3	24	6	0	22	6.5	5
Jan. 4, 1961	120	7.0	.03	1.8	.4	1.5	.6	9	1.2	.7	.0	.4	22	6	0	21	6.6	5
Feb. 2	130	7.1	.01	1.4	.4	1.7	.6	8	2.0	.5	.0	.7	20	6	0	21	6.3	10
Mar. 6	390	6.7	.01	1.0	.7	1.1	.5	8	.8	.4	.0	.8	21	6	0	19	6.5	10
Apr. 5	347	6.4	.02	1.4	.4	1.6	1.2	8	1.6	2.0	.0	.7	19	5	0	23	6.2	5
May 3	250	7.1	.01	1.4	.6	.9	.6	9	1.6	1.0	.0	.7	20	6	0	21	6.5	2
June 5	234	6.5	.03	1.8	.4	1.1	.8	10	2.4	.5	.0	.3	24	6	0	20	6.4	10
July 7	257	7.0	.01	2.2	.3	1.3	.4	9	2.8	1.0	.0	.4	20	6	0	22	6.5	10
Aug. 2	169	6.9	.04	1.4	.6	1.2	1.4	10	2.0	1.4	.0	.3	23	6	0	24	6.4	10
Sept. 7	230	7.2	.03	1.4	.6	1.2	.7	9	1.2	1.8	.0	.2	a18	6	0	19	6.5	5

a Calculated from determined constituents.

TENNESSEE RIVER BASIN--Continued

3-4595. PIGEON RIVER NEAR HEPCO, N. C.

LOCATION.--At gaging station, 0.8 mile downstream from Jonathan Creek, 2.0 miles south of Hepco, Haywood County, and 2.4 miles upstream from Fines Creek.
DRAINAGE AREA.--350 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1956, October 1957 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 4, 1960	434	11	0.19	31	2.0	50	2.6	42	34	88	0.4	0.5	288	84	50	430	7.1	150
Nov. 3	274	10	.54	35	1.8	62	2.4	54	28	112	.5	.6	352	96	51	520	6.5	--
Dec. 5	230	11	.11	33	12	61	2.2	49	33	135	.5	.4	440	131	91	600	7.0	350
Jan. 4, 1961	328	9.5	.17	35	1.9	46	1.9	55	30	84	.4	.8	293	94	50	440	7.3	160
Feb. 2	317	10	.14	24	1.4	38	2.0	42	28	63	.3	1.3	212	66	31	342	6.4	200
Mar. 2	1,260	7.9	.03	9.7	1.2	14	1.0	17	11	25	.1	1.3	97	29	15	140	6.3	50
Apr. 5	796	8.1	.07	14	2.9	23	1.3	26	21	39	.2	.3	149	47	26	230	6.3	80
May 4	465	9.1	.15	29	1.3	46	1.6	58	23	78	.4	.3	255	79	32	380	7.1	200
June 2	452	9.4	.22	22	1.6	33	1.8	26	20	65	.3	.1	225	62	40	293	6.2	160
July 6	456	9.8	.10	29	1.2	36	1.7	44	22	68	.3	.3	243	77	41	338	6.8	140
Aug. 3	408	10	.23	22	1.7	57	2.7	54	26	80	.4	.5	271	62	18	400	6.3	240
Sept. 6	447	9.7	.32	32	1.0	41	2.0	57	23	74	.3	.6	271	84	38	383	6.4	240

TENNESSEE RIVER BASIN--Continued

3-4607.66. PIGEON RIVER AT WATERVILLE, N. C.

LOCATION.--From tailrace of Carolina Power and Light powerplant about 7 miles below Waterville Lake at Waterville, Haywood County.
DRAINAGE AREA.--536 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1957 to September 1961.
REMARKS.--No discharge records available for this station.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 18, 1960.....		9.6	0.43	26	1.7	40	1.9	48	16	74	0.3	0.5	235	71	32	360	6.8	200
Nov. 19.....		10	.51	20	7.3	44	2.0	44	22	82	.3	.4	240	80	44	385	7.4	250
Dec. 19.....		10	.47	35	2.0	52	2.5	55	30	96	.1	.3	316	96	50	480	6.9	240
Jan. 20, 1961.....		8.9	.61	25	2.0	35	1.8	47	24	59	.2	2.2	216	72	33	330	7.4	120
Feb. 15.....		8.1	.57	18	8.3	36	1.6	45	25	68	.3	.9	233	78	42	363	7.3	140
Mar. 18.....		8.5	.12	10	2.0	13	1.7	29	12	17	.1	1.0	96	34	10	135	6.8	40
Apr. 19.....		7.8	.10	11	1.7	13	1.0	26	9.6	23	.1	.7	94	34	12	138	7.0	50
May 13.....		7.9	.06	17	1.2	17	1.3	43	12	29	.2	.2	122	48	12	185	7.0	80
June 19.....		9.4	.24	19	1.5	26	1.8	34	15	50	.3	.1	171	54	26	245	7.4	120
July 15.....		9.6	.18	15	.9	23	1.4	29	13	40	.1	.3	146	42	18	206	7.2	140
Aug. 15.....		10	.31	21	1.8	38	2.0	42	21	64	.3	.7	195	58	24	329	6.9	180
Sept. 19.....		9.7	.47	24	1.4	35	1.7	45	19	61	.3	.7	220	65	28	310	6.5	140

TENNESSEE RIVER BASIN--Continued

3-4633. SOUTH TOE RIVER NEAR CELO, N. C.

LOCATION.--Temperature recorder at gaging station 800 feet upstream from county road bridge, 0.3 mile downstream from Whiteoak Creek, and 1.9 miles southeast of Celo, Yancey County.
DRAINAGE AREA.--43.4 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1958 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 78°F Aug. 1; minimum, 33°F on many days during December, January, and February.
EXTREMES, 1958-61.--Water temperatures: Maximum, 78°F Aug. 1, 1961; minimum, freezing point on several days during winter months.
REMARKS.--Recorder stopped; range in temperature Sept. 3-18, 55°F to 69°F.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 17, 1960.....	74.2	8.1	0.03	0.9	0.2	0.9	0.4	7	1.2	0.3	0.0	0.0	18	3	0	15	6.5	3
May 15, 1961.....	217		.02	1.5	.6	1.0	.5	9	.5	1.0	.0	.2		6	0	17	6.2	

TENNESSEE RIVER BASIN--Continued

3-4633. SOUTH TOE RIVER NEAR CELO, N. C.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Day	October		November		December		January		February		March		April		May		June		July		August		September	
	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
1..	61	57	52	47	36	33	39	37	37	34	48	45	52	46	53	50	64	58	65	60	78	69	66	63
2..	64	59	51	47	35	33	37	34	37	35	48	41	50	41	58	50	67	59	65	59	72	68	65	63
3..	66	61	51	47	34	33	36	33	35	33	48	40	50	43	57	47	69	61	64	61	73	67	--	--
4..	63	59	48	43	36	33	36	33	35	33	52	44	48	43	57	50	64	61	68	58	69	65	--	--
5..	60	57	49	44	38	34	36	33	34	33	53	49	50	42	54	50	63	60	66	59	72	64	--	--
6..	61	59	48	44	40	37	40	35	34	33	55	51	50	45	58	50	64	61	64	60	70	64	--	--
7..	61	59	44	41	43	40	38	34	34	33	54	51	51	42	59	55	67	60	63	60	69	62	--	--
8..	59	58	42	38	41	38	37	34	35	33	55	50	51	42	65	55	66	62	69	59	70	64	--	--
9..	61	57	45	40	38	35	34	33	37	35	50	40	49	44	62	58	65	61	69	61	69	65	--	--
10..	61	57	49	45	36	33	33	33	39	33	44	37	51	43	58	54	68	62	68	57	69	65	--	--
11..	60	55	46	42	38	35	34	33	42	36	46	39	51	41	54	51	68	62	62	57	70	65	--	--
12..	59	53	44	39	38	33	34	33	43	39	49	42	49	45	52	50	65	62	61	58	71	65	--	--
13..	59	54	44	40	33	33	35	33	42	37	49	46	46	43	56	50	66	62	67	59	73	65	--	--
14..	59	55	46	41	33	33	39	35	45	39	49	47	52	41	60	50	70	61	67	62	68	63	--	--
15..	59	56	46	41	34	33	42	39	43	40	50	42	50	46	60	53	66	61	67	62	67	60	--	--
16..	61	56	49	45	36	34	42	40	46	41	51	46	50	44	64	56	61	56	67	61	69	61	--	--
17..	59	55	49	46	35	33	41	37	45	40	49	42	51	41	63	55	60	55	71	63	71	63	--	--
18..	58	54	46	43	34	33	41	38	46	43	47	42	47	42	61	58	63	54	68	64	70	64	--	--
19..	57	54	46	42	36	33	40	38	45	42	53	42	50	43	65	57	62	54	68	62	70	64	56	56
20..	56	52	44	39	39	35	38	33	45	43	51	45	53	43	64	57	61	56	73	63	67	62	61	56
21..	52	47	46	42	37	34	34	33	43	41	49	45	53	46	62	57	57	55	70	64	62	59	63	57
22..	51	46	45	40	34	34	34	33	48	43	45	44	55	48	59	54	63	55	67	62	63	59	62	56
23..	52	47	47	44	34	34	34	33	49	46	48	44	57	53	59	55	60	56	69	62	67	62	65	58
24..	53	49	47	47	34	34	36	33	47	43	47	44	59	53	62	52	62	56	69	63	65	59	66	59
25..	50	45	49	45	34	33	34	33	47	41	50	41	58	52	60	54	63	56	73	65	60	59	65	60
26..	48	45	47	43	34	34	33	33	45	39	51	41	63	55	60	55	61	57	70	65	61	59	67	61
27..	50	47	45	43	35	34	33	33	47	41	51	45	58	51	58	50	59	56	69	64	63	59	65	59
28..	53	50	48	42	37	36	33	33	52	42	51	47	56	49	61	50	60	57	73	65	65	60	63	57
29..	51	47	54	46	39	36	33	33	--	--	54	48	55	45	60	53	63	56	71	66	66	62	61	55
30..	52	48	46	36	40	38	33	33	--	--	52	48	52	47	64	56	67	58	73	65	65	61	62	57
31..	51	50	--	--	38	34	35	33	--	--	52	48	--	--	64	54	--	--	76	67	67	61	--	--
Aver.	57	53	47	43	36	34	36	34	42	38	50	44	52	45	60	53	64	58	68	62	68	63	--	--

3-4855. DOE RIVER AT ELIZABETHTON, TENN.

LOCATION.--Temperature recorder at gaging station, 1,500 feet upstream from bridge on State Highway 91 at Elizabethton, Carter County, and 1 mile upstream from mouth.
DRAINAGE AREA.--137 square miles.
RECORDS AVAILABLE.--Water temperatures: February 1954 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 75°F July 22, minimum, 36°F Dec. 2-4, Jan. 23, 28-30.
EXTREMES, 1954-61.--Water temperatures: Maximum, 82°F July 14, 1954; minimum, freezing point on several days during December 1954 and January 1959.

Temperature (°F) of water, water year October 1960 to September 1961
(Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	66	66	66	64	64	65	64	65	64	64	63	62	62	63	62	63	62	62	60	59	54	52	54	54	53	50	51	53	54	54	54	60
Minimum	62	62	63	60	60	62	62	62	62	62	59	58	58	59	60	60	60	58	58	54	50	49	50	52	48	48	49	51	50	51	53	57
November																																
Maximum	53	53	53	50	48	47	46	44	46	47	47	46	46	47	49	50	52	50	47	46	47	46	48	50	51	51	50	51	52	48	--	49
Minimum	51	48	50	46	46	46	44	41	43	46	44	43	43	44	46	47	49	46	44	43	44	44	46	48	49	48	47	47	48	42	--	46
December																																
Maximum	42	39	39	40	40	41	45	45	43	41	42	42	39	37	38	38	38	38	38	40	40	39	37	38	39	39	39	39	40	41	41	40
Minimum	39	36	36	36	37	39	41	42	41	38	41	39	37	37	37	38	37	37	38	38	39	37	37	37	38	38	39	38	39	40	40	38
January																																
Maximum	41	41	40	39	39	40	41	41	41	39	39	39	39	41	42	42	42	42	42	41	38	37	37	38	37	37	37	37	37	37	38	39
Minimum	40	40	39	39	38	39	40	41	39	38	38	38	38	39	41	42	41	41	41	38	37	37	36	37	37	37	37	36	36	36	37	38
February																																
Maximum	38	39	39	38	38	38	38	38	38	39	41	43	44	44	44	45	46	48	48	48	48	51	52	50	50	44	47	48	--	--	--	44
Minimum	37	38	38	38	37	37	38	38	38	38	39	41	42	43	43	43	44	46	46	47	46	48	50	46	43	41	42	45	--	--	--	42
March																																
Maximum	48	48	47	52	54	55	57	57	52	45	57	51	51	51	50	51	49	48	51	55	53	54	53	50	52	53	54	53	57	56	54	52
Minimum	46	44	44	47	52	54	54	52	41	40	41	45	49	47	45	48	43	45	46	49	48	47	50	45	45	45	48	50	51	52	52	47
April																																
Maximum	53	49	47	46	46	48	48	49	47	45	49	51	49	52	55	55	47	46	46	52	53	56	57	61	59	63	58	58	55	53	--	52
Minimum	46	43	45	42	40	45	43	42	45	43	41	46	42	42	48	46	43	43	42	43	49	51	55	54	55	58	54	50	48	49	--	46
May																																
Maximum	55	57	58	58	57	63	64	69	66	60	59	59	61	65	63	65	65	64	65	65	63	62	65	64	62	62	57	61	62	65	66	62
Minimum	51	52	49	52	54	54	59	59	60	57	56	56	54	57	61	61	58	61	61	58	60	57	58	56	57	56	51	51	56	57	57	56
June																																
Maximum	68	71	70	70	68	67	70	71	70	71	74	72	70	72	70	64	65	67	68	66	66	65	64	67	68	65	68	70	71	73	--	69
Minimum	60	62	64	64	64	63	63	65	66	66	65	68	66	66	64	61	59	59	60	62	62	62	62	61	61	61	61	62	64	65	--	63
July																																
Maximum	73	73	72	73	72	71	70	71	71	69	67	68	71	73	73	72	72	71	71	74	74	75	71	71	73	72	71	73	71	71	72	72
Minimum	66	67	67	65	65	66	66	65	64	61	63	64	65	67	68	67	66	67	66	67	69	69	66	66	67	68	66	66	68	67	68	66
August																																
Maximum	71	70	70	69	69	69	68	69	68	67	69	68	69	68	69	70	69	71	71	69	68	68	70	69	65	65	66	68	70	71	70	69
Minimum	64	65	67	67	64	65	63	65	66	63	65	66	66	63	62	63	65	65	65	64	62	63	64	65	62	62	62	64	66	66	67	64
September																																
Maximum	71	71	73	71	71	73	72	72	73	72	72	72	72	70	67	62	61	60	62	63	65	65	68	69	69	68	66	64	65	65	--	68
Minimum	66	66	67	67	68	67	66	67	67	67	67	67	67	66	61	56	56	56	59	61	60	60	62	64	64	65	61	59	59	60	--	63

TENNESSEE RIVER BASIN--Continued

3-5105. TUCKASEGEE RIVER AT DILLSBORO, N. C.

LOCATION.--At gaging station, 0.4 mile downstream from Scott Creek and 0.5 mile downstream from U.S. Highway 23 at Dillsboro, Jackson County.
DRAINAGE AREA.--347 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1957 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 3, 1960	306	11	0.00	2.9	0.8	2.7	1.1	18	3.4	0.8	0.0	0.1	a32	10	0	36	6.4	5
Nov. 4	467	7.8	.04	2.1	.7	22	.9	31	27	1.7	.1	.3	103	8	0	120	6.4	120
Dec. 2	320	7.5	.09	2.6	.4	28	1.1	37	34	1.2	.2	.7	143	8	0	157	6.5	160
Jan. 5, 1961	382	9.0	.07	1.9	1.5	56	1.4	84	70	2.5	.2	1.6	276	10	0	250	6.8	280
Mar. 13	979	7.9	.02	1.8	.8	2.7	.6	12	4.8	1.0	.0	.1	31	8	0	29	6.5	10
Apr. 11	1,280	7.1	.01	1.3	.4	1.2	.6	8	2.4	1.0	.0	.0	20	4	0	23	6.4	5
May 18	847	7.6	.07	2.1	.5	5.7	1.2	13	7.9	1.5	.0	.4	44	7	0	40	6.9	20
June 9	778	6.8	.03	1.8	.3	2.0	.5	10	2.4	.7	.1	.2	32	6	0	24	6.3	20
July 24	544	9.3	.09	2.4	.9	11	1.0	22	14	1.2	.0	.7	80	10	0	77	6.2	75
Aug. 29	1,120	6.8	.03	1.3	.6	1.9	.9	10	1.6	1.8	.0	.3	28	6	0	25	6.3	15
Sept. 26	526	7.6	.09	1.9	.6	11	.8	22	12	.3	.0	.4	72	8	0	72	6.6	40

a Calculated from determined constituents.

TENNESSEE RIVER BASIN--Continued

3-5130. TUCKASEGEE RIVER AT BRYSON CITY, N. C.

LOCATION.--At bridge on State Highway 288, at Bryson City, Swain County, 400 feet upstream from gaging station, and 0.6 mile downstream from Deep Creek.
DRAINAGE AREA.--655 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1951, October 1957 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 3, 1960.....	527	9.5	0.02	2.5	0.5	13	1.3	25	16	1.5	0.1	0.4	66	8	0	81	6.7	60
Nov. 18.....	662	8.9	.02	2.1	.9	29	1.3	43	34	2.0	.2	.8	137	8	0	160	6.6	240
Dec. 1.....	740	7.6	.03	2.1	.4	14	1.0	22	18	.5	.1	.2	70	6	0	85	7.2	80
Jan. 3, 1961.....	1,110	7.3	.01	1.8	.4	1.7	.6	9	2.8	.4	.0	.2	19	6	0	25	6.9	5
Feb. 9.....	1,040	6.9	.05	1.8	.6	9.5	1.2	16	16	2.0	.1	1.6	65	7	0	73	6.8	40
Mar. 27.....	1,800	7.6	.03	1.6	.8	1.6	1.2	9	1.4	2.0	.0	.5	23	7	0	24	6.2	1
Apr. 28.....	1,700	7.0	.06	1.6	.7	7.0	.7	15	8.6	2.0	.1	.5	47	7	0	49	6.0	30
May 31.....	1,290	7.6	.00	1.9	.6	9.5	1.5	19	10	2.0	.0	.5	59	8	0	63	6.2	50
June 27.....	1,770	7.3	.06	1.6	.4	6.6	.6	14	8.0	1.3	.1	.5	41	6	0	42	6.3	30
July 3.....	1,520	7.6	.00	1.9	.5	1.3	.8	10	1.6	.6	.0	.5	20	7	0	22	6.5	5
Aug. 14.....	665	7.9	.04	1.8	.3	2.4	.8	11	1.8	1.5	.0	.6	26	6	0	26	6.3	5
Sept. 28.....	722	7.8	.03	1.7	.4	12	1.0	23	9.6	.9	.0	.7	70	6	0	72	6.5	90

TENNESSEE RIVER BASIN--Continued

3-5820. ELK RIVER ABOVE FAYETTEVILLE, TENN.

LOCATION.--Temperature recorder at gaging station, 100 feet downstream from highway bridge, 1.8 miles southeast of Fayetteville, Lincoln County, and 4 miles upstream from Norris Creek.
DRAINAGE AREA.--827 square miles.
RECORDS AVAILABLE.--Water temperatures: June 1960 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 82°F Aug. 1, 2; minimum, 37°F Jan. 28, 29.
EXTREMES, June 1960 to September 1961.--Water temperatures: Maximum, 84°F Aug 7, 8, 1960; minimum, 37°F Jan. 28, 29, 1961.

Temperature (°F) of water, water year October 1960 to September 1961
(Recorder with temperature attachment, continuous ethyl alcohol-actuated thermorgaph)

Month	Day																															Average
	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	
October																																
Maximum	69	69	69	69	69	68	69	70	69	68	68	67	67	66	66	66	66	66	65	64	59	57	57	58	57	57	58	58	57	58	58	64
Minimum	67	67	68	68	68	68	68	69	68	68	67	66	65	65	65	66	65	64	64	59	57	56	56	56	56	57	57	56	55	57	57	63
November																																
Maximum	57	56	55	55	54	52	51	50	51	51	50	48	48	50	53	55	55	54	53	51	51	51	54	54	55	55	54	57	57	57	--	53
Minimum	56	55	54	53	52	50	50	49	50	49	48	47	47	48	50	53	54	53	51	50	50	50	52	54	54	54	54	54	55	51	--	52
December																																
Maximum	51	48	46	46	46	48	49	49	48	47	48	48	46	43	41	42	41	41	41	43	43	42	40	40	42	45	45	44	45	47	47	45
Minimum	48	46	45	45	45	46	48	48	47	45	46	46	43	41	41	41	41	40	40	41	42	40	39	39	40	42	44	44	44	45	45	43
January																																
Maximum	46	46	45	44	43	43	44	44	44	42	42	43	43	46	47	47	47	46	45	44	43	41	40	41	40	40	40	39	38	39	40	43
Minimum	45	45	44	43	43	42	43	44	42	41	41	42	43	43	46	46	46	44	44	43	41	39	39	40	39	40	39	37	37	38	38	42
February																																
Maximum	42	43	43	43	42	42	44	45	45	44	44	46	48	50	51	52	52	54	54	52	51	54	54	54	52	49	52	54	--	--	--	48
Minimum	40	42	43	42	41	42	42	44	44	43	43	44	46	48	50	51	52	52	52	50	50	51	53	52	49	48	49	52	--	--	--	47
March																																
Maximum	54	53	52	54	57	59	59	58	56	53	53	54	55	55	55	55	54	53	54	55	55	56	54	53	53	55	56	57	57	56	55	55
Minimum	53	51	51	52	54	57	58	56	52	50	51	53	54	54	54	54	53	52	52	54	55	54	53	52	51	53	55	56	56	54	54	53
April																																
Maximum	55	54	54	54	54	54	54	54	54	54	54	55	55	55	58	58	58	58	59	61	62	63	65	67	67	67	66	65	64	63	--	59
Minimum	54	53	54	53	54	54	53	53	53	54	53	54	55	54	55	56	56	56	57	59	61	61	62	65	66	65	65	64	62	61	--	57
May																																
Maximum	63	62	62	63	64	65	68	68	68	66	63	64	66	68	69	69	67	67	67	68	68	68	65	64	65	65	63	63	64	67	68	66
Minimum	62	61	60	61	62	64	65	67	65	63	62	62	63	65	67	67	66	65	65	66	67	65	63	63	64	63	62	61	62	64	66	64
June																																
Maximum	70	72	73	74	73	72	71	70	71	72	72	72	71	69	69	68	65	64	66	65	65	65	65	65	66	67	67	68	69	70	--	69
Minimum	67	69	70	72	72	71	68	68	70	70	71	71	69	68	68	65	54	64	64	65	64	64	65	65	65	66	66	66	67	69	--	67
July																																
Maximum	72	73	72	72	74	74	74	75	75	75	74	73	74	75	75	75	75	76	76	78	77	78	77	77	78	78	78	78	79	80	81	76
Minimum	70	71	71	70	72	73	72	73	74	73	73	72	72	73	74	75	74	74	76	76	76	76	76	76	76	77	77	76	77	78	79	74
August																																
Maximum	82	82	81	80	80	80	78	78	78	79	80	80	80	79	78	76	77	77	77	77	76	75	74	74	74	73	74	76	77	78	78	78
Minimum	80	80	79	78	78	78	78	77	77	77	78	79	78	77	76	75	75	75	76	76	75	73	74	74	73	73	73	74	75	76	76	76
September																																
Maximum	76	74	74	75	75	77	78	78	78	78	78	79	78	78	75	72	70	68	68	69	70	72	73	74	74	74	72	71	70	70	--	74
Minimum	74	74	74	74	74	76	76	76	76	76	77	77	77	75	72	69	67	67	68	68	68	70	72	73	74	72	71	70	69	70	--	73

TENNESSEE RIVER BASIN--Continued

3-6095. TENNESSEE RIVER AT KENTUCKY DAM, NEAR PADUCAH, KY.

LOCATION.--At tailrace of powerplant at Kentucky Dam at Gilbertsville, Marshall County, 3,500 feet upstream from base gaging station, 3.0 miles upstream from Shadie Creek, and 16 miles east of Paducah, McCracken County.
DRAINAGE AREA.--40,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to August 1950, October 1951 to September 1954, October 1956 to September 1961.
Water temperatures: October 1952 to September 1954, October 1956 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 122 ppm Jan. 1-31; minimum, 76 ppm May 1-29, Aug. 1-21, 24-31.
Hardness: Maximum, 78 ppm Feb. 1-28; minimum, 54 ppm May 1-29.
Specific conductance: Maximum daily, 290 micromhos Jan. 18; minimum daily, 119 micromhos Mar. 18.
Water temperatures: Maximum, 85°F Aug. 20, Sept. 7-11; minimum, 34°F Jan. 29 to Feb. 4, 14, 15.
EXTREMES, 1952-54, 1956-61.--Dissolved solids: Maxium, 127 ppm Dec. 11-20, 1956; minimum, 63 ppm May 21-31, 1953.
Hardness: Maximum, 86 ppm Jan. 1-10, 1954; minimum, 48 ppm Mar. 11-20, Apr. 2-10, 1953.
Specific conductance: Maximum daily, 290 micromhos Jan. 18, 1961; minimum daily, 107 micromhos Apr. 9, 10, 1953.
Water temperatures: Maximum, 88°F June 11, 1958; minimum, freezing point Feb. 20, 1958.
REMARKS.--Chemical quality samples prior to 1952 were collected at auxiliary gaging station, 17.0 miles downstream. Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 1-31, 1960.....	44,450	8.4				20	3.7	7.4	1.1	60		13	12	0.2	1.3	0.50	98	65	16		174		4		0.0
Nov. 1-8, 10-28.....	48,190	6.7				21	3.8	9.0	1.6	64		15	13	.1	1.2	.56	112	68	16		188		5		.1
Dec. 1-31....	48,140	7.6				23	4.2	8.5	.9	63		14	17	.2	1.4	.27	115	74	23		200		5		.0
Jan. 1-31, 1961.....	60,140	6.7				24	3.6	10	.5	76		14	16	.2	1.5	2.5	122	75	13		210		5		.0
Feb. 1-28....	95,250	4.8				24	4.4	7.4	1.2	70		14	12	.2	1.9	.45	114	78	20		193		4		.0
Mar. 1-31....	179,500	5.7				18	2.7	4.0	1.2	57		11	6.0	.1	2.2	.50	90	56	10		136		30		.0
Apr. 1-30....	63,370	6.1				18	2.7	4.3	1.4	58		11	5.0	.1	2.2	.40	83	56	8		131		16		.0
May 1-29.....	47,120	5.1				18	2.2	3.3	1.0	58		6.2	5.0	.1	1.6	.80	76	54	8		133		5		.0

TENNESSEE RIVER BASIN--Continued

3-6095. TENNESSEE RIVER AT KENTUCKY DAM, NEAR PADUCAH, KY.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics	
																		Calcium, magnesium	Noncarbonate					Phenols as C_6H_5HO	Alkylbenzene sulfonate (ABS)
June 2-30, 1961.....	63,400	2.8				18	3.2	5.6	1.1	65		11	6.5	0.2	1.2	0.72	79	58	5		147		2		0.0
July 1-31....	49,740	2.3				18	3.1	4.0	1.1	60		11	6.0	.2	1.1	.25	80	58	9		138		3		.0
Aug. 1-21, 24-31.....	46,480	4.9				18	3.2	4.3	1.2	59		11	7.0	.1	1.0	.21	76	58	10		139		5		.0
Sept. 1-30...	42,500	5.8				16	3.6	5.7	1.3	55		12	9.5	.2	1.4	.25	82	55	10		146		5		.0
Weighted average....	a65,500	5.5				20	3.3	5.8	1.1	62		12	9.1	0.2	1.7	0.62	94	63	12		159		11		--
Time-weighted average....	--	5.6				20	3.4	6.1	1.1	62		12	9.6	0.2	1.5	0.62	94	63	12		161		8		--
Tons per day.	--	982				3,498	591	1,040	202	11020		2,120	1,610	27	295	110	16,800	--	--		--		--		--

a Mean discharge based on 365 days; mean discharge for 357 days of chemical analyses, 65,900 cfs.

TENNESSEE RIVER BASIN--Continued

3-6095. TENNESSEE RIVER AT KENTUCKY DAM, NEAR PADUCAH, KY.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	80	80	80	78	78	78	78	78	78	72	72	72	70	70	69	69	69	70	70	67	67	67	67	67	66	66	--	64	64	62	60	71
November	61	61	61	60	60	59	59	60	--	54	54	54	54	54	59	59	54	54	54	54	54	55	55	58	54	55	57	57	--	--	--	57
December	55	55	55	54	--	--	52	54	54	52	52	--	--	--	52	48	52	48	48	--	--	40	40	40	40	40	38	39	40	40	40	--
January	40	40	40	40	43	42	43	42	42	45	45	40	39	39	40	40	45	45	45	45	45	38	38	38	38	38	36	35	34	34	34	40
February	34	34	34	34	35	35	35	35	35	36	36	36	36	34	34	--	--	--	43	43	43	43	43	43	44	45	48	48	--	--	--	39
March	48	45	45	45	50	51	56	56	50	52	51	52	54	54	55	58	58	58	51	51	--	--	54	54	54	54	54	54	54	56	54	53
April	54	54	53	--	58	58	58	58	58	--	57	60	60	59	59	53	53	58	58	55	55	55	56	60	58	58	60	60	60	62	--	57
May	62	60	60	62	62	62	62	62	58	--	65	65	66	--	63	65	--	--	--	70	70	70	61	61	70	60	70	70	70	--	--	--
June	--	70	70	70	--	70	70	--	--	--	72	72	78	80	72	73	73	73	73	79	79	75	75	--	75	75	82	82	82	82	--	--
July	82	82	--	--	--	--	--	80	80	--	--	--	81	81	81	81	--	--	--	84	84	84	84	--	84	84	84	84	84	84	84	--
August	84	84	83	83	83	84	84	82	82	--	--	--	--	84	84	84	83	83	84	85	84	--	--	80	81	81	81	82	--	--	83	--
September	82	82	82	82	82	82	85	85	85	85	85	83	80	78	78	78	78	78	78	78	76	76	76	76	76	75	76	76	76	76	--	80

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OHIO RIVER MAIN STEM

3-6115. OHIO RIVER AT METROPOLIS, ILL.

LOCATION.--Temperature recorder at gaging station at Paducah and Illinois Railroad bridge at Metropolis, Massac County, 9.5 miles downstream from Tennessee River, and 37 miles upstream from mouth.
DRAINAGE AREA.--203,000 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1952 to September 1953.
Water temperatures: March 1954 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 85°F Aug. 8; minimum, 34°F Jan. 31 to Feb. 8, Feb. 11-13.
EXTREMES, 1954-61.--Water temperatures: Maximum, 88°F Aug. 3-6, 1955; minimum, freezing point Feb. 20-24, 1958.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	76	76	75	75	74	73	73	72	72	71	71	71	71	71	71	71	71	71	71	71	68	67	67	66	65	65	65	64	63	63	62	70
Minimum	76	75	75	74	73	73	72	72	71	71	71	71	71	71	71	71	71	71	71	68	67	67	66	65	65	65	64	63	63	62	62	69
November																																
Maximum	62	61	61	60	60	60	60	58	58	57	54	53	53	52	52	53	53	53	53	53	53	53	52	52	52	52	52	53	53	52	--	55
Minimum	61	61	60	60	60	60	58	58	57	54	53	53	52	52	52	52	53	53	53	53	53	52	52	52	52	52	52	52	52	52	--	55
December																																
Maximum	52	52	52	51	50	50	49	49	48	47	47	47	47	46	45	43	43	42	41	41	41	41	41	40	36	35	35	35	36	36	36	44
Minimum	52	52	51	50	50	49	49	48	47	47	47	47	46	45	43	43	42	41	41	41	41	41	40	36	35	35	35	35	35	36	36	43
January																																
Maximum	36	36	36	36	35	35	35	35	35	35	35	35	35	36	36	36	36	36	36	36	36	36	36	35	35	35	35	35	35	35	35	35
Minimum	36	36	36	35	35	35	35	35	35	35	35	35	35	35	36	36	36	36	36	36	36	36	35	35	35	35	35	35	35	35	34	35
February																																
Maximum	34	34	34	34	34	34	34	35	35	35	35	34	36	36	36	37	38	40	40	41	41	42	43	43	43	44	44	44	--	--	--	38
Minimum	34	34	34	34	34	34	34	34	35	35	34	34	34	36	36	36	37	38	40	40	41	41	42	43	43	43	44	44	--	--	--	37
March																																
Maximum	44	44	44	45	46	47	48	48	48	48	48	48	49	49	49	49	49	49	49	49	49	49	49	49	48	48	48	49	49	49	49	48
Minimum	44	44	44	44	45	46	47	48	48	48	48	48	48	49	49	49	49	49	49	49	49	49	49	48	48	48	48	48	49	49	49	48
April																																
Maximum	49	49	49	49	49	50	50	50	50	50	50	50	50	50	50	50	52	51	51	51	51	51	52	54	55	56	56	56	57	57	--	52
Minimum	49	49	49	49	49	49	50	50	49	49	50	50	50	50	50	50	50	50	51	51	51	51	51	52	54	55	56	56	56	57	--	51
May																																
Maximum	58	58	58	58	58	59	59	60	60	60	60	61	62	64	65	65	65	66	66	66	67	67	67	67	67	67	67	67	67	67	69	63
Minimum	57	58	58	58	58	58	59	59	60	60	60	60	61	62	64	65	65	65	66	66	66	67	67	67	67	67	67	67	67	67	67	63
June																																
Maximum	70	71	72	73	74	75	75	75	75	76	76	77	78	78	78	76	76	76	75	75	75	75	74	74	74	74	75	76	77	78	--	75
Minimum	69	70	71	72	73	74	75	75	75	75	76	76	77	78	76	76	76	75	75	75	75	74	74	74	74	74	74	75	76	77	--	75
July																																
Maximum	79	79	79	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	81	81	81	81	81	81	81	81	81	82	82	83	80
Minimum	78	79	79	79	80	80	80	80	80	80	80	80	80	80	80	79	79	80	80	80	81	81	81	81	81	81	81	81	81	82	82	80
August																																
Maximum	84	84	84	84	84	84	84	85	84	84	84	83	83	83	82	82	82	82	82	82	82	81	80	79	78	78	78	78	79	80	80	82
Minimum	83	84	84	84	84	84	84	84	84	84	83	83	83	82	82	82	82	82	82	82	81	80	79	78	78	78	78	78	78	79	80	82
September																																
Maximum	81	81	81	81	81	81	81	81	82	82	82	82	82	82	80	79	78	78	78	77	76	76	76	76	76	76	76	76	75	74	--	79
Minimum	80	81	81	81	81	81	81	81	81	81	82	82	82	80	79	78	78	78	77	76	75	75	76	76	76	76	76	75	74	73	--	78

3-6125. OHIO RIVER AT LOCK AND DAM 53, NEAR GRAND CHAIN, ILL.

LOCATION.--About 1,500 feet upstream from dam, lock and dam 53 (mile 962.6) near Grand Chain, Pulaski County, 7,300 feet downstream from Bledsoe Creek, 18.5 miles downstream from gaging station at Metropolis, and 29.7 miles downstream from Tennessee River.
DRAINAGE AREA.--203,100 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1954 to September 1961.
Water temperatures: October 1954 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 271 ppm Jan. 1-31; minimum, 150 ppm Sept. 1-30.
Hardness: Maximum, 157 ppm Jan. 1-31; minimum, 98 ppm Oct. 1-31.
Specific conductance: Maximum daily, 563 micromhos Jan. 8; minimum daily, 190 micromhos May 17, 18.
Water temperatures: Maximum, 84°F Aug. 2, 14; minimum, freezing point on several days during December to February.
EXTREMES, 1954-61.--Dissolved solids: Maximum, 310 ppm Dec. 1-9, 1958; minimum, 128 ppm Mar. 11-20, 1955.
Hardness: Maximum, 192 ppm Dec. 1-9, 1958; minimum, 84 ppm Mar. 11-20, 1955, Feb. 11-20, 1957.
Specific conductance: Maximum daily, 628 micromhos Nov. 9, 1959; minimum daily, 170 micromhos Feb. 9, 1957.
Water temperatures: Maximum, 87°F Aug. 5, 1955; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio. Records of discharge are given for gaging station at Metropolis, Ill.

Chemical analyses, in parts per million, water year October 1960 to Sepember 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics: Phenols as C_6H_5OH	Organics: Alkylbenzene sulfonate (ABS)
Oct. 1-31, 1960.....	79,430	5.6				29	6.3	13	2.0	75		36	18	0.3	1.9	0.45	154	98	37		272		5		0.1
Nov. 1-30....	100,200	6.6				34	8.2	18	1.8	82		50	25	.3	2.3	.04	205	119	52		331		5		.1
Dec. 1-19, 23-31.....	111,100	4.5				36	8.2	20	1.9	84		51	29	.4	2.9	.24	215	124	54		351		7		.1
Jan. 1-31, 1961.....	187,100	5.4				45	11	24	.9	92		81	34	.2	4.4	.30	271	157	82		437		18		.1
Feb. 1-28....	256,400	6.1				34	8.6	14	2.0	79		50	23	.3	4.1	.46	202	121	56		315		7		.0
Mar. 1-31....	790,800	6.4				31	8.4	8.1	2.1	74		48	12	.2	5.2	.50	164	112	52		274		20		.0
Apr. 1-14, 25-30.....	470,900	6.6				35	9.4	9.7	1.3	88		51	13	.1	4.6	.40	176	126	54		296		12		.0
May 1-29.....	679,300	6.1				28	8.3	5.6	1.9	80		39	7.5	.1	3.5	.25	158	104	38		243		45		.0
June 2-30....	299,800	6.9				42	11	11	2.2	107		63	15	.2	3.9	.16	223	150	62		354		5		.0
July 1-31....	164,800	3.7				37	9.4	11	1.8	97		53	14	.2	3.0	.14	191	131	52		314		4		.1
Aug. 1-31....	157,700	6.5				36	9.0	13	2.3	88		55	18	.2	3.4	.16	191	127	55		321		10		.0
Sept. 1-30...	88,580	4.0				30	7.6	10	1.8	84		38	14	.2	2.0	.18	150	106	37		264		3		.0
Weighted average.....	[a]281,100	6.0				34	8.9	11	1.9	84		50	15	0.2	4.0	0.32	184	120	52		298		19		--
Time-weighted average.....	--	5.7				35	8.8	13	1.8	86		51	19	0.2	3.4	0.27	192	123	53		315		12		--
Tons per day.	--	4512				25080	6653	7970	1403	62600		37440	11300	141	2290	242	137000	--	--		--		--		--

a Mean discharge based on 365 days; mean discharge for 349 days of actual sampling, 276,600 cfs.

OHIO RIVER MAIN STEM--Continued

3-6125. OHIO RIVER AT LOCK AND DAM 53, NEAR GRAND CHAIN, ILL.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	60	64	67	66	69	70	70	70	70	71	68	68	68	68	68	69	70	69	69	65	64	64	64	63	62	61	60	60	60	60	60	66
November	60	60	60	60	58	58	58	57	61	55	55	55	55	55	55	56	55	53	53	53	53	53	53	53	52	52	52	52	51	50	--	55
December	48	49	48	48	47	48	47	46	45	45	45	45	40	38	37	37	37	40	40	--	--	--	34	34	33	34	34	34	32	38	38	41
January	36	38	36	38	36	37	37	38	36	36	37	37	38	38	39	40	39	38	37	36	34	32	32	--	--	--	34	34	33	32	32	36
February	32	32	32	32	32	32	32	32	32	34	32	32	35	36	38	40	42	38	45	44	42	42	45	44	43	44	44	44	--	--	--	38
March	44	44	44	45	47	47	47	48	48	49	49	49	49	49	49	49	49	49	49	49	49	48	48	48	48	48	48	49	50	50	50	48
April	50	50	50	50	50	50	50	50	50	50	50	50	50	50	--	--	--	--	--	--	--	--	--	--	58	57	58	55	55	56	--	--
May	58	47	49	47	58	59	52	58	59	49	46	59	60	59	57	60	62	60	58	54	59	60	61	61	61	60	59	61	62	--	--	57
June	--	62	64	--	74	74	73	72	72	72	72	72	72	72	71	71	70	70	70	70	70	70	70	70	70	70	68	70	70	76	--	71
July	76	76	76	76	76	76	75	76	77	78	78	79	79	76	79	79	79	79	80	80	80	79	80	80	80	80	80	80	80	81	81	78
August	82	84	83	83	83	83	83	82	82	83	82	83	83	84	82	82	83	81	81	83	82	83	76	80	74	73	80	81	82	82	82	82
September	80	78	76	77	78	76	78	81	82	80	79	78	78	76	78	75	74	75	74	73	74	76	77	74	75	75	73	74	72	73	--	76

MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color
OHIO RIVER MAIN STEM																					
3-125. ALLEGHENY RIVER NEAR KINZUA, PA.																					
Oct. 13,1960.	250	--		--	--	--	--	A80	--	94	23	165	--	0.0	440	160	83		723	7.8	1
Nov. 1.....	270	0.9		0.02	0.00	52	11	102	2.0	88	25	208	0.1	.2	470	175	103		856	7.6	2
Nov. 3.....	270	12		.01	.03	78	14	172	2.2	87	35	350	.1	.2	793	252	181		1340	7.6	3
Dec. 30.....	220	11		.00	--	61	9.1	107	2.0	96	27	216	--	1.8	496	190	111		901	7.5	3
Feb. 16,1961.	330	8.1		.02	--	73	7.8	133	3.0	70	21	292	--	1.5	624	214	157		1110	6.8	3
Mar. 23.....	6400	15		.00	--	13	2.3	15	1.3	28	15	24	--	1.4	108	42	19		162	7.2	3
Apr. 28.....	21900	--		--	--	--	--	A5.3	--	12	12	10	--	2.4	--	27	17		96	6.5	8
June 1.....	2320	4.5		.02	.00	20	4.6	34	2.0	29	14	75	.1	.6	233	69	45		313	7.1	5
July 13.....	590	3.0		.00	.00	42	6.8	76	3.0	54	14	170	.2	1.3	404	133	89		674	6.7	3
Sept. 14.....	684	5.7		.00	.00	34	4.0	50	2.5	60	14	101	.2	.5	274	102	53		460	7.1	3
3-160. ALLEGHENY RIVER AT WEST HICKORY, PA.																					
Nov. 1, 1960.	480	0.4		0.00	0.00	44	10	61	2.0	100	23	116	0.1	0.7	317	151	69		579	7.2	2
FRENCH CREEK BASIN																					
3-240. FRENCH CREEK AT UTICA, PA.																					
Nov.10,1960 B.	402	--		--	--	--	--	6.9	--	108	32	6.0	--	0.6	--	116	28		250	7.5	3
Nov. 10 C.....	402	--		--	--	--	--	7.6	--	110	31	8.0	--	.4	--	118	28		247	7.9	4
Dec. 22.....	210	7.1		0.00	0.00	38	7.9	8.0	1.9	102	44	8.6	0.1	2.6	168	128	44		275	7.3	3
Feb. 2,1961...	260	11		.02	--	35	6.4	8.8	1.3	100	35	8.5	--	3.0	164	114	32		260	7.4	2
Feb. 24.....	8200	--		--	--	--	--	4.4	--	32	22	5.0	--	4.4	88	50	24		123	7.2	1
Apr. 6.....	3520	4.7		.00	--	19	3.4	6.0	1.3	48	24	5.0	--	2.0	95	62	22		150	7.0	3
June 13.....	977	2.4		.02	.02	27	4.9	3.8	1.5	86	19	3.5	.3	1.4	139	88	17		192	7.5	15
July 12.....	201	3.9		.02	.00	35	6.9	8.8	1.0	110	25	8.3	.2	2.1	155	116	26		249	7.7	5
Aug. 17.....	165	4.8		.00	.00	37	6.4	8.1	1.8	114	26	7.0	.1	3.7	172	119	26		263	7.4	3

A Sodium and potassium calculated as sodium (Na).
B Center.
C Left and right sides.

MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color
OHIO RIVER MAIN STEM--Continued																					
3-255. ALLEGHENY RIVER AT FRANKLIN, PA.																					
Nov. 2,1960	925	2.2		0.00	0.00	36	7.4	9.8	1.5	118	25	9.8	0.1	1.1	150	121	24		266	7.2	2
3-315. ALLEGHENY RIVER AT PARKERS LANDING, PA.																					
Nov. 2,1960	1530	1.9		0.14	0.00	36	10	34	1.0	64	57	60	0.1	0.5	240	131	79		416	7.1	2
REDBANK CREEK BASIN																					
3-318. MILL CREEK AT ALLENS MILLS, PA.																					
Oct. 14,1960	0.6	--		--	--	--	--	16	--	98	90	5.0	--	0.9	--	146	66		337	7.6	10
OHIO RIVER MAIN STEM																					
COWANSHANNOCK CREEK NEAR KITTANNING, PA																					
Nov. 23,1960	--	7.5		0.06	0.10	41	12	52	2.0	26	213	16	0.1	1.2	357	152	131		554	6.8	3
KISKIMINETAS RIVER BASIN																					
3-488. PATTERSON CREEK NEAR WORTHINGTON, PA.																					
Oct. 14,1960	0.4	--		--	--	--	--	22	--	117	123	18	--	0.5	--	202	106		478	7.7	3
OHIO RIVER MAIN STEM																					
3-495. ALLEGHENY RIVER AT NATRONA, PA.																					
Nov. 2, 1960	2420	6.4		0.02	5.0	57	20	42	3.0	4	242	44	0.2	0.5	430	224	221		648	5.0	3
CHARTIERS RIVER BASIN																					
3-496. CHARTIERS RUN NEAR LEECHBURG, PA.																					
Oct. 14,1960	0.1	--		--	--	--	--	27	--	136	36	14	--	0.4	--	110	0		315	7.9	4
PINE CREEK BASIN																					
3-497. NORTH FORK PINE CREEK NEAR WEXFORD, PA.																					
Oct. 13,1960	0.1	--		--	--	--	--	49	--	99	42	107	--	0.4	--	170	89		559	7.2	3

MONONGAHELA RIVER BASIN

3-728.5. SOUTH FORK TENMILE CREEK NEAR ROGERSVILLE, PA.

Oct. 19, 1960	0.9							6.4		A126	24	5.5		0.4		126	20		262	8.5	3

3-748. LICK RUN AT HOPWOOD, PA.

Oct. 19, 1960	0.3							21		47	24	35		0.7		68	30		248	7.7	1

3-812. DRAKE RUN NEAR CONFLUENCE, PA.

Oct. 19, 1960	1.2							0.9		5	6.3	1.0		0.3		10	6		28	6.2	2

3-835. YOUGHIOGHENY RIVER AT SUTERSVILLE, PA.

Oct. 24,1960B	1030							20		7	103	3.0		1.3	--	74	69	--	244	6.2	1
Oct. 24C.....	1030							--		0	395	11		.7	--	215	215	--	958	3.4	1
Dec. 2D.....	925							10		3	87	3.0		1.6	142	76	74	--	215	5.6	1
Dec. 2C.....	925							--		0	349	14		.8	--	220	220	--	808	3.8	1
Mar. 17,1961B	8660							3.2		3	32	2.0		4.0	--	35	33	--	104	5.4	2
Mar. 17C.....	8660							9.4		2	106	4.0		3.9	--	100	99	--	277	5.0	3
Apr. 24.....	10400							3.7		5	44	2.0		3.9	--	48	44	--	135	5.8	3
May 26D.....	2430							6.9		1	69	1.5		2.2	--	62	61	0.3	192	4.8	5
May 26C.....	2430							--		0	352	6.0		3.5	--	250	250	1.0	830	3.8	7
June 30.....	1660							--		0	122	3.5		.8	202	96	96	.2	324	4.4	3
June 30.....	1660							--		0	588	12		.7	--	365	365	--	1350	3.2	3
Aug. 3.....	3290	4.7		0.00	0.00	15	5.0	7.5	2.0	4	65	3.0	0.2	1.6	113	58	55	--	172	6.0	3
Sept. 7D.....	1450							10		4	65	2.5		1.7	--	54	51	--	173	5.8	4
Sept. 7C.....	1450							--		0	211	8.0		.7	--	122	122	.5	547	3.6	5

3-850. MONONGAHELA RIVER AT BRADDOCK, PA.

Oct. 10,1960	2710	8.5	1.0	0.02	1.1	42	11	29	3.0	0	211	8.5	0.2	3.2	--	150	150	0.2	472	4.4	2
Apr.3, 1961.	25000	7.1	--	.00	--	31	7.4	13	2.0	14	109	5.0	--	2.3	190	108	97		297	6.4	5
June 22.....	9300	7.9	--	.01	.45	24	7.5	15	2.0	5	108	4.5	.2	1.4	215	91	87		286	5.9	2
July 17.....	5700	8.6	.2	.00	.03	35	11	25	3.0	2	167	8.0	.1	.5	273	133	131		402	5.2	3

BEAVER RIVER BASIN

3-1061. WOLF CREEK NEAR GROVE CITY, PA.

Oct.13,1960	0.3							4.1		163	26	3.0		0.7		156	23		304	7.9	5

RACCOON RIVER BASIN

3-1078. SERVICE CREEK NEAR SHIPPINGPORT, PA.

Oct.13,1960	0.1							15		136	34	5.0		0.2		122	11		291	7.7	5

A Includes 4 parts per million of carbonate (CO_3).
B Left side.
C Right side.
D Left side and center.

MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Discarge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Dissolved oxygen: ppm	Dissolved oxygen: Percent saturation
FISHING CREEK BASIN																										
3-1143. FISHING CREEK NEAR NEW MARTINSVILLE, W. VA.																										
Oct. 1, 1960.		3.1		0.30	0.28	26	6.1	21	2.2		75	0	23	40	0.2	0.2		164	90	28		304	7.4	6		
May 22, 1961.		1.9		.18	.08	20	4.5	8.1	1.4		55	0	26	11	.0	.1		106	68	24		180	7.1	2		
MIDDLE ISLAND CREEK BASIN																										
3-1145. MIDDLE ISLAND CREEK AT LITTLE, W. VA.																										
Oct. 1, 1960.		3.7		0.32	0.31	17	4.4	14	2.0		51	0	16	24	0.2	0.2		112	60	18		197	7.2	6		
May 25, 1961.		1.2		.73	.04	16	4.7	12	1.6		46	0	18	22	.1	.1		102	60	22		187	7.1	2		
GUYANDOTTE RIVER BASIN																										
3-2027. CLEAR FORK AT OCEANA, W. VA.																										
Oct. 5, 1960.				0.31	0.28						78	0	225	16	0.2	1.4			207	143		651	6.7			
May 3, 1961..				.15	.09						5	0	46	1.0	.0	1.2			50	46		128	6.1			
3-2030. GUYANDOTTE RIVER AT MAN, W. VA.																										
Oct. 5, 1960.		0.2		0.46	0.25	28	13	56	3.4		112	0	130	16	0.2	0.1		304	124	32		501	7.0	3		
May 2, 1961..		6.5		.27	.42	8.0	3.9	6.2	1.3		16	0	33	2.5	.2	.7		71	36	23		114	6.5	8	8.6	77
3-2040. GUYANDOTTE RIVER AT BRANCHLAND, W. VA.																										
Oct. 5, 1960.				0.23	0.34						104	0	218	40	0.3	0.2			184	99		841	6.9			
May 2, 1961..				.26	.07						22	0	67	3.5	.0	1.0			65	47		203	6.6			
GUYANDOTTE RIVER AT PINEVILLE, W. VA.																										
Oct. 5, 1960.				2.1	0.09						260	0	162	14	0.3	2.4			128	0		786	7.6			
May 3, 1961..				.40	.57						35	0	48	2.0	.0	.6			50	22		171	7.2			

TWELVEPOLE CREEK BASIN

3-2068. EAST FORK TWELVEPOLE CREEK AT EAST LYNN, W. VA.

Oct. 4, 1960.			7.8	1.5	0.26						0	0	177	7.0	0.7	0.3			140	140	0.8	402	4.3			
May 2, 1961..				.32	.33						6	0	15	1.0	.0	.4			19	14		52	6.0			

3-2070. TWELVEPOLE CREEK AT WAYNE, W. VA.

Oct. 4, 1960.		7.2		1.3	1.4	14	5.4	6.1	3.1		48	0	22	10	0.4	0.6		93	57	31		163	6.2	23		
May 2, 1961..		6.6		.62	.92	3.9	3.0	1.4	1.4		10	0	16	1.7	.1	.6		45	22	14		60	6.3	22	8.3	75

BIG SANDY RIVER BASIN

TUG FORK AT RODERFIELD, W. VA.

Oct. 5, 1960.				0.21	0.44						376	0	224	9.0	0.4	3.7			246	0		1010	7.9			
May 2, 1961..				.25	.30						80	0	88	2.5	.0	.2			100	34		296	6.8			

PIGEON CREEK AT NAUGATUCK, W. VA.

Oct. 4, 1960.			1.5	6.6	6.3						0	0	810	15	0.4	1.1			500	500	0.4	1580	4.1			
May 2, 1961..				.28	.07						12	0	35	2.0	.0	.4			42	32		111	6.3			

3-2130. TUG FORK AT LITWAR, W. VA.

Oct. 5, 1960.		5.7		0.17	0.32	48	23	142	4.3		386	0	198	14	0.3	1.3		625	215	0		947	7.6	3		
May 2, 1961..		7.2		.29	.63	17	6.6	12	1.7		59	0	46	2.5	.1	.9		126	70	21		204	6.9	16		

GREEN RIVER BASIN

3-3075. SOUTH FORK LITTLE BARREN RIVER AT EDMONTON, KY.

Nov. 8, 1960.				0.01							180	0	137	1410	0.1	1.6			648	500		4780	7.3			
Apr. 13, 1961				.08							97	0	19	14	.1	1.4			102	22		237	7.8			

OIL WELL BRANCH AT EDMONTON, KY.

Nov. 15, 1960				0.02							142	0	330	4200	0.6				1450	1330		12500	6.8			
Mar. 10, 1961				.03							116	0	22	101	.1	2.2			149	54		582	7.7			
Apr. 13.....	10.6			--							--	--	--	76	--	--			--	--		486	--			

CUMBERLAND RIVER BASIN

3-4072. WEST FORK CANE BRANCH NEAR PARKERS LAKE, KY.

Jan. 18, 1961											3	0	4.8					10	7	4		20	6.1			
May 23, 1961.											6	0	7.0					28	15	10		21	6.6			

3-4073. HELTON BRANCH AT GREENWOOD, KY.

Jan. 17, 1961	1.2	5.0	0.1	0.03	0.03	5.2	0.5	0.2	0.8		10	0	6.8	2.0	0.1	0.3		20	15	7		39	6.4	6		
May 22.....	.4										11	0	6.2					26	12	3		29	6.8		9.8	90

MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1960 to September 1961

Date	Time (24 hr)	Water temperature (°F)	Discharge (cfs)	Suspended sediment	
				Mean concentration (ppm)	Discharge (tons per day)
MIAMI RIVER BASIN					
3-2670. MAD RIVER NEAR URBANA, OHIO					
Apr. 6, 1960	1345		125	35	12
Nov. 1	0945		46	42	5
GREEN RIVER BASIN					
GREEN RIVER AT NEATSVILLE, KY.					
Oct. 14, 1959	0845		35	12	1.1
Feb. 17, 1960	1630		500	10	14
June 26	1400		431	32	37
Sept. 21	1430		31.1	10	.8
Apr. 11, 1961	1115		--	19	--
Oct. 3	0920		--	5	--
3-3065. GREEN RIVER AT GREENSBURG, KY.					
Oct. 14, 1959	1600		89	14	3.4
Sept. 22, 1960	0815		134	30	11
Apr. 11, 1961	1700		3360	51	463
Oct. 4	1300		28	6	.4
RUSSELL CREEK NEAR GRESHAM, KY.					
Oct. 14, 1959	1745		40	28	3.0
Feb. 18, 1960	0830		--	36	--
June 27	1915		190	59	30
Sept. 21	1030		34	22	2.0
Apr. 11, 1961	1500		--	41	--
Oct. 1	1130		--	13	--
BIG PITMAN CREEK NEAR GREENSBURG, KY.					
Feb. 16, 1960	1200		222	7	4.2
Sept. 20	1800		47	7	.9
Apr. 11, 1961	1830		--	12	--
3-3140. DRAKES CREEK NEAR ALVATON, KY.					
Oct. 16, 1959	1245		126	16	5.4
Feb. 19, 1960	1610		1280	20	69
Sept. 20	1045		138	34	13
Apr. 11, 1961	1615		1010	114	311

MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color
KANAWHA RIVER BASIN																		
3-1610. SOUTH FORK NEW RIVER NEAR JEFFERSON, N. C.																		
Jan. 16, 1961.....	1,050	6.7	0.03	2.6	1.2	2.0	1.4	9	3.6	2.2	0.1	4.1	28	12	4	40	6.1	15
June 28.....	496	8.4	.01	3.1	.7	1.6	.8	12	1.2	1.8	.1	1.5	a33	11	1	33	5.8	5
TENNESSEE RIVER BASIN																		
3-4410. DAVIDSON RIVER NEAR BREVARD, N. C.																		
Oct. 4, 1960.....	64.2	8.1	0.03	1.5	0.2	1.5	0.7	8	0.8	1.2	0.1	0.3	18	5	0	20	6.5	8
May 2, 1961.....	121		.01	1.6	.8	1.0	.5	9	3.8	.5	.0	.2		7	0	23	6.2	
3-4414.82. LITTLE RIVER NEAR CEDAR MOUNTAIN, N. C.																		
Oct. 20, 1960.....		8.0	0.06	1.4	0.1	0.8	0.2	6	0.4	1.5	0.0	0.5	16	4	0	17	6.4	15
Dec. 12.....		8.4	.03	.6	.5	1.2	.3	6	1.6	1.0	.0	.2	17	4	0	18	6.2	5
Feb. 13, 1961.....		6.6	.04	1.1	.3	1.3	.2	7	.4	1.5	.0	.1	a18	4	0	15	6.5	3
Apr. 17.....		6.4	.02	.4	.1	1.2	.3	4	.4	.5	.0	.1	a13	2	0	13	6.6	5
June 27.....		7.0	.02	.8	.2	1.2	.4	6	.4	.5	.0	.7	a14	3	0	12	6.4	10
Aug. 14.....		8.3	.03	.8	.1	1.2	.4	6	1.6	.5	.0	.4	a16	2	0	15	6.5	5
3-4460. MILLS RIVER NEAR MILLS RIVER, N. C.																		
Oct. 4, 1960.....	130	9.0	0.04	1.1	0.2	1.3	0.7	6	1.0	1.7	0.1	0.0	18	4	0	16	6.7	10
May 2, 1961.....	181	6.4	.02	1.5	.3	1.0	.6	5	.4	2.0	.0	.4	15	5	1	16	6.1	7
3-4485. HOMINY CREEK AT CANDLER, N. C.																		
Oct. 3, 1960.....	44.3	16	0.04	2.6	1.7	3.2	1.4	21	2.0	1.8	0.1	0.0	39	14	0	46	7.0	5
May 3, 1961.....	80.9	12	.03	2.9	1.4	2.3	1.0	18	1.2	.5	.1	.8	31	12	0	36	7.2	7
3-4500. BEETREE CREEK NEAR SWANNANOA, N. C.																		
Oct. 5, 1960.....	3.6	9.8	0.01	1.2	0.5	1.2	0.5	7	0.4	1.0	0.1	0.6	18	5	0	19	6.6	5
May 3, 1961.....	10.2		.01	1.4	1.1	1.3	.4	10	2.4	1.8	.0	.0		8	0	22	6.2	

a Residue at 180°C.

MISCELLANEOUS ANALYSES OF STREAMS IN OHIO RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
TENNESSEE RIVER BASIN--Continued																		
3-4510. SWANNANOA RIVER AT BILTMORE, N. C.																		
Oct. 5, 1960.....	84.6	13	0.01	3.4	1.6	6.5	2.1	21	6.4	3.8	0.1	1.2	48	15	0	65	7.2	5
May 3, 1961.....	138		.04	3.0	1.2	6.7	1.5	18	2.1	6.0	.0	2.0		12	0	59	6.3	
3-4530. IVY RIVER NEAR MARSHALL, N. C.																		
Oct. 10, 1960.....	82.8	17	0.05	4.6	1.9	3.2	2.1	30	0.6	1.7	0.1	1.8	48	20	0	61	7.2	7
May 15, 1961.....	236	11	.02	3.2	1.6	2.3	1.0	18	1.0	2.0	.1	1.0	32	14	0	40	7.0	3
3-4540. BIG LAUREL CREEK NEAR STACKHOUSE, N. C.																		
Oct. 10, 1960.....	133	12	0.01	3.4	1.4	2.0	1.2	20	0.8	0.6	0.1	2.0	34	14	0	42	6.8	10
May 15, 1961.....	200	11	.01	3.4	1.3	2.2	.9	18	1.9	1.7	.1	.8	32	14	0	37	6.9	5
3-4560. WEST FORK PIGEON RIVER NEAR WAYNESVILLE, N. C.																		
Oct. 3, 1960.....	48.4	7.3	0.02	1.2	0.1	1.0	0.5	6	0.4	1.0	0.0	0.7	15	4	0	15	6.7	5
May 2, 1961.....	150	6.4	.01	1.5	.5	.9	.3	7	.6	1.3	.0	.3	15	6	0	14	6.6	7
3-4565. EAST FORK PIGEON RIVER NEAR CANTON, N. C.																		
Oct. 3, 1960.....	41.7	9.9	0.01	1.5	0.1	1.3	0.6	8	1.2	1.3	0.1	0.0	20	4	0	17	6.8	8
May 2, 1961.....	113	6.2	.01	1.1	.5	.9	.4	7	.3	1.3	.0	.5	14	5	0	17	6.5	5
3-4575. ALLEN CREEK NEAR HAZELWOOD, N. C.																		
Oct. 4, 1960.....	13.5	11	0.01	1.3	0.5	1.4	0.6	9	1.6	1.0	0.1	0.0	22	5	0	20	6.6	8
May 4, 1961.....	32.1	7.4	.01	1.4	.3	.9	.4	8	.2	1.2	.1	.3	16	5	0	17	6.2	5
3-4590. JONATHAN CREEK NEAR COVE CREEK, N. C.																		
Oct. 4, 1960.....	89.9	11	0.01	2.2	0.4	2.1	1.3	12	1.0	1.8	0.1	0.3	26	8	0	30	6.7	7
May 4, 1961.....	134		.03	1.7	1.2	1.7	.5	12	.4	1.8	.0	.3		9	0	23	6.8	
3-4640. CANE RIVER NEAR SIOUX, N. C.																		
Oct. 17, 1960.....	101	13	0.04	3.2	1.2	2.1	1.2	21	0.4	1.5	0.2	1.4	34	13	0	40	7.2	5
May 15, 1961.....	489		.02	2.9	1.4	1.7	.9	14	2.0	2.4	.0	1.7		12	1	34	6.4	

3-4790. WATAUGA RIVER NEAR SUGAR GROVE, N. C.

Oct. 18, 1960.....	64.2	12	0.06	3.0	1.1	2.0	0.8	19	1.4	1.5	0.1	0.0	31	12	0	35	7.2	10
May 15, 1961.....	268		.04	3.0	1.6	1.8	.7	16	2.4	1.5	.0	1.3		14	1	33	6.6	

3-5000. LITTLE TENNESSEE RIVER NEAR PRENTISS, N. C.

Oct. 7, 1960.....	447	9.9	0.04	1.4	0.4	1.9	1.4	10	1.0	1.3	0.1	2.1	25	6	0	26	6.3	10
Oct. 19.....	266	10	.03	1.1	.7	1.8	.7	11	.4	.5	.0	1.5	22	6	0	22	6.8	5
May 2, 1961.....	413	8.0	.02	1.8	.3	1.2	.5	9	.1	1.5	.1	.3	18	6	0	17	6.9	7

3-5005. CULLASAJA RIVER AT HIGHLANDS, N. C.

Oct. 7, 1960.....	101	5.6	0.09	1.1	0.1	1.1	0.5	6	0.2	1.2	0.2	2.1	15	4	0	15	6.5	20
May 2, 1961.....	50	4.8	.04	1.2	.6	.9	.3	6	.1	1.5	.0	.4	13	6	0	13	6.6	7

3-5010. CULLASAJA RIVER AT CULLASAJA, N. C.

Oct. 7, 1960.....	222	8.0	0.05	1.8	0.1	1.3	0.7	9	0.4	0.9	0.2	0.7	18	5	0	19	6.7	10
May 2, 1961.....	214	7.0	.02	1.3	.6	1.2	.4	9	.1	1.7	.1	.2	17	6	0	16	6.7	7

3-5030. LITTLE TENNESSEE RIVER AT NEEDMORE, N. C.

Oct. 3, 1960.....	620	11	0.03	1.8	1.2	1.8	0.7	12	0.4	0.7	0.2	0.5	24	10	0	24	6.7	8
May 1, 1961.....	1,100	7.8	.02	1.4	.4	1.1	.4	10	.4	.2	.0	.1	17	5	0	18	7.2	5

3-5040. NANTAHALA RIVER NEAR RAINBOW SPRINGS, N. C.

Oct. 18, 1960.....	118	8.4	0.01	1.0	0.8	0.8	0.4	10	0.4	0.4	0.0	0.4	18	6	0	15	6.6	8
May 12, 1961.....	196	6.5	.02	1.8	.2	.8	.3	8	.4	1.5	.1	.2	16	6	0	14	6.9	7

3-5080. TUCKASEGEE RIVER AT TUCKASEGEE, N. C.

Oct. 3, 1960.....	706	7.4	0.07	1.3	0.2	1.3	0.6	8	1.4	0.9	0.2	0.7	20	4	0	18	6.1	10
May 8, 1961.....	437	5.6	.02	1.3	.5	.8	.4	5	1.8	1.7	.1	.4	15	5	1	12	6.8	10

3-5120. OCONALUFTEE RIVER AT BIRDTOWN, N. C.

Oct. 6, 1960.....	383	8.5	0.01	1.2	0.4	1.1	0.8	8	0.6	0.5	0.1	0.6	18	4	0	19	6.3	8
May 10, 1961.....	500	6.6	.01	1.5	.3	1.0	.4	8	1.0	1.5	.1	.2	17	5	0	15	7.0	7

3-5450. HIWASSEE RIVER AT PRESLEY, GA.

Oct. 18, 1960.....	92.6	9.3	0.04	0.9	0.4	1.0	0.5	7	0.4	1.4	0.1	0.7	18	4	0	14	6.5	8
May 12, 1961.....	154	7.3	.01	1.4	.3	1.0	.4	8	.1	2.0	.1	.1	17	5	0	14	7.0	3

3-5500. VALLEY RIVER AT TOMOTLA, N. C.

Oct. 17, 1960.....	74.2	8.8	0.03	5.1	1.4	1.5	0.7	25	0.4	1.6	0.2	0.7	32	18	0	46	6.7	8
May 11, 1961.....	238	6.3	.01	2.9	1.0	1.0	.4	14	.4	1.0	.1	1.0	21	11	0	26	7.2	3

3-5505. NOTTELY RIVER NEAR BLAIRSVILLE, GA.

Oct. 18, 1960.....	92.5	11	0.04	1.6	0.5	1.5	0.7	11	0.4	2.0	0.2	0.0	23	6	0	21	6.5	8
May 11, 1961.....	215	8.1	.02	1.8	.4	1.2	.5	10	.1	.2	.1	.2	18	6	0	18	7.1	7

PART 4. ST. LAWRENCE RIVER BASIN

STREAMS TRIBUTARY TO LAKE SUPERIOR

4-155. SECOND CREEK NEAR AURORA, MINN.

LOCATION.--At bridge at mouth, 0.4 mile downstream from gaging station, 0.5 mile downstream from First Creek, and 2.1 miles east of Aurora, St. Louis County.
DRAINAGE AREA.--26.3 square miles upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: April 1956 to September 1959, July 1960 to September 1961.
Water temperatures: April 1956 to September 1959, July 1960 to September 1961.
EXTREMES, July 1960 to September 1961.--Dissolved solids: Minimum, 123 ppm Apr. 21-23, 1961.
Hardness: Minimum, 61 ppm Apr. 21-23, 1961.
Specific conductance: Minimum daily, 148 micromhos Apr. 21, 1961.
Water temperatures: Maximum, 78°F July 11, 12, 1960, June 29, 1961; minimum, freezing point on several days during November 1960, February and April 1961.
EXTREMES, 1956-59, 1960-61.--Dissolved solids (1957-59, 1960-61): Minimum, 104 ppm June 5-8, 1958.
Hardness (1957-59, 1960-61): Minimum, 44 ppm June 5-8, 1958.
Specific conductance (1957-59, 1960-61): Minimum daily, 110 micromhos June 7-8, 1958.
Water temperatures: Maximum, 82°F July 27, 28, 1959; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office at Lincoln, Nebr.

Chemical analyses, in parts per million, July 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C): Parts per million	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, Magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
July 1-31, 1960 a.....	14.7	13	0.56	28	14	15	--	112	0	34	20	0.7	1.3	--	207	0.28	8.22	126	34	0.6	318	7.3	50
Aug. 1-31 a.....	13.2	15	.48	31	15	23	--	135	0	36	25	.9	1.4	--	228	.31	8.13	138	27	.8	357	7.3	45
Sept. 1-21 a....	13.8	17	.48	30	15	24	--	133	0	36	27	1.2	.8	--	231	.31	8.61	136	27	.9	363	7.2	35
Sept. 22-30 a...	11.0	16	.42	25	13	11	3.1	110	0	32	16	.5	.2	--	175	.24	5.20	114	24	.4	286	7.3	18
Oct. 1-23.....	7.4	--	.29	25	13	14	--	113	0	34	13	.5	.4	--	188	.26	3.76	118	25	.6	286	7.4	21
Oct. 24-Nov. 17.	9.8	--	.47	28	15	15	--	105	0	39	24	.6	2.1	--	221	.30	5.85	131	45	.6	348	7.2	28
Nov. 18-26.....	7.1	--	.42	32	18	23	--	109	0	69	23	.6	10	--	249	.34	4.77	153	64	.8	392	7.1	29
Nov. 27.....	8.5	16	--	34	19	20	5.2	107	0	63	25	.7	22	0.13	280	.38	6.43	165	77	.7	436	7.2	24
Nov. 28-30.....	8.4	--	--	29	16	16	--	105	0	49	20	.4	9.9	--	222	.30	5.04	139	53	.6	351	7.0	13
Jan. 25, 1961...	2.4	--	.95	38	21	22	--	157	0	52	31	.8	2.3	--	284	.39	1.84	182	53	.7	444	7.6	22
Feb. 22.....	3.8	--	.76	27	13	22	--	106	0	39	28	1.0	1.8	--	215	.29	2.21	123	36	.9	340	7.1	29
Mar. 31.....	35	12	.48	21	9.6	9.5	--	58	0	38	14	.3	6.2	.21	168	.23	15.9	92	44	.4	234	6.9	15
Apr. 2-20.....	27.7	12	.44	19	10	9.9	3.2	67	0	34	12	.3	7.3	.05	159	.22	11.9	90	35	.5	241	7.0	12
Apr. 21-23.....	182	--	.37	13	6.9	6.8	--	27	0	36	8.4	.2	4.5	--	123	.17	60.4	61	39	.4	172	6.5	25
Apr. 24-30.....	67.3	--	.34	18	8.8	11	--	42	0	45	10	.2	10	--	161	.22	29.3	81	47	.5	235	6.7	70

a Not included in weighted average.

May 1-31, 1961..	39.2	--	0.29	20	11	8.7	--	58	0	45	11	0.3	2.8	--	165	0.22	17.5	94	46	0.4	243	7.2	35
June 1-30.....	15.5	9.3	.32	27	13	10	3.2	96	0	52	12	.4	1.2	0.08	198	.27	8.29	122	43	.4	299	7.2	26
July 1-31.....	11.9	--	.21	30	16	12	--	116	0	51	11	.3	1.6	--	233	.32	7.49	139	44	.5	329	7.2	32
Aug. 1-31.....	6.2	--	.22	33	15	18	--	137	0	50	13	.3	.9	--	229	.31	3.83	146	34	.6	360	7.2	25
Sept. 1-30.....	36.6	16	.50	30	16	15	4.2	92	0	72	14	.1	6.0	.03	250	.34	24.7	140	65	.5	360	6.9	85
Weighted average.....	b 16.8	--	0.37	24	12	11	--	76	0	49	12	0.3	4.5	--	192	0.26	11	109	47	0.5	282	6.9	42
Tons per day..	--	--	0.02	1.4	0.7	0.7	--	5	0	2.9	0.7	0.0	0.3	--	--	--	--	--	--	--	--	--	--

b Mean discharge based on 365 days; mean discharge for 246 days of chemical analyses, 22.1 cfs.

Temperature (°F) of water, July to September 1960

Month	Day 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	Average
July.....	65	63	65	63	65	71	73	75	77	71	78	78	72	72	72	68	71	72	--	68	76	77	--	75	74	75	73	72	71	69	69	71
August.....	73	76	70	69	73	73	72	73	73	69	72	75	68	66	69	73	74	73	75	74	76	77	69	67	68	69	--	65	74	74	74	72
September.....	--	66	73	71	71	72	64	63	64	62	56	56	59	58	58	60	58	53	57	58	62	57	49	52	56	57	54	50	50	51	--	59

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day 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	Average
October	48	50	48	49	55	52	51	53	53	54	52	55	52	52	51	51	49	43	39	37	38	38	40	38	37	38	39	41	43	45	44	46
November	42	39	39	38	37	38	35	36	33	32	33	34	33	35	34	33	34	34	34	34	34	--	34	35	35	36	34	32	32	32	--	35
December	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	33	--	--	--	--	--	--	--
February.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	--	--	--	--	--	--	--	--	--	--
March.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
April.....	--	36	36	33	33	34	33	33	32	36	37	36	35	35	34	34	36	36	39	40	43	44	40	39	38	39	42	42	43	41	--	37
May.....	45	45	53	48	53	45	48	48	47	43	54	57	54	50	48	53	49	56	58	56	60	61	64	65	58	60	63	64	67	68	67	55
June	64	64	65	66	74	66	69	70	72	67	74	70	70	68	68	70	66	72	68	64	67	65	63	63	--	69	70	76	78	73	--	69
July.....	77	69	63	66	71	75	71	68	69	--	71	69	70	--	67	66	64	73	70	73	--	68	66	72	70	76	75	76	72	73	68	70
August.....	71	73	74	72	72	67	70	74	72	71	70	68	65	71	74	73	74	70	68	66	70	66	69	69	70	67	67	67	70	73	70	70
September.....	73	--	--	58	59	62	64	63	72	67	69	56	53	51	54	56	58	61	63	59	59	53	53	50	50	52	46	46	45	45	--	57

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

4-160. PARTRIDGE RIVER NEAR AURORA, MINN.

LOCATION.--At gaging station at highway bridge, 1,000 feet downstream from Second Creek, 2.5 miles east of Aurora, St. Louis County, and 2.8 miles upstream from mouth.
DRAINAGE AREA.--156 square miles.
RECORDS AVAILABLE.--Chemical analyses: April 1956 to September 1959, July 1960 to September 1961.
Water temperatures: April 1956 to September 1959, July 1960 to September 1961.
EXTREMES, July 1960 to September 1961.--Dissolved solids: Maximum, 187 ppm Sept. 1-30, 1961; minimum, 93 ppm May 15-23, 1961.
Hardness: Maximum, 100 ppm Sept. 1-20, 1960, Sept. 1-30, 1961; minimum, 35 ppm May 15-23, 1961.
Specific conductance: Maximum daily, 325 micromhos Oct. 12, 1960; minimum daily, 65 micromhos May 10, 1961.
Water temperatures: Maximum, 82°F June 29, 1961; minimum, freezing point Nov. 10, 30, 1960.
EXTREMES, 1956-59, 1960-61.--Dissolved solids: Maximum (1960-61), 187 ppm Sept. 1-30, 1961; minimum (1957-59, 1960-61), 76 ppm May 8-31, 1959.
Hardness: Maximum (1960-61), 100 ppm Sept. 1-20, 1960, September 1-30, 1961; minimum (1957-59, 1960-61), 30 ppm June 11-17, 1958.
Specific conductance: Maximum daily (1960-61), 325 micromhos Oct. 12, 1960; minimum daily (1957-59, 1960-61), 53 micromhos June 8, 1959.
Water temperatures: Maximum, 82°F on several days during June 1956, July 1957 and 1959, June 1961; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office at Lincoln, Nebr.

Chemical analyses, in parts per million, July 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C) Parts per million	Tons per acre-foot	Tons per day	Hardness as $CaCO_3$ Calcium, Magnesium	Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
July 1-10, 1960 a	34.7	6.7	0.58	15	6.9	6.6	--	58	0	21	6.3	0.4	1.1	--	120	0.16	11.2	66	18	0.4	160	6.9	95
July 11-31 a	38.0	9.5	.71	18	8.5	10	--	72	0	26	10	.5	1.0	--	145	.20	14.9	80	21	.5	201	7.1	90
Aug. 1-31 a	31.6	11	.77	17	9.1	10	--	78	0	20	11	.5	1.4	--	142	.19	12.1	80	16	.5	203	7.0	85
Sept. 1-20 a	22.8	14	.72	22	11	17	--	100	0	26	18	.7	.8	--	172	.23	10.6	100	18	.7	265	7.2	60
Sept. 21-30 a	15.2	13	.60	20	10	8.8	2.5	90	0	25	11	.4	.6	--	147	.20	6.03	92	18	.4	226	7.1	35
Oct. 1-9	15.3	--	.45	19	11	11	--	87	0	26	10	.4	.6	--	151	.21	6.24	91	20	.5	227	6.9	36
Oct. 10-23	10.9	--	.51	17	9.9	8.0	--	80	0	23	6.7	.3	.7	--	137	.19	4.03	83	17	.4	202	7.1	48
Oct. 24-Nov. 7	23.9	--	.37	19	9.6	11	--	75	0	29	12	.4	1.1	--	153	.21	9.87	87	25	.5	238	7.0	49
Nov. 8-30	25.0	9.7	.62	16	7.8	7.5	2.7	60	0	27	8.3	.3	2.6	0.08	136	.18	9.18	72	23	.4	185	6.9	70
Dec. 22	7.7	12	1.0	18	7.6	8.5	--	67	0	27	7.1	.2	1.2	.11	135	.18	2.81	76	21	.4	184	7.1	65
Jan. 25, 1961	2.5	--	.75	14	4.9	2.2	--	56	0	12	.4	.1	.8	--	104	.14	.70	55	9	.1	123	7.5	75
Feb. 22	5.3	--	.64	14	4.9	2.7	--	58	0	11	.6	.1	1.0	--	103	.14	1.47	55	7	.2	126	6.8	55
Mar. 31	40	8.0	.48	18	7.1	7.7	--	52	0	30	9.4	.2	3.8	.03	125	.17	13.5	74	31	.4	185	7.4	26
Apr. 2-18	28.6	12	.46	18	9.3	9.1	3.0	66	0	30	10	.2	5.5	.08	144	.20	11.1	83	29	.4	222	7.0	55
Apr. 19-27	159	--	.46	14	6.8	7.0	--	34	0	33	7.9	.2	5.3	--	127	.17	54.5	63	35	.4	174	6.7	65
Apr. 28-May 14	160	--	.40	8.3	4.2	1.4	--	22	0	19	.5	.2	2.4	--	96	.13	41.5	38	20	.1	105	6.7	90
May 15-23	516	--	.37	7.8	3.8	.3	--	20	0	16	.3	.2	2.1	--	93	.13	130	35	19	.0	91	6.7	90
May 24-31	152	--	.39	8.6	4.5	.5	--	25	0	18	.0	.2	1.7	--	102	.14	41.9	40	19	.0	102	6.8	90

a Not included in weighted average.

June 1-12, 1961.	94.1	5.8	0.35	12	4.9	4.7	1.4	33	0	23	4.0	0.3	1.7	0.09	117	0.16	29.7	50	23	0.3	124	6.7	85
June 13-30.....	36.3	--	.44	15	6.2	4.5	--	52	0	22	3.8	.3	1.4	--	123	.17	12.1	63	20	.2	152	6.9	65
July 1-31.....	23.0	--	.41	25	7.7	7.4	--	81	0	34	4.5	.3	1.4	--	161	.22	10.0	94	28	.3	237	7.1	55
Aug. 1-31.....	13.9	--	.41	22	10	8.4	--	91	0	31	4.8	.3	1.2	--	161	.22	6.04	97	22	.4	232	7.4	55
Sept. 1-30.....	62.9	13	.53	24	9.7	9.1	2.8	68	0	51	7.8	.2	4.4	.01	187	.25	31.8	100	44	.4	276	6.9	90
Weighted average.....	b 48.2	--	0.42	13	5.9	4.0	--	39	0	25	3.5	0.2	2.6	--	121	0.16	22	57	25	0.2	150	6.8	80
Tons per day..	--	--	0.08	2.4	1.1	0.7	--	7	0	4.6	0.6	0.0	0.5	--	--	--	--	--	--	--	--	--	--

b Mean discharge based on 365 days; mean discharge for 247 days of chemical analyses, 67.2 cfs.

Temperature (°F) of water, July to September 1960

Month	Day 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	Average
July.....	68	66	66	65	66	74	73	75	78	72	79	79	73	73	70	70	73	75	--	72	77	80	--	76	74	76	76	74	72	72	70	73
August.....	74	77	72	71	74	74	74	75	75	71	72	78	70	68	71	74	73	68	74	78	79	78	69	68	70	72	--	68	73	76	75	73
September.....	--	68	75	73	73	73	66	68	62	64	58	56	60	58	59	60	60	54	56	59	67	57	50	52	56	56	54	52	50	52	--	60

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day 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	Average
October	48	52	49	49	55	52	50	54	53	54	53	55	53	52	50	50	48	43	39	37	38	42	39	38	37	39	40	40	42	44	44	46
November	42	39	39	40	37	39	36	37	34	32	35	37	38	39	39	37	39	38	37	38	39	37	38	40	38	40	38	36	33	32	--	37
December	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	33	--	--	--	--	--	--	--
February.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	33	--	--	--	--	--	--	--	--	--	--
March.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
April.....	--	37	35	37	37	38	38	38	34	39	36	40	37	38	35	33	37	42	40	43	43	43	40	40	39	40	43	44	44	43	--	39
May.....	44	46	53	51	54	48	51	50	52	47	56	58	56	52	52	54	52	57	58	57	58	67	65	65	61	60	65	65	68	68	65	57
June	67	67	67	69	74	69	72	70	77	72	76	73	74	71	74	74	70	74	70	68	71	67	66	65	--	70	71	77	82	77	--	72
July.....	75	70	64	67	72	77	71	71	71	69	73	70	72	--	67	68	66	77	72	75	76	68	67	74	70	78	76	78	74	74	70	72
August.....	73	75	77	74	72	67	71	78	74	70	72	70	--	68	74	76	77	--	68	66	73	67	68	71	72	69	67	69	70	73	72	71
September.....	74	--	--	58	60	63	68	70	75	68	61	56	53	52	55	58	60	63	65	61	60	55	55	53	55	55	48	48	46	48	--	59

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

4-165. ST. LOUIS RIVER NEAR AURORA, MINN.

LOCATION.--At gaging station at highway bridge, 0.8 mile downstream from Partridge River and 1.5 miles south of Aurora, St. Louis County.
DRAINAGE AREA.--312 square miles.
RECORDS AVAILABLE.--Chemical analyses: April 1956 to September 1959, July 1960 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
																		Calcium, magnesium	Noncarbonate				
Oct. 28, 1960	32	11		0.59	--	19	6.5	6.8	3.0	74	0	18	6.9	0.2	1.0	0.03	119	74	13	0.3	179	6.9	34
Nov. 20.....	56	8.4		.68	--	14	5.1	4.6	1.4	54	0	17	3.5	.1	1.0	.04	103	56	12	.3	144	6.8	47
Dec. 21.....	23.2	14		.84	--	19	7.4	6.2	1.8	74	0	23	5.6	.2	1.5	.06	134	78	17	.3	180	7.2	65
Jan. 24, 1961	10.8	17		.70	--	21	9.9	6.5	1.3	96	0	20	7.4	.3	.6	.08	162	93	14	.3	208	6.9	55
Feb. 22.....	15.6	--		--	--	--	--	7.6	--	94	0	17	8.4	--	--	--	147	90	13	.3	212	7.1	43
Mar. 27.....	146	7.0		.62	--	9.4	4.5	2.4	.8	44	0	9.3	.2	.1	1.1	.08	70	42	6	.2	90	7.1	28
May 10.....	467	--		--	0.03	--	--	a 2.1	--	19	0	12	.5	--	--	--	79	29	13	.2	72	6.7	90
May 22.....	727	3.5		.34	.00	5.2	2.2	1.9	.4	18	0	9.0	.1	.2	1.6	.08	77	22	7	.2	56	7.0	100
June 21.....	104	6.5		.64	--	10	4.6	2.6	.8	38	0	13	.0	.3	1.4	.07	95	44	13	.2	95	6.8	90
July 19.....	74	9.1		.40	--	20	5.6	4.6	1.4	67	0	21	3.0	.2	1.1	.08	132	73	18	.2	167	7.1	65
Aug. 11.....	33	--		--	--	--	--	3.4	--	74	0	12	3.0	--	--	--	119	70	9	.2	162	7.5	90
Sept. 13.....	179	12		.47	--	17	7.2	9.8	2.0	54	0	39	.6	.3	1.5	.08	151	72	28	.5	194	7.3	75

a Does not include potassium (K).

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

4-170. EMBARRASS RIVER AT EMBARRASS, MINN.

LOCATION.--At gaging station at highway bridge at Embarrass, St. Louis County, 70 feet upstream from railroad bridge.
DRAINAGE AREA.--93.8 square miles.
RECORDS AVAILABLE.--Chemical analyses: April 1956 to September 1959, July 1960 to September 1961.
Water temperatures: April 1956 to September 1957.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 26, 1960	7.0	--		--	--	18	2.7	2.8	--	58	0	8.3	4.1	--	--	--	94	56	8	0.2	124	6.6	45
Nov. 19.....	13	15		1.2	--	17	1.4	2.8	0.8	44	0	12	3.4	0.1	0.8	0.01	99	48	12	.2	109	6.9	60
Dec. 21.....	3.7	19		1.3	--	16	5.4	3.4	1.0	59	0	15	4.0	.2	1.2	.06	111	62	14	.2	134	7.1	55
Jan. 19, 1961	3.8	19		1.4	--	27	5.5	3.2	1.5	108	0	6.3	.3	.1	.9	.09	140	90	1	.1	189	7.0	42
Feb. 23.....	3.0	--		--	--	--	--	2.7	--	92	0	6.3	.0	--	--	--	127	76	1	.1	161	7.6	55
Mar. 30.....	76	8.1		.91	--	8.4	2.9	1.3	2.6	20	0	15	.0	.2	5.2	.06	79	33	17	.1	78	6.2	80
May 10.....	122	--		--	0.02	--	--	a 1.6	--	17	0	9.8	.1	--	--	--	83	26	12	.1	59	6.5	110
May 19.....	348	5.8		.37	.00	5.5	2.0	1.6	.4	14	0	9.3	.6	.2	1.7	.09	87	22	11	.1	54	6.5	100
June 16.....	24	8.6		2.5	--	9.2	3.4	2.1	.6	34	0	9.0	.0	.3	2.4	.08	98	37	9	.1	78	6.7	95
July 19.....	5.6	9.7		1.0	--	17	3.6	2.7	1.0	68	0	6.0	.0	.2	.6	.04	101	57	1	.2	125	7.0	47
Aug. 11.....	2.3	--		--	--	--	--	1.8	--	80	0	3.3	.6	--	--	--	106	66	0	.1	140	7.1	40
Sept. 12.....	103	10		.43	--	11	1.1	6.2	.7	26	0	21	.2	.3	4.0	.02	116	32	11	.5	130	6.5	160

a Does not include potassium (K).

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STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

4-180. EMBARRASS RIVER NEAR MCKINLEY, MINN.

LOCATION.--At gaging station at highway bridge, 0.9 mile downstream from outlet of Esquagama Lake and 4.5 miles southeast of McKinley, St. Louis County.
DRAINAGE AREA.--171 square miles.
RECORDS AVAILABLE.--Chemical analyses: April 1956 to September 1959, July 1960 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 29, 1960	32	8.6		0.26	--	18	3.2	3.2	1.4	57	0	15	0.9	0.2	1.1	0.03	101	58	11	0.2	129	6.8	55
Nov. 16.....	41	--		--	--	17	3.3	2.2	--	55	0	14	.9	--	--	--	99	56	11	.1	123	7.1	55
Dec. 20.....	32.2	10		.23	--	17	4.5	3.4	1.2	59	0	18	2.0	.2	.6	.06	100	61	13	.2	133	6.9	55
Jan. 16, 1961	24.1	10		.22	--	19	4.5	3.7	1.0	65	0	17	2.6	.2	.7	.06	115	66	13	.2	147	6.9	49
Feb. 21.....	29.4	11		.29	--	20	6.6	4.1	1.3	78	0	17	3.5	.2	.9	.04	128	77	13	.2	172	7.0	51
Mar. 31.....	121	9.3		.34	--	17	5.3	3.6	1.8	62	0	18	3.0	.2	1.2	.11	104	64	13	.2	144	6.9	40
May 10.....	322	--		--	0.04	--	--	2.5	--	54	0	12	4.7	--	--	--	108	58	14	.1	138	7.0	55
May 19.....	443	8.4		.38	.09	14	4.1	4.4	1.6	50	0	15	4.5	.2	1.1	.06	104	52	11	.3	127	7.4	90
June 20.....	73	--		.39	--	12	2.9	3.3	1.4	35	0	15	1.9	.2	.8	.06	97	42	13	.2	100	6.7	65
July 20.....	65	--		--	--	--	--	2.6	--	39	0	14	1.6	--	--	--	99	43	11	.2	105	6.8	60
Aug. 12.....	27	--		--	--	--	--	1.5	--	43	0	11	2.5	--	--	--	93	47	12	.1	110	7.1	70
Sept. 11.....	72	5.1		.17	--	14	3.7	3.5	1.4	44	0	19	.2	.3	1.0	.04	93	50	14	.2	121	6.9	45

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

4-190. WEST TWO RIVER NEAR IRON JUNCTION, MINN.

LOCATION.--At gaging station at bridge on State Highway 216, 5 miles southwest of Iron Junction, St. Louis County, and 9.2 miles upstream from St. Louis River.
DRAINAGE AREA.--68.4 square miles.
RECORDS AVAILABLE.--Chemical analyses: April 1956 to September 1959, July 1960 to September 1961.
Water temperatures: April 1956 to September 1957.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 18, 1960	12	6.9		0.34		21	17	8.6	2.2	142	0	16	7.6	0.2	0.2	0.03	165	122	6	0.3	271	7.5	19
Dec. 1.....	10	11		.36		20	22	9.1	2.4	153	0	26	7.7	.2	1.1	.04	193	141	16	.3	308	7.7	17
Feb. 8, 1961.	a 5.2	19		.14		41	18	11	1.8	200	0	16	11	.3	1.8	.02	225	175	11	.4	375	7.5	10
Mar. 24.....	36.1	10		.26		26	10	7.1	3.4	111	0	20	8.0	.2	2.8	.11	146	106	15	.3	246	7.3	18
May 10.....	105	7.0		.25	0.04	12	4.1	2.8	1.5	46	0	11	.9	.3	.8	.07	96	47	9	.2	106	7.1	60
May 18.....	266	--		--		--	--	.4	--	38	0	10	.2	--	--	--	84	41	10	.0	95	6.8	65
June 13.....	90	6.0		.19		13	3.8	2.4	.9	49	0	9.8	.0	.5	1.0	.06	88	48	8	.2	102	6.8	60
July 12.....	9.4	7.3		.34		27	11	6.7	1.6	133	0	12	3.4	.2	.3	.02	154	113	4	.3	245	7.4	22
Aug. 11.....	6.5	--		--		--	--	7.4	--	143	0	12	3.3	--	--	--	160	118	1	.3	258	7.1	15
Sept. 16.....	50	12		.26		23	8.4	5.6	2.0	86	0	29	4.2	.3	1.3	.08	151	92	21	.3	214	7.0	35

a Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

4-200. SWAN RIVER NEAR TOIVOLA, MINN.

LOCATION.--At gaging station at bridge on County Highway 5, 0.4 mile downstream from confluence of East Swan and West Swan Rivers, 3.5 miles upstream from mouth, and 5.8 miles north of Toivola, St. Louis County.
DRAINAGE AREA.--254 square miles.
RECORDS AVAILABLE.--Chemical analyses: July 1958 to September 1959, July 1960 to September 1961 (discontinued).

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 18, 1960	43	6.8		0.11	--	46	20	14	3.7	202	0	40	14	0.2	5.5	0.06	261	199	33	0.4	432	7.6	12
Dec. 1.....	42.0	11		.10	--	48	18	12	2.6	189	0	39	13	.2	6.8	.04	256	193	38	.4	416	7.7	9
Feb. 8, 1961.	23.5	18		.04	--	51	23	16	2.8	218	0	43	18	.3	11	.05	300	221	42	.5	489	7.3	9
Mar. 23.....	59.2	12		.18	--	35	15	12	3.6	145	0	33	13	.2	8.6	.05	223	149	30	.4	349	7.6	17
May 11.....	348	5.4		.27	0.08	14	5.8	3.9	1.6	55	0	13	2.2	.3	2.1	.08	110	59	14	.2	128	6.8	85
May 18.....	1070	5.8		.36	.03	12	4.1	2.5	1.2	42	0	12	.1	.3	1.3	.07	96	47	13	.2	108	7.0	75
June 13.....	61	6.6		.19	--	31	11	9.5	2.0	132	0	20	7.5	.3	3.5	.08	183	124	16	.4	281	7.2	45
July 12.....	22	8.5		.05	--	49	21	17	3.8	213	0	45	16	.3	4.3	.07	278	208	33	.5	468	7.2	17
Aug. 11.....	28	--		--	--	--	--	19	--	212	0	46	19	--	--	--	303	207	33	.6	481	7.3	13
Sept. 16.....	76	--		--	--	35	16	14	--	151	0	46	9.7	.1	--	--	221	155	31	.5	344	7.1	12

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

4-240. ST. LOUIS RIVER AT SCANLON, MINN.

LOCATION.--At gaging station at bridge on U.S. Highway 61 at Scanlon, Carlton County, 0.6 mile downstream from Minnesota Power and Light Co. powerplant, 3 miles upstream from Thomson Reservoir, and 3.2 miles upstream from Midway River.
DRAINAGE AREA.--3,430 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: July 1958 to September 1959, July 1960 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 31, 1960	818	8.0		0.39	--	22	8.0	7.9	1.6	92	0	18	9.1	0.2	0.8	0.06	142	88	13	0.4	204	7.1	50
Dec. 2.....	1340	6.1		.42	--	22	4.2	7.9	1.4	67	0	24	7.5	.2	1.3	.10	144	72	17	.4	174	7.0	85
Dec. 24.....	733	8.6		.54	--	31	4.5	10	1.2	90	0	26	12	.2	.9	.25	172	96	22	.4	227	7.5	90
Jan. 26, 1961	a 670	9.9		.41	--	32	6.6	13	1.5	79	0	39	19	.3	1.8	.16	228	107	42	.6	277	6.6	170
Feb. 27.....	802	--		--	--	--	--	11	--	108	0	20	14	--	--	--	202	106	17	.4	254	7.3	100
Mar. 24.....	1190	9.7		.51	--	27	5.0	7.5	2.0	77	0	26	13	.2	1.0	.16	163	88	25	.3	213	6.7	80
May 8.....	4390	--		--	0.04	--	--	2.7	--	49	0	13	3.0	--	--	--	111	52	12	.1	121	6.8	100
May 27.....	3120	5.1		.57	.00	17	4.3	4.3	1.4	52	0	15	3.9	.3	1.4	.15	128	60	17	.2	136	7.5	110
June 23.....	1110	7.0		.55	--	25	4.0	6.9	1.4	65	0	21	11	.3	1.3	.13	167	79	26	.3	188	6.8	90
July 21.....	794	7.6		.46	--	30	6.1	11	1.1	83	0	26	17	.3	1.5	.20	210	100	32	.5	249	6.7	100
Aug. 16.....	524	--		--	--	--	--	6.6	--	68	0	23	14	--	--	--	173	85	29	.3	213	7.0	90
Sept. 16.....	1100	7.9		.33	--	26	7.6	7.6	1.7	84	0	25	12	.3	.9	.05	168	96	27	.3	224	7.4	70

a Daily mean discharge.

STREAMS TRIBUTARY TO LAKE SUPERIOR

4-310. BLACK RIVER NEAR BESSEMER, MICH.

LOCATION.--Temperature recorder at gaging station, 450 feet downstream from bridge on county highway, 500 feet downstream from Powder Mill Creek, and 2.5 miles north of Bessemer, Gogebic County.
DRAINAGE AREA (revised).--200 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1954 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Minimum, freezing point on many days during November to March.
EXTREMES, 1954-61.--Water temperatures: Maximum, 83°F Aug. 2, 1957; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	51	50	50	51	54	54	52	52	53	55	55	54	54	55	55	53	51	50	48	46	44	44	44	43	41	40	41	43	43	43	43	49
Minimum	50	50	49	49	50	52	50	50	51	52	53	53	53	54	53	51	48	46	46	44	41	42	43	41	39	39	40	40	42	42	43	47
November																																
Maximum	43	43	41	40	40	38	37	35	34	34	34	34	34	34	34	34	34	34	33	33	34	34	33	33	33	33	33	33	32	32	--	35
Minimum	43	41	40	40	38	37	35	34	34	34	34	34	33	33	33	34	33	33	33	33	33	33	33	33	33	33	33	32	32	32	--	35
December																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
March																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	33	33	33	33	33	33	33	33	33	34	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	33	33	33	33	33	33	33	33	33	32
April																																
Maximum	34	34	34	34	34	34	34	35	37	37	37	37	38	38	37	37	37	39	40	41	45	46	46	44	42	42	42	42	41	42	--	39
Minimum	34	33	34	34	34	34	34	34	34	36	36	36	37	37	37	37	37	37	39	40	40	43	43	42	40	41	40	41	39	40	--	37
May																																
Maximum	42	41	46	50	50	50	51	51	50	48	52	58	58	56	51	50	50	50	53	55	57	58	59	61	61	55	59	60	60	62	--	53
Minimum	40	38	42	44	48	48	47	50	48	45	44	51	56	51	48	47	49	49	50	52	53	53	53	56	53	51	53	57	56	56	--	50
June																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
August																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
September																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	58	56	56	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	55	54	55	--	--

STREAMS TRIBUTARY TO LAKE MICHIGAN

4-460. BLACK RIVER NEAR GARNET, MICH.

LOCATION.--Temperature recorder at gaging station, 10 feet upstream from county bridge, 15 feet downstream from unnamed tributary entering from right, 3.5 miles upstream from Lake Michigan, and 4 miles southwest of Garnet, Mackinac County.
DRAINAGE AREA.--28 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1951 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 62°F June 30 to July 3, Sept. 9, 10; minimum, freezing point on many days during December and January.
EXTREMES, 1951-61.--Water temperatures: Maximum, 68°F July 21, 22, 1952; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	43	43	42	42	44	44	41	41	41	41	41	41	41	43	43	--	--	--	--	--	--	44	44	43	41	40	43	45	46	46	47	43
Minimum	41	42	41	41	42	41	39	39	39	40	41	38	39	41	43	--	--	--	--	--	--	42	43	41	39	39	40	43	45	44	46	41
November																																
Maximum	47	47	45	44	43	41	40	39	39	38	37	37	37	37	40	41	41	39	38	37	37	37	37	37	37	38	38	38	37	36	--	39
Minimum	47	45	44	43	41	40	39	39	38	37	37	37	37	37	37	40	39	38	37	37	37	37	37	36	36	37	38	37	36	33	--	38
December																																
Maximum	33	33	33	34	35	35	35	33	32	32	33	32	32	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	33	33
Minimum	33	33	33	33	34	35	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	32
January																																
Maximum	33	33	33	33	33	33	33	33	33	33	33	33	34	34	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
Minimum	33	33	33	33	33	33	32	33	33	33	33	32	33	33	33	32	32	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
February																																
Maximum	33	33	33	33	33	33	33	33	34	34	34	34	35	36	36	34	35	35	34	34	35	36	36	36	36	36	36	36	--	--	--	34
Minimum	33	33	33	33	33	33	33	33	33	34	33	33	34	35	34	34	34	34	34	34	34	35	36	36	36	34	35	35	--	--	--	34
March																																
Maximum	38	38	38	38	36	36	37	37	38	37	36	36	38	39	39	38	37	39	40	42	41	40	40	45	42	43	41	38	37	37	36	39
Minimum	36	38	38	35	35	35	35	36	37	36	36	36	37	38	38	37	36	36	39	38	39	40	40	40	40	41	38	37	37	36	36	37
April																																
Maximum	36	36	38	38	38	37	37	38	38	38	37	38	40	38	38	37	37	38	42	43	45	44	44	43	43	45	45	45	44	44	--	40
Minimum	36	35	35	37	37	37	37	35	36	36	35	36	36	38	37	37	36	36	38	41	43	43	43	42	41	43	44	44	43	42	--	39
May																																
Maximum	42	42	46	47	49	49	49	49	47	45	49	54	56	55	56	54	49	49	51	50	52	52	53	55	53	49	53	52	53	51	50	50
Minimum	41	41	41	43	45	46	45	47	45	42	43	48	52	53	54	49	45	47	46	48	48	47	47	48	48	47	46	49	47	46	48	47
June																																
Maximum	50	53	51	57	59	57	55	54	53	59	58	55	55	56	56	57	58	55	57	55	54	52	51	51	54	56	56	58	60	62	--	55
Minimum	48	50	47	49	52	51	50	51	51	51	50	54	54	51	49	49	50	52	52	49	51	51	51	51	51	53	55	54	58	60	--	52
July																																
Maximum	62	62	62	56	57	56	57	57	57	56	56	59	58	57	57	56	58	58	56	58	58	56	54	57	59	60	57	56	60	59	59	58
Minimum	62	60	56	54	53	54	54	53	52	54	53	54	55	53	54	54	53	54	53	53	54	53	53	53	54	54	54	54	54	55	55	54
August																																
Maximum	59	59	58	60	59	59	57	60	58	59	58	57	55	57	60	56	56	58	57	56	56	56	55	57	57	57	58	57	60	57	61	58
Minimum	53	55	54	53	55	55	52	54	55	56	55	53	50	50	55	52	50	52	54	52	50	50	51	52	52	54	53	54	55	55	56	53
September																																
Maximum	60	61	60	59	58	58	59	61	62	62	61	58	55	55	55	54	54	56	56	53	53	53	53	52	51	51	50	50	48	48	--	56
Minimum	57	58	59	56	54	56	55	55	57	58	58	55	54	54	53	53	53	54	52	51	53	53	52	51	51	50	50	48	46	46	--	53

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-585. EAST BRANCH ESCANABA RIVER AT GWINN, MICH.

LOCATION.--Temperature recorder at gaging station in county park at Gwinn, Marquette County, 1 mile upstream from mouth.
DRAINAGE AREA (revised).--124 square miles.
RECORDS AVAILABLE.--Water temperatures: November 1954 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 71°F Sept. 1-3; minimum, freezing point on many days during November to March.
EXTREMES, 1954-61.--Water temperatures: Maximum, 79°F July 4, 1955; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	49	48	48	49	50	50	49	49	49	51	51	50	51	52	52	51	50	47	47	45	44	43	43	43	41	40	41	43	43	43	44	47
Minimum	46	46	46	46	48	47	46	46	46	48	50	48	49	51	51	50	47	46	45	44	42	43	43	41	39	40	39	41	43	43	43	45
November																																
Maximum	44	44	43	41	40	39	37	36	36	36	36	35	35	36	37	37	37	37	37	36	36	37	37	36	35	33	32	32	32	32	--	37
Minimum	44	43	41	40	39	37	36	36	36	36	35	35	35	35	36	37	37	37	36	36	36	36	36	35	33	32	32	32	32	32	--	36
December																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
March																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34	34	34	34	33	33	33	33	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	33	33	33	33	33	32
April																																
Maximum	33	33	34	35	35	35	35	35	35	36	36	36	37	37	37	36	36	36	38	41	43	44	44	42	39	41	43	43	42	42	--	38
Minimum	33	33	33	33	34	34	34	35	34	35	36	36	36	37	36	34	35	35	36	38	41	43	42	39	38	38	41	42	41	41	--	37
May																																
Maximum	42	41	43	46	48	48	48	49	48	46	46	54	56	56	49	47	48	49	49	51	53	55	56	58	58	54	53	57	57	58	58	51
Minimum	41	40	40	43	45	46	45	48	46	42	42	46	54	49	47	45	46	48	48	49	50	51	51	53	53	50	48	52	53	52	55	48
June																																
Maximum	58	58	58	61	63	63	62	62	62	62	64	63	64	62	62	63	65	66	66	64	64	63	58	58	59	60	61	65	67	68	--	62
Minimum	56	57	55	54	59	58	57	59	58	57	57	61	62	58	56	57	59	61	62	61	59	57	55	55	54	56	58	59	63	65	--	58
July																																
Maximum	68	68	66	63	63	62	63	64	65	65	67	69	69	67	65	67	68	69	68	67	66	65	64	63	65	68	69	69	69	69	69	66
Minimum	65	65	60	56	57	58	58	58	59	62	62	64	65	65	63	64	63	63	64	63	63	63	63	62	62	61	65	68	64	66	65	62
August																																
Maximum	67	68	68	68	68	66	65	68	68	68	67	66	65	67	68	67	67	67	67	65	65	65	65	65	64	64	65	65	67	68	70	67
Minimum	62	64	64	63	63	60	61	62	62	65	65	63	59	60	64	61	60	63	63	60	60	60	60	59	60	61	61	62	61	64	65	62
September																																
Maximum	71	71	71	69	65	65	65	66	68	68	67	64	60	57	54	53	55	57	58	59	60	60	59	55	54	53	52	51	49	48	--	60
Minimum	67	69	69	64	61	62	60	62	64	65	64	60	57	54	52	51	52	54	55	56	58	59	55	54	52	49	51	49	46	48	--	57

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-595. FORD RIVER NEAR HYDE, MICH.

LOCATION.--Temperature recorder at gaging station, 40 feet downstream from county highway bridge, 1.4 miles downstream from Tenmile Creek, and 1.5 miles north of Hyde, Delta County.
DRAINAGE AREA.--450 square miles.
RECORDS AVAILABLE.--Water temperatures: July 1956 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 82°F July 12, Aug. 10; minimum, freezing point on many days during December to April.
EXTREMES, 1956-61.--Water temperatures: Maximum, 86°F July 19, Aug. 2, 1957; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	47	47	47	47	49	49	48	47	48	50	51	50	50	53	52	49	47	45	43	40	39	38	39	39	36	39	39	40	40	41	42	45
Minimum	45	45	45	46	47	47	45	45	46	47	50	47	47	50	49	47	45	42	40	38	37	38	38	36	34	36	39	39	40	40	41	43
November																																
Maximum	42	42	41	39	38	37	36	34	35	35	33	34	35	35	37	38	38	37	37	35	35	35	35	33	33	33	34	35	35	34	--	36
Minimum	42	41	39	38	37	36	34	34	34	33	33	33	34	35	35	37	37	37	35	35	35	35	33	33	33	33	33	34	34	34	--	35
December																																
Maximum	34	33	33	32	32	32	32	32	32	32	32	32	32	42	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
March																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
April																																
Maximum	32	32	32	32	32	32	32	32	32	32	33	33	33	38	38	38	37	39	40	42	44	44	44	43	41	42	42	42	42	42	--	37
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	33	38	36	36	37	38	39	42	43	43	41	39	39	40	41	40	41	--	36
May																																
Maximum	42	42	45	46	47	47	49	49	47	45	45	50	54	54	50	47	47	46	48	49	52	53	54	57	57	52	54	55	55	59	59	50
Minimum	40	40	41	42	44	44	44	47	45	42	41	44	49	50	47	45	45	45	44	46	47	48	49	51	52	48	47	51	51	53	55	46
June																																
Maximum	59	60	60	66	67	67	65	66	66	68	68	69	70	67	66	68	70	71	71	70	67	67	63	62	67	68	68	73	77	77	--	67
Minimum	56	58	56	58	64	62	62	61	63	64	64	68	67	62	61	62	65	67	68	66	64	61	59	59	60	63	64	64	70	72	--	63
July																																
Maximum	76	76	76	69	72	72	72	73	75	76	78	82	80	77	75	74	76	77	77	75	75	75	72	71	73	75	78	78	79	78	76	75
Minimum	72	74	66	63	67	70	68	67	68	73	73	75	76	73	72	70	73	74	74	72	73	72	71	70	69	71	74	76	75	74	74	72
August																																
Maximum	75	77	78	78	78	74	75	79	79	82	78	75	73	77	79	75	75	--	--	--	--	--	--	--	--	--	--	--	75	78	79	--
Minimum	72	73	74	73	73	69	71	74	75	77	75	72	67	68	73	69	67	--	--	--	--	--	--	--	--	--	--	--	68	72	74	--
September																																
Maximum	78	76	78	76	72	73	72	76	78	77	76	69	61	58	57	59	61	63	63	64	65	65	64	58	56	57	57	55	51	53	--	66
Minimum	75	74	74	71	68	70	68	71	73	75	70	61	58	57	54	55	57	59	60	60	63	63	58	55	53	52	55	51	47	51	--	62

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-655. STURGEON RIVER NEAR FOSTER CITY, MICH.

LOCATION.--Temperature recorder at gaging station, 30 feet downstream from bridge on County Highway 569, 1.8 miles downstream from confluence of East and West Branches, and 4 miles south of Foster City, Dickinson County.
DRAINAGE AREA.--244 square miles.
RECORDS AVAILABLE.--Water temperatures: July 1956 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 77°F July 12, 29, Sept. 9; minimum, freezing point on many days during November to April.
EXTREMES, 1956-61.--Water temperatures: Maximum, 83°F July 19, 29, Aug. 2, 1957, July 30, 1959; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	51	51	52	53	54	54	53	53	54	56	56	54	55	58	56	54	51	49	48	44	43	42	42	41	40	41	42	44	45	46	47	49
Minimum	48	48	47	48	50	50	48	48	48	49	52	50	51	54	54	50	48	46	44	42	40	41	41	38	37	40	41	42	44	44	46	46
November																																
Maximum	46	45	43	41	40	39	36	35	36	35	35	34	36	35	37	36	38	37	35	35	35	35	35	33	34	34	34	34	34	32	--	37
Minimum	45	43	41	40	39	36	35	35	35	33	34	34	34	35	35	37	37	35	34	34	34	35	34	33	33	33	33	34	32	32	--	35
December																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
March																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
April																																
Maximum	32	32	32	33	33	35	34	35	36	39	40	40	43	42	41	39	37	38	41	43	48	49	48	45	42	44	46	45	45	46	--	40
Minimum	32	32	32	32	32	32	32	33	33	35	37	39	39	40	39	37	36	35	37	40	43	46	45	42	40	40	43	43	42	43	--	38
May																																
Maximum	44	44	48	50	50	50	51	51	49	46	47	55	57	57	53	49	49	48	49	52	55	56	58	59	59	53	56	59	59	61	61	53
Minimum	42	40	41	44	47	47	46	49	46	42	41	47	54	53	49	46	46	46	45	48	49	50	51	54	53	50	49	54	54	54	58	48
June																																
Maximum	62	64	63	68	71	70	67	70	71	72	72	71	70	67	67	68	70	70	70	67	67	65	62	60	63	63	65	70	73	76	--	68
Minimum	59	60	59	59	65	63	63	63	64	66	65	68	66	61	60	61	64	65	65	63	61	59	57	57	56	59	61	63	67	70	--	62
July																																
Maximum	76	76	72	70	72	73	73	72	72	71	74	77	75	71	72	73	73	74	71	69	69	67	67	66	72	75	76	75	77	74	74	72
Minimum	71	72	65	61	63	64	65	63	64	67	68	70	69	67	66	66	67	67	67	66	66	66	65	64	64	66	70	70	69	69	69	67
August																																
Maximum	70	74	75	75	71	73	73	76	76	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	66	66	68	68	66	63	65	67	68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
September																																
Maximum	--	--	--	--	--	--	73	74	77	76	74	68	62	59	59	60	61	63	63	64	65	63	61	58	58	57	56	53	51	52	--	63
Minimum	--	--	--	--	--	--	66	69	70	72	68	62	59	57	54	54	55	57	58	58	51	61	58	55	53	51	51	49	47	51	--	58

4-1215. MUSKEGON RIVER AT EVART, MICH.

LOCATION.--Temperature recorder at gaging station, 500 feet downstream from bridge on U.S. Highway 10 at Evart, Osceola County, 0.4 mile upstream from Twin Creek, and at mile 123.9.
DRAINAGE AREA.--1,450 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: November 1956 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 79°F June 30; minimum, freezing point on many days during December to February.
EXTREMES, 1956-61.--Water temperatures: Maximum, 80°F Aug. 24, 1959; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	54	56	55	56	57	58	56	55	55	55	56	54	56	56	58	58	55	53	50	48	46	46	47	46	46	45	47	47	49	49	48	52
Minimum	51	52	53	52	53	54	52	51	51	50	53	51	51	55	55	55	53	50	48	46	45	45	46	44	43	45	45	47	47	47	48	50
November																																
Maximum	48	47	46	45	44	43	42	41	41	41	40	42	42	42	47	49	48	45	43	43	42	41	41	40	39	40	42	43	43	40	--	43
Minimum	47	46	45	43	43	42	41	40	40	40	40	40	41	41	42	47	45	43	43	42	41	41	40	39	39	39	40	42	40	37	--	42
December																																
Maximum	37	35	35	36	39	38	38	36	34	33	34	34	34	34	33	33	33	33	33	33	33	33	33	33	33	32	33	33	33	33	32	34
Minimum	35	35	34	35	36	38	36	34	33	33	33	34	34	33	33	33	33	33	33	32	32	32	33	33	32	32	32	32	33	32	32	33
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	33	33	33	33	33	33	33	33	33	33	33	33	34	33	34	33	33	32	32	32	32	33
Minimum	32	32	32	32	32	32	32	32	32	32	32	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	32	32	32	32	32	32
February																																
Maximum	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	32	34	34	34	34	33	33	33	34	34	34	--	--	--	33
Minimum	32	33	33	32	32	32	32	32	32	33	33	33	33	32	32	32	32	32	32	33	33	33	33	33	33	33	33	33	--	--	--	33
March																																
Maximum	34	34	38	38	36	36	36	36	34	35	34	36	35	35	37	37	37	36	39	40	39	37	37	38	37	38	39	39	38	38	38	37
Minimum	33	33	33	36	36	35	35	33	33	34	34	34	35	35	35	35	34	34	35	37	37	37	37	37	37	37	38	38	37	36	37	35
April																																
Maximum	39	39	38	39	39	42	42	42	41	40	42	43	46	45	45	45	41	41	43	46	50	51	52	52	50	50	49	50	50	49	--	45
Minimum	38	38	37	37	39	39	41	39	40	39	38	42	41	44	44	41	40	40	41	43	46	49	50	50	49	48	49	48	47	48	--	43
May																																
Maximum	49	48	49	53	53	53	56	56	56	55	58	62	66	66	66	64	62	59	59	60	62	62	62	64	62	56	57	61	63	62	61	59
Minimum	48	45	45	48	50	51	50	55	54	51	52	56	60	64	64	60	58	56	53	55	58	56	56	57	56	52	49	54	58	56	58	54
June																																
Maximum	60	65	66	68	71	71	69	66	71	72	71	72	74	72	70	69	70	70	69	64	65	65	61	63	64	66	68	73	77	79	--	69
Minimum	57	59	60	61	64	67	65	65	63	67	67	68	69	67	64	62	63	64	63	60	60	61	57	55	59	60	62	65	69	72	--	63
July																																
Maximum	78	78	75	70	71	73	72	71	72	70	72	73	71	72	72	71	70	73	72	71	70	70	70	71	70	73	74	73	75	74	73	72
Minimum	72	73	67	62	63	64	67	65	63	65	64	65	67	66	67	67	66	65	66	68	67	67	66	67	67	65	67	68	67	70	70	67
August																																
Maximum	70	70	71	74	73	69	70	69	72	72	73	71	68	67	68	70	70	71	69	67	67	68	66	64	67	66	68	71	73	73	74	70
Minimum	67	66	66	67	69	67	64	66	66	69	69	67	64	62	64	63	64	64	64	62	61	61	63	62	63	63	63	65	67	68	68	65
September																																
Maximum	73	75	74	74	73	70	71	72	73	74	74	72	66	65	63	61	61	61	61	61	63	66	66	63	62	58	57	55	53	55	--	66
Minimum	71	70	72	70	70	68	65	67	68	69	71	66	65	63	60	59	58	58	58	59	61	63	63	62	58	56	55	53	51	53	--	63

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-1235. MANISTEE RIVER NEAR GRAYLING, MICH.

LOCATION.--Temperature recorder at gaging station, 25 feet upstream from bridge on State Highway 72, 2.5 miles downstream from Goose Creek, and 6.5 miles northwest of Grayling, Crawford County.
DRAINAGE AREA.--159 square miles.
RECORDS AVAILABLE.--Water temperatures: May 1957 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 74°F June 29; minimum, freezing point on many days during December to March.
EXTREMES, 1957-61.--Water temperatures: Maximum, 74°F June 29, 1961; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	48	50	50	51	54	54	50	50	51	53	54	52	52	52	52	51	50	48	46	43	43	42	44	42	43	43	44	46	46	46	46	48
Minimum	43	47	46	46	49	49	45	45	46	47	51	46	48	51	50	48	47	43	43	41	41	41	41	38	38	42	42	45	44	43	45	45
November																																
Maximum	46	44	43	42	42	40	39	39	41	41	39	39	43	43	48	49	46	42	43	43	42	43	43	40	41	44	45	44	44	38	--	43
Minimum	44	43	41	40	40	38	37	37	37	39	37	38	39	40	42	44	42	41	42	41	39	40	39	38	39	40	44	42	38	35	--	40
December																																
Maximum	35	37	38	41	45	45	39	37	34	33	34	34	34	33	33	33	33	33	33	33	34	33	33	33	33	32	32	32	32	32	33	35
Minimum	34	34	36	37	41	39	37	34	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	32	32	32	32	32	32	32	34
January																																
Maximum	33	34	34	33	34	36	36	35	33	33	34	36	38	38	36	35	35	35	33	32	32	32	32	32	32	32	33	32	32	32	32	34
Minimum	33	33	33	33	33	34	35	33	33	33	33	34	36	36	34	33	34	33	32	32	32	32	32	32	32	32	32	32	32	32	32	33
February																																
Maximum	32	33	32	32	32	32	32	32	32	35	35	35	35	36	36	32	38	38	37	36	38	41	41	40	39	38	39	39	--	--	--	36
Minimum	32	32	32	32	32	32	32	32	32	32	34	33	34	35	32	32	32	37	34	33	33	36	40	39	35	34	36	33	--	--	--	34
March																																
Maximum	40	41	43	42	37	37	40	40	36	36	36	42	42	36	40	38	37	38	43	45	44	40	40	44	43	47	46	46	38	42	44	41
Minimum	35	37	38	36	35	35	34	32	32	32	33	35	36	35	36	33	32	32	36	38	38	38	39	39	39	40	43	38	35	33	37	36
April																																
Maximum	43	37	43	45	46	46	45	46	46	42	50	49	51	51	48	48	45	44	53	53	53	53	53	51	51	53	52	49	51	50	--	48
Minimum	37	34	34	41	42	43	39	36	41	40	39	45	43	45	45	43	40	41	43	45	48	48	47	46	44	46	49	45	43	47	--	43
May																																
Maximum	47	45	50	56	56	54	59	58	54	51	58	65	66	65	64	59	55	55	59	59	62	60	60	63	62	50	57	63	61	60	60	58
Minimum	42	41	41	45	47	47	47	53	49	43	46	52	58	60	59	50	47	50	46	51	54	51	50	52	50	46	44	52	52	50	52	49
June																																
Maximum	59	66	64	68	70	69	66	61	66	70	70	72	71	66	64	66	67	66	65	60	61	61	55	59	61	63	63	71	74	73	--	66
Minimum	53	57	56	57	60	60	58	57	55	60	60	63	64	57	55	54	56	58	56	50	54	55	51	48	54	54	58	57	65	65	--	57
July																																
Maximum	72	72	70	63	64	65	64	65	66	64	67	69	68	67	67	63	63	69	69	68	68	68	68	67	68	70	72	72	73	72	67	68
Minimum	64	65	67	51	55	57	58	54	55	57	56	60	63	61	60	59	58	59	62	63	62	63	62	62	63	61	63	65	64	64	63	61
August																																
Maximum	69	67	68	72	70	63	66	67	70	69	67	66	63	64	69	67	66	68	67	60	62	63	62	61	63	63	65	65	67	67	70	66
Minimum	60	62	61	62	63	59	57	62	62	65	62	60	56	55	61	59	58	58	58	54	55	55	58	58	58	59	59	61	60	62	62	59
September																																
Maximum	69	70	70	69	68	65	63	66	68	69	69	65	57	58	57	56	56	57	57	57	61	60	60	59	55	55	54	52	49	54	--	61
Minimum	65	63	66	64	63	60	57	59	61	63	65	57	55	56	53	52	51	52	51	52	56	57	57	55	51	49	49	46	43	49	--	56

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-1245. *EAST BRANCH PINE RIVER NEAR TUSTIN, MICH.*

LOCATION.--Temperature recorder at gaging station, 75 feet downstream from highway bridge, 1.6 miles upstream from North Branch, 3.0 miles west of Tustin, Osceola County, and 5.5 miles northwest of Le Roy.
DRAINAGE AREA.--63 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: July 1952 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 71°F June 29; minimum, 34°F Dec. 1-5, Dec. 8 to Jan. 24.
EXTREMES, 1952-61.--Water temperatures: Maximum, 73°F July 4, 1955; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	50	51	51	50	52	52	51	50	50	51	52	51	53	54	54	54	54	51	49	49	47	45	44	44	44	43	45	46	47	47	47	49
Minimum	48	49	50	49	50	51	49	48	48	49	51	49	50	53	54	54	51	49	49	47	45	44	44	44	43	43	43	45	46	47	47	48
November																																
Maximum	47	47	46	43	42	42	41	40	39	39	39	38	39	40	45	47	46	42	41	41	41	39	39	38	37	39	40	42	42	37	--	41
Minimum	47	46	43	42	42	41	40	39	39	39	38	38	38	39	40	45	42	41	41	41	39	39	38	37	37	37	39	40	37	35	--	40
December																																
Maximum	35	34	34	34	38	38	37	35	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
Minimum	34	34	34	34	34	37	35	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
January																																
Maximum	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	35	35	35	35	35	35	35	35	34
Minimum	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	35	35	35	35	35	35	35	34
February																																
Maximum	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	--	--	--	35
Minimum	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	--	--	--	35
March																																
Maximum	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	37	37	37	36	36	36	36	38	38	37	37	36	37	36
Minimum	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	36	36	36	36	36	35	35	36	37	36	36	36	35
April																																
Maximum	37	37	36	39	39	42	42	40	39	39	40	40	45	45	43	43	38	37	41	45	49	49	49	48	47	47	46	46	46	46	--	43
Minimum	37	36	36	36	39	39	40	37	39	38	38	40	40	43	43	38	37	37	37	41	45	49	48	47	45	46	46	45	43	45	--	41
May																																
Maximum	46	43	48	52	52	51	55	55	54	50	56	62	65	65	63	60	56	55	56	57	60	58	58	62	61	53	55	61	61	59	59	56
Minimum	43	42	41	46	48	48	47	54	50	46	48	54	60	62	60	54	52	52	50	53	55	52	52	54	53	51	48	54	55	53	56	51
June																																
Maximum	59	63	63	66	67	67	66	63	67	67	67	67	67	66	62	63	65	65	64	59	60	59	57	58	62	63	64	68	71	70	--	64
Minimum	56	59	57	59	61	63	61	62	61	64	64	64	65	60	56	55	56	58	58	55	56	57	55	53	57	57	59	62	65	66	--	59
July																																
Maximum	70	70	67	61	61	63	64	63	63	61	64	64	64	65	65	65	64	64	64	65	65	63	63	65	65	65	66	65	66	65	65	65
Minimum	65	67	60	56	56	57	59	58	56	59	59	60	61	61	63	62	60	60	61	63	61	63	61	62	63	60	62	63	62	63	64	61
August																																
Maximum	65	63	64	65	63	62	62	61	64	65	65	63	60	61	62	62	62	62	61	58	58	58	58	58	60	60	61	63	64	64	65	62
Minimum	62	61	60	61	61	61	58	60	60	63	63	60	57	55	60	58	57	57	57	55	55	55	56	56	58	59	58	60	61	61	61	59
September																																
Maximum	64	68	68	68	66	65	64	65	65	66	65	65	61	62	61	58	56	57	57	56	59	61	61	60	57	55	54	52	50	53	--	61
Minimum	63	63	68	65	65	63	61	62	63	64	65	60	60	61	58	55	55	55	55	55	56	59	60	57	55	53	52	50	47	47	--	58

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-1250. PINE RIVER NEAR LE ROY, MICH.

LOCATION.--Temperature recorder at gaging station, 15 feet downstream from highway bridge, 5.1 miles downstream from East Branch, 5.0 miles northwest of Le Roy, and 5.3 miles southwest of Tustin, Osceola County.
DRAINAGE AREA.--118 square miles.
RECORDS AVAILABLE.--Water temperatures: January 1953 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 66°F June 29 to July 2; minimum, not determined.
EXTREMES, 1953-61.--Water temperatures: Maximum, 69°F July 22, 1953, Aug. 1, 2, 5, 6, 1955; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	49	49	49	49	51	51	50	48	48	49	51	50	50	52	52	52	51	50	48	47	47	45	45	45	44	44	45	45	46	46	46	48
Minimum	48	48	49	48	49	50	48	47	47	48	49	48	49	50	52	51	50	48	47	47	45	45	45	44	43	43	44	45	45	44	45	47
November																																
Maximum	46	45	44	42	41	41	40	39	39	39	39	38	39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	45	44	42	41	41	40	39	38	39	39	38	38	38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	33	33	33	33	33	33	33	33	33	34	34	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	33	33	33	33	33	33	33	33	33	33	34	--
January																																
Maximum	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	35	35	35	34	34	34	34	35	35	35	35	35	35	35	35	34
Minimum	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	35	34	34	34	34	34	34	35	35	35	35	35	35	35	34
February																																
Maximum	35	35	35	35	35	35	35	35	36	37	37	36	37	37	37	36	37	37	37	36	37	37	37	37	36	36	36	37	--	--	--	36
Minimum	35	35	35	35	33	34	34	34	35	36	36	36	36	37	36	35	35	37	35	35	35	36	37	36	36	36	36	35	--	--	--	35
March																																
Maximum	37	38	38	37	36	36	36	36	36	36	36	37	37	36	37	37	37	37	39	39	39	38	38	38	38	40	40	39	37	37	38	37
Minimum	36	37	36	36	36	36	35	34	34	34	34	35	36	36	36	36	34	34	36	38	38	38	38	36	36	37	39	37	36	35	36	36
April																																
Maximum	38	38	37	39	39	41	41	40	40	39	41	41	43	42	42	42	37	38	41	45	48	48	48	47	46	46	46	45	47	47	--	42
Minimum	38	36	36	37	39	39	39	37	39	38	37	41	40	42	42	35	36	37	38	41	45	47	47	46	45	46	45	45	44	45	--	41
May																																
Maximum	47	45	48	52	51	51	53	53	52	50	54	60	62	62	60	58	55	53	54	56	58	56	56	58	57	51	52	58	57	56	55	55
Minimum	45	43	43	46	48	48	47	52	50	46	48	52	56	59	58	54	51	51	50	51	53	51	51	52	51	49	49	51	52	51	52	50
June																																
Maximum	55	60	59	61	62	62	61	58	62	62	62	63	64	63	60	59	60	61	60	56	58	57	55	55	58	60	59	63	66	66	--	60
Minimum	52	55	55	55	57	58	57	58	57	59	59	59	62	59	56	54	55	56	56	54	54	55	54	52	55	55	55	57	61	62	--	56
July																																
Maximum	66	66	63	58	59	59	60	59	59	58	60	61	61	61	60	60	60	60	60	61	61	59	60	61	61	61	62	62	63	62	62	61
Minimum	61	62	57	55	54	55	57	55	55	56	56	57	58	58	58	58	57	57	58	59	58	59	58	58	59	57	59	60	59	60	60	58
August																																
Maximum	62	59	60	61	61	59	58	58	60	61	61	60	59	57	59	59	58	58	58	56	55	55	55	55	56	56	57	58	60	60	61	58
Minimum	59	58	57	58	58	58	56	57	57	59	59	58	55	54	57	56	56	56	56	53	53	53	54	54	55	56	55	57	58	58	59	56
September																																
Maximum	61	62	63	62	62	60	59	60	60	62	62	61	59	60	60	57	55	54	54	53	56	57	57	57	55	53	53	51	49	52	--	58
Minimum	60	60	62	61	60	59	57	58	58	59	61	58	58	59	57	55	53	52	52	52	53	56	57	55	53	53	51	49	47	48	--	56

4-1255. PINE RIVER NEAR HOXEYVILLE, MICH.

LOCATION.--Temperature recorder at gaging station, 500 feet upstream from bridge on State Highway 37, 4.2 miles northwest of Hoxeyville, Wexford County, 8.0 miles east of Wellston, and 8 miles upstream from mouth.
DRAINAGE AREA.--251 square miles.
RECORDS AVAILABLE.--Water temperatures: July 1952 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 66°F June 29 to July 2; minimum, 34°F Dec. 12-15.
EXTREMES, 1952-61.--Water temperatures: Maximum, 68°F Aug. 1, 1955; minimum, freezing point on several days during January 1955 and February 1958.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	50	50	50	49	49	49	49	48	48	48	49	49	49	51	51	51	50	49	47	47	46	45	45	45	44	44	44	44	45	45	45	48
Minimum	49	49	49	49	49	49	48	48	48	48	48	48	48	49	51	50	49	47	47	46	45	45	45	44	44	44	44	44	44	45	45	47
November																																
Maximum	45	45	44	44	43	42	42	41	41	41	41	41	41	41	44	45	45	43	42	42	41	41	41	40	40	40	41	41	41	39	--	42
Minimum	45	44	44	43	42	42	41	41	41	41	41	41	41	41	41	44	43	42	42	41	41	41	40	40	39	39	40	41	39	38	--	41
December																																
Maximum	38	37	37	37	40	40	39	37	36	35	35	35	34	34	36	36	35	35	35	35	35	35	35	35	35	35	35	35	35	36	38	36
Minimum	37	37	37	37	37	39	37	36	35	35	35	34	34	34	34	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	36	35
January																																
Maximum	38	38	38	37	37	37	38	38	37	37	37	37	38	39	39	38	38	38	38	37	36	36	36	36	36	35	35	35	35	35	35	37
Minimum	38	38	37	36	36	37	37	37	37	37	37	37	37	38	38	38	38	38	37	36	36	36	36	36	35	35	35	35	35	35	35	37
February																																
Maximum	35	35	35	35	35	36	36	36	36	38	38	38	38	39	39	38	39	39	39	38	38	39	40	40	39	38	39	39	--	--	--	38
Minimum	35	35	35	35	35	35	35	35	36	36	38	38	38	38	38	38	38	39	38	37	37	38	39	39	38	38	38	38	--	--	--	37
March																																
Maximum	39	40	40	40	39	39	39	38	37	37	37	39	39	39	39	39	39	38	40	42	42	41	41	41	41	42	43	43	42	40	42	40
Minimum	38	39	40	39	39	39	38	36	36	37	37	37	38	38	39	39	37	38	38	40	41	41	41	41	40	40	42	42	40	39	40	39
April																																
Maximum	42	42	41	43	43	44	44	43	43	43	42	43	45	45	44	44	42	40	43	45	48	48	48	48	48	48	47	47	48	48	--	45
Minimum	42	41	41	41	43	43	43	42	43	42	41	42	42	44	44	42	40	40	40	43	45	48	48	47	47	47	47	47	46	47	--	44
May																																
Maximum	47	46	48	50	50	50	52	52	52	50	52	56	59	59	58	56	54	53	54	54	57	55	55	56	56	52	52	55	56	55	54	53
Minimum	46	45	44	47	48	48	48	52	50	48	46	52	55	58	56	53	52	52	51	52	53	52	52	52	52	50	48	51	53	52	52	51
June																																
Maximum	53	57	58	60	61	62	61	58	61	62	61	63	63	63	61	60	61	61	60	57	57	57	55	56	59	59	60	64	66	66	--	60
Minimum	52	53	55	56	58	59	58	58	57	60	59	59	61	60	58	56	56	57	56	55	55	55	54	53	56	56	58	59	62	63	--	57
July																																
Maximum	66	66	65	59	61	61	62	61	61	60	62	62	62	61	61	61	62	62	61	63	62	60	60	62	61	63	63	62	63	63	63	62
Minimum	62	64	59	56	56	56	58	57	56	58	57	59	59	58	58	59	58	58	59	60	59	59	58	59	60	58	59	60	59	61	61	59
August																																
Maximum	62	60	62	63	62	61	60	60	61	61	62	61	59	59	60	61	61	60	59	57	57	57	56	56	57	58	58	58	60	61	62	60
Minimum	60	59	59	59	59	59	58	58	58	60	60	59	56	55	58	57	57	57	57	55	55	55	55	55	55	56	56	57	58	58	59	57
September																																
Maximum	62	62	62	62	62	60	60	61	61	62	62	60	57	58	58	57	55	55	55	54	56	57	57	57	55	54	53	53	51	53	--	58
Minimum	60	60	61	60	60	59	58	58	59	59	60	57	57	57	57	55	54	54	54	54	54	56	56	55	54	53	53	51	50	50	--	56

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

4-1262. LITTLE MANISTEE RIVER NEAR FREESOIL, MICH.

LOCATION.--Temperature recorder at gaging station, 25 feet upstream from Six-mile Bridge, 5.8 miles north of Freesoil, Mason County, 7.4 miles upstream from mouth, and 9.0 miles southeast of Manistee.
DRAINAGE AREA.--200 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1956 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 71°F June 29 to July 2; minimum, 33°F Nov. 30 to Dec. 2, Dec. 11-15, 21-24, Jan. 20-26.
EXTREMES, 1956-61.--Water temperatures: Maximum, 72°F June 17, 18, 1957; minimum, freezing point on several days in December 1957.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	49	50	50	49	52	52	50	49	50	51	51	50	50	51	51	51	50	49	47	46	44	45	45	45	44	45	47	47	47	47	48	48
Minimum	46	48	48	47	48	50	47	47	47	48	50	47	48	50	50	49	49	47	46	44	44	44	45	43	42	44	45	47	46	46	47	47
November																																
Maximum	49	48	47	46	46	44	43	43	43	43	42	42	44	44	48	49	48	46	44	43	43	41	41	40	40	42	43	45	43	38	--	44
Minimum	48	47	46	46	44	43	43	43	43	42	42	41	42	43	44	48	46	44	42	42	41	41	40	40	40	40	42	43	38	33	--	43
December																																
Maximum	34	34	35	37	40	40	38	37	35	35	34	33	33	33	35	35	35	34	34	34	34	33	33	34	34	34	34	34	34	36	37	35
Minimum	33	33	34	35	37	38	37	35	34	34	33	33	33	33	33	35	34	34	34	34	33	33	33	33	34	34	34	34	34	34	36	34
January																																
Maximum	37	37	37	35	35	36	36	36	36	36	35	35	36	37	37	37	37	37	37	35	33	33	33	33	33	34	34	34	34	34	34	35
Minimum	37	37	35	35	35	35	36	36	36	35	34	35	35	36	36	35	35	37	35	33	33	33	33	33	33	33	34	34	34	34	34	35
February																																
Maximum	34	34	34	34	34	34	34	34	34	34	34	36	36	37	37	37	39	39	39	38	38	40	41	41	41	39	39	40	--	--	--	37
Minimum	34	34	34	34	34	34	34	34	34	34	34	34	36	36	37	35	36	39	37	36	36	38	40	41	39	38	38	38	--	--	--	36
March																																
Maximum	41	41	42	42	41	40	41	41	38	39	39	41	41	40	40	40	40	40	42	45	44	42	42	46	45	47	47	47	44	43	44	42
Minimum	39	40	41	41	40	40	39	37	36	36	38	39	39	39	40	38	37	37	40	41	42	42	42	42	42	43	47	44	41	39	40	40
April																																
Maximum	44	42	43	47	46	48	46	46	44	44	46	45	49	48	46	46	43	44	46	49	55	55	53	51	51	50	50	49	52	50	--	48
Minimum	42	40	41	42	44	44	43	41	43	42	40	44	43	46	46	42	41	42	41	45	49	51	49	49	47	47	48	47	46	48	--	44
May																																
Maximum	49	47	51	55	53	52	57	55	53	51	57	61	65	63	62	58	56	54	57	58	59	58	58	61	58	51	55	60	59	59	57	56
Minimum	45	45	43	47	49	49	49	53	50	46	48	54	57	60	58	53	52	52	48	51	54	51	51	52	51	48	46	51	53	51	53	51
June																																
Maximum	56	62	62	64	66	65	63	61	65	65	63	66	65	64	61	62	62	63	61	59	61	60	56	59	62	63	63	69	71	71	--	63
Minimum	52	55	55	56	58	59	59	59	57	60	60	60	63	60	55	54	55	56	55	52	55	56	53	50	55	56	58	61	64	65	--	57
July																																
Maximum	71	71	67	63	63	65	64	62	64	61	65	66	64	67	65	65	66	67	65	68	65	63	62	65	64	66	67	65	67	66	66	65
Minimum	65	67	61	57	56	57	59	58	56	59	58	60	62	60	61	61	60	60	61	62	61	62	60	60	61	59	61	62	60	63	63	60
August																																
Maximum	65	64	66	68	65	64	63	62	64	63	65	62	60	62	64	64	64	64	62	60	60	60	58	59	59	59	60	60	63	64	65	63
Minimum	62	60	60	62	62	61	58	59	59	62	61	59	57	55	60	57	58	58	58	55	55	55	56	55	55	57	56	59	59	59	60	58
September																																
Maximum	64	64	66	65	64	63	63	64	64	65	64	62	58	58	57	56	55	56	56	55	57	58	58	57	55	54	53	52	50	53	--	59
Minimum	62	61	63	61	61	61	59	60	60	61	62	57	57	57	54	54	53	53	53	53	54	56	56	55	53	51	51	50	48	49	--	56

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STREAMS TRIBUTARY TO LAKE HURON

4-1280. STURGEON RIVER NEAR WOLVERINE, MICH.

LOCATION.--Temperature recorder at gaging station, 1.8 miles north of Wolverine, Cheboygan County, 2.8 miles downstream from West Branch, and 9 miles upstream from mouth.
DRAINAGE AREA.--170 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: October 1958 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 70°F June 30, Sept. 3; minimum, freezing point on many days during December to February.
EXTREMES, 1958-61.--Water temperatures: Maximum, 73°F June 28, 1959; minimum, freezing point on many days during winter months.
REMARKS.--Recorder stopped Aug. 3-7, 12-22.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	48	50	50	51	54	53	50	49	50	52	52	49	51	51	51	50	49	47	45	43	44	44	45	42	43	42	45	46	45	45	46	48
Minimum	44	48	47	47	49	49	46	45	46	47	49	46	48	50	50	47	47	45	43	42	42	42	42	41	40	41	42	44	43	42	45	45
November																																
Maximum	46	45	44	42	42	41	40	40	42	41	40	39	41	41	45	45	44	41	41	41	41	41	41	38	39	42	42	41	41	38	--	42
Minimum	45	44	42	41	41	40	39	39	40	40	39	38	39	39	41	44	41	41	41	40	40	40	38	38	38	39	41	40	38	35	--	40
December																																
Maximum	35	35	35	37	40	40	37	35	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	32	32	34
Minimum	34	34	34	35	37	37	35	33	32	32	33	33	33	32	32	33	33	33	33	33	33	33	33	33	33	32	33	33	32	32	32	33
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	33	34	34	34	33	33	33	32	33	33	33	33	33	33	33	33	33	33	33	33	33
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	33	34	33	32	32	32	32	32	32	33	33	33	33	32	32	33	33	33	33	32
February																																
Maximum	33	33	33	33	33	33	33	33	32	32	33	32	32	33	33	33	33	33	34	34	35	37	37	37	37	36	36	36	--	--	--	34
Minimum	33	33	33	32	32	32	32	32	32	32	32	32	32	32	33	32	32	33	33	33	33	35	37	36	35	34	34	33	--	--	--	33
March																																
Maximum	37	37	38	37	35	35	37	36	35	34	34	38	37	36	37	36	34	35	39	40	39	38	38	41	38	41	39	38	36	39	40	37
Minimum	35	36	36	34	34	34	34	33	33	33	33	34	34	35	35	33	33	33	35	35	36	37	37	37	36	37	38	35	35	34	35	35
April																																
Maximum	39	36	39	39	41	40	38	40	39	39	44	42	45	43	43	43	42	41	46	49	49	49	48	46	46	51	49	47	48	46	--	44
Minimum	35	34	35	37	37	38	36	34	36	36	36	38	38	39	40	39	37	39	39	41	45	44	44	43	41	44	45	43	42	43	--	39
May																																
Maximum	46	43	48	51	52	50	55	53	51	48	56	61	64	64	62	57	53	51	55	57	58	57	58	61	59	50	55	55	56	55	54	55
Minimum	41	40	40	42	43	45	45	49	47	43	45	51	55	57	57	50	45	48	45	48	51	48	48	50	50	47	44	51	48	47	51	47
June																																
Maximum	60	60	58	64	67	64	62	60	62	66	66	69	68	61	61	63	65	65	63	60	61	58	54	57	58	62	60	65	69	70	--	63
Minimum	52	55	52	53	57	56	55	56	54	58	57	62	60	56	53	53	55	57	57	51	54	54	52	50	53	52	56	56	61	62	--	55
July																																
Maximum	67	69	66	61	63	61	59	62	63	62	64	65	64	64	62	61	60	63	65	64	64	63	65	65	65	67	68	66	68	67	66	64
Minimum	61	62	56	52	53	55	55	53	54	57	55	58	61	59	58	58	56	56	58	60	59	60	59	60	61	59	61	61	60	61	61	58
August																																
Maximum	65	66	--	--	--	--	--	66	68	67	65	--	--	--	--	--	--	--	--	--	--	--	60	60	62	62	63	62	65	64	68	--
Minimum	56	59	--	--	--	--	--	60	60	63	61	--	--	--	--	--	--	--	--	--	--	--	55	57	56	58	58	60	60	61	62	--
September																																
Maximum	67	68	70	68	65	64	63	65	68	68	67	64	58	60	59	57	55	56	56	56	60	61	61	57	55	54	53	52	49	53	--	60
Minimum	64	63	65	64	60	60	57	59	61	63	64	58	56	58	56	53	52	53	53	53	56	58	57	55	52	51	50	47	44	49	--	56

STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1290. PIGEON RIVER NEAR VANDERBILT, MICH.

LOCATION.--Temperature recorder at gaging station at Pigeon River Fisheries Experiment Station, 11.1 miles east of Vanderbilt, Otsego County.
DRAINAGE AREA.--63 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: October 1950 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 75°F June 12; minimum, freezing point on many days during December to March.
EXTREMES, 1950-61.--Water temperatures: Maximum, 81°F Aug. 1, 1955; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	52	51	51	52	54	54	54	54	54	55	55	55	55	54	53	52	51	50	48	46	44	44	44	43	43	43	44	47	48	48	47	47
Minimum	47	49	48	49	50	50	50	49	48	49	51	50	51	52	52	52	50	48	46	44	42	42	43	40	40	41	43	44	45	45	46	44
November																																
Maximum	47	46	45	43	42	42	40	38	40	40	39	39	41	41	44	46	46	42	42	42	42	43	40	38	39	41	40	40	40	38	--	42
Minimum	46	45	43	41	41	40	38	37	38	39	38	38	39	40	41	44	42	42	41	41	41	40	38	37	36	38	40	40	38	33	--	40
December																																
Maximum	34	35	37	36	39	38	37	35	34	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33
Minimum	33	33	34	35	36	37	35	33	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33
January																																
Maximum	32	32	32	32	32	33	32	33	32	33	33	34	35	35	36	34	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	33
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	33	32	33	34	33	34	36	37	36	36	36	35	37	36	38	--	--	--	34
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	32	32	33	34	35	33	33	33	33	--	--	--	32
March																																
Maximum	38	39	39	36	34	34	36	34	36	37	34	37	36	35	36	38	38	38	39	42	39	38	38	41	40	41	40	38	35	38	41	38
Minimum	33	34	35	34	33	32	33	33	32	32	32	32	32	34	33	32	32	32	33	33	35	36	36	36	36	37	37	35	34	34	34	34
April																																
Maximum	40	37	38	39	42	40	39	41	40	39	44	42	46	45	44	42	41	41	46	49	49	50	49	45	48	50	49	48	49	47	--	44
Minimum	36	34	34	34	36	37	35	35	36	36	36	38	39	39	42	41	38	38	38	41	44	44	45	44	42	43	45	43	43	43	--	39
May																																
Maximum	47	43	43	51	54	49	52	53	50	49	55	59	63	65	64	59	61	52	56	59	62	62	61	63	58	52	56	56	59	61	57	56
Minimum	43	40	39	42	43	47	47	49	47	45	45	49	55	59	59	51	50	49	48	49	52	51	51	53	52	47	45	49	50	51	53	49
June																																
Maximum	60	64	64	69	71	70	69	63	65	69	73	75	69	68	68	69	71	71	65	65	62	56	56	55	58	62	62	66	70	72	--	66
Minimum	55	58	56	58	61	60	59	59	57	60	60	64	64	59	58	57	59	62	59	55	54	55	53	51	54	54	54	58	64	64	--	58
July																																
Maximum	71	74	66	65	67	64	63	67	69	63	68	72	70	69	67	64	62	65	68	69	69	64	68	69	68	70	71	69	73	70	67	68
Minimum	63	66	62	56	55	56	58	57	57	60	59	60	64	66	63	60	59	59	59	62	63	63	63	63	63	62	63	64	63	66	64	61
August																																
Maximum	70	68	72	71	67	65	69	70	73	70	69	68	65	68	69	69	69	70	64	66	65	65	64	62	64	63	66	62	64	65	70	67
Minimum	61	62	61	62	63	63	60	63	63	66	63	61	58	57	61	59	57	59	60	57	56	55	57	59	58	59	60	61	60	60	63	60
September																																
Maximum	70	71	72	69	68	66	67	68	71	72	70	65	60	59	58	55	58	60	60	60	62	63	62	59	57	56	54	52	51	52	--	62
Minimum	65	66	66	65	64	63	61	61	63	66	65	60	59	58	55	54	54	54	54	55	57	59	59	57	54	52	52	49	46	48	--	58

STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1355. AU SABLE RIVER AT GRAYLING, MICH.

LOCATION.--Temperature recorder at gaging station, 65 feet upstream from bridge on U.S. Highway 27 at Grayling, Crawford County, and 0.8 mile upstream from East Branch.
DRAINAGE AREA.--110 square miles.
RECORDS AVAILABLE.--Water temperatures: March 1953 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 77°F June 30, July 29, 30; minimum, freezing point on many days during December to February.
EXTREMES, 1953-61.--Water temperatures: Maximum, 80°F June 20, 21, 1953, July 6, 7, Aug. 1, 2, 5, 6, 1955; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	50	50	52	52	54	54	52	52	52	54	54	54	53	53	53	52	51	50	48	46	42	42	42	42	41	41	42	46	47	47	46	49
Minimum	47	48	48	49	50	52	49	48	48	49	52	50	51	52	52	51	49	47	46	42	42	41	42	38	38	40	41	42	45	45	45	46
November																																
Maximum	46	45	43	41	40	40	38	37	37	37	37	36	39	40	44	46	45	41	40	41	41	40	40	37	37	40	41	41	41	37	--	40
Minimum	45	43	41	39	40	38	37	35	35	37	36	36	36	38	40	44	41	40	40	40	39	38	37	37	37	37	40	40	37	34	--	39
December																																
Maximum	34	33	33	34	38	38	36	35	34	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	34
Minimum	33	33	33	33	34	36	35	34	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	32	32	33	33	33
January																																
Maximum	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	33	34	34	34	34	34	35	36	37	--	--	--	33
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	33	34	34	34	34	34	34	35	--	--	--	33
March																																
Maximum	38	38	40	40	37	37	38	38	35	36	36	37	37	36	37	37	38	38	38	41	41	39	39	42	43	46	48	48	42	42	45	40
Minimum	36	36	37	37	37	35	35	35	35	35	35	35	36	36	36	35	36	36	35	37	38	38	39	39	40	41	44	42	39	36	39	37
April																																
Maximum	45	41	49	41	44	44	44	43	43	40	45	45	48	48	47	47	44	43	50	51	53	54	54	54	50	52	52	51	50	50	--	47
Minimum	41	37	36	38	40	41	39	37	39	38	37	43	43	45	44	44	41	40	42	46	49	50	50	48	46	47	49	48	45	47	--	43
May																																
Maximum	49	47	48	54	55	55	58	58	58	53	58	66	69	69	69	65	57	57	59	59	61	61	61	64	64	56	56	61	61	61	61	59
Minimum	46	42	42	45	50	50	50	55	53	48	49	55	62	66	65	56	53	53	52	54	57	55	56	58	56	51	48	53	56	56	58	53
June																																
Maximum	61	65	66	68	71	71	71	67	68	71	72	75	75	71	68	68	69	69	69	64	64	64	60	60	61	66	66	72	76	77	--	68
Minimum	58	60	60	62	64	67	65	65	61	65	67	69	71	65	63	62	64	65	63	60	61	60	56	52	55	58	62	62	69	73	--	63
July																																
Maximum	76	76	75	66	66	69	69	67	69	69	69	72	72	73	73	70	69	70	72	72	72	72	72	72	70	74	75	75	77	77	73	72
Minimum	71	72	64	60	62	64	65	63	64	64	64	66	70	68	69	66	65	65	68	70	68	68	68	67	67	67	70	72	72	71	69	67
August																																
Maximum	72	72	72	74	74	71	69	70	72	72	72	70	68	67	68	69	69	71	71	64	65	65	64	64	65	65	69	69	70	71	73	69
Minimum	66	68	68	69	71	66	64	66	68	70	68	67	63	62	64	65	64	65	64	61	61	61	62	62	62	63	64	65	65	67	68	65
September																																
Maximum	73	74	74	73	72	72	69	71	73	75	75	72	64	62	62	60	61	62	62	63	65	66	66	65	61	56	56	54	50	54	--	65
Minimum	71	69	72	70	69	67	65	67	69	71	72	64	62	62	58	57	56	56	57	57	61	62	63	61	56	53	52	48	45	48	--	61

STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1365. AU SABLE RIVER AT MIO, MICH.

LOCATION.--Temperature recorder at gaging station, 150 feet upstream from bridge on State Highway 33 at Mio, Oscoda County, 10 miles downstream from Big Creek, and 80 miles upstream from mouth.
DRAINAGE AREA.--1,100 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: July 1952 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 72°F July 2, 29; minimum, freezing point Jan. 13, 14.
EXTREMES, 1952-61.--Water temperatures: Maximum, 77°F Aug. 4, 1955; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																														Average
	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	
October																																
Maximum	53	53	51	51	51	51	51	51	52	52	53	52	53	53	52	52	52	51	49	48	47	45	45	43	43	43	43	44	44	45	46	49
Minimum	51	51	49	49	49	49	49	49	49	50	50	50	51	52	52	51	51	49	48	47	45	44	43	42	42	42	41	42	43	44	44	47
November																																
Maximum	45	45	44	43	42	42	40	40	39	38	38	38	39	39	41	41	41	42	42	41	40	41	40	39	39	39	39	40	39	39	--	40
Minimum	45	44	43	42	42	40	40	37	37	36	36	37	37	38	38	40	40	41	40	40	39	40	39	38	38	37	37	38	39	38	--	39
December																																
Maximum	38	36	35	35	36	36	36	36	36	35	35	35	35	34	34	34	34	34	34	34	34	34	34	34	33	33	33	33	33	33	33	34
Minimum	36	34	34	34	33	35	35	36	34	34	34	34	34	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	34
January																																
Maximum	33	33	33	33	33	33	33	33	33	33	33	33	34	34	34	34	34	34	34	34	34	34	34	34	34	33	33	33	33	34	33	33
Minimum	33	33	33	33	33	33	33	33	33	33	33	33	32	32	33	33	34	34	34	34	34	34	34	34	33	33	33	33	33	33	33	33
February																																
Maximum	33	35	34	34	34	34	34	34	34	34	34	34	34	34	35	35	35	35	35	35	36	36	36	36	37	38	38	38	--	--	--	35
Minimum	33	33	34	34	34	34	34	34	34	34	34	34	34	34	34	35	35	35	35	35	35	35	35	35	36	36	37	36	--	--	--	35
March																																
Maximum	38	38	38	38	38	38	39	37	37	38	36	37	36	36	37	38	38	38	38	38	38	38	39	41	40	40	40	41	41	41	40	38
Minimum	36	37	37	37	37	38	37	36	36	36	36	35	36	36	36	37	37	37	37	36	37	38	38	39	39	39	40	40	41	40	39	37
April																																
Maximum	40	40	41	40	41	42	41	43	41	41	42	42	43	44	45	45	44	44	43	44	46	49	49	48	48	48	47	47	48	47	--	44
Minimum	39	39	39	39	39	40	41	40	41	40	40	41	41	42	43	44	43	42	42	42	43	45	47	47	47	47	46	46	46	46	--	43
May																																
Maximum	46	45	45	46	46	47	51	52	51	53	52	54	58	60	62	61	59	58	57	57	55	56	57	59	57	56	56	56	56	56	56	54
Minimum	45	44	44	44	45	46	47	50	50	49	50	51	53	56	58	58	58	57	55	54	53	53	54	56	56	55	53	54	52	52	54	52
June																																
Maximum	58	59	60	62	64	64	64	64	66	64	67	68	66	67	65	66	67	66	65	63	64	62	60	59	58	59	60	64	67	65	--	63
Minimum	56	57	57	58	61	62	62	63	63	63	63	64	65	65	65	64	64	64	63	62	61	59	58	57	58	57	57	58	62	64	--	61
July																																
Maximum	71	72	70	68	68	67	65	65	67	65	67	67	66	68	69	68	68	68	67	67	67	69	70	69	68	69	70	70	72	69	69	68
Minimum	65	68	67	67	66	64	64	63	64	64	64	64	64	65	66	66	66	66	66	65	65	65	67	67	67	67	67	67	67	69	68	66
August																																
Maximum	70	70	69	68	68	67	68	67	68	68	68	68	66	65	65	64	63	66	64	63	63	63	61	61	62	62	62	61	63	64	66	65
Minimum	68	68	68	66	66	66	66	66	65	66	66	66	64	63	63	61	61	62	63	62	62	60	60	60	60	60	61	60	59	61	61	63
September																																
Maximum	64	66	67	66	66	67	66	66	68	69	68	66	64	64	61	58	57	57	57	57	59	61	60	60	60	59	58	56	53	52	--	62
Minimum	63	63	64	64	65	65	65	64	64	64	66	64	63	61	58	57	56	55	55	55	56	58	59	59	58	58	56	53	51	51	--	60

4-1380. EAST BRANCH AU GRES RIVER AT McIVOR, MICH.

LOCATION.--Temperature recorder at gaging station, 25 feet downstream from highway bridge at McIvor, Iosco County, 1.1 miles east of National City, and 9 miles, southwest of Tawas City.
DRAINAGE AREA.--84 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: October 1951 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 72°F June 29 to July 2, July 23, 24; minimum, freezing point on many days during December to March.
EXTREMES, 1951-61.--Water temperatures: Maximum, 76°F Aug. 3, 1957; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	49	52	53	52	53	53	52	50	51	52	54	53	55	55	54	52	51	50	48	46	45	45	48	46	43	45	48	50	49	49	49	50
Minimum	45	48	49	50	50	51	48	47	48	49	52	48	50	54	52	50	49	46	46	44	44	44	45	42	42	43	45	48	47	46	48	47
November																																
Maximum	49	48	47	45	43	43	42	39	43	43	42	42	44	43	49	49	48	43	43	43	43	42	42	39	38	42	43	44	44	39	--	43
Minimum	48	47	45	42	43	42	39	39	39	42	40	40	42	42	43	48	43	42	42	43	41	41	39	37	38	38	42	43	39	36	--	42
December																																
Maximum	36	34	34	37	40	41	40	35	33	33	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34
Minimum	34	34	34	34	36	40	35	33	33	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
March																																
Maximum	32	34	38	38	35	34	35	35	33	32	32	32	34	34	37	36	34	32	39	41	39	38	38	38	36	37	38	38	38	39	40	36
Minimum	32	32	34	35	34	34	34	33	32	32	32	32	32	32	34	33	32	32	32	35	37	38	37	36	34	35	37	38	37	34	36	34
April																																
Maximum	40	39	39	39	44	43	42	42	41	39	46	45	43	45	47	47	39	41	46	47	49	48	50	49	47	46	46	46	44	44	--	44
Minimum	39	36	37	39	38	40	39	36	39	38	38	41	40	40	43	39	38	38	40	41	45	45	44	45	44	43	43	43	41	42	--	40
May																																
Maximum	45	44	46	51	51	51	54	55	55	52	55	59	64	64	64	63	58	55	55	56	59	57	58	61	61	53	55	59	59	59	59	56
Minimum	43	42	42	44	46	46	46	52	50	46	47	52	57	60	62	56	52	51	48	51	55	51	51	53	53	49	46	54	54	52	56	51
June																																
Maximum	58	63	62	65	67	67	63	58	61	62	62	67	67	62	61	61	64	66	66	58	58	58	55	58	58	60	61	69	72	72	--	63
Minimum	56	56	57	59	60	61	56	57	54	59	58	62	62	58	55	54	57	59	58	53	53	55	54	52	54	52	58	60	66	68	--	57
July																																
Maximum	72	72	71	63	63	66	66	66	66	66	67	70	70	69	70	70	67	67	70	70	69	70	72	72	68	70	70	70	70	70	66	69
Minimum	65	68	62	56	58	59	63	60	60	62	61	64	66	65	64	66	63	62	65	66	63	67	66	67	65	64	65	67	64	66	64	64
August																																
Maximum	65	69	69	69	68	64	66	66	68	68	66	65	64	64	68	68	64	66	66	66	64	63	62	61	64	64	64	64	65	67	70	66
Minimum	61	64	64	65	64	63	61	64	63	65	63	61	59	58	62	62	58	59	63	59	58	57	58	59	60	60	58	62	61	62	63	61
September																																
Maximum	70	69	68	68	67	66	65	67	68	70	71	70	62	63	61	58	58	59	58	58	62	65	65	61	60	56	56	54	51	55	--	63
Minimum	66	65	65	65	63	62	60	61	62	64	66	62	61	61	57	54	54	54	54	55	57	60	61	59	56	55	52	51	46	46	--	59

STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1390. HOUGHTON CREEK NEAR LUPTON, MICH.

LOCATION.--Temperature recorder at gaging station, 0.5 mile upstream from mouth, 3 miles downstream from Wilkins Creek and 3 miles southwest of Lupton, Ogemaw County.
DRAINAGE AREA.--27 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: July 1950 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 66°F June 29; minimum, freezing point on many days during December to February.
EXTREMES, 1950-61.--Water temperatures: Maximum, 69°F June 25, 1952; minimum, freezing point on many days during winter months.
REMARKS.--Recorder stopped Dec. 6-19.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	47	50	50	49	51	51	49	48	48	51	52	51	52	52	52	51	50	49	46	45	45	44	45	44	42	44	46	48	47	47	46	48
Minimum	44	47	47	48	48	49	46	45	46	47	51	48	49	52	50	48	48	45	45	42	43	42	44	41	40	42	44	46	46	44	45	46
November																																
Maximum	46	45	44	42	42	41	40	39	42	42	40	40	42	43	46	47	44	41	42	42	42	41	41	40	40	43	44	44	44	39	--	42
Minimum	45	44	42	41	41	40	37	38	39	40	39	39	40	40	43	44	41	40	41	42	40	41	39	38	39	40	43	42	39	35	--	40
December																																
Maximum	35	37	37	40	42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	33	33	32	32	33	33	33	33	33	36	36	36	--
Minimum	34	34	36	37	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	33	32	32	32	32	32	32	33	32	32	36	36	--
January																																
Maximum	36	35	35	34	36	36	37	37	33	35	37	37	37	38	37	36	38	37	34	33	33	33	33	33	33	33	33	33	33	33	33	35
Minimum	35	35	34	33	34	36	36	32	32	33	35	36	36	37	36	34	35	34	33	32	32	33	33	32	32	33	32	33	32	32	32	34
February																																
Maximum	33	33	33	33	33	34	35	36	38	38	37	36	37	37	37	35	38	38	36	36	38	39	37	36	36	37	38	39	--	--	--	36
Minimum	33	33	33	32	32	32	33	34	36	37	34	34	36	37	34	33	35	35	35	34	33	36	34	34	35	34	36	35	--	--	--	34
March																																
Maximum	39	40	40	40	38	38	38	37	36	35	36	40	40	38	40	38	37	38	42	42	39	39	38	39	37	41	40	40	37	41	41	39
Minimum	36	37	37	37	37	34	34	33	33	33	34	36	36	35	37	34	33	33	37	37	37	38	36	32	32	35	36	37	36	35	37	35
April																																
Maximum	41	38	40	40	43	44	42	42	42	41	45	44	45	44	46	46	38	42	46	47	48	47	48	47	46	46	46	46	45	45	--	44
Minimum	38	36	37	39	39	40	38	36	38	38	38	40	40	40	42	36	35	37	40	40	44	44	43	43	43	42	42	43	40	42	--	40
May																																
Maximum	44	43	46	50	50	49	53	52	51	49	53	58	61	59	59	56	52	51	54	53	55	56	56	58	57	48	53	55	55	55	55	53
Minimum	41	40	42	43	44	45	44	48	47	43	44	48	53	54	55	50	46	47	45	48	50	47	48	50	48	46	44	50	50	48	52	47
June																																
Maximum	54	60	58	61	63	62	58	57	59	59	61	62	62	59	57	58	60	61	61	55	56	55	52	55	55	57	57	64	66	65	--	59
Minimum	52	54	53	55	57	57	53	55	52	56	55	58	58	55	52	52	53	55	54	50	51	52	52	50	52	51	54	55	60	61	--	54
July																																
Maximum	64	64	63	58	58	59	59	60	60	59	60	61	61	61	61	61	59	60	61	60	60	60	63	62	61	62	62	62	63	63	59	61
Minimum	58	60	55	52	53	53	56	54	54	55	54	57	58	57	57	57	56	55	57	58	56	58	58	59	58	57	58	59	58	58	58	57
August																																
Maximum	60	61	61	61	61	59	59	60	60	60	60	60	58	58	61	61	58	60	60	57	57	57	56	56	59	59	58	58	60	61	62	59
Minimum	55	58	58	58	58	58	55	57	56	57	58	56	53	52	57	56	53	54	56	54	53	53	54	55	55	56	55	57	57	57	58	56
September																																
Maximum	62	61	61	60	59	59	59	60	61	61	62	62	58	61	59	55	54	55	55	54	58	58	58	57	55	54	54	52	49	54	--	58
Minimum	59	59	59	58	57	56	56	56	57	58	60	57	56	58	55	52	51	52	51	52	54	56	57	55	53	53	50	48	45	49	--	55

STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1395. RIFLE RIVER AT "THE RANCH" NEAR LUPTON, MICH.

LOCATION.--Temperature recorder at gaging station, 0.2 mile downstream from Houghton Creek, and 3 miles southwest of Lupton, Ogemaw County.
DRAINAGE AREA.--54 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: July 1950 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 69°F June 29; minimum, freezing point on several days during December to February.
EXTREMES, 1950-61.--Water temperatures: Maximum, 72°F June 25, 26, 1952, July 5, 6, 9, Aug. 1, 1955; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	50	53	52	52	54	53	51	51	51	54	55	51	54	54	54	53	52	50	48	47	47	46	47	46	44	44	46	49	49	47	47	50
Minimum	45	50	48	49	49	50	47	46	47	48	42	47	49	52	52	50	49	47	47	45	45	44	46	43	41	43	44	46	46	46	46	47
November																																
Maximum	47	46	45	44	43	42	41	40	42	42	40	40	42	42	45	46	44	41	42	42	41	41	41	39	40	42	42	43	43	39	--	42
Minimum	46	45	43	42	42	41	39	39	39	40	39	39	40	40	42	44	41	40	41	41	39	40	39	38	39	39	42	41	39	36	--	40
December																																
Maximum	36	36	36	38	40	40	38	36	33	35	33	33	33	33	35	35	34	34	34	33	33	32	33	33	33	33	33	33	33	34	35	35
Minimum	34	35	35	36	38	38	36	33	33	33	33	33	33	33	33	34	33	33	33	32	32	32	32	33	33	33	33	32	32	33	34	34
January																																
Maximum	35	34	34	34	34	35	36	36	33	34	35	35	36	37	37	36	36	36	34	33	33	33	33	33	33	33	33	33	33	33	33	34
Minimum	34	34	34	33	33	34	35	33	33	33	34	35	35	36	35	34	35	34	33	33	33	33	32	32	33	32	33	33	33	33	33	34
February																																
Maximum	33	33	33	33	33	32	33	35	36	36	35	35	35	36	36	34	36	36	35	35	36	38	36	36	36	36	38	39	--	--	--	35
Minimum	33	33	33	32	32	32	32	33	34	35	33	33	35	35	33	32	34	34	34	33	33	35	34	34	35	34	36	35	--	--	--	34
March																																
Maximum	39	39	40	40	38	38	38	37	36	36	36	40	39	37	40	38	37	37	42	41	39	39	38	39	37	39	39	39	38	40	41	39
Minimum	36	37	37	37	37	36	35	33	33	33	35	36	37	35	37	35	33	33	36	36	37	38	36	33	33	35	36	38	37	36	37	36
April																																
Maximum	41	39	41	40	44	45	42	44	42	41	46	45	45	44	46	46	38	42	46	48	49	48	49	47	48	47	47	46	46	45	--	45
Minimum	39	37	37	39	39	40	39	37	39	39	39	41	40	40	42	37	36	37	39	40	44	44	42	44	43	42	42	43	41	42	--	40
May																																
Maximum	44	43	47	53	53	50	54	53	52	51	56	60	64	61	62	58	55	52	57	53	58	58	58	61	58	48	55	57	58	57	56	55
Minimum	41	40	42	42	44	45	44	48	48	43	44	48	53	55	56	50	46	47	45	47	50	47	48	50	48	46	43	50	49	47	52	47
June																																
Maximum	55	62	61	64	66	64	59	58	63	61	64	65	64	62	61	62	64	64	63	57	57	56	53	56	56	58	58	67	69	67	--	61
Minimum	52	54	53	55	57	57	53	55	52	57	55	59	59	55	52	52	54	55	55	50	51	53	52	50	52	51	53	56	60	62	--	54
July																																
Maximum	67	67	63	61	60	63	62	63	64	60	64	64	63	65	64	63	60	63	64	63	64	64	67	65	63	67	67	65	68	66	62	64
Minimum	58	61	55	51	53	54	57	55	54	55	55	58	59	59	58	59	57	56	58	59	57	61	60	61	60	59	60	61	61	61	60	58
August																																
Maximum	64	65	65	65	64	62	64	64	65	63	64	64	61	62	66	64	63	64	62	61	62	59	59	59	63	61	62	61	64	65	67	63
Minimum	56	59	59	60	60	60	57	59	59	61	61	59	55	54	59	59	55	56	59	56	54	54	55	57	58	57	56	59	59	59	60	58
September																																
Maximum	65	64	64	64	63	62	62	64	65	66	65	62	58	61	59	56	57	58	57	56	60	61	60	59	57	56	55	54	50	55	--	60
Minimum	62	61	61	60	60	59	57	58	59	60	61	57	56	58	55	52	51	52	51	53	55	56	58	56	54	54	51	49	46	50	--	56

STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1400. PRIOR CREEK NEAR SELKIRK, MICH.

LOCATION.--Temperature recorder at gaging station, 0.2 mile upstream from mouth, 0.5 mile downstream from Ammond Creek, and 1.5 miles north of Selkirk, Ogemaw County.
DRAINAGE AREA.--19 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: October 1950 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 70°F June 29, July 29; minimum, freezing point on many days during December to March.
EXTREMES, 1950-61.--Water temperatures: Maximum, 76°F Aug. 1, 1955; minimum, freezing point on many days during winter months.
REMARKS.--Recorder stopped Mar. 12-26.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	47	50	50	50	52	52	50	48	49	52	55	52	53	54	54	52	51	48	46	44	43	42	45	43	40	41	44	47	47	46	45	48
Minimum	42	46	47	48	48	50	46	44	45	47	52	47	49	53	52	48	48	44	44	40	40	40	42	39	37	40	41	44	45	43	45	45
November																																
Maximum	45	45	43	40	40	39	37	35	39	39	37	38	41	41	46	48	45	40	41	40	39	39	39	36	37	40	41	42	42	36	--	40
Minimum	45	43	40	38	39	37	34	34	35	37	36	37	38	38	41	45	40	39	39	39	37	37	36	35	36	36	40	40	36	33	--	38
December																																
Maximum	33	33	33	34	39	39	36	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33
Minimum	33	33	33	33	34	36	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
March																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	35	34	35	37	--
Minimum	32	32	32	32	32	32	32	32	32	32	32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	34	33	33	34	--
April																																
Maximum	37	36	36	36	40	41	40	39	39	47	42	42	41	41	43	43	34	39	44	47	49	49	51	48	48	46	47	47	47	46	--	43
Minimum	35	34	34	35	35	37	36	34	35	35	35	38	37	38	39	34	33	34	37	38	43	44	42	43	42	41	42	42	40	41	--	38
May																																
Maximum	45	43	48	53	53	51	57	57	55	53	58	64	68	66	67	62	55	53	58	55	59	58	60	63	60	51	55	59	58	56	56	57
Minimum	41	39	41	42	43	47	46	51	50	44	45	51	57	60	62	54	48	49	46	49	52	49	50	52	51	47	44	52	52	48	53	49
June																																
Maximum	56	61	60	64	66	65	60	57	62	63	64	66	66	62	58	60	62	64	63	57	56	56	54	55	55	58	58	66	70	69	--	61
Minimum	54	56	54	56	58	59	54	57	54	59	58	62	62	57	53	52	55	57	57	51	51	54	54	52	54	52	55	58	64	66	--	56
July																																
Maximum	68	69	66	60	59	62	62	62	62	61	64	65	65	65	65	65	63	63	65	65	64	66	69	68	66	68	68	68	70	69	65	65
Minimum	61	66	57	54	54	55	59	57	55	58	58	60	62	63	60	62	59	59	61	63	61	64	64	65	64	62	63	65	66	65	63	61
August																																
Maximum	63	65	67	65	65	63	63	64	66	65	65	64	61	61	66	64	61	63	63	60	60	58	57	59	62	61	61	62	64	65	67	63
Minimum	58	62	61	63	63	63	59	62	61	63	64	61	56	55	61	60	55	57	60	57	55	54	55	57	59	59	57	61	61	61	62	59
September																																
Maximum	67	65	65	65	64	63	63	65	66	68	68	68	60	63	62	57	56	57	57	56	60	63	63	60	58	55	55	53	49	55	--	61
Minimum	65	64	65	64	62	61	58	60	62	64	66	60	60	60	57	53	52	54	52	54	56	60	60	58	55	54	52	49	45	48	--	58

4-1405. RIFLE RIVER AT SELKIRK, MICH.

LOCATION.--Temperature recorder at gaging station at highway bridge at Selkirk, Ogemaw County, 1.5 miles downstream from Prior Creek.
DRAINAGE AREA.--110 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1950 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 71°F June 29; minimum, freezing point on many days during December to March.
EXTREMES, 1950-61.--Water temperatures: Maximum, 78°F Aug. 1, 1955; minimum, freezing point on many days during winter months.
REMARKS.--Recorder stopped Oct. 20 to Nov. 8.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	48	51	50	50	52	51	50	48	49	51	54	52	52	53	53	52	51	50	47	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	44	47	47	48	48	49	46	45	45	47	51	48	49	52	51	50	48	46	45	--	--	--	--	--	--	--	--	--	--	--	--	--
November																																
Maximum	--	--	--	--	--	--	--	--	41	41	39	39	42	42	47	48	45	41	42	42	41	41	41	38	39	41	43	42	42	37	--	--
Minimum	--	--	--	--	--	--	--	--	37	39	38	38	39	40	42	45	41	41	41	41	39	40	38	37	38	38	41	41	37	34	--	--
December																																
Maximum	34	34	34	36	40	40	38	34	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33
Minimum	33	33	33	34	36	38	34	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	33	34	34	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	34	35	35	34	34	34	35	36	--	--	--	33
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34	33	33	33	32	34	34	--	--	--	32
March																																
Maximum	36	36	38	38	36	36	35	35	34	33	34	38	37	35	38	36	34	34	40	40	38	36	36	36	35	36	36	36	36	38	38	36
Minimum	35	35	36	35	35	35	34	32	32	33	33	33	34	33	35	33	33	33	34	35	36	36	35	34	33	34	35	36	35	34	35	34
April																																
Maximum	38	37	38	39	43	45	43	43	42	40	46	45	45	44	46	46	38	41	45	46	48	47	48	48	48	47	46	46	45	45	--	44
Minimum	37	35	35	38	38	40	39	36	39	38	38	41	40	41	42	38	36	37	40	41	45	45	44	45	44	44	44	44	42	43	--	40
May																																
Maximum	44	44	47	51	52	51	53	53	53	51	55	60	64	63	63	61	57	54	57	56	59	58	60	61	59	52	55	58	59	57	57	56
Minimum	42	42	43	44	47	47	46	51	51	46	47	52	57	60	61	55	51	50	48	51	53	51	52	53	52	48	45	52	52	51	53	50
June																																
Maximum	55	61	61	65	67	66	62	58	61	62	64	66	64	62	61	62	64	64	63	57	57	57	54	55	55	58	59	67	71	70	--	62
Minimum	54	54	55	57	59	60	56	56	53	58	57	61	61	57	54	53	56	57	57	52	52	54	53	50	53	52	55	58	64	67	--	56
July																																
Maximum	69	70	67	62	61	65	64	64	64	63	64	66	65	66	65	65	64	64	65	65	64	66	67	67	65	67	68	68	69	68	64	66
Minimum	62	65	59	54	56	57	59	57	57	59	57	61	62	62	60	62	59	58	61	63	60	63	62	64	62	60	62	64	63	64	61	60
August																																
Maximum	63	65	67	64	64	62	63	63	66	65	64	64	62	62	65	63	62	64	63	61	61	59	59	59	61	61	61	61	63	65	65	63
Minimum	58	61	61	61	62	60	58	61	60	62	62	60	57	56	60	59	56	57	59	57	55	55	56	57	58	59	57	60	60	61	60	59
September																																
Maximum	65	63	63	63	62	62	61	63	64	66	66	65	60	60	60	56	56	57	57	56	60	61	61	59	57	54	54	52	48	52	--	59
Minimum	63	61	62	61	60	59	58	59	60	62	64	60	58	58	56	53	52	53	52	53	55	58	59	57	53	52	51	48	44	48	--	56

STREAMS TRIBUTARY TO LAKE HURON--Continued

4-1415. WEST BRANCH RIFLE RIVER NEAR SELKIRK, MICH.

LOCATION.--Temperature recorder at gaging station, 0.5 mile downstream from Campbell Creek, 3.5 miles upstream from mouth, 4 miles southwest of Selkirk, Ogemaw County, and 6.5 miles southeast of West Branch.
DRAINAGE AREA.--52 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: May 1952 to June 1961 (discontinued).
EXTREMES, 1960-61.--Water temperatures: Maximum, 71°F June 12, 13; minimum, freezing point on many days during December to March.
EXTREMES, 1952-61.--Water temperatures: Maximum, 79°F June 28, 1959; minimum, freezing point on many days during winter months.

Temperature (°F) of water, October 1960 to June 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	51	54	54	54	55	55	53	52	52	56	57	56	56	57	57	56	53	52	49	47	45	45	47	45	42	44	47	50	50	49	49	51
Minimum	46	50	50	50	50	51	48	47	47	49	54	50	52	55	54	51	50	47	47	44	42	42	45	41	38	42	44	47	48	46	47	48
November																																
Maximum	49	47	45	43	43	42	40	38	41	41	39	40	43	44	49	51	48	42	43	44	42	42	42	40	40	43	44	46	46	39	--	43
Minimum	47	45	43	41	42	40	36	36	38	39	38	38	40	40	44	46	42	42	42	42	40	40	39	38	38	39	43	44	39	34	--	41
December																																
Maximum	34	33	34	37	41	41	39	34	33	33	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33
Minimum	32	32	33	34	37	39	34	33	33	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
March																																
Maximum	34	37	38	38	35	35	35	35	33	32	32	37	36	35	39	36	34	35	40	41	38	36	36	35	35	38	39	39	37	40	41	36
Minimum	32	34	36	35	35	34	33	32	32	32	32	32	34	32	34	33	33	33	34	35	36	36	34	34	33	35	36	37	35	33	36	34
April																																
Maximum	41	39	39	40	43	46	42	41	40	39	46	44	46	46	49	47	38	41	47	50	52	51	53	51	50	49	50	49	48	49	--	46
Minimum	39	36	35	37	37	40	39	35	37	37	36	41	40	40	42	38	36	37	41	43	47	48	46	47	46	46	46	46	43	43	--	41
May																																
Maximum	47	45	47	54	55	52	56	57	56	54	58	64	68	68	67	63	58	56	58	58	60	61	61	64	62	53	55	59	60	59	59	58
Minimum	44	42	41	42	44	47	46	52	53	45	46	51	57	61	63	55	50	50	47	50	54	51	52	54	53	48	45	51	53	51	54	50
June																																
Maximum	57	64	64	67	69	68	65	63	65	67	69	71	71	68	64	65	67	68	67	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	56	57	57	59	61	62	58	61	58	58	62	64	66	61	58	56	58	60	60	--	--	--	--	--	--	--	--	--	--	--	--	--

STREAMS TRIBUTARY TO LAKE ERIE

4-1935. MAUMEE RIVER AT WATERVILLE, OHIO

LOCATION.--At gaging station at bridge on State Highway 64 at Waterville, Lucas County, 3 miles downstream from Tontogany Creek.
DRAINAGE AREA.--6,314 square miles.
RECORDS AVAILABLE.--Chemical analyses: March 1950 to February 1952.
Water temperatures: March 1950 to September 1961.
Sediment records: April 1950 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 90°F June 30; minimum, freezing point on many days during December to February.
Sediment concentrations: Maximum daily, 924 ppm Mar. 15; minimum daily, 2 ppm Jan. 11.
Sediment loads: Maximum daily, 77,100 tons Mar. 15; minimum daily, 1 ton Oct. 25, 26.
EXTREMES, 1950-61.--Water temperatures: Maximum, 92°F Aug. 25, 1959; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 2,240 ppm Mar. 26, 1954; minimum daily, 1 ppm on many days during 1953, 1955, and 1956.
Sediment loads: Maximum daily, 208,000 tons Feb. 12, 1959; minimum daily, less than 0.5 ton on several days during October to December 1953, and September 1955.
REMARKS.--Low flow slightly regulated by powerplants above station. Flow affected by ice Dec. 9 to Jan. 14, Jan. 20 to Feb. 17.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day 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	Average
October																																
Maximum	67	68	66	67	67	68	67	63	66	67	69	70	70	70	67	67	66	63	59	53	55	54	51	49	51	48	51	53	51	53	51	61
Minimum	57	59	59	58	58	61	57	57	56	57	59	63	60	62	64	62	58	55	53	50	51	49	49	45	43	47	48	50	49	48	49	55
November																																
Maximum	49	47	46	47	46	44	45	41	41	42	42	44	45	45	49	50	47	47	46	46	46	48	48	46	46	50	48	52	51	38	--	46
Minimum	47	45	44	43	44	41	39	39	41	40	38	37	39	42	45	47	44	44	43	42	44	43	43	42	42	42	45	48	38	35	--	42
December																																
Maximum	38	35	40	41	44	44	40	38	34	33	33	32	32	32	32	32	32	32	32	33	33	33	32	32	32	32	32	32	32	32	32	34
Minimum	34	34	34	38	38	40	38	34	33	33	32	32	32	32	32	32	32	32	32	32	33	32	32	32	32	32	32	32	32	32	32	33
January																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	36	35	35	34	33	33	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	34	34	33	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	35	35	35	36	38	37	38	38	38	37	38	39	--	--	--	34
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	35	35	35	36	37	37	38	37	36	36	38	--	--	--	34
March																																
Maximum	39	41	42	42	44	47	47	46	45	43	42	42	42	41	42	42	42	40	39	39	38	39	40	41	43	44	46	46	46	45	46	43
Minimum	38	39	41	42	42	44	46	45	43	41	41	41	41	41	41	42	40	39	39	37	38	38	39	40	41	43	44	46	44	43	44	41
April																																
Maximum	44	44	41	43	42	42	43	44	42	39	41	41	41	42	43	43	42	41	41	43	47	48	50	52	53	53	53	54	53	51	--	45
Minimum	44	41	40	41	42	42	42	41	39	39	39	40	40	41	42	42	40	41	41	41	43	47	48	50	52	53	53	53	51	50	--	44
May																																
Maximum	52	52	52	53	53	53	54	56	56	57	57	58	61	63	65	65	64	63	63	63	64	64	66	68	68	66	64	65	68	69	68	61
Minimum	50	51	50	50	51	51	53	54	56	56	55	55	58	60	63	63	63	61	60	62	62	62	63	65	66	61	59	61	63	64	65	58
June																																
Maximum	71	72	73	75	78	78	79	76	77	79	81	83	84	82	73	72	76	78	78	76	71	74	74	71	70	77	78	80	83	90	--	77
Minimum	66	69	71	70	72	74	73	74	74	74	77	78	81	73	69	69	71	74	75	70	69	71	70	68	69	68	70	73	75	77	--	72

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1935. MAUMEE RIVER AT WATERVILLE, OHIO--Continued

Temperature (°F) of water, water year October 1960 to September 1961--Continued
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Aver-age
	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	
July																																
Maximum	87	82	83	82	82	82	80	79	80	81	84	84	77	78	82	80	80	82	80	82	85	83	84	84	82	82	84	82	84	83	83	82
Minimum	80	80	76	73	73	73	74	72	72	73	75	75	74	73	74	75	77	79	79	78	78	80	81	81	80	79	80	82	81	82	82	77
August																																
Maximum	82	80	83	82	82	78	79	79	80	80	81	81	80	82	82	82	82	85	86	80	76	77	76	78	79	78	81	81	82	84	87	81
Minimum	80	80	80	81	78	77	78	77	78	80	80	79	77	76	76	77	76	74	77	74	72	72	73	74	76	76	76	78	80	78	77	77
September																																
Maximum	81	83	83	85	85	85	83	81	82	83	84	82	80	78	73	71	72	72	72	72	75	78	79	79	76	71	68	67	66	66	--	77
Minimum	79	77	78	79	79	79	79	79	78	79	79	79	78	73	70	67	67	67	67	68	68	69	71	72	71	68	67	66	64	64	--	73

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1935. MAUMEE RIVER AT WATERVILLE, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961

Day	OCTOBER				NOVEMBER				DECEMBER			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	156	10		4	645	15		26	191	5	B	2
2..	233	9		6	298	8	B	6	205	7	B	4
3..	202	5		3	362	7	B	7	191	7		4
4..	184	5		2	247	6	B	4	198	6	B	3
5..	227	5		3	1090	35		103	242	5	B	3
6..	272	5	B	4	454	19	B	25	302	5	B	4
7..	175	4	B	2	282	10	B	8	312	5	B	4
8..	142	4		2	831	20		45	177	5	B	2
9..	212	5	B	3	520	9	B	13	260	5	B	4
10..	277	5	B	4	428	7	B	8	290	5		4
11..	252	5	B	3	222	6	B	4	160	5	B	2
12..	190	6	B	3	300	5		4	260	5	B	4
13..	170	7	B	3	441	7	B	8	160	5	B	2
14..	205	8	B	4	494	7	B	9	200	5	B	3
15..	190	9		5	416	8	B	9	240	7	B	4
16..	177	9	B	4	533	22		32	250	7	B	5
17..	213	8	B	5	386	16	B	17	240	8		5
18..	178	7	B	3	358	15	B	14	310	8	B	7
19..	122	7	B	2	370	15	B	15	280	8	B	6
20..	258	6	B	4	546	14	B	20	250	8	B	5
21..	335	6		5	480	13	B	17	240	7	B	4
22..	234	7		4	324	11	B	10	220	7	B	4
23..	253	6	B	4	282	10	B	8	200	7	B	4
24..	193	6	B	3	405	8	B	9	200	7	B	4
25..	97	5	B	1	335	6	B	5	220	7	B	4
26..	92	5	B	1	282	5		4	200	7	B	4
27..	142	5	B	2	302	5	B	4	210	7	B	4
28..	156	4	B	2	312	5	B	4	200	7	B	4
29..	308	3		2	567	5	B	8	200	7	B	4
30..	292	3		2	265	5	B	4	220	7	B	4
31..	288	3		2	--	--		--	240	7	B	4
Total	6425	--		97	12777	--		450	7068	--		121

Day	JANUARY				FEBRUARY				MARCH			
1..	230	6	B	4	180	7	E	3	8080	198		4320
2..	210	5	B	3	180	8	E	4	7330	155		3070
3..	240	5	B	3	180	8	E	4	4440	142		1700
4..	420	5	B	6	170	9	E	4	3800	120		1230
5..	700	4	B	8	150	10	E	4	3570	108		1040
6..	400	3	B	3	140	10	E	4	5220	117		1650
7..	250	3		2	140	12	E	4	7650	125		2580
8..	200	3	B	2	170	12	E	6	8800	115		2730
9..	200	3	B	2	200	12	E	6	9340	118		2980
10..	300	3	B	2	190	12	E	6	9560	127		3280
11..	350	2	B	2	190	12	E	6	9830	152		4030
12..	310	3	B	2	200	12	E	6	7610	120		2460
13..	300	5	B	4	210	12	E	7	8160	108		2380
14..	340	5		4	260	13	E	9	23300	524	S	36400
15..	242	5	B	3	390	13	E	14	30900	924		77100
16..	205	5	B	3	310	13	E	11	25100	660		44700
17..	205	5	B	3	330	17		15	19200	416		21600
18..	305	5	B	4	1450	30		117	13800	316		11800
19..	272	5	B	4	1570	30	B	130	11700	220		6950
20..	360	4	B	4	1720	14		65	15500	178		7450
21..	380	4		4	1940	11	B	60	18500	178		8890
22..	290	40	E	30	2000	15		81	18500	235		11700
23..	250	17	E	11	1990	20		107	21500	260		15100
24..	230	9	E	6	1880	16	B	80	23000	292		18100
25..	260	17	E	12	2060	15		83	21100	278		15800
26..	430	45	E	50	5370	52		754	16700	213		9600
27..	260	14	E	10	7770	108		2260	13200	173		6160
28..	220	7	E	4	8120	252		5520	10500	153		4340
29..	200	7	E	4	--	--		--	7810	133		2800
30..	190	7	E	4	--	--		--	6060	110		1800
31..	190	7	E	4	--	--		--	5070	101		1380
Total	8939	--		207	39460	--		9370	394830	--		335120

E Estimated.
S Computed by subdividing day.
B Computed from estimated-concentration graph.

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1935. MAUMEE RIVER AT WATERVILLE, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961--Continued

Day	APRIL				MAY				JUNE			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	3960	87		930	27000	220		16000	1080	30	E	85
2..	3290	75	B	650	21600	188		10900	1610	57		248
3..	2610	65	B	460	15200	146		5990	1290	50	B	170
4..	1790	55	B	270	9060	113		2760	1080	40	B	120
5..	1480	46		184	6570	82		1450	894	35	B	85
6..	1990	41		220	4370	68		802	1210	35	B	110
7..	1530	40	B	160	3730	52		524	797	30	B	65
8..	1550	34		142	3700	45	B	450	1070	30	B	85
9..	1270	30	B	100	4500	45	B	550	766	25		52
10..	1550	25	B	100	13900	105		3940	1460	25	B	100
11..	3000	45	B	360	18700	322		16200	2080	25	B	140
12..	5070	70		958	16900	282		12900	1420	25	B	95
13..	10200	67		1840	12600	180	B	6100	2250	25	B	150
14..	13600	80		2940	9200	150	B	3700	1830	25	B	120
15..	13600	150		5510	7050	120	B	2300	1970	30	B	160
16..	19800	243		13000	5220	100	B	1400	1700	30	B	140
17..	26000	441		31000	4130	85	B	950	1920	30	B	160
18..	30200	440	B	36000	3900	65	B	700	1550	30	B	120
19..	33700	353		32100	2510	50		339	1160	30	B	95
20..	31000	301		25200	2430	67		440	1230	45	B	150
21..	25800	227		15800	1650	35	B	160	3030	55	B	450
22..	23900	180		11600	1680	30	B	140	2750	40	B	300
23..	36500	302		29800	1720	25	B	120	2400	37		240
24..	40100	468		50700	1650	25	B	110	1530	35	B	140
25..	45600	525		64600	1300	20	B	70	1320	35	B	120
26..	53500	475		68600	1230	16	B	55	719	35	B	70
27..	52200	450		63400	996	15		40	844	35	B	80
28..	50300	403		54700	1070	14	E	40	782	35	B	70
29..	45800	309		38200	533	13	E	19	617	35	B	60
30..	34100	248		22800	1030	13	E	35	441	34		40
31..	--	--		--	689	15	E	30	--	--		--
Total	614990	--		572324	205818	--		89214	42800	--		4020

Day	JULY				AUGUST				SEPTEMBER			
1..	588	35	E	55	3570	70	E	650	660	21		37
2..	546	35	E	40	2430	55	E	360	546	20	E	30
3..	428	35	E	40	1720	45	E	200	631	20	E	35
4..	272	30	E	20	1500	36		146	645	20	E	35
5..	573	30	E	45	1340	35	E	130	507	20	E	30
6..	559	30	E	45	2560	60	E	420	719	25	E	50
7..	588	30	E	50	4750	95	E	1200	844	25	E	55
8..	617	30	E	50	4300	85	E	1000	1210	59		193
9..	588	30	E	50	3510	65	E	600	1250	55	E	190
10..	645	30	E	50	2890	55	E	450	860	30	E	70
11..	602	30	E	50	1920	50		259	703	30	E	60
12..	454	30	E	35	1500	45	B	180	782	35	E	75
13..	335	30	E	25	1100	45	B	130	1210	35	E	110
14..	382	30	E	30	766	40	B	85	703	35	E	65
15..	617	30	E	50	703	35	B	65	703	38		72
16..	945	30	E	70	546	35	B	50	797	40	B	90
17..	1700	30	E	140	467	30	B	40	877	40	B	95
18..	1550	30	E	130	467	29		36	797	40	B	90
19..	1210	30	E	100	382	30	E	30	631	40	B	70
20..	1160	29		91	428	35	E	40	533	40	B	60
21..	979	30	B	80	405	35	E	40	494	40	B	55
22..	1250	30	B	100	573	35	E	55	428	41		47
23..	1070	30	B	90	877	40	E	95	393	40	B	40
24..	860	35	B	80	1010	45	E	120	428	40	B	45
25..	996	35	B	90	945	45		115	559	40	B	60
26..	1340	35	B	130	1080	40	E	120	1140	45	B	130
27..	1650	35	B	160	860	40	E	95	1500	65	B	260
28..	1380	38		142	1270	35	E	120	1850	60	B	300
29..	1480	40	E	160	1100	30	E	90	1070	40		120
30..	1740	40	E	190	766	25	E	50	1230	40	B	130
31..	3260	60	E	550	617	25	E	40	--	--		--
Total	30364	--		2938	46352	--		7011	24700	--		2699

Total discharge for year (cfs-days)..... 1434523
Total load for year (tons)..... 1023571

E Estimated.
B Computed from estimated-concentration graph.

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1935. MAUMEE RIVER AT WATERVILLE, OHIO--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment											Method of analysis
							Percent finer than size indicated, in millimeters											
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Mar. 23, 1961.....	1640			21500	267		82	86	92	96	98	98	100					SBWC
Mar. 24.....	1800			23100	288		92	96	98	98	99	99	100					SBWC
Mar. 24.....	1800			23100	288		49	68	94	97	98	98	100					SBN
Apr. 28.....	1730			50400	405		80	85	90	94	96	97	100					SBWC
Apr. 28.....	1730			50400	405		42	54	76	90	94	98	100					SBN

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-1990. HURON RIVER AT MILAN, OHIO

LOCATION.--Temperature recorder at gaging station, 500 feet downstream from bridge on U.S. Highway 250, 0.2 mile northwest of Milan, Erie County, and 2 miles downstream from confluence of East and West Branches.
DRAINAGE AREA.--363 square miles.
RECORDS AVAILABLE.--Chemical analyses: March 1950 to February 1952.
Water temperatures: March to August 1950, July 1953 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 87°F July 23; minimum, freezing point on many days during December to February.
EXTREMES, 1953-61.--Water temperatures: Maximum, 91°F July 27, Aug. 4, 1955; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	60	62	61	59	61	65	62	59	62	69	63	66	65	65	65	65	62	59	56	54	51	50	51	50	46	45	48	51	50	52	52	58
Minimum	54	56	56	55	54	61	57	55	57	55	56	62	60	61	62	62	55	54	54	51	47	45	49	46	42	43	45	48	49	48	49	53
November																																
Maximum	50	49	45	46	46	45	40	41	42	42	40	39	44	48	52	54	51	44	42	41	42	44	44	41	39	44	46	51	51	38	--	45
Minimum	48	45	44	42	45	40	37	36	40	40	36	35	37	44	48	50	44	40	39	37	40	39	41	36	37	38	43	46	38	33	--	41
December																																
Maximum	33	32	32	32	39	41	41	36	32	32	32	32	32	32	32	32	32	32	32	32	32	33	34	34	33	32	33	33	33	33	33	33
Minimum	32	32	32	32	32	39	36	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	32	32	32	33	33	33	32	32
January																																
Maximum	32	33	33	33	33	32	32	32	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	32	32	32	32	32	32	32
Minimum	32	32	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	35	35	37	37	40	45	44	35	37	39	--	--	--	34
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	32	34	37	39	35	33	34	37	--	--	--	32
March																																
Maximum	38	40	44	44	46	47	46	42	40	37	39	40	41	41	41	42	40	37	37	40	40	43	43	41	44	47	51	50	48	50	46	43
Minimum	36	36	38	42	44	44	42	39	37	34	35	37	39	40	39	39	36	35	37	36	38	40	41	40	39	41	46	47	45	41	41	39
April																																
Maximum	42	41	42	46	44	45	45	50	47	41	45	45	43	47	48	48	43	42	48	52	53	54	56	60	60	56	53	53	50	53	--	48
Minimum	39	38	37	40	41	42	40	40	40	40	39	43	41	40	46	43	40	39	42	44	50	53	51	54	55	53	50	50	48	47	--	44
May																																
Maximum	57	56	55	61	56	59	63	64	63	63	65	69	75	78	75	71	67	63	69	65	61	64	69	71	72	69	64	70	67	69	68	66
Minimum	50	49	49	48	50	55	58	59	57	54	54	59	61	65	68	62	58	59	57	58	57	53	55	58	62	55	52	57	62	57	60	57
June																																
Maximum	72	70	68	74	76	78	74	73	71	76	82	85	84	8.	64	69	73	75	76	74	64	73	71	68	66	72	76	79	82	85	--	74
Minimum	62	65	64	60	63	67	67	69	68	67	70	71	75	64	61	58	59	62	65	61	59	58	63	59	62	60	63	66	71	74	--	64
July																																
Maximum	85	82	77	72	72	77	76	74	75	76	76	76	75	74	75	76	78	80	78	78	82	85	87	84	80	82	82	81	82	83	82	79
Minimum	74	76	71	67	65	65	67	66	64	65	69	71	71	69	69	70	71	71	70	68	72	75	76	75	73	72	71	73	74	75	76	71
August																																
Maximum	80	79	83	79	81	79	77	79	82	82	83	81	77	76	80	80	77	76	77	75	69	73	73	75	76	78	79	81	79	79	79	78
Minimum	74	75	73	73	72	70	68	69	72	74	76	75	69	69	72	74	69	67	69	69	65	65	69	69	71	71	71	72	74	70	72	71
September																																
Maximum	77	75	79	82	81	80	74	75	76	79	81	80	78	76	67	67	67	66	64	70	72	74	76	77	75	67	64	63	59	65	--	73
Minimum	70	69	72	75	75	73	69	68	67	70	73	75	71	67	62	58	59	57	59	63	65	66	69	70	67	62	58	59	54	55	--	66

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-2080. CUYAHOGA RIVER AT INDEPENDENCE, OHIO--Continued

Temperature (°F) of water, water year October 1960 to September 1961--Continued
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
July																																
Maximum	80	80	76	75	73	74	73	72	72	72	73	75	75	74	74	76	75	77	77	73	76	79	81	81	78	77	77	78	79	80	80	76
Minimum	76	74	73	72	69	70	70	69	67	67	70	71	73	72	74	72	68	72	68	70	72	75	78	78	75	75	75	75	77	78	77	73
August																																
Maximum	78	78	79	79	77	77	77	77	78	80	80	80	78	76	77	78	77	76	76	76	73	71	72	74	75	76	76	77	77	78	80	77
Minimum	76	77	78	76	72	75	74	73	74	76	78	78	75	73	74	75	73	73	74	73	70	70	70	72	74	73	74	74	76	74	76	74
September																																
Maximum	80	77	79	80	80	80	80	79	77	78	78	78	78	78	74	67	67	67	66	70	73	74	75	76	76	73	68	66	64	65	--	74
Minimum	76	75	75	79	79	77	77	75	75	75	76	77	76	74	67	65	64	63	64	66	70	71	73	74	73	68	65	64	62	61	--	71

4-2080. *CUYAHOGA RIVER AT INDEPENDENCE, OHIO*

LOCATION.--At gaging station at bridge on Rockside Road, 1 mile northeast of Independence, Cuyahoga County, and 3 miles downstream from Tinkers Creek.
DRAINAGE AREA.--709 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1948 to September 1949.
Water temperatures: October 1948 to September 1949, October 1952 to September 1961.
Sediment records: October 1950 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 81°F July 23, 24; minimum, freezing point on many days during December to February.
Sediment concentrations: Maximum daily, 2,120 ppm July 19; minimum daily, 6 ppm Oct. 26.
Sediment loads: Maximum daily, 35,300 tons Apr. 26; minimum daily, 2 tons on several days in October.
EXTREMES, 1948-49, 1950-61.--Water temperatures (1948-49, 1952-61): Maximum, 88°F Aug. 18, 1949; minimum, freezing point on many days during winter months.
Sediment concentrations (1950-61): Maximum daily, 4,800 ppm Aug. 21, 1960; minimum daily, 1 ppm Sept. 4, 10, 1955.
Sediment loads (1950-61): Maximum daily, 35,300 tons Apr. 26, 1961; minimum daily, less than 0.5 ton on several days during August and September 1954 and September 1955.
REMARKS.--Recorder stopped Nov. 24 to Dec. 7; range in temperature from 38°F to 52°F. Diurnal fluctuations caused by powerplants above station. Flow regulated slightly by reservoirs and lakes above station.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																															Average
	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	
October																																
Maximum	64	62	62	61	60	64	63	61	61	61	61	63	63	64	64	65	64	61	59	57	55	54	54	54	48	48	51	54	54	54	53	59
Minimum	60	60	60	59	57	60	60	59	60	59	59	61	61	62	64	64	61	59	57	55	54	53	54	48	47	47	47	51	53	53	53	57
November																																
Maximum	53	53	51	49	49	49	48	46	46	47	47	46	47	50	53	54	53	49	47	47	48	48	49	--	--	--	--	--	--	--	--	--
Minimum	53	51	49	48	49	48	46	44	45	46	46	44	44	47	50	53	49	47	47	46	47	47	47	--	--	--	--	--	--	--	--	--
December																																
Maximum	--	--	--	--	--	--	--	43	40	38	37	36	35	34	35	36	36	36	35	35	34	33	33	33	33	32	32	32	32	34	35	--
Minimum	--	--	--	--	--	--	--	40	38	37	36	35	34	34	34	35	36	35	35	34	33	33	33	33	32	32	32	32	32	32	34	--
January																																
Maximum	35	36	36	35	34	36	37	37	37	35	35	35	36	36	36	36	36	36	36	36	35	33	33	33	32	32	32	32	32	32	32	35
Minimum	35	35	35	34	33	34	36	37	35	35	34	34	35	36	36	36	36	36	36	35	33	33	33	32	32	32	32	32	32	32	32	34
February																																
Maximum	32	32	32	32	32	32	32	33	35	37	38	39	39	39	38	37	37	38	38	36	37	38	40	43	43	41	40	40	--	--	--	37
Minimum	32	32	32	32	32	32	32	32	33	35	37	38	38	38	37	37	33	34	36	35	36	37	38	40	41	38	38	40	--	--	--	36
March																																
Maximum	40	41	44	46	47	49	49	47	45	42	42	43	43	43	45	45	43	43	42	43	44	46	46	45	45	46	48	49	49	48	48	45
Minimum	40	39	41	44	46	47	47	45	42	41	41	42	43	43	43	43	42	42	42	41	43	44	45	43	43	44	46	48	48	46	46	44
April																																
Maximum	46	43	42	44	45	45	45	47	47	44	45	45	44	46	47	48	45	43	46	49	49	50	53	57	57	56	54	53	51	51	--	48
Minimum	43	41	41	42	43	45	45	44	44	42	42	44	43	43	46	45	42	42	43	45	48	49	49	53	55	54	53	51	50	49	--	46
May																																
Maximum	52	52	52	53	53	53	56	58	59	58	60	65	67	68	68	67	63	63	63	63	60	59	61	64	66	67	58	62	62	62	62	61
Minimum	50	50	50	50	52	52	53	56	58	56	57	60	63	66	67	62	60	61	60	60	59	56	57	59	62	58	56	56	61	58	59	58
June																																
Maximum	66	68	68	68	70	72	72	71	69	72	74	77	77	77	67	67	69	70	72	71	68	68	68	67	66	66	70	72	75	78	--	70
Minimum	61	65	67	64	66	68	69	69	64	66	71	73	73	67	65	64	65	66	68	68	64	63	67	64	64	63	64	67	71	73	--	67

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-2080. CUYAHOGA RIVER AT INDEPENDENCE, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	APRIL Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)		Suspended sediment Tons per day	MAY Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)		Suspended sediment Tons per day	JUNE Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)		Suspended sediment Tons per day
1..	1150	180	J	600	2580	264		1840	512	90	K	130
2..	1860	--		1200	2080	225		1260	1440	919	S	3970
3..	1520	90	B	370	1700	155		711	978	300	B	800
4..	1640	65	B	290	1460	120	B	470	640	82		142
5..	1380	58		216	1250	110	B	370	568	25	B	40
6..	1560	71		299	1110	100	B	300	472	25	B	30
7..	1710	68		314	1310	204		722	382	30	B	30
8..	1350	50		182	1240	151		506	512	244	S	502
9..	1250	47		159	1690	217		990	1800	1010	S	5960
10..	2750	287		2130	1600	130	B	550	1530	470		1940
11..	2280	114		702	1270	65	B	220	946	220	B	550
12..	1860	85		427	1160	55	B	170	802	100	B	220
13..	2220	222		1330	1030	50	B	140	658	43		76
14..	1770	87		416	892	50	B	120	1770	721	S	5150
15..	1510	68		277	793	46		98	1490	390	S	1660
16..	3370	787	S	9090	870	40	B	90	1060	140	B	400
17..	3520	411		3910	730	40	B	80	788	67		142
18..	4190	295		3340	780	41		86	649	45	B	80
19..	3130	228		1930	811	40	B	85	568	50	B	75
20..	2250	149		905	588	30	B	45	500	55	B	75
21..	2920	368	S	3500	468	30	B	40	584	50	B	80
22..	3760	426		4320	416	30	B	35	496	45	B	60
23..	3460	236	S	2360	378	25	B	25	307	50	K	65
24..	3240	1050	S	15000	349	25	B	25	464	150	A	190
25..	7590	1590		32600	382	25	B	25	356	55	B	50
26..	8760	1300	S	35300	432	20	B	25	332	35	B	30
27..	4880	408		5380	408	20	B	20	310	30	B	25
28..	4310	408		4750	382	20	B	20	280	30	B	20
29..	4360	346		4070	363	25	B	25	260	25	B	18
30..	3260	318		2800	408	31		34	260	25	B	18
31..	--	--		--	352	17		16	--	--		--
Total	88810	--		138167	29282	--		9143	21714	--		22528

Day	JULY Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)		Suspended sediment Tons per day	AUGUST Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)		Suspended sediment Tons per day	SEPTEMBER Mean discharge (cfs)	Suspended sediment Mean concentration (ppm)		Suspended sediment Tons per day
1..	270	20	B	14	276	50	B	35	133	30	B	11
2..	300	40	S	40	263	25	B	18	140	13		5
3..	420	78		88	263	16	B	11	162	8	B	3
4..	183	45	B	20	280	--		30	126	12	B	4
5..	290	25	B	20	293	--		30	126	19	B	6
6..	280	25	B	19	228	20	B	12	144	20	B	8
7..	273	25	B	18	191	25	B	13	310	--		40
8..	244	25	B	16	191	20	B	10	155	16	B	7
9..	222	25	B	15	173	18	B	8	131	13		4
10..	199	18		10	164	20	B	9	126	12	B	4
11..	199	19	B	10	199	20	B	11	117	16	B	5
12..	178	20	B	10	164	25	B	11	131	17		6
13..	186	20	B	10	144	20	B	8	157	18	B	8
14..	178	19	B	9	121	20	B	6	135	25	B	9
15..	162	13		6	137	25	B	9	137	20	B	7
16..	199	--		650	137	25	B	9	123	14		5
17..	408	--		1600	131	20	B	7	111	10	B	3
18..	263	280	B	200	120	18	B	6	98	13	B	3
19..	3190	2120	S	20600	126	18	B	6	112	15		4
20..	1860	777	S	4200	216	49	S	36	112	16	B	5
21..	811	480	B	1000	211	60	K	45	115	18	B	6
22..	540	170		248	228	108	S	73	114	17	B	5
23..	420	55	B	60	166	45	B	20	114	13	B	4
24..	420	40	B	45	157	35	B	15	108	16	B	5
25..	708	--		130	181	30	B	15	192	90	J	90
26..	508	30	B	40	208	30		17	488	--		340
27..	385	20	B	20	196	30	B	16	178	45	B	20
28..	335	16	B	14	155	25	B	10	148	18		7
29..	276	14	B	10	168	20	B	9	152	10	B	4
30..	270	13	B	9	214	20	B	12	157	9	B	4
31..	540	--		260	178	32		15	--	--		--
Total	14717	--		29391	5879	--		532	4552	--		632

Total discharge for year (cfs-days)..... 280496
Total load for year (tons)..... 293832

S Computed by subdividing day.
A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.
K Computed from estimated-concentration graph and subdividing day.

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-2080. CUYAHOGA RIVER AT INDEPENDENCE, OHIO--Continued

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER				NOVEMBER				DECEMBER			
	Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment			Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day		Mean concentration (ppm)		Tons per day
1..	126	9		3	178	17	B	8	130	8	B	3
2..	132	18		6	138	15	B	6	140	8	B	3
3..	138	22		8	136	15	B	6	130	10	B	4
4..	122	13		4	130	15	B	5	120	12		4
5..	122	9	B	3	132	15	B	5	140	12		4
6..	118	9	B	3	198	17	B	9	160	11	B	5
7..	115	8	B	2	155	18	B	8	190	8		4
8..	113	7	B	2	160	23		10	180	8	B	4
9..	110	9	B	3	186	25	B	12	173	11	B	5
10..	101	8	B	2	366	20	B	20	164	12	B	5
11..	112	7	B	2	275	18	B	13	153	17		7
12..	112	9	B	3	218	15	B	9	149	17	B	7
13..	116	9	B	3	190	13	B	7	166	14	B	6
14..	116	8	B	2	176	8		4	158	15	B	6
15..	112	8	B	2	180	9	B	4	155	15	B	6
16..	115	7	B	2	256	12	B	8	162	15	B	6
17..	101	8	B	2	198	12	B	6	158	15	B	6
18..	111	8	B	2	169	13	B	6	145	15	B	6
19..	122	8	B	3	158	10	B	4	140	14	B	5
20..	188	8	B	4	145	10	B	4	145	11	B	4
21..	140	8	B	3	134	11	B	4	151	14	B	6
22..	127	7	B	2	151	10	B	4	147	15	B	6
23..	118	9		3	173	12	B	6	147	14	B	6
24..	103	10	B	3	160	12	B	5	147	17	B	7
25..	113	7	B	2	150	12	B	5	147	14	B	6
26..	118	6	B	2	150	12	B	5	149	13	B	5
27..	122	8	B	3	140	12	B	4	176	15	B	7
28..	124	8	B	3	150	12	B	5	180	15	B	7
29..	118	8	B	2	140	10		4	169	17	B	8
30..	115	14		4	130	8	B	3	162	25	B	11
31..	111	15	B	4	--	--		--	155	30	B	12
Total	3711	--		92	5222	--		199	4788	--		181

Day	JANUARY				FEBRUARY				MARCH			
1..	153	35		14	149	25	B	10	2810	260	B	2000
2..	147	35	B	14	155	25	B	10	2310	200	B	1200
3..	149	30	B	12	158	30	B	13	1900	150	B	750
4..	160	30	B	13	171	30	B	14	2070	--		2200
5..	155	30	B	12	162	35	B	15	3050	480	J	4300
6..	164	25	B	11	153	39		16	2720	160	B	1200
7..	215	25	B	14	162	35	B	15	2350	65	B	410
8..	314	25	B	20	143	35	B	14	2420	249	S	2260
9..	253	23		16	142	35	B	13	2850	--		3300
10..	235	25	B	16	140	35	B	13	2170	110	B	640
11..	212	20	B	11	143	38		15	1820	45	B	220
12..	215	20	B	12	149	40	B	16	1830	18	B	90
13..	220	19	B	11	160	40	B	17	1810	75	K	450
14..	266	18	B	13	404	--		130	2420	--		800
15..	308	18	B	15	613	--		110	1940	40	B	210
16..	311	19	B	16	573	40	B	60	1600	19	B	80
17..	335	19	B	17	1460	--		3700	1400	11	B	40
18..	324	20	B	17	3390	--		12000	1270	12	B	40
19..	304	20	B	16	2580	350	B	2400	2230	370	J	3300
20..	262	18	B	13	1880	150	B	750	2220	--		1400
21..	218	15	B	9	1510	100	B	410	1640	65	B	290
22..	183	15	B	7	1480	90	B	360	1400	40	B	150
23..	158	15	B	6	1590	80	B	340	1580	55	B	230
24..	169	16	B	7	1440	55	B	210	2360	--		800
25..	155	16	B	7	2060	334	S	3080	1830	60	B	300
26..	155	18	B	8	7950	1440	S	32500	1430	45	B	170
27..	155	18	B	8	4570	440		5430	1200	40	B	130
28..	158	18	B	8	3840	340	B	3500	1030	45	B	120
29..	143	20	B	8	--	--		--	888	45	B	110
30..	136	25	B	9	--	--		--	775	60		126
31..	145	25	B	10	--	--		--	694	65	B	120
Total	6477	--		370	37327	--		65161	58017	--		27436

S Computed by subdividing day.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.
K Computed from estimated-concentration graph and subdividing day.

STREAMS TRIBUTARY TO LAKE ERIE--Continued

4-2080. CUYAHOGA RIVER AT INDEPENDENCE, OHIO--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Feb. 26, 1961.....	0630			9280	2020		43	54	68	83	90	92	94	96	100	--		SBWC
Mar. 19.....	1530			3160	619		27	35	47	60	76	84	92	96	100	--		SBWC
Apr. 24.....	1130			6920	4560		35	43	57	70	84	90	91	92	98	100		SBWC
Apr. 25.....	1345			7380	910		35	45	56	71	83	91	96	100	--	--		SBWC
Apr. 25.....	1345			7380	910		21	30	46	66	81	88	95	100	--	--		SBN
July 19.....	1630			4780	3190		33	44	57	71	82	87	90	93	98	100		SBWC
July 19.....	1630			4780	3190		20	28	42	64	82	84	90	93	98	100		SBN

STREAMS TRIBUTARY TO LAKE ONTARIO

4-2255. CANASERAGA CREEK AT GROVELAND, N.Y.

LOCATION.--On highway bridge at gage in Groveland, Livingston County, 0.2 mile downstream from small tributary.
DRAINAGE AREA.--181 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1960 to September 1961 (discontinued).
Water temperatures: October 1960 to September 1961 (discontinued).
EXTREMES, 1960-61.--Dissolved solids: Maximum, 279 ppm Sept. 1-9, 11-25; minimum, 189 ppm Mar. 1-31.
Hardness: Maximum, 217 ppm Dec. 1, 3-8; minimum, 129 ppm Mar. 1-31.
Specific conductance: Maximum daily, 614 micromhos Sept. 7; minimum daily, 262 micromhos Mar. 13.
Water temperatures: Maximum, 77°F Sept. 13.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Albany, N.Y. Streams frozen Dec. 2, Dec. 9 to Feb. 22.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed	
														Calcium, magnesium	Noncarbonate				Filtered	Unfiltered
Oct. 1-10, 1960.	32	8.1	0.06	57	15	11	2.5	209	32	16	0.2	3.6	258	204	32	443	7.7	3	2	2
Oct. 11-31.....	35	12	.10	59	15	11	2.4	216	35	15	.2	3.1	262	209	32	443	7.5	2	--	--
Nov. 1-30.....	31	8.1	.08	60	16	10	2.2	216	38	13	.0	3.7	260	216	39	440	7.8	2	3	2
Dec. 1, 3-8.....	31	9.4	.08	59	17	9.2	1.9	216	40	12	.2	4.9	261	217	40	447	7.6	3	2	1
Feb. 23-28, 1961	1004	7.9	.22	40	9.0	5.4	1.7	110	43	9.9	.2	5.1	196	137	47	294	7.6	7	7	3
Mar. 1-31.....	290	7.5	.16	38	8.1	5.9	2.2	116	32	8.9	.2	6.2	189	129	34	289	7.4	8	8	3
Apr. 11-30.....	268	10	.34	38	8.8	6.1	2.3	117	34	8.8	.1	6.3	190	131	35	301	7.3	5	4	2
May 1-26, 28-31.	801	11	.09	44	10	6.6	2.2	140	35	9.9	.0	3.9	214	151	37	339	7.2	9	5	2
June 1-30.....	305	10	.07	58	14	9.5	2.8	203	34	14	.2	4.4	262	202	36	431	7.4	6	2	1
July 1-13.....	97	13	.11	56	15	9.8	2.7	204	36	13	.1	3.6	263	201	34	442	7.3	4	7	2
Aug. 1-11, 13-31	107	12	.10	58	14	11	4.8	206	37	14	.2	5.1	262	202	33	449	7.2	4	4	3
Sept. 1-9, 11-25	43	8.2	.17	56	16	15	5.1	194	41	21	.2	12.	279	206	47	490	7.2	4	8	2
Sept. 10.....	39	--	.18	--	--	12	--	197	37	18	--	5.2	--	203	42	373	7.1	--	--	--

STREAMS TRIBUTARY TO LAKE ONTARIO--Continued

4-2255. CANASERAGA CREEK AT GROVELAND, N.Y.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day 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	Average
October																																
Maximum	55	61	54	55	54	55	48	55	50	51	--	50	54	56	62	57	66	64	50	48	47	48	50	47	43	45	52	50	48	52	50	53
Minimum	50	48	42	46	--	41	46	39	42	44	43	42	45	44	53	55	48	44	44	46	42	41	40	41	42	43	45	44	48	38	--	44
November																																
Maximum	33	--	37	36	43	41	38	33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	32	32	32	32	32	--	--	--	--
Minimum	33	35	34	33	32	33	35	35	35	35	36	34	35	36	36	35	36	36	35	35	36	36	35	37	38	37	38	38	38	37	38	36
January																																
Maximum	39	37	37	36	38	38	38	39	37	36	35	35	33	37	36	37	38	39	38	37	38	38	37	41	40	42	43	41	44	45	--	38
Minimum	45	44	46	--	48	48	50	53	55	51	55	57	51	60	54	59	55	61	55	58	51	64	63	61	56	54	--	63	65	55	59	55
February																																
Maximum	57	61	48	55	45	57	45	50	55	59	56	51	55	57	58	60	65	63	59	62	65	61	45	52	68	49	46	51	46	44	--	55
Minimum	42	46	50	55	53	53	59	61	--	56	55	49	41	--	57	59	67	53	49	58	62	45	63	60	67	50	48	--	62	67	61	55
March																																
Maximum	63	69	68	69	64	65	65	61	--	67	64	--	65	69	69	63	68	66	69	70	67	63	68	66	69	72	70	62	54	56	54	65
Minimum	59	61	58	71	70	64	63	70	74	76	73	75	77	--	--	60	61	63	64	67	66	68	71	73	--	--	--	--	--	--	--	--

STREAMS TRIBUTARY TO LAKE ONTARIO

4-2305. OATKA CREEK AT GARBUTT, N.Y.

LOCATION.--At gaging station, 40 feet downstream from highway bridge at Garbutt, Genesee County, 2 miles southwest of Scottsville, and 3.5 miles upstream from mouth.
DRAINAGE AREA.--208 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1961 (discontinued).
Water temperatures: October 1959 to September 1961 (discontinued).
EXTREMES, 1960-61.--Dissolved solids: Maximum, 1,230 ppm Jan. 18-24; minimum, 275 ppm Apr. 24-30.
Hardness: Maximum, 820 ppm Dec. 1-12; minimum, 178 ppm Feb. 26-28.
Specific conductance: Maximum daily, 1,550 micromhos Jan. 24; minimum daily, 323 micromhos Apr. 26-27.
Water temperatures: Maximum, 68°F Aug. 3-6, Sept. 4; minimum, freezing point on several days during January, February, and March.
EXTREMES, 1959-61.--Dissolved solids: 1,230 ppm Jan. 18-24, 1961; minimum, 220 ppm Apr. 1-6, 1960.
Hardness: Maximum, 820 ppm Dec. 1-12, 1960; minimum, 154 ppm Mar. 30-31, 1960.
Specific conductance: Maximum daily, 1,550 micromhos Jan. 24, 1961; minimum daily, 323 micromhos Apr. 26-27, 1961.
Water temperatures: Maximum, 68°F June 28, 1960, Aug. 3-6, Sept. 4, 1961; minimum, freezing point on several days during winter months.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Albany, N.Y. Stream frozen Dec. 13-31, Jan. 1-17, and Feb. 1-18.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed: Filtered	Oxygen consumed: Unfiltered
Oct. 1-10, 1960.	26	11	0.05	244	34	18	2.5	248	510	30	0.4	4.6	1060	750	547	1310	7.7	3	2	2
Oct. 11-31.....	24	12	.08	244	34	19	2.6	236	524	33	.4	4.5	1070	750	556	1330	7.5	2	--	--
Nov. 1-30.....	20	8.9	.08	260	34	21	2.7	251	546	34	.3	4.1	1130	789	584	1380	7.6	2	2	3
Dec. 1-12.....	21	8.9	.07	269	36	20	2.5	256	592	35	.4	4.5	1180	820	610	1430	7.5	3	1	2
Jan. 18-24, 1961	21	10	.07	258	38	20	2.4	202	600	33	.4	4.1	1230	801	635	1460	7.5	2	1	2
Feb. 18-20.....	30	--	.07	--	--	A 9.0	--	239	554	38	--	3.4	--	810	614	1410	7.7	5	--	--
Feb. 21.....	80	--	.19	--	--	A24	--	175	153	50	--	11	--	330	186	746	7.2	9	--	--
Feb. 23-25.....	388	6.5	.15	88	14	15	3.2	132	145	35	.1	8.5	392	277	169	606	7.2	10	5	8
Feb. 26-28.....	1130	--	.12	--	--	A 6.4	--	94	78	19	--	8.4	--	178	101	391	7.1	14	--	--
Mar. 1-10.....	353	7.5	.07	92	15	11	2.4	137	156	28	.2	6.7	399	291	179	611	7.5	9	4	4
Mar. 11.....	215	--	.07	--	--	6.2	--	160	183	31	--	5.2	--	356	225	702	7.3	6	--	--
Mar. 13-23.....	328	7.8	.04	108	17	16	2.2	168	174	34	.3	5.9	511	340	202	711	7.5	6	--	--
Mar. 24-25.....	612	--	.03	--	--	A 5.1	--	132	105	23	--	7.5	--	245	137	503	7.4	7	--	--
Mar. 27-31.....	376	--	.04	--	--	A 3.0	--	145	134	22	--	5.4	--	288	169	568	7.6	7	--	--
Apr. 1-10.....	367	5.7	.07	94	15	13	1.9	164	148	27	.1	4.6	440	296	162	633	7.5	5	3	3
Apr. 11-20.....	870	6.8	.12	68	10	9.8	1.9	136	88	20	.1	4.7	319	211	99	476	7.3	7	--	--
Apr. 21-23.....	513	--	.16	--	--	A 4.8	--	170	128	22	--	4.6	--	297	157	595	7.3	12	--	--
Apr. 24-30.....	1309	5.9	.22	63	9.1	7.7	2.0	135	77	14	.2	4.8	275	195	84	428	7.3	13	--	--
May 1-7.....	467	6.5	.05	90	16	10	2.0	177	132	20	.1	5.5	413	291	146	614	7.5	6	--	--

A Sodium and Potassium calculated as sodium (Na).

STREAMS TRIBUTARY TO LAKE ONTARIO

4-2305. OATKA CREEK AT GARBUTT, N.Y.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed: Filtered	Oxygen consumed: Unfiltered
May 8-10, 1961..	779	--	0.05	--	--	A 2.5	--	143	84	14	--	4.1	--	233	116	453	7.2	11	--	--
May 11-31.....	272	7.6	.05	109	18	13	2.2	200	171	23	0.2	4.3	489	346	182	714	7.6	6	3	4
June 1-16.....	272	10	.08	118	18	13	2.3	208	180	24	.3	3.3	502	369	198	716	7.5	9	4	5
June 17-30.....	138	9.8	.06	144	22	14	2.3	224	252	26	.3	3.1	626	450	267	851	7.6	5	--	--
July 1-31.....	62	8.1	.04	184	29	17	2.5	239	356	29	.3	3.4	837	579	382	1100	7.5	2	3	4
Aug. 1-3.....	63	--	.06	--	--	A18	--	206	392	27	--	4.1	--	580	411	1170	7.5	3	--	--
Aug. 4-8.....	128	9.0	.12	115	16	14	3.2	184	200	20	.3	4.0	490	353	202	710	7.5	9	--	--
Aug. 9-31.....	54	7.3	.08	193	27	16	2.9	230	392	27	.4	3.3	817	593	404	1080	7.6	5	3	3
Sept. 1-4, 6-30.	35	8.4	.06	223	32	18	2.6	236	470	33	.4	3.1	969	689	495	1240	7.5	3	2	4
Weighted average.....	--	7.4	0.10	104	16	11.0	2.2	165	160	23	0.2	5.0	465	312	177	635	7.3	8	--	--
Time-weighted average.....	208	8.5	0.07	176	26	15.0	2.5	210	336	28	0.3	4.2	777	532	359	990	7.5	4	--	--
Tons per day..	--	4.1	0.06	58	9	6.1	1.2	93	90	13	0.1	2.8	261	--	--	--	--	--	--	--

A Sodium and potassium calculated as sodium (Na).

STREAMS TRIBUTARY TO LAKE ONTARIO

4-2305. OATKA CREEK AT GARBUTT, N.Y.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day 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	Average
October																																
Maximum	51	50	51	51	50	49	53	50	54	49	49	51	50	53	56	56	52	51	50	49	46	47	48	47	43	42	45	45	46	45	46	49
Minimum	50	48	46	44	45	43	43	38	43	43	43	42	41	41	48	51	46	43	45	45	43	43	43	44	43	43	44	45	45	36	--	44
November																																
Maximum	33	34	34	40	41	44	42	37	33	33	33	33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	33	--	--	--	--
Minimum	--	--	--	--	--	--	33	33	33	33	32	33	33	33	33	34	--	32	32	32	32	32	32	32	--	--	--	--	--	--	--	--
December																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	36	38	34	--	38	38	38	33	34	35	--	--	--	--
Minimum	38	35	39	39	42	41	42	39	38	34	33	--	33	32	33	35	33	34	40	37	38	38	38	36	39	--	38	40	39	42	42	37
January																																
Maximum	37	41	41	40	41	42	42	39	41	43	41	42	43	40	39	38	41	41	43	41	42	45	46	50	50	50	51	48	46	36	--	43
Minimum	37	47	48	47	48	50	54	56	55	58	59	59	60	60	60	60	57	58	56	58	58	57	56	54	51	50	49	53	53	55	54	54
February																																
Maximum	58	57	60	60	59	60	60	61	60	60	--	58	58	59	59	60	60	61	60	60	56	55	61	60	60	58	59	60	63	65	--	60
Minimum	63	64	64	60	57	--	60	57	58	61	61	61	63	--	64	--	62	63	65	45	--	64	66	67	65	65	64	64	66	--	64	62
March																																
Maximum	--	63	63	68	68	68	65	65	66	67	66	65	64	61	63	63	60	59	63	63	61	59	59	60	64	64	--	65	63	63	64	64
Minimum	65	66	67	68	--	67	65	64	63	63	64	64	62	65	62	57	55	54	56	59	60	64	64	66	65	62	56	57	53	54	--	62

STREAMS TRIBUTARY TO LAKE ONTARIO

4-2320. GENESEE RIVER AT DRIVING PARK AVENUE, ROCHESTER, N. Y.

LOCATION.--At gaging station on right bank at Rochester, Monroe County, 40 feet downstream from plant 5 of Rochester Gas and Electric Corp., and 100 feet upstream from Driving Park Avenue Bridge.
DRAINAGE AREA.--2,467 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1954 to September 1955.
Water temperatures: October 1954 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 76°F Aug. 12; minimum, 33°F Feb. 26.
EXTREMES, 1954-61.--Water temperatures: Maximum, 79°F July 23, 1957, July 30, 31, 1959; minimum, freezing point Mar. 29, 1955, Dec. 1, 9-11, 1956, Jan. 6, 1960.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color
																Calcium, magnesium	Noncarbonate				
May 25, 1961.	3750	3.6		0.20		55	12	15	1.0	131	71	26	0.1	2.1	260	187	79		443	7.6	0

STREAMS TRIBUTARY TO LAKE ONTARIO

4-2320. GENESEE RIVER AT DRIVING PARK AVENUE, ROCHESTER, N.Y.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day 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	Average
October																																
Maximum	65	65	65	64	64	64	64	63	62	63	62	64	62	62	62	--	61	61	62	61	61	61	61	60	54	50	55	53	53	53	55	60
Minimum	65	65	64	64	64	64	63	62	62	62	63	64	63	63	62	61	63	64	62	62	61	61	61	60	58	54	53	54	54	54	54	61
November																																
Maximum	54	53	52	51	49	49	49	50	50	51	51	51	52	52	48	48	48	48	48	48	50	51	50	50	50	50	49	49	48	47	--	50
Minimum	53	52	51	51	50	49	50	50	51	52	52	52	53	52	50	50	48	48	48	48	48	48	48	48	48	48	48	49	48	47	--	50
December																																
Maximum	47	47	47	47	47	47	47	46	46	44	43	41	40	40	41	41	40	40	40	40	40	40	39	39	39	40	40	39	39	39	39	42
Minimum	47	47	47	47	47	47	46	46	46	45	44	40	40	41	41	40	40	40	40	40	39	39	39	39	39	39	39	39	39	39	39	42
January																																
Maximum	39	39	39	39	39	39	39	39	39	40	41	40	41	40	40	41	40	40	40	40	40	40	39	39	38	39	40	40	40	38	38	40
Minimum	39	39	39	40	40	41	40	39	39	41	42	41	41	40	41	41	40	40	40	40	40	39	39	38	38	38	39	39	39	39	40	40
February																																
Maximum	38	38	38	38	40	39	39	39	39	39	39	39	41	42	42	41	41	41	41	40	42	41	42	42	42	43	43	38	--	--	--	40
Minimum	40	38	39	40	40	39	39	39	39	39	39	39	41	41	41	41	40	40	40	43	44	44	43	43	43	33	34	34	--	--	--	40
March																																
Maximum	38	37	38	37	37	37	37	37	36	37	36	36	35	35	35	35	35	35	35	36	36	36	36	35	35	35	35	35	34	34	34	36
Minimum	35	37	37	37	37	38	38	36	36	36	35	35	35	35	36	36	36	35	36	35	35	35	35	36	35	36	36	35	35	35	35	36
April																																
Maximum	40	41	40	41	42	41	42	41	41	41	40	40	40	40	40	40	42	41	41	41	42	46	45	50	49	47	47	47	48	48	--	43
Minimum	40	40	41	40	42	42	42	41	41	41	40	41	40	40	40	40	40	40	40	41	41	43	43	48	47	46	48	48	48	50	--	42
May																																
Maximum	48	49	50	51	51	52	52	53	52	49	49	52	53	54	54	55	53	53	52	52	52	52	52	53	56	56	56	56	56	55	57	53
Minimum	51	51	51	50	51	52	52	52	52	51	50	50	53	53	54	54	52	52	52	55	55	56	57	58	57	57	56	56	56	55	56	53
June																																
Maximum	57	58	58	58	59	59	59	59	59	58	58	58	59	59	58	58	58	58	58	57	57	58	58	58	65	65	65	65	58	59	--	59
Minimum	56	57	57	57	58	58	58	58	59	59	59	59	59	57	58	58	58	58	58	57	57	57	57	57	57	63	63	65	57	57	--	58
July																																
Maximum	59	58	58	58	58	58	58	58	58	58	59	58	58	58	60	60	60	60	60	60	61	61	61	61	61	60	61	60	60	60	68	60
Minimum	57	58	58	58	58	57	58	58	58	58	59	58	60	59	59	59	59	60	60	60	60	60	60	60	61	60	60	60	60	60	67	59
August																																
Maximum	68	68	75	73	73	74	74	74	74	74	74	74	74	74	74	71	69	69	68	68	69	68	68	67	68	68	67	67	74	68	68	71
Minimum	67	68	72	72	74	74	73	73	73	73	73	76	74	74	72	70	70	70	70	70	69	67	67	67	67	67	65	67	68	68	68	70
September																																
Maximum	70	70	70	70	70	68	68	66	68	69	69	68	68	68	72	72	70	69	68	68	69	69	69	69	68	68	67	67	67	67	--	69
Minimum	71	70	70	71	70	69	69	65	69	70	70	70	70	68	68	68	68	68	69	68	68	68	68	68	68	68	71	68	68	68	--	69

STREAMS TRIBUTARY TO LAKE ONTARIO--Continued

4-2375. SENECA RIVER AT BALDWINSVILLE, N.Y.

LOCATION.--At lock 24 at Baldwinsville, Onondaga County, and 350 feet upstream from gaging station.
DRAINAGE AREA.--3,130 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1957 to September 1958.
Water temperatures: October 1957 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 79°F July 25; minimum, freezing point Jan. 10, 25-27.
EXTREMES, 1957-61.--Water temperatures: Maximum, 80°F July 30, 31, Aug. 1, 1959; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																															Average
	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	
October	65	64	63	62	60	61	60	59	61	60	60	60	60	60	60	61	60	59	59	58	55	55	55	55	51	50	50	51	52	52	51	58
November	52	52	51	49	49	48	46	46	46	46	45	45	45	45	45	46	46	46	46	45	45	45	45	45	45	45	45	45	45	45	--	46
December	42	41	41	40	40	42	43	40	38	37	35	37	35	35	35	35	--	--	34	34	34	34	33	--	--	--	33	33	34	34	--	37
January	--	--	33	33	33	34	--	--	33	32	33	33	33	--	--	34	33	33	33	33	--	--	33	33	32	32	32	--	--	33	33	--
February	33	33	33	--	--	34	34	33	33	34	--	--	--	34	34	34	34	--	--	34	34	--	34	34	--	--	35	34	--	--	--	--
March	34	34	35	37	38	39	39	39	38	37	34	35	35	35	37	37	35	35	36	35	37	37	39	38	34	37	39	42	43	41	40	37
April	42	43	40	39	39	40	40	40	39	40	40	41	44	44	46	45	44	44	44	44	45	45	45	50	50	49	49	50	50	49	--	44
May	50	50	50	50	50	50	54	55	55	54	55	55	56	60	61	64	60	62	62	60	59	58	58	56	59	59	58	55	57	56	58	56
June	58	58	58	60	61	62	62	63	65	67	67	68	70	70	68	68	68	68	68	66	64	64	65	67	66	67	65	68	70	70	--	65
July	70	72	74	73	72	71	71	71	70	70	70	71	72	72	72	73	74	74	75	76	76	77	77	78	79	78	78	78	78	78	78	74
August	78	77	76	76	77	77	75	75	75	76	77	77	77	77	75	75	74	73	73	75	74	73	73	74	74	73	74	73	73	73	74	75
September	75	75	77	77	77	77	77	77	77	77	78	78	76	76	75	74	72	68	70	70	72	74	74	74	74	74	72	70	68	67	--	74

STREAMS TRIBUTARY TO LAKE ONTARIO--Continued

4-2560. INDEPENDENCE RIVER AT DONNATTSBURG, N.Y.

LOCATION.--On right bank on downstream side of highway bridge at Donnattsburg, Lewis County, 1.2 miles downstream from Chase Lake Outlet, 4.5 miles northeast of Glenfield, and 5 miles upstream from mouth.
DRAINAGE AREA.--91.7 square miles.
RECORDS AVAILABLE.--Water temperatures: Octoher 1959 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 80°F July 24; minimum, freezing point on many days during February and March.
EXTREMES, 1959-61.--Water temperatures: Maximum, 80°F July 24, 1961; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
[Continuous ethyl alcohol-actuated thermograph]

Month	Day																															Average
	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	
October																																
Maximum	59	55	55	54	53	55	55	52	53	53	54	54	52	54	57	57	55	54	51	49	48	47	47	46	44	42	44	46	48	48	48	51
Minimum	55	52	52	51	50	53	52	49	50	50	52	50	48	51	54	55	52	50	49	48	46	45	46	44	41	40	42	44	45	46	46	49
November																																
Maximum	50	50	48	46	45	44	43	42	41	43	42	41	41	42	45	46	46	43	42	41	40	41	42	41	39	39	41	42	44	44	--	43
Minimum	48	48	46	45	44	43	42	40	40	41	41	40	40	40	42	45	43	42	41	40	39	40	41	39	38	38	39	41	42	38	--	42
December																																
Maximum	38	38	36	37	36	39	39	37	38	36	36	36	36	36	36	35	35	35	35	36	35	35	36	36	36	35	36	36	36	36	35	36
Minimum	36	36	36	36	36	36	37	36	36	36	36	36	36	36	35	35	35	35	35	35	35	35	35	36	35	35	35	36	36	35	35	36
January																																
Maximum	35	36	36	36	36	36	36	35	35	36	35	35	35	35	36	36	36	35	35	35	35	34	34	34	34	34	34	34	34	33	33	35
Minimum	35	35	35	35	35	35	35	35	35	34	34	34	35	34	34	35	35	35	35	34	34	34	34	34	34	34	34	34	33	33	33	34
February																																
Maximum	33	33	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
Minimum	33	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
March																																
Maximum	33	32	32	33	33	33	33	33	33	33	34	33	33	33	33	34	34	34	33	34	34	34	35	35	35	35	39	39	39	35	37	34
Minimum	32	32	32	32	33	32	33	32	33	33	32	33	32	32	32	33	33	32	32	32	33	33	34	34	34	33	34	37	35	35	35	33
April																																
Maximum	37	37	37	38	39	40	40	40	44	43	39	44	43	40	45	45	44	42	42	44	48	48	48	48	45	45	45	48	48	47	--	43
Minimum	36	36	36	36	38	39	40	39	38	39	39	39	40	40	40	44	40	42	42	41	44	47	46	45	45	45	44	45	47	46	--	41
May																																
Maximum	46	47	47	47	48	49	53	54	56	57	55	55	58	60	61	63	60	58	57	54	56	55	55	56	58	58	55	55	56	56	56	55
Minimum	46	46	45	44	47	47	49	52	54	55	53	54	55	58	59	60	57	57	54	52	54	55	54	54	55	54	52	52	55	53	54	53
June																																
Maximum	58	62	62	59	62	63	64	65	66	67	67	69	73	73	68	66	67	68	68	68	67	68	68	68	68	68	68	69	72	73	--	67
Minimum	56	58	59	58	59	62	62	63	65	66	66	67	69	68	65	63	64	66	67	67	66	66	65	66	66	67	66	67	69	72	--	65
July																																
Maximum	73	75	73	73	70	69	69	69	69	68	68	70	72	73	73	73	72	73	74	76	76	75	76	80	78	77	77	76	76	76	76	73
Minimum	71	72	72	70	67	67	68	67	68	66	68	68	70	72	72	72	72	71	72	73	74	74	74	75	76	76	74	74	75	74	74	72
August																																
Maximum	74	73	71	71	66	68	67	65	66	67	66	66	66	65	66	66	64	62	63	63	64	63	63	61	62	65	66	62	63	63	63	65
Minimum	71	69	69	65	65	65	64	65	65	65	65	65	65	64	63	64	62	62	62	63	63	63	61	61	61	62	62	62	62	62	62	64
September																																
Maximum	62	69	69	64	64	63	63	63	63	62	64	62	62	64	64	62	59	57	56	56	57	56	57	58	58	58	58	58	56	54	--	61
Minimum	62	62	64	62	63	63	63	63	62	62	62	62	62	62	62	57	55	55	55	56	56	56	56	57	58	58	58	56	54	51	--	59

STREAMS TRIBUTARY TO LAKE ONTARIO--Continued

4-2571.5. BEAVER RIVER AT MOSHIER FALLS, N. Y.

LOCATION.--At the Niagara-Mohawk Moshier Falls Power Station, Herkimer County, which is at the confluence of Beaver River and Sunday Creek near Number Four, N. Y.
DRAINAGE AREA.--184 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1955 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 71°F Sept. 5; minimum, 33°F on many days during December, January, and February.
EXTREMES, 1955-61.--Water temperatures: Maximum, 74°F Sept. 10, 1959; minimum, 33°F on many days during winter months.
REMARKS.--Measurements made by plant employes, five feet below surface in tailrace of the Moshier Falls hydroelectric station, No discharge records available.

Temperature (°F) of water, water year October 1960 to September 1961
[Daily measurement at approximately 0900]

Month	Day 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	Average
October	60	60	56	54	53	53	52	52	56	55	54	53	52	54	53	53	53	52	52	52	51	49	48	47	45	42	42	46	43	44	46	51
November	45	44	44	43	44	43	42	42	41	41	40	40	40	40	43	44	43	42	41	41	40	40	41	40	39	38	40	41	42	40	--	41
December	39	38	37	36	36	36	36	36	35	35	34	33	34	34	34	34	34	34	34	33	33	33	33	33	33	34	34	33	33	33	35	34
January	35	34	34	35	34	36	36	36	34	34	35	34	34	36	35	34	34	34	34	34	34	34	34	34	33	33	33	33	33	33	33	34
February	33	33	34	34	34	35	34	34	34	34	34	34	34	35	35	35	36	36	36	36	36	36	36	36	37	36	36	35	--	--	--	35
March	35	35	36	36	36	36	36	36	35	34	34	34	34	34	35	34	34	34	34	34	34	34	34	34	34	34	35	35	35	35	35	35
April	35	35	35	35	35	35	35	35	35	35	35	35	35	35	36	35	35	35	35	35	36	36	38	38	38	38	38	39	39	39	--	36
May	38	38	39	40	40	41	44	44	47	47	44	46	50	52	50	50	53	52	51	52	52	52	51	51	52	54	52	51	54	52	52	48
June	54	54	54	54	55	57	56	58	58	59	59	58	60	60	59	59	58	59	60	60	60	61	61	61	61	62	62	63	63	64	--	59
July	64	64	64	64	64	64	65	65	65	64	65	66	66	66	66	66	66	67	67	68	69	68	69	69	69	69	69	70	70	70	70	67
August	70	69	68	68	68	68	68	68	69	70	68	68	67	68	68	69	69	69	68	68	68	67	70	68	68	68	68	68	68	68	68	68
September	69	69	70	70	70	71	70	70	70	69	69	70	70	69	68	69	68	68	68	68	68	67	67	68	68	68	68	67	66	65	--	69

ST. LAWRENCE RIVER MAIN STEM

4-2608. ST. LAWRENCE RIVER AT ALEXANDRIA BAY, N.Y.

LOCATION.--Off pier behind post office at the Corps of Engineers river-stage gage at Alexandria Bay, Jefferson County.
DRAINAGE AREA.--296,500 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: October 1955 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 73°F July 26-31, Sept. 12; minimum, freezing point from January to March.
EXTREMES, 1955-61.--Water temperatures: Maximum, 75°F on several days during August and September 1959.
REMARKS.--River frozen during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
[Twice-daily measurements at 0800 and 1600]

Month	Day																															Average
	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	
October																																
Maximum	63	61	60	60	59	59	58	58	58	58	58	58	58	58	58	58	57	57	57	56	56	55	55	54	54	53	52	52	52	52	52	57
Minimum	62	61	60	60	60	59	58	59	58	58	58	58	58	58	58	58	58	57	57	56	56	55	55	54	53	52	53	53	53	53	52	57
November																																
Maximum	53	53	52	52	51	50	50	49	49	48	48	48	48	48	48	48	48	47	47	47	47	47	47	46	46	46	47	46	46	46	--	48
Minimum	53	52	52	52	51	50	50	49	49	48	48	48	48	48	48	48	48	48	47	47	48	47	47	46	46	47	47	46	46	46	--	48
December																																
Maximum	46	44	44	43	43	44	44	42	42	42	41	40	38	38	38	38	38	38	37	37	36	36	35	34	34	35	34	34	34	34	34	39
Minimum	46	44	44	43	44	44	43	42	42	42	40	39	37	38	38	38	38	38	38	37	36	36	35	34	34	36	34	34	34	34	34	39
January																																
Maximum	34	32	32	32	32	32	32	32	32	32	34	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	34	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
March																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
April																																
Maximum	34	34	34	34	34	34	34	34	35	36	34	35	35	36	36	36	36	36	36	38	39	40	41	39	40	40	40	40	40	40	--	37
Minimum	34	34	34	34	34	35	34	34	36	36	35	35	36	36	36	36	36	36	37	39	40	40	39	40	40	40	40	40	40	40	--	37
May																																
Maximum	40	40	40	41	42	42	44	44	45	45	46	46	47	47	48	49	49	49	49	48	48	48	48	48	50	49	48	48	49	48	48	46
Minimum	40	40	40	42	43	43	44	44	45	46	46	46	48	48	49	49	49	50	49	48	48	48	49	49	50	48	48	49	48	49	49	47
June																																
Maximum	48	48	49	50	51	52	51	52	52	52	53	54	55	54	54	54	54	55	54	54	54	55	56	56	56	57	57	58	60	60	--	54
Minimum	49	49	50	51	52	52	52	52	52	52	54	55	56	55	54	54	55	56	55	54	54	56	56	56	57	57	58	58	60	61	--	54
July																																
Maximum	60	61	62	62	62	62	62	62	62	63	63	64	64	65	65	65	66	66	67	68	69	69	70	70	71	72	73	73	73	73	72	66
Minimum	62	62	63	63	63	63	62	63	63	64	64	64	65	65	65	66	67	67	68	68	69	70	70	71	72	73	73	73	73	73	73	67
August																																
Maximum	72	71	70	70	71	71	71	71	71	72	72	72	72	71	71	70	70	70	70	71	70	70	70	70	70	69	70	69	70	69	69	70
Minimum	72	70	70	71	72	72	71	72	72	72	72	72	72	72	72	71	70	71	71	70	70	70	70	70	70	70	70	70	70	69	70	71
September																																
Maximum	69	69	70	70	71	71	71	71	71	72	72	72	72	72	72	70	69	69	68	69	69	70	70	72	70	72	70	68	68	66	--	70
Minimum	70	69	70	71	72	72	71	72	72	72	72	73	72	72	71	70	70	70	69	70	70	70	71	71	71	72	70	68	68	67	--	71

STREAMS TRIBUTARY TO ST. LAWRENCE RIVER

4-2680. RAQUETTE RIVER AT RAYMONDVILLE, N. Y.

LOCATION.--At old highway bridge at Raymondville, St. Lawrence County, 250 feet downstream from gage on right bank, 0.3 mile downstream from Trout Brook, 0.4 mile downstream from powerplant at Niagara Mohawk Power Corp., and 18 miles upstream from mouth.
DRAINAGE AREA.--1,131 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1961.
Water temperatures: October 1959 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 177 ppm May 12-17, minimum, 47 ppm Sept. 12-30.
Hardness: Maximum, 205 ppm Mar. 24; minimum, 25 ppm Oct. 15-24.
Specific conductance: Maximum daily, 377 micromhos Mar. 24; minimum daily, 62 micromhos Oct. 11-13.
Water temperatures: Maximum, 81°F Sept. 9; minimum, freezing point on several days during January, February and March.
EXTREMES, 1959-61.--Dissolved solids: Maximum, 177 ppm May 12-17, 1961; minimum, 41 ppm Aug. 18-31, 1960.
Hardness: Maximum, 205 ppm Mar. 24, 1961; minimum, 21 ppm Aug. 18-31, 1960.
Specific conductance: Maximum daily, 377 micromhos Mar. 24, 1961; minimum daily, 49 micromhos Aug. 29, 1960.
Water temperatures: Maximum, 81°F Sept. 9, 1961; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office in Albany, N. Y. Record of discharge for water year October 1960 to September 1961 given in Surface Water Records of New York for 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed: Filtered	Oxygen consumed: Unfiltered
Oct. 1-3, 1960..	1004	--	0.26	--	--	a0.7	--	21	8.2	1.9	--	0.8	--	27	10	67	6.7	32	--	--
Oct. 4.....	918	--	.30	--	--	a .9	--	38	8.8	1.8	--	.9	--	41	10	92	6.9	32	--	--
Oct. 5-10.....	986	4.5	.23	7.2	1.8	1.4	0.6	20	7.8	1.7	0.2	.8	51	26	9	63	6.6	33	9	12
Oct. 11-13.....	978	--	.41	--	--	a .5	--	21	6.8	1.4	--	1.0	--	26	9	62	6.4	28	--	--
Oct. 14.....	833	--	.46	--	--	a1.2	--	40	7.4	.6	--	1.1	--	40	7	89	6.9	27	--	--
Oct. 15-24.....	1004	5.0	.40	7.4	1.6	1.6	.7	22	7.6	1.9	.2	.8	50	25	7	64	6.5	29	--	--
Oct. 25-26.....	1145	--	.37	--	--	a .9	--	68	13	2.6	--	.7	--	71	16	150	7.0	26	--	--
Oct. 27.....	978	--	.25	--	--	a .7	--	180	21	3.8	--	3.1	--	176	29	336	7.0	18	--	--
Oct. 28-31.....	1012	--	.40	--	--	a1.4	--	80	18	4.0	--	.7	--	87	22	185	7.0	23	--	--
Nov. 1-2.....	1007	--	.37	--	--	a2.5	--	80	20	3.3	--	.5	--	86	21	181	7.1	27	--	--
Nov. 3-11.....	1020	8.1	.34	14	5.4	2.7	1.3	50	20	2.1	.2	.9	89	57	16	134	6.9	23	8	9
Nov. 12.....	1670	--	.40	--	--	a .7	--	165	30	1.4	--	3.4	--	169	34	323	7.0	23	--	--
Nov. 13-21,27-28	1188	5.6	.33	18	6.1	3.0	1.3	46	34	2.7	.0	.9	107	70	33	163	6.8	22	--	--
Dec. 4-10.....	1044	6.4	.28	19	6.6	2.8	.9	48	37	2.8	.2	1.2	166	75	35	177	6.8	28	--	--
Dec. 11.....	900	--	.25	--	--	a1.3	--	69	59	4.0	--	.9	--	120	64	256	6.7	30	--	--
Dec. 12-31.....	943	7.4	.31	15	4.0	2.4	.7	37	25	2.1	.2	1.2	91	54	24	129	6.6	32	9	12
Jan. 1-5, 1961..	1195	--	.32	--	--	a .9	--	42	24	1.9	--	1.0	--	61	27	135	6.4	28	--	--

a Sodium and potassium calculated as sodium (Na).

STREAMS TRIBUTARY TO ST. LAWRENCE RIVER--Continued

4-2680. RAQUETTE RIVER AT RAYMONDVILLE, N. Y.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color	Oxygen consumed: Filtered	Oxygen consumed: Unfiltered
Jan. 6-8, 1961..	827	--	0.34	--	--	a0.9	--	30	15	1.3	--	1.1	--	41	17	94	6.3	21	--	--
Jan. 9-11.....	833	--	.28	--	--	a1.2	--	53	24	2.5	--	.7	--	70	27	153	7.0	20	--	--
Jan. 12-14.....	747	--	.51	--	--	a1.2	--	93	31	2.6	--	.7	--	110	34	230	7.3	18	--	--
Jan. 15-16.....	680	--	.18	--	--	a2.1	--	130	60	5.0	--	.6	--	172	66	346	7.1	26	--	--
Jan. 17-18.....	640	--	.28	--	--	a1.6	--	66	32	2.5	--	1.6	--	89	35	190	6.7	18	--	--
Jan. 19-20.....	680	--	.20	--	--	a1.4	--	113	54	4.8	--	1.6	--	154	62	309	6.9	22	--	--
Jan. 21-23.....	720	--	.29	--	--	a .9	--	18	10	1.2	--	1.2	--	26	11	68	6.1	24	--	--
Jan. 24.....	740	--	.31	--	--	a .2	--	55	13	.4	--	1.7	--	60	15	127	6.5	24	--	--
Jan. 25-31.....	711	8.4	.28	7.2	1.4	2.1	0.5	18	11	.7	0.2	1.4	57	24	9	66	6.3	27	9	12
Feb. 1-17.....	751	6.6	.25	8.1	1.5	2.2	.6	20	10	2.9	.1	1.5	61	26	10	73	6.5	34	10	11
Feb. 18.....	560	--	.16	--	--	a .7	--	29	18	3.6	--	1.5	--	47	23	105	6.2	36	--	--
Feb. 19.....	800	--	.28	--	--	a2.5	--	84	24	4.0	--	2.5	--	96	27	191	6.6	31	--	--
Feb. 20-28.....	1212	3.8	.16	12	4.0	2.2	1.1	35	16	3.0	.1	2.1	71	47	18	113	6.5	39	--	--
Mar. 1-10.....	2390	3.8	.10	16	6.2	2.0	1.1	51	22	2.3	.3	1.9	94	66	24	149	6.7	40	8	9
Mar. 11-13.....	2733	--	.20	--	--	a .5	--	64	33	.6	--	1.3	--	88	36	183	7.1	33	--	--
Mar. 14-16.....	2233	--	.11	--	--	a .2	--	93	46	1.6	--	1.3	--	127	51	254	7.0	41	--	--
Mar. 17-23.....	2154	7.3	.23	21	7.2	2.4	1.1	59	34	2.5	.2	1.6	127	82	34	178	6.8	32	--	--
Mar. 24.....	2520	--	.20	--	--	a .2	--	201	32	2.4	--	4.9	--	205	41	377	7.2	20	--	--
Mar. 25-31.....	2911	5.4	.17	20	7.6	2.3	1.2	64	29	1.8	.2	1.8	121	82	29	177	7.0	28	--	--
Apr. 1-4.....	2468	--	.22	--	--	a .2	--	59	26	.3	--	.7	--	76	28	164	6.9	33	--	--
Apr. 5.....	2450	--	.27	--	--	a .5	--	138	28	.2	--	2.8	--	144	31	284	7.1	20	--	--
Apr. 6-23.....	2682	6.2	.25	21	7.6	2.5	.8	70	28	.2	.1	1.1	124	84	27	182	7.1	37	8	10
Apr. 24.....	2290	--	.20	--	--	a .2	--	132	26	.4	--	1.5	--	136	28	268	7.2	42	--	--
Apr. 25-30.....	2117	9.5	.23	23	8.5	3.4	.7	86	26	.2	.2	.7	137	93	22	199	7.2	53	--	--
May 1-11.....	1696	12	.13	21	8.1	2.6	.8	80	24	.8	.1	.9	125	86	21	191	7.0	49	9	12
May 12-17.....	3168	6.3	.13	31	12	4.9	1.2	133	25	1.5	.2	1.3	177	127	18	273	6.9	59	--	--
May 18-25.....	2901	--	.18	--	--	a3.0	--	72	14	.8	--	1.3	--	82	23	154	6.9	49	--	--
May 26-31.....	2243	7.6	.10	30	11	3.3	.7	128	16	1.7	.2	1.9	165	120	15	246	7.0	69	--	--
June 1-4.....	2300	--	.15	--	--	a1.4	--	124	15	.6	--	1.4	--	116	15	229	7.1	59	--	--
June 5-15.....	1695	6.3	.16	16	5.1	2.3	7	66	10	.9	.2	1.4	89	61	7	131	7.0	41	8	10
June 16-21.....	1657	11	.13	10	3.2	1.0	7	36	8.5	1.0	.1	1.5	66	38	9	84	6.6	29	--	--
June 22-30.....	2117	12	.21	21	7.4	1.7	7	88	12	.9	.2	1.3	114	83	11	169	7.0	69	--	--
July 1.....	2020	--	.39	--	--	--	--	72	23	.2	--	--	--	71	12	160	7.0	--	--	--
July 2-7.....	3100	13	.29	30	9.6	3.1	8	133	12	.8	.2	1.7	168	115	6	243	7.1	65	--	--

July 8-26, 1961.	1749	13	0.27	19	7.0	2.2	0.6	81	10	0.8	0.1	1.3	110	77	10	162	7.3	45	12	14
July 27-31.....	1437	14	.22	11	6.0	2.2	.8	44	11	2.9	.1	1.8	80	52	16	114	6.6	--	--	--
Aug. 1-12.....	670	6.0	.15	11	4.4	2.3	.9	46	8.8	1.5	.2	2.1	70	46	8	103	6.8	19	6	7
Aug. 13-23.....	607	6.1	.11	8.0	2.5	2.1	.6	28	9.2	1.0	.1	1.5	54	31	8	75	6.6	16	--	--
Aug. 24-31.....	850	7.5	.12	8.3	3.3	2.5	1.4	34	8.3	1.5	.1	1.7	61	34	6	86	6.7	14	--	--
Sept. 1-3.....	1540	--	.10	--	--	a1.2	--	39	8.8	1.0	--	1.1	--	41	9	93	7.1	19	--	--
Sept. 4.....	1520	--	.21	--	--	a1.4	--	108	15	1.4	--	2.3	--	105	17	198	6.9	--	--	--
Sept. 5-7.....	1543	--	.15	--	--	.5	--	56	10	1.0	--	1.3	--	58	12	126	6.7	24	--	--
Sept. 8-11.....	1485	--	.13	--	--	.5	--	40	8.6	1.5	--	2.3	--	45	12	101	6.8	19	--	--
Sept. 12-30.....	1162	5.5	.12	6.0	2.8	2.4	.9	22	9.7	1.2	.1	2.1	47	27	9	66	6.2	29	6	8
Weighted average.....	--	--	0.21	--	--	2.2	--	67	19.0	1.4	--	1.4	--	74	19	159	6.7	38	--	--
Time-weighted average.....	1518	--	0.23	--	--	2.1	--	57	18.0	1.6	--	1.4	--	65	18	142	6.6	34	--	--
Tons per day..	--	32	0.88	--	--	9.1	--	274	79.0	5.8	--	5.7	--	--	--	--	--	--	--	--

a Sodium and potassium calculated as sodium (Na).

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day 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	Average
October	64	61	60	59	58	57	53	54	56	55	50	61	60	54	55	56	60	58	49	50	50	48	49	45	58	59	49	48	49	52	51	54
November	49	50	48	49	48	45	46	49	47	44	43	48	44	46	49	45	49	43	45	40	43	47	44	42	44	40	43	45	45	39	--	45
December	39	--	36	34	45	45	39	40	36	35	38	34	36	34	35	37	35	35	34	35	39	37	38	39	39	41	40	35	36	37	34	37
January.....	35	32	40	36	40	41	43	45	37	35	37	35	36	35	37	36	36	38	37	39	35	32	32	35	34	32	34	35	—	33	35	36
February.....	36	40	39	36	34	32	32	41	32	34	36	38	32	32	32	35	37	39	32	37	35	40	35	41	35	40	39	38	--	--	--	36
March	32	35	39	41	32	32	36	35	37	32	36	36	39	32	39	39	32	35	39	38	34	35	39	35	41	39	40	43	41	39	40	37
April.....	45	46	40	45	47	41	39	40	33	40	41	44	46	40	45	47	49	40	43	45	47	49	50	51	52	53	53	51	50	56	--	46
May.....	51	49	53	54	55	57	60	50	55	58	59	60	61	67	68	69	62	58	66	63	61	60	59	62	67	63	69	69	51	50	58	59
June	56	65	61	66	59	56	50	53	61	68	69	60	63	65	69	69	65	68	71	70	72	69	66	62	65	65	68	69	70	72	--	65
July.....	74	74	71	69	70	76	79	79	63	65	69	69	70	73	78	70	73	75	76	71	70	72	75	77	70	81	75	79	80	70	75	73
August.....	80	76	70	75	79	72	74	75	76	74	75	76	76	78	70	71	73	69	79	80	75	70	73	79	78	80	80	79	76	78	79	76
September.....	74	76	73	76	75	82	79	80	81	72	74	72	73	74	76	70	64	65	66	69	71	65	69	71	70	73	70	71	70	60	--	72

MISCELLANEOUS ANALYSES OF STREAMS IN ST. LAWRENCE RIVER BASIN

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
STREAMS TRIBUTARY TO LAKE SUPERIOR																							
4-187.7. ELBOW CREEK NEAR IRON JUNCTION, MINN.																							
Oct. 19, 1960	2.1	13		0.03		25	13	9.1	2.8	114	0	34	5.7	0.2	1.6	0.04	179	118	25	0.4	271	7.6	20
May 10, 1961.	a 24	2.7		.15	0.06	17	8.2	6.5	2.3	65	0	28	5.4	.2	1.8	.06	129	76	23	.3	188	6.9	45
May 19.....	33.6	3.3		.14		16	9.3	7.0	2.4	66	0	32	4.7	.2	.6	.05	131	78	24	.3	193	7.2	35
June 13.....	8.0	7.9		.20		24	8.3	7.1	1.8	82	0	32	3.7	.3	1.1	.01	152	94	27	.3	217	7.4	45
July 12.....	2.8	6.9		.18		28	14	9.3	2.5	108	0	47	5.9	.3	.3	.03	194	126	37	.4	292	7.5	28
Aug. 11.....	1.2	4.5		.22		29	15	11	3.2	123	0	49	7.3	.3	.4	.04	196	136	35	.4	320	7.0	25
Sept. 16.....	--	12		.05		29	14	11	2.9	99	0	58	7.4	.3	1.9	.06	206	132	51	.4	317	7.6	20
4-189. EAST TWO RIVER NEAR IRON JUNCTION, MINN.																							
Oct. 19, 1960	9.2	3.9		0.11		44	16	19	3.5	158	0	55	23	0.1	1.4	0.06	255	174	44	0.6	426	7.4	13
May 10, 1961.	a 53	.9		.15	0.08	21	8.7	7.8	2.2	71	0	31	9.9	.2	2.0	.07	147	88	30	.4	220	6.8	45
May 19.....	116	2.7		.16		23	10	8.1	2.2	76	0	41	9.6	.3	.7	.05	158	100	38	.4	242	7.1	80
June 13.....	33.2	6.2		.04		52	21	12	3.0	159	0	83	15	.2	3.2	.00	299	214	84	.4	465	7.2	28
July 12.....	9.5	3.9		.05		61	35	19	4.0	186	0	143	22	.2	.3	.05	416	294	141	.5	633	7.2	12
Aug. 11.....	9.5	3.6		.05		64	37	20	3.8	216	0	147	22	.2	.0	.06	461	312	135	.5	663	7.3	12
Sept. 16.....	--	10		.03		51	27	18	3.9	178	0	100	16	.2	4.9	.10	344	240	94	.5	522	6.9	20
4-195. EAST SWAN RIVER NEAR TOIVOLA, MINN.																							
Aug. 11, 1960	76	12		0.12	0.00	32	12	9.4	2.3	123	0	30	9.7	0.3	7.0		197	129	28	0.4	292	6.9	50
May 11, 1961.	167	6.2		.27	.00	18	6.6	5.5	1.8	70	0	17	4.1	.2	.5	0.05	113	72	15	.3	168	7.0	
4-210. WHITEFACE RIVER NEAR MEADOWLANDS, MINN.																							
Aug. 11, 1960		6.9		0.48	0.00	15	6.2	2.9	1.0	70	0	8.3	0.0	0.2	0.9		118	63	6	0.2	126	6.9	110
May 11, 1961.	a 750	4.3		.37	.02	12	1.5	1.8	1.0	34	0	10	.4	.2	1.5	0.08	85	36	8	.1	76	6.8	120
4-212. FLOODWOOD RIVER NEAR FLOODWOOD, MINN.																							
Aug. 11, 1960		8.6		0.70	0.00	21	6.5	2.1	0.6	82	0	8.5	0.0	0.3	1.8		152	79	12	0.1	140	6.8	190
May 11, 1961.	a 400	3.7		.27	.03	17	2.1	1.6	1.0	49	0	13	.0	.2	1.6	0.09	98	51	9	.1	98	7.0	130

a Estimated.

STREAMS TRIBUTARY TO LAKE ERIE																		
BUFFALO CREEK AT WALES CENTER, N. Y.																		
Apr. 10, 1961.....		3.1	0.15	25	4.0	2.9	1.4	58	28	5.5	0.1	2.2	112	79	32	184	7.3	14
Aug. 21.....		2.9	.14	53	12	4.7	2.0	176	41	5.4	.0	.4	224	182	38	384	7.6	4
BUFFALO CREEK AT ELMA, N. Y.																		
Apr. 10, 1961.....		3.1	0.21	27	4.3	3.1	1.4	62	30	6.5	0.0	2.0	118	85	34	194	7.2	14
Aug. 21.....		2.5	.04	55	12	4.8	2.0	180	42	5.8	.0	.3	231	187	39	394	7.9	4
4-2145. BUFFALO CREEK AT GARDENVILLE, N. Y.																		
Apr. 10, 1961.....	954	3.1	0.11	29	4.6	3.7	1.5	67	33	6.3	0.3	2.6	131	92	37	210	7.3	8
Aug. 21.....	37	.9	.04	52	12	5.7	2.1	165	44	7.6	.0	.7	223	179	44	378	7.8	9
STREAMS TRIBUTARY TO NIAGARA RIVER																		
BARGE CANAL AT LYONS, N. Y.																		
Nov. 2, 1960.....		2.7	0.07	69	14	20	2.4	148	90	38	0.1	2.7	333	230	108	548	8.1	5
May 3, 1961.....		3.5	.13	76	18	11	2.1	199	94	20	.2	3.7	360	264	101	560	7.7	11
BARGE CANAL AT NEWARK, N. Y.																		
Nov. 2, 1960.....		1.9	0.08	62	13	21	2.4	146	76	39	0.2	2.0	306	208	89	514	8.0	5
May 3, 1961.....		1.9	.10	91	25	9.6	2.4	208	148	20	.3	6.3	465	330	160	680	7.6	8
BARGE CANAL AT ROCHESTER, N. Y.																		
Nov. 2, 1960.....		1.8	0.03	60	10	21	2.0	132	74	40	0.0	2.4	289	191	83	495	7.1	1
May 3, 1961.....		3.6	1.0	39	7.5	9.2	2.1	90	50	16	.1	2.1	202	129	55	319	6.8	19
BARGE CANAL AT SPENCERPORT, N. Y.																		
Nov. 1, 1960.....		0.8	0.03	43	9.7	20	1.6	121	48	30	0.3	0.5	222	148	49	387	7.2	2
May 3, 1961.....		9.9	1.0	43	6.9	5.5	2.1	113	40	8.8	.2	2.5	187	136	44	300	7.1	29

MISCELLANEOUS ANALYSES OF STREAMS IN ST. LAWRENCE RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
STREAMS TRIBUTARY TO NIAGARA RIVER--Continued																		
BARGE CANAL AT BROCKPORT, N. Y.																		
Nov. 1, 1960.....		1.0	0.06	48	9.0	13	1.7	120	50	27	0.1	2.3	226	157	59	393	7.0	2
May 3, 1961.....		4.3	1.0	45	7.8	5.5	2.0	116	47	9.2	.2	2.3	201	145	50	319	7.2	19
BARGE CANAL AT ALBION, N. Y.																		
Dec. 6, 1960.....		2.0	0.12	49	9.3	13	1.9	A123	52	27	0.2	2.5	230	161	62	389	8.3	1
BARGE CANAL AT MEDINA, N. Y.																		
Dec. 6, 1960.....		1.2	0.18	56	9.8	16	1.9	125	68	30	0.3	4.4	264	180	78	444	7.1	2
BARGE CANAL AT LOCKPORT, N. Y.																		
Dec. 6, 1960.....		1.2	0.12	54	10	17	1.9	124	62	33	0.3	4.0	258	176	74	440	7.1	2
BARGE CANAL AT PENDLETON, N. Y.																		
Dec. 6, 1960.....		1.5	0.27	58	11	21	2.1	124	75	40	0.2	3.9	290	190	88	484	7.0	1
STREAMS TRIBUTARY TO LAKE ONTARIO																		
FISH CREEK NEAR WEST SOMERSET, N. Y.																		
Apr. 11, 1961.....		4.8	0.08	35	7.6	4.2	3.1	58	59	9.9	0.2	6.8	183	119	72	275	6.8	31
4-2310. BLACK CREEK AT CHURCHVILLE, N. Y.																		
Nov. 1, 1960.....	14	3.7	0.02	205	49	14	3.7	176	536	29	0.3	0.7	975	714	570	1220	7.6	5
May 3, 1961.....	152	2.4	.09	103	24	11	2.0	221	155	24	.4	3.5	460	356	175	706	7.8	24
CONESUS LAKE AT LAKEVILLE, N. Y.																		
Dec. 6, 1960.....		1.3	0.05	40	11	7.3	2.1	132	31	13	0.1	0.9	176	145	37	309	7.7	4
June 6, 1961.....		2.6	.02	36	9.9	8.3	1.7	126	28	12	.2	1.2	174	131	27	295	7.7	7

A Includes equivalent of 2 parts per million of carbonate (CO_3).

STREAMS TRIBUTARY TO LAKE ONTARIO--Continued

HEMLOCK LAKE NEAR HEMLOCK, N. Y.																		
Dec. 6, 1960.....		3.1	0.07	22	5.3	4.1	1.3	67	23	7.1	0.1	0.7	104	77	22	188	7.4	1
June 8, 1961.....		5.0	.00	21	5.0	5.2	1.2	62	23	7.1	.0	.7	107	73	22	178	6.9	2
CANADICE LAKE AT CANADICE LAKE, N. Y.																		
Dec. 6, 1960.....		3.2	0.04	12	2.8	2.2	1.0	34	17	2.3	0.1	0.4	61	42	14	104	7.0	1
June 8, 1961.....		2.9	.00	12	2.9	3.0	1.0	31	19	2.6	.1	.6	62	42	17	104	6.8	2
IRONDEQUOIT BAY AT ROCHESTER, N. Y.																		
May 3, 1961.....		2.9	0.02	72	20	32	3.2	169	111	52	0.2	6.5	437	262	123	682	7.0	18
Nov. 1, 1960.....		3.5	.06	76	25	30	3.4	176	122	54	.8	10	422	293	149	688	8.0	4
CLYDE RIVER AT CLYDE, N. Y.																		
Nov. 2, 1960.....		2.2	0.19	84	18	20	2.6	166	133	40	0.3	2.3	391	284	148	626	6.9	2
May 3, 1961.....		10	.13	65	14	9.3	1.9	170	77	14	.2	3.4	303	220	80	469	7.6	14
4-2345. CANANDAIGUA LAKE AT CANANDAIGUA, N. Y.																		
Dec. 7, 1960.....		2.5	0.07	36	9.1	3.9	1.9	126	29	4.7	0.0	1.0	158	128	24	273	7.7	3
June 8, 1961.....		5.5	.04	35	9.7	5.7	1.8	126	28	5.1	.2	1.7	162	128	24	271	8.1	6
CANANDAIGUA LAKE OUTLET NEAR S. NEWARK, N. Y.																		
Nov. 2, 1960.....		1.6	0.04	86	18	9.7	1.8	169	137	14	0.3	4.3	385	289	150	597	7.4	5
May 3, 1961.....		2.9	.02	48	12	5.7	1.9	146	47	7.6	.3	2.1	219	170	50	357	7.8	4
WEST BRANCH KEUKA LAKE AT PULTENEY, N. Y.																		
Dec. 7, 1960.....		1.1	0.12	27	6.9	3.8	1.2	89	28	3.8	0.1	0.8	121	96	23	215	7.6	2
June 8, 1961.....		8.9	.05	27	8.1	4.7	1.6	97	26	4.0	.1	1.1	131	101	22	228	7.4	4
EAST BRANCH KEUKA LAKE AT KEUKA PARK, N. Y.																		
Dec. 7, 1960.....		1.5	0.11	28	7.2	3.7	1.2	91	28	4.2	0.1	0.4	123	100	25	219	8.2	2
June 8, 1961.....		6.4	.03	27	7.3	4.5	1.6	89	28	4.0	.1	1.0	133	98	25	215	7.2	6
SENECA LAKE AT GENEVA, N. Y.																		
Dec. 7, 1960.....		0.8	0.06	39	9.1	70	2.4	113	37	114	0.0	1.5	344	135	43	627	7.7	3
June 8, 1961.....		1.2	.02	40	10	83	2.6	128	39	125	.1	1.6	370	141	36	646	7.1	3
CAYUGA LAKE AT CAYUGA, N. Y.																		
Dec. 7, 1960.....		1.0	0.02	47	9.6	59	2.0	129	55	88	0.2	2.8	333	157	52	596	7.4	1
June 9, 1961.....		1.5	.01	42	9.2	64	1.9	129	43	93	.1	2.2	344	143	38	568	7.3	4

MISCELLANEOUS ANALYSES OF STREAMS IN ST. LAWRENCE RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
STREAMS TRIBUTARY TO LAKE ONTARIO--Continued																		
OWASCO LAKE AT AUBURN, N. Y.																		
Nov. 3, 1960.....		2.9	0.04	38	7.3	2.3	1.0	127	21	4.5	0.0	3.3	148	125	21	264	7.5	2
June 8, 1961.....		16	.04	36	7.4	3.3	1.0	121	20	4.8	.2	3.4	156	121	22	253	7.5	2
SENECA RIVER NEAR WEEDSPORT, N. Y.																		
Nov.2, 1960.....		1.7	0.12	54	12	56	2.5	135	69	92	0.3	2.9	370	184	74	653	7.3	5
May 3, 1961.....		1.3	.08	48	11	39	1.8	134	47	68	.2	1.9	319	165	55	539	7.5	7
SKANCATELES LAKE AT SKANCATELES, N. Y.																		
Nov. 3, 1960.....		1.4	0.07	34	6.4	1.6	0.8	113	20	2.3	0.2	2.1	124	112	19	230	7.5	2
June 7, 1961.....		1.7	.00	34	5.8	1.6	.9	110	17	2.6	.0	2.2	132	109	19	227	7.1	1
BARGE CANAL AT COLD SPRINGS, N. Y.																		
Nov. 3, 1960.....		1.8	0.07	74	11	75	2.6	136	77	143	0.1	5.6	487	230	118	857	7.4	3
May 4, 1961.....		1.8	.08	64	13	49	2.1	142	60	97	.2	2.7	408	213	97	671	7.4	8
BARGE CANAL AT BALDWINSVILLE, N. Y.																		
Nov. 3, 1960.....	2590	1.9	0.02	58	12	56	2.3	136	74	89	0.0	5.4	380	194	83	670	7.0	2
May 4, 1961.....	10300	1.7	.05	53	12	36	2.0	142	62	59	.3	1.8	316	182	65	543	7.6	7
BARGE CANAL AT SYLVAN BEACH, N. Y.																		
Nov. 3, 1960.....		3.3	0.12	20	5.4	2.4	0.7	65	21	3.7	0.0	1.3	94	72	19	165	7.0	7
May 5, 1961.....		2.0	.13	11	3.3	1.1	.3	37	9.0	.3	.2	1.0	59	41	11	91	7.2	23
ONEIDA RIVER AT THREE RIVERS, N. Y.																		
Nov. 4, 1960.....		1.8	0.04	66	9.5	40	1.9	118	60	95	0.0	5.0	365	204	107	632	7.2	4
May 4, 1961.....		.9	.04	36	9.1	3.4	1.0	95	44	5.2	.2	.9	167	128	50	273	7.3	9

STREAMS TRIBUTARY TO LAKE ONTARIO--Continued

BARGE CANAL AT BREWERTON, N. Y.

Nov. 4, 1960.....		1.8	0.02	41	8.6	3.5	1.0	106	51	5.9	0.0	0.7	174	138	51	297	7.0	2
May 5, 1961.....		.6	.05	37	8.8	3.2	1.2	94	47	5.5	.1	1.1	176	129	52	275	7.6	7

GREEN LAKE NEAR FAYETTEVILLE, N. Y.

Nov. 9, 1960.....		1.2	0.02	400	62	12	2.6	192	1050	24	0.2	4.7	1770	1260	1100	1960	7.5	1

STREAMS TRIBUTARY TO ST. LAWRENCE RIVER

SALMON RIVER AT CHASM FALLS, N. Y.

May 16, 1961.....	161	7.6	0.21	12	2.3	1.2	0.5	36	8.5	1.0	0.1	1.0	53	40	10	80	6.9	16
June 7.....	150	6.8	.32	7.4	2.7	1.4	.2	30	7.1	.4	.1	1.0	46	30	5	65	6.9	17
July 6.....	150	7.7	.26	9.0	3.0	1.2	.4	35	7.5	.2	.1	.9	55	35	7	77	6.8	24

SALMON RIVER AT MALONE, N. Y.

Nov. 8, 1960,,....		8.4	0.22	9.6	2.6	1.7	0.7	33	10	0.6	0.0	1.6	55	35	8	76	7.7	16
Mar. 30, 1961.....		6.8	.15	5.4	1.6	.9	.5	16	8.0	.3	.0	1.2	42	20	7	47	7.0	32

SALMON RIVER AT FORT COVINGTON, N. Y.

Nov. 8, 1960.....		7.0	0.19	14	3.8	2.2	0.8	46	15	1.5	0.1	1.6	72	51	13	109	7.3	15
Mar. 30, 1961.....		5.8	.10	9.4	2.5	1.1	.8	28	11	.6	.0	1.8	57	34	11	77	6.9	27
May 17.....		5.0	.33	15	4.2	1.8	.8	53	12	1.6	.1	2.0	75	55	12	119	6.8	19
June 7.....		5.8	.21	14	3.6	2.6	.6	52	11	1.5	.2	2.1	71	50	8	115	7.0	16
July 6.....		8.6	.18	14	4.5	2.4	.7	56	10	1.0	.1	1.7	78	54	8	117	7.6	29

LITTLE SALMON RIVER AT SKERRY, N. Y.

Nov. 8, 1960.....		7.3	0.15	7.2	1.7	1.2	0.6	18	12	0.4	0.1	0.9	48	25	10	58	6.4	26
Mar. 31, 1961.....		3.8	.11	3.2	1.4	.7	.2	88	9.0	.5	.2	.7	40	14	8	36	6.2	32
May 16.....		5.1	.17	6.4	1.4	1.0	.3	19	7.5	.8	.1	.9	40	22	7	50	6.5	24
June 7.....		6.0	.10	5.4	2.9	1.2	.1	20	7.1	.4	.1	.9	40	26	9	49	7.0	19
July 6.....		5.9	.14	5.6	2.0	.9	.2	20	5.3	.9	.1	.9	44	22	6	50	6.6	38

LITTLE SALMON RIVER AT BRUSHTON, N. Y.

Nov. 8, 1960.....		8.3	0.11	12	3.4	1.9	0.7	34	17	1.4	0.1	1.9	70	44	16	102	6.5	19
Mar. 31, 1961.....		5.4	.10	5.7	2.4	1.0	.4	16	9.5	.5	.1	6.3	48	24	11	54	6.7	24
May 16.....		5.1	.10	11	2.4	1.4	.6	32	11	.9	.1	1.9	57	38	12	86	6.8	16
June 7.....		6.4	.03	10	3.1	1.5	.5	34	9.3	1.0	.0	2.0	59	38	10	90	7.0	16
July 6.....		7.4	.13	10	3.7	1.6	.4	38	9.0	.3	.1	1.6	61	40	9	89	7.1	29

4-2702. LITTLE SALMON RIVER AT BOMBAY, N. Y.

Nov. 8, 1960.....	37.1	7.1	0.53	17	5.2	1.9	0.8	50	26	1.3	0.0	1.3	93	64	23	148	7.0	11
Mar. 30, 1961.....	600	5.2	.22	8.8	2.5	1.2	.9	27	13	.4	.2	1.2	59	33	11	81	6.9	27
May 16.....	56.0	3.1	.19	16	4.7	1.8	.8	57	14	.8	.2	1.0	80	60	13	131	6.9	11
June 7.....	46.2	4.9	.15	15	5.0	2.4	.6	60	14	.6	.2	1.5	80	51	9	129	6.9	15
July 6.....	106	7.0	.18	16	6.2	1.8	.6	68	11	.8	.2	1.2	91	66	10	143	7.2	34

MISCELLANEOUS ANALYSES OF STREAMS IN ST. LAWRENCE RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
STREAMS TRIBUTARY TO ST. LAWRENCE RIVER--Continued																		
4-2705. CHATEAUGAY RIVER NEAR CHATEAUGAY, N. Y.																		
Nov. 8, 1960.....	164	3.3	0.08	14	2.8	2.4	0.8	47	11	1.0	0.1	1.0	62	47	8	103	7.4	8
Mar. 28, 1961.....	371	4.4	.07	11	2.1	1.4	.7	34	10	.4	.0	.4	59	36	8	87	7.3	8
May 16.....	202	3.8	.51	10	1.5	1.3	.6	28	9.9	1.0	.1	.9	50	31	8	75	6.7	11
June 7.....	153	3.4	.03	8.4	3.9	1.4	.3	33	11	.8	.1	.8	50	37	10	81	7.2	8
July 6.....	138	2.4	.14	9.4	2.8	1.4	.7	34	8.4	.7	.1	.6	49	35	7	82	6.8	4
LITTLE TROUT RIVER NEAR BURKE, N. Y.																		
Nov. 8, 1960.....		8.1	0.07	11	2.8	1.7	0.7	35	12	1.0	0.0	2.0	60	39	11	91	6.8	9
Mar. 31, 1961.....		5.5	.07	4.8	2.0	.8	.4	12	11	.3	.3	.9	42	20	10	45	6.6	18
May 16.....		5.2	.07	8.3	1.7	1.3	.6	27	7.7	1.1	.1	1.3	48	28	6	70	6.8	9
June 7.....		6.2	.00	11	1.8	1.6	.5	34	8.2	.4	.0	1.7	54	35	7	84	6.7	9
July 6.....	16.8	6.7	.16	11	2.2	1.4	.2	33	9.8	.6	.1	.9	55	37	10	80	6.8	19
TROUT RIVER NEAR OWLS HEAD RANGE, N. Y.																		
Nov. 8, 1960.....		7.4	0.22	6.8	1.5	1.2	0.5	16	11	0.5	0.0	0.7	44	23	10	55	6.4	16
Mar. 30, 1961.....		5.6	.22	4.0	1.2	.7	.3	8	9.3	.2	.1	2.5	39	15	9	36	6.4	12
May 16.....		4.6	.25	6.6	.7	.9	.2	14	8.6	.5	.1	.5	36	20	8	44	6.5	24
June 7.....		5.1	.23	5.6	2.1	1.0	.1	18	9.1	.2	.1	.4	36	23	8	45	6.5	17
July 6.....		6.4	.32	5.3	1.8	.9	.2	17	7.5	.5	.1	.6	39	21	7	47	6.6	29
4-2707. TROUT RIVER AT TROUT RIVER, N. Y.																		
Nov. 8, 1960.....	39.6	7.2	0.10	18	4.4	2.3	0.8	54	21	1.5	0.1	1.2	85	63	19	136	7.4	9
Mar. 30, 1961.....	325	5.3	.09	8.6	1.8	.9	.6	24	12	.5	.0	1.0	55	29	10	73	7.0	21
May 16.....	79.4	3.0	.08	15	4.3	1.8	.7	53	13	.2	.1	.7	75	55	12	125	6.8	21
June 7.....	62.7	4.5	.05	17	4.0	2.1	.6	58	13	.8	.1	.6	79	59	12	133	7.4	9
July 6.....	73.7	4.9	.12	14	4.5	1.6	.4	54	11	.5	.2	.6	73	54	9	119	7.0	19
4-2715. GREAT CHAZY RIVER AT PERRY MILLS, N. Y.																		
Nov. 8, 1960.....	118	4.4	--	16	4.0	1.8	1.8	49	17	2.3	0.1	0.7	77	57	17	123	7.5	16
Mar. 30, 1961.....	1120	4.2	0.10	9.6	2.5	1.0	.9	28	13	.3	.0	.7	60	35	12	82	6.9	27
May 16.....	200	2.5	.13	13	3.4	1.5	1.0	46	11	1.9	.1	1.0	68	47	9	106	6.8	19
June 7.....	180	2.6	.06	17	3.2	1.4	.7	54	13	.8	.0	.5	71	56	11	116	6.8	16
July 6.....	69.0	2.6	.13	15	4.6	1.7	.8	58	9.2	1.3	.1	.9	72	57	9	121	7.2	5

STREAMS TRIBUTARY TO LAKE SUPERIOR

4-444. CARP RIVER NEAR NEGAUNEE, MICH.

July 20, 1961	70	5.2		2.0	0.13	22	5.0	4.0	2.0		75	0	15	4.0	0.2	1.9	112	76	14		171	6.9	30	6.2	67	2
Aug. 24.....	51	7.2		.39	.14	25	5.8	3.9	1.6		98	0	12	4.5	.0	.2	124	86	6		188	7.1	21	7.8	83	1

STREAMS TRIBUTARY TO LAKE MICHIGAN

4-578.5. BLACK RIVER NEAR HUMBOLDT, MICH.

July 20, 1961	1.5	3.8		0.91	0.11						8	0	3.8	1.5		2.7					36	5.6	180			
Aug. 24.....	.1	6.4		.57	.00						12	0	6.8	1.0		.4	68	14	4		36	6.3	170			2

4-578.7. LAKE LORY OUTLET (TRIBUTARY TO BLACK RIVER) NEAR REPUBLICH.

July 20, 1961	2.5	13		1.9	1.3						56	0	6.2	2.0		1.4					112	6.9	180			
Aug. 24, 1961	1.0	10		.26	.00						66	0	8.0	2.5		.5	97	50	0		123	7.3	45	8.6	92	5

4-579. BLACK RIVER NEAR REPUBLIC, MICH.

July 20, 1961	4.9	11		0.66	0.23	7.7	3.4	3.1	2.7		42	0	5.6	0.5	0.2	1.2	71	33	0		88	6.8	80			20
Aug. 24.....	1.9	7.6		.79	.09	8.2	3.5	2.4	2.0		43	0	8.8	1.2	.0	.3	72	35	0		88	7.0	42	8.8	98	5

4-579.8. BLACK RIVER NEAR GREENWOOD, MICH.

July 19, 1961	9.0	9.0		1.5	0.17						38	0	7.2	1.0		0.8					77	6.8	65			
Aug. 24.....	5.0	7.6		1.1	.15	8.6	2.9	2.0	1.5		41	0	8.0	1.0	0.0	.3	66	34	0		79	6.9	46	8.0	86	3

4-580. MIDDLE BRANCH ESCANABA RIVER NEAR ISHPEMING, MICH.

July 19, 1961	37	8.8		0.87	0.09	9.4	2.7	2.2	0.7		40	0	6.4	1.0	0.1	0.4	56	34	2		81	7.3	35	8.8	95	2
Aug. 24.....	23	9.5		.29	.01						54	0	9.2	.5		.1	72	47	3		101	7.3	25			1

4-581. MIDDLE BRANCH ESCANABA RIVER NEAR PRINCETON, MICH.

July 19, 1961	340	8.3		0.24	0.05						54	0	7.6	0.8		0.4					98	7.0	31	7.8	89	
Aug. 23.....	80	7.8		.55	.12	14	4.0	1.2	0.6		58	0	8.8	.5	0.0	.2	76	52	4		104	7.0	18	10	105	5

4-585. EAST BRANCH ESCANABA RIVER AT GWINN, MICH.

July 19, 1961	42	8.2		0.15	0.00	18	4.2	3.0	1.2		66	0	12	0.5	0.1	0.9	84	62	8		140	7.2	15	8.8	94	0.4
Aug. 23.....	34	6.4		.26	.07	18	4.0	2.2	.7		66	0	11	.5	.0	.3	81	62	8		132	7.1	15	10.1	106	2

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN ST. LAWRENCE RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1960 to September 1961

Date	Time (24 hr)	Water temperature (°F)	Discharge (cfs)	Suspended sediment	
				Mean concentration (ppm)	Discharge (tons per day)
STREAMS TRIBUTARY TO LAKE MICHIGAN					
4-578.7. LAKE LORY OUTLET NEAR REPUBLIC, MICH.					
July 24, 1961	1115		2.5	66	0.4
Aug. 24	1730		1	4	t
4-579. BLACK RIVER NEAR REPUBLIC, MICH.					
July 20, 1961	1215		4.9	12	0.2
Aug. 24	1815		1.9	5	t
4-580. MIDDLE BRANCH ESCANABA RIVER NEAR ISHPEMING, MICH.					
July 19, 1961	1720		37	3	0.3
Aug. 24	1400		23	8	.5

t Less than 0.05 ton.

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